

**January 14, 2014**

Tintina Mailing List

**RE: Decision on Application for Amendment of Tintina Alaska Exploration, Inc.  
Exploration License No. 00710, Black Butte Copper Project**

Dear Reader:

Tintina Alaska Exploration, Inc., (Tintina) has conducted surface exploration activities at the Black Butte Copper Project under Exploration License No. 00710 since September 2010. On November 7, 2012, Tintina submitted an application to amend the exploration license to gain underground access to the mineral deposit. Tintina proposes to construct an exploration decline to obtain up to a 10,000-ton bulk sample for metallurgical testing.

DEQ has conducted an environmental review on Tintina's application to amend its exploration license under the Montana Environmental Policy Act (MEPA). MEPA authorizes DEQ to prepare a mitigated environmental assessment as an alternative to preparing an environmental impact statement when the action might normally require an environmental impact statement, but the effects which might otherwise be deemed significant appear to be mitigable below the level of significance through design, or enforceable controls or stipulations or both imposed by DEQ or other governmental agencies. The environmental review culminated in the issuance of the Final Mitigated Environmental Assessment (EA) accompanying this letter.

In the Final Mitigated EA, DEQ analyzed a No Action Alternative, a Proposed Action Alternative, and an Agency Mitigated Alternative. DEQ hereby approves Tintina's application to amend Exploration License No. 00710, selecting the Agency Mitigated Alternative. As reflected in the Final Mitigated EA, DEQ has determined that all of the potential impacts of the proposed action have been accurately identified, that the impacts will be mitigated below the level of significance through project design and stipulations imposed by DEQ as reflected in the Agency Mitigated Alternative, and that no significant impact is likely to occur.

The Agency Mitigated Alternative is described in detail in the Final Mitigated EA. The Agency Mitigated Alternative contains the following modifications to Tintina's proposed amendment. These modifications become enforceable stipulations to Exploration License No. 00710. The required monitoring is to verify DEQ's determination that significant impacts to surface and groundwater are not likely to occur.

1. Tintina is required to map and isolate the subsoil cell stored in the portal pad to prevent contamination.
2. Tintina is required to have an archaeologist present during road construction in the vicinity of the prehistoric site that was identified on the proposed access road during the 2011 cultural inventory.

3. Tintina is required to conduct surface and groundwater monitoring through the closure phase and for as long thereafter as DEQ determines is necessary.
4. Tintina is required to collect representative samples of water discharged to the LAD areas on a weekly basis, and to submit these data to DEQ monthly. Required reporting values and effluent limits are specified in the following table:

Parameter	Required Reporting Value (mg/L)	Ground Water Effluent Limit (mg/L)
Nitrate + Nitrite as N	0.020	10.0
Antimony	0.0005	0.006
Arsenic	0.001	0.010
Barium	0.003	1.0
Beryllium	0.0008	0.004
Cadmium	0.00003	0.005
Chromium	0.01	0.1
Copper	0.002	1.3
Fluoride	0.2	4.0
Lead	0.0003	0.015
Mercury	0.000005	0.002
Nickel	0.002	0.1
Strontium	0.02	4.0
Selenium	0.001	0.05
Silver	0.0002	0.1
Thallium	0.0002	0.002
Uranium	0.0002	0.03
Zinc	0.008	2.0

5. If Tintina receives a preliminary laboratory report showing that a contaminant has exceeded standards, Tintina is required to notify DEQ within 3 working days and submit a corrective action plan for addressing the exceedance.
6. If contaminants from LAD are detected in surface water, Tintina is required to modify the LAD system to prevent discharge to surface water. No discharge to surface water is allowed.
7. Tintina is required to monitor groundwater and surface water in the project area at the locations and frequencies specified in Table 2 (pages 13-15) of the Final Mitigated EA, for the parameters listed in Table 3 (pages 15-16) of the Final Mitigated EA. Tintina must submit these data to DEQ in quarterly monitoring reports.
8. Although DEQ believes water treatment would not be needed while the decline is advanced through unsaturated rock, Tintina is required to have a temporary treatment plant on-site before the decline advances beyond 1,500 feet. The temporary treatment

plant must be available, in standby mode, and used at the first indication that actual development water does not consistently meet appropriate discharge standards.

9. In addition to the three monitoring wells currently installed down-gradient of the LAD area and up-gradient of the wetlands along the unnamed tributary to Little Sheep Creek (Figure 7), Tintina is required to install eight additional piezometers in the subsurface LAD area during installation of the underground LAD system. The reporting requirements for the monitoring wells and piezometers are set forth in Paragraph # 4 above. The monitoring wells are installed to verify that groundwater quality standards are not exceeded as a result of land application disposal. The eight piezometers would be used to track groundwater mounding due to water disposal and to avoid soil saturation.
10. Tintina is required to place the LAD area more than 400 ft away from any wetlands. The locations of the underground LAD drainfield lines shown on Figure 7 are conceptual. Prior to their installation, Tintina is required to use data from the monitoring wells and piezometers near the wetlands and the LAD site to finalize drainfield design locations where the applied water will infiltrate to groundwater rather than report to surface water. Tintina is required to notify DEQ prior to beginning installation of the underground LAD system so that DEQ staff can be on-site for oversight. Tintina is required to submit as built drawings of the underground LAD system to DEQ.
11. Tintina is required to line the non-acid generating (NAG) waste rock stockpile with a 60-mil geotextile. This will minimize leakage and provide additional assurance that seepage from the stockpile will not discharge to groundwater beneath the pad but would be collected and routed to the seepage collection pond. This will provide an additional level of groundwater protection in the event that NAG waste rock produces seepage that exceeds any groundwater standards. Tintina is required to maintain each of the NAG and the potentially acid generating (PAG) seepage collection ponds with the capacity to retain runoff from a 100 year, 24 hour storm event plus an additional two feet of freeboard.
12. Tintina is required to use crushed PAG materials instead of NAG materials above the gravel layer in the PAG pad during construction of the PAG pad. This would decrease the amount of PAG contaminated materials that need to be placed in the decline below the hydraulic plug at permanent closure.
13. If Tintina applies for an operating permit, Tintina is required to store PAG or PAG contaminated materials on the PAG pad covered with a low permeability material for temporary storage. Tintina is required to store PAG or PAG contaminated materials in the sulfide zone below a hydraulic plug in the decline for permanent closure.
14. Tintina is required to backfill the portion of the decline below Coon Creek (approximately 200 feet) with cemented waste rock backfill prior to allowing the decline to flood.
15. Dewatering of the exploration decline is not predicted to impact surface water flows in the Sheep Creek watershed. However, Tintina is required to monitor for groundwater

drawdown and surface water flows to verify that surface flows in the Sheep Creek watershed are not being impacted.

16. Tintina is required to install a monitoring/dewatering well at the end of the decline prior to flooding the decline.

Tintina is required to post and maintain a reclamation bond in an amount that may not be less than the estimated cost to the State to ensure compliance with the Montana Air and Water Quality Acts, the Metal Mine Reclamation Act, administrative rules promulgated under the Metal Mine Reclamation Act, and the exploration license. Within 30 days of the date of this decision, DEQ will request Tintina to submit a bond increase. Section 82-4-338(1), MCA, requires Tintina to file with DEQ a bond in the sum determined by DEQ before they can move forward with the approved activities.

The bond calculations will be on file and available at DEQ upon request.

DEQ's responses to public comments on the Draft EA and the Final Mitigated Environmental Assessment are attached.

Information on the exploration license can be obtained by writing or calling the Montana Department of Environmental Quality, c/o Kristi Ponozzo, P.O. Box 200901, Helena, MT 59620, telephone (406) 444-2813; e-mail address [kponozzo@mt.gov](mailto:kponozzo@mt.gov).

Legal actions seeking review of this decision must be filed within 90 days of the date of this decision document pursuant to Section 82-4-349(1), MCA. Pursuant to Section 75-1-201(6)(a)(ii), MCA, an action alleging failure to comply with the Montana Environmental Policy Act must be brought within 60 days of the action that is the subject of the challenge, which in this case is the date of this decision document. An applicant for amendment of an exploration license may request an administrative hearing on a denial of the application within 30 days of written notice of the denial pursuant to Section 82-4-353(2), MCA.

Warren D. McCullough  
Warren D. McCullough, Chief  
Environmental Management Bureau

1 / 14 / 14  
Date

# **Final Mitigated Environmental Assessment**

**Tintina Alaska Exploration, Inc.  
Black Butte Copper Project, Meagher County, MT  
Exploration License #00710**

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY  
ENVIRONMENTAL MANAGEMENT BUREAU

January 2014

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APPENDIX A Tintina Black Butte Copper Project, Response to Comments

## Glossary of Terms

**country rock:** rock surrounding the mineralized zone

**Darcy's Law:** an empirically derived equation that describes the flow of water through a porous medium

**decline:** a downward-sloping underground opening for access to the workings

**drift:** horizontal tunnel, excavation, or cut parallel to the mineralized zone

**ephemeral drainage:** a gulch or coulee that contains flowing water only part of the year or only during "wet" years; sometimes referred to as an intermittent drainage

**facies:** a distinctive rock unit that forms under certain conditions of sedimentation, reflecting a particular process or environment.

**gabbro:** dark, coarse-grained, intrusive mafic igneous rock chemically equivalent to basalt

**gossan:** intensely oxidized, iron bearing weathered zone overlying a sulfide deposit, formed by the oxidation of sulfides and the leaching of sulfur and metals

**Herth and Arndts:** an empirically derived equation that describes groundwater linear steady state flow

**homogeneous:** alike, consistent composition or structure; properties do not change throughout the unit

**hydraulic conductivity:** a property of soil or rock that describes the ease with which water can move thorough pore spaces or fractures.

**hydrophytic vegetation:** plant-life that thrives in wet conditions; used as an indicator of wetlands

**igneous:** rocks that have cooled and crystallized from magma (previously molten rock);

**igneous intrusion:** rocks that were previously melted, then squeezed into and between (intruded) older rocks before crystallizing; the heat and fluids from an igneous intrusion can cause country rock to become metamorphosed

**lithic scatters:** archaeological sites that consist solely of flaked stone artifacts

**lithology or lithologies:** rock type or types

**massive:** thick units of homogeneous (alike; consistent) material

**mil:** one/thousandth of an inch

**ore:** naturally occurring rock that contains an amount of minerals that can be extracted at a profit

**oxidation:** alteration of a rock by the addition of oxygen

**oxide:** mineral group that contains oxygen

**potentiometric surface map:** a map that indicates the distribution of groundwater elevations and direction of groundwater flow.

**pyrite:** an iron sulfide mineral that, when exposed to the atmosphere, may be capable of generating acid

**pyrrhotite:** an iron sulfide mineral with varying iron content that, when exposed to the atmosphere, may be capable of generating acid

**transmissivity:** a measure of how much water can be transmitted through an aquifer which is dependent on aquifer thickness and hydraulic conductivity

**sedimentary rock:** rocks formed from fragments of other rock (sediment) that are weathered, transported, deposited, and lithified (compressed and/or cemented to form rock); can also be rock that forms by chemical precipitation from water

**subsidence:** settling or collapse of the ground surface

**sulfide:** mineral group that contains sulfur; may include pyrite, pyrrhotite, or other potentially acid-generating minerals

## List of Acronyms

**ac:** Acre; a land measure currently based on the U.S. survey foot, one acre is approximately 43,560 square feet or 4,046.873 square meters.

**ARM:** Administrative Rules of Montana

**ASTM:** American Society for Testing and Materials

**cfs:** cubic feet per second is an Imperial unit/U.S. customary unit of volumetric flow rate, which is equivalent to a volume of 1 cubic foot flowing every second.

**CY:** cubic yards

**DEQ:** Department of Environmental Quality

**EA:** Environmental Assessment

**gpm:** gallons per minute.

**ICP-MS:** a type of analytical technique which is capable of detecting metals and some non metals at concentrations as low as one part in in one trillion

**LAD:** Land application disposal; refers to disposal method for produced water.

**LECO S:** a brand of carbon/sulfur combustion furnace equipped with infrared detection used for measurement of sulfur concentration in rock, soil, and organic materials over a wide concentration range.

**Ma:** Millions of years before present (as a point in time). The term for millions of years as a unit of measure is Myr.

**MEPA:** Montana Environmental Policy Act

**mg/L:** milligram per liter; approximately equal to parts per million (ppm).

**MPDES:** Montana Pollution Discharge Elimination System

**MSHA:** Mine Safety and Health Administration

**NAG:** non-acid-generating

**NP:AP ratio:** balance between the acid consumption potential and the acid production potential of a rock

**PAG:** potentially acid-generating

**ppb:** parts per billion; approximately equal to micrograms per liter ( $\mu\text{g/L}$ )

**SAP:** Sampling and Analysis Plan

**SC:** Specific conductance; an electrical measure of the amount of dissolved substances in water

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**SHPO:** State Historic Preservation Office

**TCLP:** a soil sample extraction method for chemical analysis to simulate leaching through a material for hazardous contaminants

**TDS:** Total dissolved solids; a measure of the amount of dissolved substances in water

**TKN:** Total Kjeldahl nitrogen; an analytical test that measures all forms of reduced nitrogen (ammonia, ammonium ion, and organic amines/amides including proteins) in waste water. The Kjeldahl method cannot measure nitrate or nitrite nitrogen.

**µg/L:** micrograms per liter; approximately equal to parts per billion (ppb)

## **1.0 INTRODUCTION**

On November 7, 2012 Tintina Alaska Exploration, Inc. (Tintina) submitted an exploration license amendment proposal to expand exploration activities on its Black Butte Copper Project property (Project) located about 15 miles north of White Sulphur Springs (Figure 1). DEQ reviewed the exploration license amendment application and issued deficiency letters on January 4<sup>th</sup>, and March 15<sup>th</sup>, 2013. Tintina responded to the agency's comments and submitted an amended final application on April 4<sup>th</sup> 2013 (Tintina 2013a). DEQ issued a Draft Environmental Assessment (EA) on July 15, 2013 and received public comments until August 26, 2013. This Final EA includes all comments, responses to comments, clarifications of the proposed action and additional mitigations.

The Project site is in Meagher County, and is located on the Bar Z Ranch and Hanson properties in sections 23, 24, 25, 26, 28, 32, 33, 34, 35, and 36, Township 12 North, Range 6 East; sections 19, 29, 30, and 32, Township 12 North, Range 7 East; sections 1, 2, 6, and 7, Township 11 North, Range 6 East; sections 1 and 12, Township 11 North, Range 5 East (project location) and encompasses a proposed surface disturbance area of 46.5 acres.

The purpose of the project is to expand exploration activities by constructing an exploration decline into the upper Johnny Lee copper-cobalt-silver deposit zone. It is intended that the decline would be used as access from which to conduct an underground development drilling program that would provide a more thorough understanding of the geometry and grade of the mineable resource. The decline would also provide access for the collection of a 10,000 ton bulk sample for metallurgical testing. In addition, the decline would allow for other technical investigations such as hydrologic/aquifer, water quality, geochemical characterization, and geotechnical studies to be conducted in support of future mine planning. The exploration decline and the portal pad facilities may be used in future mining operations should Tintina decide to submit an operating permit application and if that application is approved.

While the scope of this environmental assessment (EA) is limited to the impacts of the installation of an exploration decline and the subsequent reclamation of that decline, the purpose of the decline is to determine the potential for future mining of the Black Butte Copper Project property.

DEQ has jurisdiction to approve and regulate the Black Butte Copper Project under the Metal Mine Reclamation Act (MMRA) Title 82, Chapter 4, Part 3 of the Montana Code Annotated (MCA). As part of DEQ's review of the exploration license amendment application, an environmental review of the Proposed Action is required under the Montana Environmental Policy Act (MEPA) Title 75, Chapter 1, Part 2, MCA. This EA analyzes impacts of allowing the Black Butte Copper Project exploration decline as the Proposed Action.

Exploration activities at the Black Butte Copper Project have been previously approved under Exploration License #00710. DEQ currently holds a bond for the currently approved disturbances and would recalculate a required bond amount if the amendment is approved.

### **1.1 Purpose and Need of the Proposed Action**

Tintina proposes to conduct underground exploration operations at the Black Butte Copper Project north of White Sulphur Springs in Meagher County (Figure 1). The Proposed Action would produce a bulk sample for metallurgical testing. The exploration decline would provide access to the underground mineralized zone for an underground definition drilling program. Tintina would collect information to predict the environmental consequences of mining the mineral deposit in the event that Tintina decides to apply for an operating permit.

### **1.2 Authorizing Actions**

DEQ is responsible for issuing exploration licenses and approving amendments under the MMRA. The exploration license application must contain an exploration plan of operations stating the type of exploration techniques that would be used in disturbing the land. It also must include a reclamation plan in sufficient detail to allow DEQ to determine compliance with MMRA reclamation and performance requirements.

DEQ is also responsible for protecting air quality under the Clean Air Act of Montana, and water quality and quantity under the Montana Water Quality Act. The options that DEQ has for decision-making upon completion of the EA are (1) denying the application if the proposed operation would violate MMRA, the Clean Air Act, or the Water Quality Act; (2) approving Tintina's application as submitted; (3) approving the application with agency mitigations; or (4) determining the need for further environmental analysis to disclose and analyze potentially significant environmental impacts.

DEQ is responsible for calculating the amount of performance bond for reclamation of the Black Butte Copper Project exploration proposal. The purpose of the bond is to ensure the fulfillment of obligations under the MMRA and rules implementing MMRA by ensuring the availability of funds sufficient to perform reclamation in the event of default by the operator. The posting of the performance bond payable to the State of Montana is a precondition to issuance of an exploration license amendment. The amount of the bond is based upon the estimated cost to the State to ensure compliance with the Clean Air Act of Montana, the Montana Water Quality Act, and the MMRA (including the reclamation plan set forth in the exploration license).

If an exploration license amendment is approved by DEQ, then the Black Butte Copper Project would be subject to safety regulations enforced by the Mine Safety and Health Administration (MSHA). MSHA regulates human health and safety practices under the Federal Mine Safety and Health Act of 1977. The purpose of these standards is the protection of life, promotion of health and safety, and prevention of accidents. MSHA regulations are codified under 30 CFR subchapter N, part 56.

## **2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION**

This chapter describes the alternatives (potential actions) considered by DEQ including the No Action Alternative, the Proposed Action, and the Agency-Mitigated Alternative. The Proposed Action has been separated into two timeframes; the first is the installation of the decline, and the second is the closure of the decline and post closure activities. Table 1 shows the potentially impacted resources by facility under the alternatives.

**Table 1. Potentially Affected Resources by Facility**

<b>Facility</b>	<b>No Action Alternative</b>	<b>Proposed Action</b>	<b>Proposed Action during Closure and Post-Closure</b>	<b>Agency- Mitigated Alternative</b>	<b>Resource Potentially Impacted</b>
Exploration Decline	Not a component of the currently approved exploration license	Installation of a decline with conventional underground mining methods	Backfilling the decline with PAG <sup>1</sup> waste rock below the water table. NAG <sup>2</sup> waste rock would be reclaimed in place.	Water Treatment and/or disposal to LAD sites of groundwater infiltrating into the decline and collected in the NAG and PAG ponds.  Underground injection if monitoring shows decrease in surface water flow from decline dewatering  Placement of the PAG waste rock in the sulfide zone below a hydraulic plug in the decline.	Groundwater Surface Water
Support Facilities	A core shed exists and would remain for landowner use	Building roads, buildings, portal pad, sediment control structures, powder magazine, etc.	Removal of all structures not used by landowner. Reclamation of all sites using salvaged soils and then revegetation.		Vegetation and Soils
Surface Disturbance	Access roads, drill roads, and drill pads. Total disturbance to date is about 5 acres	46.5 acres of disturbance including stockpiling soils for reclamation	Reclamation of all sites using salvaged soils and then revegetation	Isolate and map stockpiled sub-soils from portal pad	Vegetation and Soils

**Table 1. Potentially Affected Resources by Facility continued**

Facility	No Action Alternative	Proposed Action	Proposed Action during Closure and Post-Closure	Agency- Mitigated Alternative	Resource Potentially Impacted
Waste Rock Storage	Not a component of the currently approved exploration license	NAG and lined PAG pads constructed for waste rock storage	Backfilling waste rock from the PAG waste rock pad and some NAG waste rock into the decline	NAG waste rock pad would be lined.  PAG waste rock pad would be covered with a low permeability material.	Groundwater
Seepage Collection	Not a component of the currently approved exploration license	Lined NAG and PAG ponds.	Remove lined ponds; restore topography.	Water Treatment and/or disposal to LAD sites	Groundwater
Land Application Disposal Area	Not a component of the currently approved exploration license	Surface LAD; Subsurface LAD	Surface LAD and Subsurface LAD until	Water Treatment and/or disposal to LAD sites  Additional monitoring wells	Groundwater

<sup>1</sup>PAG = potentially acid-generating

<sup>2</sup>NAG = non-acid-generating

<sup>3</sup>LAD = land application disposal

## **2.1 Existing Conditions**

Land uses in the Project area are predominantly agricultural, with hay and livestock production the primary activities. Outfitters and individuals use the Sheep Creek drainage for big game hunting and fishing.

### **2.1.1 Previous Exploration Disturbance**

Homestake Mining explored the property in 1973 and 1974. Cominco American, Inc. (Cominco) initiated exploration in 1976. Cominco joint ventured with BHP from 1985 through 1988. After reclaiming exploration disturbances, Cominco dropped the leases in the mid-1990s.

Approximately 66 exploration core holes were completed by Cominco and BHP.

Beginning in September 2010, Tintina drilled a total of 168 exploration holes on private land at this site and has hydraulically plugged 159. Nine drill holes remain open and are being used for hydrologic characterization. Disturbances (drill access roads and pads) to date have totaled 6.0 acres all of which have been reclaimed. The reclamation includes stockpiling of soil, hydraulic plugging of drill holes in accordance with ARM 17.24.106 to prevent aquifer cross

contamination, placement of cuttings and other drilling materials down the holes, recontouring of drill sumps, replacing soil, and revegetation. All temporary disturbances attributable to the project have been recontoured and revegetated in accordance with State requirements and seeded with a native seed mixture approved by DEQ.

Exploration drill hole abandonment/completion methods have been adopted by Tintina for all exploration drill holes to prevent cross-contamination of multiple or stacked groundwater aquifers. Exploration drill holes are plugged and abandoned from the bottom up by pumping each hole almost completely full of a bentonite grouting material containing high-swelling sodium montmorillonite clay. The upper 5-10 feet of each hole are filled with concrete. Surface well casing is either removed from the hole or cut off below ground level. If water is encountered in an exploration drill hole, a hydraulic packer is set above the point of water inflow and the remaining upper portion of the hole is filled with the grouting material and completed with a cement cap.

In addition, between September 2010 and November 2013 Tintina drilled a total of seven piezometers, twelve monitoring wells, and seven pumping wells on the property to determine groundwater levels, and to collect samples and aquifer characteristics. These wells were drilled and completed by a licensed water well driller in accordance with State regulations.

## **2.2 Proposed Action**

Tintina proposes to construct an exploration decline into the Johnny Lee copper-cobalt-silver deposit. The decline would be used as access from which to conduct an underground development drilling program that would provide a more thorough understanding of the geometry and grade of the mineable resource. The decline would also provide access for collection of a 10,000 ton bulk sample for metallurgical testing. The decline would allow for other technical investigations such as hydrologic/aquifer, water quality, geochemical characterization, and geotechnical studies to be conducted in support of future mine planning.

These studies would be used to evaluate impacts to surface water and groundwater in the event Tintina submits an application for an operating permit. In addition to underground exploration drilling and bulk sampling of the mineralized zone, Tintina expects that surface exploration drilling and hydrologic studies would continue during the proposed underground drilling phase of the exploration program. Major components of the Proposed Action are described below.

### **2.2.1 Exploration Decline**

Tintina proposes to drive an 18-foot wide by 18-foot high 5,200-foot long exploration decline to a location near the bottom of the Upper Johnny Lee mineralized deposit. Underground drill stations would be cut, and infill development drilling would be conducted from these locations. The schedule for project construction is dependent on several factors, including drill and mining crew availability. Construction would start in 2014. Development of the decline would commence immediately after site preparation and surface facilities construction activities are completed. It is anticipated that site preparation, driving the drift, and definition drilling would take from 8 to 16 months to complete.

The proposed exploration decline would be located about 8,500 feet east-southeast of Black Butte and about 3,000 feet southwest of Strawberry Butte (Figure 2). The proposed decline would be collared at an elevation of about 5,880 feet. The decline would be divided into two segments. The first 3,200-foot long segment would trend north-northwest and decrease in elevation at a grade of about 15 percent for a 480-foot elevation change. The second segment would trend more northwest, at a 1 percent decline for about 1,800 feet.

Decline construction would use conventional mining methods including drilling, blasting, rock bolting, mucking (using a loader) and underground truck haulage of mine waste to the waste rock storage areas located at the surface. Diesel powered equipment would use low emission engines complying with MSHA underground air quality regulations. The decline would be rock bolted to provide basic ground support. Shotcrete and screen mesh would be used as necessary to assist with support in areas with more intense fracturing or poor ground conditions. If pilot hole drilling in advance of the exploration decline indicates the potential for large inflows of water from water-bearing faults and/or fractures, pressure grouting techniques would be used to control the flow of water while advancing the face. Grouting of water-bearing faults and/or fractures is planned as a primary means of reducing the amount of water flowing into the decline from the maximum volume predicted by aquifer testing.

Pressure grouting involves injecting a grout material into fractured rock. The grout may be a cementitious or a solution based chemical mixture and could extend into the wallrock as much as 100 feet depending on fracturing. The purpose of grouting can be either to strengthen rock or reduce water flow through rock and is a widely accepted and standard practice in the mining industry. If large amounts of water are encountered in a pilot hole, a packer would be installed to seal the hole followed by directional grouting prior to advancing the decline. A packer is an expandable plug used to isolate sections in a borehole.

In response to comments DEQ and Tintina concluded that limiting the inflow to 100 gpm was inappropriate as a mitigation trigger. See section 4.2.2.3 for further discussion on mitigation. The predicted decline inflow rates used in the hydrologic modeling described below are 100-500 gpm. However, Tintina anticipates reducing mine inflow by as much as to 60 to 70 percent with this type of grouting program. The resulting water inflow would range between 150 to 250 gpm. This reduction in inflow is desirable so that water flow into the workings does not slow or physically interfere with the effectiveness of underground mining; it also reduces the anticipated rate of discharge to LAD systems and water treatment systems.

### **2.2.2 Support Facilities and Surface Disturbance Areas**

Surface disturbances associated with the proposed exploration decline include: access roads, a portal patio containing various support facilities, an explosives magazine, waste rock storage pads, lined waste rock seepage collection ponds, surface and subsurface land application disposal areas (LADs), a water supply well and pipeline, a water storage tank, a septic/drainfield system, soil/subsoil stockpiles, and storm water control structures and ponds (best management practices or BMPs) (Figure 3).

Support facilities on the portal patio include: an office, dry/change house, warehouse, shop/maintenance facility, construction laydown area, employee parking, fuel and lubricant

storage. Major pieces of support equipment include: an air compressor, propane heaters for winter heating of decline air, and a power supply and transformers with back-ups for on-site power generation (Figure 4).

### **2.2.3 Waste Rock Storage and Seepage Collection Support Facilities**

Temporary waste rock storage facilities would be constructed for placement of development rock generated during construction of the exploration decline. Two waste rock storage facilities are proposed, one for potentially acid-generating waste (PAG) and another for non-acid-generating waste (NAG). The combined facilities are designed to hold approximately 115,400 cubic yards (CY) (163,000 tonnes) of waste rock (Figure 5).

The PAG waste rock storage facility would be constructed on a composite compacted subgrade/geotextile bottom liner, with an internal waste rock seepage collection system. The NAG waste rock storage facility would use a compacted subgrade base with an internal seepage collection system and no geotextile liner. Seepage would be gravity fed to lined seepage collection/evaporation ponds (Figure 5).

The PAG and NAG seepage collection ponds were both designed to contain the volumes of water resulting from the average annual rainfall (17 inches) intercepted by the lined waste rock storage areas and their associated lined retention ponds, with no allowance for evaporation of water or absorption of water within the waste rock piles. In addition to these volumes associated with average annual precipitation, the ponds were also designed to retain the volumes of water resulting from a 100-year, 24-hour storm event (3.4 inches of precipitation). Both ponds, as designed, could retain these required water volumes and still have 16 to 17 percent excess capacity (Tintina 2013c).

All waste rock pad and seepage collection pond liners and associated HDPE piping would be installed by a subcontracted liner or piping specialty company. The development of a quality assurance/quality control (QA/QC) testing program, and all liner installation inspections and testing protocols would be completed by an independent third-party engineering company. After all the liners and piping are installed, the third-party engineering contractor would provide DEQ with a QA/QC liner/piping installation report to ensure proper installation of these critical components of the exploration decline plan.

Evaporation rates at the project site (34 inches per year) are approximately twice the precipitation rate (17 inches per year). Seepage from both facilities would either be treated prior to discharge or directly discharged into a surface or underground LAD system depending on the water quality and season of the year. Diversion structures would channel surface water run-on away from the waste rock facilities and into a dispersion structure.

### **2.2.4 Tintina's Plan to Avoid Water Treatment**

As the decline trends deeper it would penetrate the mineral deposit and encounter much lower permeability bedrock. Aquifer test results indicate bedrock hydraulic conductivity at this depth interval is approximately 0.015 feet/day. Calculated inflow to this lower section of the decline is about 10 to 12 gpm. The major ion chemistry of the water at the lower portion of the decline is similar to that of the shallow groundwater system, but there are several metals present at higher

concentrations including arsenic, strontium, thallium and zinc, as shown in the deep aquifer water quality test data presented below in Section 3.2.3. The arsenic concentration of 0.067 mg/L exceeds the human health standard of 0.010 mg/L and the strontium concentration of 9.3 mg/L exceeds the human health standard of 4 mg/L. All of the remaining parameters meet applicable regulatory limits with most metals present at concentrations below detection limits including cadmium, chromium, copper, mercury, nickel, selenium, silver, and thallium.

Water treatment may be required for nitrogen and arsenic (or other constituents) if grouting to reduce inflow and mixing and dilution of the two zones of the bedrock aquifer waters, is not sufficient to protect groundwater by meeting groundwater standards prior to discharge to an LAD. Treatments being considered for decline water and for PAG waste rock seepage include lime treatment and co-precipitation of arsenic with iron, reverse osmosis (RO) with thermal evaporation of brine for off-site disposal, sulfide precipitation, ceramic microfiltration, and zero discharge strategies.

The contaminated water would be managed/stored/recirculated as described in sections 2.2.4.1 through 2.2.4.4 until appropriate treatment systems are operational.

#### ***2.2.4.1 Dilution.***

Ten to twelve gpm of water from the sulfide zone that may exceed human health standards would be diluted with more than 140 gpm of groundwater from the upper zone of the bedrock aquifer so that the mixed stream meets groundwater standards and can be discharged to an underground LAD system.

The water quality of the water pumped from the decline is determined based on the final quality of mixing two waters, one from a lower zone of the bedrock aquifer with an estimated flow rate of 12 gpm, and one from an upper zone of the bedrock aquifer with a variable flow rate between 100 to 500 gpm. There are only two exceedances of ground water standards for the bedrock aquifers in the vicinity of the decline based on groundwater test results from wells PW-3 (upper aquifer) and PW-4 (lower aquifer). These exceedances are for arsenic and strontium in the lower aquifer, the only. In the lower aquifer arsenic concentration of 0.067 mg/L exceeds the human health standard of 0.010 mg/L and the strontium concentration of 9.3 mg/L exceeds the human health standard of 4 mg/L.

Given the water quality of the upper aquifer and based on simple loading calculations (flow times concentration), if the flow from the upper aquifer of 100 to 500 gpm were kept to at least 140 gpm (from a maximum predicted flow of about 500 gpm) all groundwater standards would be met for the mixed groundwater flow from the combined aquifers and could be discharged directly to the underground LAD infiltration drainfield without treatment.

Tintina predicts a reduced flow rate of 150 to 250 gpm achieved by grouting of fracture systems. Therefore, the predicted water quality of the groundwater from the decline would meet all groundwater (human health) standards. Treatment required would only be needed for suspended sediment removal and oil skimming, which would occur in underground sumps or the NAG seepage collection pond if additional sediment setting were required. Actual results and requirements for mixing would need to be verified under field testing conditions.

#### ***2.2.4.2 Seepage Collection Pond Storage.***

There would be storage capacity available in the seepage collection ponds during decline construction. The schedule for the exploration amendment would take up to 16 months to complete the decline, collect a bulk sample of the ore, and conduct the required underground development drilling.

All of the NAG waste rock (85,000 cubic yards, 42 feet deep) and PAG waste rock (30,000 cubic yards, 23 feet deep) would be loaded on the pads within 16 months. At the end of 16 months, there would no longer be any need to continue to dewater the decline, and the decline would not need to be used again unless Tintina applied for and received an operating permit. Tintina could allow the decline to flood allowing added capacity in the pond volumes available for storage. Both the PAG and NAG rock piles would be placed on prepared subgrades designed to freely drain into lined containment ponds. These constructed foundations would be lined, then would be covered with a gravel layer in which seepage collection systems (perforated pipe) would be installed to guarantee that all seepage passing through the rock piles rapidly drains into the containment ponds. This seepage collection and drainage system would prevent saturated conditions from developing within the waste rock piles.

#### ***2.2.4.3 Recirculation.***

Contaminated water can also be recirculated from the upper to lower sumps in the mine. This pumping can provide storage for a few days of inflow at 100 gpm.

#### ***2.2.4.4 Mine Flooding.***

The pumps in the underground workings could be shut off and the decline allowed to flood. Flooding of the decline would eventually reach the level of the pre-mining water table but would never discharge from the decline portal.

#### ***2.2.4.5 Water Treatment***

A portable trailer-mounted reverse osmosis (RO) treatment system would be used to treat decline water if necessary. RO is capable of extracting nitrogen compounds and arsenic. RO can also effectively remove selenium, thallium, and strontium, the other possible contaminants. Trailer-mounted RO systems are capable of handling 100 to 200 gpm and multiple units can be operated in parallel to handle higher flow volumes. RO would meet groundwater quality standards for discharge to the underground LAD systems. RO treatment creates a brine that is about 6 to 7 times more concentrated and about 10 to 15 percent or less of the total volume treated, assuming 85 to 90 percent efficiency levels. At 100 gpm, the RO unit could generate as much as 20,000 gallons per day of brine.

Brine water would be driven off by thermal evaporation and the remaining salts disposed off-site in an approved facility; alternatively, Tintina may choose to use an adsorptive medium removal system if necessary to treat the brine. Adsorptive media treatment may be suitable by itself as a stand-alone treatment method if only select metals need removal. The adsorptive medium would likely be a hydrous iron-oxide or alternatively a granular iron-oxide/titanium-oxide medium for the removal of arsenic. Various adsorptive media are available for the removal of multiple and/or

selective constituents. Adsorption media when fully loaded typically fall well below the threshold for a hazardous waste, but fully loaded media would be tested the toxicity characteristic leaching procedure (TCLP) prior to landfill disposal.

A skid-mounted bag filtration system consisting of 25 Micron and 5 Micron prefilters would also be included as part of the brine treatment system. These filters provide prefiltration of solids and adsorbed metals prior to the adsorptive medium tanks to prevent premature fouling of the media.

Both the RO and adsorptive medium treatment systems are readily available from commercial vendors and are capable of meeting discharge standards. RO systems are generally available for lease or purchase to be moved onto a site and operational within six weeks.

Tintina may modify the proposed treatment methodologies if other technologies appear to be more applicable based on actual water quality conditions encountered. Treatment will also be implemented if necessary for NAG and PAG seepage collection pond water.

### **2.2.5 Land Application Disposal Areas**

Surface and underground (infiltration) LADs are proposed for the disposal of decline inflow, NAG and PAG waste rock seepage, and storm water. Disposal of any decline water to surface LAD areas would occur via a surface drip emitter discharge system or traditional impact-type irrigation systems (e.g., Rain Bird ® brand). A major component of surface water disposal is through evapotranspiration, particularly during the spring, summer, and early fall seasons when vegetation growth and evaporation rates are high. Use of surface LAD systems would be most effective during initial dewatering when large volumes of water may need to be disposed of, as opposed to smaller sustained decline-inflows later in the exploration program.

Discharge to the underground LAD areas occurs from 600 - 2,200 feet south of the decline portal over a series of three topographic ridges (Figure 28 in Amendment Document). The potentiometric surface map in the Amendment Document (Figure 8) indicates that groundwater beneath these ridges lies from about 40 to 100 feet below the ground surface. Discharges in the underground drainfield infiltration LAD areas would be introduced from 4 to 6 feet below the surface in highly fractured bedrock with high infiltration rates (i.e. average 32 feet/day).

The potentiometric surface map also indicates flows to the east north-east in this area, not to the north in the direction of the decline collar. Therefore, most of the LAD water introduced would move downward and to the ENE. The decline collar lies some 170 feet above the water table, and along the decreasing grade (-15 percent) of the decline, the water table does not rise to intersect the existing workings until about 1,700 north of the portal, so there is little chance of LAD applied water to reenter the active mine workings. Rather the groundwater would be pumped from the bedrock aquifer in one place in the Sheep Creek drainage and discharged to shallow but highly permeable fractured bedrock further south in the same drainage basin. The LAD groundwater would mix with the regional groundwater as the water moves downgradient into the basin.

Valves would be installed at all solid/perforated pipe junctions (Figure 28, Amendment Document) in the system to allow for switching of discharge between individual zones, to prevent saturation, and allow for periods of rest between infiltration cycles. Eight new

piezometers would be installed in the various cells of the underground LAD system. Therefore, the zones of the system can be rotated and switched to different geographic areas within the LAD area as frequently as necessary to eliminate the risk of individual zone saturation and the creation of newly generated surface seeps and springs downgradient of the underground LAD infiltration drainfield. Baseline conditions would be measured before initial use of the underground LAD system, and daily monitoring of piezometers in the zones of active discharge would be conducted. The frequency of measurements would be adjusted pending the results of the monitoring.

Because water needs to be disposed of on a year-round basis, large area underground drainfield systems would be constructed to dispose of water below the frost level during winter months, returning water to the shallow fractured bedrock system. Tintina has conducted shallow and deep percolation testing to identify areas suitable for drainfield disposal scenarios (Section 4.2.5.2). The areas proposed for surface and underground infiltration drain-field LAD sites as well as the infiltration test sites are illustrated on Figure 6. A description of the testing is provided in Section 2.5.2 of the Amendment to Exploration License 00710 (Tintina Alaska Exploration, Inc. 2013). Within these areas, Tintina would discharge to up to two surface and one underground LAD systems that have excess capacity for handling anticipated decline water. Tintina has applied for an underground injection control (UIC) permit from the Environmental Protection Agency (EPA). The EPA would determine if a UIC permit is required.

Discharge to the underground LAD areas would occur from 600 – 2,200 feet south of the decline portal over a series of three topographic ridges (Figure 6). Discharges in the underground drainfield infiltration LAD areas will be introduced from 4 to 6 feet below the surface in highly fractured bedrock with infiltration rates averaging 32 feet/day. The groundwater will be pumped from the bedrock aquifer in one place in the Sheep Creek watershed and discharged to shallow but highly permeable fractured bedrock a little further south in the same drainage basin. The LAD water will mix with the regional groundwater as the water moves downgradient into the basin.

Tintina proposes to construct about 4,800 lineal feet of infiltration drainfield trenching that could be capable of infiltrating of as much as about 1,800 gpm (Figure 6). However Tintina proposes to control mine dewatering requirements to about 150 – 250 gpm which means that water disposal requirements could require as little as 8 percent to as much as 14 percent of the entire system at any given time to dispose of the required water volume. This means that the system could be divided up into 7 to 12 segments that could be operated independently to dispose of the entire amount of water required. Each of the perforated line segments can be switched on or off independent of other perforated lines. Valves would be installed at all solid/perforated pipe junctions (Figure 6) in the system to allow for switching of discharge between individual zones, to prevent saturation, and to allow for periods of rest between infiltration cycles.

The active zones of the LAD system can be rotated and switched to different geographic areas within the LAD area as frequently as necessary to eliminate the risk of individual zone saturation and the creation of newly generated surface seeps and springs down-gradient of the underground LAD infiltration drainfield. Up to eight new piezometers would be installed in the various cells

of the underground LAD system. Tintina has stated that these piezometers could be used to collect groundwater chemistry data. Baseline conditions would be measured before initial use of the underground LAD system, and daily monitoring of water levels in piezometers in the zones of active discharge would initially be conducted. The frequency of measurements could be adjusted pending the results of the monitoring.

### **2.2.6 Monitoring and Mitigation Plans**

Monitoring is necessary to verify that the required mitigations are effective in maintaining the environmental impacts below the level of significance.

#### **2.2.6.1 Dust Control and Air Monitoring**

Tintina would implement dust control measures on high traffic areas along access roads that can create dust. Waste rock stockpiles would be watered to minimize dust while loading or unloading material. Monitoring by site personnel during each shift would minimize the effects of dust at the site.

The ambient air monitoring station west of the core shed would remain operational during the period of exploration decline construction and evaluation. The station was established to accurately characterize the local meteorology and collect baseline data.

An Air Quality Permit has been submitted for the construction and operations of the Project's exploration decline. On November 18, 2013 DEQ issued the Preliminary Determination on Permit Application 4978-00 and proposed to issue the permit with conditions to Tintina.

#### **2.2.6.2 Surface Water and Groundwater Monitoring**

Tintina continues to monitor water resources for the proposed exploration decline under the existing water monitoring plan (Table 2). Eleven surface water stations have been established as baseline monitoring sites (Figure 6). Flow, stage, and field parameters (temperature, pH, and specific conductance [SC]) are monitored quarterly at these sites. Water quality samples are collected quarterly at six of the surface water stations and seven groundwater monitoring wells.

Thirteen seeps and springs are monitored annually. Tintina installed a stilling well with a transducer as a gauging station near the bridge over Sheep Creek (near SW-1) on the north end of the property. This station was monitored and field checked against a staff gauge on the bridge to begin establishing a hydrologic rating curve for in-stream flow. Data from both the rising and falling limb of the hydrograph were captured in the spring of 2013. SW-1 has been monitored quarterly for water quality (including temperature) and flow since May of 2011.

**Table 2 Proposed and Agency-Mitigated Water Monitoring Plans**

<b>Surface Water</b>			
<b>Monitoring Site:</b>	<b>Parameter suite* (F, L, WL)</b>	<b>Monitoring Frequency</b>	<b>Agency-Mitigated</b>
SW-1	F, L	quarterly	
SW-2	F, L	quarterly	
SW-3	F, L	quarterly	F monthly
SW-4	F	quarterly	F monthly
SW-5	F, L	quarterly	
SW-6	F, L	quarterly	monthly
SW-7	F	quarterly	
SW-8	F	quarterly	
SW-9	F	quarterly	
SW-10	F	quarterly	
SW-11	F, L	quarterly	
<b>Springs, Seeps, Gossan</b>			
SP-1	F, L	annually	Flow monthly
SP-2	F, L	annually	Flow monthly
SP-3	F, L	annually	Flow monthly
SP-4	F, L	annually	Flow monthly
SP-5	F	annually	
SP-6	F, L	annually	Flow monthly
SP-7	F	annually	
DS-1	F	annually	
DS-2	F, L	annually	F, L twice per year
DS-3	F	annually	Flow monthly
DS-4	F, L	annually	Flow monthly
DS-5	F	annually	
DS-6	F	annually	
G-1	F	annually	
G-2	F	annually	
<b>Groundwater – monitoring wells</b>			
MW-1A	WL, F, L,	quarterly	WL monthly
MW-1B	WL, F, L	quarterly	WL monthly
MW-2A	WL, F, L	quarterly	WL monthly
MW-2B	WL, F, L	quarterly	WL monthly
MW-3	WL, F, L	quarterly	WL monthly
MW-4A	WL, F, L	quarterly	WL monthly
MW-4B	WL, F, L	quarterly	WL monthly
MW-5A (proposed)	WL, F, L	quarterly	WL monthly
MW-5B (proposed)	WL, F, L	quarterly	WL monthly

**Table 2: Proposed and Agency-Mitigated Water Monitoring Plans continued**

<b>Groundwater – monitoring wells continued</b>			
<b>Monitoring Site:</b>	<b>Parameter suite* (F, L,WL)</b>	<b>Monitoring Frequency</b>	<b>Agency-Mitigated</b>
MW-6A	WL, F, L	quarterly	WL monthly
MW-6B	WL, F, L	quarterly	WL monthly
MW-7	WL, F, L	quarterly	WL monthly
MW-8	WL, F, L	quarterly	WL monthly
<b>Groundwater Pumping or Observation wells – Hydrologic testing</b>			
PW-1 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
PW-2 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
PW-3 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
PW-4 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
PW-5 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
PW-6 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
PW-7 (pumping well)	Not currently sampling		F, L quarterly; WL monthly
SC11-032 (Observation)	Not currently sampling		WL monthly
SC11- 09 (Observation)	Not currently sampling		WL monthly
SC11-031 (Observation)	Not currently sampling		WL monthly
SC12-116 (Observation)	Not currently sampling		WL monthly
<b>Groundwater - Piezometers</b>			
PZ-1	WL	quarterly	
PZ-2	WL	quarterly	
PZ-3	WL	quarterly	
PZ-4	WL	quarterly	
PZ-5	WL	quarterly	
PZ-6A (proposed)	WL		monthly
PZ-6B (proposed)	WL		monthly
PZ-7A	WL		monthly
PZ-7B	WL		monthly
PZ-8 (proposed)			monthly
PZ-9 (proposed)			monthly

**Table 2: Proposed and Agency-Mitigated Water Monitoring Plans continued**

<b>Groundwater – Piezometers continued</b>			
<b>Monitoring Site:</b>	<b>Parameter suite* (F, L,WL)</b>	<b>Monitoring Frequency</b>	<b>Agency-Mitigated</b>
UG LAD piezometers (up to 8)	WL, L	Daily water level initially, then weekly water levels in the active zones of the LAD. L quarterly for at least 5 piezometers	
Surface LAD piezometers (3)	WL	weekly water levels (initially when in use)	
<b>Mine Water</b>			
Decline Water	F, L	Monthly (quarterly eventually)	
NAG pond water	F, L	Monthly (quarterly eventually)	
PAG pond water	F, L	Monthly (quarterly eventually)	
Discharge to LAD			F, L weekly

\*Parameter Suites:

F = field parameters (stream flow or stage, water temperature, dissolved oxygen, pH, SC)

L = Laboratory Analyses (See Table 3-1)

WL = water level

The parameter list, detection limits and analytical methods are included in Table 3. Monitoring would continue through development of the exploration decline, and evaluation of the mineral deposits from underground, including any closure intervals.

**Table 3. Parameters, Methods, and Detection Limits for Baseline Environmental Assessment**

<b>Parameter</b>	<b>Analytical Method<sup>1</sup></b>	<b>Required Detection Limit(mg/L)</b>
<b>Physical Parameters</b>		
Total Dissolved Solids (TDS)	SM 2540C	10
<b>Common Ions</b>		
Alkalinity	SM 2320B	4
Sulfate	300.0	1
Chloride	300.0/SM 4500CL-B	1
Fluoride	A4500-F C	0.1
Calcium	215.1/200.7	1
Magnesium	242.1/200.7	1
Sodium	273.1/200.7	1
Potassium	258.1/200.7	1
<b>Nutrients</b>		
Nitrate+nitrite as Nitrogen (N)	353.2	0.01

**Table 3. Parameters, Methods, and Detection Limits for Baseline Environmental Assessment continued**

Parameter	Analytical Method <sup>1</sup>	Required Detection Limit(mg/L)
<b>Trace Constituents (SW - Total Recoverable except Aluminum [Dissolved], GW - Dissolved)<sup>2</sup></b>		
Aluminum (Al)	200.7/200.8	0.03
Antimony (Sb)	200.7/200.8	0.003
Arsenic (As)	200.8/SM 3114B	0.003
Barium (Ba)	200.7/200.8	0.005
Beryllium (Be)	200.7/200.8	0.001
Cadmium (Cd)	200.7/200.8	0.00008
Chromium (Cr)	200.7/200.8	0.001
Cobalt (Co)	200.7/200.8	0.01
Copper (Cu)	200.7/200.8	0.001
Iron (Fe)	200.7/200.8	0.03
Lead (Pb)	200.7/200.8	0.0005
Manganese (Mn)	200.7/200.8	0.005
Mercury (Hg)	245.2/245.1/200.8/SM 3112B	0.00001
Molybdenum (Mo)	200.7/200.8	0.005
Nickel (Ni)	200.7/200.8	0.01
Selenium (Se)	200.7/200.8/SM 3114B	0.001
Silver (Ag)	200.7/200.8	0.0005
Strontium (Sr)	200.7/200.8	0.1
Thallium (Tl)	200.7/200.8	0.0002
Uranium (U)	200.7/200.8	0.0003
Zinc (Zn)	200.7/200.8	0.01
Stream Flow	HF-SOP-37/-44/-46	NA
Water Temperature	HF-SOP-20	0.1 °C
Dissolved Oxygen (DO)	HF-SOP-22	0.1 mg/L
pH	HF-SOP-20	0.1 s.u.
Specific Conductance (SC)	HF-SOP-79	1 µmhos/cm

<sup>1</sup> Analytical methods are from *Standard Methods for the Examination of Water and Wastewater* (SM) or EPA's *Methods for Chemical Analysis of Water and Waste* (1983).

<sup>2</sup> Samples analyzed for dissolved constituents field-filtered through a 0.45 µm filter.

Tintina would initially monitor water quality monthly for the decline water, seepage from the waste rock pads, and seepage collection ponds. The frequency of sampling may be adjusted depending on results. Daily records of LAD discharge volumes and locations would be maintained. Three piezometers would be installed in the two surface LAD areas and eight in the underground LAD cells. In addition to collecting baseline water level data, piezometers would be monitored weekly for measurement of saturation levels within individual LAD cells. Weekly monitoring would continue until trends are established that may suggest a change in the required frequency of sampling. Tintina would complete the piezometers with well head protection and collect samples for water quality from at least five of the piezometers on a quarterly basis. A greater frequency of sampling would be conducted if deemed necessary by DEQ.

Samples would be analyzed for the groundwater suite (Table 3). In addition, two new piezometers would be installed in seeps located downgradient of the underground LAD areas. The proposed underground LAD system would have a four-fold capacity to accommodate the maximum estimated 500-gpm flow from the underground workings. A pair of downgradient wells would be monitored for potential impacts to shallow alluvial or deeper bedrock groundwater. Weekly inspections would be conducted to document potential saturation of soils and prevent surface ponding or downslope seepage.

DEQ would take results of monitoring during exploration activities and use that data to select monitoring sites, analytical parameters, and frequency of monitoring during the post-exploration period.

### ***2.2.6.3 Ore and Waste Rock Testing***

Water quality can be affected by mining when acid-forming minerals such as pyrite react with oxygen and water to generate more acid than the other minerals in the rock can neutralize, and when metals are released by weathering or acidification. Black Butte Copper has used several geochemical methods to test for potential water quality impacts related to its proposed Johnny Lee decline.

#### ***Static Test***

Multi-element tests of rock composition using inductively coupled plasma mass spectrometry (ICP-MS) were used to evaluate whole rock metal content during the exploration process, and served as a statistical basis for sample selection. Static testing methods were used to evaluate both acid generation and metal release potential. Static testing, which refers to analysis at a fixed point in time, differs from kinetic testing which measures changes in oxidation and solute release over time. The Acid Base Accounting (ABA) and Net Acid Generation (NAG) pH methods were used to evaluate potential for acid generation. The EPA method 1312 Synthetic Precipitation Leach Procedure (SPLP) was used to evaluate potential metal mobility.

#### ***Kinetic Test***

Kinetic testing is used to further evaluate static testing of ore and waste rock. The most common form of kinetic testing uses a humidity cell. Humidity cell tests are designed to mimic weathering at the laboratory scale in a controlled fashion. The test determines the rate of acid generation, and the variation over time in leachate water quality and thus allows development of mitigating strategies. As the acid rock drainage generating and neutralizing minerals leach away, the mineralogy of the leach sample will change. In net acid materials, the neutralizing minerals become depleted relative to the acid producing sulfides, and in net alkaline materials, the sulfide is consumed before the alkalinity is depleted. The relative rate of these changes is studied by the investigator, and understanding of the mineralogy as well as the intended application of the results is required for meaningful interpretation.

The standard humidity cell test is conducted at the bench scale. The sample is subjected to alternating cycles of dry and moist air to simulate precipitation cycles, after which the sample is rinsed with deionized water. The water percolates through the sample and is then collected. This

leachate is analyzed for a number of parameters indicative of sulfide oxidation and neutralization, including pH, sulfate, acidity, alkalinity, conductivity and metals (including Ca and Mg). A suite of metals is also analyzed at detection limits suitable to the regulatory jurisdiction of interest, at least 16 to 24 weeks, but often longer when potential for depletion of alkalinity is uncertain.

#### Acid Base Accounting Test

Sulfide minerals in waste rock, particularly pyrite, react with water and oxygen to produce sulfuric acid ( $H_2SO_4$ ), which can be neutralized by minerals capable of consuming acid, such as calcite. The ABA test measures the relative acid production and neutralization properties of a mine waste material based on the conservative assumption that all sulfide is present in a rock as pyrite and will oxidize, releasing acidity. The acid base accounting test quantifies the acid production potential (AP) and neutralization potential (NP) of a sample in units of tons  $CaCO_3$  / kiloton of rock (Sobek et al. 1978), allowing calculation of the net neutralization potential (NNP) as NP less AP and the neutralization potential ratio (NPR) as NP divided by AP (INAP, 2012). The ABA test uses a relatively complete digestion of finely ground rock, and therefore conservatively estimates the reactivity of available sulfide minerals.

To determine neutralization potential, a sample is treated with excess standardized hydrochloric acid (HCl) at ambient temperatures for 24 hours. The remaining acid is titrated with a standardized base to pH of 8.3 after the test is complete to allow the calculation of calcium carbonate equivalent for acid consumed. This study used the modified Sobek method of ABA analysis, which uses a fizz test to adjust the amount of acid used in alkalinity titration.

Review of the sulfur-bearing minerals indicates that both sulfide and sulfate minerals occur within the Black Butte Copper deposit. Sulfur was therefore fractionated to identify the sulfide, acid soluble and insoluble sulfate, and residual sulfur fractions. Total sulfur was determined by LECO S, and total sulfate sulfur was measured by analysis of the carbonate soluble sulfur fraction. Sulfide was then calculated by subtracting total sulfate from total sulfur. Acid insoluble sulfate was calculated by subtracting the HCl-soluble sulfate from the total sulfate. Barium was determined by x-ray fluorescence was used to calculate the amount of barite present. Potential acidity (AP) was calculated based on sulfide sulfur for this study.

The NNP and NPR are used by regulatory agencies to assess acid generation potential of rock samples based on the criteria shown in Table 4. Samples falling in the “uncertain” category require kinetic testing using humidity cells to evaluate whether they would generate acidic leachate over an extended period of weathering. For this project, however, Black Butte Copper conservatively elected to test all waste rock materials using kinetic methods, even those which did not fall into the “uncertain” category”.

Results of the baseline geochemistry study for the 2012 decline suggest that 70 to 80 percent of the 135,000 tonnes of rock to be removed during construction would be non-acid-generating with a low potential to release metals. The rock from the decline would be selectively handled and placed into waste rock facilities based on NAG and PAG designations.

Initial Results of geochemical testing described below indicated three units ( USZ, 0/1 SZ, and IG lithologies) would be acid-generating or release metals such that they should be handled as PAG (Tintina 2013).

Net Acid Generation pH Test

The net acid generation pH (NAG pH) test is designed to avoid the potential bias built into the assumptions that the ABA method relies on. The ABA method assumes that all sulfide is acid generating pyrite and that carbonate is the only acid-neutralizing agent in rock. Neither of these assumptions is strictly true. In the NAG pH test, a sample of rock is ground and oxidized with hydrogen peroxide, and neutralized by all available minerals. The resulting pH indicates whether the rock is potentially acid-generating or not. A pH value less than 4.5 indicates that the rock is potentially acid-generating. (INAP, 2012)

Geochemical criteria dictate that a final NAG pH greater than 4.5 and/or a NP:AP ratio above 3 would indicate non-acid-generating (NAG) material and would distinguish NAG from potentially acid-generating (PAG) material for selective handling purposes.

Static testing would be conducted frequently during the decline construction and underground exploration drilling program.

During installation of the decline geochemical sampling and analysis would be conducted to confirm the NAG classifications of lithotypes based on drill samples. This sampling would guide placement of potentially acid generating waste rock during decline development. The selective handling criteria in Table 4 were developed to identify waste rock to be placed on the NAG facility and to provide additional information for future geochemical studies for the potential future mining operations. The waste rock characterization and management program has three levels of additional analyses during the exploration decline program.

<b>Lithotype*</b>	<b>% tonnage</b>	<b>Designation</b>	<b>Criteria</b>	<b>Justification</b>	<b>Add. Data<sup>1</sup></b>
<i>Ynl 0 (Lower Newland Unit 0)</i>	6	NAG	lithology	NAG pH > 4.5, NP:AP > 3, low metals	Confirmation sampling
<i>Ynl B (Lower Newland Unit B)</i>	26	NAG	lithology	NAG pH > 4.5, NP:AP > 3, low metals	Confirmation sampling, static analysis
<i>Ynl (Lower Newland Formation)</i>	41	NAG	Operational NAG > 4.5	NAG pH > 4.5, NP:AP > 3, low metals	Mapping, static analyses

**Table 4. Selective Handling Criteria Black Butte Copper continued**

Lithotype*	% tonnage	Designation	Criteria	Justification	Add. Data <sup>1</sup>
<i>0/1 SZ (Sulfide zone at the top of Lower Newland Formation)</i>	5	PAG	lithology	nd <sup>2</sup>	Mapping, none
<i>IG (Igneous intrusive)</i>	<1	NAG <sup>4</sup>	lithology	Elevated SPLP metals	Mapping, none
<i>USZ (Upper Sulfide Zone)</i>	11	PAG	lithology	NAG pH < 4.5 NP:AP < 3	none
<i>Copper Ore</i>	10	PAG	lithology	nd	none

1 See detailed testing plan below

2 nd – not determined

3 Subsequent tests indicate that the Ynl is unlikely to be acid generating (Enviromin, Inc. 2013a).

4 Igneous intrusive rock may leach heavy metals and will be stored on the PAG pad

Note: Sub 0 SZ and Copper Ore were not included in the baseline geochemistry study for the decline

\*All lithologies listed in the table, with the exception of IG, are units within the Lower Newland Formation.

#### NAG Confirmation Sampling.

Tintina would confirm baseline results through collection of additional samples for static analyses during construction of the decline. Samples would be collected from each lithology and subjected to further analyses including onsite NAG pH and development of composites for additional metal mobility testing. The frequency of sampling and analysis will be based on the results of the ongoing kinetic test work.

1. One composite of each delineated NAG lithologies (*Ynl 0, Ynl, Ynl B, and IG*) would be archived for both metal mobility and kinetic humidity cell testing.
2. Testing of the Lower Newland Formation (*Ynl*) to confirm apparent NAG status, and identify any PAG sub-samples if they exist. Following reclassification of the one outlier USZ sample in April 2013, and the analysis of 20 additional Ynl samples, the Ynl does not appear to have a PAG fraction that will require sub-handling. Tintina will continue to monitor rock in this unit for such potential, however, using the following NAG confirmation sampling protocol:
  - a. Detailed geologic mapping of the Ynl would be performed to define sulfide distribution and locate zones of sulfide enrichment, relative to stratigraphic markers of relevance to potential future mining operations. Sedimentary or structural features controlling sulfide occurrence would be identified to guide selective handling. Ynl samples were collected for static analyses to represent the observed variation in lithotype.
  - b. These samples would be screened initially, with all rock having sulfides identified visually sent for handling as PAG. Any rock not identified as

PAG would be subjected to screening level testing using the NAG pH test method at a frequency of sampling to be determined based on results of current kinetic testing.

- c. The samples would be conducted every 200 feet (25 samples) for the entire 5,000 ft of the decline.

*In-situ monitoring of water quality in decline and on NAG/PAG waste rock pads*

Water quality would be monitored on or near the waste rock pads or the discharge to the seepage collection ponds, and in the decline, over a period of years, to evaluate changes in chemistry due to weathering of exposed and blasted rock. NAG and PAG waste rock pad seepage, and pond water quality results would be analyzed as an in-situ field scale pilot test of ARD potential and metal mobility. Results of this in situ work would be used to scale future kinetic test results that would be conducted during the baseline geochemistry program for a future potential mine. Also, analysis of mineral products of weathering would be performed for both run of mine NAG and PAG.

Data collected as a part of the decline sampling program would be considered as part of the site-wide geochemistry baseline study for the proposed potential mine.

***2.2.6.4 Soil Testing***

Stockpiled soil would be tested before respreading to identify what, if any, deficiencies or limitations in soil physical and chemical properties might affect plant growth. Appropriate fertilizer, liming, organic matter, and other amendments would be determined prior to use for reclamation.

***2.2.6.5 Weed Control***

Tintina completed the Black Butte Copper Project Weed Mitigation and Management Plan in November 2013 (Tintina 2013d) and Meagher County Weed District approved the plan on November 18, 2013. DEQ will inspect the site for revegetation and the presence of noxious weeds regularly.

***2.2.6.6 Cultural Resources Protection***

Cultural resources were surveyed in areas likely to be within the area of influence of surface disturbances related to exploration decline operations. One cultural resource site lies within the proposed disturbance area. It was recommended that an archaeologist be present during road construction in the vicinity of this site if construction were approved. Future areas proposed for disturbance would be surveyed for cultural resources prior to disturbance.

***2.2.6.7 Wetland Delineation***

A baseline wetland survey delineated wetland areas in the Project area. Tintina has a surface water and groundwater monitoring network in place that would be used to monitor drawdown effects and verify that wetlands are not impacted. Tintina would implement mitigation if necessary to prevent adverse impacts to wetlands in these areas. Mitigation can be implemented either through grouting controls to reduce exploration decline inflows, or through re-infiltration

of groundwater to the shallow bedrock aquifer in an intervening area to limit the extent of drawdown effects.

#### ***2.2.6.8 Sediment Mitigation***

Sediment would be generated from non-vegetated disturbance areas, including the exploration decline portal patio or access roads during periods of high rainfall or snowmelt. Sediment transport into area streams would be minimized by maintaining BMPs consisting of berms and/or silt fences along the perimeter of the water supply pond and along the access road. All storm water controls would be constructed prior to or in conjunction with soil stockpiling.

#### ***2.2.7 Reclamation Plan***

After the exploration decline and drilling are completed, either temporary or permanent closure plans would be implemented. Temporary closure may be necessary if Tintina applies for an operating permit for a mine. The following description of site reclamation is focused on final reclamation of the exploration decline site, its support facilities, and other disturbance. At the end of the exploration decline project, Tintina would meet with DEQ and review the approved closure plan. Any proposed revisions to the plan would be submitted to DEQ in writing for its review and approval. Tintina would initiate closure and reclamation activities within four years of the completion of the exploration decline. An extension of the four-year time frame could be requested from the DEQ if appropriate (e.g. reclamation may be deferred pending potential approval of an operating permit [ARM 17.24.103(1)(d)]).

Section 5.4 of the Amendment Application contains detailed descriptions of Tintina's plan to reclaim the PAG and NAG ponds and pads, and the LAD system.

##### ***2.2.7.1 Land and Road Use After Exploration***

Land uses at the decline site would remain primarily grazing, recreation, and wildlife habitat. Tintina would reclaim the disturbances to these land uses. Reclamation activities would stabilize the site, minimize erosion, and provide a self-sustaining plant community.

The Sheep Creek and Black Butte roads would remain for public access, while roads such as the access road to the decline on private property would either be reclaimed or left open at the request of the landowner. Reclamation of private exploration roads would recontour the road to blend with existing topography followed by soil placement and reseeding.

##### ***2.2.7.2 Solid Waste and Facility Disposal***

Should a decision be made that the project would not be advanced after exploration work is completed, all buildings except the core shed along Sheep Creek Road would be removed. All infrastructure at the decline site not needed for use by the landowner would be dismantled and removed. Building materials, aboveground piping and other infrastructure would be recycled or disposed of at an approved facility. Concrete foundations would be broken up, leveled, and buried on the portal patio site. All exposed rebar would be cut off. The concrete would be buried with a minimum of three feet of fill material.

Following removal and/or salvage of facilities, any remaining solid waste would be disposed of in accordance with Montana and Meagher County laws and regulations. Valuable inert waste such as steel, wood, or plastic would be sold to scrap dealers for recycling. The regraded fill would be covered with 15 inches of subsoil and 6 inches of topsoil and seeded.

### ***2.2.7.3 Decline and Portal Pad Closure***

All mobile equipment and utilities (air, ventilation, and electrical lines, including pumps) would be removed from the underground workings. The PAG and some of the NAG waste rock would be backfilled in the decline below the water table. At closure, the decline would be densely backfilled in the area under Coon Creek to limit future fracturing of overburden over the decline and to limit any potential for subsidence in the decline.

The surface of the portal patio would be stripped of potentially contaminated PAG material from hauling between the portal and the PAG pile. This material would be placed underground, below the projected water table at closure. The mine would be allowed to flood as PAG backfill is placed with a gradual retreat of the pumps as the fill is placed. Flooding of the decline would eventually reach the level of the pre-mining water table but would never discharge from the decline portal.

A geotechnical engineer would evaluate the rock quality data for the first 250 feet of the decline to determine the risk of collapse of the underground workings that might result in surface subsidence. If there is risk of subsidence, additional ground support at closure would be installed to eliminate the risk. Alternatively, a longer section of workings could be backfilled with NAG waste rock until stable conditions are reached. It is proposed to close the portal with a cemented NAG waste rock backfill for at least the first 25 feet of the underground workings to prevent access to the underground workings and limit surface subsidence.

The portal patio fill slope material would be used to backfill the cut at the back of the patio. Excess material would be blended to a final reclamation slope of 2.5 to 3:1. The perimeter of the reclaimed site would be graded to blend with surrounding topography. A stabilized drainage would be re-established. Stockpiled soil would be placed over the regraded surfaces and the area seeded.

### **2.3 Agency-Mitigated Alternative**

Components of the Agency-Mitigated Alternative are summarized below and discussed at length in Section 4.2. To minimize potential impacts to groundwater, additional mitigations and monitoring would be required. The Agency-Mitigated Alternative does not involve any major changes to facility location or design.

DEQ would require Tintina to map and isolate the subsoil cell stored in the portal pad to prevent contamination.

DEQ recommends an archaeologist be present during road construction in the vicinity of the prehistoric site that was identified on the proposed access road during the 2011 cultural inventory.

In addition to Tintina's proposed monitoring of decline water and waste rock seepage, DEQ would require weekly sampling of water discharged to the LAD system to confirm that discharged water meets applicable water quality standards (Table 2).

DEQ had determined the need for an in-place treatment plant prior to starting dewatering of the decline. Although DEQ believes water treatment would not be needed while the decline is advanced through unsaturated rock, DEQ would require Tintina to have a temporary treatment plant on-site before the decline advances beyond 1,500 feet where the decline is anticipated to reach groundwater. The temporary treatment plant would be available, in standby mode, and would be used at the first indication that actual development water would not consistently meet appropriate discharge standards.

Three monitoring wells have been installed down-gradient of the LAD area and up-gradient of the wetlands along the unnamed tributary to Little Sheep Creek (Figure 7). These monitoring wells would verify that groundwater quality standards are not exceeded as a result of land application disposal. Tintina proposed eight additional piezometers in the subsurface LAD area for the purpose of tracking groundwater mounding due to water disposal and to avoid soil saturation. The additional piezometers would be installed during the installation of the underground LAD system.

The LAD area would be more than 400 ft away from any wetlands. The locations of the underground LAD drainfield lines shown on Figure 7 are conceptual and prior to their installation DEQ would require that the data from monitoring wells and piezometers near the wetlands and the LAD site be used to select drainfield locations that would avoid impacts to wetlands and surface water. Tintina must notify DEQ prior to beginning installation of the underground LAD system so DEQ staff could be on-site for oversight. Tintina would be required to submit as built drawings of the underground LAD system.

DEQ would require that the NAG waste rock stockpile be lined with a 60-mil geotextile. This would minimize leakage and provide additional assurance that seepage from the stockpile would not discharge to groundwater beneath the pad but would be collected and routed to the seepage collection pond. This would provide an additional level of groundwater protection in the event that NAG waste rock produces seepage that exceeds any groundwater standards. DEQ would require Tintina design and maintain each of the NAG and PAG seepage collection ponds with two feet of freeboard.

DEQ would require that Tintina use crushed PAG materials instead of NAG materials above the gravel layer in the PAG pad during construction of the PAG pad. This would decrease the amount of PAG contaminated materials that need to be placed in the decline below the hydraulic plug at permanent closure.

DEQ would require Tintina to store PAG or PAG contaminated materials on the PAG pad covered with a low permeability material for temporary closure. DEQ would require Tintina to store PAG or PAG contaminated materials in the sulfide zone below a hydraulic plug in the decline for permanent closure.

DEQ has determined that surface water impacts would be below the level of significance. Any surface water impacts, including reductions in flow seeps and springs, would be an indirect result of impacts to groundwater. The mitigations to ultimately protect surface water are discussed in various sections in this document including surface water, groundwater, wetlands, and seeps and springs.

DEQ would require mitigations to ensure that dewatering the exploration decline does not impact surface water flows in the Sheep Creek watershed. DEQ and Tintina have agreed on a mitigation that relies on; monitoring for groundwater drawdown and surface water flows. A potential mitigation if surface water flow reduction occurs would be to discontinue dewatering the decline, or inject water into the bedrock aquifer underlying the Sheep Creek alluvial aquifer downgradient of the decline.

DEQ would require that Tintina install a monitoring/dewatering well at the end of the decline prior to flooding the decline.

Tintina would be required to conduct surface and groundwater monitoring through the closure phase and for as long thereafter as DEQ determines is necessary.

Please see the following sections for further clarification of the reasons why DEQ has determined the mitigations for groundwater would reduce impacts to below the level of significance.

#### 2.3 Agency Mitigated Alternative

##### 2.2.6.2 Surface Water and Groundwater Monitoring

##### 3.2.1.4 Hydrologic Evaluation and Predicted Inflow/Dewatering Volume

##### 4.2.2.2 Groundwater Proposed Action

##### 4.2.2.3 Groundwater Agency Mitigated Alternative

##### 4.2.3.2 Wetland and Riparian Areas Proposed Action

##### 4.2.4.2 Surface Water Proposed Action

##### 4.2.4.3 Surface Water Agency Mitigated Alternative

### **2.4 Alternatives Considered But Dismissed**

Two other decline portal locations were evaluated. One was located in the NE/4, NE/4 of Section 24 and the other was in the center of the N/2 of Section 25. Although these declines were shorter in length, they intercepted higher amounts of sulfide-bearing rock, would cause support facilities to be spread out over a greater geographic area, and have greater visual impacts than the Proposed Alternative. In addition, the two other portal locations did not have suitable LAD areas nearby. The two other portal locations, therefore, were not carried forward for detailed analysis.

The footprint of the disturbance area has been minimized by placing the support facilities and waste rock pads and seepage collection ponds as physically close as possible to the decline portal. Because alternative locations would have resulted in more widespread disturbance, they were not considered in detail.

### **3.0 AFFECTED ENVIRONMENT**

### **3.1 Geological Resources**

The copper-cobalt-silver (Cu-Co-Ag) deposits of Black Butte occur in middle Proterozoic sediments of the Belt Supergroup (Zieg and Leitch, 1993). During this period, a deep water basin, the Helena Embayment, was formed. Calcareous shale (Newland Formation) was deposited in the eastern part of this basin. The northern boundary of the Helena Embayment is located along the southern flank of the Little Belt Mountains north of White Sulphur Springs, Montana.

The Newland Shale hosts the Black Butte Copper massive sulfide deposits, and consists of a lower shale-dominated section, which measures approximately 2,500 feet in thickness and an upper carbonate-dominated section which measures approximately 1,150 feet thick.

#### **3.1.1 Deposit Type**

The Black Butte Copper bedded sulfide accumulations are shale-hosted, sulfide deposits formed from subaqueous hydrothermal vents on the Precambrian sea floor. These sulfide deposits are concentrated as several discrete, continuous, and laterally extensive stratigraphic layers.

The sulfide deposits are associated with hydrothermal vent fields that were present during deposition of the host shale. The hydrothermal vent fields are localized at structural intersections developed during prolonged extensional faulting along the northern margin of the Helena Embayment.

#### **3.1.2 Mineralization**

Copper-cobalt mineralization is located in bedded layers within the calcareous shale of the Lower Newland Formation. In the Project area north of the Black Butte fault, four separate beds of massive sulfide deposits occur within the Upper Sulfide Zone (*USZ*). *USZ* stratigraphic horizons are separated by conglomerate lenses or cut into separate structural blocks by northeast trending, down-to-the-southeast normal faults. One of the massive sulfide deposits, the Johnny Lee Upper Zone (*JL-UZ*), is the target for additional underground exploration drilling and sampling. With the exception of its higher copper content, the overall structure of the Johnny Lee Upper Zone is typical of the *USZ* throughout the Black Butte Copper Project area.

The *JL-UZ* consists of several beds of fine-grained pyrite as much as 285 feet thick. These beds contain as many as three different copper-bearing horizons. These beds may also contain cobalt (Co), nickel (Ni), and arsenic (As)-rich material.

While most of the waste rock to be removed would be non-acid producing, the sulfide rock containing the copper mineralization could be acid generating. The amount of potentially acid generating waste rock is estimated at 20-30 percent of the total amount to be removed from the decline. In addition to the potentially acid generating waste rock, there would be a small percentage of igneous intrusive waste rock that may have the potential to leach heavy metals. Igneous intrusive rock with the potential to leach metals would be stored on the PAG pad.

#### **3.1.3 Geochemistry**

The copper deposits to be explored would be the Johnny Lee Upper and Lower Zones. These zones contain copper and smaller amounts of silver and cobalt. The Johnny Lee Upper Zone copper mineralization lies in the *USZ*, which is hosted by the Proterozoic Lower Newland

Formation in calcareous shale. The *USZ* is enclosed in shale, dolostone and conglomerate of the Lower Newland Formation. Above the *USZ* are thin, locally discontinuous beds of massive sulfide. At various locations in the Newland Formation there are narrow dikes and sills of intrusive igneous rock.

The exploration decline would have the following purposes:

- Facilitate underground exploration drilling of the Upper and Lower Johnny Lee Zones,
- Extract a bulk sample of up to 10,000 tons of the Johnny Lee Upper Zone for metallurgical testing, and
- Collect hydrogeologic, geochemical, and geotechnical data in support of potential mine plans.

The decline location and routing were chosen to intercept a minimum of potentially acid-generating sulfide rock. A total of 115,400 CY of waste rock is expected to be produced. Out of this total 70 percent is anticipated to be non-acid-generating with a low potential to release metals. The rock from the decline would be selectively handled and placed into waste rock facilities based on NAG and PAG designations. A series of core holes were drilled along the decline alignment specifically to evaluate the materials to be mined during construction of the exploration decline.

### **3.1.3.1 Geochemical Baseline Study**

The geochemical baseline study identified five dominant lithologies that were selected for characterization, these included the following (relative percent of the total volume of each lithology to be mined is shown in parentheses): upper sulfide zone (*USZ*, 16 percent), igneous dikes (*IG*, 1 percent), and three sub units of the lower Newland formation host rock (*Ynl*) – including a dolomite (*Ynl 0*, 6 percent); undifferentiated (*Ynl*, 41 percent) and basal conglomerate (*Ynl B*, 26 percent). From these various lithologic units, 228 samples were initially collected for geochemical characterization.

Results of static and metal mobility tests for 61 samples tested indicated that the *Ynl* units are unlikely to generate acid or significant concentrations of metals. The EPA Synthetic Precipitation Leaching Procedure (SPLP) test results also indicated that the *USZ* and *IG* units have potential to release some metals, including iron, aluminum, chromium, and selenium. However, one sample that was originally classified as undifferentiated *Ynl*, was subsequently reclassified as *USZ* based on updated stratigraphy. This uncertainty, together with improved geological understanding of the local variation in sulfide mineralization close to the *USZ* contact, led to the analysis of 20 additional samples of *Ynl* at the request of the Montana DEQ. Two-hundred-forty-eight drill core sample intervals were chosen from thousands of drill hole intervals that had been analyzed for total metals. These 248 samples were selected based on statistical analyses of sulfur, iron, arsenic, and zinc content for static acid-base accounting and metal mobility testing.

Sixty-one samples from the various lithologies representing the full range of observed sulfur, iron, arsenic, and zinc chemistry in the vicinity of the decline were tested for acid generation potential using the modified Sobek and NAG pH methods. From these 61 samples, seven

composite samples were created for metal mobility testing using the SPLP and to test for the presence of asbestiform minerals using polarized light microscopy (PLM). The results of these analyses are described by Enviromin in its *Black Butte Copper Project Baseline Environmental Geochemistry Evaluation 2012 Johnny Lee Decline Report*, dated March 20, 2013, and *Results of Additional Ynl and USZ Static Geochemical Testing* memo to Tintina, dated June 7, 2013. The results of all ABA and NAG static tests are summarized briefly below.

<b>Lithology</b>	<b>Whole Rock Total Element Analyses</b>	<b>Static Test Samples</b>	<b>Metal Mobility Composites</b>
<i>IG</i>	15	8	1
<i>USZ</i>	14	13	2
<i>Ynl</i>	195	27	2
<i>Ynl 0</i>	17	6	1
<i>Ynl B</i>	7	7	1
<b>Total</b>	<b>248</b>	<b>61</b>	<b>7</b>

Figure 8 summarizes the results of the baseline acid base accounting work, which shows that the rock to be mined from the Upper Sulfide Zone (*USZ*) is potentially acid generating, while the waste rock lithologies to be mined from the various subunits of the lower Newland (*Ynl*, *Ynl 0*, *Ynl B*) and igneous dikes that cross cut the lower Newland locally (*IG*) are not. No asbestiform minerals were found. Due to the metal mobility release potential suggested for the *IG* by SPLP testing the *IG* would be handled as PAG.

Humidity cell testing, (a kinetic test designed to simulate accelerated weathering conditions in a laboratory) has been conducted on composite samples of *USZ*, *Ynl 0*, *Ynl* and *Ynl B*. These kinetic tests are designed to confirm static test results and evaluate the rates of net acid production and metal release resulting from sulfide oxidation and neutralization due to long term weathering. Results of the kinetic tests reported after 24 weeks of leaching indicated no production of acid leachate by any of the tested rock, in spite of obvious evidence of sulfide oxidation by all of the *Ynl* lithologies except the *Ynl 0* dolomite. These results are consistent with the static results, which indicated presence of both sulfide and abundant neutralization potential (Enviromin 2013c). The *USZ* and *Ynl 0* kinetic tests were discontinued after 24 weeks because DEQ and Enviromin agreed that the *USZ* would eventually generate acid, and that there was no potential for the *Ynl 0* to generate acid. Testing of the other two kinetic cells, *Ynl* and *Ynl B* were continued through week 44 and do not vary significantly from previous results (Enviromin 2013e). The results confirm that *Ynl* and *Ynl B* are non-acid generating and would be handled as NAG.

Leachate from the kinetic tests was analyzed for a suite of metals at suitable detection limits, and indicated that only selenium and thallium would be released by weathering of these rock types. Selenium was detected at concentrations below groundwater standards in early weeks in all

lithotypes. Thallium was also detected in concentrations that typically exceeded the groundwater standard in the *USZ* and *Ynl* effluent in early weeks of testing, but not in the *Ynl O* or *Ynl B*.

Based on results of the humidity cell tests obtained through 20 weeks, and in consultation with Montana DEQ, Enviromin Inc. recommended termination of the *USZ* and *Ynl O* columns and continued testing of the *Ynl* and *Ynl B*. As the *USZ* contains locally massive sulfide mineralization, which may exceed available neutralization potential over time, and will be processed operationally to remove sulfide to obtain the copper resource, the unprocessed *USZ* has been designated as PAG and removed from further kinetic testing; any future testing of this material will focus on characterization of tailing produced by flotation of the copper-bearing sulfides from *USZ* bulk sample to be collected during work in the evaluation decline. The *Ynl O* test was terminated due to strongly neutral pH and lack of sulfide oxidation and metal release by this dolomite unit. The *Ynl* and *Ynl B* tests were continued to address evidence of ongoing sulfide oxidation in spite of strongly neutral pH (above 7.4). Weeks 40 and 44 do not vary significantly from previous results. Ultimately, the results of the *Ynl O*, *Ynl* and *Ynl B* kinetic tests should be compared with monitoring of water quality from the NAG stockpile and seepage collection pond to correlate the laboratory data with field data.

The proposed exploration license amendment plan includes storage of PAG in a lined storage area and NAG waste rock in an unlined storage area. About 30 percent of the waste rock is projected to be PAG, with the other 70 percent being NAG. The majority of the *USZ* ore stored on the PAG pad is ultimately going to be removed for operational processing, with removal of more than 80 percent of the sulfide. If a bulk sample is removed for metallurgical testing, the mineralized rock would be temporarily stored in the PAG area until it is hauled to the testing facilities. The *USZ*, because of its risk of acid generation, and the *IG*, because of its potential for metal mobility, would be placed on the PAG waste rock pad. The other units would be placed on the NAG pad because of their low risk of acid generation and metal release.

### ***3.1.3.2 Waste Rock Seepage Water Quality and Treatment***

The decline location was chosen based on exploration drilling to intercept a minimum of potentially acid-generating sulfide rock when compared with other possible sites. A total of 115,400 CY of waste rock is expected to be produced. Out of this total 70 percent is anticipated to be non-acid-generating with a low potential to release metals. The rock from the decline would be selectively handled and placed into waste rock facilities based on NAG and PAG designations based on geologic information from test holes drilled along the proposed alignment of the exploration decline and upon the results of baseline static and kinetic waste rock characterization testing of representative samples. Additional operational static sampling will be conducted during the mining of the decline to verify initial geochemical observations, rock type characteristics and as a test to screen waste for placement of rock in the appropriate in waste rock storage facilities. A description of additional screening of NAG and PAG rock during the construction of the decline is presented in Section 2.2.6 Monitoring and Mitigation Plans, subsection NAG Confirmation Sampling.

A description of the NAG and PAG waste rock pads with waste storage stacking layouts, and their respective seepage collection ponds, including their footprint areas and storage capacities are discussed in Section 2.2.3. Leachate forming from infiltration of precipitation through waste rock on the pads reports through a seepage collection system above the pad liner to the respective seepage collection pond prior to being discharged or treated and discharged to the underground LAD system.

As stated above, leachate from the kinetic tests was analyzed for a suite of metals at suitable detection limits, and indicated that only selenium and thallium release are associated with weathering of the *Ynl*, *Ynl 0* and *Ynl B*. Selenium was detected at concentrations below groundwater (human health) standards in early weeks in all lithotypes. Thallium was detected in concentrations that typically exceeded the groundwater (Human Health) standard in the *USZ* (*the mineralized zone*) during weeks 0 and 1, and *Ynl* effluent in early weeks of testing (weeks 0, 1, and 2), but not in the *Ynl 0* or *Ynl B*. Thallium concentrations dropped and have stayed below the Groundwater Standard for both the *USZ* and *Ynl* during the remainder of the 36 weeks (Enviromin 2013d) following the early detections. Early detection of metals that subsequently and rapidly drop off is often attributed to rinsing of previously formed oxidation by-products from the samples during the initial simulated weathering cycles.

Predicting the water quality of seepage accumulation in the collection ponds requires looking at the water balance relations between pads and ponds. The only form of moisture available for leaching of wastes on the pad comes from rain or snowfall. However, precipitation falls on both pad and pond pairs at the same time, and therefore there is significant dilution of the leachate draining from the pads by rainwater that has already collected in the ponds. Based on the footprints of the pads and pond this dilution is about 92 percent (almost 1:1) in the NAG pond and about 75 percent in the PAG pond. Going back to the exceedance calculations presented above and adjusting the concentration of the resulting water in the seepage collection ponds by this dilution factor results in no exceedances in the groundwater standard for Selenium and exceedances for Thallium in Week 1 only for the *Ynl* NAG material (calculated concentration 0.003 with standard of 0.002 mg/L for Thallium). Therefore, based on the predicted chemistry of the NAG seepage collection pond meeting all groundwater standards, water from this pond would likely be able to be discharged directly to the LAD without treatment.

Leachate from the PAG cell humidity test showed week 0 exceedances of the groundwater standard for As (measured 0.01mg/L, standard 0.01 mg/L), Pb (measured 0.0413 mg/L, standard 0.015 mg/L), Ni (measured 1.15 mg/L, standard 0.1 mg/L), and Tl (measured 0.0112 mg/L, standard 0.002 mg/L) and an exceedance of the surface water standard in week 0 for Al. By week 1 however, thallium equaled the standard at (0.002 mg/L) and the other metals were all below the groundwater standard. If the same dilution model for seepage collecting in the PAG pond is used, only with a 75 percent multiplier for dilution by rainwater in week 0, only Pb, Ni, Tl, and Zn exceed the groundwater standard, and there are no groundwater exceedances by week 1. As stated above, early detection of metals that subsequently and rapidly drop off is often attributed to rinsing of previously formed oxidation by-products from the samples during the initial simulated weathering cycle. It may be necessary to treat PAG seepage collection pond water for the metals listed for week 0 above, prior to discharge to an LAD system. Water quality

sampling of the PAG pond water will occur on a weekly basis when it becomes necessary because of accumulated volume to discharge water from the pond. Routine treatment could be eliminated if it were found to be unnecessary based on actual chemical analysis of the water. It may also be possible to dilute the PAG pond water with decline water to meet the groundwater standards prior to discharging.

PAG rock loading onto the pad will likely not occur in any significant volume until about 11 months into the proposed 16 month construction schedule. This is because the first four months are allotted to surface work and then the actual mining of the decline is estimated to take about 12 months. However, almost all of the PAG rock will be mined from the last 2000 feet of the 5000 foot long decline and should require about 40 percent of the total mining time or about 5 months.

#### ***3.1.3.3 NAG Seepage Quality from Humidity Cell Tests***

Thallium is the only metal exceeding groundwater standards, in week one effluent value from the *Ynl* humidity cell with a calculated concentration 0.003 and a standard of 0.002 mg/L. Based on the predicted chemistry of the NAG seepage collection pond meeting all groundwater standards, water from this pond may be able to be discharged directly to the LAD without treatment.

#### ***3.1.3.4 PAG Seepage Quality from Humidity Cell Tests***

PAG rock loading onto the pad will likely not occur in any significant volume until about 11 months into the proposed 16 month construction schedule.

The water balance for the NAG and PAG systems is the sum of water reporting to the respective NAG and PAG ponds and represents the total amount anticipated from each pad for disposal to the underground LAD system (Tintina Resources 2013c). Seepage from the pads and water collecting in the ponds from the sum of both the annual precipitation (on both pads and ponds) and the 100 year 24 hour storm event is calculated to be 1,352,982 gallons per year (3,706 gallons per day or 2.5 gpm) from the PAG pond, and 2,384,384 gallons per year (6,532 gallons per day or 4.53 gpm) from the NAG pond. Only the PAG water will need treatment (2.5 gpm); however, even if both seepage collection ponds were to require treatment the combined flow volume would average about 7 gpm. In addition, a system that would be required to treat the estimated (100 gpm to 500 gpm range) decline discharge of 150 gpm plus the total seepage collection pond volumes would only need to treat about 157 gpm on average.

#### **3.1.4 Climate**

The Western Regional Climate Center maintained two weather stations in the vicinity of the Project area beginning in the late 1940s and mid-1960s until the early to mid-1980s. More recent data are available from a station located in White Sulphur Springs from 1978 through 2005. Temperatures could be expected to be somewhat lower at the Project area due to its greater elevation compared to the weather stations. Recent monthly data from the station located in White Sulphur Springs ranges from an average low of 12 degrees F in January to an average monthly high of 81 degrees F in July.

Precipitation data from the station nearest to the project area (6.5 miles southeast and about 700 feet lower in elevation) show an average annual precipitation of about 16 inches from 1949 through 1981. Further away at White Sulphur Springs annual precipitation averaged about 13 inches between 1978 and 2005. The annual snowfall is considerably different at these two stations with 83 inches historically falling at the station closest to the Project area while only 37 inches was measured in White Sulphur Springs. It is difficult to determine whether the apparent difference in snowfall is due to the different location (Black Butte area is much closer to the Little Belt Mountains) and/or the different period of record for each of the weather stations. Annual snowfall at the Project area likely falls within the reported range for the two weather stations. Annual evaporation rates for the Project area are believed to be between 35 and 40 inches per year as reported by the two stations closest to the site that have evaporation measuring capability, Canyon Ferry Lake (40 miles away) and Montana State University in Bozeman (80 miles away).

## **3.2 Hydrological Resources**

### **3.2.1 Groundwater**

The proposed exploration decline would penetrate dolomitic and silicic shales of the Newland Formation. The shale bedrock formations have a thin colluvial cover over most upland areas, but are overlain by thicker Tertiary deposits along the flanks of the major drainages. Quaternary alluvial deposits are present beneath the stream channels and along the axis of the drainages. Limited historical information on the hydrogeology of the decline area is available; however artesian flow from drill holes has been observed in the Sheep Creek Valley (RMI, 2010).

#### ***3.2.1.1 Summary of Monitoring and Pumping Wells***

An initial set of paired monitoring wells (MW-1A and MW-1B) was installed for baseline groundwater monitoring in June 2011 (Figure 6 and 7). These wells were completed immediately upgradient of the Sheep Creek hay meadows in the unconsolidated Tertiary clayey gravel deposits (alluvial aquifer) and in the underlying upper zone of the bedrock groundwater system. A second set of paired monitoring wells (MW-2A and MW-2B) was completed in November 2011 near Coon Creek in unconsolidated clayey gravels (alluvial aquifer) and the underlying shallow zone of the bedrock aquifer. Monitoring well MW-3 was completed in November 2011 near the proposed terminus of the exploration decline within the mineralized zone. A third set of paired monitoring wells (MW-4A and MW-4B) was completed in May 2012 in the hay meadow field north and east of the proposed decline area and near Sheep Creek. The wells were installed in the shallow alluvial gravels and the shallow zone of the bedrock aquifer to provide baseline data between the Project area and Sheep Creek.

In November 2013 Tintina installed four new wells (MW-6A, MW-6B, MW-7 and MW-8) near the proposed underground LAD area. The purpose of these monitor wells was to characterize groundwater beneath the LAD area, evaluate the potential for groundwater/surface water interaction, and establish baseline water quality. One well (MW-6A) is completed in the alluvial aquifer and the other three wells are completed in the shallow zone of the bedrock aquifer.

In addition to the monitoring wells, four test wells (a.k.a. pumping wells) have been installed to provide information on the hydrologic characteristics of the lower zone of the bedrock aquifer.

Two of the test wells (PW-1 and PW-2) were installed in November 2011 and two additional test wells (PW-3 and PW-4) were installed in March 2012. Water level and water quality data were collected at these locations during testing; however, these wells are not routinely monitored during quarterly baseline monitoring events. Water level data have also been collected from various exploration boreholes during hydrologic testing at PW-1, PW-2, PW-3, and PW-4.

### ***3.2.1.2 Summary of Baseline Groundwater Quality***

Groundwater in the shallow alluvial aquifer wells and in shallow zone of the bedrock aquifer wells is calcium/magnesium bicarbonate type water with near neutral pH and moderately low dissolved solids. One exception is well MW-1B, which has a calcium/magnesium sulfate type water with a lower pH range (6.2 to 6.5) and moderate dissolved solids (338 to 416 mg/L). The water quality at MW-1B is similar to MW-3 and test well PW-4, both of which are completed in the sulfide zone.

Wells completed in the shallow unconsolidated overburden deposits (alluvial aquifer) include MW-1A, MW-2A, and MW-4A. These wells have neutral pH water (7.2-7.4) with low to non-detectable concentrations of dissolved metals. MW-1A periodically exhibits variable water quality with some excursions of arsenic, barium, iron, lead, manganese, and thallium above the human health standards. Well MW-1A is screened in fine-grained sediments and has high turbidity present in the water during sampling events. Monitoring events where metals are detected at higher concentrations at this well may reflect breakthrough of particulate through the filters due to the high turbidity.

Wells completed in the shallow zone of the bedrock aquifer above the Upper Sulfide Zone include MW-2B, MW-4B, and test wells PW-1, PW-2, and PW-3. Dissolved trace constituents that are present at detectable concentrations in the shallow bedrock wells include arsenic, barium, iron, manganese, strontium, thallium, and uranium. Water quality at test wells PW-1, PW-2, and PW-3 exceeds the secondary drinking water standards for iron (0.3 mg/L) and manganese (0.05 mg/L). Neither of these secondary standards is currently listed in Montana's October 2012 Circular DEQ-7. The concentration of thallium at MW-2B (0.0031-0.0036 mg/L) exceeds the human health standard of 0.002 mg/L. Thallium concentrations at the other shallow bedrock wells do not exceed regulatory limits. Monitoring wells MW-7 and MW-8, completed in the LAD area, exceeded antimony standards during the first sampling event. All other parameters in the shallow aquifer meet applicable regulatory limits.

While thallium is also present at detectable concentrations in MW-3 and PW-4, it does not exceed the human health standard. All of the sulfide zone wells exceed the secondary drinking water standard for iron, and MW-1B and PW-4 also exceed the secondary drinking water standard for manganese.

Wells completed in the lower zone of the bedrock aquifer (MW-3 and PW-4) have the highest concentrations of dissolved solids and sulfate compared to the other wells. As previously discussed MW-1B has similar water quality to these sulfide zone wells. The pH of water at these sulfide zone wells ranges from 6.2 to 7.1 which is slightly lower than other wells. Dissolved trace constituents that are present at detectable concentrations in the sulfide zone wells include

arsenic, barium, cobalt (MW-1B only), iron, manganese, mercury, nickel, strontium, thallium, and uranium. Strontium concentrations are elevated (9.3 to 16.2 mg/L) at MW-3 and PW-4 and exceed the human health standard of 4 mg/L. Arsenic concentrations at MW-1B, MW-3 and PW-4 range from 0.054 mg/L to 0.067 mg/L. In the first quarter of 2013 well MW-2B had an arsenic concentration of 0.018 mg/L and exceeded the human health standard of 0.010 mg/L. Arsenic speciation of samples from MW-1B and MW-3 indicate that the majority of the arsenic is present in reduced form as As (III). Concentrations of thallium at MW-1B (0.0133 mg/L) also exceed the human health groundwater standard of 0.002 mg/L.

### 3.2.1.3 Potentiometric Surface

Potentiometric water level data from November 2013 were compiled and show a north eastward trending groundwater flow direction in the bedrock groundwater system (Figure 9). Paired wells MW-1A and MW-1B have a strong downward gradient during all monitoring events with a head differential between the two wells of 15 to 21 feet. All the other paired monitor wells have a slight upward gradient (Table 6).

Only monitoring wells completed in the bedrock aquifer were used to create the potentiometric surface map. Water level elevation data for monitoring wells completed in the various alluvial aquifers (MW-1A, MW-2A, MW-4A, and MW-6A) is included in Table 6 below, but was not used to create Figure 9.

**Table 6. November 2013 Water Level Elevations**

Well Name <sup>1</sup>	Screen Interval (ft bgs)	Ground Surface Elev. (ft amsl)	Measuring Point Elev. (ft amsl)	Static Water Level (ft bmp)	Water Level Elevation (ft amsl)
<b>Monitoring Wells</b>					
MW1A	25-34	5635.81	5637.73	2.34	5635.39
MW1B	88-98	5636.14	5637.90	23.02	5614.88
MW2A	52-62	5743.72	5745.31	42.27	5703.04
MW2B	70-80	5743.44	5745.53	42.20	5703.33
MW3	285-305	5760.06	5762.17	44.20	5717.97
MW4A	14-23	5610.12	5612.12	5.58	5606.54
MW4B	39-59	5610.07	5612.07	5.08	5606.99
MW-6A	5-15	5680.08	5681.87	9.04	5672.83
MW-6B	40-50	5683.41	5685.31	12.18	5673.13
MW-7	40-50	5747.48	5749.46	32.32	5717.14
MW-8	70-80	5809.10	5810.93	30.79	5780.14
<b>Test Wells</b>					
PW1	140-211	5912.07	5913.74	103.64	5810.10
PW2	132-112	5793.08	5794.88	67.45	5727.43
PW3	90-127	5655.21	5657.42	13.30	5644.12
PW4	200-239	5678.13	5680.01	54.09	5625.92

ft bgs = feet below ground surface  
ft amsl = feet above mean sea level

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ft bmp = below monitoring point  
<sup>1</sup> see Figure 7 for well location

#### ***3.2.1.4 Hydrologic Evaluation and Predicted Inflow/Dewatering Volume***

The exploration decline can be divided into three sections for hydrologic evaluation purposes. Based on water level data from existing wells, the first 1700 feet of the decline, which decrease at a slope of about 15 percent, will be above the regional water table and should generate minimal water during mining.

The decline would drop below the water table over the next 1200 feet (from 1700 to 2900 feet in from the portal to a depth of about 435 feet below the collar elevation of the decline) where test wells encountered moderately fractured bedrock conditions. Aquifer test results indicate a hydraulic conductivity for this upper zone of the bedrock aquifer at this depth interval of approximately 1.5 feet/day. The majority of the groundwater inflow to the decline is expected to occur over this interval with total inflows estimated to range from approximately 175 to 614 gpm (Herth and Arndts, and Darcy's Law estimates respectively) assuming no fracture grouting. Inflow is expected to be largely from individual fractures, fracture systems or faults from the shallow bedrock groundwater system.

As the decline is driven deeper it penetrates the mineralized zone and encounters more competent and much lower permeability bedrock of the lower zone of the bedrock aquifer, and the predicted rate of groundwater inflow decreases significantly. Aquifer test results indicate a hydraulic conductivity for the lower zone of the bedrock aquifer of approximately 0.015 ft/day, more than 100 times less permeable than the overlying upper zone of the bedrock aquifer. Calculated inflow to this lower section of the decline is about 10 -12 gpm. This portion of the decline slopes at about 1 percent from about 3200 to 5000 feet in from the portal to a maximum depth of about 480 feet below the collar of the decline, as it gradually cuts through and then comes in below the sulfide-bearing mineralized zone.

Therefore, the lower zone of the bedrock aquifer has the lowest hydraulic conductivity, the upper bedrock unit has a hydraulic conductivity that is at least 100 times greater than the lower unit, and the Sheep Creek alluvial aquifer has a hydraulic conductivity that is in turn 140 times greater than the upper zone of the bedrock aquifer. Calculated inflow from the shallow zone of the bedrock aquifer ranges from 175 to 614 gpm and the calculated inflow from the deeper zone of the bedrock aquifer ranges from 10 to 12 gpm. Therefore, predicted decline inflows would range from 185 gpm to 626 gpm without any fracture flow grouting.

#### ***Aquifer Testing -Analytical Modeling and Draw-Down Analysis***

An initial aquifer test was completed for the project which used open core holes to conduct preliminary tests (Tetra Tech 2011a). The test was designed to provide, for planning purposes, a rough estimate of water volumes that might be expected during development of the ore deposit in a future permitting action. The values obtained from this suggest, as a preliminary estimate, that water volumes as large as 400 to 600 gpm might be expected to be produced from the mined deposit zone during production, but are inconclusive due to the limited number of holes for this testing purpose.

A more rigorous aquifer testing program was designed to refine the earlier estimate of the likely water production (Hydrometrics 2012b). This testing utilized the previously installed well pair

MW-1A and MW-1B as observation wells and MW-2A, MW-2B, and MW-3 that were installed in conjunction with the aquifer test program. Pumping wells PW-1 and PW-2 were also installed for an aquifer test for an earlier conceptual decline location. Based on the pump tests for PW-1 and PW-2, steady state decline inflows between 160 and 500 gpm were predicted.

The most recent aquifer assessment for the proposed decline location was completed in 2012 and included installation of two new wells (PW-3 and PW-4) (Hydrometrics 2013). In addition two existing exploration holes (SC12-116 and SC12-117) were also used as observation wells (Figure 7). Forty-eight hour pumping tests were conducted at test wells PW-3 and PW-4 to establish aquifer characteristics for the bedrock units that would be encountered along the path of the proposed exploration decline. Aquifer test results were analyzed using AQTESOLV (v.4.01) to calculate aquifer transmissivities, hydraulic conductivities, and storage coefficients. Analyses were performed using several analytical solutions including the Theis (1935) solution for confined aquifers, the Theis recovery solution, the Hantush-Jacob (1955) solution for leaky confined aquifers and the Moench (1984) dual porosity solution for fractured rock systems.

Both PW-3 and SC12-116 yield similar hydraulic conductivity estimates for the PW-3 pumping test of the upper zone of the bedrock aquifer, with estimated hydraulic conductivity values ranging from 1.1 to 2.2 feet/day, and calculated inflow rates of 100 to 500 gpm. The analysis of PW-4 drawdown of the lower zone of the bedrock aquifer yielded hydraulic conductivity estimates of approximately 0.01 to 0.02 feet/day, and calculated inflow rates of 10-12 gpm.

Depression of the local groundwater table would develop along the lineal north-south trend of the decline as a result of mine dewatering. A draw-down analysis was conducted for the decline using AnAqSim, an analytical element modeling software package, to provide another estimate of rates of groundwater inflow into the proposed decline. These analytical solutions yield generalized predictions representing average inflow rates over time and are based on a large scale analysis of flow through the bedrock system. The model is capable of evaluating draw-down relationships in both the bedrock and the Sheep Creek alluvial aquifers. The model domain encompasses an area of approximately 4.5 square miles and includes the reach of Sheep Creek to the east, adjacent to the project area; and extends approximately a mile south and west of the exploration decline facilities. This model uses porous media solutions, which are appropriate for regional bedrock models and bedrock that is highly fractured. If fractures are more discrete and are not well connected a porous media solution can over predict drawdown extent. Other limitations of this model are as follows:

- The results were based on steady state solutions that would tend to predict greater drawdown than may occur during the time it would take to drive the decline (two years).
- Alluvial groundwater flow entering the model area was not incorporated into the model. This additional alluvial inflow, if it were included in the model, would further limit the actual amount of drawdown in the Sheep Creek alluvial aquifer.
- Return flows from re-infiltration of mine water via the LAD system discharge to groundwater were not simulated.

These limitations result in very conservative (high) drawdown predictions, particularly in outlying areas at the margins of the model domain.

The results of the hydrologic investigation were used to develop the decline inflow analysis. The potentiometric data from the investigation indicate that the initial 1700 feet of the decline is likely to lie above the regional water table. The model assumed a hydraulic conductivity of the shallow bedrock aquifer of 1.5 feet per day based on aquifer test result at test well PW-3 which is completed near Coon Creek adjacent to the exploration decline. Hydrologic characteristics at test well PW-3, are assumed to be representative of the next 1200 feet of the decline, which penetrates the lower Newland formation above the mineralized zone. Test results from PW-4, with a hydraulic conductivity of about 0.015 feet per day, are assumed to be representative of the remaining 2300 feet of the decline that extends down through and beneath the mineralized zone. The alluvial aquifer was assigned a hydraulic conductivity of 210 feet per day, based on slug test results for alluvial monitoring well MW-4A (Figure 7).

The exploration decline was modeled using a discharge specified boundary with an assumed inflow rate of 500 gpm to simulate decline inflows without any grouting to reduce inflows. A second simulation was conducted with an assumed discharge rate of 100 gpm to evaluate drawdown effects with a grouting program in place to reduce decline flows. The 500 gpm rate is the approximate inflow rate predicted by the model using a head specified boundary for the decline. This value is also on the higher end of the predicted inflows determined using analytical methods (190 - 603 gpm, Hydrometrics, 2012).

Groundwater flow directions are to the east and northeast in the bedrock aquifer while the alluvial groundwater system flows parallel to Sheep Creek. After developing a pre-exploration simulation, the exploration decline was added to the model to simulate decline inflows and pumped discharges. Draw-down was calculated from the model simulation in both the bedrock and alluvial groundwater systems. The predicted drawdown from the 500 gpm discharge simulation extends outward from the exploration decline, but is limited in the alluvium to the east by the higher transmissivity of the alluvial aquifer. The maximum drawdown predicted by the model (approximately 75 feet) is located just south of Coon Creek along the path of the exploration decline. Although the simulation shows drawdown extending out into the bedrock area south and west of the exploration decline; re-infiltration of mine water would offset drawdown in this area.

The linear groundwater depression along the trend of the decline for the 100 gpm discharge simulation is much more limited in extent and magnitude. The maximum drawdown over the decline in this simulation is only 10 feet and the extent of drawdown would be greatly reduced at these lower inflow rates resulting from grouting of the fracture systems encountered by the decline.

Although the draw-down model's peak dewatering scenario of 500 gpm shows the cone of depression extending into the alluvial gravels of Sheep Creek (Figure 10), limitations of the model result in very conservative (high) drawdown predictions, particularly in outlying areas at the margins of the model domain. Re-infiltration of mine water via the LAD system was not simulated. Virtually all of the water intercepted by the decline would be re-infiltrated to the shallow groundwater system through the proposed LAD areas (Figure 7) between 500 and 2400

feet south of the portal area. Dewatering rates would be held in the range of 150 to 250 gpm (not 500 gpm) by underground grouting of fractures controlling water inflows in to the decline.

#### Evaluation of Decline Water Quality

Tintina estimated the quality of water that would be produced from dewatering of the decline based upon water quality data obtained from wells PW-3 and PW-4 during the pumping tests, combined with the calculated hydraulic conductivities of the two aquifer zones that the decline would penetrate. As described above, various accepted methods were used to evaluate the data collected during the pump tests of wells PW-3 and PW-4, and these methods result in a range of calculated hydraulic conductivities and decline inflow rates. Given the wide range of predicted inflows from the shallow bedrock aquifer represented by PW-3 (between 175 gpm and 614 gpm) and Tintina's reduction of inflows to this portion of the decline by grouting, several calculations of water chemistry resulting from blending of inflows from the two aquifer zones were made using varying assumed inflows from the shallow aquifer zone.

As the decline is driven, the first 1700 feet in from the portal would be above the water table and very little inflow is anticipated. The next section, from 1700 to 2900 feet from the portal, would penetrate the shallow bedrock aquifer and would need to be dewatered. Based upon the water chemistry analysis from well PW-3, this water should meet groundwater (human health) standards, and could be discharged to the LAD system without treatment other than that described below.

Prior to discharge suspended sediments would be settled out, and oil based components would be removed in underground sumps. Excess suspended sediment would be settled out in the NAG seepage collection pond prior to discharge to the LAD system.

The final section of the decline would penetrate the deeper and less permeable sulfide zone of the bedrock aquifer 2900 to 5000 feet in from the portal and would produce 10 to 12 gpm of groundwater that would exceed the human health standards for arsenic and strontium based upon the water chemistry analysis from well PW-4.

DEQ reviewed Tintina's method of estimating decline water chemistry and concluded that each of the required assumptions involve sufficient uncertainty such that blending of water sources within the decline should not be relied upon to guarantee that water discharged to the LAD areas would consistently achieve groundwater standards. Factors which limit the reliability of the estimated chemistry of decline inflows include:

- Possible deviation of inflow rates from those predicted: Tintina assumed that inflow rates from the shallow aquifer could be controlled by grouting, but that the deeper aquifer would contribute a constant 10-12 gpm. This value assumes that the hydraulic conductivity obtained from the pump test for well PW-4 is representative of the entire deeper zone of the decline between 2900' to 5000' in from the portal, which may be a reasonable assumption if the aquifer were a homogenous porous medium. Fractured bedrock aquifers are likely to have greater variability and the decline may intercept zones in the deeper bedrock that are not represented by the hydraulic conditions measured at

well PW-4. Therefore, inflow rates from the deeper portion of the aquifer may be higher than predicted.

- The average groundwater chemistry of the shallow and deep portions of the aquifer which will contribute inflow to the decline may differ from the water quality analyses from PW-3 and PW-4. Groundwater chemistry may vary seasonally at individual wells, and the single water quality analyses performed on water from wells PW-3 and PW-4 during the May 2012 pump tests may not fully describe their average long term chemistry. The decline may intercept other water-bearing fractures with chemistries that differ substantially from the water sampled from wells PW-3 and PW-4. For example, shallow bedrock monitoring well MW-1B exceeds groundwater standards for arsenic and thallium; therefore, the water chemistry from PW-3 may not represent the quality of all shallow groundwater that would be intercepted by the decline. Furthermore, chemistry of water flowing into the decline may change over time as the drawdown zone surrounding the decline expands and intercepts water from a larger region of the aquifer.
- The chemistry of groundwater may be altered after flowing into the adit. Groundwater within the surrounding bedrock likely contains very little oxygen and conditions are reducing. Elements such as arsenic are more mobile in reducing conditions, which is why humidity cell testing did not produce similar water chemistry as is observed from monitoring wells completed within the sulfide zone. Humidity cells are subjected to oxidizing conditions which would occur within the waste rock storage areas and also within the decline itself. Groundwater flowing into the decline may interact under oxidizing conditions with blasted rock and with rock and sediment distributed on the decline floor by vehicle traffic. Therefore, additional metals may leach into the decline water at levels similar to those predicted by humidity cell testing. At the same time, oxidation of the water may cause some dissolved constituents in the groundwater, such as arsenic and iron, to precipitate from the water either within underground sumps or within the lined NAG pond prior to land application.

For these reasons, DEQ concluded that Tintina should be prepared to treat intercepted groundwater in order to achieve groundwater quality standards prior to its land application as soon as groundwater pumping first becomes necessary during decline development.

#### Summary Water Balance and Treatment

The flow path of water from decline dewatering through release to LAD systems is outlined in this section. Driving of the decline is expected to produce 100 to 500 gpm from the underlying bedrock formations. Tintina proposes to manage this flow by underground grouting methods to between 150 to 250 gpm. But see Section 4.2.4.3 for DEQ's Agency Mitigated Alternative.

As water is pumped from the decline it will pass through two, staged underground sumps several hundred feet in from the portal. Water will flow by gravity from one sump to the other as sediment is removed and oil based materials are skimmed for disposal. Water will be pumped from the sumps either directly to the LAD areas if no treatment is required, or to temporary storage and/or additional sediment removal in the NAG seepage collection pond. It is predicted that the decline water would meet groundwater standards, based on the bedrock aquifer water

quality mass loading calculations. But see Section 4.2.2.3 for DEQ's Agency Mitigated Alternative.

The PAG and NAG seepage collection ponds were both designed to contain the volumes of water resulting from the average annual rainfall (17 inches) intercepted by the lined waste rock storage areas and their associated lined retention ponds, with no allowance for evaporation of water or absorption of water within the waste rock piles. In addition to these volumes associated with average annual precipitation, the ponds were also designed to retain the volumes of water resulting from a 100-year, 24-hour storm event (3.4 inches of precipitation). Both ponds, as designed, could retain these required water volumes and still have 16 to 17 percent excess capacity. These designs are conservative because: (1) actual volumes of seepage from the waste rock piles would be reduced by evaporation from the rock pile surfaces and absorption of water within the rock piles, (2) evaporation from the pond surfaces would reduce the volume of water within the ponds, and (3) water would be removed from the ponds, treated, and discharged to the land application disposal area.

More critical to NAG pond sizing than rainfall interception, however, is the proposed use of the NAG pond for storage of water pumped from the decline. Assuming the pumping rate necessary to keep the decline dewatered would be somewhere between 100 gpm and 500 gpm, the pond would have the capacity to retain between 6 and 28 days of water pumped from the decline. Because water pumped from the decline would have a greater influence on pond capacity than rainfall, DEQ has decided to impose minimum freeboard requirements for the ponds rather than requiring a minimum pond size. Water levels in both ponds would be required to be maintained such that each has the capacity to retain the 100-year 24-hour storm event plus an additional two feet of freeboard. The upper two feet of the NAG pond would provide capacity to store 1.4 million gallons of water. The volume of water associated with a 100-year 24-hour precipitation event falling on the lined catchment reporting to the NAG pond is 528,000 gallons. Thus the NAG pond would always have the excess capacity to retain nearly 2 million gallons of water, and the PAG pond would have excess capacity to store over 750,000 gallons.

Water to be discharged to the underground LAD System will average 150 to 250 gpm. Water quality would be tested on a weekly basis for its ability to meet groundwater (human health) standards. If the discharge does not meet groundwater standards, discharge to the underground LAD system will be suspended, and water will be treated prior to discharge.

As water is pumped from the decline it will pass through two, staged underground sumps several hundred feet in from the portal. Water will flow by gravity from one sump to the other. The purpose of these staged sumps is to provide treatment of the decline water for suspended sediments by allowing the suspended material to settle out in the sumps (using flocculants if necessary). This is essential to protect down-stream water treatment and LAD systems from clogging with sediments. In addition, oil-based materials will be removed from the decline water using skimmers, this residue will be returned to additional oil water separators in the Wash Pad/Diesel Storage facility building on the portal pad. Periodically this waste will be hauled away by a licensed contract hauler for disposal.

The specific water treatment options presented are reverse osmosis (RO) with brine evaporation, or RO with absorptive median (zeolite) brine treatment.

### **3.2.2 Seeps and Springs Resources**

As a part of the initial water resource evaluation, nine seeps and 13 springs in the Project area have been identified, mapped, and some sampled for water quality and flow as a part of an inventory completed in 2011. A second series of flow and water quality samples of seeps and springs was collected during July 2012 (Figure 7). A number of springs discharge along the Volcano Valley Fault where the Flathead Quartzite is in contact with the Newland Formation.

Observed flow rates at the springs ranged from 1 gallon per minute (gpm) to as much as approximately 50 gpm. Water samples were collected at five of the primary spring sites (SP-1, SP-2, SP-3, SP-4, and SP-6) that surround the proposed exploration decline area, and two surface water locations (G-1 and G-2 on Figure 7) where gossan (an iron oxide deposit) is exposed in outcrop in the streambed.

The springs generally exhibit neutral to slightly alkaline pHs (6.8-8.0) with moderate to high alkalinities (61-240 mg/L). Background nitrate concentrations were low (<0.1 - 0.68 mg/L) at all of the spring sites. Metals concentrations were within regulatory limits. Manganese at springs SP-1 and SP-2, slightly exceeded the recommended secondary standard for drinking water of 0.05 mg/L. Iron at SP-3 exceeded the recommended secondary drinking water standard of 0.3 mg/L. SP-3 had slightly higher concentrations of some dissolved metals (Al, Cu, and Cr) but all were well below regulatory standards. Other samples from springs originating from gossan sites showed similar water quality to the spring samples with no major differences in dissolved metals concentrations. Total metals concentrations at one of the gossan sites (G-2) exceeded the secondary drinking water standard for iron and the numeric drinking water standard for thallium.

### **3.2.3 Wetlands Delineation**

A wetland survey identified 28 wetland sites comprising approximately 268 acres associated with perennial streams (including Coon Creek, Little Sheep Creek, and Sheep Creek), Sheep Creek Meadow, ephemeral drainages, and springs and seeps in the Project study area (Figure 7) (Hydrometrics, Inc., 2011). Vegetation observed in the wetland sites included hydrophytic grasses, grass-like plants (e.g., sedges), shrubs, and trees. Hydrologic indicators observed at these sites included perennial stream flow, evidence of ephemeral stream flow, standing water, saturated soils, and evidence of early-growing season saturation. The most typical character of Project area wetlands is hydrophytic vegetation growing in linear riparian corridors on saturated soils along perennial and ephemeral drainages. These wetlands generally transition to wider, dry channels and swales in upper drainage reaches where wetland features (hydrophytic vegetation and supporting hydrology) become isolated or absent.

Localized wetlands were noted in the immediate area of all upper drainage springs, seeps, and springs/seeps developed to support livestock watering. These wetlands are characterized by hydrophytic vegetation stabilizing lower-gradient riparian sites on saturated soils that are subject to trampling by livestock.

Larger wetland complexes are present at upper Coon Creek and lower perennial drainage locations on Coon Creek, Little Sheep Creek, and Sheep Creek Meadow in the Project study area. These wetland complexes are characterized by hydrophytic vegetation growing in broader, less-incised riparian sites on saturated soils in perennial drainages. These sites generally provide high quality habitat and buffer site stability. Some wetlands in the Project area are isolated without a direct connection to perennial drainages. These isolated sites support grass and forested wetlands that provide high quality habitat. Although wetlands, seeps, and springs are present in various places throughout the Project area, the proposed portal location, and related support facility sites required for the construction of the exploration decline have avoided disturbance of all wetland areas.

### **3.2.4 Surface Water**

#### ***3.2.4.1 Surface Water Existing Conditions***

The Project area is in the Sheep Creek watershed, a tributary to the Smith River, which is in turn a tributary of the Missouri River. The site elevation ranges from approximately 5,600 feet along Sheep Creek to 6,800 feet atop Black Butte. To the west of Black Butte is Butte Creek, which is a tributary to Sheep Creek. Sheep Creek is a fifth order stream draining a total of approximately 194 square miles (NRIS, 2011). The Project area is located in the approximate upper third of the drainage. The nearest gaging station with a long term record is located on the Smith River just below the confluence with Sheep Creek. Base flows at the gaging station range from approximately 30 cubic feet per second (cfs) to peak flows on the order of 1,500 cfs (US Geological Survey [USGS] Station No. 06077200). Tintina installed a stilling well with a transducer as a gaging station near the bridge over Sheep Creek (near SW-1) on the north end of the property (see Section 2.2.6.2 for description).

Baseline surface water monitoring was conducted for the Black Butte Copper Project during the second quarter of 2011, and for surface and groundwater during the third and fourth quarters of 2011 as well as the first, second, and third quarters of 2012. These data were included in the exploration license amendment application for the Project. Quarterly baseline data collection is ongoing. Water quality samples were submitted for analyses of physical parameters, common constituents, nutrients, and a comprehensive suite of trace constituents as listed in Table 3. With the exception of aluminum, trace constituents were analyzed for the total recoverable fraction for surface water samples; aluminum was analyzed for the dissolved fraction. All trace constituents for groundwater samples were analyzed for the dissolved fraction. This report summarizes the results of groundwater and surface water monitoring conducted in 2011, 2012, and the first and second quarter of 2013.

Sheep Creek originates in the Little Belt Mountains at an elevation of about 7,600 feet and discharges to the Smith River approximately 23 river miles to the west of Black Butte at an elevation of 4,380 feet. The Project area is approximately 17 air miles above the confluence with the Smith River which is a popular destination for recreational fishermen, rafters, and boaters. Sheep Creek is a high quality stream that flows in a meandering channel through a broad alluvial

valley upstream of the Project site but enters a constricted bedrock canyon just downstream. Sheep Creek is used principally for stock water, irrigation, and fishing (RMI, 2010).

Primary tributaries to Sheep Creek in the immediate Project area are Little Sheep Creek, and Coon Creek (Figure 6). Little Sheep Creek is located to the southeast of the Project area and converges with an unnamed tributary approximately half a mile south of Strawberry Butte before converging with Sheep Creek at the southern terminus of Strawberry Butte. Coon Creek follows Butte Creek Road east of Black Butte and joins Sheep Creek at the head of a canyon located almost one mile northwest of Strawberry Butte. To the west of Black Butte is Butte Creek, also a tributary to Sheep Creek. Another unnamed tributary flows westward from the northern side of Black Butte into Butte Creek. Flows in the tributary drainages are only perennial on their lower reaches and are ephemeral upstream.

Eleven surface water stations have been established as baseline monitoring sites (Figure 6). Flow, stage, and field parameters (temperature, pH, and specific conductivity (SC) are monitored quarterly at all of these sites. Water quality samples are collected at six of the sites during quarterly monitoring. Monitoring was initiated at these sites in May of 2011 with subsequent quarterly monitoring events scheduled in the months of August, November, March, and May of each year.

During the first year of the baseline study from May to November 2011, discharge in Sheep Creek ranged from approximately 21 to 250 cfs at the upstream site (SW-2) and 21 to 612 cfs at the downstream site (SW-1). During the second year of monitoring, there was a decrease in peak flows in the month of May with the upstream Sheep Creek monitoring site (SW-2) decreasing from approximately 250 cfs in 2011 to 103 cfs in 2012 and the downstream monitoring site (SW-1) ranging from approximately 612 cfs in 2011 to 111 cfs in 2012. In 2013 discharge in Sheep Creek at the downstream site (SW-1) ranged from 12.63 cfs in March to 195 cfs in June.

Flows decreased at all surface water sites from the spring of 2011 to the spring of 2012. This decrease was due to unusually high runoff conditions in the spring of 2011 (612 cfs, at SW-1) versus much lower flow rates (111 cfs at SW-1) in 2012, and intermediate flow rates (195 cfs at SW-1) conditions in 2013.

Flows in Coon Creek measured at SW-3 ranged from 4.9 cfs in May 2011 to 0.08 cfs (36 gpm) in November 2012. In May 2012 the flow was measured at 0.40 cfs (180 gpm). Flow in the unnamed tributary of Little Sheep Creek ranged from 4.1 cfs in May 2011 to 0.16 cfs (70 gpm) in November 2011 and 2012. The May 2012 flow in the unnamed tributary of Little Sheep Creek was 0.81 cfs (364 gpm) and may be more representative of the average high flow.

**Table 7 Surface Water Flow Summary 2011-2013**

	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	SW-10	SW-11
<b>May-11</b>	612 (E)	250 (E)	4.9	2	4.7	4.1	0.286	9.1	12.7	15.2	21.4
<b>Jul-11</b>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	0.038	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
<b>Aug-11</b>	34.26	29.77	0.34	0.04	Dry	0.18	0.040	0.45	0.83	0.5	0.86
<b>Nov-11</b>	20.7	20.7	0.113	0.03	Dry	0.16	<i>F</i>	<i>F</i>	0.42	<i>NM</i>	<i>F</i>
<b>Mar-12</b>	30.24	<i>F</i>	<i>F</i>	<i>NM</i>	<i>NM</i>	<i>F</i>	<i>F</i>	<i>F</i>	1.13	<i>F</i>	1.0307
<b>May-12</b>	110.73	102.5 7	0.401	0.253	0.75	0.81	0.062	2.65	2.33	1.85	3.24
<b>Jul-12</b>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>	0.034	<i>NM</i>	<i>NM</i>	<i>NM</i>	<i>NM</i>
<b>Aug-12</b>	15.24	9.74	0.168 5	0.033	Dry	0.33	0.006 1	1.09	0.78	0.54	1.00
<b>Nov-12</b>	17.971	<i>F</i>	0.08	0.011	Dry	0.157	0.000 4	0.453	0.536	0.345	0.844
<b>Mar-13</b>	12.63	<i>F</i>	<i>F</i>	<i>F</i>	Dry	0.04 (E)	Dry	<i>F</i>	0.32	<i>F</i>	<i>F</i>
<b>Jun-13</b>	195.7	156.4	0.3	0.208	0.66	0.76	0.05	5.72	2.50	1.66	4.08

**NOTES:** All flows in cubic feet per second; *F* denotes frozen conditions. No flow taken; *NM* denotes no flow measurements taken; (E) denotes estimate

Surface water results show neutral to slightly alkaline pH values (6.8 to 8.6), and low to moderate specific conductance (49 to 443  $\mu\text{mhos/cm}$ ). Major ion chemistry is dominated by calcium and bicarbonate. Metals data show some infrequent excursions above DEQ-7 water quality standards for selected metals (aluminum and iron) during high runoff events. Surface water standard exceedances were observed for the following constituents:

- Total recoverable iron at all sites during peak runoff periods except SW-6 and SW-11 (2011); SW-3 (2012); but only stations SW-1, SW-2 and SW-5 exceeded the standard in the first half of 2013
- Dissolved aluminum during peak runoff season (2011 only) at SW-1, SW-2, SW-5, and SW-11; and in 2013 SW-1, SW-2, SW-5 and SW-11.
- The human health surface water standard for thallium of 0.00024 mg/L was exceeded at SW-3 during three separate monitoring events in 2011 only.

Although the draw-down model's peak dewatering scenario of 500 gpm shows the cone of depression extending into the alluvial gravels of Sheep Creek (Figure 10), the following limitations of the model result in very conservative (high) drawdown predictions, particularly in outlying areas at the margins of the model domain:

Re-infiltration of mine water via the LAD system was not simulated. Since virtually all of the water intercepted by the decline would be re-infiltrated to the shallow groundwater system through the proposed LAD areas (Figure 7) between 500 and 2400 feet south of the portal area. This discharge would offset any drawdown effects near the LAD area.

The model results are based on steady state solutions that tend to predict greater drawdown than may occur during the time it will take to drive the decline (16 months).

Dewatering rates would be held in the range of 150 to 250 gpm (not 500 gpm) by underground grouting of fractures controlling water inflows in to the decline.

Alluvial groundwater flow entering the model area is not incorporated into the model. This additional alluvial inflow, if it were included in the model, would further limit the actual amount of drawdown in the Sheep Creek alluvial aquifer.

As the underlying bedrock aquifer is gradually being drawn down as the decline is dewatered, the water flows through rock with a hydraulic conductivity of 1.5 feet or less per day. Once the cone of depression reaches the alluvial aquifer from the bedrock aquifer its expansion would be halted by water moving laterally through the highly transmissive alluvial gravels (hydraulic conductivity 210 feet per day). The alluvial aquifer also has the ability to provide a large volume of water because of its very large storage capacity.

#### ***3.2.4.4 Total Maximum Daily Load***

Montana has established water quality standards to protect designated beneficial uses of its waters (e.g., aquatic life, drinking water, recreation, agriculture and industrial uses). A water body that does not meet one or more standards is called an impaired water. Every two years, the Montana Department of Environmental Quality (DEQ) prepares a Water Quality Integrated Report that lists all impaired water bodies and their identified impairment causes. The 303(d) list portion of the Integrated Report includes all water body segments impaired by a pollutant (e.g., a metal, a nutrient, pathogens, temperature).

Montana's Water Quality Act (Section 75-5-701, MCA) requires the development of total maximum daily loads (TMDLs) for water bodies impaired by a pollutant. A TMDL is the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. TMDLs provide an approach to improve water quality so that streams and lakes can support and maintain their state-designated uses. Sheep Creek, which flows into the Smith River, is identified on the "2012 Water Quality Integrated Report" (DEQ 2012b) as not supporting its uses of aquatic life and primary contact recreation (e.g. swimming, bathing) due to impairments of aluminum, iron, and E. coli. TMDL development for Sheep Creek will most likely not occur until after 2014, and a schedule has not been established.

It is worth noting that Sheep Creek was previously identified as impaired for mercury. In 2011, Tintina collected water quality data for the purpose of a baseline water quality study for the Black Butte Copper Project, and none of the collected samples exceeded Montana's water quality standard for mercury. The data was submitted to DEQ with a request to remove the mercury impairment for Sheep Creek. DEQ conducted a reassessment of Sheep Creek using the new data and concluded that Sheep Creek was not impaired for mercury, and removed the impairment.

### **3.3 Soils Resources**

The Natural Resources Conservation Service (NRCS) has completed a Meagher County soil survey in the vicinity of the proposed exploration decline and in other portions of the Project area (NRCS, 2011). Soil surveys are complete in all areas proposed for surface disturbance associated

with the exploration decline (Figure 12). The soil survey was updated and some soil map unit boundaries and names changed in the proposed disturbance areas in 2012 (NRCS 2012).

The soil survey data show that soils near the decline location and in areas under consideration for land application disposal areas (LADs) primarily consist of loamy mollisols. The major soil mapping unit to be disturbed was called 1175D (Stubbs-Copenhaver complex) in 2011. In 2012 it was mapped as 1175E (Owenspring-Cheadle complex). Soils within the area are rated as being either poor or fair for use as a topsoil source or as reclamation material according to the NRCS soil survey due to shallow depths to bedrock, and/or a high percentage of rock fragments within the soil. Area soils are rated as having a high potential for subsequent reclamation if disturbed in place and then revegetated. Exploration decline related disturbance areas and the LAD system layouts are also shown on Figure 12. The new mapping in 2012 does not change the soil analysis in the EA because of the site specific field verification testing completed by Tintina.

Field verification of the County soil survey was completed in the Project area to confirm soil classifications, and to determine the depth of salvageable soil for reclamation uses in areas likely to be disturbed during construction of the exploration decline and associated facilities. Physical data collected during the field survey include horizon depths, texture, structure, color, and reaction (pH) with hydrochloric acid. Samples were submitted to an analytical laboratory for determination of saturated paste pH, electrical conductivity, nutrient content (nitrogen as nitrate, phosphorus, potassium, and organic matter content), sodium adsorption ratio (SAR), and gradation including coarse fragment content. Chemical parameters were measured in the A (surface) and B (subsoil) horizons from each sampled location.

Composite samples representing the A and B horizons from soil mapping units 340D and 1175D were submitted for analysis of 16 saturated paste extractable metals. Discrete samples from two unmapped units were submitted for analysis of saturated paste extractable arsenic, iron, manganese, and selenium concentrations. Field and lab data were provided along with the Meagher County soil survey descriptions for the mapping units 38E, 340D, and 1175D which are the soil units selected as potential LAD sites.

Field verification confirmed the accuracy of soil descriptions and boundaries provided by the Meagher County soil survey in the vicinity of the decline portal and proposed LAD areas except for several minor discrepancies. Soil samples collected across the Project area were fine textured with clay-loam surface horizons and clay-loam or silty clay-loam subsoil horizons. Coarse fragment content ranged from 7 to 27 percent in surface horizons (17 percent average) and from 10 to 52 percent in subsoil (28 percent average). Soil pH was slightly acidic, ranging from 5.3 to 7.7 (average of 5.8). Electrical conductivity and SAR values were low, and along with pH data, show that these soils are not saline or sodic. Organic matter concentrations ranged from 3.3 to 6.4 percent in the surface horizons and from 0.9 to 3.2 percent in subsoil horizons. Average nitrogen, phosphorus, and potassium were respectively <1, 2.7, and 296 mg/kg.

### **3.4 Vegetation Resources**

Baseline vegetation studies were conducted in the area during the summer of 2011 (Elliot 2011). The following habitat based communities were identified.

### **3.4.1 Wetlands and Riparian Areas**

A large wetland complex, charged by both surface and groundwater flows, is present on the floodplain of Sheep Creek and Little Sheep Creek on the eastern side of the Project area. Recharge of outlying upland wetlands in nearby drainages are derived from springs associated with bedrock strata at higher elevations than the shallow groundwater system associated with the decline. Other linear wetlands, originating from springs, dissect upland habitats and occur along stream courses along valley bottoms that ultimately flow into Sheep Creek and Little Sheep Creek. The sub-irrigated meadows are dominated by introduced and native grasses, sedges, and forbs including: meadow foxtail, beaked sedge, Nebraska sedge, yellow monkey flower, berula, marsh aster, Baltic rush, redtop, smallfruited bulrush, and tufted hairgrass. On dryer microsites in the meadows, agronomic naturalized and introduced species (e.g., Kentucky bluegrass, smooth brome, and timothy) are present.

### **3.4.2 Shrub Communities**

Shrub communities along Sheep Creek originate from springs on upland sites, and consist mainly of Bebb's willow and Booth's willow, with understory species including: large-leaf avens, beaked sedge, Nebraska sedge, Baltic rush, willow-herb, shrubby cinquefoil, marsh butterweed, and tufted hairgrass. Scattered aspens often are present along the linear drainages dissecting upland sites. One tree-dominated wetland, charged by springs, is present in the southern part of Section 24 at the base of a forested slope. Engelmann spruce, horsetail, mannagrass, brook saxifrage, baneberry, and colt's-foot dominate this wetland.

### **3.4.3 Coniferous Forest**

Upland forest communities in the project area are dominated by an overstory of Douglas-fir with lesser amounts of lodgepole pine. In open Douglas-fir stands on dryer sites, Idaho fescue and big sagebrush are common understory plants. On moist, north-facing slopes understory species include common juniper, birch-leaf spirea, showy aster, Oregon-grape, twinberry, and bearberry.

### **3.4.4 Big Sagebrush\Grassland**

Non-forested uplands support big sagebrush\grassland communities with common species including: big sagebrush, Idaho fescue, rough fescue, Sandberg's bluegrass, western needlegrass, Junegrass, sticky geranium, and silky lupine.

### **3.4.5 Species of Concern**

No plant Species of Concern (SOC) are listed in the vicinity of the project area, however, nine SOC are known to exist in other areas of Meagher County (Elliot, 2011). These species were not identified in the Project area during baseline studies and have a low to moderate likelihood of occurring in or near the project area.

### **3.4.6 Noxious Weeds**

Noxious weeds observed in the project area include Canada thistle, musk thistle, and houndstongue.

## **3.5 Wildlife**

Reconnaissance level baseline wildlife studies were conducted in 2011 to characterize wildlife habitat and assess the potential for animal species of concern to be present within the proposed

project area (Elliot 2011). Databases maintained by the Montana Natural Heritage Program and Montana Department of Fish, Wildlife & Parks (FWP) were also queried to obtain natural resources information relevant to the project area.

### **3.5.1 Wildlife Observed**

Wildlife species or their sign (tracks, scats, skeletal remains, nests, beds, or calls) observed during field studies include white-tailed deer, mule deer, elk, coyote, beaver, Richardson's ground squirrel, pocket gopher, red-tailed hawk, Swainson's hawk, northern harrier, kestrel, Canada goose, Clark's nutcracker, eastern kingbird, barn swallow, tree swallow, savannah sparrow, lark sparrow, gold finch, rock dove, northern flicker, yellow-rumped warbler, mourning dove, raven, American robin, ruffed grouse, magpie, and red-winged blackbird.

### **3.5.2 Species of Concern**

Wildlife SOC were not observed during the 2011 survey and are not recorded as present within the project area, but SOC have been identified in Meagher County (MNHP, 2011). The only species of concern observed on the site to date is the Clark's nutcracker. The habitat types frequented by some of these SOC are associated with habitats that are present within the Project area (i.e., conifer forests, grasslands, streams/riparian areas) suggesting that SOC could also be present within the Project's area of influence. In the case of far-ranging wildlife, it is likely that the Project area comprises only a relatively small proportion of the total range used by such wildlife during the year. Other SOC found in Meagher County that have a high potential of occurring in the project include northern goshawk, Brewer's sparrow, Cassin's finch, golden eagle, hoary bat, fringed myotis, western toad, and westslope cutthroat trout.

The habitat required for lynx and wolverine is mixed coniferous forests. The Project is located adjacent to a small stand of primarily Douglas fir forest and sagebrush grasslands which is not preferred habitat for lynx and wolverine. Lynx and wolverine may pass through the area on occasion but they would not stay.

Sheep Creek and Little Sheep Creek are perennial streams that meander through a broad floodplain of sub-irrigated meadows and shrub-dominated wetlands. Sheep Creek has riffles and pools with cobble and gravel substrates. There is evidence of abandoned beaver dams, and oxbows are a prominent feature of the broad floodplain area.

It is likely that brook trout, rainbow trout, westslope cutthroat trout, and hybrids of rainbow and westslope cutthroat trout are present in waters of the Project area. No critical fishery habitat locations have been identified at this time. Tintina provided DEQ a Review of Fisheries Literature, Data, and Management Actions in Sheep Creek, Smith River Basin, Montana (Confluence 2013).

Benthic invertebrate communities in the project area were not quantitatively analyzed.

### **3.6 Cultural Resources**

The proposed Project area is entirely on private land and cultural resource inventories are not required under State and Federal laws. DEQ recommended that Tintina conduct a cultural resource inventory prior to filing the exploration license amendment application to construct the exploration decline. Tintina conducted an intensive pedestrian inventory of 970 acres of private

land within the Project area (Tetra Tech, 2013). This area also covers the central portion of the lease block, most of the plan view of the Johnny Lee mineral deposit, the proposed decline portal, portal pad, temporary waste rock storage facilities and the temporary access road. This area also includes all of the proposed facilities identified during conceptual planning for the exploration decline.

The pedestrian inventory recorded seven prehistoric sites, three historic sites, and two prospect pits. Additionally, a previously recorded road was identified. All seven prehistoric sites are lithic scatters that if they are to be disturbed, require further work to determine their eligibility to the National Register. The three historic sites and the previously recorded historic road are recommended not eligible to the National Register of Historic Places (NRHP) and no further work is recommended prior to exploration activities. The prospect pits were recorded as isolated finds. Evaluation of National Register eligibility was not conducted as isolated finds usually do not have the ability to contribute information important to prehistory or history.

One of the identified prehistoric sites occurs in an area proposed for surface disturbance associated with one of the exploration decline's related facilities. Because this identified prehistoric site falls within an area of proposed future surface disturbance it was more thoroughly re-evaluated to determine its potential eligibility for recommendation to the NRHP. A detailed report for the cultural resources at the site was prepared and submitted to the State Historical Preservation Office (SHPO) for a ruling on their eligibility for the National Register. Avoidance was recommended for all potentially NRHP eligible sites.

Beginning at the County Road, Tintina would upgrade an existing two-track road into a decline portal access road. Site 24ME163, a potentially NRHP eligible prehistoric site, was identified next to the proposed access road during the 2011 cultural inventory. At the recommendation of DEQ, Tintina conducted NRHP eligibility test of the site on November 7, 2012 (Tetra Tech, 2013). Testing indicated that the site contains intact subsurface cultural deposits that may be capable of addressing important archaeological research questions (Criterion D). The site would be preserved by covering with local fill.

The 10,000 tons of ore would be hauled and processed off-site. As requested by MDT, an analysis of Sheep Creek road would be completed if the mine progresses past the exploration stage.

The haul trucks are required to comply with all State and Federal Motor Carriers Safety Regulations and must comply with all laws and administrative rules. If the transport trucks do not meet the statutory lengths and weights, special permits must be obtained from Montana Motor Carriers (MCS) prior to traveling on public highways. It is recommended the transport company contact MDT/Meagher County prior to transport commencement, this would allow for notification of any roadway closures or restrictions.

Access between US Highway 89 and the portal and ancillary facilities would be primarily along the existing Sheep Creek (county) road and private ranch roads located on leased private property. The minimum work necessary would be conducted to provide year round access and upgrades for safety on these existing roads as part of the mobilization process. Proposed road

modifications would occur almost entirely within the existing road prism and would include resurfacing a number of road sections to improve traffic flow, drainage control, and/or culvert replacement to reduce sediment yield from roadway surfaces. All roadway modifications would be conducted in consultation with the landowners, the county, and DEQ.

The Sheep Creek and Black Butte county roads would remain for public access and Tintina does not anticipate anything other than possible minor delays during the initiation of construction and upgrading of the county roads for suitable access as needed. Tintina would implement dust control measures using either water or chemical treatment on high traffic areas along access roads that can create dust. Tintina may also plow roads in the winter as necessary to maintain access to the decline construction site.

### **3.7 Socio-Economics**

Meagher County is sparsely populated by Montana and US standards with a 2010 population of 1,891 and a land area of 2,392 square miles (Table 8). The population density is 0.8 people per square mile, while the average for Montana in 2010 was 6.8 people per square mile. The population in Meagher County has decreased slightly since 2000, but it is higher than the 1990 population of 1,824. The US Census Bureau reports that migration out of the county is greater than migration into the county (loss is 2.1 percent), and the number of births has also decreased, which are the primary causes of the population decline. Meagher County has a significantly higher proportion of its population over the age of 65 (21.2 percent) compared to Montana (14.6 percent) and the US (12.9 percent) (Table 9). In addition the percentage of the population under the age of 5 is 5.6 percent in Meagher County, 6.4 percent in Montana and 6.9 percent in the US.

Year	Meagher County	Montana	US
2010	1,891	989,415	308,745,538
2000	1,932	902,190	281,424,602
2000 to 2010	-2.1%	9.7%	9.7%

Source: US Census 2011

	Meagher County	Montana	US
Under 5 years old, percent, 2009	5.6%	6.4%	6.9%
Under 18 years old, percent, 2009	20.1%	22.5%	24.3%
65 years old and over, percent, 2009	21.2%	14.6%	12.9%

Meagher County is rural and the main industries of farming and ranching employ 173 people or 16.9 percent of the population. Other major industries that employ people include: retail trade (9.5 percent); arts, entertainment and recreation (5 percent); accommodation and food services (6.7 percent); other services (6.7 percent); and government (14.1 percent). Growth industries for jobs include: retail trade (+34 percent since 2001); real estate (+142.3 percent); education (+12 percent); arts, entertainment and recreation (+4.8 percent); and other services (+5.9 percent). Industries showing a loss of jobs include: farming/ranching (-23.8 percent since 2001); accommodation and food services (-7.5 percent); and government (-16.1 percent).

The unemployment rate is an indication of the potential number of available employees for Tintina’s project. Considering nationwide economic conditions, both Meagher County and Montana reported lower than average unemployment rates for August 2011, with 65 people or 7.8 percent and 36,014 people and 7.1 percent, respectively. Meagher County and Montana “per capita” incomes are \$18,866 and \$22,881 respectively. The median household incomes for Meagher County and the State of Montana are \$32,409 and \$42,222 respectively. The percentages of populations in Meagher County and the State of Montana considered below the poverty level as defined by the US Census are 19 percent and 15 percent respectively.

### **3.8 Land Use**

Land uses in the Project area are predominantly agricultural, with hay and livestock production the primary activities. In addition, outfitters and individuals use the Sheep Creek drainage for big game hunting and fishing.

The decline site and related facilities fall entirely within two tracts of private property owned by the Bar Z Ranch, three members of the Hanson family, and/or Rose Holmstrom who together control 100 percent of the surface and mineral rights. Tintina has lease agreements with each of these owners (RMI, 2010). The leases stipulate that only underground mining would be practiced. Post mining land uses are expected to revert to farming, ranching, outfitting/guide services, and recreational access.

#### 4.0 Resources Status and Possible Effects Analysis

The Proposed Action may affect the physical environment and the human population in the area. Table 10 lists the resources of the human environment and their presence in the project area. The potential of being affected by the Proposed Action is listed for each resource.

**Table 10. Summary Comparison of Resource Impacts by Alternatives**

Resources Evaluated	No Action Alternative	Proposed Action	Agency-Mitigated Alternative	Impact Analysis
<b>RESOURCES ELIMINATED FROM FURTHER STUDY</b>				
Air Quality	Existing quality is good due to lack of emission sources in the area. Air quality is unimpaired by exploration activities to date.	Potential emissions are expected to be less than levels that trigger Prevention of Significant Deterioration (PSD) review. Tintina would apply for an Air Quality Permit if needed.	Same as Proposed Action.	No significant impacts predicted.
Wildlife, Fisheries, and Aquatic Resources	Wildlife habitat and fisheries have been impacted by historic grazing. Minimal impacts have occurred from exploration activities on 5.1 acres of disturbance.	Exploration activities would displace some wildlife species. No long-term impacts predicted. If surface water quality and quantity are not impacted, fisheries and Aquatic resources would not be impacted.	Same as Proposed Action.	No significant impacts predicted.
Socio-Economics	Meagher County is suffering from lack of a diverse economy. Median household income is 35 percent below the national average.	Potential positive economic effects of the Project on local communities from the 45 people temporarily employed during the exploration program.	Same as Proposed Action.	Potential positive effects.
<b>RESOURCES FURTHER EVALUATED IN THIS EA</b>				
Geochemistry	The area is a mineralized zone with natural geochemical weathering and release of metals.	Rates of geochemical weathering would increase from exposure of sulfide-rich ore and/or other rock lithologies.  To minimize geochemical weathering in closure, PAG would be backfilled into the decline below the water table, as well as any NAG waste that is shown by humidity cell testing to leach metals under near-neutral conditions.	Hydraulic plugging of the exploration decline between the NAG and sulfide zones would be required at closure based on hydrogeological and geochemical data collected during the installation of the decline.  Use PAG materials instead of NAG materials above the gravel layer in the PAG pad.  PAG contaminated surface materials would be removed and stored underground below the hydraulic plug at closure.	Impacts are reduced below the level of significance due to mitigation measures.
Groundwater	Groundwater in some wells naturally exceeds drinking water standards including arsenic, iron, strontium, and thallium. Impacts to groundwater from licensed exploration to date have been minimal due to Tintina's drill hole hydraulic plugging program.	Potential impacts would occur to groundwater near the decline from weathering of sulfide-rich ore and/or other rock lithologies.  Potential impact to shallow groundwater from NAG seepage.  Potential impact of aquifer cross-contamination from decline development.  Decline dewatering would lower the bedrock aquifer potentiometric surface.  During decline development Tintina would grout to limit inflows.  If necessary, Tintina would treat water with a reverse osmosis system prior to discharge in the LAD areas	Installation of additional monitoring wells and increased monitoring of groundwater resources would document cone of depression and water quality from dewatering the decline and LAD area discharge.  Lining the NAG pad would minimize leakage to shallow groundwater.  Installation of decline hydraulic plug would minimize aquifer cross contamination.  Installation of dewatering well at end of the decline.  Temporary water treatment plant on site prior to decline reaching	Impacts are reduced below the level of significance due to mitigation measures.

**Table 10. Summary Comparison of Resource Impacts by Alternatives continued**

<b>RESOURCES FURTHER EVALUATED IN THIS EA Continued</b>				
<b>Resources Evaluated</b>	<b>No Action Alternative</b>	<b>Proposed Action</b>	<b>Agency-Mitigated Alternative</b>	<b>Impact Analysis</b>
Wetlands	Wetlands have been impacted by historic grazing, and dewatering for producing hay. Wetlands are unimpaired by exploration activities to date.	No additional direct impacts to wetlands are proposed. No indirect impacts to wetlands are predicted.  Tintina would develop a corrective action plan if adverse impacts to wetlands are measured.	DEQ would require Tintina to develop a corrective action plan if impacts to wetlands are measured.	Impacts are reduced below the level of significance due to mitigation measures.
Surface Water	The existing impairment of Sheep Creek for elevated levels of fecal coliform bacteria, which is possibly related to livestock grazing, would remain. Water quality standards are infrequently exceeded for iron, aluminum, manganese, and thallium during high runoff events. Existing conditions are unimpaired by exploration activities.	There are no predicted impacts to existing surface water quality and quantity from dewatering of the exploration decline. Tintina would use best management practices (BMPs) to control runoff and limit erosion.	Underground injection if monitoring shows change in stream flow greater than 10 percent of the 7Q1010 ,  DEQ would require Tintina to backfill the portion of the decline below Coon Creek with cemented waste rock prior to allowing the decline to flood.  Surface and groundwater monitoring through the closure phase as long as DEQ determines it is necessary	Impacts are reduced below the level of significance due to mitigation measures
Soil	Licensed exploration activities have disturbed 5.1 acres.	An additional 46.5 acres would be disturbed. Soil salvage and replacement would minimize soil impacts. Development of the portal pad and LAD would increase the potential for soil slumping. LAD would increase the potential for soil contamination and leaching of contaminants to surface water and groundwater.	DEQ would require Tintina to map and isolate the subsoil cell stored in the portal pad to prevent contamination.	Impacts are reduced below the level of significance due to mitigation measures.
Vegetation	Vegetation has been affected by historic grazing. Licensed exploration activities have disturbed 5.1 acres.	An additional 46.5 acres would be disturbed. Soil salvage and replacement would minimize vegetation impacts. Locally, many native species dominated communities would lose species reducing long term diversity. Noxious weeds may increase.	Same as Proposed Action.	Impacts are below the level of significance.
Historical/ Cultural	Historic mining sites in the area.	Potential impacts to one NRHP eligible site.	One agency mitigation is recommended.	No significant impacts predicted.

#### **4.1 Resources Eliminated from Further Study**

The DEQ has assessed the presence of and evaluated the possible impacts on the resources from the Proposed Action, and has determined the Proposed Action would not affect the following resources. The rationale for dismissing further evaluation follows in this section.

##### **4.1.1 Air Quality Resources**

###### ***4.1.1.1 Air Quality No Action Alternative***

Existing air quality is good because of lack of emission sources in the area other than occasional forest fires. Existing air quality has been unimpaired by exploration activities to date.

###### ***4.1.1.2 Air Quality Proposed Action***

Potential emissions are expected to be less than levels that trigger Prevention of Significant Deterioration (PSD) review. Tintina has submitted an Air Quality Permit application and would have to comply with conditions in its Air Quality Permit under the Clean Air Act. On December

25, 2013 DEQ issued the Final Determination on Permit Application 4978-00 and issued the permit with conditions to Tintina.

Air quality will not be evaluated further as part of this EA.

#### ***4.1.1.3. Air Quality Agency-Mitigated Alternative***

Same as Proposed Action.

#### **4.1.2 Wildlife and Fisheries**

##### ***4.1.2.1 Wildlife and Fisheries No Action Alternative***

Existing wildlife resources are described in Section 3.5. No threatened and endangered animal species were found in the Project area. Animal species of concern have been observed in Meagher County. As Tintina would disturb less than 50 acres in the Project area, there are no predicted impacts to species of concern. As such, wildlife resources will not be evaluated further in this EA.

Fishery resources are described in Section 3.5.3. No critical fishery habitat locations have been identified. Surface water resources and wetlands would not be affected by the proposed exploration program (Section 4.1.2.2).

##### ***4.1.2.2 Wildlife and Fisheries Proposed Action***

There would be no impact to fisheries from any activities in the proposed action.

##### ***4.1.2.3 Wildlife and Fisheries Agency-Mitigated Alternative***

Same as proposed action.

#### **4.1.3 Socio-Economic Resources**

##### ***4.1.3.1 Socio-Economic No Action Alternative***

Under the No Action Alternative the exploration decline would not be constructed. There would be no additional impacts from decline construction, removal of waste rock, or discharge of water. Other exploration activities could continue. More core drilling might occur from the surface.

##### ***4.1.3.2 Socio-Economic Proposed Action***

Average quarterly employment for the decline construction and development drilling period is shown in Table 11. Mining crews would nominally consist of 5 to 6 miners per shift and underground drilling crews would consist of 2 people per drill per shift and typically require assistance from the miners for moves and material handling. Additional personnel would include the project engineer, site superintendent, chief geologist, field geologists, environmental technician, head mechanic, head electrician, drillers, and surface laborers. The maximum number of employees would be about 45 people.

Potential short-term positive effects of the proposed Project development include:

- reduction of unemployment in the region,
- job opportunities for younger people and encouragement to retain younger people in the county,

- increased tax base for local, state and federal government,
- economic stimulus for existing local businesses,
- economic development and contract opportunities for existing and new businesses, and
- community infrastructure improvements.

#### 4.1.3.3 Socio-Economic Agency-Mitigated Alternative

Same as proposed action.

**Table 11. Average Quarterly Employment and Principal Tasks**

Employees	Quarter							Awaiting Permitting	
	1	2	3	4	5	6			
Admin/Supervision	3	6	6	6	6	6	2	2	
Hourly <sup>1</sup>	14	24	24	24	39	39	2	2	
<b>Total</b>	<b>17</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>45</b>	<b>45</b>	<b>4</b>	<b>4</b>	
Principal Tasks	Mobilization	Decline Construction.			Decline Construction, Development, Drilling/Bulk Sampling, and Temporary or Permanent Closure and Monitoring		Care and Maintenance while awaiting Permitting, and Monitoring		

<sup>1</sup> Miners, drillers, and laborers

## 4.2 Resources Evaluated in this EA

The following resources have been identified by the DEQ as being possibly affected by the Proposed Action.

### 4.2.1 Environmental Geochemical Resources

When sulfide-bearing deposits are exposed to air and water, oxidation of some metal sulfides within the deposit may occur, even at near-neutral pH, and release metals. This geochemical reaction is sometimes referred to as the creation of acid rock drainage.

#### 4.2.1.1 Geochemistry No Action Alternative

Under the No Action Alternative the exploration decline would not be constructed. There would be no geochemical impacts from decline construction. Other exploration activities would continue as permitted. Geochemical impacts would not occur.

#### 4.2.1.2 Geochemistry Proposed Action

Sulfide-bearing geological deposits in the exploration decline would oxidize as a result of dewatering the decline during the proposed exploration program. After being exposed to air and water, oxidation of some metal sulfides within the PAG waste rock, the 10,000 ton bulk sample, and the wallrock around the decline may generate geochemical reactions even at near-neutral pH,

and release metals. Even if waste rock is classified as NAG, there is a potential that metals could leach out of it at near neutral pH levels. The primary impacts to geochemistry at the Tintina project would be as follows:

- Upon being exposed to air and water, some metal sulfides in the NAG and PAG waste rock stockpiles would oxidize and release metals,
- Upon being exposed to air and water, the wallrock in the exploration decline would release metals in acidic or even in near-neutral pH conditions. These oxidation byproducts could be mobilized by inflows during the exploration program and from rising groundwater levels after the exploration program is completed as the groundwater table rebounds, and
- Sulfide-bearing material may inadvertently be brought to the surface on equipment tires and spread along the portal patio and road surfaces.

#### ***4.2.1.3 Geochemistry Agency-Mitigated Alternative***

Tintina would line the NAG waste rock stockpile with a 60-mil liner to minimize release of geochemical byproducts and nitrogen compounds. Covering the NAG waste rock stockpile with salvaged soil and revegetation would minimize any future seepage from the NAG waste rock pad.

DEQ would require that Tintina use crushed PAG materials instead of NAG materials above the gravel layer in the PAG pad. This would decrease the amount of PAG contaminated materials that need to be placed in the decline below the hydraulic plug at permanent closure.

Tintina would sample road and other disturbance area surfaces to identify areas contaminated with PAG materials during construction of the exploration decline. PAG waste rock and PAG contaminated materials would be stored temporarily at the surface in a repository. The Agency Mitigated Alternative would require Tintina to cover the PAG waste rock pad with a low permeability material to shed the bulk of precipitation that would otherwise infiltrate into the waste rock. This would minimize seepage from the facility. Covering the PAG waste rock pad with a low permeability material would minimize the amount of water that would need to be treated during the period of inactivity.

The Agency Mitigated Alternative would require Tintina to include installation of a 60-mil liner in the NAG waste rock pad as is required in the PAG waste rock pad under the Proposed Alternative. This would minimize seepage to groundwater from the NAG waste rock pile, ensuring that any impacts to groundwater would remain below the level of significance. If Tintina defers closure, the PAG waste rock would be left on the PAG pad.

DEQ would require Tintina to install a dewatering well at the end of the decline. This well would be used to pump water from the lowest point in the decline for treatment or dewatering, if necessary, until water quality in the decline meets background water quality in the surrounding deep bedrock aquifer. DEQ will determine background based on future data collection before the decline intersects the deep bedrock aquifer. Currently, 14 samples have been collected from 5 wells and by the end of 2014 an additional 20 samples will be collected from these 5 wells which would be used to calculate baseline water quality.

At closure, PAG waste rock and PAG contaminated materials would be removed from the surface and placed in the decline. The exploration decline would be closed with a hydraulic plug above the sulfide zone to minimize cross-contamination of bedrock aquifers. All PAG material will be placed below the hydraulic plug. These mitigations will reduce long term geochemical weathering to below the level of significance.

#### **4.2.2 Groundwater Resources**

##### ***4.2.2.1 Groundwater No Action Alternative***

Groundwater in some wells naturally exceeds drinking water standards including arsenic, antimony, iron, strontium, and thallium. Impacts to groundwater from licensed exploration to date have been minimal due to Tintina's drill hole hydraulic plugging program. Under the No Action Alternative, the exploration decline would not be constructed. There would be no additional impacts from decline construction, removal of waste rock, or discharge of water. Other exploration activities could continue. More core drilling might occur from the surface.

##### ***4.2.2.2 Groundwater Proposed Action***

Potential groundwater impacts are discussed separately for development of the exploration decline, flooding of the exploration decline after closure, operation of the waste rock storage pads and seepage collection ponds, and operation of the LAD system.

##### ***Potential Impacts of the Decline Development on Groundwater Quality***

The Proposed Action would produce conditions that could degrade groundwater quality during decline development and after completion of the exploration program.

Dewatering the decline would lower the groundwater table, causing the decline to act as a groundwater sink (Figures 10 and 11). Development of the decline would first encounter the shallow bedrock aquifer. Inflows could range up to 500 gpm from the shallow bedrock aquifer (Figure 10). Tintina would attempt to grout the decline to minimize the inflow to a reasonable sustainable level with the goal of attaining inflows of about 100 gpm. (Figure 10). The water in the shallow bedrock aquifer is generally of good quality and meets all ground water quality standards, with the exception of well MW-1B, which routinely exceeds standards for arsenic and thallium.

As the decline extends into deeper bedrock (about 435 feet below the surface and 2,900 feet from the portal), it would penetrate the mineralized deposit and encounter lower permeability bedrock, less inflows, and groundwater that is of lower quality than the shallow bedrock aquifer. The major ion chemistry of the water in the sulfide zone is similar to the shallow bedrock aquifer system, but there are metals present at detectable concentrations. Arsenic, strontium, and thallium exceed groundwater standards in some wells. Aquifer test results indicate bedrock hydraulic conductivity at this depth interval would be approximately 0.015 feet/day. Calculated inflow to this section of the exploration decline is 10-12 gpm.

The 10-12 gpm inflow from the sulfide zone would mix in the underground collection sumps with 100 to 500 gpm from the shallow bedrock aquifer. As described above in section 3.2.1.4 the water quality of the water pumped from the decline would be dependent upon the ratio of

volumes of water from these two sources, as well as other factors. Tintina has estimated that blending of inflows from the two zones within the bedrock aquifer will result in compliance with all groundwater standards in water to be discharged to the LAD areas.

Dewatering and decline development would expose waste rock and mineralization in the decline to oxygen, resulting in the production of geochemical byproducts. The geochemical processes are discussed in Section 4.2.1. Nitrogen residues from blasting compounds or other metals from geochemical reactions in decline water could eventually exceed groundwater quality standards, requiring water treatment prior to land application disposal.

#### *Potential Impacts of the Decline Development on Groundwater Quantity*

A hydrologic assessment model was prepared that provides an analysis of draw-down of groundwater resulting from the construction of the exploration decline. The model uses a hydraulic conductivity of the shallow bedrock aquifer of 1 to 1.5 feet per day based on aquifer test results from test well PW-3, which is completed adjacent to the evaluation decline. The alluvial aquifer in Sheep Creek was assigned a hydraulic conductivity of 210 feet per day, based on slug test results for alluvial monitoring well MW-4A (Figure 7). The evaluation decline was modeled using a discharge specified boundary with an assumed inflow rate of 500 gpm (Figure 10) to simulate decline inflows (required pumping rates) without any grouting to reduce inflows. A second simulation was conducted with an assumed discharge rate of 100 gpm (Figure 11) to evaluate drawdown effects assuming a grouting program was in place that significantly reduced decline inflows. The 500 gpm rate is the approximate inflow rate predicted by the model using a head specified boundary for the decline. This value is near the higher end of the predicted inflows determined using analytical methods (190 - 603 gpm, Hydrometrics, 2012).

Draw down was calculated from the model simulation in both the bedrock and alluvial groundwater systems. The predicted drawdown from the 500 gpm discharge simulation extends outward from the evaluation decline, but is limited in the alluvium to the east by the higher transmissivity of the alluvial aquifer (Figure 10). The maximum drawdown (approximately 75 feet, for the 500 gpm inflow) is located just south of Coon Creek along the path of the exploration decline. The cone of depression for the 100 gpm discharge simulation is much more limited in extent and magnitude (Figure 11). The maximum drawdown over the decline in this simulation is only 10 feet and the extent of drawdown is greatly reduced.

The resultant simulations for both dewatering rates show limited potential for drawdown effects in the Sheep Creek alluvium due to the high permeability of the alluvium. In addition, the extent of draw-down predicted near the decline portal and in the Sheep Creek alluvial aquifer, may be offset by effects of re-infiltration of water in the underground LAD area, which was not evaluated in the simulation. The 100 gpm simulation predicts much more limited drawdown effects.

The high permeability of the Sheep Creek alluvial aquifer results in a hydraulic conductivity greater than 210 feet per day (about 140 times greater than that of the upper zone of the bedrock aquifer and 14,000 times greater than that of the lower zone of the bedrock aquifer). The large volume of water contained within the alluvial aquifer at those high conductivity rates would

immediately halt the expansion of any cone of depression from bedrock drawdowns. In addition, because virtually 100 percent of the groundwater removed from the bedrock aquifer is re-infiltrated to and recharges the shallow bedrock aquifer immediately south of the decline, this re-infiltration may further negate any potential impact to Sheep Creek alluvial aquifer assuming the re-infiltrated water would eventually flow into the Sheep Creek Alluvium. Thus the impact on Sheep Creek would be below the level of significance.

*Storage Capacity of the NAG and PAG Ponds*

The PAG and NAG seepage collection ponds were both designed to contain the volumes of water resulting from the average annual rainfall (17 inches) intercepted by the lined waste rock storage areas and their associated lined retention ponds, with no allowance for evaporation of water or absorption of water within the waste rock piles. In addition to these volumes associated with average annual precipitation, the ponds were also designed to retain the volumes of water resulting from a 100-year, 24-hour storm event (3.4 inches of precipitation). Both ponds, as designed, could retain these required water volumes and still have 16 to 17 percent excess capacity. These designs are conservative because: (1) actual volumes of seepage from the waste rock piles would be reduced by evaporation from the rock pile surfaces and absorption of water within the rock piles, (2) evaporation from the pond surfaces would reduce the volume of water within the ponds, and (3) water would be removed from the ponds, treated, and discharged to the land application disposal area.

More critical to NAG pond sizing than rainfall interception, however, is the proposed use of the NAG pond for storage of water pumped from the decline. Assuming the pumping rate necessary to keep the decline dewatered would be somewhere between 100 gpm and 500 gpm, the pond would have the capacity to retain between 6 and 28 days of water pumped from the decline.

*Potential Impacts of the Decline Flooding at Closure on Groundwater*

Tintina would place PAG and some NAG waste rock with a potential to release metals back in the sulfide zone of the decline after exploration is completed. As the waste rock was being placed underground, the pumps would be gradually pulled back and the backfilled portion of the decline would be allowed to flood. The controlling factor in the rate of flooding of the decline as estimated by Tintina would be the amount of time required to place the PAG backfill (about 30 days) and construct the hydraulic plug (about 5 days).

Potential impacts to groundwater quality would occur from the weathered PAG and NAG waste rock that have been placed underground. As the water table rebounds, geochemical byproducts exposed on weathered waste rock as well as the decline wallrock would dissolve, impacting water quality. Generation of additional geochemical byproducts would be short-lived. Once the sulfide zone within the decline is flooded, continued geochemical reactions would not occur because the sulfide in the waste rock and decline wallrock would not be exposed to oxygen.

There is a potential to increase metals and nitrogen compounds in groundwater in the immediate vicinity of the decline as the water table rebounds. Initially, up to 100 gpm from the upper portion of the decline, derived from the upper zone of the bedrock aquifer, would mix with 10-12

gpm inflows from the sulfide zone, derived from the lower zone of the bedrock aquifer. The water quality in the upper zone of the bedrock aquifer is of better quality than the water in the lower zone of the bedrock aquifer as discussed in Section 3.2.1.2. The decline would connect these two semi-isolated zones of the bedrock aquifer and may result in cross-contamination. As the water table rebounds, the rate of groundwater flow into and around the decline would decrease compared with inflow rates during dewatering, and would return to baseline flow rates.

Once the decline floods, it would no longer be a groundwater sink. Groundwater would reestablish its pre-existing flow path except where the decline wallrock has been grouted. Grouting would slow the flow of groundwater in the area of the decline, resulting in the majority of groundwater flowing around the decline. This would dilute any seepage of potentially impacted water from within the decline entering the surrounding bedrock aquifer.

The majority of seepage out of the decline would occur where bedrock is most permeable, within the shallow bedrock system beneath and south of Coon Creek. This seepage would mix with bedrock groundwater and flow northeast toward the Sheep Creek alluvial aquifer. The seepage would be further diluted upon mixing with alluvial groundwater. The flow of groundwater through the Sheep Creek alluvium is much greater than through the local bedrock aquifer in the area of the decline. As the groundwater flows from the bedrock to the alluvial aquifer, changes in geochemical conditions are likely to cause metals to precipitate out of the groundwater and adsorb to clay minerals in sediments.

Kinetic testing of rock from the Lower Newland Formation indicates low potential for acid generation and metal release except for materials from the USZ (Enviromin, Inc. 2013b). The potential for metals and nitrates to impact the shallow bedrock aquifer beyond the drawdown area shown in Figure 11 would be short in duration and below the level of significance.

Flooding of the underground workings would never reach a level that would discharge from the portal because the portal elevation is above the naturally occurring water table.

### Potential Impacts of Waste Rock Storage Pads and Seepage Collection Ponds on Groundwater

#### *1. Tintina does not apply for an operating permit.*

If Tintina does not apply for an operating permit, Tintina would place PAG waste rock in the sulfide zone of the decline below the water table. As discussed above, placing the PAG waste rock below the water table would prevent the generation of acidic water.

Placement of the PAG waste rock below the water table would reduce the impacts to groundwater below the level of significance. After the PAG waste rock is placed in the decline, the pad area would be regraded, soiled, and revegetated.

Waste rock storage in an unlined NAG waste rock pad may allow leakage of contaminants of concern into groundwater during installation of the decline and after the decline is closed. If Tintina does not decide to apply for an operating permit the NAG waste rock pad would be regraded, soiled, and revegetated. Revegetation with 21 inches of soil would minimize seepage long-term. Reclamation would reduce the impacts to groundwater below the level of significance. The groundwater table is approximately 100 feet below the NAG waste rock pad.

## *2. Tintina applies for an operating permit*

Tintina may decide to apply to DEQ for an operating permit based on information obtained during development of the exploration decline and associated exploration activities. If Tintina applies for an operating permit, it is likely that PAG and NAG waste rock would be left at the surface during the operating permit application process. One or both waste rock pads may be retained operationally for temporary waste rock storage.

Waste rock left on the PAG waste rock pad would weather and may generate acid mine drainage. Seepage from the PAG waste rock pad would need to be collected and treated until the PAG waste rock is placed in the exploration decline below the water table. Since the PAG waste rock pad is lined there is a minimal potential for contaminants of concern to escape. Although the leakage could escape, impacts to groundwater are unlikely because the groundwater table is approximately 100 feet below the PAG waste rock pad. Waste rock left on the NAG waste rock pad would weather and there is a minimal potential for contaminants of concern to escape. Although the seepage could escape, impacts to groundwater are unlikely because the groundwater table is approximately 100 feet below the NAG waste rock pad.

### ***4.2.2.3 Groundwater Agency-Mitigated Alternative***

DEQ has several actions that would mitigate potential impacts to groundwater including:

- Mitigating potential impacts of decline flooding
- Increasing the storage capacity of NAG and PAG ponds
- Modifying the temporary and long term waste rock storage plan
- Additional monitoring

DEQ mitigations described below would ensure that these impacts to groundwater remain below the level of significance.

Agency mitigations also would require Tintina to obtain additional baseline data during installation of the decline for use in the event that Tintina applies for an operating permit.

#### *Mitigating Potential Impacts of the Decline Flooding on Groundwater*

DEQ analyzed three scenarios for managing water in the decline after Tintina's proposed exploration project is completed. The first scenario assumes that Tintina does not apply for an operating permit and permanently closes the exploration decline. The second scenario assumes that Tintina indefinitely defers closure of the decline and continues to pump and treat the decline water. The third scenario assumes that Tintina indefinitely defers closure of the decline and allows it to flood.

### *1. Tintina does not apply for an operating permit and closes the exploration decline.*

If Tintina does not apply for an operating permit, DEQ would require all PAG waste rock be placed in the decline in the sulfide zone and below a hydraulic plug

The decline would connect the upper and lower zones of the bedrock aquifer, resulting in the possible diffusion or dispersion of contaminated water. The Agency Mitigated Alternative requires Tintina to install a hydraulic plug in the decline between the upper decline and the

sulfide zone. The hydraulic plug would consist of a steel rebar frame set into the wallrock with concrete poured into the frame.

Due to the low permeability of the concrete and surrounding grout, the hydraulic plug would form a barrier between the upper zone of the bedrock aquifer, which flows through non-acid generating rock, and the lower zone of the bedrock aquifer, which flows through potentially acid-generating sulfide rock. Cross-contamination between these semi-isolated water bearing units after the decline is flooded would be reduced to below the level of significance.

The Agency Mitigated Alternative would require Tintina to install two wells to monitor water quality in the decline. One of the wells would be placed above the hydraulic plug and the other well below the hydraulic plug. In addition to measuring water quality, the well placed below the hydraulic plug would be used to pump water from the lowest point in the decline for treatment or dewatering, if necessary, until water quality in the decline meets background water quality in the surrounding deep bedrock aquifer. DEQ will determine background based on future data collection before the decline intersects the deep bedrock aquifer.

DEQ would require Tintina to backfill the portion of the decline below Coon Creek (approximately 200 feet) with cemented waste rock backfill prior to allowing the decline to flood.

*2. Tintina indefinitely defers closure of the decline and continues to pump and treat the decline water.*

Tintina may defer closure of the decline and would continue to dewater, treat, and land apply water from the decline to continue exploration or while it applies for an operating permit.

DEQ would require Tintina to store PAG or PAG contaminated materials at the surface in a temporary repository. The repository would be built in the proposed location of the PAG pad.

Continued dewatering during this period would increase the length of time water may need treatment. The rate of water flow through the treatment plant would essentially remain unchanged, however, and no change to the treatment system would be required. Continued dewatering would also allow sulfide material in the sulfide zone and the PAG waste rock to weather for longer period of time. As a result, it may take longer for the water quality to return to background conditions after the decline is flooded. At final closure, the decline would be backfilled and closed as discussed above. Water may have to be pumped from the flooded decline and treated for a longer period of time until baseline levels are reached.

In the event that Tintina does apply for an operating permit and continues to dewater the exploration decline, the impacts on groundwater would be below the level of significance.

*3. Tintina indefinitely defers closure of the decline and allows it to flood*

Tintina may defer closure and allow the decline to flood. DEQ would require Tintina to store PAG or PAG contaminated materials at the surface in a temporary repository. The repository would be built in the proposed location of the PAG pad.

Instead of continuing to dewater, treat, and land apply water from the decline, Tintina could allow the decline to flood while it applies for an operating permit. Flooding of the decline during this period would minimize the amount of water needing treatment and minimize weathering of exposed sulfide materials. The Agency Mitigated Alternative would require the installation of a hydraulic plug between the upper non-acid generating and lower potentially acid-generating sulfide bedrock aquifers. The hydraulic plug would minimize cross-contamination between these semi-isolated water bearing units after the decline is flooded.

The Agency Mitigated Alternative would require Tintina to install two wells to monitor water quality in the decline. One of the wells would be placed above the hydraulic plug and the other well below the hydraulic plug. In addition to measuring water quality, the well placed below the hydraulic plug could be used to pump water from the lowest point in the decline for treatment or for dewatering, if necessary, until water quality in the decline meets background water quality in the surrounding deep bedrock aquifer.

DEQ would require Tintina to backfill the portion of the decline below Coon Creek (approximately 200 feet) with cemented waste rock backfill prior to allowing the decline to flood.

#### *Mitigation of the Storage Capacity of the NAG and PAG Ponds*

Because water pumped from the decline would have a greater influence on pond capacity than rainfall, DEQ has decided to impose minimum freeboard requirements for the ponds rather than requiring a minimum pond size. Water levels in both ponds would be required to be maintained such that each has the capacity to retain the 100-year 24-hour storm event plus an additional two feet of freeboard. The upper two feet of the NAG pond would provide capacity to store 1.4 million gallons of water. The volume of water associated with a 100-year 24-hour precipitation event falling on the lined catchment reporting to the NAG pond is 528,000 gallons

#### *Mitigating Potential Impacts of Waste Rock Storage Pads and Seepage Collection Ponds on Groundwater*

The Agency Mitigated Alternative would require Tintina to include installation of a 60-mil liner in the NAG waste rock pad as is required in the PAG waste rock pad under the Proposed Alternative. This would minimize seepage to groundwater from the NAG waste rock pile, ensuring that any impacts to groundwater would remain below the level of significance.

DEQ would require that Tintina use crushed PAG materials instead of NAG materials above the gravel layer in the PAG pad. This would decrease the amount of PAG contaminated materials that need to be placed in the decline below the hydraulic plug at permanent closure.

The Agency Mitigated Alternative would require Tintina to cover the PAG waste rock pad with a low permeability material to shed the bulk of precipitation that would otherwise infiltrate into the waste rock. This would minimize seepage from the facility. Covering the PAG waste rock pad with a low permeability material would minimize the amount of water that would need to be treated during the period of inactivity.

*Mitigating Potential Impacts of Land Application Discharge on Groundwater*

There is a reasonable expectation that development water would meet water quality standards without any treatment. Tintina would treat water to meet ground water standards prior to discharging water to the LAD area. The Agency Mitigated Alternative would require Tintina to include additional monitoring wells in the LAD area to detect any groundwater impacts from LAD. Monitoring wells MW-6A and MW-6B are downgradient of the LAD area and adjacent to the unnamed tributary to Little Sheep Creek (Figure 7). Monitoring well MW-7 is also downgradient of the LAD area. DEQ would identify locations for additional monitoring wells during final design of the LAD areas if needed.

These monitoring wells would document groundwater quality downgradient of the sub-surface LAD and upgradient of the nearest wetlands. If contaminants are detected in monitoring wells above DEQ-7 standards for groundwater, Tintina would be required to modify the LAD system to reduce or limit the impacts below the level of significance. Also, if water quality changes in the monitoring or test wells indicate that further LAD is likely to result in migration of contaminants into surface water, then DEQ would require that either the LAD system be modified to prevent any effects on surface water, or discharge would cease until an MPDES surface water discharge permit could be obtained.

Additionally, DEQ would require one surface water monitoring site (SW-6) to have an increased monitoring frequency from quarterly to monthly (Table 2). The purpose of this increased monitoring is to document surface water quality at the closest surface water sampling point downgradient to the LAD system. If contaminants from LAD are detected in surface water, Tintina would be required to modify the LAD system to prevent discharge to surface water. This would ensure impacts remain below the level of significance.

DEQ would require additional monitoring of water discharged to the LAD system after treatment. Tintina would measure field parameters and collect water samples on a weekly basis for analytical laboratory analysis at the entry point to the LAD system. If Tintina receives a preliminary laboratory report showing that a contaminant has exceeded standards, it would be required to notify DEQ within 3 working days and submit a corrective action plan for addressing the exceedances. For example, the corrective action plan may consist of resampling to determine if there actually is an exceedance, cessation of the discharge to the LAD, and/or modifications to the treatment system.

DEQ would require that discharge of decline development water to the LAD areas meet groundwater quality standards. Development water may require water treatment prior to disposal in the LAD areas. Most background water quality sample laboratory results show contaminants of concern below WQB-7 standards. Three sampling locations (PW-4, MW-3, and MW-1B) have yielded samples with slightly elevated levels of thallium, arsenic, and strontium. Geochemical tests have shown that the pH levels of water exposed to the sulfide-bearing rocks remain above 7 during kinetic tests. Tintina has proposed a feasible water management plan including dilution, seepage collection pond storage, recirculation within the underground workings, and decline flooding (Section 4.2.2.2) to decrease concentrations of contaminants of concern to below water quality standards.

Although DEQ believes water treatment would not be needed initially, out of an abundance of caution, Tintina would be required to have a temporary treatment plant on-site before the decline advances beyond 1,500 feet. The temporary treatment plant would be available, in standby mode, at the first indication that actual development water does not meet discharge standards. This would ensure that impacts to groundwater would remain below the level of significance.

The other potential contaminant of concern is nitrogen compounds from blasting residues. Tintina would be required to treat these compounds if they exceeded groundwater standards, except that water with higher nitrate levels could be applied in the surface LAD areas during summer months.

#### Additional Monitoring of Potential Impacts on Groundwater

DEQ predicts that groundwater impacts would be below the level of significance based on the monitoring and mitigations discussed above. However, DEQ would require additional monitoring to verify this prediction.

Additional groundwater monitoring under the Agency Mitigated Alternative would document baseline flow and quality and measure potential impacts from construction of the decline. The additional groundwater monitoring would begin immediately and continue until further written notice from DEQ. Tintina would be required to report hydrogeologic data to DEQ quarterly.

The Agency Mitigated Alternative requires additional monitoring of flow at eight springs near the proposed decline (Table 2). The frequency of monitoring water levels at natural springs (SP-1, SP-2, SP-3, SP-4 and SP-6) and three developed springs (DS-2, DS-3 and DS-4) would be increased from annually to monthly. The purpose of the increased monitoring frequency is to detect any impacts of dewatering the decline on the area springs. If impacts to water rights are documented Tintina would be required to replace the water supply as required by Section 82-4-355, MCA.

The Agency Mitigated Alternative requires additional water level monitoring at points near the proposed decline (Table 2). The frequency of water level monitoring would be increased from quarterly to monthly. The purpose of this increased monitoring frequency is to measure the amount that the local groundwater table is depressed as a result of dewatering the decline. If this impact is different than the projected impact from the dewatering model, then Tintina would use the data to recalibrate the model (Figures 10 and 11). Impacts to groundwater would be below the level of significance even if the model predictions are different than the actual drawdown because the proposed exploration activity is of short duration.

If the alluvial groundwater table is depressed near any wetlands, seeps, or springs, then DEQ would require a corrective action plan to mitigate the groundwater impact before any surface water impacts can occur. Impacts to flows in Coon Creek are not predicted to result from construction and dewatering of the Tintina's proposed exploration decline (Tintina 2013d).

DEQ would require increased frequency of monitoring of stream flow in Coon Creek above and below the location where the decline would pass beneath the creek. Additional piezometers have

been installed near Coon Creek to monitor shallow groundwater in the alluvium and wetland areas in order to detect alluvial groundwater drawdown that may result in stream flow impacts.

The Agency Mitigated Alternative requires additional monitoring at groundwater pumping and observation wells in the project area (Table 2). Water levels at pumping wells PW-1, PW-2, PW-3, and PW-4 and at observation wells, SC11-032, SC11-09, SC11-031, and SC12-116, would be required monthly. Field parameters and water samples for analytical laboratory analysis would be required quarterly from pumping wells PW-1, PW-2, PW-3, and PW-4. The purpose of this increased monitoring is to document baseline and operational chemistry and groundwater levels for use in the event that Tintina applies for an operating permit.

DEQ would require Tintina to have a temporary treatment plant on-site before the decline advances beyond 1,500 feet. The temporary treatment plant would be available at the first indication that actual development water does not meet DEQ-7 standards.

### **4.2.3 Wetlands and Riparian Area Resources**

#### ***4.2.3.1 Wetlands and Riparian Areas No Action Alternative***

Wetlands in the Project area are described in Section 3.4.1 and are shown in Figure 7. Wetlands have been impacted by grazing, and dewatering for producing hay. Wetlands are unimpaired by exploration activities to date.

#### ***4.2.3.2 Wetlands and Riparian Areas Proposed Action***

An assessment of drawdown effects from the proposed exploration decline shows minimal potential for impacts to existing wetlands with inflows from 100 to 500 gpm or less along Coon Creek and the main valley of Sheep Creek. Aquifer testing indicated drawdown would be isolated to the area immediately above the decline (Figure 9). Surface water monitoring during the aquifer test showed no connection between the shallow bedrock aquifer and surface water. Recharge of other outlying wetlands in nearby drainages are derived from springs associated with bedrock strata at higher elevations than the shallow groundwater system associated with the decline, therefore no impacts are anticipated in these more distal wetlands.

A general survey of wetlands was conducted for the Black Butte Copper Project in September 2011 (Figure 7). The purpose of the survey was to identify and document all potential wetland sites in the Black Butte Copper Project Area that might meet jurisdictional wetland criteria, based on apparent hydrophytic vegetative cover, soil, and apparent site hydrology. The wetland survey conducted was intended as a reference for avoiding wetlands in project planning. As designed, this exploration phase of the Black Butte Copper Project would not disturb or impact directly or indirectly any potential wetland areas identified in the September 2011 wetland survey. In addition, the Black Butte Copper Project is not proposing to dredge or place any fill in waterways, wetlands, or other Waters of the U.S.

The exploration decline would pass approximately 90 feet below the Coon Creek tributary of Sheep Creek about 2,400 feet in from the portal (Figure 7). Shallow bedrock at test well PW-3, which is located along the decline trend adjacent to Coon Creek, encountered minimal

groundwater in the upper 75 feet of the borehole suggesting that dewatering of the deeper decline would have minimal impact on Coon Creek flow, and that there would be low risk of dewatering its associated wetlands.

This is because the zone of 25 feet between the shallow alluvial aquifer and the bedrock aquifer is not saturated and contains only minor amounts of perched groundwater (selective sedimentary layer or fracture controlled) water. Because the bedrock and shallow alluvial aquifer are not hydrologically connected, draw-down of the bedrock aquifer should not impact the shallow alluvial aquifer or wetlands. These results were verified by the aquifer pump tests in that there were no reduced flows in Coon Creek from the pump test.

Tintina has proposed to install paired piezometers in the wetlands near where the decline passes beneath Coon Creek during the spring of 2014. The pair of piezometers will verify if groundwater movement is vertical and wetlands are being supplied with water from below or if water supply is predominantly horizontal along the stream flow-path. Vertical flow of groundwater is not supported based on a 25 foot thick unsaturated zone between the surface wetland and the underlying regional groundwater table.

Fractures at the decline level in this area would be grouted to further minimize the potential for inflow into the underground workings and further reduce or eliminate the potential for impact to surface water flow or wetlands near Coon Creek. In addition, no impacts to surface water quantity or to wetlands in the main Sheep Creek valley are predicted to result from bedrock dewatering the decline through the range of pumping rates evaluated (100 to 500 gpm). This conclusion is based on near surface saturated conditions and the extremely high hydraulic conductivity (>200 feet per day) of the thick alluvial aquifer in the valley when compared with the bedrock aquifer (between 0.010 and 2.2 feet per day).

Tintina would implement mitigation if necessary to prevent any adverse impacts to wetlands in these areas. Mitigation can be implemented either through grouting controls to reduce exploration decline inflows, or through re-infiltration of treated groundwater to the shallow bedrock aquifer up-gradient of wetlands, in order to maintain water supply to the wetlands. However, impacts to wetlands in the Coon Creek area are not predicted based on the results of aquifer testing, which indicates that there is no connection between the shallow alluvial (wetland) aquifer and the bedrock aquifer in this area.

In Sections 4.2.1.3 and 4.2.2.3, DEQ concludes that surface water and groundwater resources in wetlands would not be impacted by the proposed exploration program. Tintina has a surface water monitoring network in place that would be used to monitor for drawdown effects during exploration activities. DEQ would require additional groundwater monitoring between the proposed decline and the closest wetlands that would verify groundwater impacts between the decline and wetlands and to assess the wetlands water source. (Table 2).

No US Army Corps of Engineers (USAC) or DEQ permits for wetland disturbance are needed.

The wetlands located down-gradient of the decline portal along the unnamed tributary of Little Sheep Creek appear to be recharged by groundwater from the alluvial aquifer but there were no localized springs identified on these lower stream reaches within the inventory area. These

wetlands are also located down-gradient of the underground LAD infiltration galleries. Increased flow to, or the formation of, seeps and springs down-gradient of the LAD areas cannot be authorized under an exploration license. Discharge to surface waters or wetlands would require a Montana Pollution Discharge Elimination System (MPDES) permit. Down-gradient areas in the vicinity of Little Sheep Creek are proposed for frequent monitoring of bedrock and alluvial aquifers, and surface water quality, as a condition of the approval of the exploration decline.

#### ***4.2.3.3 Wetlands and Riparian Areas Agency Mitigated Alternative***

Same as proposed action.

### **4.2.4 Surface Water Resources**

#### ***4.2.4.1 Surface Water No Action Alternative***

The existing impairment of Sheep Creek for elevated levels of fecal coliform bacteria, which is possibly related to livestock grazing, would remain. Water quality standards in streams in the project area are infrequently exceeded for aluminum, and thallium during high runoff events. Under the No Action Alternative no exploration decline would be constructed. Thus, there would be no impacts from; decline construction, removal of waste rock and a bulk sample, potential reduction of stream base flow due to the lowering of the groundwater table, or potential increases in surface water flow or chemistry due to land application. Other exploration activities could continue. More core drilling might occur from the surface.

#### ***4.2.4.2 Surface Water Proposed Action***

There are no predicted impacts to existing surface water quality and quantity from dewatering associated with construction of the exploration decline. Water flowing into the decline would be primarily derived from the shallow bedrock aquifer. This water would be pumped out of the decline, treated if necessary, and disposed of via LAD. The dewatering associated with the construction of the exploration decline would result in the drawdown of the groundwater table.

Drawdown analysis indicates that at a pumping rate of 100 gpm, the cone of depression associated with dewatering the bedrock aquifer in the vicinity of the decline (hydraulic conductivity between 0.010 and 2.2 feet per day) would not extend beyond the shallow bedrock aquifer and would not impact the Sheep Creek alluvial aquifer. In addition, even under higher dewatering rates (as much as 500 gpm) if the cone of depression extended to the Sheep Creek alluvial aquifer, the high permeability of the Sheep Creek alluvial aquifer (hydraulic conductivity >200 feet per day) and the large volume of water contained within the alluvial aquifer would limit the extent of drawdown in the direction of Sheep Creek. Thus the impact on Sheep Creek would be below the level of significance.

Drawdown effects are most likely to occur where the exploration decline would pass beneath Coon Creek, a tributary of Sheep Creek, and its associated wetlands.

As was observed in PW-3, the bedrock zone between the Coon Creek alluvial aquifer and the underlying bedrock regional groundwater table are separated by at least 24 feet of unsaturated

ground. Thus the alluvial aquifer and the underlying regional bedrock hosted groundwater table are not hydrologically connected in the vicinity of the decline passing beneath Coon Creek. No impacts to surface water flow were seen during the 72 hour pump test of PW-3. This also shows that wetlands adjacent to Coon Creek would not be impacted in the vicinity groundwater drawdown in this area. This hypothesis will be tested in early 2014 by installing pairs of piezometers in the Coon Creek wetland designed to determine if the flow in the wetlands is lateral from seeps and springs or vertical. The evidence shows that a lateral source of water flow supplies the wetlands in the upper Coon Creek area. The larger wetland areas along Coon Creek are far upstream from where the decline would cross beneath the creek, and thus are not likely to be affected by groundwater drawdown.

Estimated drawdown effects are relatively minor in surrounding drainages and in upstream springs and wetlands in Coon Creek and other drainages near the Sheep Creek hay meadow area. Recharge to wetlands near the proposed decline are derived from bedrock strata at higher elevations than the shallow zone of the bedrock aquifer near the decline, therefore no impacts are anticipated in these more distal wetland areas. In addition, higher elevation springs are often supplied by smaller localized aquifer systems that are perched above the deeper bedrock aquifers. Flow in these springs is maintained by local precipitation recharge and therefore may be subject to seasonal and annual variability. For these reasons no impacts are anticipated in these more distal wetland areas. Also, because these springs are located at a higher elevation than the decline, groundwater would not discharge from the flooded decline to these springs after closure.

The Proposed Action also includes operational elements that mitigate impacts to surface water below the level of significance. Tintina would use standard mining techniques such as controlled blasting, grouting, and ground support to reduce the potential for impacts to Coon Creek. Bedrock integrity is essential in mining from an operational, environmental, safety, and regulatory standpoint. The integrity of the bedrock can be maintained by using controlled blasting to minimize over-break (excavation/fragmentation outside the planned 18' by 18' dimension of the decline), reduce ground vibrations, and reduce fracturing within bedrock. Minimal fractures and over-break, less ground support, and safety can be achieved by selecting and employing proper blast design, and precise/accurate timing delays of the charges. These practices would provide maximum protection of the bedrock and preserve as much as possible its original strength, thereby reducing the potential for impacts to Coon Creek.

Tintina would grout significant water bearing features along the decline beneath Coon Creek to minimize groundwater inflows into the underground workings and the potential to impact surface water. Pressure grouting would seal fractures tens of feet beyond the decline perimeter. For these reasons, grouting would reduce groundwater inflow into the decline.

Tintina would use "ground support" to stabilize areas with more intense fracturing or poor ground conditions. Ground support techniques may include the use of rock bolts, shotcrete, and screen meshes to assure structural integrity of the decline. While the primary purpose of ground support is to protect workers from rock fall, a secondary benefit is limiting fracturing of wallrock during operations.

The combination of the hydrogeologic conditions described above plus the proposed operational elements would result in potential impacts to wetlands and flows in Coon Creek during operations that are below the level of significance.

Tintina has a surface water and groundwater monitoring plan in place that would be used to monitor water quality and drawdown effects during exploration activities (Figures 6 and 7). Monitoring would verify the extent of the groundwater drawdown between the decline and Coon Creek, and the flow in Coon Creek.

Increased flow to, or the formation of, seeps and springs down-gradient of the LAD areas cannot be authorized under an exploration license. Discharge to surface waters or wetlands would require a Montana Pollution Discharge Elimination System (MPDES) permit. Down-gradient areas in the vicinity of Little Sheep Creek are proposed for frequent monitoring of bedrock and alluvial aquifers, and surface water quality, as a condition of the approval of the exploration decline. Tintina would treat water, if necessary, to meet groundwater standards prior to discharging water to the LAD area.

If the land application disposal areas are not properly managed, mounding of groundwater beneath the LAD sites could result in the formation of seeps and springs and migration of the land applied water through the shallow groundwater system and into surface waters. Surface water flow within the unnamed tributary to Little Sheep Creek could increase. Water would be treated, as necessary, to achieve compliance with all groundwater standards prior to discharge. Aquatic life criteria for surface water are more stringent than groundwater standards for some parameters, and as a result, exceedance of aquatic life criteria within this tributary to Little Sheep Creek would be a possibility.

Discharge of land applied water to surface water can be avoided through proper management of the LAD area, including:

- monitor groundwater levels and quality surrounding the LAD area
- daily inspection of the LAD system
- rotate use of different zones of the LAD area to avoid saturation
- limit the volume of discharge to LAD areas such that water levels and quality are not affected
- minimize water volumes requiring discharge by effective grouting of inflows in the decline
- rely on surface irrigation rather than use of the underground LAD during summer months (surface irrigation can be operated such that the majority of the water is consumed by evapotranspiration and does not enter groundwater)
- temporary storage of water in the pond system during winter months when surface irrigation is not effective
- modify or expand of the LAD areas as necessary to disperse the actual volume of water produced without reporting to surface water

If grouting and other water management methods cannot keep the water volume to sufficiently low levels such that discharge to surface water can be avoided, then Tintina would be required

to acquire an MPDES surface water discharge permit prior to continuing to operate the LAD system.

Tintina would use BMPs to control runoff and limit sediment discharge to surface water to a level below significance. Typical BMPs such as silt fences, rock check dams, settling ponds, and straw wattles reduce runoff velocity and sediment transport. BMPs are proven techniques to control erosion from sediment sources.

With respect to storm water, Tintina is required to submit a Storm Water Pollution Prevention Plan (SWPPP) designed to protect state surface water from pollutants, primarily sediment. The storm water permitting program focuses on storm water discharge associated principally with construction activity and must be in place prior to any surface disturbance activities at the site. In Montana the DEQ Water Protection Bureau (WPB) administers Storm Water Permitting through the Montana Pollutant Discharge Elimination System (MPDES) Program.

A SWPPP would be developed and implemented by Tintina. A SWPPP consists of three major components: 1) assessing the characteristics of the site, 2) identifying potential sources of pollutants such as sediment from disturbed areas, and 3) identifying Best Management Practices (BMPs), which will be used to minimize or eliminate the potential for these pollutants to reach surface waters through storm water runoff. There are four general principles that must be abided by as part of the permitting process.

- There must be no discharge of process wastewater pollutants to state surface waters.
- Any discharge to state surface waters must be composed entirely of storm water generated by rainfall precipitation and snowmelt
- A discharge of storm water must not cause or contribute to a violation of water quality standards.
- Tintina must implement and maintain all BMPs and storm water management controls in accordance with the requirements of the General Permit

Figure 17 of the Amendment to Exploration License 00710 (Tintina 2013a) is a map that shows a very general drainage plan for the project site along with a few infiltration stilling basins as BMPs designed to deposit and trap sediment from storm water. The SWPPP submitted to the Water Protection Bureau will consist of a much more comprehensive plan integrating site facilities with drainage pathways and BMPs, will describe routing maintenance to be performed and provide for routine inspections of BMPs

#### Closure of the Decline after Exploration is Completed

Tintina proposes to backfill the PAG and some NAG waste rock in the decline below the water table, including the segment of the decline beneath Coon Creek. Backfilling would reduce the potential for subsidence by filling the void space in the decline. There would be no long term impacts to surface water quantity or wetlands.

Recharge to wetland features in upper Coon Creek and surrounding drainages is derived from bedrock strata at higher elevations than the shallow groundwater system associated with the decline. There would be no impacts in these more distal wetland areas.

#### **4.2.4.3 Surface Water Agency-Mitigated Alternative**

Instead of using modeling to predict potential impacts to Sheep Creek, DEQ would rely on empirical data to ensure the impact to surface water would be below the level of significance. DEQ defines the degradation of surface water due to change in flow as a 10 percent change in the lowest flow averaged over any 7 day period during a ten year period (7Q10). See the Montana Water Quality Act (WQA) (ARM 17.30.715 (1)(a)).

Any change in stream flow less than 10 percent of the 7Q10 is considered below the level of significance pursuant to the WQA. DEQ would:

- require that Tintina not change flow in Sheep Creek by more than the non-degradation criteria for water volume, which is a change of 10 percent to the lowest measured or calculated flow that occurs over a 7-day period during a 10-year cycle (7Q10). Low flow in Sheep Creek at site SW-1<sup>1</sup> is 8 to 8.6 cfs therefore the non-degradation threshold for a 7Q10 flow of 8 to 8.6 cfs would be 359 to 386 gpm.
- require Tintina to monitor alluvial groundwater levels in Sheep Creek at multiple locations in the main part of the valley and along the valley's western edge in an area where dewatering impacts would most likely be evident should they occur. DEQ would then compare water level changes over time to document effects, if any, to alluvial water supplies in Sheep Creek; and
- if impacts to flow in Sheep Creek are identified via the monitoring described above, DEQ would require that Tintina revise their dewatering and water disposal plans. Groundwater could be pumped from dewatering wells adjacent to the decline. Tintina would treat the produced water if necessary to comply with standards, and inject the water in the shallow bedrock underlying the Sheep Creek alluvial aquifer, thereby mitigating any decrease in water levels measured in the Sheep Creek alluvium caused by dewatering.

If the alluvial groundwater table is depressed near any wetlands, seeps, or springs, then DEQ would require a corrective action plan to mitigate the groundwater impact before any surface water impacts can occur. Examples of corrective action could include cessation of dewatering, additional grouting below the area impacted, or replacement of flow to the surface water system. Impacts to flows in Coon Creek are not predicted to result from construction and dewatering of the Tintina's proposed exploration decline (Tintina 2013d).

DEQ would require increased frequency of monitoring of stream flow in Coon Creek above and below the location where the decline would pass beneath the creek. Additional piezometers have been installed near Coon Creek to monitor shallow groundwater in the alluvium and wetland areas in order to detect alluvial groundwater drawdown that may result in stream flow impacts.

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<sup>1</sup> The 7Q10 low flow of Sheep Creek was calculated for upstream monitoring site SW-2, where the USGS operated a gaging station between 1941 and 1972. The 7Q10 flow for Sheep Creek adjacent to the Black Butte project area was then estimated by multiplying the calculated 7Q10 value at SW-2 (4.9 cfs) by the ratio of the drainage areas upstream of SW-2 versus SW-1. The watershed above SW-1 is 75 percent larger than that above SW-2, resulting in a 7Q10 estimate at SW-1 of 8.6 cfs

DEQ would require Tintina to backfill the portion of the decline below Coon Creek (approximately 200 feet) with cemented waste rock backfill prior to allowing the decline to flood.

#### **4.2.5 Soil Resources**

##### ***4.2.5.1 Soils No Action Alternative***

Under the No Action Alternative no exploration decline would be constructed. There would be no additional impacts from decline construction, removal of waste rock and a bulk sample, or discharge of water. Other exploration activities could continue. More core drilling might occur on the surface as well as additional roads.

All exploration activities would have to be reclaimed by replacing stockpiled soils and seeding except the core shed area which would be left for use by the land owner. Soil impacts on the 5.1 acres of exploration disturbances include the typical loss of soil development, disruption of the soil profile, increased compaction, loss of soil structure, reduction in organic matter content, reduction in soil productivity, and reduction in soil biological communities. Salvage and replacement of soil would reduce these impacts. This is an unavoidable impact of allowing soil disturbance similar to farming. Revegetation to date of reclaimed exploration soil disturbances indicates the disturbed soils can be successfully revegetated to control erosion.

##### ***4.2.5.2 Soils Proposed Action***

Soil impacts on the additional 46.5 acres of exploration disturbances would be the same as those on existing disturbances. All of the proposed surface disturbances associated with the exploration license amendment would occur within the Copenhagen soil type, mapping unit 1175D. This is a shallow soil with a clay-loam surface horizon to a depth of about 7 inches below ground surface. Subsoil textures range from clay-loam to sandy clay-loam with about 16 percent coarse fragments to depths of around 20 inches. Bedrock is encountered below this depth. Salvageable soil volumes are limited mostly by the shallow depth to bedrock. The fine textured surface horizons may require amelioration with mulch or other organic amendments and fertilizer to enhance successful revegetation.

Undisturbed soils and the weathered bedrock in the Project area may be contributing to the baseline metal concentrations measured in surface water or groundwater. Metals such as aluminum, antimony, barium, copper, iron, and manganese could be mobilized from area soils and bedrock. Metal mobilization from area soils and bedrock would not be significant during the Proposed Action because:

- the water disposal in the LAD area would be of relatively short duration
- the volume of water expected to be disposed is only 100-500 gpm
- the underground LAD areas are designed to handle up to 1,800 gpm.
- in the surface LAD area some of the water would be consumed through evapotranspiration instead of discharging to area soils
- the water applied would meet groundwater standards

Soil sampling to date is adequate for the evaluation of the proposed exploration license amendment.

Proposed BMPs to control erosion would limit concentrations exceeding standards in runoff from stockpiled soil, LAD areas, or reclaimed areas.

### Soil Slumping

Development of the portal pad and LAD would increase the potential for soil slumping. Observations were made on the location, size, and nature of areas of naturally occurring surface slumping throughout the project area. In general, surface slumping is restricted to areas underlain by Paleozoic sedimentary rocks to the north of the Project area, north of the Volcano Valley Fault (Figures 6 and 7).

Surface soil and subsoil down to bedrock would be removed from the roadbed and portal pad areas prior to construction of the portal pad. The portal pad site would be excavated into bedrock, and constructed of excavated bedrock fill material, supplemented by subsoil and imported fill material (gravel) and/or select net-neutralizing NAG waste rock, if this material is proven to be suitable for construction with respect to metal mobility.

### Soil Salvage and Replacement

Soil salvage and replacement would minimize soil impacts. Topsoil and subsoil would be stripped from all areas to be disturbed prior to land disturbance (i.e., waste rock storage areas, roads, ponds, soil stockpile areas). Salvaged topsoil and subsoil would be stockpiled separately and BMPs would be installed to control erosion. Soil stockpiles would be revegetated to limit weed invasion and water/wind erosion until they are scheduled for use in closure. Snow fencing would be used to minimize snow accumulations on the soil piles.

Soil stockpiles would be marked and constructed with 2.5H:1V side slopes, 3H:1V access ramps, and incrementally stabilized to minimize erosion. Broadcast seeding would be conducted during the first appropriate season following stockpiling. Fertilizer and mulch would be applied to the piles as necessary. The estimated life of each stockpile is the life of the decline.

Soil salvage quantities would be limited by slope, shallow depth to bedrock, and limited areas of exposed bedrock at the decline site. Subsoils containing coarse fragments in excess of 50 percent by volume would be salvaged for use in reclamation to ensure that no offsite soil would be required.

Topsoil stockpiles would be strategically located to ensure that topsoil derived from areas of similar slope to the original topographic slope angle would be used to reclaim the sites in closure. Subsoil from the portal patio construction area would be placed downgradient of the disturbance in berms for sediment and erosion and rock roll control. Topsoil and subsoil from the seepage collection ponds would be stored in parallel berms downgradient of the facilities for similar reasons. Subsoil from the waste rock pads would be stored in a pile to the northwest of the waste rock pads. The access road topsoil would be stored in windrows above the road, and subsoils would be stored in berms below the road or used to provide fill for the slope material for the roads.

### Soil Testing and Redistribution

Prior to soil redistribution, compacted areas (especially the access roads) would be ripped to relieve compaction. This would eliminate potential slippage on layer contacts and promote a hospitable root zone. Soil materials would be applied in lifts as thick as possible to decrease compaction. Stockpiled soil would be tested before respreading to identify what, if any, deficiencies or limitations in soil physical and chemical properties exist that might affect plant growth. Appropriate fertilizer, liming, organic matter, and other amendments would be determined prior to use for reclamation.

Soils would be redistributed to achieve a uniform thickness, reduce compaction, and minimize deterioration of chemical and physical soil properties. Subsoil would be redistributed evenly over the disturbed area, allowing an average redistribution depth of approximately 15 inches of subsoil. Six inches of topsoil would be placed on top of the subsoil in a second lift providing roughly 21 inches of plant growth medium. Reclamation of exploration disturbances to date on the site shows the suitability of area soils for reclamation of the site. Impacts to areas soils would be the same as the No Action Alternative but additional acres would be disturbed.

There is a material balance issue related to the construction of the portal patio. The portal patio requires 64,700 cubic yards of fill and only 19,900 cubic yards can be obtained from cuts on the portal pad. Therefore, there is a 44,800 cubic yard difference or deficit of material. Tintina proposes to take the 16,900 cubic yards of subsoil stripped from the waste rock pads and use it to construct the portal pad, to bring the deficit amount of material to 28,900 cubic yards that would have to be imported from offsite. In closure, Tintina would place a 3-foot lift of clean fill on top of the remaining portion of the 3.8 acre NAG pile. This requires about 18,500 cubic yards of additional material that would need to be placed on the portal patio.

Tintina would reclaim the site to its original topographic configuration, except the excess material from the portal pad (28,900 cubic yards) would modify the post-closure topography slightly in two areas.

### Soil Suitability for Land Application of Water

Improper management of the LAD system would increase the potential for soil slumping, soil contamination, and leaching of contaminants to surface and groundwater. Ten areas were evaluated for potential operation of LAD systems based on soil type, landscape position, and hydraulic properties (Figure 12). These areas are located in the vicinity of the decline.

Constant head tests were conducted using double-ring infiltrometers (ASTM D 3385-88) to measure saturated hydraulic conductivity of surface soil and shallow subsoil. These data were used to evaluate the suitability of different locations for construction and operation of surface and LAD systems such as sprinkler irrigation systems to dispose of excess water. Approximately 12 feet below ground surface, falling head percolation test pits were also used to measure hydraulic conductivity of underlying geologic materials to evaluate the suitability for deeper LAD systems.

The conceptual maximum LAD application rates that can be expected based on LAD system discharge area and site-specific infiltration rate/saturated hydraulic conductivity values were evaluated. Potential soil stability, changes to downgradient water quality, and other factors were also considered. These factors would be monitored during LAD operations and discharge volumes would be adjusted to avoid adverse impacts.

The water to be applied in the in the underground or surface LAD systems may include decline groundwater inflows influenced by bedrock units; water collected in the NAG seepage collection pond; drill sump water following removal of suspended solids; and any water from treatment systems that would meet groundwater standards for discharge. PAG seepage would likely need treatment before discharging to groundwater. Because the underground LAD system has considerable excess capacity, the primary use of the surface LAD system might be to discharge nitrogen-rich waters that exceed the groundwater standards.

In general, surface soil horizons have limited ability to infiltrate water, hydraulic conductivities decrease with depth within the soil profile due to higher clay concentrations that increase with depth. Surface LAD would not be optimal in these areas and would only be possible on a seasonal basis and of limited duration due to surface soil saturation. This is consistent with NRCS data which rate these soils' ability to infiltrate water as "very limited" due to slow water movement based on modeled results (NRCS, 2011). Soil at location J is sandy and infiltrated water more quickly compared to other area soils.

At locations F, H, and I, the shallow Copenhagen soil type 1175D overlies highly fractured Precambrian shale. The shale has relatively high hydraulic conductivities and locations F, H, and I are proximate to the portal area. Location K was not investigated during field activities but is inferred to have similar soil and parent material properties as locations H and I based on its location, vegetation, and landscape position.

Slope angles in the proposed subsurface drainfield's areas range from 1 percent in location F, 3 percent in areas K and I, to 6 percent in location H. These slope angles would minimize risk of slumping in these areas from shallow (4-6 feet deep) saturated conditions in underlying fractured bedrock. In addition, the shale in these areas strikes about N15°E and dips about 6° N. These bedrock dip directions are orientated directly opposite to the slope direction in area H. Areas K and I are at an angle of 90° to the slope direction, which would limit the formation of near surface slumps. These locations (H, I, and K) would also be favorable for operation of a subsurface LAD system.

The average hydraulic conductivity calculated for the two deep percolation test pits in location F is 22 ft/day. Location F has the capacity to percolate about 4,887 gpm per acre of LAD system trenching two feet deep at the surface of or within the fractured shale parent material. A LAD system could be located near the top of the broad ridge at location F and designed to dispose of the actual volume of water to be discharged.

It is not technically possible to discharge water evenly across the entire LAD area using a subsurface piping system unless pressure compensating valves are used for water flow controls in the lateral lines and careful monitoring tracks soil saturation throughout the LAD field. Tintina would monitor mounding effects from LAD through a series of piezometers installed in the LAD infiltration areas and would route water to alternate areas if monitoring shows evidence of excessive mounding or soil instability. The discharge rates described for such a system should be considered the maximum volume possible per unit LAD trenching area and not the amount possible per total unit land surface area.

Similar percolation rates were measured for locations H and I located to the southeast and on the opposite side of the surface water divide from location F. Percolation rates measured at location H ranged from 32 ft/day to 450 ft/day. Percolation at location I was 26 ft/day. It is likely that the high percolation rate of 450 ft/day measured at the eastern end of location H is due to isolated fracture conditions in the underlying bedrock. The conservative rate of 32 ft/day would be used to represent this location during calculation of likely water disposal rates. Based on these data the water disposal capacities of locations H and I per acre of LAD system trenching are 7,241 GPM and 5,924 gpm, respectively. Instability related impacts to downgradient wetlands are not anticipated because these are low gradient wetlands and show no evidence of slumping or soil instabilities. Since the infiltration capacity of the soils in the LAD area greatly exceeds disposal demands, oversaturation of the soils is unlikely. Soil saturation would be monitored through a series of piezometers in LAD area I. If the active LAD areas show evidence of excessive mounding, then water would be rerouted to alternate areas as needed to avoid oversaturation of the soils.

Using the average water disposal capacities determined for locations F, H, and I gives an overall capacity of 6,000 gpm per acre of LAD trenching for the area of soil mapping unit 1175D located south of the decline portal along the broad ridge separating Little Sheep Creek and Coon Creek. Additional water disposal capacity would be available by operating a subsurface LAD system in locations K and J. Geochemical testing of the gabbro that underlies location E would be warranted should this site be selected for installation of a subsurface LAD system in the future, to evaluate its potential to contribute to metal loading during LAD operations prior to discharging water in this area.

It would also be possible to discharge water using surface drip emitters or a surface wheel-line sprinkler irrigation-type LAD system on a limited seasonal basis. The preferred locations for such systems are F and J due to the highly transmissive sandy soil that is present in these locations. The soil in area J overlies fractured igneous rock which percolates water at a rapid rate. Water applied to the soil surface would infiltrate and percolate at a rate limited by the most restrictive soil or lithic horizon encountered along the flow path. At location J, the soil surface and the underlying bedrock have similar hydraulic conductivities, about 10.3 feet/day. This equates to a water disposal capacity of about 2,300 gpm per acre of land surface for the 9 acre site.

Additional locations that could be considered for surface irrigation-type LAD systems are locations A and F (depending on whether a subsurface LAD system was operating at location F). Location A could be considered for irrigation due to the size and relative flatness of this area as well as its distance from seeps/springs. Operation of such a system at location F would also be possible due to shallow soil thickness and high conductivity of the underlying shale. At location A, the average saturated hydraulic conductivity is restricted by the underlying paralithic material (0.07 ft/day) which equates to a continuous infiltration rate of 15 gpm per acre. Using the same calculations and data for location F gives a range of infiltration rate of 270 gpm per acre.

The predicted inflow into the decline during aquifer tests is over 500 gpm. Tintina will attempt to grout the decline to minimize inflow to a reasonable sustainable level with a goal of reducing flows to about 100-500 gpm. The LAD system is designed for up to 1,800 gpm. Tintina would only discharge water that meets groundwater standards. No surface water or wetland impacts are predicted. The LAD system is designed to limit the potential for soil contamination and leaching of contaminants into groundwater. Tintina would monitor LAD area usage using piezometers located in the LAD areas (Figure 7). No soil monitoring is proposed to quantify soil contaminant levels from LAD during the exploration program.

#### **4.2.5.3 Soils Agency-Mitigated Alternative**

DEQ would require Tintina to map and isolate the subsoil cell stored in the portal pad. The subsoil would be located such that it would not be impacted by PAG materials that may be brought out of the decline on vehicles or from spillage during decline development.

#### **4.2.6 Vegetation Resources**

##### **4.2.6.1 Vegetation No Action Alternative**

Vegetation has been affected by historic grazing. Licensed exploration activities have disturbed 5.1 acres. No exploration decline would be constructed. There would be no additional impacts from decline construction, removal of waste rock and a bulk sample, or discharge of water. Other exploration activities could continue. More core drilling might occur on the surface including road construction.

All exploration activities would have to be reclaimed by replacing stockpiled soils and revegetation with a native seed mix, except the core shed area which would be left for use by the rancher. Vegetation impacts on the 5.1 acres of exploration disturbances include the loss of native plant communities, temporary loss of vegetation productivity and canopy cover, reduction in species diversity, and increased potential for invasive species including noxious weeds. Salvage and replacement of soil and seeding with native species would reduce some of these impacts but the diverse native vegetation communities would not return. This is an unavoidable impact of allowing soil disturbance.

##### **4.2.6.2 Vegetation Proposed Action**

The decline site occurs primarily within montane sagebrush steppes and montane grassland habitat types, and also includes a small area of conifer dominated woodlands. Native vegetation

seed mixes would be tailored to the soils, climate, environmental setting, proposed land use, and plant community desired on the site. The seed mix would be reviewed and approved by DEQ prior to application.

An additional 46.5 acres would be disturbed. Impacts would be similar to those listed in the No Action Alternative. Soil salvage and replacement would minimize vegetation impacts. The decline site, waste rock pads, and seepage collection ponds cut and fill slopes would be revegetated as soon as practical following initial construction. In closure, the decline site and its associated facilities and the access road from the Black Butte Road to the decline would be revegetated to stabilize disturbance areas and restore wildlife habitat, watershed characteristics, soil productivity, and visual resources to be consistent with post-operation land use objectives. If required by the landowner, private access roads constructed in support of mine operations would be recontoured prior to revegetation.

Seedbed preparation would be conducted immediately after grading, spreading soil, and, if used, fertilizer application. On slopes less than 33 percent, the seedbed would be tilled and harrowed along the contour to break up large clods. On slopes exceeding 33 percent, on sites too narrow to negotiate with equipment, or on sites where organic debris has been respread, the soil surface would be left in a roughened condition. Seed and mulch would be applied during reclamation and closure, but also applied to fresh road cuts and fills as soon after construction as possible to ensure coverage by natural sloughing. Cultural treatments would be practiced to ensure successful revegetation and include fertilizing, mulching, and respreading woody debris. Ripping would be conducted prior to soil application to reduce compaction of the top of the waste rock dump, building sites, and the portion of road surfaces that would be reclaimed. Reapplied soils would be cultivated to reduce compaction to improve water and air movement.

The decision to use fertilizer would be based on cover soil tests; application rates would be formulated to achieve soil macronutrient levels capable of promoting plant growth and productivity. Tintina would make reasonable and conscientious efforts to identify, control, and suppress all weeds which its operations introduce or are likely to introduce. Noxious weeds would be controlled using appropriate mechanical, biological, and chemical treatments which meet the requirements of Montana laws. Tintina's weed control program has been developed in cooperation with the Meagher County Weed District for advice on identification of noxious weeds, appropriate treatment methods, and application rates. Tintina has consulted with landowners and the County Conservation District on what seed types and mixes to use for reseeding disturbed areas. Tintina's lease agreements with underlying ranch owners require weed control programs for disturbances created by Tintina and this plan has been presented to DEQ in various exploration drilling program plans. A more formal weed control plan would be developed between the landowners, County weed control officials, and Tintina prior to completion of the decline licensing process.

Tintina has submitted a county approved weed control plan for the all lands disturbed under the amendment to the exploration license. Tintina is bonded for and has been conducting active weed control on all of its surface disturbance and along all access roads to those exploration areas.

#### **4.2.6.3 Vegetation Agency-Mitigated Alternative**

Same as proposed action.

#### **4.2.7 Cultural Resources**

##### **4.2.7.1 Cultural Resources No Action Alternative**

Under the No Action Alternative the exploration decline would not be constructed. There would be no additional impacts from decline construction, removal of waste rock, or discharge of water. Other exploration activities could continue. More core drilling might occur on the surface.

##### **4.2.7.2 Cultural Resources Proposed Action**

Cultural resources were summarized in Section 3.6. Tintina would upgrade an existing two-track road into an exploration decline portal access road. Site 24ME163, a potentially NRHP eligible prehistoric site, was identified on the proposed access road during the 2011 cultural inventory. Due to the location of the site in a slightly lower elevation area, Tintina indicated that only fill work would occur within the site boundaries. After consultation with SHPO and DEQ, it was agreed that burial of the site would be sufficient to achieve ‘No Adverse Effect’ to the site since this would result in minimal ground disturbance and protection of the resource. SHPO recommends an archaeologist be present during road construction in the vicinity of the site. No other cultural resources identified within the Project area would be impacted by the proposed exploration activities.

##### **4.2.7.3 Cultural Resources Agency-Mitigated Alternative**

DEQ recommends an archaeologist be present during road construction in the vicinity of the site.

#### **5.0 CUMULATIVE IMPACTS**

Cumulative impacts are the combined, incremental effects of human activity in the Project Area. One active mine is in this region.

- (1) The existing Holcim Black Butte iron mine is about a mile from the proposed decline. That mine produces hematite for use at the Holcim Trident cement plant. The ore from that mine is not acid-producing and is not known to produce any geochemical environmental impacts. The cumulative impact would be an increase in traffic on the access road and highway.

#### **6.0 REGULATORY RESTRICTIONS ANALYSIS**

State agencies are required to evaluate in their MEPA documents any regulatory restrictions proposed to be imposed on the use of private property. The Proposed Action would allow Tintina to conduct mineral exploration activity on private property. The Agency-Mitigated Alternative would alter and restrict the way Tintina conducts exploration and reclamation on private property.

Governmental entities generally have the authority and responsibility to protect the public health, safety and welfare. Under this “police power,” governmental entities may limit the use of real property through land use planning, zoning ordinances, set back requirements, and environmental regulations. Normally, a governmental entity’s exercise of its police powers does not involve a taking of private property. Nevertheless, at some point government regulations may go too far and constitute a taking of property.

The No Action Alternative would prohibit Tintina from conducting exploration activities, precluding it from ascertaining the extent and value of its mineral ownership and, potentially, from deriving economic benefit from its mineral ownership. This alternative is extremely restrictive of Tintina's private property and may lead to Tintina's initiation of a legal takings action.

The mitigation measures required under the Agency Mitigated Alternative are designed to ensure compliance with the regulatory requirements of the Metal Mine Reclamation Act and the Montana Water Quality Act. The mitigation measures do not result in a physical occupation of private property, do not deprive Tintina of all economically viable uses of its property, deny Tintina a fundamental attribute of property ownership, require Tintina to dedicate a portion of its property or grant an easement, have a severe impact on the value of Tintina's property, or cause physical disturbance with respect to Tintina's property that is in excess of that sustained by the public generally. Therefore, there are no takings implications.

### **7.0 PUBLIC NOTIFICATION AND PREPARATION**

More information on public notification and comments is contained in Appendix A.

The Proposed Action Application is on the DEQ website at <http://deq.mt.gov/ea.mcp> EA

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### **8.0 NEED FOR FURTHER ANALYSIS, MAGNITUDE AND SIGNIFICANCE OF POTENTIAL IMPACTS AND PROPOSED DECISION**

DEQ has determined that all of the impacts of Tintina's proposed exploration project have been identified and are discussed above. As indicated above, the impacts of the proposed exploration project will be mitigated below the level of significance and no significant impact is likely to occur.

DEQ proposes to approve the Agency-Mitigated Alternative.

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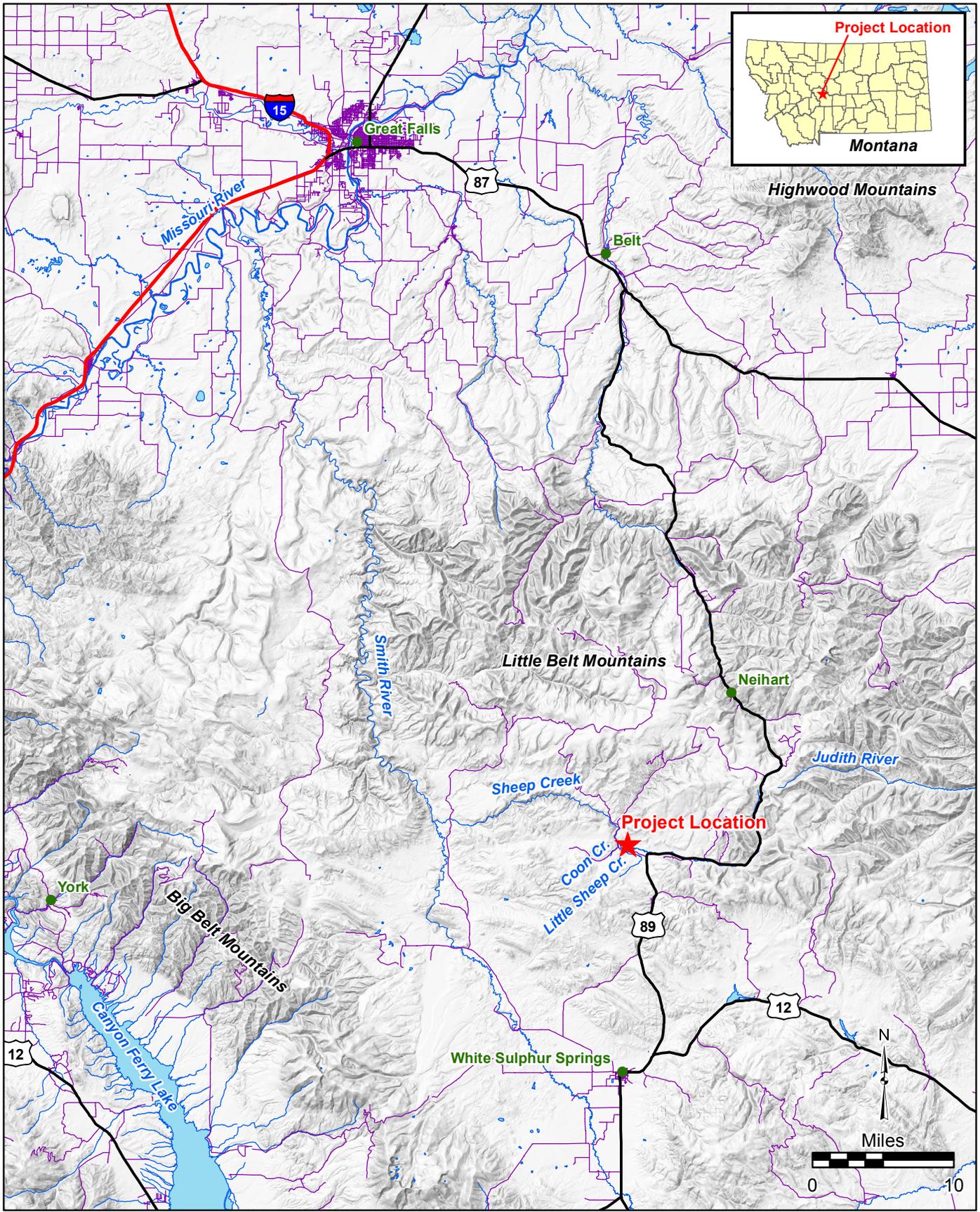
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Tintina Resources 2013e. Black Butte Copper Project Weed Mitigation and Management Plan, Tintina Resources, White Sulphur Springs, MT November.

US Census. 2011a. Meagher County Quick Facts from the US Census Bureau. Meagher County, Montana. Available online at <http://quickfacts.census.gov/qfd/states/30/30059.html>. Accessed 9/30/2011.

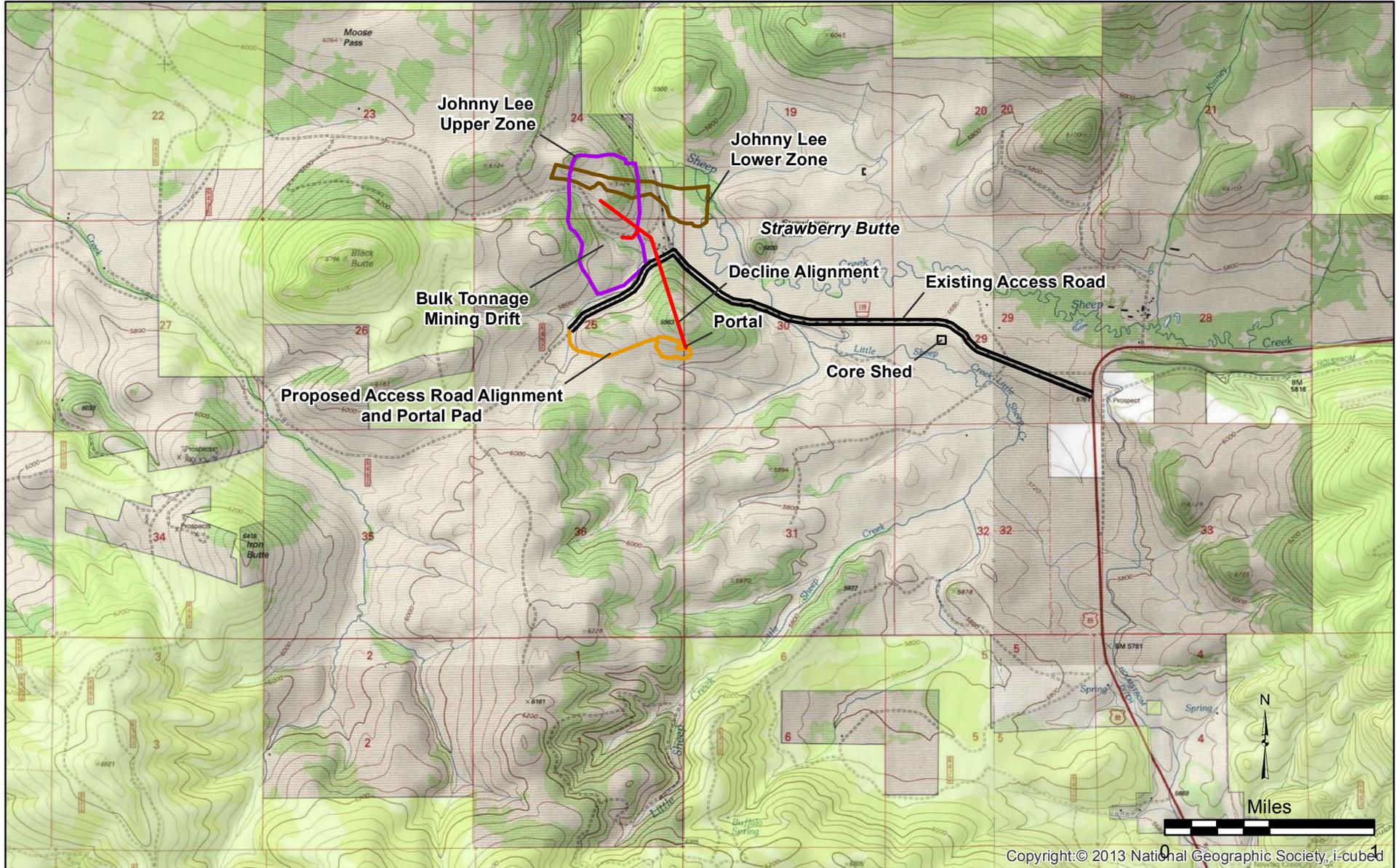
Zieg, G.A., and Leitch, Craig H.G., 1993. The Geology of the Sheep Creek Copper Deposits, Meagher County, Montana; in Belt Symposium III Abstracts, Richard B. Berg, compiler, Montana Bureau of Mines and Geology Open-File report 381, 69 p. This is a companion volume to the following: Belt Symposium III, Montana Bureau of Mines and geology Special Publication 112, 294p.

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- ★ Project Location
  - City
  - Interstate
  - U.S. Route
- Local Road
  - Stream
  - Lake

**Figure 1**  
**Project Location**  
**Black Butte Copper Project**  
**Meagher County, Montana**



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Prepared by Tetra Tech, Inc. 2012

**Figure 2**  
**Site Vicinity Map, Exploration Decline**  
**and Access Roads**  
**Black Butte Copper Project**  
**Meagher County, Montana**

- |   |   |  |                       |
|---|---|--|-----------------------|
|  | Decline Alignment                             |  | Core Shed             |
|  | Existing Access Road                          |  | Johnny Lee Lower Zone |
|  | Proposed Access Road Alignment and Portal Pad |  | Johnny Lee Upper Zone |
|   |   |  | US Forest Service     |



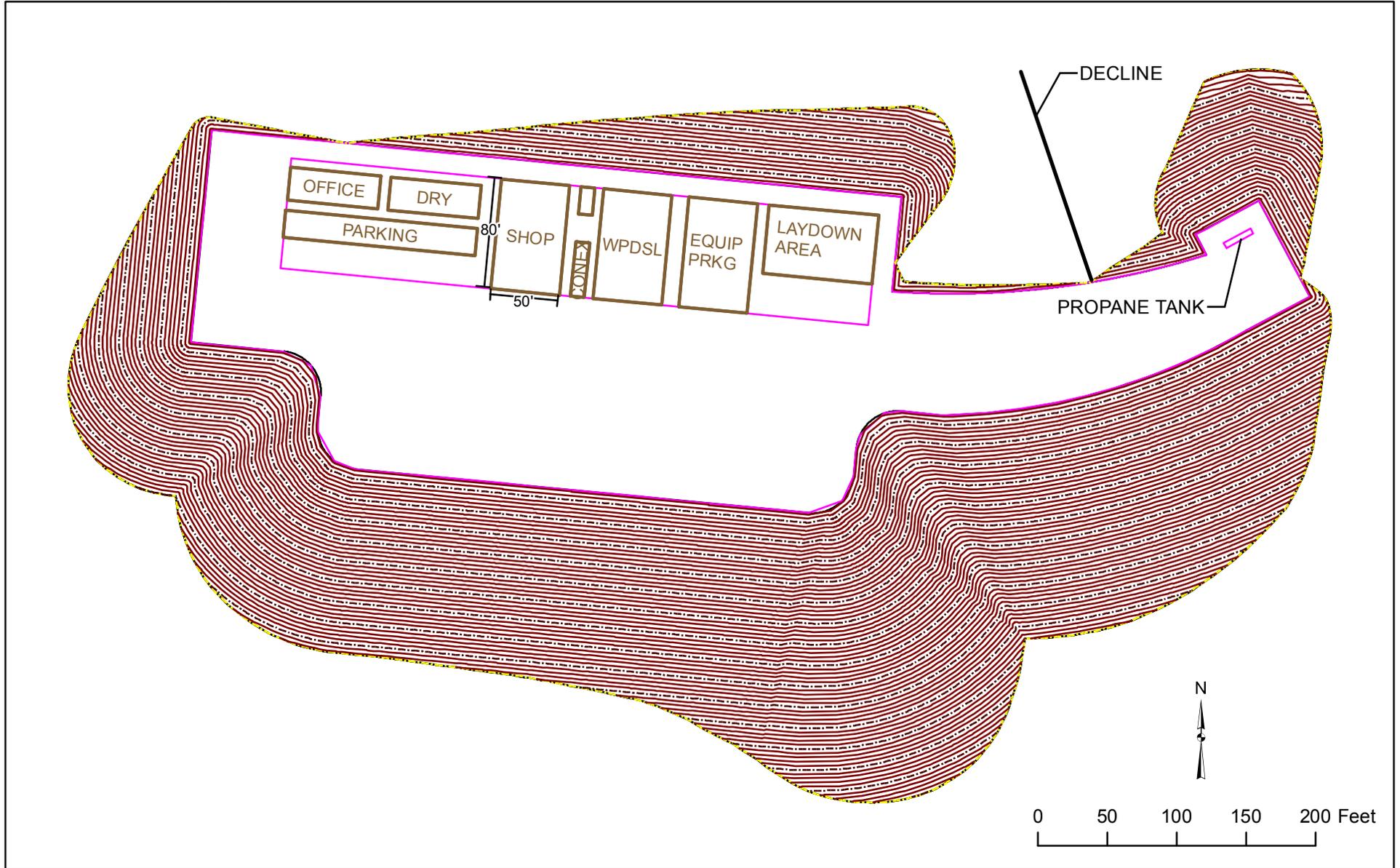
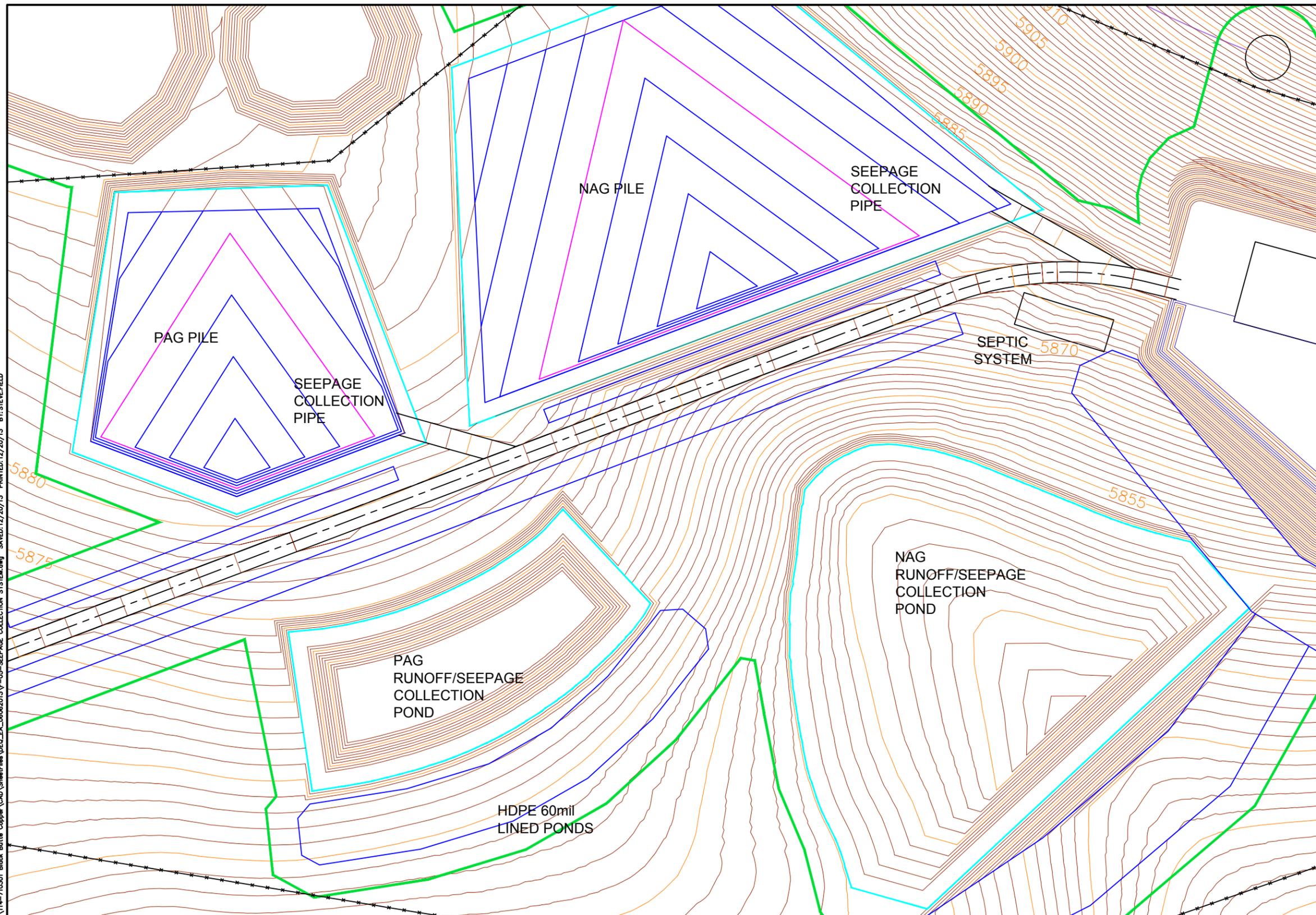


Figure 4  
Portal Patio Site Plan  
Black Butte Copper Project  
Meagher County, Montana

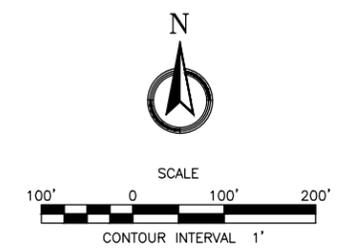
N:\PROJECTS\Tintina Gold Resources\114-710301 Black Butte Copper\CAD\SheetFiles\DEQ\_EA\_06062013\F-05-SEEPAGE COLLECTION SYSTEM.dwg  
 PRINTED: 12/20/13 BY: STEVE FIELD  
 SAVED: 12/20/13



**GENERAL NOTES:**  
 1. ALL DIMENSIONS AND ELEVATIONS ARE IN FEET.

**LEGEND:**

MAJOR CONTOURS.....	
MINOR CONTOURS.....	
PAD MAJOR CONTOURS.....	
PAD MINOR CONTOURS.....	
LINER.....	



**TINTINA** RESOURCES

Rev	Description	BY	Date

ENGINEER'S SEAL

**DRAFT**

Scale: As Shown On 22x34  
 Designed by: MWC  
 Drawn by: MRH  
 Checked by: TLM  
 Approved by: TLM

Issued for:  
**BLACK BUTTE  
 COPPER PROJECT**

Issued by:



**TETRA TECH**  
 120 West Park Drive, Suite 204  
 Grand Junction, Colorado 81505  
 (970) 986-3566 (970) 241-3120 fax

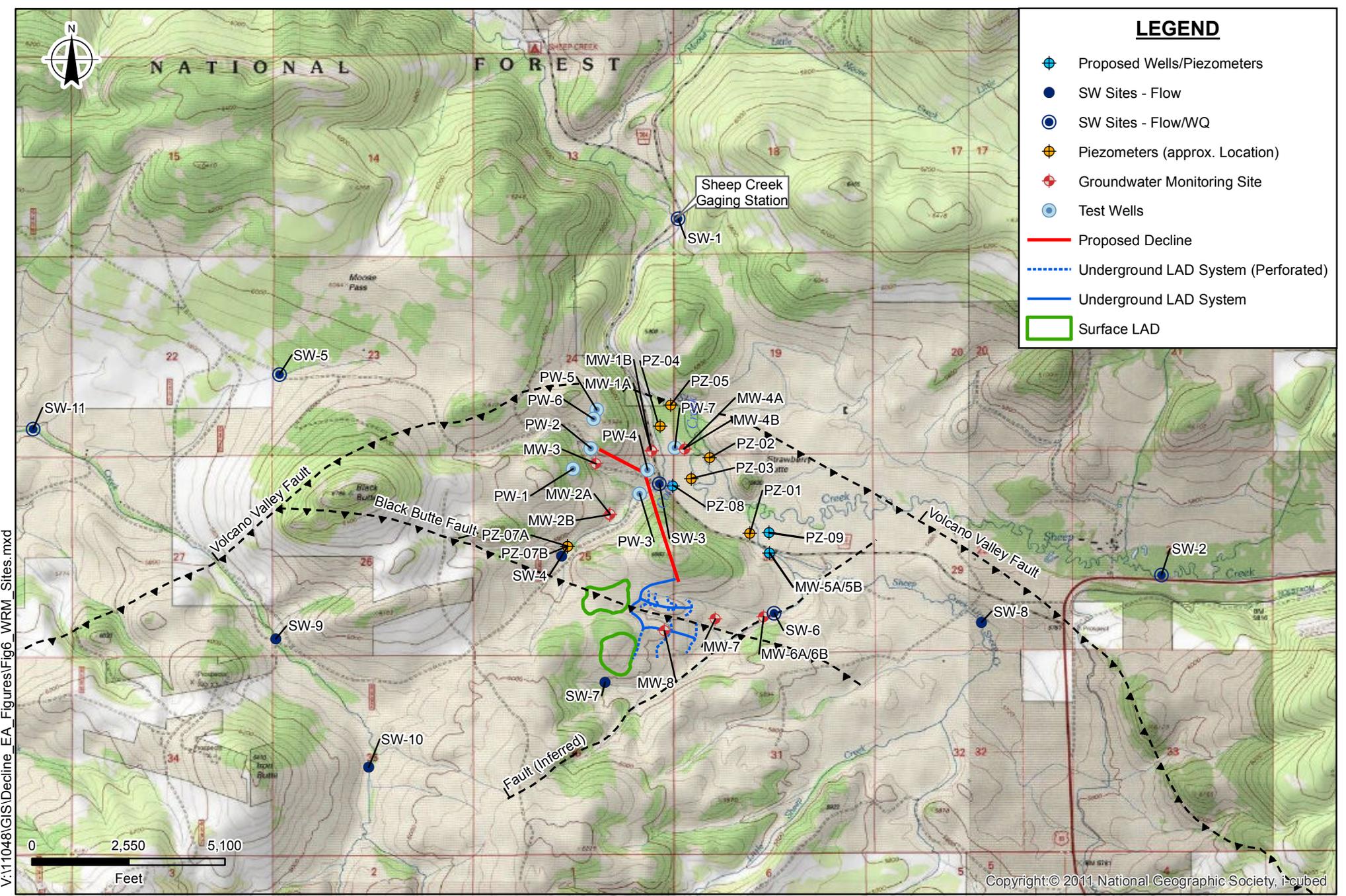
Title:  
**SEEPAGE COLLECTION SYSTEM**

Project: TINTINA GOLD  
 Location: MEAGHER COUNTY, MONTANA

Project no.: 114-710301  
 Date: 08/12

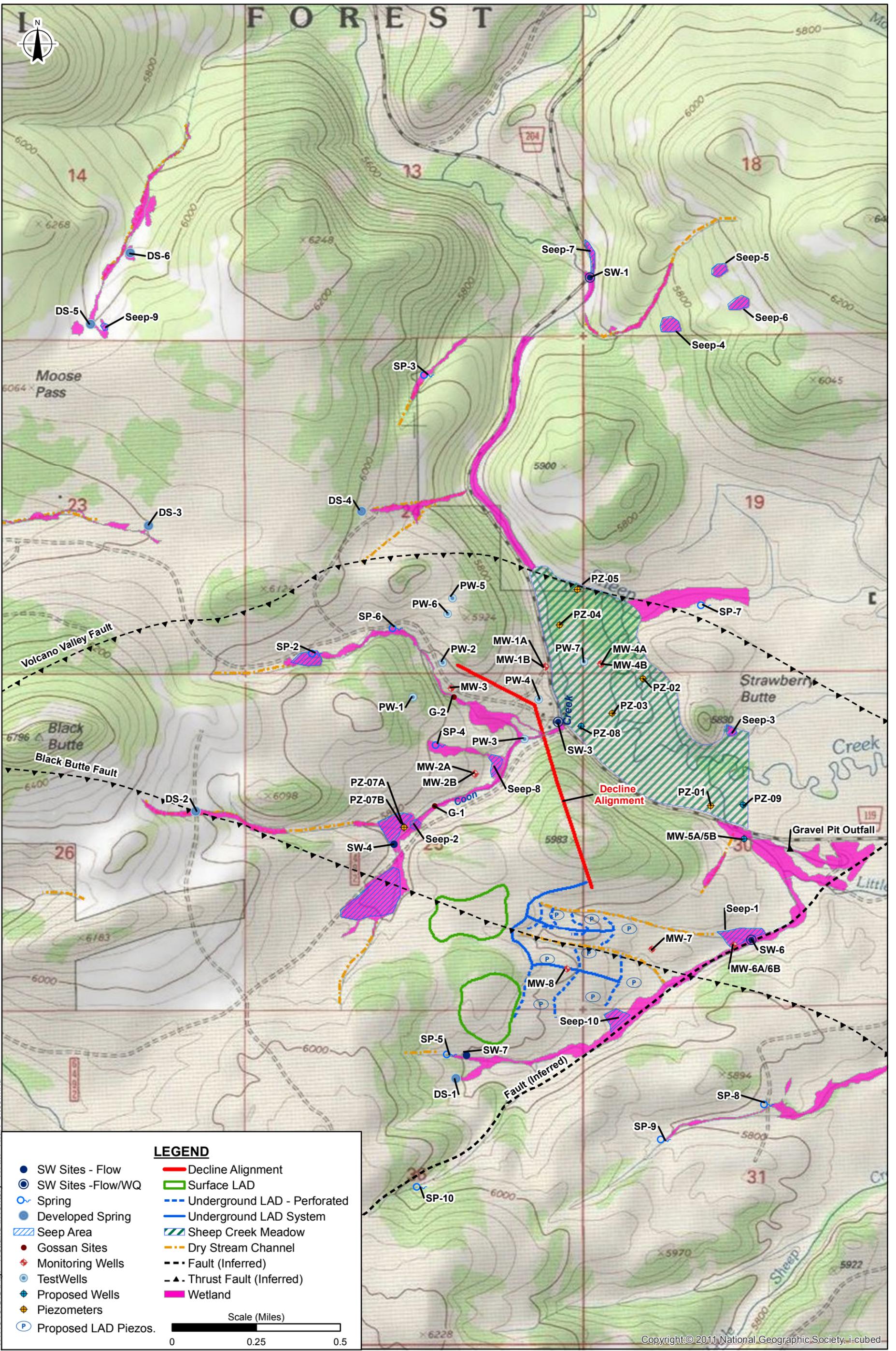
**Figure no. 05**





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**Figure 6**  
**Water Resource Monitoring Sites**  
**Black Butte Copper Project**  
**Meagher County, Montana**

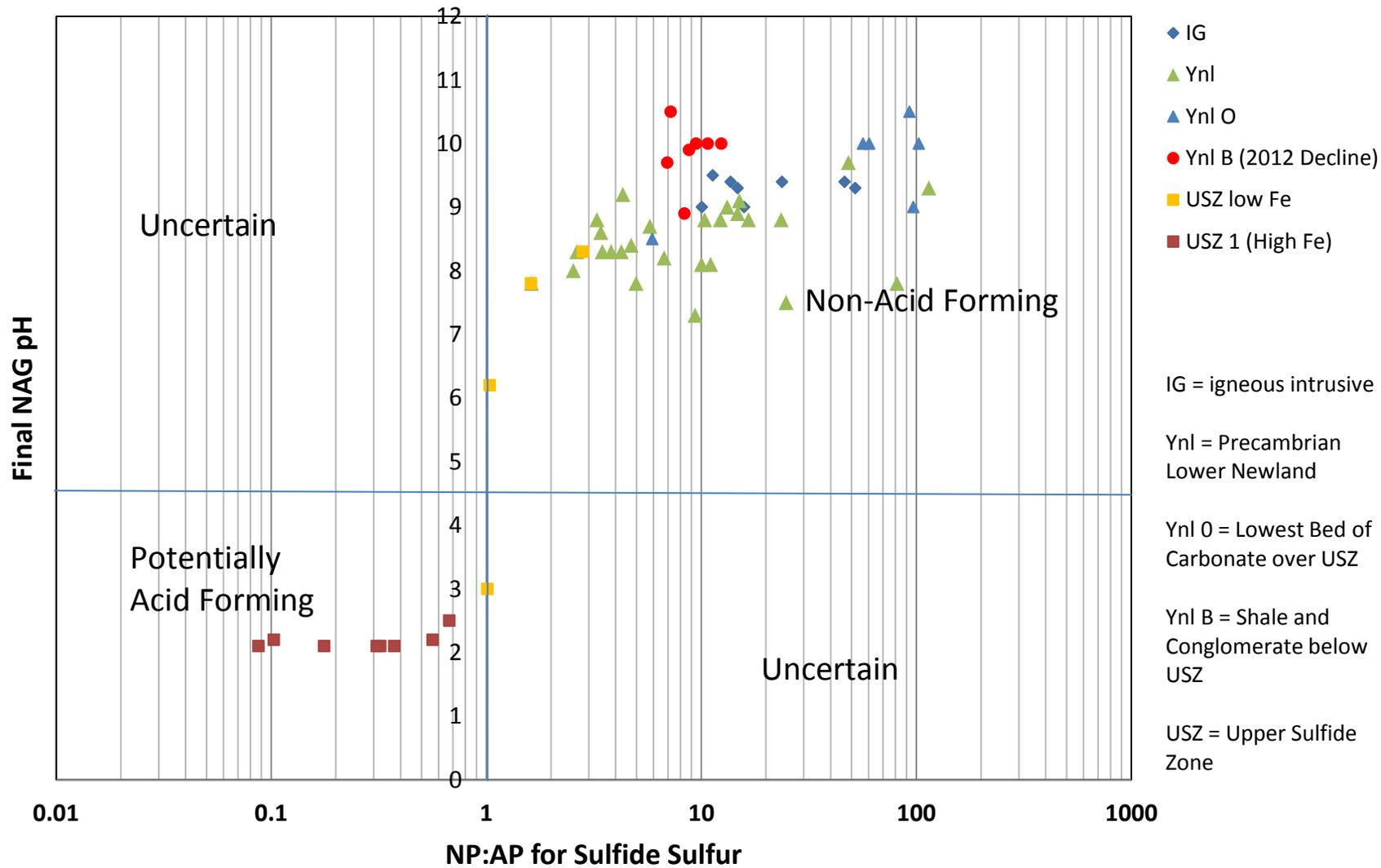


V:\11048\GIS\Fig7 Wetland Inventory WRM\_11x17 sites.mxd

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**Figure 7**  
**Surface Water and Groundwater**  
**Monitoring Sites and Wetlands**  
 Black Butte Copper Project  
 Meagher County, Montana

**Figure 8. NAG pH vs NP:AP Data  
Proposed Decline Lithologies  
Black Butte Copper Project  
Meagher County, Montana**



K:\Project\11048\Draft\EA\Updated Figures\Fig9 Potentiometric Map.srf

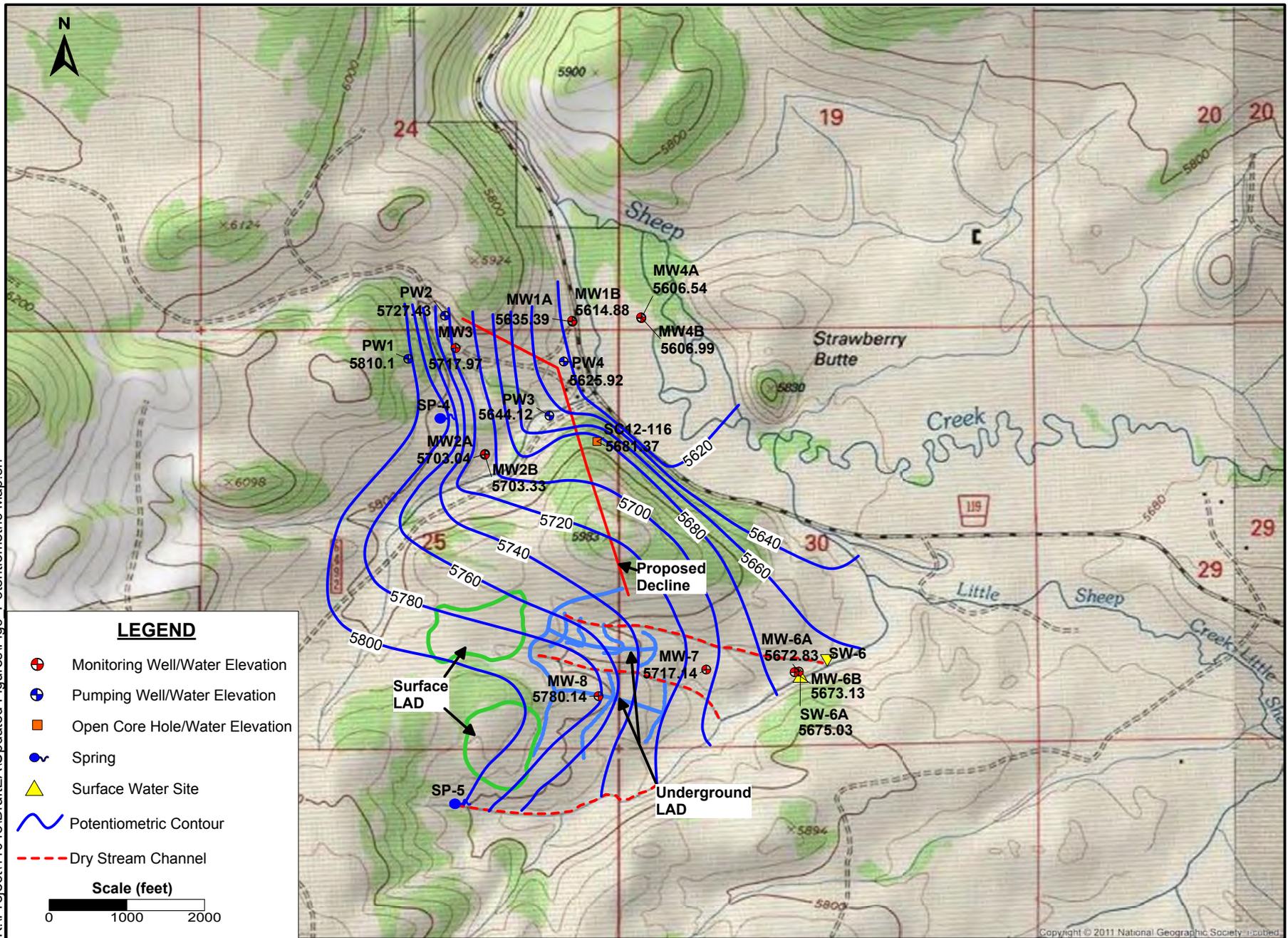
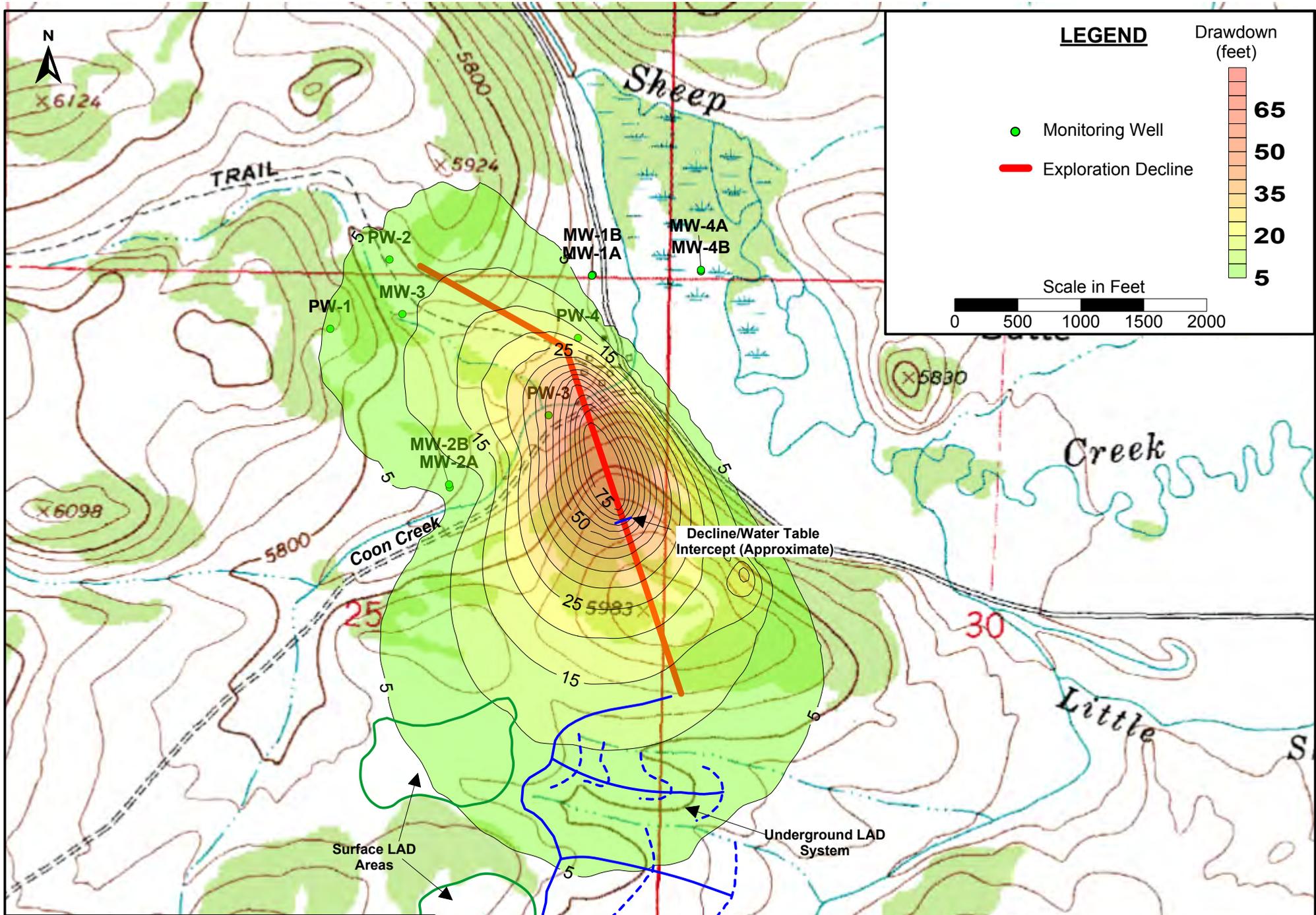


Figure 9  
Potentiometric Map November 2013  
Black Butte Copper Project  
Meagher County, Montana



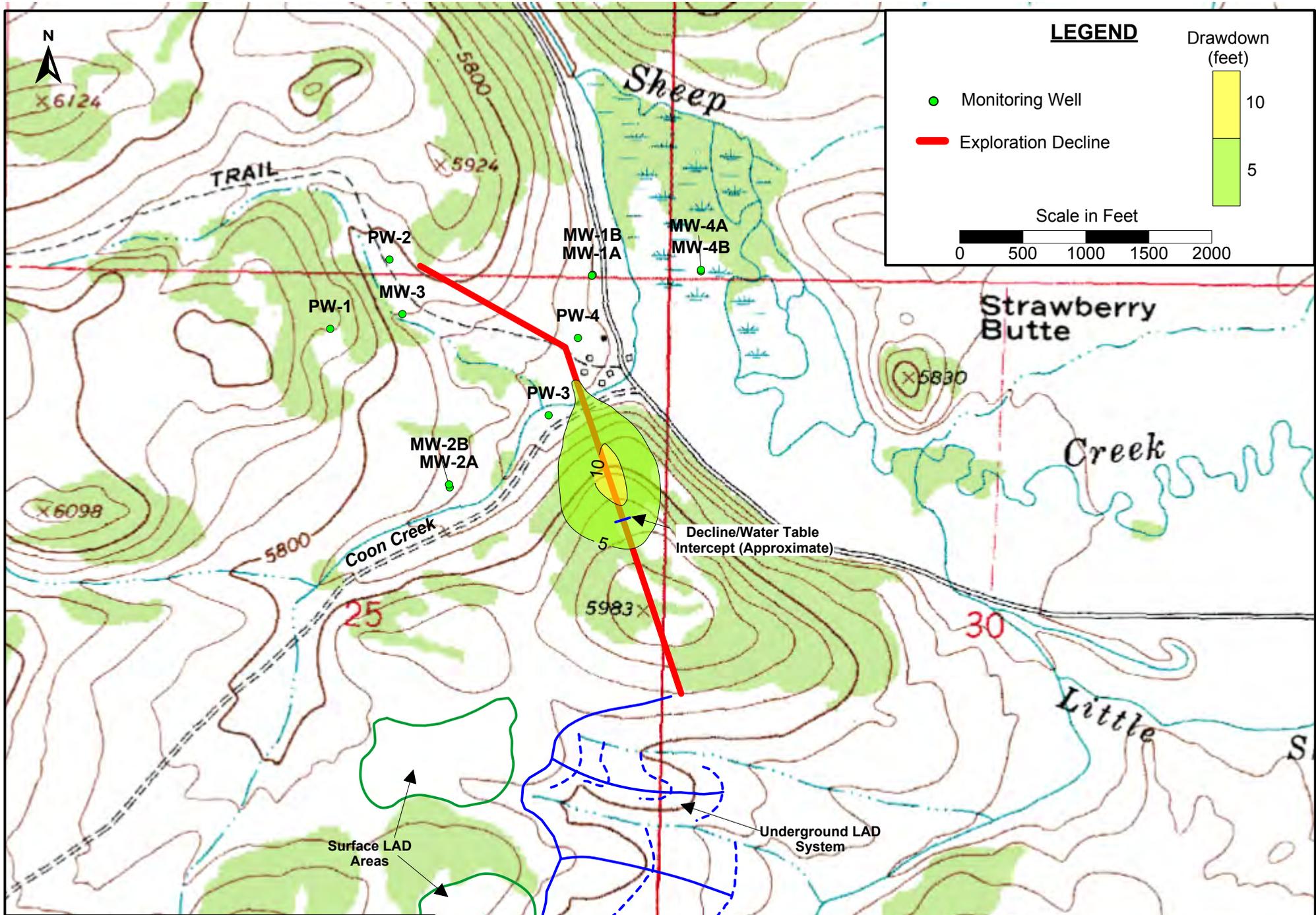
**Hydrometrics, Inc.**  
Consulting Scientists and Engineers

**Tintina Alaska Exploration Inc.**  
Black Butte Copper Project  
Meagher County, Montana

**SIMULATED DRAWDOWN**  
ADIT DISCHARGE 500 GPM

**FIGURE**

**10**



**Hydrometrics, Inc.**  
Consulting Scientists and Engineers

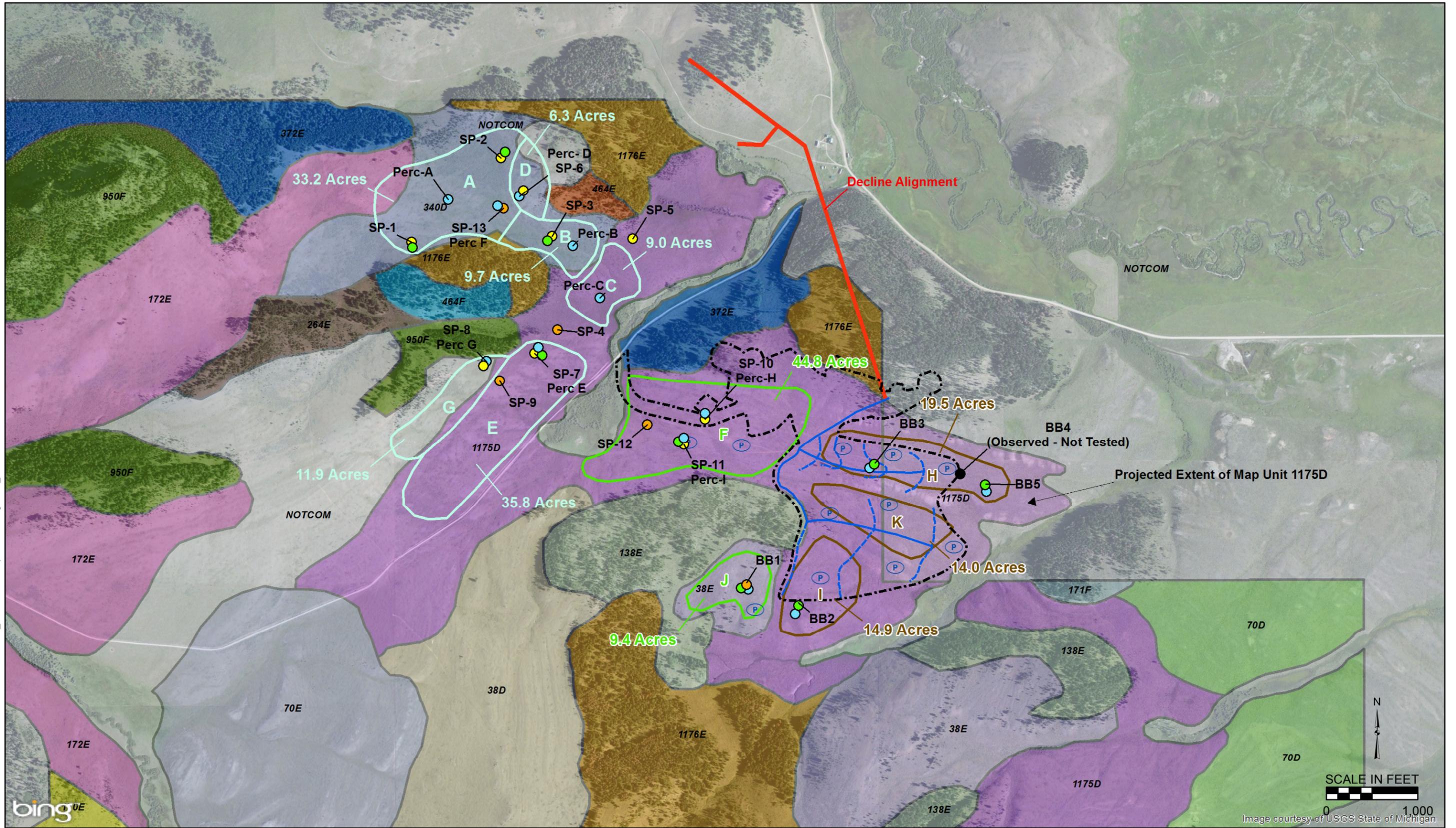
Tintina Alaska Exploration Inc.  
Black Butte Copper Project  
Meagher County, Montana

**SIMULATED DRAWDOWN**  
ADIT DISCHARGE 100 GPM

**FIGURE**

**11**

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Soil Map Units: 38E, 1175D etc. refer to NRCS (2011) Soil Mapping Units. See Table 1.  
 NOTCOM - NRCS soil survey not completed in this area.  
 Figure prepared by Tetra Tech, Inc. 2012

**TINTINA**RESOURCES

- BB4 - Test Pit Logged But Not Tested
- Deep Percolation Test Site
- Infiltrometer Test Site
- Soil Profile (Described)
- Soil Profile (Described and Sampled)
- Piezometer Well
- Disturbance Area Boundary
- Perforated Portion of Underground LAD
- Underground LAD System
- Decline Alignment
- Sampling Area
- Surface LAD Sampling Area
- Underground LAD Sampling Area

**Figure 12**  
**Soil Infiltration Testing Map**  
**Black Butte Copper Project**  
**Meagher County, Montana**

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## **BLACK BUTTE COPPER – EA – PUBLIC COMMENTS**

DEQ made the Draft Environmental Assessment available to the public on July 15, 2013. The EA was posted on the DEQ website and DEQ sent hard copies to a mailing list of 70 and electronic copies to a mailing list of 85. DEQ posted a Legal Notice in 7 papers. There were 21 news stories in 6 papers.

DEQ specified a 45 day comment period that ended on August 26, 2013. DEQ held one public meeting in White Sulphur Springs on August 7. DEQ posted a legal notice in the *Meagher County News* and the *Helena Independent Record*. DEQ also sent a Newlink press release to news organizations throughout the state. Several news organizations including the *Helena Independent Record*, the *Great Falls Tribune*, the *Meagher County News* and the *Livingston Enterprise* all ran news stories advertising the meeting. DEQ held the meeting in the White Sulphur Springs High School Gymnasium. Seventy-five people signed in at the meeting and 22 people gave oral comments. Twelve DEQ staff attended, answered questions and provided information to attendees. There were also posters, maps, and diagrams available to provide attendees further information about the project.

The mailing list, transcripts of the meeting, news stories, legal notices, and all comments are a part of the administrative record and can be accessed at the DEQ office in Helena.

DEQ received hard copy written comments, e-mail comments, and oral comments on the proposed project from various organizations, individuals, and agencies.

DEQ received government and agency letters from: Montana Fish, Wildlife and Parks, the US Forest Service, and the US Army Corps of Engineers. A side by-side comment and response format is provided for these agency letters. The Montana Department of Transportation and the Montana Department of Natural Resources and Conservation also submitted comment letters that are addressed in comment responses to comments O-5 and WR 1 and 2. In addition to side-by-side responses to the agency letters, DEQ provides side-by-side responses to letters from Earthworks, Trout Unlimited and Tintina Resources, Inc. A side-by-side response is also provided for the John Hamann letter because of the uniqueness of the comments specific to soils.

In addition to government and agency letters, a total of about 4,000 written comments were received by DEQ or were collected at the public meeting. A majority of the comments were attributed to several organized form letter campaigns. The remaining comments were unique comments generated by private citizens, organized groups, and public officials.

Numerous common themes and issues were identified and categorized based upon review and analysis of the comments. Those comment themes and responses are included below. A

Appendix A  
Tintina Black Butte Copper Project, Response to Comments  
January 2014

spreadsheet of all the comment letters received and the comments is included as an, electronic only, Appendix B and is also part of the administrative record.

### **General Comments**

**G1 - Comment:** *Commenters urged DEQ to conduct an Environmental Impact Statement (EIS) on this project because of the long-term risk of acid mine drainage, and the importance of protecting the headwaters of the Smith River.*

*The Montana Environmental Policy Act requires disclosure of all known and reasonably foreseeable impacts of proposed actions affecting the human environment. DEQ must determine whether an EIS is necessary based on:*

- 1) Scope and magnitude of the action*
- 2) The severity, duration, geographic extent, and frequency of the impact;*
- 3) Full characterization of the location and resources at risk*
- 4) The probability an impact will occur*
- 5) The quality of the affected resources,*
- 6) Any precedent represented by the action.*

**Response:** ARM 17.4.608 sets forth the criteria DEQ must consider in regard to the need to prepare an EIS. These criteria include the following:

1. The severity, duration, geographic extent, and frequency of occurrence of the impact;
2. The probability that the impact will occur if the proposed action occurs, or conversely, reasonable assurance in keeping with the potential severity of an impact that the impact will not occur;
3. Growth-inducing or growth-inhibiting aspects of the impact, including the relationship or contribution of the impact to cumulative impacts;
4. The quantity and quality of each environmental resource or value that would be affected, including the uniqueness and fragility of those resources or values;
5. The importance to the state and to society of each environmental resource or value that would be affected;
6. Any precedent that would be set as a result of an impact of the proposed action that would commit the department to future actions with significant impacts or a decision in principle about such future actions; and
7. Potential conflict with local, state, or federal laws, requirements, or formal plans.

DEQ agrees that a consideration of these factors indicate that an EIS is required.

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However, MEPA Model Rule III(4), allows state agencies, as an alternative to preparing an EIS, prepare an EA whenever the action is one that might normally require an EIS, but effects that might otherwise be deemed significant appear to be mitigable below the level of significance through design, or enforceable controls or stipulations or both imposed by the agency or other government agencies. For an EA to suffice in this instance, the agency must determine that all of the impacts of the proposed action have been accurately identified, that they will be mitigated below the level of significance, and that no significant impact is likely to occur. DEQ has adopted MEPA Model Rule III(4). See ARM 17.4.607(4).

As discussed in the draft Environmental Assessment, DEQ believes that the impacts that may potentially result from Tintina's construction of the exploration decline are mitigable below the level of significance through project design and stipulations imposed by DEQ. Therefore, DEQ believes that a mitigated environmental assessment is an appropriate level of review for the project. Should Tintina ultimately apply for an operating permit for an underground mine, DEQ will prepare an environmental impact statement in conjunction with taking state action on the operating permit application.

**G2 - Comment:** *The EIS should cover the entire project at one time, not just the initial test hole/exploration decline.*

**Response:** Section 75-1-201(b)(iv), MCA, requires state agencies to prepare an environmental review on proposals for projects, programs, and other major actions of state government affecting the quality of the human environment. DEQ prepared the Mitigated Environmental Assessment in conjunction with its action on Tintina's application to amend its exploration license. DEQ will have to approve, approve with modification, or deny that application. Tintina has not submitted an application for an operating permit to authorize construction and operation of an underground mine. Thus, DEQ will not be taking any state action relative to a mine.

MEPA requires state agencies to consider "cumulative impacts" when taking state action on proposed projects. The term "cumulative impacts" is defined to mean the collective impacts on the human environment of the proposed action when considered in conjunction with other past and present actions related to the proposed action by location or generic type. Related future actions must also be considered when these actions are under concurrent consideration by any state agency through pre-impact statement studies, separate impact statement evaluation, or permit processing procedures. As previously indicated, Tintina has not submitted an application for an underground mine and, therefore, it is not under concurrent consideration.

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Finally, DEQ believes that whether Tintina applies for an operating permit for an underground mine depends on the results of its exploration program and, therefore, is not a foregone conclusion.

**G3 - Comment:** *Commenters urged DEQ to hold more public meetings and extend the comment period.*

**Response:** The comment period for the EA was 45 days, 15 days longer than our standard comment period. DEQ believes this was an adequate length of time for comment on the EA. DEQ held a public meeting in White Sulphur Springs, the county seat of the county in which the proposed exploration adit would be constructed and the town closest to its proposed location.

**G4 – Comment:** *Time and location of the public meeting was difficult to find, time of day was not ideal and when people rose to state concerns, they were “heckled aggressively by the crowd.” Another meeting was held in Great Falls but was not well publicized.*

**Response:** Please see beginning of this section, for specifics on DEQ’s public outreach announcing the time and place for the public meeting. DEQ conducted the public meeting and did not observe, nor was it made aware of, heckling at the meeting. DEQ did not hold a public meeting to receive comments on the Mitigated EA in Great Falls.

**G5 - Comment:** *Commenters expressed that they were satisfied with the Environmental Assessment and its evaluation of impacts.*

**Response:** Comment noted

**G6 -Comment:** *Several commenters noted the importance of the decline to ascertain more information.*

**Response:** Comment noted

**G7 - Comment:** *Commenters wanted more information on the bonding of the project, were concerned about amount of bonding, had specific requests for how the project should be bonded, and wanted to ensure that DEQ would carry a bond for the project.*

**Response:** Prior to issuance of an exploration license amendment, Tintina would be required to deposit with DEQ a reclamation performance bond in a form and amount as determined by the department in accordance with 82-4-338, MCA. Bonds may be in the form of cash, negotiable bonds of the United States (not treasury certificates), state or municipalities, negotiable certificates of deposit, or an irrevocable letter of credit of any bank

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Tintina Black Butte Copper Project, Response to Comments  
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organized or authorized to transact business in the United States or other surety acceptable to the department as put forth in the statute referenced above.

The required bond amount will be based on final reclamation of the exploration decline site, its support facilities, and associated disturbances, regardless of whether a temporary reclamation plan is implemented (i.e. full back-fill scenario), with the goal of stabilizing the site, minimizing erosion, and providing a self-sustaining plant community with minimal noxious weeds. The exact figure has not yet been finalized.

There is currently a \$62,590 performance bond being held on the project, none of which has been released to the company, although Tintina's reclamation efforts thus far have satisfied the reclamation requirements mentioned above. Tintina has satisfactorily recontoured drill roads and pads to a stable landform, abandoned exploration drill holes not used as monitoring wells or piezometers per ARM 17.24.106, monitored the success of its revegetated plant communities and sprayed noxious weeds to control the invasion of noxious weeds.

Per ARM 17.24.101, any person or persons engaging in exploration of minerals on or below the surface of the earth, may not do so without first obtaining the appropriate license from DEQ. Issuance of the license and subsequent approval of amendments to said license is contingent on receipt of a reclamation performance bond. Tintina is required to submit a reclamation bond and DEQ is allowed to hold the bond for this project.

(Also see Section 1.0 and 1.2 of the draft EA, and final EA for a discussion of bonding.)

**G8 - Comment:** *Tintina has reclaimed its drill sites for the first phase of their exploration.*

**Response:** Tintina has recontoured, successfully revegetated, and is currently monitoring weeds on a total of 22.7 acres that were disturbed and have since been reclaimed. This includes a minimum of 40 drill pads and 20,915 feet of temporary roads. Some of the roads were existing two-track routes that were moderately improved. Overland travel was used whenever possible. This total does not include exploration activities on other areas of the property.

**G9 - Comment:** *Several commenters expressed concern over the history of regulation of copper mining in Montana and pointed to examples like the Berkeley Pit in Butte and the Zortman/Landusky mines in the Little Rockies. They wanted to know how this mine would not cause the same type of pollution.*

**Response:** The Berkeley Pit was a huge, largely unregulated, pre-modern law, open-pit, and Zortman and Landusky were large cyanide heap-leach, open-pit, gold-mining complexes which used technology banned in Montana in 1999. There is no realistic

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geological or technical basis for comparison between those mines and Tintina's exploration proposal. DEQ is preparing this Environmental Assessment to assess the environmental impacts of the proposed exploration decline set forth in Tintina's application to amend its exploration license. DEQ is not analyzing the operation of a mine. After conducting the exploration actions, assuming they are approved, Tintina may submit an application for an operating permit to support operation of a mine. DEQ would analyze the mine's impact at that time.

**Emergency Response Comments**

**E1 - Comment:** *Commenters expressed concern that streams and ponds flood, pads leak, and seeps and springs depend on changes in other outflows – how would this all be accounted for and mitigated?*

**Response:** Proposed facilities are all located outside of any floodplains, and retention ponds would be designed with capacity to hold the 100-year return storm with two feet of freeboard. Tintina has proposed a water monitoring plan that would identify leaks from the PAG and NAG pads and ponds. Tintina would monitor flows in all seeps, springs, and streams to identify impacts from dewatering and LAD. DEQ has added additional monitoring to ensure all impacts are mitigated below the level of significance.

Tintina has prepared an emergency response plan that includes:

- Emergency Call List and Evacuation Plan
- Spill Response Plan
- Flood Response Plan
- Fire Response Plan

**E2 - Comment:** *A comment was received that expressed concerns about wildfire on the surface around the mine stating that there were light flashy fuels, dead trees, and mountain pine beetle in the area.*

**Response:** Tintina has prepared an emergency response plan that addresses events such as a wildfire. Typically exploration and mining operations have been called on by local agencies in case of wildfires to provide equipment and water for use in managing local area fires. Holcim, Inc. has an iron ore mine nearby which has operated seasonally since 1976 without any fires. DEQ does not believe that an underground exploration operation would increase fire risk in the area and has not seen evidence of this at other exploration or mine sites.

**Water Rights Comments – See DNRC comments and response below**

**WR1 - Comment:** *The environmental assessment briefly mentions the use of a water supply well, pipeline and storage tank, but does not indicate whether Tintina will require an appropriation of water for beneficial use in its mining operation. Simple dewatering of the decline would not require a water right, however if water will be appropriated for beneficial use, a water right will be required. The process of obtaining a new water right or changing an existing water right may be simple or complex, depending on the nature of the appropriation. If beneficial water use for this project will require any surface water diversion or groundwater in excess of 35 gallons per minute up to 10 acre-feet annually; Tintina or its consultant should contact the DNRC immediately to discuss this issue.*

**Response:** Dewatering of the exploration decline does not require a water right as this water would not be put to beneficial use. Water from exploration decline dewatering would be discharged directly to an underground drainfield LAD system, back into the shallow bedrock immediately south of the decline portal area (Figure 7).

Discharge of water to the LAD area has also been designed to place the water back in the same drainage basin (Sheep Creek) and from the immediate vicinity of the area from which it was derived (Figure 7). These factors should eliminate impacts to downgradient groundwater quantities by replenishing groundwater to the shallow bedrock aquifer. As described in the EA, there are no impacts predicted to in-stream-flows, seeps (see response to second DNRC comment below), and wetlands or to downstream users predicted by the decline dewatering and LAD.

Tintina would use groundwater for water supply for the portal facilities (well, pipeline, and storage tank) as described in the modification to the exploration license. In addition, Tintina would require water for dust suppression. No surface water would be diverted for either of these uses. Tintina intends to obtain this water from wells drilled during the exploration drilling phase of the project and completed as potentially producing groundwater wells by Tintina on behalf of the property owners. Five of these wells have been drilled to date and completed at sites where groundwater was found, and desired for use by the landowner; each well has a GWIC number and drill logs have been filed with the DNRC.

When these wells are placed into use by the property owners, a Notice of Completion of Groundwater Development (Form No. 602) would be filed by the landowner for multiple uses. Tintina would work with the owners of the wells to submit a Notice of Completion of Ground Water Development within 60 days of the wells being put to use with the appropriate uses detailed in the application. The water right filed would likely be for 35 gpm not to exceed 10 acre feet per year. Tintina has underlying agreements with the

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landowners to use the water from these wells for the water supply and dust suppression uses described in the modification to the exploration license (as well as other not yet defined future uses). Tintina understands that multiple wells would be operated as stand-alone sources and would not be manifolded together during use.

To date only one of these wells has been placed into use, this well is located near Tintina's core shed and has been used as a water supply well for that facility, for exploration drilling water and for dust suppression on exploration drilling roads. This well is drilled on land owned by Rose Holmstrom, in T12N, R7E, Section 29, NW1/4 of NE1/4 of SW1/4. The well's GWIC id number is 263440. The water right was filed by Rose Holmstrom for 3.41 acre feet per year.

**WR2 - Comment:** *The environmental assessment indicates the potential for mine dewatering to result in drawdown of the groundwater table, which in turn could negatively impact the discharge of local springs. If the springs are relied upon by lawful water users, the action of dewatering could become problematic to those users. It should be noted that the result for adverse effects to spring flows previously authorized for beneficial water use could be litigation in District Court.*

**Response:** Although the Proposed Action would lower the groundwater level in the area near the decline, there is a low risk that area springs would have decreased flows and that groundwater quality would be impaired. Section 2.3 of the Final EA outlines the Agency-Mitigated Alternatives. Clarification of the reasons why Tintina and DEQ has determined that after the mitigations, impacts would remain below the level of significance, as discussed in sections:

2.3 Agency Mitigated Alternative

2.2.6.2 Surface Water and Groundwater Monitoring

3.2.1.4 Hydrologic Evaluation and Predicted Inflow/Dewatering Volume

4.2.2.2 Groundwater Proposed Action

4.2.2.3 Groundwater Agency Mitigated Alternative

4.2.3.2 Wetland and Riparian Areas Proposed Action

4.2.4.2 Surface Water Proposed Action

4.2.4.3 Surface Water Agency Mitigated Alternative

Nine seeps and 13 springs (including 2 developed springs) in the Project area have been identified and mapped as a part of an inventory completed in 2011, and 13 have been sampled for water quality and/or flow annually since 2011 (Hydrometrics, 2011a).

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The Agency Mitigated Alternative requires additional monitoring of flow at seven springs near the proposed decline (Table 2). The frequency of monitoring water levels at five natural springs (SP-1, SP-2, SP-3, SP-4 and SP-6) and two developed springs (DS-3 and DS-4) would be increased from annually to monthly. The purpose of the increased monitoring frequency is to detect any impacts of dewatering the decline on the area springs. If impacts to water rights are documented Tintina would be required to replace the water supply as required by Section 82-4-355, MCA. DEQ mitigations would ensure that these impacts remain below any level of significance.

In addition, Tintina's underlying lease agreement with the various landowners stipulates that impacts to water supplies identified at seeps and springs that result from exploration or mining related impacts will be reconstructed or replaced.

## **Water Comments**

### ***Water Treatment***

**W1- Comment:** *Commenters said the EA does not provide a detailed plan for how waste water, and all on-site water, will be managed and treated.*

**Response:** This response has been combined with response W2 below.

**W2 - Comment:** *Many commenters said DEQ should require the company to have a modern water-treatment system in place before the exploration decline is constructed – and run long after the project is complete.*

**Response:** DEQ would require that discharge of decline development water to the LAD areas meet groundwater quality standards. Development water may require water treatment prior to disposal in the LAD areas. Most background water quality sample laboratory results show contaminants of concern below WQB-7 standards. Two sampling locations (PW-3 and MW-1B) have yielded samples with slightly elevated levels of thallium, arsenic, and strontium. Geochemical tests have shown that the pH levels of water exposed to the sulfide-bearing rocks remain above 7 during kinetic tests. See also response to CH- 1. Tintina has proposed a water management plan including dilution, seepage collection pond storage, recirculation within the underground workings, and decline flooding (Section 2.2.4, Draft EA and Section 3.2.1.4, Final EA) to decrease concentrations of contaminants of concern to below water quality standards.

The other potential contaminant of concern is nitrogen compounds from blasting residues. Tintina would have to treat these compounds if they exceeded groundwater standards.

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Development water is expected to meet water quality standards without any treatment. Designing a permanent treatment plant prior to having real water quality data would be counter-productive. It is important to know what the quality of the production water is prior to designing a treatment plant because: 1) the anticipated design may not effectively treat the contamination in the discharge water, 2) an improperly designed treatment plant may create unnecessary and undesirable byproducts such as brine or sludge, and 3) over designed treatment plants would use excessive amounts of energy and be a waste of resources.

DEQ understands that there is heightened concern over water quality in this watershed and has received numerous comments that discuss the need for an in-place treatment plant prior to starting dewatering of the decline. Although DEQ believes water treatment would not be needed initially, DEQ will require Tintina to have a temporary treatment plant on-site before the decline advances beyond 1,500 feet. The temporary treatment plant would be available at the first indication that actual development water does not meet WQB-7 standards.

*The above language has been added to Section 4.2.2.3 in the Agency-Mitigated Alternative of the Final EA.*

***Dewatering/drawdown impact to surface water***

**W3 - Comment:** *Commenters were concerned about the affects to water flow and surface water quantity, specifically in a drainage of the Smith River.*

DEQ does not anticipate significant impacts to surface water flow. However, DEQ received multiple comments on the perceived deficiencies in the submitted model results that used the 100 - 500 GPM projected decline inflows. In response to comments, instead of using modeling to predict impacts to Sheep Creek, DEQ would rely on empirical data to ensure the impact to surface water would be below the level of significance. DEQ defines the degradation of surface water due to change in flow as a 10 percent change in the lowest flow averaged over any 7 day period during a ten year period or 7Q10. See the Montana Water Quality Act (WQA) (ARM 17.30.715 (1)(a)). Any change in stream flow less than 10 percent of the 7Q10 is considered below the level of significance pursuant to the WQA. DEQ would require:

- Tintina not change flow in Sheep Creek by more than the non-degradation criteria for water volume, which is a change of 10 percent to the lowest measured or calculated flow that occurs over a 7-day period during a 10-year cycle (7Q10). Low flow in

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Sheep Creek at site SW-1<sup>1</sup> is 8 to 8.6 cfs therefore the non-degradation threshold for a 7Q10 flow of 8 to 8.6 cfs would be 359 to 386 gpm.

- Tintina to monitor alluvial groundwater levels in Sheep Creek at multiple locations in the main part of the valley and along the valley's western edge in an area where dewatering impacts would most likely be evident should they occur (Figure 7 in Final EA). DEQ and Tintina would then compare water level changes over time to be able to show no significant impact to alluvial water supplies in Sheep Creek; and
- If impacts to flow in Sheep Creek are identified via the monitoring described above, DEQ would require that Tintina revise their dewatering and water disposal plans. Groundwater would be pumped from dewatering wells adjacent to the decline. Tintina would treat the produced water if necessary to comply with standards, and inject the water in the shallow bedrock underlying the Sheep Creek alluvial aquifer, thereby mitigating any decrease in water levels measured in the Sheep Creek alluvium caused by dewatering.

The above language has been added to the EA as part of the Agency-Mitigated Alternative (Section 4.2.4.3 Final EA).

Hydrometrics conducted an analysis of potential drawdown effects to identify appropriate locations to monitor for water level changes during development of the exploration decline. Depression of the local groundwater table would develop along the lineal north-south trend of the decline as a result of mine dewatering. A drawdown analysis was conducted for the decline using AnAqSim, an analytical element modeling software package, to estimate rates of groundwater inflow into the proposed decline. These analytical solutions yield generalized predictions representing average inflow rates over time and are based on a large-scale analysis of flow through the bedrock system. The model is capable of evaluating drawdown relationships in both the bedrock and the Sheep Creek alluvial aquifers. The model domain encompasses an area of approximately 4.5 square miles and includes the reach of Sheep Creek to the east, adjacent to the Project area; and extends approximately a mile

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<sup>1</sup> The 7Q10 low flow of Sheep Creek was calculated for upstream monitoring site SW-2, where the USGS operated a gaging station between 1941 and 1972. The 7Q10 flow for Sheep Creek adjacent to the Black Butte project area was then estimated by multiplying the calculated 7Q10 value at SW-2 (4.9 cfs) by the ratio of the drainage areas upstream of SW-2 versus SW-1. The watershed above SW-1 is 75 percent larger than that above SW-2, resulting in a 7Q10 estimate at SW-1 of 8.6 cfs. Because the additional watershed area between SW-2 and SW-1 has a slightly lower average elevation, DEQ assumes that the 7Q10 value would actually be somewhat less than predicted by the watershed ratios and would likely be in the 6 to 8 cfs range. The threshold for degradation of Sheep Creek due to reduced flow would therefore be 10 percent of this value, which equates to a flow reduction between 260 and 360 gpm.

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south and west of the exploration decline facilities (Figure 10 and 11, Final EA). This model uses porous media solutions, which are appropriate for regional bedrock models and bedrock that is highly fractured. If fractures are more discrete and are not well-connected a porous media solution can over-predict drawdown extent. Other limitations of this model are as follows:

- The results are based on steady state solutions that would tend to predict greater drawdown than may occur during the time it would take to drive the decline (< two years).
- Alluvial groundwater flow entering the model area is not incorporated into the model. This additional alluvial inflow, if it were included in the model, would further limit the actual amount of drawdown in the Sheep Creek alluvial aquifer.
- Effects of flood irrigation on the intervening hay meadow adjacent to Sheep Creek were also not considered.

These factors likely result in the model over-predicting drawdown, particularly in outlying areas at the margins of the model domain.

Based on these factors and the high permeability of the alluvial aquifer, there is minimal potential for measurable drawdown in the alluvial aquifer adjacent to Sheep Creek. DEQ has determined the potential for impacts to Sheep Creek is below the level of significance. A more detailed analysis is unlikely to provide more quantitative results until more comprehensive hydrologic testing can be completed during completion of the exploration decline. Quantitative hydrologic testing would be a key objective of the exploration phase of development.

Based on current hydrologic analysis, bedrock flows in the decline area do not appear to be connected to surface flows in the area. A 48-hour pump test was conducted on well PW-3. The test was at 27 gpm for 48 hours to establish aquifer characteristics in the upper higher-flow bedrock units. PW-4, located in the deeper bedrock aquifer also underwent a 48-hour pumping test. Pump rates were adjusted between 1 and 6 gpm as not to completely dewater the wells.

Pumping produced 70 ft of drawdown at the PW-3 and approximately 20 ft of drawdown at well CS12-16, located in the decline alignment approximately 700 ft to the southeast. Static water levels in PW-4, approximately 700 ft to the northeast, had a drawdown of 3.5 ft and no drawdown was noted in other monitoring wells. During this time, periodic flow and stage measurements were conducted at the mouth of Coon Creek. No measurable changes were noted.

Pumping at PW-4 produced 120 ft of drawdown with no observable drawdown in surrounding monitoring wells.

Alluvial inflows and return flows from re-infiltration of decline water into the shallow groundwater system were not incorporated into the model.

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Test conclusions indicate due to the high permeability of the alluvium, there is limited potential for drawdown in Sheep Creek. The most effect may be along the exploration decline where it would pass under Coon Creek. Re-infiltration of decline water into the shallow aquifer in the LAD areas should negate any impacts. See also response to comment TU-21.

**W4 – Comment:** *Commenters were concerned about the reliance on grouting as a means of adequate mitigation.*

**Response:** Grouting is a proven method of reducing groundwater in-flows into any type of underground construction. As the decline advances, concurrent borings would be advanced before the main rock face. This ‘in advance’ boring, in addition to providing information as to the rock to be drilled through, would also give advanced warning if waters are encountered. Grout would then be pumped through the drill boring to seal off fissures that would allow groundwater inflow. Pressure grouting of fractures in advance of mining should last indefinitely. The grout is placed under pressure (200 + psi) into the fractures as far as they would allow the grout to flow. Once development catches up to the grouted interval, if poor ground conditions exist then the workings would be screened, rock-bolted and/or shotcreted over the top of the screen. The objective of grouting of water-bearing fractures in advance of development is to control undesirable inflows and to provide additional ground support, if needed. Both of these objectives, if met, would minimize problems during decline development. See also response to comment W-3 above.

#### ***Waste Rock Piles and Acid Mine Drainage***

**W5 - Comment:** *Commenters expressed lack of sufficient analysis on the potential water quality impacts from acid mine drainage and were confused in general about acid mine drainage effects.*

**Response:** Acid mine drainage may occur when rock containing sulfides (such as pyrite) comes in contact with oxygen and water. A chemical reaction takes place producing a weak sulfuric acid. Not all sulfide minerals readily oxidize or generate acidity. Sample rock from exploration drill holes was subjected to several types of testing. These tests are designed to produce in the laboratory conditions encountered in the field but on a faster time scale. This simulation speeds up the natural weathering, process thus producing test data in weeks to a few months instead of a natural time scale of years to decades. By having an idea as to the amounts of sulfuric acid that may be produced, engineered containment facilities, and treatment methods may be designed, thus minimizing acid generation and/or eliminating the possibility of any discharge of acid mine drainage.

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The Draft EA summarized the testing conducted on the ore and waste rock in Section 2.2.6.3. For the Black Butte Copper Project, samples from a total of 318 drill intervals were tested. These samples were subjected to several methods of testing, all following established EPA testing protocols. Results of the baseline geochemical analysis indicates up to 70 percent of the rock to be mined during the exploration decline would be non-acid generating and, in fact, may have the potential for acid neutralization. Testing results also provide guidance on management of any rock that may be acid generating. Any rock having the potential to be acid generating would be separated out and placed on the PAG waste rock storage facility. Testing further indicated there were no identifiable asbestiform (potentially asbestos containing) minerals in any of the drill hole samples.

As the decline advances, water monitoring would continue. If at any time an issue arises, measures appropriate to handle those conditions would be implemented. These proactive measures would further protect waters from any decline impacts.

**W6 - Comment:** *Several commenters suggested that lining the NAG and PAG piles was insufficient stating that liners leak and have a history of leaking.*

**Response:** DEQ disagrees that all liners leak. The liners beneath the NAG and PAG piles would be designed to be free draining into holding ponds and therefore would never have any hydraulic head on them. This would minimize any potential leakage even if there were holes in the liner system because leakage is largely driven by the depth of water over a liner. The holding ponds themselves would be a greater risk, but could be drained and inspected routinely to confirm that the liners remain intact. Both waste rock storage facilities would be designed with a compacted subgrade and berms before the liner is installed. This subgrade layer and berms would perform three functions: 1) provide a stable surface for liner placement and 2) act as a barrier from any pore waters that may be below the subgrade, and 3) direct any surface runoff away from the liners. These measures would further ensure liner protection. Construction of the subgrade and berms would be performed by a construction company with the experience needed to ensure these structures meet or exceed manufacturer's requirements prior to liner placement.

Liners would have a thickness of 60 mil (60/1000 of an inch) and be made of a high-density polyethylene (HDPE) geomembrane. Installation of the liner would be by a manufacturer's certified third-party installation company. This third party installation company would have the expertise required to ensure the liners are installed to the manufacturer's specifications. Liner penetration for the outflow pipe would also be installed with strict adherence to the manufacturer's instructions/ requirements. Additional quality assurance/quality control would be conducted by a qualified on-site geotechnical engineer. The geotechnical engineer

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would have the field experience needed to ensure subgrades, berms, and liners are installed according to manufacturer's specifications.

Liners would be further protected from damage by the placement of 2.5 feet of 1.5 inch minus drain rock. Drain rock would be placed around and over all drainage pipes and placed across the entire liner, thus covering the entire liner to a depth of 2.5 feet. This drain rock would also meet or exceed the liner manufacturer's specifications before placement. Areas in the waste rock facilities where haul roads would be located would get an additional cover of 1.5 feet of run of development rock (rock generated by the excavation of the decline) placed on top of the 2.5 feet of 1.5 inch minus rock, providing a minimum depth of 4 feet at these locations. All rock would meet specifications and would have to be approved for use by the on-site geotechnical engineer before being placed.

The geotechnical engineer would be on-site during construction activities thus insuring quality assurance/quality control through all phases of construction. If at any time, the on-site engineer feels specifications are not being met, the engineer would have the authority to stop construction until such time the deficiencies are corrected.

**W7 – Comment:** *Define Selective Handling*

**Response:** Baseline data was obtained from the exploration drill hole samples which allowed testing of the different rock types to be encountered during decline development. As the exploration decline is developed and the rock removed, depending on the rock type (again identified during exploration drilling), all development rock would be separated (i.e. selectively handled) into two categories: potentially acid producing and non-acid producing. The selectively handled waste rock would then be placed in the appropriate engineered waste rock storage facility.

**W8 - Comment:** *The EIS should disclose exactly what the quality of discharge will be at the project, and what treatment will be in place to deal with pollution.*

**Response:** The expected quality of water that would be discharged from the proposed project is described in the Draft EA in Sections 2.2.4 and 3.2.3. The exact quality of the water produced by the project cannot be predicted with certainty due to a number of factors, as discussed further below. Water treatment would be required in order to ensure that all water discharged would comply with groundwater standards for the receiving waters, as discussed in response to W2 above.

The majority of water to be managed at the exploration project site would be derived from inflow of groundwater into the exploration decline from the surrounding bedrock. The bedrock penetrated by the decline is the Newland Formation, a metamorphosed calcareous

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shale within the middle Proterozoic Belt Supergroup. Flow of groundwater through this type of bedrock is typically controlled by faults and fractures within the rock rather than primary porosity. Numeric groundwater models normally assume that groundwater flow is controlled by primary porosity, which limits their ability to estimate inflow rates within geologic materials where groundwater flow is dominantly restricted to within fractures.

To estimate the quality and quantity of groundwater inflow to the exploration decline, data from two wells drilled near the proposed location of the decline were used. Well PW-3 was drilled where the decline would pass beneath Coon Creek and was completed in shallow fractured bedrock at a depth of 90 to 127 feet below ground surface. Well PW-4 was drilled near the deepest extent of the proposed decline and was completed in the 'Upper Sulfide Zone' of the Newland Formation, the portion of the bedrock that hosts copper mineralization, at a depth of 200 to 239 feet below ground surface. Analysis of the pump test for well PW-3 indicates that the inflow to portion of the decline within shallow fractured bedrock represented by this well could range between 175 and 614 gallons per minute. The pump test for well PW-4 indicated that total inflow to the deeper portion of the adit within less-fractured bedrock would range between 10 and 12 gallons per minute. Installation of additional test wells could alter these inflow estimates but would not necessarily improve the reliability of the prediction. To limit water production from the decline, Tintina proposes to grout water-bearing fractures to be encountered by the decline prior to advancing the decline through these zones. Grouting would reduce inflows to an uncertain degree.

The quality of groundwater inflow to the adit can be estimated by multiplying the concentrations of parameters of concern (e.g. arsenic, thallium, etc.) detected in wells PW-3 and PW-4 by the expected inflow volumes represented by each well, adding these together, and then dividing by the total anticipated volume. Water quality from these wells is noted in the Draft EA, and further information is provided in Tintina's application for an amendment to its exploration license as well as subsequent monitoring reports.

Estimating overall quality of the water entering the decline, as described above, relies on the much less certain quantities of inflow from various sources. As noted in the Draft EA (Section 3.2.3), ambient water quality in the shallow bedrock aquifer (represented by PW-3) is better than that in the deeper bedrock of the Upper Sulfide Zone. Water from both sources would be pumped from the decline and discharged to the lined NAG pond where it would mix with rain water falling directly into the pond plus runoff from the lined NAG waste rock storage pad. Geochemical predictive tests conducted by Tintina can be used to estimate the quality of runoff from the lined PAG and NAG waste storage pads. These tests indicate that neither waste rock pad would generate acidic runoff, but that the runoff may initially exceed groundwater quality standards for some metals, including thallium. Actual concentrations

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would be dependent upon rock weathering rates, the amount of rainfall and evaporation within the ponds, and the volume of water pumped from the decline. Consequently, as stated above, the quality of water produced by the project would be dependent on multiple factors and would vary with time.

Due to this uncertainty, DEQ would require that a portable reverse osmosis treatment system be present at the project site prior to the need to discharge any water. Reverse osmosis is a non-specific water treatment method and is capable of removing similar percentages of all dissolved constituents from water. Treatment via reverse osmosis also has disadvantages, such as high electrical power demands and the production of a brine waste which must then be further treated, evaporated, or sent to an off-site licensed facility for disposal. For that reason, DEQ anticipates that Tintina would later replace the reverse osmosis treatment system with an alternate treatment process that is designed to remove the specific contaminants of concern that may otherwise have the potential for exceeding discharge criteria. (See also response to comment W-2).

**W9 – Comment:** *Disclose how much nitrate will be released into surface water.*

**Response:** Discharge of water from the project into surface water is not proposed, and Tintina would be required to apply for and receive an MPDES permit before such a discharge would be authorized. Concentrations of nitrate or other nitrogen compounds in decline development water are highly variable between exploration projects, and may or may not exceed groundwater standards. If nitrogen compounds in decline water exceed groundwater discharge criteria, then the water would require treatment prior to discharge to the underground LAD system.

***Discharge to LAD area and Discharge from LAD area to Wetlands***

**W10 - Comment:** *Commenters expressed concern about discharging and leaching acid and heavy metals into aquatic ecosystems.*

**Response:** Geochemical kinetic and other testing performed to date indicates that no acidic water would be produced by the project (Enviromin, Inc., 2013 a,b,c ). Regardless of the actual quality of the water, no discharge to the LAD areas would be allowed unless the water was first tested and determined to comply with human health standards for groundwater. In addition, groundwater quality would also be monitored downgradient of the LAD area to confirm that no contaminants were migrating from the LAD area toward the wetlands or surface waters.

**W11 - Comment:** *What if there is more water encountered than can be addressed thru evaporation ponds or land application? Discuss the project site's soil absorption capacity.*

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**Response:** Tintina would discharge decline development water to two surface and one underground LAD systems that have capacity for handling anticipated decline water. Testing in the proposed underground LAD area has documented that over 6,000 gallons of water per minute could be infiltrated into the soils and bedrock in this area. The volume of water expected to be discharged to the LAD system is only 100 – 500 gpm from the decline plus any stormwater collected in the ponds. See Final EA Section 3.2.1.4 which discusses inflows into the decline. Higher inflows of short duration could be managed by storing the water in the proposed lined ponds. Unanticipated sustained inflows greater than a few hundred gallons per minute may require temporary suspension of operations, possibly including flooding of the decline, until an alternate water management strategy is developed or until a decision is made to terminate the project.

**W12 - Comment:** *There is very little discussion on the likelihood of contaminated groundwater to reenter alluvial aquifers and the hydrologic cycle.*

**Response:** The Draft EA clearly states that groundwater would not be contaminated in Table 1, Sections 2.2.3, 2.2.4, 2.3, Table 8, 4.1.2.2, 4.1.3.2, 4.2.1.2, 4.2.2.2, 4.2.2.3, and 4.2.3.2. The Final EA clarifies the reason why DEQ has determined the mitigations for groundwater would reduce impacts to below the level of significance in:

- 2.3 Agency Mitigated Alternative
- 2.2.6.2 Surface Water and Groundwater Monitoring
- 3.2.1.4 Hydrologic Evaluation and Predicted Inflow/Dewatering Volume
- 4.2.2.2 Groundwater Proposed Action
- 4.2.2.3 Groundwater Agency Mitigated Alternative
- 4.2.3.2 Wetland and Riparian Areas Proposed Action
- 4.2.4.2 Surface Water Proposed Action
- 4.2.4.3 Surface Water Agency Mitigated Alternative

The potential for contaminated groundwater to discharge to alluvial aquifers is considered unlikely because all water discharged from the project would be tested and treated if necessary to groundwater standards, prior to being discharged to the shallow bedrock beneath the LAD area. Monitoring of groundwater in the shallow bedrock aquifer downgradient of the LAD areas would be required to assure that no contamination results from discharge to the LAD area. The excess capacity in the designed LAD systems discussed in response to W11 minimizes the potential of groundwater to be impacted by LAD.

***Groundwater Contamination from Decline Flooding***

**W13 - Comment:** *A comment from residents close to the mine – concerned about water quality of their wells and who will start monitoring their wells.*

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**Response:** DEQ is aware of only one domestic well near the Project Area, but recommends that concerned area residents contact Tintina to request routine monitoring of their wells, or else contact DEQ to discuss the relationship between their well locations, the Project Area, and the potential for impacts to wells. Well owners are protected from damages to their water supplies by the Montana Metal Mine Reclamation Act (82-4-355 MCA).

***Monitoring***

**W14 - Comment:** *The EA needs more rationale (like page 46) to show how this project will meet state water quality laws.*

**Response:** See response to comments W12. All water would be treated before discharge. Additional monitoring required in the Agency-Mitigated Alternative would verify contamination is not occurring.

**W15 - Comment:** *No data is present demonstrating whether springs and seeps could be affected by the project during operation and after closure.*

**Response:** Flow from springs and seeps could be reduced by the project if pumping groundwater out of the decline draws down the water table within the source area of a spring or seep. Tintina has inventoried springs and seeps within the project area (See Figure 7 in the Draft EA), and also contracted with Hydrometrics, Inc., to assess the potential groundwater drawdown associated with dewatering of the decline. Two scenarios were evaluated, one in which sustained inflows of 500 gallons per minute enter the decline (simulated drawdown area shown on Figure 8 of the Draft EA), and one in which sustained inflows of only 100 gallons per minute enter the decline (Figure 9 of the Draft EA). In the case of the greater inflow rate (which is in excess of the predicted inflow rate) the predicted drawdown area underlies the locations of some mapped seeps, and may influence them if these seeps are not the result of a shallow perched groundwater system.

Under the Agency Mitigated Alternative in the Draft EA, DEQ would require increased monitoring of springs and seeps in the area, in addition to more frequent monitoring of wells. In the event that a spring or other groundwater source covered by a water right is adversely affected by the exploration project, the water right holder is protected by the Metal Mine Reclamation Act (82-4-355, MCA).

***Storage Capacity of Ponds***

**W16 - Comment:** *Commenters expressed concerns about the storage capacity of the ponds and failure of the ponds due to ground instability and storm events.*

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**Response:** The PAG and NAG seepage collection ponds were both designed to contain the volumes of water resulting from the average annual rainfall (17 inches) intercepted by the lined waste rock storage areas and their associated lined retention ponds, with no allowance for evaporation of water or absorption of water within the waste rock piles. In addition to these volumes associated with average annual precipitation, the ponds were also designed to retain the volumes of water resulting from a 100-year, 24-hour storm event (3.4 inches of precipitation). Both ponds, as designed, could retain these required water volumes and still have 16 to 17% excess capacity. These designs are conservative because: (1) actual volumes of seepage from the waste rock piles would be reduced by evaporation from the rock pile surfaces and absorption of water within the rock piles, (2) evaporation from the pond surfaces would reduce the volume of water within the ponds, and (3) water would be removed from the ponds, treated, and discharged to the land application disposal area.

More critical to NAG pond sizing than rainfall interception, however, is the proposed use of the NAG pond for storage of water pumped from the decline. Assuming the pumping rate necessary to keep the decline dewatered would be somewhere between 100 gpm and 500 gpm, the pond would have the capacity to retain between 6 and 28 days of water pumped from the decline. Because water pumped from the decline would have a greater influence on pond capacity than rainfall, DEQ has decided to impose minimum freeboard requirements for the ponds rather than requiring a minimum pond size. Water levels in both ponds would be required to be maintained such that each has the capacity to retain the 100-year 24-hour storm event plus an additional two feet of freeboard. The upper two feet of the NAG pond would provide capacity to store 1.4 million gallons of water. The volume of water associated with a 100-year 24-hour precipitation event falling on the lined catchment reporting to the NAG pond is 528,000 gallons. Thus the NAG pond would always have the excess capacity to retain nearly 2 million gallons of water, and the PAG pond would have excess capacity to store over 750,000 gallons.

DEQ will require Tintina to design and maintain each of the NAG and PAG ponds with two feet of freeboard. This has been added as an agency mitigation to the final EA.

Tintina also provided DEQ a memo addressing Seismic Stability Analysis in which modeling determined pseudo-static Factors of Safety (FOS) of 2.4 and 1.7 to the NAG and PAG pond embankments, respectively. FOS refers to the ratio of the sum of driving forces over resisting forces, such that a FOS of above 1.0 infers a measure of stability. The memo concluded, and DEQ agrees, that the modeled FOSs are more than adequate.

**W17 - Comment:** *What would the timetable be for construction of the deep underground drain field?*

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**Response:** The drainfield would be installed at start-up, ensuring it would be in place and functional prior to its actual need.

## **Wildlife Comments**

**WL1 - Comment:** *How will fish and wildlife be protected?*

**Response:** Detailed fisheries responses are provided in the FWP letter responses. See response to FWP letter and W1.

No impacts to wildlife are predicted in the EA. The disturbance constructing the exploration decline may displace some wildlife. No threatened or endangered species or wildlife species of concern would be impacted.

**WL2 - Comment:** *Elk use the nearest ridges as a migration corridor and may be impacted by the mine.*

**Response:** The EA concludes that development of the exploration decline may displace wildlife during construction. Wildlife is commonly observed on Montana exploration and mine sites and often seek refuge on mine sites during the hunting season.

**WL3 - Comment:** *How much water will need to be pumped out of the Black Butte Mine to allow extraction of the ore and why shouldn't we be worried that it will cause dewatering of Sheep Creek which already suffers major fish kills during drought years?*

**Response:** See response to comment W1.

**WL4 - Comment:** *Complete baseline information on fish and wildlife in the area.*

**Response:** See response to FWP letter, FWP-8.

**WL5 – Comment:** *The project allows unpermitted take of Lynx, wolverine, and whitebark pine.*

**Response:** The Metal Mine Reclamation Act does not have regulatory requirements for mitigating impacts to wildlife or species of concern on private lands. In the application for the exploration amendment, the likelihood of occurrence of lynx and wolverine in the Project Area is reported to be low. DEQ agrees. The habitat required for lynx and wolverine is mixed coniferous forests. The Project is located adjacent to a small stand of primarily Douglas fir forest and sagebrush grasslands which are not preferred habitat for lynx and wolverine. Lynx and wolverine may pass through the area on occasion but they would not

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stay. This language has been added to Section 3.5 of the final EA. Whitebark pine is not known to exist in the Project Area.

The taking of endangered or threatened species is regulated under the Endangered Species Act of 1973. DEQ does not have regulatory authority under that federal law.

**WL6 – Comment:** *Commenters expressed concerns about habitat disruption on boreal toads and potential loss of toads in lined ponds.*

**Response:** The likelihood of occurrence of western (boreal) toad in the Project Area is predicted to be high. The habitat for western toads includes ponds, slow moving streams, and wetlands. There is preferred habitat for western toads in the area around the proposed disturbance area.

Less than 50 acres of potential toad foraging habitat would be destroyed over the life of the project. The small footprint of this foraging area in the large landscape limits potential impacts to the western toad. DEQ predicts no impacts would occur to the toad's preferred habitat which includes seeps, springs, surface water, and wetlands in the area.

Western toads have been observed and have bred in human-made ponds at mine sites such as the Beal Mountain Mine and the Troy Mine where these ponds were not being used daily. Toads could be attracted to Tintina's lined NAG and PAG ponds however, these ponds would be actively used and this use would discourage use by the toads.

Toads could end up in the ponds and may have trouble climbing out of ponds in steep lined portions of the ponds. Overall, impacts to the western toad would be limited to loss of individual toads and the project would not threaten the continued survival of the species.

### **Socio-Economic Comments**

**SE1 - Comment:** *Commenters expressed their support for the mine and the economic advantages they believe it will bring to the community.*

**Response:** Comment noted

**SE2 - Comment:** *Commenters said they would like to see the socio-economic section, found on page 40 of the document, enhanced to reflect the true quality of the jobs that could be created of the proposed exploration advances.*

**Response:** Most of the jobs created under the proposed action will be miner, driller, and laborer positions with annual salaries ranging from \$50,000 to \$100,000. See Section 4.1.5 of the Draft EA and Section 4.1.3 of the final EA.

## Geochemistry Comments

### CH1 - Comment: *Kinetic Testing was incomplete*

**Response:** See response to comments EW-24 and TU-16. The twelve week tests in Section 2.2.6.3 of the draft EA were favorable and indicated no serious acid generation potential or neutral metal leaching potential. However, as a precaution DEQ made the decision to require a lined storage pad and a lined pond for the non-acid-generating (NAG) rock as well as for the potentially acid generating (PAG) materials. Later weeks of kinetic testing confirmed the lack of acid generating potential for all types of waste rock. Nevertheless, the lined waste rock storage pads and lined drainage ponds will still be required for this exploration project. See section 3.1.3.1 for more information on the geochemical baseline study.

The kinetic testing was completed for two rock types (*USZ and Ynl0*) at 24 weeks, and the final report on these rock types submitted to DEQ in September 2013 concluded that none of the sulfide bearing rocks sampled at the site would produce acid in a natural weathering and oxidizing environment. The report also concluded that metal mobility was minimal (HC Kinetic ARD Potential Testing, Black Butte Copper 2012 Johnny Lee Decline Project, McClelland Laboratories, Inc. September 4, 2013). Further testing of the other two rock types (*Ynl and YnlB*) has continued through 44 weeks and do not vary significantly from previous results (Enviromin, Inc., 2013d). Results of this testing would not change the requirement to store all waste rock on lined pads. The above language and references have been added to the Final EA.

Results of static and metal mobility tests for NAG samples indicated that the *Ynl* units are unlikely to generate acid or significant concentrations of metals. The static metal mobility SPLP test results also indicated that the Upper Sulfide Zone (*USZ*) and *IG* units have potential to release some metals, including iron, aluminum, chromium, and selenium. Figure 11 summarizes the results of the baseline acid base accounting work, which suggests that the rock to be mined from the (*USZ*) is potentially acid generating, while the waste rock lithologies to be mined from the various subunits of the lower Newland (*Ynl, Ynl0, YnlB*) and igneous dikes (*IG*) that cross cut the lower Newland locally are not. Due to the metal mobility release potential suggested for the *IG* by SPLP testing, which is low in tonnage (less than 1%), Enviromin recommended that the *IG* be handled as PAG, and did not recommend additional kinetic testing of this rock type.

Results of the kinetic tests reported after 24 weeks of leaching indicate no production of acid leachate by any of the tested rock (including the *USZ*); in spite of obvious evidence of sulfide

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oxidation by all of the *Ynl* lithologies except the *Ynl0* dolomite. These results are consistent with the static results, which indicated presence of both sulfide and abundant neutralization potential.

Leachate from the kinetic tests was analyzed for a suite of metals at suitable detection limits in a week 20 report (provided to the DEQ prior to completion of the Draft EA), and indicated that only selenium and thallium are associated with weathering of these rock types. Selenium was detected at concentrations below groundwater standards in early weeks in all rock types. Thallium was also detected in concentrations that typically exceeded the groundwater standard in the *USZ* and *Ynl* effluent in early weeks of testing, but not in the *Ynl0* or *YnlB*. Because all waste rock would be placed on a liner, there would be no discharge to surface or groundwater. Water collected from the liner may be discharged to the land application disposal (LAD) area only if it meets groundwater standards. The Agency-Mitigated Alternative requires treatment if necessary to meet those standards.

Since a number of treatment methods are known that can remove selenium and thallium, and since at a minimum a trailer-mounted reverse osmosis system can be obtained on short notice, water collected on the NAG and PAG pad liners can be effectively treated before disposal. This conclusion does not depend on the long-term results of kinetic testing.

**CH2 - Comments:** *Several commenters suggested that lining the NAG and PAG piles was insufficient stating that liners leak and have a history of leaking.*

*The QA/QC testing program and monitoring plan for the pad and pond liners should have been more fully described and available for public review in the DEA, rather than merely referenced as a future component of the project.*

**Response:** Both waste rock storage facilities would be designed with a compacted subgrade and berms before the liner is installed. This subgrade layer and berms would perform three functions: 1) provide a stable surface for liner placement, 2) act as a barrier from any pore waters that may be below the subgrade, and 3) direct any surface runoff away from the liners. These measures would further ensure liner protection. Construction of the subgrade and berms would be performed by a construction company with the experience needed to ensure these structures meet or exceed manufacturer's requirements prior to liner placement.

Liners would have a thickness of 60 mil (60/1000 of an inch) and be made of a high-density polyethylene (HDPE) geomembrane. Installation of the liner would be by a manufacturer's certified third-party installation company. This third party installation company would have the expertise required to ensure the liners are installed to the manufacturer's specifications. Liner penetration for the outflow pipe would also be installed with strict adherence to the

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manufacturer's instructions/requirements. Additional quality assurance/quality control would be conducted by a qualified on-site geotechnical engineer. The geotechnical engineer would have the field experience needed to ensure subgrades, berms, liners, and penetrations are installed according to manufacturer's specifications.

Liners would further be protected from damage by the placement of 2.5 feet of 1.5 inch minus drain rock. Drain rock would be placed around and over all drainage pipes and across the entire liner, thus covering the entire liner to a depth of 2.5 feet. This drain rock would meet or exceed the liner manufacturer's specifications before placement. Areas in the waste rock facilities where haul roads would be located would get an additional cover of 1.5 feet of development rock (rock generated by the excavation of the decline) placed on top of the 2.5 feet of 1.5 inch minus rock, providing a minimum depth of 4 feet at these locations. The development rock would also meet specifications and would have approval for use from the on-site geotechnical engineer before being placed.

The geotechnical engineer would be on site during all construction activities thus ensuring quality assurance/quality control through all phases of construction. If at any time the on-site engineer feels specifications are not being met, the engineer would have the authority to stop construction until such time the deficiencies are corrected.

**CH3 – Comment:** *Define Selective Handling*

**Response:** Baseline data was obtained from the exploration drill hole samples which allowed testing of the different rock types to be encountered during decline development. As the exploration decline is developed and the rock removed, depending on the rock type (again identified during exploration drilling), all removal would be separated into the two categories, potentially acid producing and non-acid producing. The separated waste rock would then be placed in the appropriate engineered waste rock storage facility.

**CH4 Comment:** *What are the confidence limits and standard error associated with the estimated percentages of PAG and NAG in the decline waste rock? The range of probable values is relevant to evaluating the storage capacities for the proposed PAG waste rock pad and seepage collection pond.*

**Response:** Analysis of 175 bore holes with 248 separate two- meter intervals of the underlying lithologies characterize the rock interval data for the amount of waste rock to be encountered.

The relative amounts or tonnages of NAG and PAG are based on five core holes drilled specifically for decline alignment and mined interval sampling. Other core holes falling near the alignment were also sampled. In all 248, two-meter intervals of bedrock lithologies

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occurring along the decline alignment were sampled and analyzed by whole rock ICP methods for 61 chemical elements. This analysis was used to bin and select representative rock types previously logged by geologists, over the full geochemical spectrum of critical element concentrations. Based on these analyses, 62 subsets of composites were selected based on total sulfur concentrations for static testing (acid-base accounting and NAG pH testing). Based on these results seven composite samples were selected for metal mobility testing (SPLP tests). In addition, four of the SPLP composite samples were selected for kinetic testing (Humidity Cell Tests).

The quantity of waste rock and ore developed would vary with concentration of minerals in the rock, as well as the value of rock, at the time it is removed. The total volume of rock would remain the same. DEQ is confident that the lined facilities can handle the projected volumes of ore and waste rock.

**CH5 Comment:** *Please provide the locations of other mine sites in Montana where anaerobic biological treatment systems have been successfully employed, as so stated.*

**Response:** The Stillwater Nye and East Boulder mines have a proven record of biological treatment.

**CH6 Comment:** *The Groundwater section, the Agency-Mitigated Alternative claims that increased monitoring would document water quality, but there is no action plan for responding to unexpected deviations or actual groundwater contamination detected at monitoring wells, nor any discussion of remedial actions that would be possible at that point. Therefore, the conclusion that "Impacts are reduced below the level of significance due to mitigation measures" is completely unsupported.*

**Response:** All waters would be treated prior to discharge to meet groundwater standards, so no impacts are anticipated. The LAD systems are over designed to minimize impacts to groundwater. Additional monitoring would ensure groundwater and surface water are not impacted.

**CH7 Comment:** *Upon closure, the decline would be filled with weathered PAG and NAG waste rock and flooded. Has this technique been proven to prevent further acid generation and groundwater contamination at other exploration sites or mines?*

**Response:** Acid is produced when sulfide-containing rock from a reduced environment is exposed to the oxygen in the air, causing a chemical reaction. As air is more mobile than groundwater, the amount of oxygen available in the air is greater than in water. By placing the PAG rock below the hydraulic plug and allowing the decline to flood, the oxygen that surrounds PAG rock is quickly used up in geochemical reactions and the

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reactions slow down significantly in the reduced environment. This reduces the potential amount of acid generation. The New World Mine District near Cooke City, MT has had ore shafts backfilled and plugged and, generally, water quality has improved significantly.

**CH8 Comment:** *What would prevent water contaminated with geochemical byproducts from moving outward from the decline walls along rock fractures into the surrounding aquifers?*

**Response:** Major water-bearing fractures encountered during decline development would be grouted reducing groundwater flows in and out of the decline. As the decline is backfilled at closure, pumps would remove water as needed to allow access to the workings for the backfilling operation. After backfilling is completed, the decline would flood and the water table would rebound to preexisting levels. The decline would be a groundwater sink until the water table rebounds to pre-existing levels. The initial flush of geochemical byproducts on the waste rock would begin to move into the regional groundwater at less than pre-existing rates because of the grouting. The reestablishment of a reducing environment in the decline would limit further weathering of the waste rock. Dilution along the groundwater flow path in the deep bedrock aquifer would limit impacts into the regional groundwater and surface water aquifers.

**CH9 Comment:** *What is the basis for determining that filling this decline with waste rock and flooding it would be the best available closure procedure for avoiding impacts, rather than simply the cheapest and most expedient way for Tintina to terminate its operation?*

**Response:** See response to CH7 above. Backfilling and flooding are not the cheapest and most expedient method. However, flooding is a technique used to reduce geochemical reactions occurring in an oxidized environment. Surface storage of waste rock is the easier method, but requires a larger pad footprint.

**CH10 Comment:** *The pumping and treatment of contaminated water from below the hydraulic plug would be preferable to assuming that polluted water won't leak out through fractures in the wallrock and contaminate aquifers. However, it is not clear how this pumping would be balanced with the need to keep the sulfide zone flooded to reduce acid generation.*

**Response:** See response to comment CH8. Fracture grouting would limit inflows into and outflows out of the decline during operations and in post- closure. Once the decline has flooded to the previous level, water quality parameters that existed prior to the decline development are expected to return. The pumping well below the hydraulic plug would be kept in place until water in the flooded decline meets groundwater quality standards.

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**CH11 - Comment:** *Please provide specifics about constant head tests using Double Ring Infiltrometers.*

Response: The double-ring infiltrometer tests were conducted in accordance with the American Society of Testing and Materials Method D 3385. This test method is useful for field measurement of the infiltration rate of soils. The double-ring infiltrometer method consists of driving two open cylinders, one inside the other, into the ground, partially filling the rings with water and then maintaining the liquid at a constant level. The volume of liquid added to the inner ring, to maintain the liquid level constant, is the measure of the volume of liquid that infiltrates the soil. The maximum steady state velocity is equivalent to the infiltration rate.

For the Black Butte Copper Project the infiltration rate reported is the steady state infiltration measured at the end of the double-ring infiltrometer test for all locations except for the minimum value at area H. This data point was the minimum infiltration recorded during the test due to a leak between the inner and outer ring. Conceptual discharges reported are the theoretical maximums based on the areas identified for the soil investigation and their respective infiltration rates.

Please see Attachment 4 to Appendix E of the exploration license amendment for the field notes, tables and figures for the infiltration tests.

*ASTM, Standard Method D3385 - Test Method for Infiltration Rate of Soils in Field Using Double Ring Infiltrometers.* For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org) or contact ASTM Customer Service at [Service@astm.org](mailto:Service@astm.org).

**CH12 Comment:** *Provide what synthetic discharge solution representative of major ion chemistry of the water would be created.*

**Response:** The major ion chemistry of the shallow aquifer water is dominated by calcium, magnesium, and bicarbonate (p. 26 of the Environmental Analysis). Other major ions present include iron and manganese. The deeper groundwater in the sulfide zone (pp. 7 and 44) is also of the calcium-magnesium-bicarbonate type, with elevated levels of several trace metals.

More information is needed before a complete formula for the synthetic discharge solution can be developed. Since some of the discharge water would have contacted excavated rock stored on the PAG and NAG pads, data from the kinetic (humidity cell) testing are needed to predict the metals that can be expected to leach from the rock and their likely concentrations

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in the leachate. That testing is largely completed and a summary of the results is included in response to comment CH1.

**CH13 Comment:** *What key metals and nutrients of concern would be added to develop isotherms?*

**Response:** Water entering the LAD system will have been treated, if necessary, to meet groundwater quality standards for metals and nutrients. It is possible that during leaching through bedrock, some additional solute metal load will be acquired, which is represented by the available kinetic test data. These data indicate that any such solute load will be small. For this reason no treatment via solute attenuation is anticipated or required to occur within the LAD system. Consequently sorption isotherms are not needed to evaluate its capacity to provide its attenuation, and therefore these isotherms have not been developed.

**CH14 Comment:** *Relevance to ionic order 47, 62 in relationship to wheat grass?*

**Response:** The meaning of “ionic order 47,62” as it might apply to environmental chemistry is unclear. (Ionic order is an architectural term.)

**CH15 – Comment:** *How do the sulfides react in the oxidation process of PAG waste relate to binary computing in isotherms/development of piezoelectric fields over LAD areas?*

**Response:** The meaning of this question is unclear.

**CH16 - Comment:** *Would LAD result in soil or groundwater contamination? Please discuss effectiveness of LAD practices at other mines.*

**Response:** LAD systems provide an efficient means of disposing of treated exploration decline wastewater if designed, implemented, and operated properly. Tintina would propose to treat all water discharged to LAD systems to meet groundwater standards which would avoid soil and groundwater contamination. The LAD has excess capacity for soil infiltration to avoid soil, groundwater, and surface water contamination. DEQ would require additional monitoring downgradient of the LAD system to ensure groundwater is not contaminated.

**CH17- Comment:** *After fracturing and exposure to oxygen, how much would the arsenic and metals concentrations that exceed human health standards in water in the lower sections of the decline be expected to increase?*

**Response:** Based on kinetic testing completed on the rock types at the site, DEQ predicts the arsenic and metals exposed to fracturing and exposure to oxygen would not increase. See response to comment CH1. Testing indicated when subjected to accelerated

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natural weathering and oxidation, acid production would not occur. In addition, metals mobility was minimal. All waters that exceed discharge criteria for any parameter would be required to be treated prior to discharge.

**CH18- Comment:** *Dilution of arsenic contaminated water with other groundwater would not be a long term solution. What is the capacity of the proposed LAD system to absorb this arsenic load? At some point, this form of water treatment would exhaust all available LAD systems in the project area and compromise treatment options for further mine development.*

**Response:** Dilution of arsenic contaminated water with other groundwater is not proposed. Water treatment for arsenic and other parameters would be required prior to any discharge of water that would otherwise exceed human health standards. Treatment would remove arsenic to groundwater standards. Additionally, monitoring wells would be installed in the LAD area to confirm that no pollution results from discharges to the LAD area. The absorptive capacity of local soils would not be exceeded in the short-term exploration program. If LAD is proposed for a long-term mining project the soils attenuation capacity for arsenic and other metals would have to be evaluated in soil columns or field tests.

**CH19- Comment:** *The presence of arsenic and various metals in concentrations above human health standards confirms that extreme caution with waste rock and water management would be needed if the decline were excavated.*

**Response:** All waters generated by the exploration project must meet applicable standards and will be treated if needed prior to any discharge. Exceedance of the groundwater standard for arsenic occurs in native groundwater in MW-1B, MW-3, and PW-4. Most other groundwater wells have values below the detection level. The only other metals that exceed the groundwater standards are lead in MW-1A, thallium in MW-1A and 1B, MW-2A, MW-3, and PW-4 and selenium in MW-3 and these exceedances are not for all events. Discharging waters to groundwater standards would limit risk associated with the exploration project.

### **Noxious Weeds/Vegetation/Soils Comments**

**V1 – Comment:** *Disclose current noxious weed infestations and native plant communities*

**Response:** Section 2.7 of Tintina's application (Tintina 2013a) summarizes the native plant communities and noxious weeds present in the area. Appendix G of the application contains the Biological Resource Report. The Final EA in Section 3.4 essentially restates the summary presented in Tintina's application. The level of detail in the EA is appropriate based on the plant communities inventoried and proposed to be impacted. The

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plant communities identified are common in the area. The species of concern identified in Meagher County area have a low probability of occurring in the exploration area.

In the EA in Section 4.2.6, the agency discusses the impacts to vegetation resources. The impacts resulting from the 46.5 acres of proposed disturbance under the exploration plan would be the same as discussed in Section 4.2.6. Holcim, Inc. has an iron ore mine within a mile of the proposed exploration decline. Some of the same plant communities were disturbed at that site. Revegetation of the disturbances using essentially the same reclamation practices has been successful at the iron ore mine. The impacts disclosed in this EA on vegetation plant communities reflect the impacts observed at the iron ore mine and for other disturbances where native plant communities are disturbed. Tintina is proposing standard revegetation practices accepted in the industry. DEQ did not require any mitigations of the revegetation plan as a result.

Noxious weeds are currently scattered in the area and have not been mapped. Tintina has an approved Meagher County noxious weed control plan. Noxious weeds are expanding in many areas of Montana. Tintina would be required to meet the requirements specified in an approved county weed control plan.

**V2 - Comment:** *Disclose detrimental soil disturbance and the analytical data that supports soil mitigation and remediation methods*

**Response:** Section 2.5 of Tintina's application summarizes the soil resources present in the area. The Final EA in Section 3.3 essentially restates the summary presented in Tintina's application. The level of detail in the EA is appropriate based on the soils inventoried and proposed to be impacted. Section 4.1.4 of the application discusses Tintina's plan for soil salvage and replacement. The soils identified are common in the area and have no limitations from DEQ's perspective except they may be shallow to bedrock. DEQ's salvage guidelines require the operator to salvage all soils on up to 2:1 slopes and with less than 50% coarse fragments (2mm) by volume.

In the Final EA in Section 4.2.5, the agency discusses the impacts to soil resources. The impacts resulting from the 46.5 acres of proposed disturbance under the exploration plan would be the same as listed in Section 4.2.5. Holcim, Inc. has an iron ore mine within a mile of the proposed exploration decline. Similar soil disturbance occurred at that site. Reclamation of the disturbances using essentially the same soil salvage and replacement practices has been successful at the iron ore mine. The impacts disclosed in this EA on soil resources reflect the impacts observed at the iron ore mine and for other disturbances where undisturbed soils are disturbed. Tintina is proposing standard reclamation practices accepted in the industry. DEQ did not require any additional soil resource mitigations as a result.

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DEQ only required mapping the subsoils stored in the portal pad to ensure they are not lost. DEQ also proposed additional groundwater monitoring to verify LAD of treated decline water does not leach metals from the LAD area to groundwater.

**V3 – Comment:** *Disclose the amount of habitat for old growth and mature forest dependent species*

**Response:** The proposed disturbance areas have all been grazed and logged in the past. The proposed disturbance areas are all on private land. The landowner does not have land management plans that try to preserve habitat for old growth and to protect mature forest dependent species.

### **Other Comments**

**O1 - Comment:** *Noise pollution and aesthetics will deter people from using the area.*

**Response:** Noise and aesthetics were not analyzed in the EA because the project is located in a rural area on private property and surrounded by large ranches. The landowner has agreed to allow Tintina access for exploration activities and the adjacent land owners (within a mile of the proposed decline) have entered into agreements with Tintina to lease both surface and mineral rights. Any land use change would be at the landowner's discretion.

The decline portal and support facilities would be located behind a hill and out of sight from the Sheep Creek Road (USFS #119). Except for some segments of US Highway 89, the same hill blocks the view of the facilities located some 1.8 miles to the west of the Highway. At night, the glow of lights from operations may be visible from this Highway. Drivers on Butte Creek Road would be able to see the decline portal facilities from private property only near the topographic divide between Sheep and Butte Creeks about a mile west of the portal pad.

Butte Creek Road, Sheep Creek Road, and US Highway 89 have been used to haul ore from an iron mine (Operating Permit #00071) since 1976. See response to comment O5 regarding additional truck traffic.

**O2 - Comment:** *General concern about increased noise pollution from the mine from heavy machinery and truck traffic*

**Response:** See response to O1.

**O3 – Comment:** *How will the county maintain highways and roadways (with increased truck traffic)? How will the County monitor sanitation issues?*

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**Response:** See response to O5 regarding increased truck traffic. Sanitation issues would be reviewed by the county sanitarian under laws administered by the Department of Public Health and Human Services. The iron ore mine (Operating Permit #00071), now owned by Holcim, has been hauling ore from the same area (Butte Creek road to Sheep Creek road to US 89) since 1976.

**O4 – Comment:** *Concerns that increased truck traffic from mining vehicles was not adequately addressed in the EA.*

**Response:** Comments were provided by the Montana Department of Transportation stating: *The Montana Department of Transportation (MDT) staff has reviewed the Draft EA for the modification to exploration license 00710 by Tintina Alaska Exportation Inc. for the Black Butte Copper Project. The EA indicates the access to the mine will be off US 89 at the Sheep Creek Road Access (RP 15.16).*

*The EA also indicates there could be a maximum of 45 employees per day at the mine, but does not state where the 10,000 tons of ore will be processed. If the mine progresses beyond the exploration stage, MDT requests an analysis of the Sheep Creek Road/US 89 intersection be completed to determine if the haul truck will be able to make the movement without encroachment into opposing lanes.*

The 10,000 tons of ore would be hauled and processed off-site. As requested by MDT, an analysis of Sheep Creek road would be completed if the mine progresses past the exploration stage.

The haul trucks are required to comply with all State and Federal Motor Carriers Safety Regulations and must comply with all laws and administrative rules. If the transport trucks do not meet the statutory lengths and weights, special permits must be obtained from Montana Motor Carriers (MCS) prior to traveling on public highways. It is recommended that the transport company contact MDT/Meagher County prior to transport commencement, this would allow for notification of any roadway closures or restrictions.

Access between US Highway 89 and the portal and ancillary facilities would be primarily along the existing Sheep Creek (county) road and private ranch roads located on leased private property. The minimum work necessary would be conducted to provide year round access and upgrades for safety on these existing roads as part of the mobilization process. Proposed road modifications would occur almost entirely within the existing road prism and would include resurfacing a number of road sections to improve traffic flow, drainage control, and/or culvert replacement to reduce sediment yield from roadway surfaces. All

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roadway modifications would be conducted in consultation with the landowners, the county, and DEQ.

The Sheep Creek and Black Butte county roads would remain open for public access and Tintina does not anticipate anything other than possible minor delays during the initiation of construction and upgrading of the county roads for suitable access as needed. Tintina would implement dust control measures using either water or chemical treatment on high traffic areas along access roads that can create dust. Tintina may also plow roads in the winter as necessary to maintain access to the decline construction site.

This language has been added to the Final EA in Section 3.6.

**O5 – Comment:** *Disclose the acreages of post, current and reasonably foreseeable logging, grazing, and road-building activities within the project area.*

**Response:** There are no logging projects proposed in the project area. Grazing would continue in the LAD area and grazing and haying would continue in the hay meadow. No new roads, only improvements to existing roads, are planned.

**O6 - Comment:** *Meagher County is a biased party and cannot be relied upon to assist in monitoring Tintina's activities.*

**Response:** Meagher County would enforce the Noxious Weed Control Act. DEQ is the regulatory body to be relied upon to assist in monitoring Tintina's activities

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**Black Butte Copper – EA – Agency Side-by-Side Letters**

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Comment Letter	Response
<div style="text-align: center;">  <p>REPLY TO ATTENTION OF</p> <p><b>DEPARTMENT OF THE ARMY</b> CORPS OF ENGINEERS, OMAHA DISTRICT HELENA REGULATORY OFFICE 10 WEST 15TH STREET, SUITE 2200 HELENA, MONTANA 59626-9705</p> <p>August 19, 2013</p> <p>Regulatory Branch Montana State Program Corps No. NWO-2013-01385-MTH</p> <p>Subject: Draft Environmental Assessment – Black Butte Copper Project</p> <p>Montana Department of Environmental Quality Attn: Herb Rolfes Post Office Box 200901 Helena, Montana 59620-0901</p> <p>Dear Mr. Rolfes:</p> <p>This letter is in response to your request for comments on the Draft Environmental Assessment for the Black Butte Copper Project in Meagher County, Montana. The project site is located in Sections 1 and 12, Township 11 North, Range 5 East, in Meagher County, Montana.</p> <p>The mission of the U.S. Corps of Engineers (USACE) regulatory program is to protect the Nation's aquatic resources while allowing reasonable development through fair, flexible and balanced permit decisions. In particular, under 404 of the Clean Water Act, we work to protect the biological, physical, and chemical integrity of the Nation's aquatic resources. Projects are evaluated on a case-by-case basis to determine the potential benefits and detriments that may occur as a result of the proposal. In all cases, an applicant must avoid and minimize impacts to aquatic resources to the greatest extent practicable.</p> <p>After reviewing the available information, it unclear if the proposed project will impact Waters of the U.S. (WOUS). Our comments for this project are:</p> <p><b>USAC-1</b> 1. If the project does not involve installation of fill material in waters of the U.S., no DA permit is required for this project.</p> <p><b>USAC-2</b> 2. If the project involves the placement of fill material in waterways and wetlands, a DA permit may be required. Structures should be placed outside of wetlands and away from waterways wherever possible. If the project involves work in a waterway or wetland, the work should be conducted in the dry as much as possible.</p> <p><b>USAC-3</b> 3. It is unclear if wetlands are located at the project site or may be impacted by the project. An on-the-ground wetland delineation is required if wetlands of the U.S. will be affected. In order for a DA permit application to be considered complete, a wetland delineation will be required in accordance with the Corps of Engineers 1987 Wetland Delineation Manual and applicable Regional Supplements. While the National Wetland</p> <p style="text-align: center;"><small>Printed on  Recycled Paper</small></p> </div> <div style="text-align: right; margin-top: 20px;">  </div>	<p style="text-align: center;"><b>Response</b></p> <p><b>Comment Response USAC-1</b> The Black Butte Copper Project is not proposing to install any fill in waters of the U.S.</p> <p><b>Comment Response USAC-2</b> The Black Butte Copper Project is not proposing to place any fill in waterways or wetlands, or working in a waterway or wetland.</p> <p><b>Comment Response USAC-3</b> A general survey of wetlands was conducted for the Black Butte Copper Project in September 2011 by Hydrometrics. The purpose of the survey was to identify and document all potential wetland sites in the Black Butte Copper Project Study Area that might meet DA jurisdictional wetland criteria, based on apparent hydrophytic vegetative cover and apparent site hydrology. Hydric soils, requiring more in-depth assessment, were not evaluated in this survey. The wetland survey was intended as a reference for avoiding wetlands in project planning.</p> <p>As designed, this phase of the Black Butte Copper Project would not impact any potential wetland areas identified in the September 2011 wetland survey. Specific project locations and areas of potential impact would be surveyed again in Fall 2013 and any observed wetlands would be delineated in accordance with the Corps of Engineers 1987 Wetland Delineation Manual and applicable Regional Supplements.</p>

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<p style="text-align: center;">-2-</p> <p><b>USAC-4</b></p> <p>Inventory (NWI) maps are informative for planning and pre-application reviews, the NWI maps are insufficient for our permit-level review of aquatic impacts.</p> <p>4. Compensatory mitigation is required for unavoidable losses to aquatic resources over 0.1 acres and for stream impacts over 300 linear feet. A compensatory mitigation plan for both wetland and stream impacts must be submitted as a part of the proposal. Please refer to Final Rule 33 CFR 325 and 332 for guidance on this requirement.</p> <p>5. Under Section 106 of the Historic Preservation Act, projects requiring a DA permit and which may affect historic sites listed on the National Register of Historic Places may require consultation with the Montana State Historical Society. It is advised that impacts to sites listed or qualifying for the National Register of Historic Places should be avoided to the best extent possible.</p> <p><b>USAC-5</b></p> <p>Once a project proposal is submitted, other factors relevant to the USACE regulatory program which are not included in the above list may need to be considered. Please contact me at (406) 441-1375 if you have questions and reference Corps File Number NWO-2013-01385-MTH.</p> <p style="text-align: center;">Sincerely,</p> <p style="text-align: center;"></p> <p style="text-align: center;">Deborah Blank Project Manager</p>	<p><b>Comment Response USAC-4</b></p> <p>The Black Butte Copper Project is not proposing activities that would result in unavoidable losses to aquatic resources over 0.1 acres or stream impacts over 300 linear feet, including any impact to wetlands or Waters of the U.S.</p> <p><b>Comment Response USAC-5</b></p> <p>Comment noted.</p>

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Comment	Response
<div> </div> <div> <p><b>EARTHWORKS</b></p> </div> <hr/> <div> <p>August 1, 2013</p> </div> <div> <p>Herb Rolfes        Montana Department of Environmental Quality        Environmental Management Bureau        Lee Metcalf Building        PO box 200901        Helena, MT 59620-0901  <a href="mailto:HRolfes@mt.gov">HRolfes@mt.gov</a></p> </div> <div> <p>Dear Mr. Rolfes,</p> </div> <div> <p>Re: Draft EA Tintina Alaska Exploration, Inc., Black Butte Copper Project</p> </div> <div> <p>Thank you for the opportunity to comment on the Draft Environmental Assessment for exploration activities at the Black Butte Copper Project. Please accept these comments on behalf of Earthworks, a non-profit conservation organization.</p> </div> <div> <p>The proposed project is at the headwaters of the Smith River, one of the most treasured streams in Montana for its premier recreational opportunities, beautiful scenery and renowned trout fishing.</p> </div> <div> <p>Given the acid-generating qualities of this ore-body and the value of the downstream resource, the proposed Black Butte exploration project merits rigorous review and the most protective measures.</p> </div> <div> <p>Our most significant concern is the lack of detail in how wastewater from the site will be managed and treated. The EA provides various options for how water might be managed, but there isn't a specific detailed plan. Furthermore, the EA states that "kinetic humidity cell tests are ongoing and water treatment systems are under design, so Tintina cannot quantitatively predict the chemistry of water that would be land applied using the LAD system" (EA p. 53). Without this information, the EA can't effectively evaluate potential water quality impacts, mitigation measures, or determine whether impacts are significant.</p> </div> <div> <p>We're also concerned that the EA doesn't provide specifics for how wastewater will be managed in the event that Tintina seeks an operating permit after the decline is complete. The permit application and EIS process may take years to complete. During this time the exposed decline</p> </div> <div> <p>1612 K ST. N.W. / SUITE 808 / WASHINGTON, DC 20006 / P 202 887 1872 F 202 887 1875 / WWW.EARTHWORKSACTION.ORG</p> </div>	

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<p>walls and waste rock will likely be an ongoing source of acid or metals leaching, which will require management and treatment.</p> <p>It appears that the LAD systems may ultimately discharge to wetlands/surface water. What hydrologic analysis has been done to determine whether these discharges will ultimately report to surface water, and whether surface water quality will be impaired? Additional analysis should be done to evaluate the capacity of the LAD systems to manage flows and various contaminants.</p> <p>A mile-long underground tunnel into acid generating rock at the headwaters of the Smith River is a significant proposal. Water quality impacts from hardrock mines are notoriously difficult to predict. Montana mines with acid mine drainage have resulted in severe impacts to surface and groundwater quality.<sup>1</sup> The State of Montana needs to do a better job of identifying these impacts up front rather than after the impact has occurred. For these reasons, we believe an Environmental Impact Statement (EIS) is warranted.</p> <p>The EIS should include a thorough analysis of the potential impacts to water quality, and detailed plans for water management and treatment that extends over a 3-5 year timeframe to account for managing seepage in the event the company files for an operating permit.</p> <p>We support the agency-mitigated alternatives that include a geotextile liner for the NAG stockpile and the additional water quality monitoring of water discharging to the LAD systems, but we believe that those should be incorporated within the alternatives analysis of the EIS process.</p> <p>We also ask that MDEQ include the bond calculation in the EIS. Given Tintina's lack of financial resources, the bond amount needs to ensure that the cost of all aspects of exploration, reclamation and long-term water treatment are covered. The public ultimately bears the liability for these costs, therefore the public should have the opportunity to comment on the bond amount as part of the EIS process.</p> <p>Thank you again for the opportunity to comment. More detailed comments are below.</p> <p>Sincerely,</p>  <p>Bonnie Gestring  Earthworks  140 South 4<sup>th</sup> Ave. West, Unit 1  Missoula, MT 59801  406-549-7361  <b>bgestring@earthworksaction.org</b></p> <p><small><sup>1</sup> J. Kuipers, A. Maest, K. MacHardy, G. Lawson. Comparison of Predicted and Actual Water Quality at Hardrock Mines: The reliability of predictions in Environmental Impact Statements. April 2006.</small></p> <p><small>1612 K ST. N.W. / SUITE 808 / WASHINGTON, DC 20006 / P 202.887.1872 F 202.887.1875 / WWW.EARTHWORKSACTION.ORG</small></p>	

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<p>Please consider these comments on the proposed Black Butte exploration project.</p> <p><b>2.2.3 Waste Rock Storage and Seepage Collection Support Facilities</b></p> <p><b>EW-1</b> It is difficult to accurately segregate potentially acid generating waste rock (PAG) from non-acid generating waste rock (NAG), so it is likely that some PAG may be placed with the NAG.</p> <p><b>EW-2</b> Furthermore, the geochemical analysis indicates that the NAG contains other pollutants, such as thallium, that may be an issue. Thallium has leached from unlined waste rock piles at the Kendall Mine near Lewistown, and resulted in violations of water quality standards.<sup>2</sup> Nitrates in blasting residue may also be an issue. For those reasons, the PAG and NAG waste rock piles and ponds should all be constructed on geotextile liners, with a leak detection system to minimize impacts to groundwater.</p> <p><b>EW-3</b></p> <p><b>EW-4</b> We agree that it would be useful to keep the various waste rock types segregated on the piles, so that additional leachate can be collected to evaluate how the different types are performing over time.</p> <p><b>EW-5</b> What is the storage capacity of the seepage ponds in relation to a large storm event? There have been numerous incidents at mines in Montana where engineering for the 100 year, 24-hour storm event has failed to prevent water quality impacts (e.g., Zortman Landusky).<sup>3</sup> The 2011 storm underscores the need for engineering seepage ponds to withstand larger storm events.</p> <p><b>2.2.4 Water Treatment</b></p> <p><b>EW-6</b> There appears to be no clear plan for how water treatment will be managed at the site. The EA includes a variety of options, but no specific detailed plan, or analysis to support the plan. There needs to be a detailed plan to demonstrate how water will be managed and treated throughout the 18 months associated with constructing the decline, and extending throughout the time in which Tintina may need to manage and treat wastewater if they choose to apply for an operating permit. And, it should incorporate the analysis to demonstrate that the water management and treatment regime identified by Tintina will adequately protect surface and ground water.</p> <p><b>EW-7</b> Given the value of the downstream resource and the acid generating qualities of the orebody, the project should be required to have a water treatment system (i.e., RO unit) on site in advance of decline construction to ensure that the company can take prompt action to treat to water quality standards.</p> <p><b>2.2.5 Land Application Disposal Areas</b></p> <p><sup>2</sup> MTDEQ, Letter from MTDEQ to CR Kendall Corporation, re: Notice of Violation and Administrative Order, Docket No. WQ-98-06, July 19, 1999.</p> <p><sup>3</sup> David Williams, U.S. Bureau of Land Management, Climate Change – Extreme Conditions: Do Plans of Operation Need to Include an Ark?. Presentation for Mine Design, Operations &amp; closure Conference, 2012. <a href="http://www.mtech.edu/mwtp/conference/2012.../Dave%20Williams.pdf">www.mtech.edu/mwtp/conference/2012.../Dave%20Williams.pdf</a></p> <p>[Also, Jim Kuipers P.E., Nothing New Here: A Technical Evaluation of I-147, September 2004. <a href="http://www.earthworksaction.org/files/pubs-others/Kuipers-NothingNewHere.pdf">http://www.earthworksaction.org/files/pubs-others/Kuipers-NothingNewHere.pdf</a></p> <p>1612 K ST. N.W. / SUITE 808 / WASHINGTON, DC 20006 / P 202 887 1872 F 202 887 1875 / WWW.EARTHWORKSACTION.ORG</p>	<p><b>Comment Response EW-1</b></p> <p>Figure 11 of the Draft and Final EA summarizes the results of the baseline acid base accounting work, which suggests that the rock to be mined from the Upper Sulfide Zone (USZ) is potentially acid generating, while the other waste rock lithologies to be mined from the various subunits of the lower Newland (<i>Ynl</i>, <i>Ynl0</i>, <i>YnlB</i>) and igneous dikes that cross cut the lower Newland locally (<i>IG</i>) are not. Figure 11 also shows that all of the 27 samples of <i>Ynl</i>, which indicate a 2 order of magnitude range in NAG pH between 7 and 9, and which presumably include some sulfide stringer mineralization based on the known range of sulfide content, would all pass these criteria. By placing all visible sulfides on the PAG pile, it is likely that this population would trend toward the pH 9 level during the mining of the exploration decline and would result in no PAG waste being placed on the NAG pad.</p> <p>In addition, results of the kinetic tests reported after 20 weeks of leaching indicate no production of acid leachate by any of the tested rock (including the USZ), in spite of obvious evidence of sulfide oxidation by all of the <i>Ynl</i> lithologies except the <i>Ynl0</i> dolomite (Enviromin, Inc. 2013c). These results are consistent with the static results, which indicated presence of both sulfide and abundant neutralization potential in mined rock, and excess neutralization in the <i>Ynl</i> host rock. Testing of the other two kinetic cells, <i>Ynl</i> and <i>Ynl B</i> were continued through week 44 and do not vary significantly from previous results. In conclusion, results of static, metal mobility, and humidity cell tests for NAG samples indicated that the <i>Ynl</i> units are unlikely to generate acid or significant concentrations of metals.</p> <p>In addition, the following special handling criteria would be implemented during decline construction:</p> <p>Detailed geologic mapping of the <i>Ynl</i> would be performed to define sulfide distribution and locate zones of sulfide enrichment.</p> <p>Mined samples would be screened initially, with all rock having sulfides identified visually sent for handling as PAG. This is conservative since not all rocks with visual sulfides are acid generating; in particular <i>Ynl</i> lithologies do not appear to be acid-forming. Even when sulfide stringers are present they have excess neutralization potential.</p> <p>Finally, any rock not identified as PAG would be subjected to screening level testing using the NAGpH test method during construction of the</p>

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	<p>decline.</p> <p><b>Comment Response EW-2</b> Results of static and metal mobility tests for NAG samples indicated that the <i>Ynl</i> units are unlikely to generate acid or significant concentrations of metals. The static metal mobility SPLP test results indicated that the <i>USZ</i> and <i>IG</i> units have potential to release some metals, including iron, aluminum, chromium, and selenium. Figure 11 summarizes the results of the baseline acid base accounting work, which suggests that the rock to be mined from the Upper Sulfide Zone (<i>USZ</i>) is potentially acid generating, while the waste rock lithologies to be mined from the various subunits of the lower Newland (<i>Ynl</i>, <i>Ynl0</i>, <i>YnlB</i>) and igneous dikes that cross cut the lower Newland locally (<i>IG</i>) are not. Due to the metal mobility release potential suggested for the <i>IG</i> by SPLP testing, which is low in tonnage (less than 1 percent), it was recommended that the <i>IG</i> be handled as PAG. <i>IG</i> is easily identified from other lithologies in the field.</p> <p>Leachate from the kinetic tests of both PAG and NAG (<i>Ynl</i> host rock for the deposit) was analyzed for a suite of metals at suitable detection limits, and indicated that <u>only</u> selenium and thallium are associated with weathering of these rock types. Selenium was detected at concentrations below groundwater standards in early weeks in all rock types. Thallium was detected in concentrations that typically exceeded the groundwater standard in the <i>USZ</i>, and <i>Ynl</i> effluent in early weeks of testing, but not in the <i>Ynl0</i> or <i>YnlB</i>. Because all waste rock would be placed on liners, and seepage treated (if necessary) prior to discharge to an underground LAD system, there is no predicted impact to groundwater, and there would be no discharge to surface water.</p> <p><b>Comment Response EW-3</b> Blasting residue would be controlled by good housekeeping practices of explosives underground. Decline water would be pumped to the NAG pond and treated if necessary prior to releases to the underground LAD system. The groundwater standard for nitrates is 10 ppm. There are no predicted discharges to, and therefore, no predicted impacts to surface water. Monitoring of surface and groundwater is also proposed to determine potential impacts of metals or nitrates to either resource, with various methods of water handling, modification of use of LAD systems, or ceasing of pumping operations if discharges exceeding the standards are detected.</p>

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	<p><b>Comment Response EW-4</b>                      Compacted clay and geotextile liners with cushion and drain layers, and a seepage collection system were proposed for the PAG pad and NAG and PAG seepage collection ponds. No geotextile liner was proposed for the NAG pad, but the DEQ would require the use of a liner as a mitigation. No leak detection systems are proposed for either pads or seepage collection ponds. Leakage from the pads is unlikely because they are free-draining and saturated conditions would not occur over the lined areas.</p> <p><b>Comment Response EW-5</b>                      See response to comment W16.</p> <p><b>Comment Response EW-6</b>                      The description presented in Section 2.3 is sufficient for this stage of the project. Some of the major objectives in construction of the exploration decline are to obtain actual values under mining conditions for decline inflow volumes using grout control, a better sampling of water quality for water treatment design, and hydrologic data for more accurate predictive analysis and modeling of groundwater movement for any future mine operating permit application.</p> <p>There are two streams of water that could be mixed, a flow of about 12 gpm of water in contact with sulfide ore that exceeds groundwater standards for arsenic (0.067 mg/L, standard 0.010 mg/l) and strontium (9.3 mg/L, standard 4 mg/L) only, and a much higher flow volume of water at 100 to 500 gpm that meets all applicable groundwater standards. These two streams of water would be mixed (the larger stream diluting the much smaller stream at a ratio of about 40:1) in the underground decline workings and may meet groundwater quality standards for discharge without treatment other than settling of suspended solids. Section 2.2.4 then goes through a specific list of sequentially implemented water management options including dilution, seepage pond collection storage, recirculation, and mine flooding.</p> <p>Specific water treatment options are presented: RO with brine evaporation or RO with absorptive media (zeolite) brine treatment. Absorptive media treatment may be suitable by itself as a stand-alone treatment method if only select metals need removal. These treatment systems are readily available for installation and operation within 2 to 6 weeks (for absorptive media and RO treatment, respectively). These systems are likely capable</p>

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	<p>of meeting the discharge standards required.</p> <p>Should Tintina decide to apply for an operating permit, the decline would continue to be dewatered to the NAG seepage collection pond, treated (if necessary) and discharged to the underground infiltration LAD system.</p> <p>In spite of the inference of the comment, municipal water treatment companies, specialty contract water treatment companies and even mining companies do not normally design, build, and/or install water treatment systems that are readily available, until they are reasonably sure of the water quality and flow volume to be treated.</p> <p><b>Comment Response EW-7</b> Please see response to comment W1.</p>

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<p>The EA states that waste rock seepage will either be treated prior to discharge or directly discharged into a surface or underground LAD system. LAD systems have consistently failed to protect water resources at mines in Montana.</p>	<p><b>Comment Response EW8:</b> The land application system at Beal Mountain was not designed and implemented the way Tintina’s LAD system would be. Tintina’s LAD system is oversized to handle the projected flows with options for moving the system zones readily to avoid saturation. In addition, the water would be treated to groundwater standards before discharge.</p>
<p><b>EW-8</b></p> <p>At the Beal Mountain Mine, land application of process solution initiated in 2001 resulted in adverse water quality impacts. The 2005 EECA analysis on Beal found that “Springs located within and downhill of the land application area show appreciable increases in cyanide and selenium concentrations since land application began in 2001.” (<i>Draft EECA, Beal Mountain mine Engineering Evaluation/Cost Analysis, Prepared for USFS Northern Region, September 2005.</i>)</p>	<p><b>Comment Response EW9:</b> The land application system at Zortman/Landusky was not designed and implemented the way Tintina’s LAD system would be. Tintina’s LAD system is oversized to handle the projected flows with options for moving the system zones readily to avoid saturation. In addition, the water would be treated to groundwater standards before discharge.</p>
<p><b>EW-9</b></p> <p>At the Zortman Landusky Mine, LAD resulted in serious water quality impacts, as described by a 2006 memo by Dr. Dave Chambers, “The most problematic mine discharge/compliance point at this time is Goslin Gulch, where the land application of partially treated effluent (mainly from the Landusky leach pads) had been applied for several years. It is anticipated that after this year (2006), the land application area will no longer be needed, and that all effluent from the mines (from both the leach pads and waste rock dumps) will be routed through the treatment plants. At the point of compliance for the Goslin Gulch the surface water, when running (Ruby Creek is an intermittent stream at this point), exceeds Montana Water Quality Standards for selenium (60 times the standard), nitrate (10 times the standard), and residual cyanide (20 times the standard). Selenium is the most problematic contaminant because it can affect aquatic organisms (probably no fish present), sheep and horses. Once land application stops, it is possible that water quality in Ruby Creek downstream of the LAD area will improve significantly. However, it is also possible that the existing water quality problems could continue for some time, as the solution that was land-applied is flushed through the soils. There are no present plans to collect or treat this discharge.” (<i>David Chambers, Memorandum, May 18, 2006</i>)</p>	<p><b>Comment Response EW-10:</b> The three land application case histories cited by Earthworks are substantially different from the land application plan proposed for the Black Butte Copper exploration project. DEQ disagrees that land application systems have consistently failed to protect water resources at mines in Montana. Several other cases could be cited, involving projects that are more similar to the proposed project, in which no impacts to water resources have been documented.</p>
<p><b>EW-10</b></p> <p>At the Kendall Mine, impacts to vegetation and soils from LAD were identified: “Environmental management staff members have noticed signs of distressed vegetation in areas, which have received direct application of treated water on the site.” (<i>Montana DEQ, Letter from Director Jan Sensibaugh to James Volberding CR Kendall, January 11, 2002.</i>) DEQ initiated an EIS in 2002 to develop a final reclamation plan for the site, including an evaluation of the effects of land application of process water on revegetation efforts. (<i>Final EA and Decision Notice on CR Kendall Corp Amended Closure Plan Proposed Coversoil System Changes, Appendix F, February 5, 2002</i>)</p>	<p>For the Black Butte Copper exploration project, it would be required that any water discharged to the LAD areas meet human health (groundwater) standards prior to discharge into the LAD system. Pre-treatment of the water would be necessary if the water does not meet those effluent limits without treatment.</p>
<p><b>EW-11</b></p> <p>The EA for the Black Butte project doesn’t include sufficient analysis on the capacity of the surface or underground LAD systems to evaluate potential impacts to water quality. Analysis is needed to evaluate the adsorption capacity of LAD soils, and whether the LAD areas are sufficient to manage the anticipated discharges and contaminants. A dye test should be done to identify where the injected discharges will emerge.</p>	<p>The three projects referenced by Earthworks are all open pit cyanide heap leach mines that were permitted over 25 years ago. This method of mineral extraction has since been banned in Montana. Heap leach facilities involve large lined pads on which ore is placed and is leached with cyanide. These facilities intercept all precipitation that falls on them, which can result in the need to rapidly discharge large quantities of water in response to large precipitation events.</p>
<p><b>EW-12</b></p> <p>It appears that the wastewater (comprised of wasterock seepage, decline inflow and stormwater) released to the surface LAD system could discharge to adjacent wetlands associated with a tributary to Sheep Creek. It also appears that the underground LAD system is adjacent to the</p>	<p>For example, heap leach pads at the Zortman and Landusky mines covered a combined 369 acres, so a six inch rain event could result in collection of up to 60 million gallons of water in the leaching circuit.</p>
<p>1612 K ST. N.W. / SUITE 808 / WASHINGTON, DC 20006 / P 202 887 1872 F 202 887 1875 / WWW.EARTHWORKSACTION.ORG</p>	<p>Requirements for design of land application areas were different when</p>

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	<p>these heap leach mines were permitted. No pretreatment of water (other than cyanide neutralization) was required because it was assumed that water application would occur at sufficiently slow rates such that metals would be absorbed via soil attenuation and nutrients would be utilized by the vegetation. However, land application associated with heap leach facilities often occurs in response to large precipitation events, necessitating rapid disposal on soils that may already be near saturation. Use of LAD areas outside of the growing season may also be necessary, in which case nutrient uptake by vegetation is minimal.</p> <p>For the above reasons, and because the Black Butte Copper exploration project proposes discharge of water to an underground drainfield system which would have less potential for soil attenuation and nutrient uptake than a surface LAD system, DEQ would require that all water discharged to the proposed LAD system would meet groundwater standards prior to discharge. This requirement would prevent the impacts to water resources that have sometimes resulted from use of LAD areas at cyanide heap leach mines.</p> <p><b>Comment Response EW-11</b>            Application rates have been computed based on multiple site infiltration testing of both shallow (at surface, 6-inches-deep, and near surface 18 inches deep) for surface LAD sites; and deep (4 -15 feet below surface) in weathered bedrock for subsurface infiltration LAD drainfields sites. The underground drain-field system is capable of handling about 6,000 gpm of flow, whereas the maximum predicted flow would be about 500 gpm. This represents a LAD infiltration system that is capable of handling values, which in reality allows for switching between zones in the drain-field so that near surface saturation does not occur in any one zone.</p> <p><b>Comment Response EW-12</b>            Storm water would not be included with waste water.</p> <p>Surface LAD areas F and J (Figure 16) are located 400 or more feet from ephemeral, but generally dry, stream tributaries and some 2,000 feet from wetlands (Figure 9) of Little Sheep Creek. During the operation of the surface LAD systems no surface water would be allowed to leave the application area (it must infiltrate). Surface LAD areas would have 3 piezometers installed within them to measure proximity of saturated ground to the surface (measured weekly), allowing for discharge rates to be modified or different surface cells to be operated to minimize or eliminate</p>

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	<p>the risk of soil saturation and discharges to the surface. In addition, the development of seeps and springs, or rills and gullies are not acceptable to DEQ down-gradient of the infiltration area. If any of these features develop the LAD system will be shut down until it can be modified or the application rate is decreased.</p>

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<p><b>EW-13</b> <b>EW-14</b></p> <p>upper reaches of a tributary, and could ultimately discharge to surface water (figure 28 in Black Butte Copper Project’s application). What data and analysis has been done to ensure that pollutants from the LAD discharge will not reach surface waters, requiring an MPDES permit?</p> <p><b>3.2.6 Aquifer Testing</b></p> <p><b>EW-15</b></p> <p>The EA states that the decline will pass within 90 feet of Coon Creek, and that the cone of depression won’t affect the creek. However, it’s possible that the decline could intercept a fracture, and result in unanticipated dewatering. What will be the potential impacts to Coon Creek if a fracture is intercepted? How long will it take to grout a fracture to reduce inflows?</p> <p>While the EA states that this won’t occur, it has occurred at other mines in Montana. For example, at the Stillwater Mine, the adit encountered a large inflow of water that peaked at 884 gpm and within a few months decreased to a steady-state of approximately 200 gpm where it remained. A small watershed containing a several springs and a perennial stream was located a vertical distance of 830 ft above the adit.<sup>4</sup> The springs and stream both dried up and remained dry.</p> <p><b>3.5.3 Fisheries and Aquatic Resources</b></p> <p><b>EW-16</b> <b>EW-17</b></p> <p>The EA states that Coon creek, in its lower reaches, is a perennial stream. What baseline data has been collected concerning the presence or use of Coon Creek by fish or other aquatic life? Given its proximity to the drawdown, baseline data should be collected, and incorporated into the EA on this stream.</p> <p><b>4.1.3 Wetland and Riparian Area Resources</b></p> <p><b>EW-18</b></p> <p>It would appear that the surface LAD system could discharge wastewater into the wetland system associated with an unnamed tributary to Sheep Creek. The EA should provide analysis on these LAD systems, analyzing the fate of these flows and associated contaminants, and potential impacts to the wetland area and any associated surface water.</p> <p><b>4.2.1.3 Geochemistry Agency-Mitigated Alternative</b></p> <p><b>EW-19</b></p> <p>The NAG wasterock pile should be lined to minimize impacts to groundwater, given the challenges of effectively segregating NAG from PAG, and the potential for leaching of nitrates and other contaminants from NAG.</p> <p><b>4.2.2 Groundwater Resources</b></p> <p><b>EW-20</b></p> <p>According to the EA, after the decline is backfilled with PAG, the majority of seepage out of the decline would occur where bedrock is most permeable, within the shallow bedrock system beneath and south of Coon Creek. The seepage would flow toward the Sheep Creek alluvial</p> <hr/> <p><sup>4</sup> Blodgett and Kuipers, Technical Report on Underground Hardrock Mining: Subsidence and Hydrologic Environmental Impacts, February 2002.</p> <p>1612 K ST. N.W. / SUITE 808 / WASHINGTON, DC 20006 / P 202 887 1872 F 202 887 1875 / WWW.EARTHWORKSACTION.ORG</p>	<p><b>Comment Response EW-13</b></p> <p>The swales between the ridges that host the proposed underground drain-field LAD system are upland dry areas and have no defined channels. As with surface LAD areas, all applied water in underground drain-fields is expected to report to either the shallow or deep bedrock aquifer. Development of downgradient seeps or springs below the LAD areas is not acceptable to DEQ. Tintina would be required to reduce application rates or otherwise manage discharges to prevent new seeps or increase discharge to existing seeps. The underground drainfield LAD area would have eight (8) piezometers installed to measure thickness of the vadose zone (measured weekly in five of the eight piezometers), allowing for discharges to be routed to different portions of the system to minimize or eliminate the risk of discharges to the surface. In addition, there would be at least two downgradient nested pairs of groundwater wells completed in shallow alluvium and bedrock designed to detect changes in groundwater quality below the LAD areas (sampled quarterly) and two proposed surface water monitoring sites below the LAD area on little Sheep Creek to detect possible impacts to surface water (SW-6 to be sampled monthly).</p> <p><b>Comment Response EW-14</b></p> <p>Water will meet groundwater standards prior to being discharged to underground drain-field LAD systems. Impacts to surface water from either surface LAD or underground drain-field LAD systems are not anticipated as saturated shallow groundwater conditions will be monitored weekly in monitoring wells as described above. Shallow alluvial/colluvial monitor wells and deeper bedrock groundwater wells in two nested pairs will be completed downgradient of the LAD areas (monitored quarterly) and two surface water sites would also be established along Little Sheep Creek (monitored quarterly).</p> <p><b>Comment Response EW-15</b></p> <p>There should be no impacts to Coon Creek if a significant water-bearing fracture is encountered in the decline that is connected to surface water in the creek for several reasons:</p> <ul style="list-style-type: none"> <li>• The zone between surface water in the creek /saturated alluvial materials, and the decline as it passes below the creek is comprised of about 24 feet of vadose zone (unsaturated) bedrock, and the first 1700 feet of the decline should be dry taking the decline past its projection under Coon Creek.</li> </ul>

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	<ul style="list-style-type: none"> <li>• If water-bearing fractures are encountered by core holes drilled in advance of the exploration decline, they would be grouted in the vicinity of the fractures' intersection with the decline in order to minimize inflow prior to the decline being driven through the structures.</li> <li>• Should a water-bearing fracture be encountered during the advance of the decline it would be sealed by drilling and pressure grouting of the fracture zone adjacent to the decline. This process should not take more that 2-3 days to complete in any given fracture zone.</li> </ul> <p>See response to comment W3.</p> <p><b>Comment Response EW-16</b>            Baseline studies for fisheries and aquatic life would be required prior to submission of any future mine operating permit application. Surface water impacts resulting from decline construction are predicted to be below the level of significance. See response to the Fish Wildlife and Parks letter, FWP-16.</p> <p><b>Comment Response EW-17</b>            The draft EA states in Section 4.1.2.1: The exploration adit would pass approximately 90 feet below Coon Creek (Figure 7). Aquifer tests, however, indicate that there is no direct hydrologic connection between surface water in Coon Creek and the shallow bedrock aquifer in the area. PW-3, a well located immediately adjacent to Coon Creek, indicates the primary water producing zones in the shallow bedrock are at depth and separated from the surface by a sequence of lower permeability bedrock which is dry near the surface. PW-3 encountered minimal groundwater in the upper 75 feet of the borehole.</p> <p>Furthermore, there was no observed decrease in water levels or flow in Coon Creek during a 72-hour aquifer test conducted on PW-3. The water quality sample collected at the end of the 72-hour aquifer test did not show evidence that Coon Creek was a source of recharge to the unsaturated zone in the shallow bedrock beneath the Coon Creek alluvium and the pump test results indicate the lack of connection between the shallow bedrock and Coon Creek alluvial aquifers. Therefore, there the risk is low risk that construction of the decline would decrease flows in Coon Creek.</p> <p>The combination of the hydrogeologic conditions described above plus the proposed operational elements that would result in potential impacts to</p>

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	<p>wetlands and flows in Coon Creek during operations are below the level of significance.</p> <p><b>Comment Response EW-18</b> See response to comment from 2.2.5 Land Application Disposal Areas, Paragraph 6, Lines 1 and 2 above.</p> <p>Surface LAD areas F and J (Figure 16) are located 400 or more feet from generally dry, ephemeral stream tributaries and about 2,000 feet from wetlands (Figure 9) of Little Sheep Creek.</p> <p>No fate and transport modeling is anticipated at this time.</p> <p><b>Comment Response EW-19</b> DEQ has already proposed a geotextile liner beneath the NAG pad as mitigation in its draft EA.</p> <p>See all three responses to comments on 2.2.3 Waste Rock Storage and Seepage Collection Support Facilities above.</p> <p><b>Comment Response EW-20</b> In closure, the Agency Mitigated Alternative requires Tintina to install a hydraulic plug in the decline, after the decline is backfilled with PAG, between the upper decline NAG host rock and the upper sulfide zone. The hydraulic plug would consist of a steel rebar frame set into the wall-rock, with concrete then poured into the frame. This plug can be relatively thin (a few feet) as the ultimate water pressure on either side of the plug should equalize once the mine is flooded. Due to the low permeability of the concrete and surrounding grout, the hydraulic plug would form a barrier between the upper zone of the bedrock aquifer, which flows at a relatively high rate (1.5 feet per day) through non-acid-generating rock, and the lower zone of the bedrock aquifer, which flows at a very low rate (0.015 feet per day, 100 times less than the upper zone) through potentially acid-generating sulfide rock. Therefore, the majority of the seepage would occur out of the upper, shallower, high permeability aquifer being recharged from the upper aquifer that meets all groundwater standards rather than the lower aquifer with its low flow rate. Because of these factors, cross-contamination between these semi-isolated water bearing units after the decline is flooded would be reduced to below the level of significance.</p> <p>Finally, the high permeability of the Sheep Creek alluvial aquifer results</p>

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	<p>in a hydraulic conductivity greater than 200 feet per day (about 130 times greater than that of the upper zone of the bedrock aquifer and 230 times greater than that of the lower zone of the bedrock aquifer) and the large volume of water contained within the alluvial aquifer would limit the extent of impact of the lower aquifer groundwater by dilution factor of about 230:1. Thus the impact on Sheep Creek would be below the level of significance.</p> <p>In addition, the Agency-Mitigated Alternative would require Tintina to install two wells to monitor water quality in the decline. One of the wells would be placed above the hydraulic plug and the other well below the hydraulic plug. In addition to measuring water quality, the well placed below the hydraulic plug would be used to pump water from the lowest point in the decline for treatment, if necessary, until water quality in the decline meets background water quality in the surrounding deep bedrock aquifer.</p>

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<p>EW-21            aquifer. The EA asserts that impacts to the aquifer would be below the level of significance. Where is the data and analysis to support this assertion?</p> <p>EW-22            If Tintina applies for an operating permit, seepage from waste rock left on the NAG pad could escape, but the EA states that impacts to groundwater are unlikely because the water table is 100 feet below the pad. Where is the data to demonstrate that contaminants wouldn't reach groundwater?</p> <p>EW-23            If Tintina defers closure of the decline while it applies for an operating permit, the groundwater quality in the decline area could worsen as it is exposed to acid-generating and metals leaching from the decline walls. The EA says that it may take longer for the water quality to return to background conditions after the decline is flooded. It asserts that the impacts on groundwater would be below the level of significance. Where is the supporting data for this?</p> <p>EW-24            It would appear that impacts to groundwater from acid mine drainage, nitrates and metals are likely to be significant, and warrant the full analysis afforded by an Environmental Impact Statement.</p> <p>EW-25  <b>4.2.3.2. Soil Suitability for Land Application of Water</b>            According to the EA, kinetic humidity cell tests are ongoing and water treatment systems are under design, so Tintina cannot quantitatively predict the chemistry of water that would be land applied using the LAD system (EA p. 53). It states that by mid-2013, such data will be available and batch attenuation tests will be conducted, using representative samples of surface soils developed within the proposed surface LAD areas F and J. It would appear that this EA is premature. MTDEQ should wait until this data is available, and then incorporate it into an EIS. How can DEQ or the public appropriately evaluate the potential impacts of this proposed action without such essential information?</p> <p>The EA is too vague and contains incomplete information to accurately evaluate impacts to water quality/quantity, and therefore the conclusion that impacts are insignificant aren't adequately supported. An EIS should be conducted to incorporate this data and analysis, provide a detailed water management and treatment plan, and address the full risks of acid mine drainage at the headwaters of the Smith River.</p> <p style="font-size: small;">1612 K ST. N.W. / SUITE 808 / WASHINGTON, DC 20006 / P 202 887 1872 F 202 887 1875 / WWW.EARTHWORKSACTION.ORG</p>	<p><b>Comment Response EW-21</b>            DEQ is proposing a geotextile liner beneath the NAG pad as mitigation that would significantly reduce the risk of potential seepage from the pad. Seepage from the NAG pad reports to the NAG Seepage Collection pond, where it would be treated (if necessary) prior to discharge to the underground LAD system</p> <p><b>Comment Response EW-22</b>            If Tintina defers closure of the decline while it applies for an operating permit, the groundwater would continue to be pumped from the decline in order to prevent damage to the underground utilities installed (air, water, and electrical lines and ventilation equipment). This pumped groundwater inflow would be temporarily stored and treated (if necessary) in the NAG seepage collection pond to meet groundwater quality standards prior to discharge to the LAD system.</p> <p><b>Comment Response EW-23</b>            See response to the comments above.</p> <p><b>Comment Response EW-24 (see CH-8 and TU-16)</b>            Results of static and metal mobility tests for NAG samples indicated that the <i>Ynl</i> units are unlikely to generate acid or significant concentrations of metals. The static metal mobility SPLP test results also indicated that the <i>USZ</i> and <i>IG</i> units have potential to release some metals, including iron, aluminum, chromium, and selenium. Figure 11 summarizes the results of the baseline acid base accounting work, which suggests that the rock to be mined from the Upper Sulfide Zone (<i>USZ</i>) is potentially acid generating, while the waste rock lithologies to be mined from the various subunits of the lower Newland (<i>Ynl</i>, <i>Ynl O</i>, <i>Ynl B</i>) and igneous dikes that cross cut the lower Newland locally (<i>IG</i>) are not. Due to the metal mobility release potential suggested for the <i>IG</i> by SPLP testing, which is low in tonnage (less than 1%), Enviromin recommended that the <i>IG</i> be handled as <i>PAG</i>, and did not recommend additional kinetic testing of this lithotype.</p> <p>Results of the kinetic tests reported after 20 weeks of leaching indicate no production of acid leachate by any of the tested rock (including the <i>USZ</i>);</p>

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	<p>in spite of obvious evidence of sulfide oxidation by all of the <i>Ynl</i> lithologies except the <i>Ynl 0</i> dolomite. These results are consistent with the static results, which indicated presence of both sulfide and abundant neutralization potential. Testing of the other two kinetic cells, <i>Ynl</i> and <i>Ynl B</i> were continued through week 44 and do not vary significantly from previous results (Enviromin 2013e).</p> <p>Leachate from the kinetic tests was analyzed for a suite of metals at suitable detection limits in a week 20 report (provided to the DEQ prior to completion of the EA), and indicated that only selenium and thallium are associated with weathering of these rock types. Selenium was detected at concentrations below groundwater standards in early weeks in all lithotypes. Thallium was also detected in concentrations that typically exceeded the groundwater standard in the <i>USZ</i>, and <i>Ynl</i> effluent in early weeks of testing, but not in the <i>Ynl 0</i> or <i>Ynl B</i>. Because all waste rock will be placed on a liner, there will be no discharge to surface water.</p> <p>Water collected from the liner may be discharged to the land application disposal (LAD) area only if it meets all groundwater standards. The Agency Mitigated Alternative requires treatment if necessary to meet those standards. Since a number of treatment methods are known that can remove selenium and thallium, and since at a minimum a trailer-mounted reverse osmosis system can be obtained on short notice, there is no question that water collected on the NAG and PAG pad liners can be effectively treated before disposal. This conclusion does not depend on the long-term results of kinetic testing.</p> <p><b>Comment Response EW-25</b> See response to comment G1.</p>

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<div> </div> <hr/> <div> <p>PO Box 200701 Helena, MT 59620-0701 406-444-3186 FAX: 406-444-4952 Ref: DO321-13 August 26, 2013</p> </div> <div> <p>Herb Rolfes - EMB Montana Dept. of Environmental Quality PO Box 200901 Helena, MT 59620-0901</p> </div> <div> <p>RE: Comments of Montana Fish, Wildlife &amp; Parks on the Draft EA for the Tintina Alaska Exploration, Inc. Amended Exploration Permit for the Black Butte Copper Project</p> </div> <div> <p>Dear Mr. Rolfes:</p> </div> <div> <p>We trust DEQ receives these comments in the spirit intended by §75-1-201(1)(c), MCA with Montana Fish, Wildlife &amp; Parks (FWP) being a public service agency entrusted with responsibility for and expertise in managing the public fish and wildlife resources of Montana. The proposed Black Butte Copper Project is located near Sheep Creek, which is a very important public resource not only in terms of the resident fishery, but also to the highly valued Smith and Missouri river fisheries and Smith River State Park.</p> </div> <div> <p>FWP -1</p> </div> <div> <p>The project lies in immediate proximity to a section of Sheep Creek that was physically rehabilitated in the 1960's to mitigate the impacts from human-caused disturbance (road building) on Highway 89 and Sheep Creek Road (Forest Road 119). We have a wealth of fisheries and stream information from these sections spanning from the 1950's through the 1990's. The nature of the rehabilitation involved restoring streamside vegetation in a section located 4.7 miles upstream from the project site that was straightened by highway construction and affected historic weed spraying practices. The other section is located 1.5 miles downstream of the project site. Here log drop structures were installed in a straightened section of channel in order to dissipate stream energy and provide deep water habitat for fish. In 1980, FWP considered gathering rainbow trout from Moose Creek to be used in our hatchery system because preliminary studies showed these fish outperformed hatchery trout in both growth and survival. In 1982, Montana State University completed a graduate research project in this area evaluating the fish populations.</p> </div> <div> <p>FWP -2</p> </div> <div> <p>Our most recent fisheries work in this area occurred from 2007 to 2012 and involved three independent studies of trout behavior in the Smith River drainage. We surgically implanted radio transmitters in fish and monitored their movements to identify habitats for spawning, summering and wintering. Our studies have shown 52% of the tagged rainbow trout in the Smith River spawn in the main stem, and 42% spawn in tributaries. The Sheep Creek drainage accounts for</p> </div>	<div> <p><b>Comment Response FWP-1</b></p> </div> <div> <p>Comment noted. DEQ is aware of the importance of the Smith River to Montana.</p> </div> <div> <p><b>Comment Response FWP-2</b></p> </div> <div> <p>Thank you for making DEQ aware of the streambed rehabilitation FWP has performed in the vicinity of the proposed exploration adit. DEQ has passed the fishery information on to Tintina for use in preparing baseline studies in the event they apply for an operating permit.</p> </div>

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FWP -3	<p>55% of the tributary spawning and includes Sheep Creek proper, Calf Creek and Moose Creek. We have documented rainbow trout from the Missouri River traveling 190 miles round trip to spawn in Moose Creek. This discovery demonstrates the importance of Sheep Creek in supporting or sustaining the Smith River and Missouri River trout fisheries.</p> <p>We hold instream flow water rights for Sheep Creek (30 cfs) and the Smith River (125-150 cfs). The rights are often not met. In fact, we presently have called on junior priority water right holders to cease diverting water in order to meet the minimum instream flow to sustain fish and wildlife habitat. Such a request is unfortunately common in the Smith River basin where stream flow is too often not adequate to fully support the fishery.</p>	<p><b>Comment Response FWP-3</b> DEQ does not evaluate the impact to stream flow as it relates to water rights. Rather, DEQ evaluates changes in stream flow as it relates to nondegradation criteria under the Montana Water Quality Act. An increase or decrease in the mean monthly flow of surface water by less than 15% or the seven-day 10 year flow by less than 10% is nonsignificant from a water quantity standpoint.</p>																																																																																										
FWP -4	<p>In addition to providing valuable fish habitat for the Smith River and Missouri River, Sheep Creek is vital for maintaining the quality recreation experience of the Smith River floating section. Over the past 17 years, the average number of angler days spent on the Smith River float section was 11,155 per year, and the average annual revenue generated for the state economy from these trips is estimated at \$1,202,868 (Table 1). Out of 1,200 fisheries the state monitors for angler use statistics, the average rank for the Smith River float section is number 10 in the region and number 60 in the state.</p>	<p><b>Comment Response FWP-4</b> DEQ will pass this fishery information on to Tintina for baseline studies.</p>																																																																																										
FWP -5	<p><b>Table 1. Angler use and economic statistics for the Smith River recreation float section (section 2), 1995-2011.</b></p> <table border="1"> <thead> <tr> <th></th> <th>Resident value \$</th> <th>State rank</th> <th>Region rank</th> <th>Non-res value \$</th> <th>Angler days</th> <th>Resident AD</th> <th>Non-res AD</th> <th>Total \$</th> </tr> </thead> <tbody> <tr> <td>2011</td> <td>46.83</td> <td>54</td> <td>8</td> <td>244.44</td> <td>11,480</td> <td>5,402</td> <td>6,078</td> <td>1,738,682</td> </tr> <tr> <td>2009</td> <td>44.55</td> <td>45</td> <td>8</td> <td>232.53</td> <td>18,100</td> <td>11,680</td> <td>6,420</td> <td>2,013,187</td> </tr> <tr> <td>2007</td> <td>43.04</td> <td>63</td> <td>9</td> <td>224.65</td> <td>8,375</td> <td>3,751</td> <td>4,624</td> <td>1,200,225</td> </tr> <tr> <td>2005</td> <td>40.43</td> <td>51</td> <td>8</td> <td>211.03</td> <td>14,188</td> <td>8,371</td> <td>5,817</td> <td>1,566,001</td> </tr> <tr> <td>2003</td> <td>38.13</td> <td>88</td> <td>15</td> <td>199.04</td> <td>6,854</td> <td>2,742</td> <td>4,112</td> <td>923,005</td> </tr> <tr> <td>2001</td> <td>36.80</td> <td>64</td> <td>10</td> <td>192.06</td> <td>9,088</td> <td>6,362</td> <td>2,726</td> <td>757,677</td> </tr> <tr> <td>1999</td> <td>34.57</td> <td>83</td> <td>16</td> <td>180.42</td> <td>7,645</td> <td>6,422</td> <td>1,223</td> <td>442,662</td> </tr> <tr> <td>1997</td> <td>33.23</td> <td>47</td> <td>9</td> <td>173.44</td> <td>13,391</td> <td>8,302</td> <td>5,089</td> <td>1,158,512</td> </tr> <tr> <td>1995</td> <td>32.34</td> <td>50</td> <td>8</td> <td>168.78</td> <td>11,272</td> <td>6,425</td> <td>4,847</td> <td>1,025,861</td> </tr> </tbody> </table>		Resident value \$	State rank	Region rank	Non-res value \$	Angler days	Resident AD	Non-res AD	Total \$	2011	46.83	54	8	244.44	11,480	5,402	6,078	1,738,682	2009	44.55	45	8	232.53	18,100	11,680	6,420	2,013,187	2007	43.04	63	9	224.65	8,375	3,751	4,624	1,200,225	2005	40.43	51	8	211.03	14,188	8,371	5,817	1,566,001	2003	38.13	88	15	199.04	6,854	2,742	4,112	923,005	2001	36.80	64	10	192.06	9,088	6,362	2,726	757,677	1999	34.57	83	16	180.42	7,645	6,422	1,223	442,662	1997	33.23	47	9	173.44	13,391	8,302	5,089	1,158,512	1995	32.34	50	8	168.78	11,272	6,425	4,847	1,025,861	<p><b>Comment Response FWP-5</b> DEQ will pass this socioeconomic information on to Tintina for the baseline studies needed if they apply for an operating permit.</p>
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FWP -6	<p>The Draft EA states in Section 1 that the purpose of the exploration is to determine feasibility of future mining. The development of the decline during the exploration phase essentially constitutes developing the entire access portion of the mining phase. We believe the Draft EA should have disclosed and fully considered this fact.</p>	<p><b>Comment Response FWP-6</b> Tintina’s exploratory workings are designed for access in a future mining scenario if Tintina applies for and obtains an operating permit. However, the mine would have to have at least two means of egress. Other facilities developed during the exploration decline could also be used in a future mining scenario if Tintina applies for and obtains an operating permit.</p>																																																																																										
FWP -7	<p>Sections 2.1 and 3.8 characterize land use in part as outfitted fishing and big game hunting. In addition to this use, non-outfitted anglers and hunters use the Sheep Creek drainage. This additional use should be reflected in the Final EA.</p>	<p><b>Comment Response FWP-7</b> DEQ has added non-outfitter angling and hunting to the Final EA in Sections 2.1 and 3.8.</p>																																																																																										
FWP -8	<p>Our most fundamental concern with the Draft EA relates to the removal of surface water and fishery resources from further study. Presumably, the aquatic resources category was also removed from further study, although the Draft EA does not specifically indicate this. The removal of fishery (and presumably all aquatic resources) from further consideration appears</p>	<p><b>Comment Response FWP-8</b> See response to comment W-1, and W-3, which describes the quantification, monitoring and mitigation for surface water impacts below the level of significance. Impacts to fisheries and aquatics resources are largely controlled by impacts to surface water quality and quantity, both of which are being monitored at numerous sites throughout the project area. Any surface water</p>																																																																																										

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	<p>impacts, including to seeps and springs would be an indirect result of direct impacts to groundwater. Surface water studies describing existing conditions, Tintina’s proposed monitoring, and predicted impacts are all included in the Final EA (Section 3.2.4). Additional surface and groundwater monitoring are included in the Agency-Mitigated Alternative in Table 2 and in Section 2.3 and Section 4.2.4 to ensure that any changes to surface and groundwater can be identified and mitigated. See also response to comment FWP-16.</p> <p>From a regulatory standpoint, there are distinct differences between groundwater and surface water with regard to water quality criteria as well as DEQ program authority to issue discharge permits. There are also different state regulations addressing water rights for surface water versus groundwater.</p>

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<p>predicated on the removal of surface water resources. The removal seems to rely on an artificial distinction between surface and ground water, which is in fact a singular resource in this setting. Potential negative impacts to ground water quantity and quality would be ultimately expressed in surface water, necessitating the further study and mitigation of impacts to surface water and related resources. We believe the Final EA should be expanded to encompass these resource categories and to include a thorough analysis of these resource categories, including monitoring, standards and mitigation that should be required in the Amended Exploration Permit.</p> <p>Section 2.2.6 of the Draft EA does not list fisheries and aquatic resources as a resource category considered in the monitoring plan. We believe it would be difficult to ascertain if the actions associated with the exploration would have any impact on the fisheries and aquatic resources of Sheep Creek without including this data gathering in the monitoring plan. These data would provide a basis to determine if exploration or mining has any impact on fisheries and aquatic resources. While the agency-mitigated alternative focuses on preventing ground-water impacts that would also negatively impact surface water and related resources, these alternatives provide no clear assurance that such impacts will not occur, and therefore monitoring is needed. The mitigation of any impacts should also be identified and disclosed in the Final EA and made part of the Amended Exploration Permit.</p> <p>Section 2.2.6.2 of the Draft EA states that surface water has been monitored at eleven sites on a quarterly basis. We recommend the applicant consider installing a USGS real-time discharge gage with seasonal thermal recording near with site SW-1 (Figure 6, Draft EA). Flow in Sheep Creek undoubtedly influences the fishery. Independent flow data gathered by USGS may be used to establish correlations to help determine if changes in the fishery are due to non-mine related impacts on stream flow or due to mine-related impacts. While the Draft EA, in many instances, references the short duration of the exploration activities (8-16 months), it does not identify a specific term for the Amended Exploration Permit. The assumption that all activities would occur within the projected timeframe is not sufficient to dismiss monitoring requirements, such as continuous monitoring provided by a USGS gage. Further, impacts to surface water quantity would continue after the temporary or permanent closure of the exploration shaft as the shaft refills with water. Consideration of surface water impacts should continue until the shaft refills to present groundwater levels. In light of new information provided herein, we believe the Final EA should evaluate and disclose the purpose and benefits of more rigorous water quantity monitoring. Such should also be a condition of the Amended Exploration Permit. Section 2.3 (and 4.2) of the Draft EA do not offer any information for fisheries and aquatic resources. We recommend the Final EA disclose meaningful information on this resource category.</p> <p>Section 4.1.2.2 of the Draft EA states that, at a pumping rate 100 gpm, the cone of depression will not impact the Sheep Creek alluvial aquifer. This conclusion seems to misconstrue the findings of the Evaluation Adit Drawdown Analysis Memorandum from Hydrometrics, Inc. dated January 29, 2013. In that Memorandum, Hydrometrics concludes, "The resultant simulations show limited potential for drawdown effects in the Sheep Creek alluvium due to the high permeability of the alluvium." It is true that drawdown will decrease substantially as the cone of depression reaches the Sheep Creek alluvial aquifer, as the high permeability aquifer will quickly replenish the water being pumped. However, some level of drawdown will ultimately extend to Sheep Creek, causing a diminishment in stream flow. Hydrometrics is careful not to assert that there will be no impact to flow in Sheep Creek. Unfortunately, the Draft EA seems to</p>	<p><b>Comment Response FWP-9</b> DEQ believes the mitigation measures provide clear assurance that impacts to surface water and related resources would be below the level of significance.</p> <p>DEQ would require baseline surveys for both fisheries and aquatics for any operating permit application for the Black Butte Copper Project. See also response to comment FWP16.</p> <p>During the construction phase of the decline and the period prior to final closure, surface water quality and flow data would be collected and compared with pre-existing baseline data. Failure to meet groundwater standards would violate Montana state law. The water treatment system would remove the elements in question to meet groundwater standards.</p> <p>DEQ understands that there is heightened concern over water quality in this watershed and has received numerous comments that discuss the need for an in-place treatment plant prior to starting the collection of mine drainage. Although DEQ believes water treatment would not be needed initially, DEQ would require Tintina to have a temporary treatment plant on-site before the decline advances 1,500 feet. The temporary treatment plant would be available, in standby mode, at the first indication that actual production water does not meet WQB-7 standards.</p> <p><b>Comment Response FWP-10</b> DEQ has no statutory authority to require that a USGS gaging station be installed at this location.</p> <p>Tintina has installed a stilling well with a transducer as a gaging station near the bridge over Sheep Creek (near SW-1) on the north end of the property. This station was monitored and field checked against a staff gauge on the bridge to begin establishing a hydrologic rating curve for in-stream flow. Data from both the rising and falling limb of the hydrograph were captured in the spring of 2013. SW-1 has been monitored quarterly for water quality (including temperature) and flow since May of 2011.</p> <p>The stream gauge has been set to record hourly measurements that are being used to document daily and seasonal variations in stream flow in Sheep Creek.</p> <p><b>Comment Response FWP-11</b> As previously indicated, DEQ has no statutory authority to require that a</p>

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	<p>USGS gaging station be installed at this location.</p> <p>The exploration decline is proposed to be 5,200 feet in length, two-thirds of which (3,466 feet) would be below groundwater. At a flow rate of 500 gpm this part of the decline below groundwater would flood to pre-decline groundwater levels in about 4 days; at 100 gpm flooding time would extend to 23 days. DEQ would require Tintina to conduct groundwater and surface water monitoring throughout the recovery period to evaluate and monitor groundwater recovery and associated effects to surface water.</p> <p>Tintina would be required to conduct surface and groundwater monitoring through the closure phase and for as long thereafter as DEQ determines is necessary. DEQ has clarified this in the Final EA, Sections 2.2.6 and 2.3.</p> <p><b>Comment Response FWP-12</b>  See response to comment W3.</p>

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<p>misinterpret Hydrometrics' findings to conclude that impacts to flow in Sheep Creek would be unlikely, and that drawdown would not reach the alluvial aquifer, stating, "...the cone of depression...would not extend to the Sheep Creek alluvial aquifer." Hydrometrics made no such claim. Figure 4 in the Memorandum (same as Figure 9 in EA) may contribute to that erroneous conclusion, as it only shows drawdown of 5 ft or more and does not show the full extent of the cone of depression. The full extent of the predicted drawdown should be depicted and considered.</p> <p>The Draft EA acknowledges some level of impact may occur on Sheep Creek by stating, "Thus the impact on Sheep Creek would be below the level of significance." We find this conclusion deficient in light of the procedure for determining significance, which requires consideration of the potential conflict with state law ARM 17.4.608(1)(g). Our prior instream water rights all too often go unmet. Preventing water from moving to another person having a prior right is a violation of the Water Use Act§85-2-114, MCA. The proposed dewatering activities have the strong potential to prevent water from moving to Sheep Creek and ultimately the Smith River, where we have prior rights. This action would constitute violation of state law and result in a significant impact.</p> <p>Further, it is fundamentally unfair that junior water rights would be requested to cease water use while a subsequent reduction in surface water would occur as a result of unmitigated mine dewatering. This request is a social impact that needs to be developed in the Final EA, unless dewatering impacts are fully analyzed and mitigated as part of the Amended Exploration Permit. In order to avoid a significant impact, we recommend the Final EA and Amended Exploration Permit require more rigorous ground-water monitoring and modeling during dewatering and after temporary or permanent closure to determine the quantitative impact on Sheep Creek, which then must be mitigated. We believe this requirement should be part of the Amended Exploration Permit and should not be delayed until the possible Operating Permit review as is suggested in section 4.2.2.3 of the Draft EA.</p> <p>The Draft EA relies on the 100 gpm drawdown analysis conducted by Hydrometrics. We believe this analysis is misplaced, as predicted dewatering rates may be as high as 200 gpm with grouting according to the Hydrometric Memorandum. While the applicant has committed to grouting, to the extent necessary to reduce dewatering to 100 gpm, the Draft EA did not disclose any assurance that this is reasonably physically possible. Also, the initial dewatering rates would be higher, potentially changing the outcome of the drawdown analysis. Hydrometrics describes the intent of their work as being to direct monitoring, as opposed to reaching conclusions about drawdown effects at specific locations. Consistent with Hydrometrics' own characterization of their work, we believe the Final EA should include more rigorous monitoring and complex modeling to determine the actual quantitative impact on water resources. Such should be made requirements of the Amended Exploration Permit along with requirements to fully mitigate any predicted reduction in flow in Sheep Creek.</p> <p>The Draft EA does not evaluate the potential for the ground-water LAD portion of the project to partially mitigate impacts to flow in Sheep Creek. It appears from the potentiometric surface data displayed in Figure 2 of Hydrometrics' January 29, 2013 Memorandum that water disposed of in the LADs may well express as surface water in the vicinity of SW-6 and points downstream. From a quantitative perspective, this water could mitigate depletion to flow in Sheep Creek due to dewatering. However, DNRC records show there is an irrigation point of</p> <p style="text-align: center;">4</p>	<p style="text-align: center;"><b>Comment Response FWP-13</b> See response to comment FWP14 below.</p>

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<p>diversion on Little Sheep Creek just north of the Sheep Creek Road, and that system could intercept this water, thus preventing it from providing any mitigation of the Sheep Creek dewatering impacts. If this LAD water is to be considered as mitigation for depletion of flow in Sheep Creek, it must be protected from diversion for irrigation and be of suitable quality to be considered appropriate surface water mitigation. The Final EA should address this new information and provide for necessary operating permit conditions to address this concern.</p>	<p><b>Comment Response FWP-14</b> The LAD area is not proposed to mitigate impacts to surface water in Sheep Creek.</p>
<p>FWP -14</p> <p>Even if the ground-water LAD does provide some level of mitigation to surface water quantity impacts, the water treatment operations that would remove water from the hydrologic system should be mitigated. The RO system would evaporate as much as 20,000 gallons per day of brine water when processing 100 gpm. Over 16 months of operation, this evaporation translates to nearly 30 acre-feet of water alone. Further water loss from the local ground-surface water system would occur with use of the surface LADs, as well as net evaporation from the seepage ponds. Also, potential increased evapotranspiration in wetlands influenced by the ground-water LAD may further remove water from the local ground-surface water system. These unknown amounts should be quantified and considered in the Final EA and conditions of the Amended Exploration Permit.</p>	<p>Water discharged into the LAD area would go to the shallow bedrock aquifer. Re-infiltration via the LAD system is merely transferring groundwater between two locations in the shallow bedrock aquifer separated laterally by approximately 800 to 2,500 feet.</p>
<p>FWP -15</p> <p>Section 4 of the Draft EA lists the resource categories that have the potential of being affected by the proposed action, but does little to disclose what the likely impacts would or could be. Most notable is Table 8 under Fish and Wildlife "...if surface water quality and quantity are not impacted, fisheries and aquatic resources would not be impacted..." We are concerned that quarterly monitoring may not be adequate for detecting changes in surface water quantity. Monthly water quantity monitoring should occur for all surface water sites, with weekly monitoring at SW-6 and continuous monitoring at SW-1 via a USGS gage station. This increased monitoring should be used to complement, but not replace, rigorous monitoring and modeling to determine actual impacts.</p>	<p>The treatment plan does have a provision for using RO as treatment and identifies thermal evaporation as an option for disposing of RO reject. If it is necessary to dispose of large volumes of reject (up to 20,000 gallons per day), the RO brine would be processed using adsorptive media rather than evaporation. The treated water would then be blended back into the treatment loop, resulting in less evaporative losses from the treatment system. As previously noted, these are contingency options for water management that are intended to be used on an infrequent basis for short durations, if needed, and are unlikely to affect the overall water balance.</p>
<p>WP-16</p> <p>Furthermore, the Draft EA does not disclose any information on present status of fisheries and aquatic resources as a basis to compare post-exploration status. As such, it seems unlikely that impacts stemming from changes in surface water quality or quantity could be detected with any degree of resolution. We recommend developing a monitoring program for fisheries and aquatic resources so there will be a baseline by which to evaluate the status and changes in these resource categories.</p>	<p><b>Comment Response FWP-15</b> FWP notes that quarterly monitoring of surface water may not be adequate to detect changes in flow. In the Agency-Mitigated Alternative, the monitoring Tintina would be required to perform would be increased from quarterly monitoring to monthly monitoring at SW-6 as well as seven springs. In addition, Tintina would be required to measure water levels on a monthly basis in 15 wells and weekly in 11 piezometers. The transducer currently installed at SW-1 would allow for hourly measurement of flow in Sheep Creek. DEQ believes that this monitoring frequency is sufficient to detect changes in stream flow. In response to FWP's concerns, however, DEQ would also require Tintina to conduct monthly monitoring of flow in Coon Creek above and below the trace of the decline, at (SW-3 and SW-4). See Agency-Mitigated Alternative in Table 2 and in Section 2.3 and Section 4.</p>
<p>FWP -17</p> <p>We also want to emphasize that the potential adverse impacts to public recreation opportunities are not adequately addressed in this EA. Smith River State Park and river corridor has statewide significance as an iconic recreational experience that is coveted by many Montanans and out of state visitors. Respondents to a study of Smith River floaters conducted in 2000 expressed a strong orientation towards enjoying the natural scenery and views of the river, getting away from the usual demands of life, being close to nature, experiencing a undeveloped river and experiencing comradery with group members and/or family. Physical relaxation, viewing wildlife, experiencing some very wild country and solitude and fishing also were highly rated reasons for visiting the river. In general, respondents reported high levels of actually attaining desired recreational experiences during their trip.</p>	<p><b>Comment Response FWP-16</b> In response to FWP's comment, Tintina has submitted a report relating to baseline fisheries information for the Sheep Creek basin. The report, entitled "Review of Fisheries Literature Data and Management Action in the Sheep Creek, Smith River Basin, Montana, October 2013" summarizes</p>

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	<p>relevant surface water hydrology and fisheries data which describes management actions and past and present fisheries characteristics in the Sheep Creek watershed. This report and any other information FWP has provided will be used for a baseline study in the event Tintina applies for an operating permit.</p> <p><b>Comment Response FWP-17</b> DEQ recognized the recreational opportunities associated with the Smith River, including its natural scenery and undeveloped state. Construction of the exploration decline is not expected to affect these recreational opportunities because the site of the exploration decline is 23 river miles away from the Smith River and cannot be seen from any point on the Smith River.</p>

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<p>The quality of the water and the fishery in the Smith River has an influence on many of those recreational values. Water quality is also important to many river recreationists who may chose to filter or treat drinking water directly from the river.</p> <p>The recreational opportunities provided by Smith River State Park and river corridor have also a significant positive impact on the economy of the nearby communities of White Sulphur Springs, Ulm and Cascade, where many river recreationists purchase food, supplies, gasoline and other amenities. Degrading the quality of the Smith River experience would likely have a negative impact on those communities.</p> <p>We recommend the issues identified in our comments receive full attention in the Final EA and subsequent Amended Exploration Permit in order to reduce and mitigate impacts to public fish, wildlife, and recreational resources.</p> <p>Sincerely,  M. Jeff Hagener Director</p> <p>c: Andy Brummond Grant Grisak Trevor Selch Jackie Windon</p> <p>6</p>	

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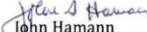
Comment	Response
<p>7 Jackrabbit Lane White Sulphur Springs, MT 59645 August 20, 2013</p> <p>RECEIVED AUG 23 2013 DEQ DIRECTORS OFFICE</p>  <p>Robert Cronholm Montana Department of Environmental Quality P.O. Box 2000901 Helena, MT 59620-0901</p> <p>Robert, I would like to offer a few comments on the Draft Tintina Alaska Exploration, Black Butte Project EA. My wife, Betsy, and I have lived 2 miles east of White Sulphur Springs, MT for 11 ½ years. We recently retired from the Forest Service and have some local knowledge of the area. I retired as the Lewis and Clark National Forest Soil Scientist and have 25 years experience primarily in soils, vegetation and hydrology with the Forest Service and Natural Resources Conservation Service. I also have over three years experience working as a Reclamation and Permitting specialist in bentonite mining in central Wyoming and southeast Montana. In addition I worked as a land surveyor for over 7 years with Peter Kiewit Mining based out of Sheridan, WY.</p> <p>Our involvement with the project has been mostly passive to this point. We have gained most of our background from the press coverage and in limited conversations with Tintina representatives and members of your staff. My familiarity with the Metal Mine Reclamation Act and Montana Water Quality Act is not good but I will make comments in reference these Acts. I understand that you and your staff primarily prepared the Draft EA and that the scope of the EA is limited to analyzing the impacts of the proposed Black Butte Copper Project exploration decline. I hope these comments will be useful to you.</p> <p>Soils</p> <p>1) The soils description on the first paragraph of page 51 of the EA under the Soils Proposed Action does not agree well with the range of soil characteristics found on page 30, first paragraph, for coarse fragments in the subsoil. My experience is that the range of coarse fragments in the subsoil is usually closer to the upper end of the stated range and makes the depth of the soil (depth to bedrock) not always clear.</p> <p>2) I very much agree with the first and second paragraph on page 52 of the EA. These are good recommendations. I do have concerns with the third paragraph on this page. Placing bermed subsoil downgrade from the portal patio, topsoil and subsoil below the seepage collection ponds and including subsoil in the fill of the roads would risk erosion, dilution, contamination and loss of biological activity of the limited amounts of topsoil and subsoil available. I recognize that earthwork balances for the area shown in Figure 3 are difficult, but would prefer to see the topsoil and subsoil placed in stockpiles above the activity.</p> <p>3) In the first paragraph on page 53 Tintina proposes to put 16,900 yards of subsoil into the fill of the portal pad. The proposed mitigation for this proposal found on</p>	<p><b>Comment Response Ham-1</b> DEQ agrees the soil descriptions on the two pages cited do not necessarily agree in the description of coarse fragment content. DEQ has two basic soil salvage guidelines: All soil must be salvaged on slopes less than 50% and all soil must be salvaged with a coarse fragment (&gt;2mm) content of 50% or less. Because of the difference in coarse fragment content in the soil descriptions, DEQ will require Tintina to salvage all soils up to a 50% coarse fragment content for final reclamation covers. As stated in the second paragraph on page 52, DEQ would require Tintina to salvage subsoils with &gt; 50% coarse fragments to ensure enough soils are salvaged and no offsite soil has to be imported.</p> <p><b>Comment Response Ham-2</b> DEQ agrees that ideally soil should be stored above the activities to avoid erosion, dilution, and contamination. In this case under an exploration program and because the materials in the embankments and portal pads are not acid producing, DEQ would allow using the soil materials as berms to control erosion, etc. The piles would be mapped and located using GPS to prevent them from being misconstrued as anything other than soil materials.</p> <p><b>Comment Response Ham-3</b> DEQ agrees that ideally subsoil should not be stored in the portal pad as fill because of potential contamination and loss of soil biological activity. The cell would be mapped and located using GPS to prevent it from being misconstrued as anything other than the stored subsoil materials. DEQ would work with Tintina to isolate the cell of subsoil as much as possible to minimize any potential contamination from PAG materials hauled out of</p>

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	<p>the decline.</p> <p>DEQ is convinced that the cell can be protected and does not want to “rob Peter to pay Paul” and import borrow to the site from another source. If enough fill cannot be generated on site, borrow materials would be characterized and the borrow site would be reclaimed.</p>

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<p><b>Ham-4</b></p> <p>the last paragraph of page 55 where the subsoil cell would be located to minimize impacts is possible but certainly optimistic. The longer the portal pad is in place the greater the likelihood of contamination, dilution, erosion and loss of biological activity within the subsoil. Returning to the first paragraph on page 53, Tintina is proposing bringing in 28,900 cubic yards of material from offsite to complete the portal pad. I urge bringing in more material from offsite to construct the portal pad and preserving all subsoil in stockpiles above the portal construction as described in the first paragraph on page 52. Identifying and discussing the nature of the borrow material is also urged. Some reclamation needs for the borrow area may also need discussion with the life of the portal being uncertain.</p> <p>4) In the 6<sup>th</sup> paragraph of page 53 of the EA, the 2<sup>nd</sup> sentence is a valuable acknowledgement. Until further testing and design is completed "Tintina cannot quantitatively predict the chemistry of water that would be land applied using the surface LAD system." An updated discussion of this point is strongly urged. Related to this point, in the 5<sup>th</sup> paragraph on page 55, it is stated: "no soil monitoring is proposed to quantify soil contaminant levels from LAD during the exploration program." Strongly urge revisiting this discussion with Tintina.</p> <p>5) References on page 60 of the EA indicate NRCS resources viewed online in 2011. Urge updating this information with 2012 data available.</p> <p><b>Ham-5</b></p> <p>Vegetation Resources</p> <p>1) The discussion of vegetation resources on page 30 and 31 of the EA is fairly broad and general and mostly accurate. The discussion of the Vegetation No Action Alternative on page 56 is good, especially the impacts to native plant communities from exploration activities. The discussion under the Proposed Action on pages 56 and 57 is very good. I understand that the extent of the discussion found on these pages meets the requirements of the Metal Mine Reclamation Act, but I can't leave this topic without asking for more. I urge listing and discussion of seed mixes, seeding rates and some measures of revegetation success. The literature is pretty helpful with levels of effective ground cover to minimize detrimental erosion (60-70 percent) and trends of revegetation toward potential for the sites before disturbance would only be to the benefit of Tintina. Revegetation efforts that look "good" backed up with some useful data would be a strong statement of commitment to soil, water and vegetation resources.</p> <p>2) The last sentence of paragraph 4 on page 57 is a great reminder. "A more formal weed control plan would be developed between landowners, County weed control officials and Tintina prior to completion of the decline permitting process." It is time for this to be shared.</p> <p><b>HamV-1</b></p> <p><b>HamV-2</b></p> <p>Still working on some comments for the geophysical and water quality sections. Not sure I'll make the deadline. Thank you for your time.</p> <p> John Hamann</p>	<p><b>Comment Response Ham-4</b></p> <p>Kinetic humidity cell tests have been completed. Results are good (See response to comment CH1). Water treatment systems are available to treat this water. DEQ agrees that Tintina cannot quantitatively predict the chemistry of water that would be land applied using the surface LAD system but DEQ is confident that it will meet groundwater standards (See response to comment CH1).</p> <p>If the water is applied at groundwater standards, DEQ is not concerned about soil contaminant levels exceeding EPA guidelines for soil application of decline water.</p> <p><b>Comment Response Ham-5</b></p> <p>DEQ has updated the reference to the Meagher County Soil Survey in the Final EA.</p> <p>The EA was updated as follows: "The Natural Resources Conservation Service (NRCS) has completed a Meagher County soil survey in the vicinity of the proposed exploration decline and in other portions of the Project area (NRCS, 2011). Soil surveys are complete in all areas proposed for surface disturbance associated with the exploration decline (Figure 10). The soil survey was updated and some soil map unit boundaries and names changed in the proposed disturbance areas in 2012 (NRCS 2012).</p> <p>The soil survey data show that soils near the decline location and in areas under consideration for land application disposal areas (LADs) primarily consist of loamy mollisols. The major soil mapping unit to be disturbed was called 1175D (Stubbs-Copenhaver complex) in 2011. In 2012 it was mapped as 1175E (Owenspring-Cheadle complex). Soils within the area are rated as being either poor or fair for use as a topsoil source or as reclamation material according to the NRCS soil survey due to shallow depths to bedrock, and/or a high percentage of rock fragments within the soil. Area soils are rated as having a high potential for subsequent reclamation if disturbed in place and then revegetated. Exploration decline related disturbance areas and the LAD system layouts are also shown on Figure 12. The new mapping in 2012 does not change the soil analysis in the EA because of the site specific field verification testing completed by</p>

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	<p>Tintina.”</p> <p>Reference: National Resource Conservation Service, 2012.  <a href="http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx">http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx</a>. Web Soil Survey. Viewed October 28, 2013.</p> <p><b>Comment Response HamV-1</b></p> <p>On page 123 of the Tintina application, Tintina describes the revegetation plan for the site. Native vegetation mixes would be tailored to the soils, climate, environmental setting, proposed land use, and plant community desired on the site. The seed mix would be reviewed and approved by DEQ prior to application. Reseeding would be applied at a rate of 20 pure live seeds (PLS) per 0.9 meter squared. This is a relatively standard practice on a site like this.</p> <p>There are two introduced species-dominated seed mixes currently being used on the site, a meadow mix for the reclaimed disturbances in the cultivated hay meadows and an upland mix, which applies to reclaimed disturbances on the remainder of the site. Reclaimed areas received an initial seeding as soon as the dirtwork was completed and then some areas received a follow-up application (see reseeded rate above) in the spring and fall, based on monitoring of the success of the initial application and during the evaluation of the status of weed infestations.</p> <p>After consultation with the NRCS (Natural Resource and Conservation Service) and the landowners, two introduced species-dominated mixes below were chosen. Nomenclature is based on Lesica, P. 2012. <i>Manual of Montana Vascular Plants</i>. BRIT. Ft. Worth, TX 771 pages. The seed was applied by broadcasting at the specified rate of 26 lbs. PLS (Pure Live Seed)/acre:</p> <p><u>Upland Mix</u></p> <table> <tbody> <tr> <td>Slender wheatgrass PLS/acre)</td> <td><i>Agropyron trachycaulum</i></td> <td>27% (7.29 lbs.</td> </tr> <tr> <td>Western wheatgrass PLS/acre)</td> <td><i>Agropyron smithii</i></td> <td>27% (7.29 lbs.</td> </tr> <tr> <td>Idaho fescue</td> <td><i>Festuca idahoensis</i></td> <td>18% (4.68 lbs.</td> </tr> </tbody> </table>	Slender wheatgrass PLS/acre)	<i>Agropyron trachycaulum</i>	27% (7.29 lbs.	Western wheatgrass PLS/acre)	<i>Agropyron smithii</i>	27% (7.29 lbs.	Idaho fescue	<i>Festuca idahoensis</i>	18% (4.68 lbs.
Slender wheatgrass PLS/acre)	<i>Agropyron trachycaulum</i>	27% (7.29 lbs.								
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	PLS/acre)		
	Alsike clover PLS/acre)	<i>Trifolium hybridum</i>	14% (3.64 lbs.
	Orchard grass PLS/acre)	<i>Dactylis glomerata</i>	14% (3.64 lbs.
	<u>Meadow Mix</u>		
	Meadow Brome PLS/acre)	<i>Bromus inermis</i>	40% (10.4 lbs.
	Creeping Fox Tail PLS/acre)	<i>Alopecurus arundinaceus</i>	20% (5.2 lbs.
	Alsike Clover PLS/acre)	<i>Trifolium hybridum</i>	20% (5.2 lbs.
	Orchard Grass PLS/acre)	<i>Dactylis glomerata</i>	20% (5.2 lbs.
	<p>It should be noted that all of Tintina’s revegetation efforts have been deemed successful thus far (See response to general Comment G8). The reclaimed and revegetated hay meadows have been harvested several times since reclamation in that area was completed. MMRA does not require a revegetation standard.</p>		
	<p>The native seed mix being used successfully on the Holcim iron ore mine nearby is broadcast seeded and harrowed into the reclaimed soils at a rate of ~13.25 lbs. PLS/acre</p>		
	Bluebunch wheatgrass /acre)	<i>Agropyron spicatum</i>	45 % (6 lbs. PLS
	Thickspike wheatgrass PLS/acre)	<i>Agropyron dasystachyum</i>	38% (5 lbs.
	Sheep fescue PLS/acre)	<i>Festuca ovina</i>	15% (2 lbs.
	Western yarrow	<i>Achillea millefolium</i>	2% (1/4 lbs.

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	<p>PLS/acre)</p> <p>Seed mixes can be modified at any time throughout the life of the project with agency approval depending on observations made in the field during inspections and based on availability of seed in fire years. DEQ does not expect the revegetation of this particular site to be challenging based on the soils and slopes in the area. Revegetation of exploration disturbances has been good to date. Tintina has proposed ocular estimates of reclamation and revegetation success on pages 123 and 124 of the application.</p> <p>DEQ expects that if Tintina applies for an operating permit and there is a need to reclaim large areas containing potentially reactive tailings, waste rock, etc. that they would propose a more rigorous revegetation standard and monitoring plan. The monitoring and revegetation plan proposed is adequate for the proposed exploration program.</p> <p><b>Comment Response HamV-2</b></p> <p>DEQ has received a County approved Weed Control Plan for the Project.</p>

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Page	Line/ Table/ Figure	Tintina (Company) Comment	DEQ Response
	Tintina	<b>Yellow highlighted text</b> is suggested revision of existing text. Please also see attached <b>redlined copy</b> of the EA for additional edits, suggested changes to the text, and other comments.	Comment noted
5	Sec. 2.2.1, 1 <sup>st</sup> paragraph, Line 1	<b>Comment:</b> The length of the decline proposed by Tintina is 5,000 feet.	5200' was the length given in the application, 5000' is the horizontal distance (See page 204 of the application)
6	Sec 2.2.2, 2 <sup>nd</sup> paragraph, Line 3	<b>Comment:</b> Suggest rewording as follows (see redlined text in attached Draft EA): .....major pieces of support equipment include an air compressor, propane heaters for winter heating of decline air, and a power supply and transformers with back-ups for on-site power generation (Figure 4).	Major pieces of support equipment include propane heaters for winter heating of decline air and air compressor(s). Primary electrical power will be pole mounted overhead lines connected to the utility grid and transformer as required at the site. Backup power will be supplied by on site generators.
6	Sec. 2.2.3 2 <sup>nd</sup> paragraph, addition at end	<b>Comment:</b> Suggest addition as follows (see redlined text in attached Draft EA): These seepage collection storage volumes include tone-years' worth of precipitation on both the pads and the seepage collection pond areas, and the 100 year 24-hour storm event. The PAG pond also has an additional 20% contingency, and the NAG pond a 100% contingency for additional storage.	See response to comment W-16
7	Sec 2.2.4 (b), 2 <sup>nd</sup> paragraph, line 6-9	<b>Comment:</b> Suggest highlighted changes: At the end of 16 months, there would no longer be any need to continue to dewater <del>that</del> the decline (but it may be desirable to prevent damage to underground utilities), and the decline would not need to be used again unless Tintina applied for and received an operating permit. Therefore, decline dewatering could (but will likely not) stop.	Comment noted, but DEQ believes the text changes are not necessary.
14	Sec. 2.2.6.3, Acid Base Accounting Test; Paragraph 4 Line 1 Paragraph 5 , Line 2	<b>Comment:</b> This table is not included in this EA; do you want to reference another document as a source for the table? I think they came from the following reference.  <i>Enviromin, Inc. 2012. Baseline Environmental Geochemistry Evaluation, 2012 Johnny Lee Decline, Black Butte Copper Project, report prepared for Tintina Resources, Inc., March 20, 2012, 28 p. and appendices.</i>	DEQ has delete reference to table in the final EA.
15	Sec. 2.2.6.3, Net Acid Generation pH Test; Paragraph 3, Lines 2-5	<b>From EA Document:</b> <i>Baseline results to date are based on limited analysis of a small number of drill samples and would be validated through analysis of an additional 20 samples of Lower Newland Formation (Ynl) using ABA and NAG pH methods prior to initiation of work in the exploration decline.</i>  <b>Comment:</b> This statement is no longer true, nor was it at the time of writing of the EA. The work on the additional 20 samples was done and reported on, with the conclusion that (page 22, Section 3.1.3, paragraph 7, Lines 3-4) " <i>Subsequent</i>	Text and references in the final EA have been updated drainages located to the west of the Sheep Creek hay meadow is derived from springs emanating from bedrock strata at much higher elevations than the shallow groundwater system associated with the decline. In addition, higher elevation springs

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Page	Line/ Table/ Figure	Tintina (Company) Comment	DEQ Response
		<p><i>tests of 20 additional samples indicate that the Ynl is unlikely to be acid generating (Enviromin, Inc. 2013a).</i>” Also data is presented in Enviromin 2012, cited above).</p> <p>This section is out of date and does not represent the extremely low Newland Formation NAG acid generation potential in a satisfactory manner. This section should be rewritten and updated to reflect the entire data set. If it were rewritten it would get rid of some potential confusion, and negate subsequent calls for unwarranted intensity of decline waste rock characterization sampling.</p> <p><b>Suggested Revision to Text:</b> (Replace deleted paragraph with the following)                      “Additional sampling and static testing analyses would be conducted during the decline construction and underground exploration drilling program. Kinetic testing of the lithologies that could release metals or acidity is ongoing to confirm the results of the static testing.”</p> <p>Revised text pages 15 – 17 redline copy</p>	<p>are often supplied by smaller localized aquifers that are perched above the deeper bedrock aquifers. These springs are fed by precipitation recharge and therefore may be subject to seasonal and annual variability. For these reasons, no impacts are anticipated in these more distal wetland areas, and they cannot be considered a source of groundwater flow from the decline area during operations or in closure. The lower reaches of Sheep Creek and Little Sheep Creek appear to be recharged by groundwater from the alluvial aquifer but there were no localized springs identified on these lower stream reaches within the</p>
17	<p>Sec. 2.2.6.3, NAG Confirmation Testing, 1<sup>st</sup> paragraph, Lines 2-4</p>	<p><b>Comment:</b> The level of testing proposed (required) in this section does not seem to be justified based on the results of the additional 20 samples that underwent static and composite SPLP testing. Nor based on the conclusions that (page 22, Section 3.1.3, paragraph 7, Lines 3-4) that “<i>Subsequent tests of 20 additional samples indicate that the Ynl is unlikely to be acid generating (Enviromin, Inc. 2013a).</i>” Updated static test data results are also presented in Enviromin 2012, cited above). In addition, humidity cell testing substantiates these observations with respect to acid-generating potential (week 28). I believe DEQ had all of the static test results and results through week 20 of the HC testing, before this EA document was completed. Tintina would like DEQ to consider rewriting these sections and reconsider the intensity of the proposed NAG sampling program. Revised text.</p>	<p>The text referenced does not specify how many additional samples of Newland (Ynl) would be tested. Some additional testing during the exploration adit phase is a reasonable requirement, because so far only the drill cores have been available for sampling. However, the EA should prescribe the amount of testing to be done as every 200 feet. This has been added to the final EA.</p>
17	<p>Sec. 2.2.6.3, NAG Confirmation Testing, Heading 2,</p>	<p><b>Comment: Comment:</b> Suggest the following addition to the text (see redlined text in attached Draft EA):</p>	<p>DEQ has added this proposed text to the final EA.</p>

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	Insitu Monitoring... 1 <sup>st</sup> paragraph, Lines 1-3	“NAG and PAG waste rock pad seepage, and pond water quality results would be analyzed as a field scale pilot test of ARD potential and metal mobility.”	
19	Section 2.2.7 Reclamation Plan; Subsection Decline and Portal Pad Closure; paragraph 1, Lines 6-7	<p><b>Statement in EA text says:</b> “Pumps would be turned off and removed with any underground pipelines.”</p> <p><b>Comment:</b> This has to happen before any backfilling begins, not after.</p> <p><b>Suggest following change (yellow highlights):</b> (Line 1) All mobile equipment and utilities (air, ventilation, and electrical lines including pumps) would be removed from the underground workings. The PAG and some of the NAG waste rock would be backfilled in the decline below the water table including the area under Coon Creek. The surface of the portal patio would be stripped of potentially contaminated PAG material from hauling between the portal and the PAG pile. This material would be placed underground, below the projected water table at closure. <del>Pumps would be turned off and removed with any underground pipelines.</del> The mine would gradually be allowed to flood as PAG backfill is placed (requires about 30 days) with a gradual retreat of the pumps as the fill is placed. <del>The decline is not anticipated to make or discharge water at or post-closure.</del></p>	Prior to allowing the decline to flood, all mobile equipment and utilities (air, ventilation, and electrical equipment, excluding pumps) would be shut down and removed from the underground workings. The PAG and some of the NAG waste rock would be backfilled in the decline below the water table, including the area under Coon Creek. The surface of the portal pad would be stripped of potentially contaminated PAG material and placed below the projected re-bounded water table during closure. Flooding would be controlled during back fill operations by using a retreat of the pumps as the back fill is placed and continued natural flooding allowed. Once the pumps are removed after full flooding, the decline is not anticipated to make or discharge water.
20	Sec. 2.3, 3 <sup>rd</sup> paragraph, Lines 3-6	<p><b>Statement in EA text says:</b> “Tintina would stop dewatering the decline.....”</p> <p><b>Comment:</b> Shouldn't this be stop “discharge from the NAG seepage pond to the LAD”. We have waste rock pad liners and lined seepage collection ponds constructed to store water from both the pad seepage and the decline for possible treatment of suspended sediment (clarification) prior to discharge to the LAD.</p> <p><b>Suggested rewording:</b> Tintina would either stop discharging from the NAG seepage pond to the LAD, or if necessary stop dewatering the decline, if water pumped from either of these facilities to the LAD system exceeds groundwater quality standards, until on-site water treatment plant is operational. Water collected in the NAG waste rock seepage collection ponds would be blended with water pumped from the decline or be used to treat water from the decline (clarification or settling).</p>	See response to W1.
20	Sec. 2.3, 3 <sup>rd</sup>	<b>Statement in EA text says:</b> “.....exceeds groundwater quality standards, until	

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	paragraph, Lines 6-7	<p>an on-site water treatment plant is operational.”</p> <p><b>Comment:</b> DEQ requested a statement as how long it might take to get a water treatment facility on-site and have it be operational.</p> <p><b>Suggested addition to the Draft EA Text (end of paragraph 3):</b> With respect to the amount of time that might be required to move a water treatment plant on site and have it be operational, Tintina indicated in the Amendment document that both the RO and absorptive media treatment systems described above are readily available from commercial vendors and are capable of meeting the discharge standards required for contingency treatment. RO systems are generally available for lease or purchase to be moved onto a site and operational with about 6-weeks advanced notice. Shorter time frames for delivery can be obtained by pre-negotiating a retainer to hold equipment until it is needed. Typically with the use of media absorption based systems, the media tanks are brought to the site and set up in advance of their being needed. If contingency treatment is in fact needed, various media are brought to the site and placed in the vessels. Media can be supplied to the site on one to two weeks’ notice.</p>	See response to W1.
22	Sec. 3.1.3, paragraph 5	<p><b>Statement in EA text says:</b> “<i>Except for the rock in the Upper Sulfide Zone and one rock sample of the Lower Newland Formation calcareous shale, all tested samples were non-acid forming. Waste rock sampling and testing would continue during construction of the decline, to identify any rock that may have the potential to form acid or leach metals.</i></p> <p><b>Comment:</b> The “one rock sample” was removed from the data set and 20 new additional samples were added. Level of NAG waste rock sampling proposed (required) is too intense for final conclusion that states “<i>Ynl is unlikely to be acid generating (Enviromin, Inc. 2013a).</i>” This statement should be updated, and if it were reworded might get rid of considerable potential confusion. See comment on page 15 above.</p> <p><b>Major re-write of this section:</b> See pages 22- and the two following additional unnumbered pages</p>	See response to CH1.
22	Sec. 3.1.3, paragraph 5	<p><b>Statement in EA text says:</b> <i>Subsequent tests of 20 additional samples indicate that the Ynl is unlikely to be acid generating (Enviromin, Inc. 2013a).</i></p> <p><b>Comment:</b> So why is this additional testing being required at this level of intensity, or at all for that matter? I believe the recommendation for NAG testing during adit construction was deleted from the final static test report (Enviromin,</p>	See response to CH1.

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		2012) and reiterated in the week 20 HCT report (Enviromin, 2013a). Revised text.	
23	Sec. 3.2.2, paragraph 1, Line 6	<p><b>Statement in EA text says:</b> <i>There are no gaging stations on Sheep Creek or its tributaries.</i></p> <p><b>Comment:</b> No longer true. Consider inserting the following text at end of the paragraph:  <i>“Tintina installed a stilling well with a transducer as a gauging station near the bridge over Sheep Creek (near SW-1) on the north end of the property. This station was monitored and field checked against a staff gauge on the bridge to begin establishing a hydrologic rating curve for in-stream flow. Data from both the rising and falling limb of the hydrograph were captured in the spring of 2013.”</i></p>	The text in the final EA has been revised accordingly.
23	Sec. 3.2.2, paragraph 2, Line 9-10	<p><b>Statement in EA text says:</b> <i>This report summarizes the results of groundwater and surface water monitoring conducted in 2011 and 2012.</i></p> <p><b>Comment:</b> Although true at the time of writing, Tintina has now supplied 2012 annual summary report and 1<sup>st</sup> and 2<sup>nd</sup> quarters of 2013 Quarterly report data to DEQ.</p> <p>I revised the text of the EA to include the first two quarters of 2013.</p>	The text in the final EA has been revised accordingly.
24	Sec. 3.2.2, paragraph 3, Lines 2-4	<p><b>Statement in EA text says:</b> <i>“...the Smith River approximately <del>34</del>23 river miles to the west at an elevation of 4,380 feet. The Project area is approximately 17 air miles above the confluence with the Smith River...”</i></p> <p><b>Comment:</b> The numbers 23 and 17 respectively are the correct values, based on AutoCad measurements from Google earth images.</p>	DEQ Accepts the values of 23 river miles and 17 air miles, which are values DEQ checked on ARCGIS. The final EA has been updated accordingly.
35	Table 8; Resources evaluated in this EA, Geochemistry, Agency Mitigated Alternative, bullet 3	<p><b>Statement in EA text says:</b> <i>If NAG waste rock leaches metals under near-neutral conditions; it would be stored on the PAG waste rock pad.</i></p> <p><b>Comment:</b> Igneous Intrusive (IG, dikes and sills) is the only waste rock lithology at risk for metal leaching under near-neutral conditions identified to date as described in <i>Section 2.6 Waste Rock geochemical Characterization</i> section of the Amendment document. It represents &lt;1% of the total volume of rock to be mined from the decline, is easily separated visually from other waste rock lithologies, and is slated to be stored on the PAG waste rock pad.</p>	Comment noted. Tintina would comply with the requirement by storing IG rock on the PAG pad.

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35	Table 8; Resources evaluated in this EA, geochemistry, Agency Mitigated Alternative, bullet 4	<p><b>Statement in EA text says:</b> <i>Rapid flooding of the decline at closure would limit geochemical weathering while the water table rebounds.</i></p> <p><b>Comment:</b> In closure the decline will have been open for some portion of 18 months to 3 years or more. Only 2/3 of the decline lies below the water table (about 3,300 Linear feet), decline is 18' x 18' in cross-section therefore contains about 1,069,200 cubic feet or a capacity of 7,998,171 gallons. At 100 gpm inflows it would take 23 days to flood the adit, at 500 gpm in-flow it would take about 4 days. The length of time to flood the adit by pumping is not significant when compared to the amount of time the adit has been open and subject to weathering, therefore pumping to flood the adit does not seem warranted. A discussion describing the actual retreat from the decline during closure is presented below in Section 4.2.2.2.</p> <p>DEQ should consider eliminating this mitigation.</p>	<p>DEQ agrees with this comment. The mitigation would accomplish little or nothing, because of the small change in total exposure to oxygen exposure it would bring about. The final EA has been modified to reflect this change.</p>
36-37	Sec. 4.1.1.2, air quality, paragraph #1	<p><b>Statement in EA text says:</b> <i>Detailed information for all emissions sources would be compiled for submittal to DEQ's Air Resources Management Bureau for review and final determination of potential permitting needs once specific pieces of equipment have been selected for the exploration decline. Tintina would apply for an air quality permit if required.</i></p> <p><b>Suggested Rewording:</b> Detailed information for all equipment emissions sources (engine HP ratings and tier levels) would be have been compiled for submittal to DEQ's Air Resources Management Bureau for review and final determination of potential air quality permitting needs. <del>once specific pieces of equipment have been selected for the exploration decline.</del></p>	<p>In accordance with current air emissions requirements, all required documentation concerning hydrocarbon fueled equipment emissions will be provided to DEQ's Air Resources Management Bureau for review. After the Air Resources Bureau review and evaluation, if required, Tintina would apply for the required air discharge permits.</p>
37	Sec. 4.1.2.2, paragraph 1, Lines 1-3	<p><b>Statement in EA text says:</b> <i>There are no predicted impacts to existing surface water quality and quantity from dewatering associated with construction of the exploration decline assuming that grouting can limit inflows to 100 gpm or less during a short duration exploration project.</i></p> <p><b>Comment:</b> The underground infiltration system as designed can handle as much as 6,000 gpm. Maximum predicted flow rate is 500 gpm. Therefore, the lack of impact to SW should not be tied to a 100 gpm (or less) pumped outflow.</p> <p><b>Suggested revision to text:</b> Drawdown analysis indicates that at a pumping rate of 100 gpm, the cone of depression associated with dewatering the bedrock aquifer in the vicinity of the decline (hydraulic conductivity between 0.010 and 2.2 feet per day) would not extend beyond the shallow bedrock aquifer and</p>	<p>See response to W3.</p>

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		<p>would not impact the Sheep Creek alluvial aquifer. In addition, even under higher dewatering rates (as much as 500 gpm) if the cone of depression extended to the Sheep Creek alluvial aquifer, the high permeability of the Sheep Creek alluvial aquifer (hydraulic conductivity &gt;200 feet per day) and the large volume of water contained within the alluvial aquifer would limit the extent of drawdown in the direction of Sheep Creek. Thus the impact on Sheep Creek would be below the level of significance.</p>	
39	<p>Sec. 4.1.3.2, paragraph 1, Lines 1-2</p>	<p><b>Statement in EA text says:</b> <i>An assessment of drawdown effects from the proposed exploration decline shows minimal potential for impacts to existing wetlands if grouting would reduce inflows to 100 gpm or less.</i></p> <p><b>Comment:</b> The only place we have information is in Coon Creek area and in Sheep Creek main valley and neither of these have predicted impacts to wetlands at all (at 100 or 500 gpm dewatering rates). In addition, recharge of other outlying wetlands in nearby drainages are derived from bedrock strata at significantly higher elevations than the shallow groundwater system associated with the adit, therefore no impacts are anticipated in these more distal wetlands either.</p> <p><b>Suggested addition to the text:</b> “In addition, impacts to surface water quantity, or to wetlands the main Sheep Creek valley, are not indicated by bedrock dewatering of the decline through the range of pumping rates evaluated (100 to 500 gpm). This is because of near surface saturated conditions and the extremely high hydraulic conductivity of the thick alluvial aquifer in the valley (&gt;200 feet per day) when compared with the bedrock aquifer (between 0.010 and 2.2 feet per day.” (see also redline comments in Draft EA document)</p>	<p>See response to W3.</p>
43	<p>Sec. 4.2.2.2, Potential Impacts of the Decline Development on Groundwater; paragraph 2, Lines 4-5</p>	<p><b>Statement in EA text says:</b> <i>Tintina would grout to control inflows to less than 100 gpm during the exploration program (Figure 9).</i></p> <p><b>Comment:</b> Tintina cannot guarantee what the adit water inflow rate might be. Tintina will strive to keep it as low as 100 gpm if possible. Change wording to – “Tintina would attempt to grout the decline to minimize the inflow to a reasonable sustainable level with the goal of attaining inflows of about 100 – 150 gpm.”</p>	<p>See response to W3.</p>
44	<p>Sec. 4.2.2.2, Potential Impacts of the Decline Flooding at Closure on Groundwater</p>	<p><b>Statement in EA text says:</b> <i>After the waste rock has been placed underground, the pumps in the underground workings would be shut off and the decline would be allowed to flood.</i></p> <p><b>Comment:</b> Pumps would need to be shut off and removed from the workings</p>	<p>Flooding would be controlled during back fill operations by using a retreat of the pumps as the back fill is placed, thus allowing controlled flooding of the decline. Once the pumps are removed after full flooding, the</p>

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	paragraph 1, Lines 3-4	(along with piping) prior to backfilling operations. More likely pumps would be gradually pulled back as the PAG was placed underground. See suggested reworded text in redline Draft EA document	decline is not anticipated to make or discharge water. After full flooding, pre-decline groundwater flow paths are expected to naturally be re-established.
44	Sec. 4.2.2.2, Potential Impacts of the Decline Flooding at Closure on Groundwater, paragraph 1, Lines 5-6	<p><b>Statement in EA text says:</b> <i>The time required to flood the sulfide zone would be minimized. It would take about 60 days for the decline to flood.</i></p> <p><b>Comment:</b> Only 2/3 of the decline lies below the water table (about 3,300 Linear feet), decline is 18' x 18' in cross-section therefore contains about 1,069,200 cubic feet or a capacity of 7,998,171 gallons. At 100 gpm inflows it would take 23 days to flood the adit, at 500 gpm in-flow it would take about 4 days.</p> <p><b>Suggested test addition see revised text in redline Draft EA.</b> "The controlling factor in the rate of flooding of the decline as estimated by Tintina would be the amount of time required to place the PAG backfill (about 30 days) and construct the hydraulic adit plug (about 5 days)."</p>	Comment noted and change made to the final EA.
48	Sec. 4.2.2.2, Potential Impacts of the Decline Flooding at Closure on Groundwater, Bullet 1, Paragraph 3, Lines 3-7	<p><b>Statement in EA says:</b> Disposing of the treated water below the hydraulic plug would speed flooding of the sulfide zone. In turn, this would minimize the length of time that the sulfide bearing wall-rock and the waste rock placed in the sulfide zone is in contact with oxygen and acid-generating, improving water quality.</p> <p><b>Comment:</b> Takes 4 days to flood the adit at 500 gpm inflow and 23 days at 100 gpm inflow. Natural flooding of the zone would occur as a result of regional groundwater flowing laterally in to filling the cone of depression rather than being filled with contaminate mine pool water. That would seem to be fast enough given that the adit walls have been exposed to underground weathering for at least several to perhaps as many as 18 months prior to earliest closure. Implementation of this deliberate flooding mitigation does not seem warranted. The controlling factor in the determination of an acceptable rate of flooding of the decline as estimated by Tintina would be the amount of time required to place the PAG backfill (about 30 days) and construct the hydraulic adit plug (about 5 days). During this period of time, the pumps would be gradually pulled back from the backfilled portion of the adit as the fill was placed.</p>	Comment noted and change made to the final EA.
48	Sec. 4.2.2.3, Mitigating Potential Impacts of the Decline Flooding on Groundwater, Bullet	<p><b>Statement in EA text says:</b> <i>In addition to measuring water quality, the well placed below the hydraulic plug would be used to pump water from the lowest point in the decline for treatment, if necessary, until water quality in the decline meets background water quality in the surrounding deep bedrock aquifer.</i></p>	DEQ will determine background based on future data collection before construction of the decline begins. New text has been added to the final EA.

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	<p>1 Paragraph 4, Lines 1-3</p>	<p><b>Comment:</b> What is background water quality? This could be very problematic depending on precisely how DEQ defines background water quality. CDEQ should clarify and specify how background water quality will be determined. The best available groundwater quality data in the vicinity of the decline comes from the pumping wells and the hydrologic testing program. These tests recognize two different aquifers a shallow and a deep with significantly different flow rates (shallow aquifer 500 gpm, deep 12 gpm) and water quality (lower zone poorer water quality). Additional pump testing is planned for both the upper and lower Johnny Lee deposit aquifers in the fall of 2013, and additional background water quality data will be obtained. Filling of the cone of depression associated with the dewatering of the decline should naturally occur by the lateral inflow of up-gradient groundwater (from the west and stratigraphically above the mineralized zone).</p>	
48	<p>Sec. 4.2.2.3, <i>Mitigating Potential Impacts of the Decline Flooding on Groundwater, Bullet 1</i> Paragraph 4</p>	<p><b>Statement in EA text says:</b> <i>In the event that Tintina does not apply for an operating permit and closes the exploration decline permanently, the impacts on groundwater would be below the level of significance</i></p> <p><b>Comment:</b> Isn't this what #1 above says? Then there is no impact? Confusing? See comment to DEQ on EA. I think this statement is confusing here and should be deleted. The idea is adequately covered in the second paragraph of the following section.</p>	<p>DEQ has deleted the confusing wording in the final EA.</p>
49	<p>Page 49, Sec 4.2.2.3, <i>Mitigating Potential Impacts of the Decline Flooding on Groundwater, Bullet 3</i> Paragraph 4, Line 1-4</p>	<p><b>Statement in EA text says:</b> <i>At final closure, the decline would be backfilled and closed as discussed above. DEQ would require water stored in the PAG and NAG storage ponds to be treated and used to flood the decline rather than being pumped to the LAD system.</i></p> <p><b>Comment:</b> As stated above Takes 4 days to flood the adit at 500 gpm inflow and 23 days at 100 gpm inflow. Natural flooding of the zone would occur as a result of regional groundwater flowing laterally in to filling the cone of depression rather than being filled with contaminated mine pool water. That would seem to be fast enough given that the adit walls have been exposed to underground weathering for at least several to perhaps as many as 18 months prior to earliest closure. Implementation of this deliberate flooding mitigation does not seem warranted. The controlling factor in the determination of an acceptable rate of flooding of the decline as estimated by Tintina would be the amount of time required to place the PAG backfill (about 30 days) and construct the hydraulic adit plug (about 5 days). During this period of time, the pumps would be</p>	<p>Paragraph is deleted in the final EA.</p>

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		gradually pulled back from the backfilled portion of the adit as the fill was placed.	
50	Page 50, Sec 4.2.2.3, <i>Mitigating Potential Impacts of Land Application Discharge on Groundwater</i> Paragraph 1, Line 3-4	<p><b>Statement in EA text says:</b> <i>These monitoring wells would document groundwater quality down-gradient of the sub-surface LAD and up-gradient of the nearest wetlands. If contaminants are detected in monitoring wells, Tintina would be required to modify the LAD system to reduce or limit the impacts below the level of significance.</i></p> <p><b>Comment:</b> Contaminants detected above GW levels only? Correct?</p>	The language as been clarified: Contaminants above DEQ-7 standards for groundwater.
50	<p>Page 50, Sec 4.2.2.3, <i>Mitigating Potential Impacts of Land Application Discharge on Groundwater</i> Paragraph 1, Line 3-4</p> <p>Page 50, Sec 4.2.2.3, <i>Mitigating Potential Impacts of Land Application Discharge on Groundwater</i> Paragraph 1, Line 4-5</p>	<p><b>Statement in EA text says:</b> <i>Three monitoring wells would be installed down-gradient of the LAD area but up-gradient of the wetlands along the unnamed tributary to Little Sheep Creek. Two of these wells would take the place of the proposed piezometers PZ-6 and PZ-7.</i></p> <p><b>Comment:</b> Tintina believes that three monitor wells in the down-gradient toe areas of the of the LAD area are unwarranted. We suggest retention of piezometers 6 and 7 as originally proposed to measure shallow groundwater saturation levels in the down-gradient toe areas of the LAD; and the construction on one new down-gradient monitor well pair to monitor surface and groundwater quality below the LAD at the location of proposed MW-6. This well would monitor shallow (colluvial) and deep (bedrock) groundwater immediately down-gradient of the LAD area and up-gradient of local wetland areas to measure any changes in the quality of groundwater. SW station SW-6 would monitor surface water quality below the LAD. See suggested revised text in redline copy.</p> <p><b>Statement in EA text says:</b> <i>These monitoring wells would document groundwater quality down-gradient of the sub-surface LAD and up-gradient of the nearest wetlands. If contaminants are detected in monitoring wells, Tintina would be required to modify the LAD system to reduce or limit the impacts below the level of significance. If contaminants are detected in surface water, Tintina would be required to modify the LAD system to prevent discharge to surface water.</i></p> <p><b>Comment:</b> What is meant by “if contaminants are detected in monitoring wells”? Presumably as long as discharge waters met these groundwater standards anything below the groundwater standards should be acceptable at groundwater monitoring sites down-gradient of the LAD areas. Tintina recognizes that if it does not meet all groundwater standards in its discharge to the LAD area (and presumably at down-gradient monitoring stations) we will</p>	DEQ disagrees and the text in the final EA remains the same.

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	Page 50, Sec 4.2.2.3, <i>Mitigating Potential Impacts of Land Application Discharge on Groundwater</i> Paragraph 2, Line 4-5	likely need to resort to RO treatment of all water before discharging, or modify LAD system design. Wouldn't it also be true that if exploration activities are exempt from non-degradation that down-gradient surface water would need to meet aquatic standards to be in compliance during the exploration phase of the project?  <b>Statement in EA text says:</b> <i>If contaminants are detected in surface water, Tintina would be required to modify the LAD system to prevent discharge to surface water.</i>  <b>Comment:</b> Wouldn't it also be true that if exploration activities are exempt from non-degradation that down-gradient surface water would need to meet aquatic standards to be in compliance during the exploration phase of the project?	See response to comment W-1  No, if there is no MPDES permit, there can be no measurable change in surface water quality.
55	Page 55, Sec. 4.2.3.2, <i>Soil suitability for Land Application of Water</i> , last paragraph	<b>Statement in EA text says:</b> Tintina has committed to grout the decline to reduce flows to 100 gpm or less.  <b>Comment:</b> Tintina cannot guarantee what the adit water inflow volume of water might be. Tintina will keep it as low as 100 gpm if possible. Change wording to – <i>“Tintina would attempt to grout the decline to minimize the inflow to a reasonable sustainable level with the goal of attaining inflows of about 100 – 150 gpm.”</i>	See response to W-3.
57	Cultural Resources	<b>Question for DEQ:</b> Is Archaeologist required to be present during all road construction (looking for new sites? Or just for mitigated site?)	Only for the mitigated site.
58	Section 6.0, paragraph 1, lines 3-4	<b>Comment:</b> Need to clarify that surface drilling could continue but no exploration decline would be allowed. Could still submit operating permit, as well.	The EA has been changed to: The exploration decline would not prevent them from doing additional surface exploration, hydrologic testing, not requiring an Agency-mitigated EA, or applying for an Operating Permit.
58	Section 6.0, paragraph 3, lines 1-2	<b>Suggested text addition:</b> ..”.....in the manner in which it would like to....’	See response above.

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<div> </div> <div> <p>31 July 2013</p> </div> <div> </div> <div> <p>Herb Rolfes Environmental Management Bureau Montana DEQ Metcalf Building P.O. Box 200901 Helena, MT 59620</p> </div> <div> <p>Re: Draft EA Tintina Alaska Exploration, Inc.'s Black Butte Project</p> </div> <div> <p>Dear Mr. Rolfes:</p> </div> <div> <p>Thanks for the opportunity to comment on the draft EA for proposed exploration activities at the Black Butte Copper Project in Meagher County. Montana Trout Unlimited (Montana TU) is comprised of 3,600 conservation-minded anglers. We have a long history of conservation advocacy in the Smith River drainage, including in recent years being responsible for establishment of a Smith River Corridor Account, which dedicates some float fees to habitat restoration in the river corridor, and by prevailing with our co-plaintiff Meagher County landowners in a legal challenge in the Montana Supreme Court that prohibited shallow well development from impairing surface water rights in the upper Missouri River basin.</p> </div> <div> <p>Further, many TU members float, fish or own property in the Smith River watershed, while a number of members and supporters depend on recreational use on the Smith River for their livelihoods. The Smith River is recognized in Montana and nationally as a special resource, one that the State of Montana promotes prominently to residents and visitors. Therefore, any large development that poses risk to water quality, streamflows and fisheries in the watershed is of interest to Montana TU.</p> </div> <div> <p>We have determined that Tintina Alaska Exploration, Inc.'s proposal to expand exploration activities to include development of a mile long exploration decline poses significant risk to the Smith River and its tributaries.</p> </div> <div> <p><b>General Observations, MEPA and Recommendation</b></p> </div> <div> <p>The draft EA for the proposed action is rife with data gaps and depends too heavily on still-to-be-specified details regarding water and waste rock chemistry, water treatment, soil characterization and operational commitments. The type and</p> </div> <div> <p>TU1</p> </div> <div> <p>TU2</p> </div>	<div> <p><b>Comment Response TU-1</b> Comment noted.</p> </div> <div> <p><b>Comment Response TU-2</b> Comment noted.</p> </div>

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<p>TU3</p> <p>scale of the project transcends typical exploration activities that merit only EAs, such as drilling or bulk sampling through excavation in pits. The project will generate a significant amount of materials and discharge – the latter perhaps permanently – that could result in a source of acid mine drainage (AMD). The record of DEQ – including staff involved in reviewing this project – in failing to accurately predict the scale and character of AMD and other pollutants at hard-rock operations around the state in recent years, as well as the inadequate reclamation, mitigation and funding the agency required for these projects, gives reasonable pause to a public regarding the thoroughness of this EA. The EA depends on mitigating potential impacts below the “threshold of significance,” but depends too much on still-to-be determined data (such as data from yet to be completed kinetic humidity tests), and amorphous promises of water treatment, “best management practices” (p. 38), or, “standard mining practices” (p. 38).</p>	<p><b>Comment Response TU-3</b> See response to comments G1 (EA v. EIS); CH1 (AMD); G9 (Prior DEQ permitting history); and W3 water treatment.</p>
<p>TU4</p> <p>We believe the EA should be pulled back, and that the agency must require additional information and perform more complete analysis while disclosing the results in a thorough Environmental Impact Statement. This EA is simply too inadequate to provide confidence to the public that the proposed action will not result in significant impacts.</p>	<p><b>Comment Response TU-4</b> See response to comment G1 in general comments.</p>
<p>TU5</p> <p>The Montana Environmental Policy Act requires disclosure of all known and reasonably foreseeable impacts of proposed actions affecting the human environment. Montana agencies are to determine whether an EIS is necessary based on, among other things: 1.) Scope and magnitude of the action; 2.) the severity, duration, geographic extent and frequency of the impact; 3.) full characterization of the location and resources at risk; 4.) the probability an impact will occur; 5.) the quality of the affected resources; and, 6.) any precedent represented by the action.</p>	<p><b>Comment Response TU-5</b> See response to comment G1 in general comments.</p>
<p>TU6</p> <p>We conclude: 1.) The scope and magnitude is much larger than the typical exploration activity, and it implicates significant ground water, surface water, wetland, fishery and wildlife resources; 2.) the location affects a significant resource of statewide and national value (the Smith River watershed); 3.) the potential of significant impacts is high, and they have potential for being severe (during and after the activity), could be long lasting and frequent, as indicated by DEQ’s own experience with mining-related activities it has permitted elsewhere with complex groundwater sources and AMD; 4.) the quality of the resources at risk is significant – water quality and the fisheries in a nationally known river that the State of Montana promotes and which contributes significantly to the economy; and, 5.) DEQ could create the wrong precedent by inadequately using an EA to approve an unusually large exploration activity that will generate AMD, and which has reasonable probability of creating long-lasting impacts to the environment.</p>	<p><b>Comment Response TU-6</b> See response to comment G1 in general comments.</p>
<p>TU7</p> <p>DEQ has not demonstrated in the EA it has mitigated the proposed activity below a significant threshold. Mitigated EAs must: 1.) Demonstrate all impacts have been accurately identified; 2.) All impacts have been mitigated below a level of significance; and, 3.) That no significant impact is likely to occur.</p>	<p><b>Comment Response TU-7</b> See response to comment G1 in general comments.</p>

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<p><b>TU8</b></p> <p>Because the EA is rife with data gaps (one example: it does not disclose quantitatively the chemistry of the proposed discharge to the LAD areas), and it includes <i>discussions but not commitments about potential actions that might be implemented</i> should something not predicted occur (i.e., vague promises about treatment based on future monitoring), the agency cannot with reasonable confidence demonstrate significant impacts will not occur. The problem with depending on monitoring that <i>might</i> result in corrective responses should an adverse impact occur later is that DEQ is setting the State up for getting into disputes with permittees about the significance of impacts and whether additional investments in mitigation should be made – <i>after the impact has occurred, the performance bond approved and the permit issued</i>. This has happened repeatedly in the past with DEQ mine permitting elsewhere. And it almost always results in litigation, unplanned taxpayer expenditures, delay in fixing problems and damaged public resources.</p> <p><b>TU9</b></p> <p>We strongly recommend DEQ depend less on potential future commitments based on future data collection and monitoring, and instead get more data now, analyze it in more depth and come up with mitigation <i>commitments instead of considerations</i>, and to do it with public participation in a more detailed EIS.</p> <p><b>Important Gaps in Data</b></p> <p><b>TU10</b></p> <p>DEQ or the applicant need to develop a full, complete and understandable water balance for the operation so the public can better understand potential effects. In addition, data gaps must be addressed before an EIS is completed and a permit issued, because the quality of the discharge from the portal, waste rock dumps and potentially from springs is still unknown or unavailable.</p> <p>The EA leaves too much to question, for instance:</p> <p><b>TU11</b></p> <ul style="list-style-type: none"> <li>• “35,000 tons of NAG “is likely to be dry.” (p. 7). Data are not provided to demonstrate this.</li> </ul> <p><b>TU12</b></p> <ul style="list-style-type: none"> <li>• “Tintina claims it would not be possible to saturate either of the waste rock piles during the short period of the decline construction and operation, or that a large volume of seepage would develop during this time period.” (p. 7). Data are not provided to validate this claim with any reasonable confidence, nor is it completely clear what DEQ thinks of the “claim.”</li> </ul> <p><b>TU13</b></p> <ul style="list-style-type: none"> <li>• Tintina assumes that there would be 5 million gallons of remaining storage capacity available.” (p. 7). Again, no data are provided. The company “assumes,” and it is unclear whether DEQ has tested this assumption. Data and engineering plans are also not provided to demonstrate that the waste</li> </ul> <p style="text-align: right;">3</p>	<p><b>Comment Response TU-8</b></p> <p>TU inappropriately characterizes actual requirements that would be included in an approval of this exploration license amendment as “vague promises”. Tintina is required to discharge to groundwater standards. See response to comments W1, W3, and FWP12 in the FWP agency side-by-side response to comments. Mitigations that are approved in the decision document would become enforceable provisions of Tintina’s exploration license.</p> <p><b>Comment Response TU-9</b></p> <p>See response to comment TU8. Sufficient data have been collected for the exploration project including but not limited to: ore and waste rock testing (Section 2.2.6.3), geological resources (Section 3.1), hydrological resources (Section 3.2), soils resources (Section 3.3), vegetation resources (Section 3.4), wildlife resources (Section 3.5), cultural resources (Section 3.6), socio-economics (Section 3.7), and land use (Section 3.8). Mitigation commitments are included in the Draft EA and have been added to in the Final EA.</p> <p><b>Comment Response TU-10</b></p> <p>See response to comments G1 and W1, W16 in general comments and FWP12. The water balance for the project is clearly described in Sections 2.2.4, and 3.2.1.4 of the Final EA.</p> <p>In addition, water pumped from the exploration decline would be stored in the lined NAG pond. Water in the ponds would be analyzed to determine compliance with water quality standards, and would be discharged to the underground LAD system only if the water complies with all groundwater standards. If results of water quality analyses show exceedances, then the water would be treated prior to discharge. No water would ever discharge from the decline portal because the regional water table is well below the decline portal.</p> <p><b>Comment Response TU-11</b></p> <p>The first 1,700 linear feet of shale or 34 percent of the 5,000 feet of the decline to be mined is above the water table, and is therefore unsaturated and dry (probably 1-3 percent moisture content). This portion of the decline would be mined in all NAG waste. The total tonnage of NAG to be mined is 99,000 tons, and therefore 34 percent of that is 33,660 tons of</p>

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	<p>material.</p> <p><b>Comment Response TU-12</b>            DEQ agrees that saturation of the waste rock piles would not occur. Both the PAG and NAG rock piles would be placed on prepared subgrades designed to freely drain into lined containment ponds. These constructed foundations would be lined, then would be covered with a gravel layer in which seepage collection systems (perforated pipe) would be installed to guarantee that all seepage passing through the rock piles rapidly drains into the containment ponds. This seepage collection and drainage system would prevent saturated conditions from developing within the waste rock piles. This language has been added to Section 2.2.3.</p> <p><b>Comment Response TU-13</b>            See response to comment W16.</p>

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<p>rock storage areas could withstand large, short-term storm events. Failure or overtopping of waste rock dumps could be very detrimental.</p> <p><b>TU14</b></p> <ul style="list-style-type: none"> <li>The EA refers several times to average site precipitation as being 17 inches a year with 34 inches of evaporation a year (p. 22). These are the data that much of the water balance for activities outside the decline is based on. But the nearest stations for these estimates are Canyon Ferry Reservoir and Bozeman, both which are at lower elevations and in different climatological settings. Given how important water management is at the operation, it's essential to have more site-specific information, with monthly averages instead of averaging over the year. It is not inconceivable that this site could experience short-duration, intense rain events or a serious rain-on-snow flooding. Further, meaningful evaporation at the site occurs probably less than half the year. Citing annual precipitation and evaporation estimates based on sites that are 40-80 miles away in different settings is not meaningful enough to evaluate potential impacts.</li> </ul> <p><b>TU15</b></p> <ul style="list-style-type: none"> <li>Surface water and groundwater baseline data (p. 22) are insufficient, with data available only from some quarters in 2011 and 2012 -- neither year having flows representing the long-term means during some months at reference gauging stations in the Smith River watershed. Data should be available from a longer period to better characterize expected surface and groundwater conditions in the area.</li> </ul> <p><b>TU16</b></p> <ul style="list-style-type: none"> <li>The EA states, "Kinetic humidity cell tests are ongoing and water treatment systems are under design, so Tintina cannot quantitatively predict the chemistry of water that would be land applied using the LAD system." (p. 53). It is absolutely crucial that the EA disclose the specific potential in terms of scale, duration and ability to buffer for AMD in the waste rock and affected discharges. This also will help determine the type of treatment required. Leaving this open while still approving a permit is a mistake, and probably violates required disclosure under MEPA. It is important to note that DEQ has consistently underestimated the potential for AMD at previous mining operations it has approved, including at Zortman-Landusky and Golden Sunlight. In terms of public confidence, the agency has an obligation to get it right with this proposal. Waiting until later to characterize the AMD potential of exposed sulfide materials and commit to specific treatment and mitigation at this site is simply bad business.</li> </ul> <p><b>TU17</b></p> <ul style="list-style-type: none"> <li>The EA identifies 9 seeps and 13 springs in the project area, indicating the potential presence of deep fractures. No data are provided demonstrating whether these springs and seeps could be affected by the exploration decline during development or after closure. Data are not provided demonstrating whether after decline closure, and after flooding, fractures connected to the decline could become sources of polluted surface discharges, as has occurred</li> </ul> <p style="text-align: right;">4</p>	<p><b>Comment Response TU-14</b> DEQ acknowledges that the referenced precipitation and evaporation data are from sites that are a considerable distance from the project area. Evaporation rates were not considered in sizing of retention ponds for the project. Only precipitation data were used and no evaporation was assumed.</p> <p>Precipitation data from the station nearest to the project area (6.5 miles southeast and about 700 feet lower in elevation) show an average annual liquid precipitation of about 16 inches from 1949 through 1981. Further away (16 miles south and 750 feet lower in elevation) at White Sulphur Springs annual precipitation averaged about 13 inches between 1978 and 2005.</p> <p>Weather monitoring, including precipitation rates, were conducted at the site, from October through December 2012. Data was recorded every hour for the entire time frame. This data was then compared with monthly precipitation data from White Sulphur Springs, Bozeman MSU and the Canyon Ferry Reservoir. A comparison of precipitation data from these three weather stations to the data collected at Black Butte showed the best correlation to be with the Bozeman MSU station.</p> <p>Most weather stations do not monitor evaporation data. The closest monitoring stations that collect this data are Canyon Ferry and Montana State University. Site-specific evaporation data would likely be collected on site in support of an application for an operating permit.</p> <p><b>Comment Response TU-15</b> DEQ reviewed 1.5 years of baseline water parameters for surface water and groundwater in the surrounding area during preparation of the Draft EA. Data from the first two quarters of 2013 have been reviewed and are consistent with previous data. DEQ believes that the hydrologic data have been gathered from a sufficient number of sources and length of time to characterize the hydrologic regime for this project.</p> <p><b>Comment Response TU-16 (See Geochemistry Comment CH1)</b> Results of static and metal mobility tests for NAG samples indicated that the Ynl units are unlikely to generate acid or significant concentrations of</p>

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	<p>metals. The static metal mobility SPLP test results also indicated that the USZ and IG units have potential to release some metals, including iron, aluminum, chromium, and selenium. Figure 11 summarizes the results of the baseline acid base accounting work, which suggests that the rock to be mined from the Upper Sulfide Zone (<i>USZ</i>) is potentially acid generating, while the waste rock lithologies to be mined from the various subunits of the lower Newland (<i>Ynl</i>, <i>Ynl0</i>, <i>YnlB</i>) and igneous dikes that cross cut the lower Newland locally (<i>IG</i>) are not. Due to the metal mobility release potential suggested for the <i>IG</i> by SPLP testing, which is low in tonnage (less than 1 percent), Enviromin recommended that the <i>IG</i> be handled as PAG, and did not recommend additional kinetic testing of this lithotype.</p> <p>Results of the kinetic tests reported after 20 weeks of leaching indicate no production of acid leachate by any of the tested rock (including the <i>USZ</i>); in spite of obvious evidence of sulfide oxidation by all of the <i>Ynl</i> lithologies except the <i>Ynl0</i> dolomite. These results are consistent with the static results, which indicated presence of both sulfide and abundant neutralization potential.</p> <p>Leachate from the kinetic tests was analyzed for a suite of metals at suitable detection limits in a week 20 report (provided to the DEQ prior to completion of the EA), and indicated that only selenium and thallium are associated with weathering of these rock types. Selenium was detected at concentrations below groundwater standards in early weeks in all rock types. Thallium was also detected in concentrations that typically exceeded the groundwater standard in the <i>USZ</i> and <i>Ynl</i> effluent in early weeks of testing, but not in the <i>Ynl0</i> or <i>YnlB</i>. Because all waste rock would be placed on a liner, there would be no discharge to surface water.</p> <p>Water collected from the liner may be discharged to the land application disposal (LAD) area only if it meets all groundwater standards. The Agency -Mitigated Alternative requires treatment if necessary to meet those standards. Since a number of proven treatment methods are known that can remove selenium and thallium, and since at a minimum a trailer-mounted reverse osmosis system can be obtained on short notice, there is no question that water collected on the NAG and PAG pad liners can be effectively treated before disposal. This conclusion does not depend on the long-term results of kinetic testing.</p> <p>See also the response to Comments CH1 and W2.</p>

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	<p><b>Comment Response TU-17</b></p> <p>All of these seeps and springs are located at higher elevations than the proposed exploration decline (see Figure 7 in the Final EA); therefore, flooding of the decline after closure could not result in groundwater from the decline discharging to surface at the locations of these seeps and springs. Recharge to wetland features in the drainages located to the west of the Sheep Creek hay meadow is derived from springs emanating from bedrock strata at much higher elevations than the shallow groundwater system associated with the decline. In addition, higher elevation springs are often supplied by smaller localized aquifers systems that are perched above the deeper bedrock aquifers. They are fed by precipitation recharge and therefore may be subject to seasonal and annual variability. For these reasons no impacts are anticipated in these more distal wetland areas, nor can they be considered a source of groundwater flow from the decline area in closure. The lower reaches of Sheep Creek and Little Sheep Creek appear to be recharged by groundwater from the alluvial aquifer but there were no localized springs identified on these lower stream reaches within the inventory area.</p> <p>The Agency-Mitigated Alternative requires additional monitoring of flow at seven springs near the proposed decline (Table 2). The frequency of monitoring water levels at natural springs (SP-1, SP-2, SP-3, SP-4, and SP-6) and two developed springs (DS-3 and DS-4) would be increased from annually to monthly. The purpose of the increased monitoring frequency is to detect any impacts of dewatering the decline on the area springs. DEQ mitigations would ensure that these impacts remain below any level of significance.</p>

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<p>at other mines in Montana. The EA needs to characterize the source of the springs and seeps, better describe potential faulting in the area and related fractures, and address the potential that decline flooding represents for creating dispersed surface discharges.</p> <p><b>TU18</b></p> <ul style="list-style-type: none"> <li>• Though the EA describes soil characteristics in the surface LAD area (p. 29 and Appendix), it doesn't provide data on the ability of these soils to reduce, adsorb, filter or otherwise permanently remove acidic discharge, metals, nitrates and sediment. Of course, it is impossible to do that analysis until the discharge has been characterized, which it hasn't (p. 53).</li> </ul> <p><b>TU19</b></p> <ul style="list-style-type: none"> <li>• Only inadequate data are provided demonstrating the hydrological connection between LAD wetland areas and surface flows. No data are provided demonstrating how the temperature of the discharged water could affect the wetlands, or, potentially connected surface flows.</li> </ul> <p><b>TU20</b></p> <ul style="list-style-type: none"> <li>• The EA states, "Sheep Creek would not be affected by the cone of depression because of high permeability and the large amount of water..." (p. 37). But the EA provides no data or specific analysis of Sheep Creek and its alluvial aquifer supporting this conclusion.</li> </ul> <p><b>TU21</b></p> <ul style="list-style-type: none"> <li>• The EA states that running the decline 90 feet under Coon Creek will not result in reduction of flows in the stream (p. 39). It is unclear whether DEQ agrees with this conclusion. We don't necessarily agree the aquifer tests presented are robust enough. DEQ should require additional data, perhaps using a dye test.</li> </ul> <p><b>TU22</b></p> <ul style="list-style-type: none"> <li>• The EA states that, "No threatened and endangered animal species were found in the project area....and there are no predicted impacts to species of concern." (p. 39). However, because a systematic survey never occurred on the site or on adjoining lands, this conclusion is not merited. In the least, wetland areas that will be affected by LAD should be inventoried for common and rare species.</li> </ul> <p><b>TU23</b></p> <ul style="list-style-type: none"> <li>• The EA states that, "no critical fishery habitat locations have been identified." (p. 39). Of course they weren't located. A systematic survey never occurred to look for them. The only fishery related data included in the document is the presence-absence chart from the Montana FWPS MFISH data base (p. 32). No data are provided on abundance and size distribution, or on non-game species of fish or other aquatic species. We note that this information indicates both resident and migratory (fluvial) trout species are in the Sheep Creek watershed. Because migratory fish are present, it indicates that water quality degradation of surface flows in the area could directly harm the fishery of the Smith River. Recent FWP telemetry data indicate that the Sheep Creek drainage below and above the mine site is used by migratory trout</li> </ul>	<p><b>Comment Response TU-18</b></p> <p>See response to comment W1. Surface and subsurface LAD was proposed by Tintina. The discharge to LAD areas was characterized in the Draft EA in Sections 4.2.2.2 and 4.2.2.3. Tintina would only discharge water to LAD areas that meets groundwater standards. Sediment would settle in seepage collection ponds. No acidic water would be discharged and the soils would not need to reduce, adsorb, filter, or otherwise permanently remove acidic discharge, metals, nitrates, and sediment.</p> <p>The Draft EA in Section 4.2.2.2 does indicate that soils in the area contain naturally occurring extractable metals in saturated paste testing and that these natural occurring metals may leach from the soils to groundwater. Tintina would install wells and piezometers to monitor for metals and nitrates, in the Agency-Mitigated Alternative. In Section 4.2.2.3 of the Final EA, the agency would require Tintina to install three additional wells in the LAD area to detect any impacts from LAD, including naturally occurring metals that would leach from the soils. The monitoring system would detect any potential changes to surface water downgradient of the LAD area. DEQ would require Tintina to conduct weekly sampling in the LAD areas and to submit a corrective action plan if any contaminant exceeds standards.</p> <p><b>Comment Response TU-19</b></p> <p>There are no wetlands located within the proposed LAD areas (See Figure 7 in the Draft EA). As indicated on that figure, wetlands are located downgradient of the proposed LAD sites along the unnamed tributary to Little Sheep Creek. The LAD area would be more than 400 ft away from these wetlands. The locations of the underground LAD drainfield lines are shown on Figure 7. Based on the conceptual plans, DEQ has determined that discharges from the proposed LAD areas would not impact the unnamed tributary to Little Sheep Creek. DEQ would require Tintina to install additional wells and piezometers to gather additional data for use in preparing the final design of the LAD. This language has been added to the Agency Mitigation Alternative.</p> <p>Regardless of the temperature of the water infiltrated in the LAD areas, the water would equilibrate with the temperature of the surrounding soil and</p>

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	<p>bedrock long before potentially reaching the wetlands.</p> <p><b>Comment Response TU-20</b> See response to general comment W3.</p> <p><b>Comment Response TU-21</b> DEQ does not believe a dye test would contribute useful data to this analysis. The primary reason that impacts to Coon Creek due to decline dewatering are not expected is that the shallow bedrock is not saturated adjacent to and beneath the Coon Creek alluvium based on the water levels observed at well PW-3. Also, during the PW-3 pump test, no reduction in Coon Creek stream flow was observed. See Appendix D, Section 2.2 (48-hour pump test) of the Application.</p> <p>DEQ would require increased frequency of monitoring of stream flow in Coon Creek above and below the location where the decline would pass beneath the creek. Additional piezometers would be required near Coon Creek to monitor shallow groundwater in the alluvium and wetland areas in order to detect possible drawdown that may result in stream flow impacts.</p> <p>At closure, the decline would be backfilled in the area under Coon Creek to limit future fracturing of overburden over the decline and to limit any potential for subsidence in the decline.</p> <p><b>Comment Response TU-22</b> A reconnaissance survey and a database query were conducted on site as reported in the Biological Resource Report Amendment Application to Exploration License 00710 (Appendix G). These reviews indicated that the only species protected under the Endangered Species Act of 1973 that is known to occur in Meagher County is the threatened Canada lynx. There is a low probability of occurrence in the Project area, which is not designated as lynx critical habitat. See Section 3.5.2, Species of Concern, in the Final EA.</p> <p>A general wetlands survey was conducted for the Black Butte Copper Project in September 2011. The purpose of the survey was to identify and document all potential wetland sites in the Black Butte Copper Project Study Area that might meet jurisdictional wetland criteria, based on apparent hydrophytic vegetative cover and site hydrology. The wetland survey was intended as a reference for avoiding wetlands in project</p>

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	<p>planning. As proposed, this exploration phase of the Black Butte Copper Project would not impact any potential wetland areas identified in the September 2011 wetland survey. Specific project locations and areas would be surveyed again in Fall 2013 and any observed wetlands would be delineated in accordance with the Corps of Engineers 1987 Wetland Delineation Manual and applicable Regional Supplements. The DEQ does not anticipate any discharges to surface water, including wetlands. Discharges to surface water can only occur if DEQ's Water Protection Bureau issues a MPDES permit, which has not been requested in this phase of the exploration decline plan by Tintina. In addition, no surface disturbances are proposed which may impact wetlands, including any dredge or fill activities, which would require an inventory for common or rare species. See also Department of the Army Corps of Engineers comment letter dated August 19, 2013, USAC - 1.</p> <p><b>Comment Response TU-23</b></p> <p>No fisheries or aquatics baseline studies were conducted by Tintina for the exploration decline because there are no predicted impacts to surface water. DEQ is aware of the importance of the fishery in Sheep Creek. Water discharged to the LAD would be required to comply with groundwater standards. Sections 2.2.4, 2.3 and 4.2.2.3 of the Draft and Final EA state that water would be treated to meet groundwater standards if necessary.</p> <p>See response to comment W1.</p>

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<p>from the Smith River, and, it appears possibly from the Missouri River. This information and other data that completely characterize the aquatics community in the vicinity of the mine should be included in the EA. The EA concludes later that fish won't be harmed because water quality won't be harmed. However, the conclusion that water quality won't be harmed is based on incomplete data, including the lack of a comprehensive water balance, still-to-be-determined rates of treated and untreated discharge, unknown water quality of the discharge, undescribed quantitative abilities of the LAD areas to remove pollutants, among other shortcomings.</p> <p><b>TU24</b></p> <ul style="list-style-type: none"> <li>• There is no description in the EA of the potential for seismic events in the area, which could affect the integrity of the waste rock sites and the decline.</li> </ul> <p><b>TU25</b></p> <ul style="list-style-type: none"> <li>• The EA states in several places that "Flooding will eventually reach the level of the water table but would never discharge from the decline." (p. 7 and elsewhere). This is Tintina's conclusion, but it's unclear if DEQ agrees. In any event, no quantitative description is included on water table elevations and the expected elevation of the flooded decline.</li> </ul> <p><b>TU26</b></p> <ul style="list-style-type: none"> <li>• The EA says much mitigation will allegedly be in place to deal with potential impacts to springs, groundwater and water rights (p. 47). We interpret this commitment to expending resources for mitigation to mean that the applicant and DEQ feel that the level of significance of potential impacts is not low, indicating that the scale and duration of the proposed activity is not insignificant and requires detailed scrutiny -- which it hasn't received in this document.</li> </ul> <p><b>Water treatment and LAD</b></p> <p>The EA references water treatment and water treatment systems, but it does not commit to any specific application. This results in part, apparently, because DEQ cannot describe the quality or quantity of the discharge. Yet this is specifically one of the purposes of an EA. And it is a key issue. Among the references and vague statements that raise rather than answer questions:</p>	<p><b>Comment Response TU-24</b> Tintina also provided DEQ a memo addressing Seismic Stability Analysis in which modeling determined pseudo-static Factors of Safety (FOS) of 2.4 and 1.7 to the NAG and PAG pond embankments, respectively. FOS refers to the ratio of the sum of driving forces over resisting forces, such that a FOS of above 1.0 infers a measure of stability. The memo concluded, and DEQ agrees, that the modeled FOSs are more than adequate.</p> <p><b>Comment Response TU-25</b> DEQ agrees that there would not be any outflows from the portal entrance. Section 2.2.1 of the Draft EA states that the elevation of the decline opening would be 5,880 feet amsl. Section 3.2.1.4 of the Final EA states that the first 1,700 feet is expected to be dry, a conclusion that was based on water level measurements in drill holes along the trace of the proposed decline. At a 10 percent slope this would indicate that the decline would intercept the groundwater table 170 feet vertically below the collar elevation of 5,880 feet. When the groundwater rebounds, it would be well below the elevation of the decline entrance. Figure 2 of the EA also shows the locations of the decline alignment holes, which were drilled to investigate geotechnical, geochemical, and hydrologic conditions along the trace of the proposed decline. The holes drilled along the southern portion of the decline trace were dry down to the depth of the proposed decline. The first of these holes that intercepted water near the proposed depth of the decline was hole SC12-116, which is identified on Figure 7 of the Draft EA. It is also shown but not labeled on Figure 2, where it is the fourth hole to the north of the proposed portal location.</p> <p><b>Comment Response TU-26</b> See response to general comment G1.</p> <p><b>Comment Response TU-27</b> The Final EA Sections 2.2.4, 2.3 and 4.2.2.3 state that if the water exceeds groundwater standards, the water would be treated. See response to general comment W1.</p> <p><b>Comment Response TU-28</b> See response to TU27.</p>
<p><b>TU27</b></p> <ul style="list-style-type: none"> <li>• Seepage will either be treated or dispersed to an LAD, depending on the time of year (p. 6). What criteria will determine whether LAD or a treatment system is used?</li> </ul> <p><b>TU28</b></p> <ul style="list-style-type: none"> <li>• Treatment "may" be required for nitrates and arsenic if grouting and LAD are "insufficient." (p. 7). What criteria will be used to make this determination? What are the standards for "insufficient?" How will this be determined?</li> </ul> <p><b>TU29</b></p> <ul style="list-style-type: none"> <li>• Contaminated water will be dealt with "until appropriate treatment systems are operational." (p. 7). Why wouldn't the systems be operational BEFORE</li> </ul> <p style="text-align: right;">6</p>	

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	<p><b>Comment Response TU-29</b> See response to general comment W1.</p>

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<p>contaminated water is present? This implies DEQ will wait until unacceptable impacts occur.</p> <p><b>TU30</b></p> <ul style="list-style-type: none"> <li>The EA says, "treatments being considered for decline H2O and PAG waste rock seepage, include lime treatment and co-precipitation of arsenic and iron," as well as possibly reverse osmosis. The permit must commit the company to a treatment system that is proven and ample for the discharge that ensues. And it must be a condition of the permit. "Being considered" is not good enough.</li> </ul> <p><b>TU31</b></p> <ul style="list-style-type: none"> <li>To deal with LAD year-round, the EA states: "Large underground drainfield systems would be constructed to dispose of water below the frost level during winter months...Tintina has developed shallow and deep percolation testing to identify areas suitable for drainfield systems." (p. 9). The EA does not explicitly describe where these areas are, how the company can dispose of water underground at the same time it is working there, and where the discharge will drain to. Further, DEQ doesn't say what it thinks about this concept and if it indeed believes this is a good practice, why and what analysis it did to demonstrate that. This has to be done before a permit is issued.</li> </ul> <p><b>TU32</b></p> <ul style="list-style-type: none"> <li>The EA says that geochemical impacts..."would be mitigated below the level of significance by operational design..." (p. 39). But it doesn't describe what that mitigation is, except to imply it will be still to be specified LAD system or water treatment technology for a discharge that's quality has still to be characterized.</li> </ul> <p><b>TU33</b></p> <ul style="list-style-type: none"> <li>The EA states that LAD discharges to wetlands will meet human health standards. We maintain DEQ has an obligation to ensure any discharges to wetlands - or groundwater -- that are hydrologically connected to surface flows meet aquatic life standards - unless there is clear and convincing evidence that concentrations and load in any discharge will be reduced to aquatic life standards before reaching surface flows.</li> </ul>	<p><b>Comment Response TU-30</b> See response to general comment W1. DEQ does not specify a particular treatment system. Tintina would be required to meet groundwater quality standards before discharging any water..</p> <p><b>Comment Response TU-31</b> The following text was added to Final EA Section 2.2.5 Paragraph #1: "The areas proposed for surface and underground infiltration drainfield LADs sites as well as the infiltration test sites are illustrated on a soil map on Figure 11 of the amendment application and which was reproduced in the Final EA as Figure 12. A description of the testing is provided in Section 2.5.2 of the amendment application".</p> <p>The following text was added to Section 2.2.5 as new Paragraph #2 and 3: "Discharge to the underground LAD areas occurs from 600 - 2,200 feet south of the decline portal over a series of three topographic ridges (Figure 28 in Amendment Document). The potentiometric surface map in the Amendment Document (Figure 8) indicates that groundwater beneath these ridges lies from about 40 to 100 feet below the ground surface. Discharges in the underground drainfield infiltration LAD areas would be introduced from 4 to 6 feet below the surface in highly fractured bedrock with high infiltration rates (i.e. average 32 feet/day).</p>
<p><b>Future commitments and undescribed promises</b></p> <p>The EA includes many promises to commit to actions later, refers to safeguards that are not described and depends on the company to make good on promises that apparently might not be required in the permit. For instance:</p> <p><b>TU34</b></p> <ul style="list-style-type: none"> <li>To ensure waste rock and polluted surface discharges are dealt with responsibly and that they are mitigated to a level that is not significant, DEQ says the company will depend on "BMPs" to control runoff. (p. 38). Then it lists "typical" BMPs. Nowhere does it say what BMPs are specifically required, where they will be applied, nor whether they will be monitored,</li> </ul>	<p>The potentiometric surface map also indicates flows to the ENE in this area, not to the north in the direction of the decline collar. Therefore, most of the LAD water introduced would move downward and to the ENE. The decline collar lies some 170 feet above the water table, and along the decreasing grade (-15%) of the decline, the water table does not rise to intersect the existing workings until about 1,700 north of the portal, so there is little chance of LAD applied water to reenter the active mine workings. Rather the groundwater would be pumped from the bedrock aquifer in one place in the Sheep Creek drainage and discharged to shallow but highly permeable fractured bedrock further south in the same drainage basin. The LAD groundwater would mix with the regional groundwater as the water moves downgradient into the basin."</p>

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	<p>Valves would be installed at all solid/perforated pipe junctions (Figure 28, Amendment Document) in the system to allow for switching of discharge between individual zones, to prevent saturation, and allow for periods of rest between infiltration cycles. Eight new piezometers would be installed in the various cells of the underground LAD system. Therefore, the zones of the system can be rotated and switched to different geographic areas within the LAD area as frequently as necessary to eliminate the risk of individual zone saturation and the creation of newly generated surface seeps and springs downgradient of the underground LAD infiltration drainfield. Baseline conditions would be measured before initial use of the underground LAD system, and daily monitoring of piezometers in the zones of active discharge would be conducted. The frequency of measurements would be adjusted pending the results of the monitoring.</p> <p><b>Comment Response TU-32</b>  See response to general comment W1.</p> <p><b>Comment Response TU-33</b>  Tintina would not be allowed to discharge to surface water or wetlands without an MPDES permit. They have not applied for a MPDES permit. All of its discharges to groundwater in LAD systems are required to meet human health (groundwater) standards. In addition, no impacts to surface water or wetlands are predicted, no discharge to surface water is allowed, and no mining-related impacts are allowed to alter surface water quality. Ample surface water and groundwater monitoring stations are in place to verify surface water quality impacts do not occur. See Table 2 of the Final EA for water monitoring plans, and Section 2.3 for the agency mitigations.</p> <p><b>Comment Response TU-34</b>  The Draft EA presents only a summary of the stormwater management requirements described in the proposed amendment to the Black Butte Copper Project Exploration License. Further detail is provided in Tintina’s application on pages 103-104. During the exploration project, Tintina would be required to comply not only with statements made in the EA, but with all commitments made in the Exploration Decline Operating Plan, the Monitoring and Mitigation Plans, and the Reclamation Plan contained within its amendment application. The entirety of its application, as amended by the EA’s preferred alternative selected by DEQ, would become part of Tintina’s permit and would be enforceable.</p>

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	<p>DEQ concurs that specific details of stormwater BMP locations are not provided in the EA. In addition to the stormwater management plan described in the EA and in Tintina's application, the company would be required to submit a Stormwater Pollution Prevention Plan (SWPPP) to DEQ's Water Protection Bureau. The MPDES Storm Water Discharge Permit, rather than the exploration license, would include the specific details required for project stormwater management. DEQ does not require specific BMPs but requires a performance standard that says Tintina must control stormwater in compliance with its permit.</p> <p>As described in the Draft EA, runoff from waste rock stockpiles would not be discharged from the site as stormwater. All waste rock would be placed on liners, with runoff directed into lined storage ponds.</p>

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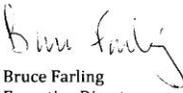
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<p>maintained and be effective. Without this information, and without explicitly stating what is required where, this is a meaningless guarantee.</p>	<p><b>Comment Response TU-35</b> See response to comments W3.</p>
<p><b>TU35</b></p> <ul style="list-style-type: none"> <li>The EA states that Tintina will depend on “standard mining practices” to provide additional protection to Coon Creek from undermining. What are those practices and does DEQ agree they are appropriate? We hope they are not similar to practices and grouting that failed to prevent a combination of low-level seismic events and surface flows from flooding the underground works at the Troy Mine, resulting in instability, unsafe working conditions and the unfortunate cessation of mining.</li> </ul>	<p>Section 2.2.1 of the Draft EA describes standard mining practices during operations. At closure, Tintina would backfill the portion of the decline under Coon Creek to prevent subsidence and associated increased fracturing of bedrock above the decline.</p>
<p><b>TU36</b></p> <ul style="list-style-type: none"> <li>The EA says, “Tintina would implement mitigation if necessary to prevent any adverse impacts to wetlands in the area.” (p. 38). Okay, but what are the measures, and will DEQ require them upfront, instead of waiting until after an impact is detected and the agency must argue with the company over implementing new measures? This is a meaningless commitment and shouldn’t be used as a measure to demonstrate impacts are being mitigated to below significance.</li> </ul>	<p>DEQ agrees that these standard mining practices are appropriate and adequate to prevent subsidence in the area of Coon Creek. The proposed exploration decline, being a single tunnel with dimensions of 18 feet wide by 18 feet high, is clearly not similar to the Troy Mine, which is a room and pillar excavation with dimensions of approximately 3,000 feet wide by 7,000 feet long, with mine voids up to 80 feet in height and a roof supported by pillars of unmined rock.</p>
<p><b>TU37</b></p> <ul style="list-style-type: none"> <li>The EA says, “Tintina contends no U.S. Army Corps of Engineers or DEQ permits for wetland disturbance are needed.” (p. 39). Okay, that’s what Tintina thinks, but what does DEQ believe and why?</li> </ul>	<p>See Section 2.2.1 in the Final EA for a description of the exploration decline.</p> <p><b>Comment Response TU-36</b> See response to general comment W3.</p>
<p><b>TU38</b></p> <ul style="list-style-type: none"> <li>The EA seems to indicate that having an RO unit on-site will be optional. (p. 8). We recommend the permit require that one be on-site permanently from project inception, at closure and until it is deemed there is no long-term discharge of polluted discharge at the site.</li> </ul>	<p><b>Comment Response TU-37</b> DEQ has received correspondence from the United States Army Corps of Engineers stating that no permit is needed.</p>
<p><b>TU39</b></p> <ul style="list-style-type: none"> <li>The EA says, “Tintina would initiate closure and reclamation activities within four years of the completion of the exploration decline. An extension of the four-year time frame could be requested from DEQ if needed.” (p. 18). This essentially does not commit Tintina to a four-year window for reclamation after closure. Without even being approached, DEQ is already telling the company the period for reclaiming after closure is on open-ended deal. It shouldn’t be. Four years should be it. Montana has enough unreclaimed mining-related sites that the industry, when pressed, promises to re-open.</li> </ul>	<p>The following language has been added to Section 4.2.3.2 of the Final EA:</p>
<p><b>TU40</b></p> <ul style="list-style-type: none"> <li>The EA says, “Tintina would make a reasonable and conscientious effort to identify, control and suppress all weeds...” (p. 57). This says Tintina will not be <i>required</i> to do weed control. It’s merely a meaningless promise. The EA also states, “Tintina has consulted with landowners and the County Conservation District on what seed types and mixes to use for reseeding disturbed areas.” (p. 57). If so, the nature of these communications and the details should be documented and disclosed in the MEPA document.</li> </ul>	<p>“A general survey of wetlands was conducted for the Black Butte Copper Project in September 2011(Figure 7 Final EA). The purpose of the survey was to identify and document all potential wetland sites in the Black Butte Copper Project Area that might meet jurisdictional wetland criteria, based on apparent hydrophytic vegetative cover, soil, and apparent site hydrology. The wetland survey conducted was intended as a reference for avoiding wetlands in project planning. As designed, this exploration phase of the Black Butte Copper Project would not disturb or impact directly or indirectly any potential wetland areas identified in the September 2011 wetland survey. In addition, the Black Butte Copper Project is not proposing to dredge or place any fill in waterways, wetlands, or other Waters of the U.S.”</p>
<p style="text-align: right;">8</p>	<p><b>Comment Response TU-38</b></p>

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	<p>See response to general comment W1.</p> <p><b>Comment Response TU-39</b> DEQ would hold a reclamation bond covering all costs of closure for the exploration decline under the Montana Metal Mine Reclamation Act. Tintina would be required to maintain compliance with the exploration license and all applicable laws.</p> <p><b>Comment Response TU-40</b> Tintina has submitted a county approved weed control plan for the all lands disturbed under the amendment to the exploration license. Tintina is bonded for and has been conducting active weed control on all of its surface disturbance and along all access roads to those exploration areas.</p>

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<p><b>TU41</b></p> <p><b>DEQ Mitigations</b></p> <ul style="list-style-type: none"> <li>We support DEQ's requirement to install geotextile liners below both the PAG and NAG waste rock. It is important to note, that segregation will be not be 100 percent, and therefore the NAG rock should be monitored rigorously, and at closure as much of it as possible moved to the decline.</li> </ul> <p><b>TU42</b></p> <ul style="list-style-type: none"> <li>We support DEQ's proposed improvements to the water quality monitoring plan, especially the increased frequency of monitoring for surface and groundwater stations.</li> </ul> <p><b>Performance Bond</b></p> <p>Given the high profile of this project, the risk and potential significant impacts it poses, and the record of underbonding mining activities that have produced AMD at other sites in Montana, the EIS should include a description and explanation of the performance bond. It is important for public confidence that the public have the ability to review the bond before a permit is issued.</p> <p>Because the project is in a sensitive watershed, has potential to affect resources of significant public concern, includes a scope and scale that is unusually large for an exploration project, and has the potential for creating long-term impacts that have been proven to be vexing if not impossible to mitigate or correct, it is essential that DEQ withdraw the EA and prepare a more detailed EIS for this proposal.</p> <p>Thank you for your consideration.</p> <p>Sincerely,</p>  <p>Bruce Farling Executive Director</p> <p>cc. Office of the Governor Montana FWP</p> <p>9</p>	<p><b>Comment Response TU-41</b> Both the PAG and NAG waste rock storage facilities would be constructed to the same specifications.</p> <p><b>Comment Response TU-42</b> Comment noted.</p> <p><b>Comment Response TU-43</b> See response to comments G1 (EA v. EIS) and G7 (bonds) in general comments.</p> <p><b>Comment Response TU-44</b> See response to comment G1</p>

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<div> </div> <div> <p>United States Department of Agriculture</p> </div> <div> <p>Forest Service</p> </div> <div> <p>Lewis and Clark National Forest White Sulphur Springs Ranger District</p> </div> <div> <p>204 W. Folsom P.O. Box A White Sulphur Spr., MT 59645 406 547-3361 FAX 406 547-3874</p> </div> <div> <p>File Code: 2810, 2400, 2500 Date: August 30, 2013</p> </div> <div> <p>DEQ Environmental Management Bureau c/o Herb Rolfes P.O. Box 200901 Helena, MT 59620-0901</p> </div> <div> <p>Re: Lewis and Clark National Forest Comments on the Black Butte Copper Project Draft EA</p> </div> <div> <p>Dear Mr. Rolfes:</p> </div> <div> <p>The Lewis and Clark National Forest appreciates the opportunity to comment on the July, 2013 Draft Environmental Assessment for the Tintina Alaska Exploration, Inc. Black Butte Copper Project, Meagher County, Montana Exploration License #00710. The project area occurs within close proximity to National Forest System (NFS) administered lands which also include approximately seven downstream miles of Sheep Creek. Our comments focus on the proposed project in recognition of the recreational and land management activities that occur on adjacent public lands, as well as in recognition of the surface and groundwater and fisheries resources on downstream NFS lands to ensure that they are not detrimentally impacted by project activities.</p> </div> <div> <p>We appreciate DEQ's understanding of the sensitivity of the Sheep Creek area and its natural resources and the foresight that went in to identification of rock types and the ramifications of their handling in light of their acid generating or non-acid generating characteristics. The following are our specific comments.</p> </div> <div> <p>FS-1</p> </div> <div> <p>1. Noxious weeds - The EA calls out the need to develop a coordinated noxious weed management plan including private landowners and the county. The Forest Service is interested in participating in such an effort as it takes all of us working together in addressing weeds. To this end we offer that there is a need to ensure that all natural erosion control and stormwater control materials utilized on the site are certified noxious weed seed free.</p> </div> <div> <p>FS-2</p> </div> <div> <p>2. Road management - The EA identifies that Tintina will conduct road maintenance in cooperation with the county. There is a tremendous amount of public use on Roads 119 and 204 that access Forest Service campgrounds, fishing access sites and roads. We have not seen issues between Tintina's activities and public users and we appreciate your continued cooperation to ensure public access.</p> </div> <div> </div> <div> <p>Caring for the Land and Serving People</p> </div> <div> </div>	<div> <p><b>Comment Response FS-1</b></p> </div> <div> <p>Tintina has an approved Meagher County Weed Control Plan. A group comprised of landowners, Tintina Resources, the County Weed Board, DEQ, and the USFS could provide a coordinated working group to develop and implement an effective noxious weed control program.</p> </div> <div> <p>Tintina has indicated to DEQ that erosion control measures, such as straw bales and wattles used by Tintina, would be constructed with certified noxious weed seed free materials.</p> </div> <div> <p><b>Comment Response FS-2</b></p> </div> <div> <p>Access between Highway 89 and the portal and ancillary facilities would be primarily along the existing Sheep Creek (county) road and private ranch roads located on leased private property. DEQ expects Tintina would conduct the minimum work necessary to provide year round access and upgrades for safety on these existing roads as part of the mobilization process. Proposed road modifications would occur almost entirely within the existing road prism and would include resurfacing a number of road sections to improve traffic flow, drainage control, and/or culvert replacement to reduce sediment yield from roadway surfaces. All roadway modifications would be conducted in consultation with the landowners, the county, and DEQ.</p> </div> <div> <p>The Sheep Creek and Black Butte county roads would, of course, remain for public access and Tintina has indicated to DEQ that they do not anticipate anything other than possible minor delays during the initiation of construction and upgrading of the county roads for suitable access as needed. Tintina would implement dust control measures using either water or chemical treatment on high traffic areas along access roads that can create dust. Tintina may also plow roads in the winter as necessary to maintain access to the decline construction site.</p> </div>

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<p>FS-3 3. Livestock allotment – The Forest Service administers livestock allotments on the federal and private lands of Black Butte Section 26 and the federal lands of the Moose Creek allotment in Section 18 to the north of the mine proposal area. Livestock utilizing Section 26 get their water from a developed spring in the northeast quarter of Section 26 on a tributary to Coon Creek. Livestock utilizing Section 18 get their water from Sheep Creek. We would like assurance of continued access to provide for administration of these allotments during your project activities and assurance that your project activities will not affect the quantity and suitability of these surface waters for watering livestock.</p>	<p><b>Comment Response FS-3</b> Access to Section 26 is gained along Butte Creek Road (6492) and access to Section 18 is gained along Sheep Creek Road (119). Both of these springs are located on private lands. Tintina has not proposed blocking access during exploration activities.</p>
<p>FS-4 4. Revegetation – The Forest Service encourages ongoing reclamation as project activities proceed to reduce potential for noxious weeds and to get land productivity restored. The Forest Service encourages native species revegetation to provide for natural landscape restoration and consistency with revegetation policies on adjacent public lands.</p>	<p>Recharge to the wetland features in the drainages located to the west of the Sheep Creek hay meadow is derived from springs emanating from bedrock strata at much higher elevations than the shallow groundwater system associated with the decline. In addition, higher elevation springs are often supplied by smaller localized aquifers that are perched above the deeper bedrock aquifers. These springs are fed by precipitation recharge and therefore may be subject to seasonal and annual variability. For these reasons, no impacts are anticipated in these more distal wetland areas, and they cannot be considered a source of groundwater flow from the decline area during operations or in closure. The lower reaches of Sheep Creek and Little Sheep Creek appear to be recharged by groundwater from the alluvial aquifer but there were no localized springs identified on these lower stream reaches within the inventory area.</p>
<p>FS-5 5. Wetlands – The EA very generally describes the wetlands of Sheep Creek and its tributaries including Coon Creek which is the ‘sponge’ area that helps sustain the downstream surface flows of Sheep Creek, including areas on NFS lands. We would like assurances that surface flows will not be reduced as part of the activities of the mine in proximity to the Sheep Creek wetlands. The preliminary assessment showing the simulated drawdown on Figure 9 that is expected to occur if all the workings are suitably grouted shows the potential to impact Coon Creek and potentially Sheep Creek where it passes through NFS lands. While grouting is a standard industry practice, it is not a perfect practice and if the grouting is not successful or has any problems, there is the potential for a larger amount of drawdown of Coon Creek and reduction of flows in the Sheep Creek wetlands as shown in the unmitigated drawdown of Figure 8. Additional data needs to be provided that addresses the potential impact to Sheep Creek and wetlands from the potential unmitigated drawdown (500 gpm) under low flow or drought conditions. This could negatively affect livestock watering, water quantity and temperatures for the Sheep Creek fishery, and public recreation on Sheep Creek downstream of the project area.</p>	<p>The Agency-Mitigated Alternative requires additional monitoring of flow at seven springs near the proposed decline (Table 2). The frequency of monitoring water levels at natural springs (SP-1, SP-2, SP-3, SP-4, and SP-6) and two developed springs (DS-3 and DS-4) would be increased from annually to monthly. The purpose of the increased monitoring frequency is to detect any impacts of dewatering the decline on the area springs. If impacts to water rights are documented Tintina would be required to replace the water supply as required by Section 82-4-355, MCA. DEQ mitigations would ensure that these impacts remain below the level of significance.</p>
<p>FS-6 6. Reclamation Plan pages 18-20 – The Reclamation Plan does not describe in much detail how the PAG and NAG waste pads would be reclaimed as well as the LAD system if it is installed. It also does not describe how/who would maintain the decline groundwater management system or LAD in event of a temporary or final closure and at what juncture a decision would be made to cap/reclaim the waste rock piles.</p>	<p><b>Comment Response FS-4</b> DEQ appreciates the US Forest Service concern about seeding native species. The Metal Mine Reclamation Act does not require native seed mixes in revegetation programs. The future land use of the propose</p>
<p>FS-7 7. Surface water baseline data – Because of the public’s recreational use of Sheep Creek downstream of the project area, the Forest Service requests that DEQ require a surface water monitoring station that includes field parameters, laboratory analyses, and stream flow data be established on Sheep Creek at the NFS/private boundary to determine baseline and project era conditions of for surface water quality and quantity as it leaves private land and enters public lands. This station should be monitored at least quarterly and data provided to the Forest Service on an annual basis. We also request that discharge on the Forest Service developed livestock watering spring on the Coon Creek tributary in Section 26 be monitored twice a year prior to determine baseline and project era flow conditions for this spring and to provide monitoring information in response to the project assumption that the decline will not result in a reduction of surface flows.</p>	

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	<p>disturbance areas drive seed mix development as well as land ownership. All land to be disturbed is private land.</p> <p>All seed mixes used for revegetation of reclaimed areas are approved by DEQ and the landowners. Stockpiled topsoil may provide native seed material.</p> <p>Tintina uses two types of seed mixes for revegetation, an upland mix and a meadow mix, depending on which topographic/vegetative/habitat areas are being reclaimed. Both have been reviewed by the NRCS, DEQ and landowners. The approved mixes contain introduced species. The upland mix includes 28 percent introduced species. The meadow mix is 100 percent introduced species.</p> <p><b>Upland Mix</b></p> <table> <tr> <td>Slender wheat grass</td> <td>27%</td> </tr> <tr> <td>Western wheat grass</td> <td>27%</td> </tr> <tr> <td>Idaho Fescue</td> <td>17%</td> </tr> <tr> <td>Alsike clover</td> <td>14%</td> </tr> <tr> <td>Orchard grass</td> <td>14%</td> </tr> </table> <p><b>Meadow Mix</b></p> <table> <tr> <td>Meadow Brome</td> <td>39%</td> </tr> <tr> <td>Creeping Fox Tail</td> <td>20%</td> </tr> <tr> <td>Alsike Clover</td> <td>19%</td> </tr> <tr> <td>Orchard Grass</td> <td>19%</td> </tr> </table> <p><b>Comment Response FS-5</b></p> <p>As was observed in well PW-3, the bedrock zone between the Coon Creek alluvial aquifer and the underlying bedrock regional groundwater table are separated by at least 75 feet of unsaturated ground. Thus the alluvial aquifer and the underlying regional bedrock hosted groundwater table are</p>	Slender wheat grass	27%	Western wheat grass	27%	Idaho Fescue	17%	Alsike clover	14%	Orchard grass	14%	Meadow Brome	39%	Creeping Fox Tail	20%	Alsike Clover	19%	Orchard Grass	19%
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	<p>not hydrologically connected in the vicinity of the decline passing beneath Coon Creek. No impacts to surface water flow were seen during the 72-hour pump test of PW-3. This also suggests that wetlands adjacent to Coon Creek should also not be impacted in the vicinity of the decline's cone of depression in this area. This hypothesis would be tested in early 2014 by installing pairs of piezometers in the Coon Creek wetland. This testing is designed to determine if the flow in the wetlands is lateral from seeps and springs or vertical. The evidence presented here suggests that a lateral source of water flow supplies the wetlands in the Coon Creek area.</p> <p>Estimated drawdown effects are relatively minor in upstream springs and wetlands in the Coon Creek and other drainages to the west of the Sheep Creek hay meadow area. Recharge to wetland features in these drainages is derived from springs emanating from bedrock strata at higher elevations than the shallow groundwater system associated with the decline, therefore no impacts are anticipated in these more distal wetland areas. The wetlands located immediately downgradient of the decline portal (which is 165 feet higher in elevation than the regional groundwater table) along Little Sheep Creek are also immediately downgradient of the underground LAD infiltration galleries. Discharge from the subsurface shallow bedrock LAD infiltration system is essentially 100 percent of the amount of water removed from the bedrock aquifer during decline dewatering. This recharge of the shallow bedrock aquifer in the same space and time, should not allow the formation of a gradient in the bedrock aquifer that might dewater the wetlands.</p> <p>Increased flow to, or the formation of, seeps and springs downgradient of the LAD areas would not be permitted under the DEQ rules for operation of LAD systems, or under the conditions of amendment approval for the exploration decline. In addition, any resulting decline-related changes to surface or wetland water quality in excess of the aquatic standards would also not be permitted. Downgradient areas in the vicinity of Little Sheep Creek are also proposed for monthly monitoring of bedrock and alluvial aquifers and surface water quality as a condition of the approval of the exploration decline.</p> <p>Although the drawdown model's peak dewatering scenario of 500 gpm shows the cone of depression extending into the alluvial gravels of Sheep Creek the following limitations result in conservative (larger than expected) drawdown predictions, particularly in outlying areas at the</p>

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	<p>margins of the model domain:</p> <ul style="list-style-type: none"> <li>• Return flows from re-infiltration of decline water via the LAD system discharge to groundwater are not simulated. Virtually all of the water intercepted by the decline would be re-infiltrated in the shallow groundwater system in proposed LAD areas (Figure 1) 500 to 2400 feet south of the portal area. LAD would offset any drawdown effects in the LAD area and downgradient in the Sheep Creek alluvial or shallow bedrock aquifers.</li> <li>• The results are based on steady-state solutions that tend to predict greater drawdown than may occur during the time it would take to drive the decline (16 months).</li> <li>• Alluvial groundwater flow entering the model area is not incorporated into the model. This additional alluvial inflow, if it were included in the model, would further limit the actual amount of drawdown in the Sheep Creek alluvial aquifer.</li> </ul> <p>As the underlying bedrock aquifer is gradually being lowered as the decline is dewatered, the water flows through the rock with a hydraulic conductivity of 1.5 feet or less per day. Once the cone of depression attempts to enter the alluvial aquifer from the bedrock aquifer it is immediately filled with water moving laterally through the highly transmissive alluvial gravels (hydraulic conductivity 210 feet per day), which also has the ability to provide large volumes of water because of its large storage capacity. This will not only prevent dewatering impacts to the alluvial aquifer, but should prevent incursion of groundwater in the bedrock aquifer downgradient of the decline and LAD areas from entering the alluvial aquifer during the dewatering process. This in turn eliminates geochemical impacts from the dewatering of the bedrock aquifer to the alluvial aquifer</p> <p>Finally, the models do not consider recharge, of the total amount of water removed by decline dewatering, to the shallow bedrock aquifer by the underground LAD infiltration drainfield. LAD would help maintain the local bedrock groundwater system in the Sheep Creek drainage. This groundwater would be replaced in the same space and time it is removed.</p> <p><b>Comment Response FS-6</b> Section 5.4 of the Amendment Application contains detailed descriptions of Tintina’s plan is to reclaim the PAG and NAG ponds</p>

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	<p>and pads, and the LAD system.</p> <p>Operation of the decline water management system and the LAD area would be Tintina’s responsibility during temporary or permanent closure. Waste rock pads and piles would be reclaimed once a decision was made for permanent closure. A reclamation bond would be in place should Tintina be incapable of closing these facilities.</p> <p><b>Comment Response FS-7</b> See response to comment FWP - 10</p> <p>The spring labeled DS-2 (Developed Spring 2) (Figure 7) has been sampled annually for field parameters and flow since 2011. In the Final EA, if the Amendment is approved, sampled would be increased to twice per year for: field parameters [includes temperature] and common ions, nitrate, total recoverable metals, dissolved aluminum, and flow. EA analysis indicates that dewatering of the decline is not expected to impact flows or wetlands in the Coon Creek area. Estimated drawdown effects are expected to be insignificant in surrounding drainages and in upstream wetlands in the Coon Creek drainage where DS-2 is located. Recharge to wetland features which DS-2 is associated with in these drainages is derived from bedrock strata that occur at higher elevations than the shallow groundwater system associated with the decline, therefore no impacts are anticipated in these more distal wetland areas. At closure, the decline area below Coon Creek would be backfilled to limit fracturing and future subsidence of the area above the decline.</p>

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<p><b>FS-8</b></p> <p>8. Fisheries – Recreational fishing is a popular activity on NFS lands along Sheep Creek and there are about 7 stream miles providing a fishery on NFS lands downstream of the project area. There is a developed fishing access site on Sheep Creek in Section 12 about 2 ½ miles downstream of the project area. There is a paucity of good, recent data on the fishery of Sheep Creek which makes it difficult to identify whether or not the project could have detrimental effects. There is a need for adequate information about the existing condition of the fishery before a conclusion can be made whether or not the project would negatively affect the fishery. Additionally, Sheep Creek is a critical tributary contributing significant flows and maintaining cooler water temperatures to the Smith River on NFS lands below its mouth. We request additional information regarding the worst case scenarios regarding changes in stream flows and water quality parameters including temperature.</p> <p>Thank you again for the opportunity to comment on the Draft EA. I look forward to working with you on the items identified in the comments. Please contact me at (406) 547-3361 if you would like to discuss these comments in more detail.</p> <p>Sincerely,</p>  <p><i>for</i> CAROL HATFIELD District Ranger</p>	<p><b>Comment Response FS-8:</b> DEQ has responded to fisheries comments in the FWP letter. Please see FWP letter responses.</p> <p>No fisheries or aquatics baseline studies were conducted by Tintina for the exploration decline. This is because there are no predicted impacts to surface water quality or quantity.</p> <p>Tintina has quarterly flow data on Sheep Creek from a number of sites including the bridge over Sheep Creek (SW-1) as it enters the canyon about one mile north of the project area and near the USFS boundary . Eleven surface water stations have been established as baseline monitoring sites (Figure 6). Flow, stage, and field parameters (temperature, pH, and specific conductivity (SC)) are monitored quarterly at all of these sites. Water quality samples are collected at six of the sites during quarterly monitoring. Monitoring was initiated at these sites in May of 2011 with subsequent quarterly monitoring events scheduled in the months of August, November, March, and May of each year.</p> <p>In addition, Tintina installed a stilling well with a transducer as a gauging station near the bridge over Sheep Creek (near SW-1) on the north end of the property. This station was monitored and field checked against a staff gauge on the bridge to begin establishing a hydrologic rating curve for in-stream flow. Data from both the rising and falling limb of the hydrograph were captured in the spring of 2013.</p> <p>Tintina has submitted a report relating to baseline fisheries information for the Sheep Creek basin. The report, entitled “Review of Fisheries Literature Data and Management Action in the Sheep Creek, Smith River Basin, Montana, October 2013” summarizes relevant surface water hydrology and fisheries data which describes management actions and past and present fisheries characteristics in the Sheep Creek watershed. This report and any other information FWP has provided will be used for a baseline study in the event Tintina applies for an operating permit.</p>

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