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Hollister Development Block Project
Hecla Ventures Corporation
Environmental Assessment
BLM/EK/PL-2004/002

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LIST OF ACRONYMS & ABBREVIATIONS

AAQS	Ambient Air Quality Standards
ABA	Acid Base Accounting
AGP	Acid Generating Potential
AMSL	Above Mean Sea Level
ANP	Acid Neutralizing Potential
ARD	Acid Rock Drainage
AUM	Animal Unit Month
Barrick	Barrick Goldstrike Mines Inc.
bgs	Below Ground Surface
BLM	Bureau of Land Management
BMP	Best Management Practices
CFR	Code of Federal Regulations
CIA	Cumulative Impact Analysis
COE	U.S. Army Corps of Engineers
CR	County Road
cy	Cubic Yards
EA	Environmental Assessment
EF	Degrees Fahrenheit
gpm	Gallons Per Minute
HC	Humidity Cell
HDB	Hollister Development Block
Hecla	Hecla Ventures Corporation
LCT	Lahontan Cutthroat Trout
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MDBM	Mount Diablo Baseline Meridian
MWMP	Meteoric Water Mobility Procedures
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NDOW	Nevada Division of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
Newmont	Newmont Mining Corporation
NHPA	National Historic Preservation Act
NNHP	Nevada Natural Heritage Program
NPDES	National Pollution Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRS	Nevada Revised Statute
PAG	Potentially Acid Generating
POO	Plan of Operations
RIB	Rapid Infiltration Basin
RO	Reverse Osmosis

SHPO	State Historic Preservation Office
SOAP	South Operations Area Project
SR	State Route
Summit	Summit Envirosolutions, Inc.
TDS	Total Dissolved Solids
USFWS	United States Fish and Wildlife Service
VRM	Visual Resource Management
WPCP	Water Pollution Control Permit

HOLLISTER DEVELOPMENT BLOCK PROJECT
FINAL DRAFT ENVIRONMENTAL ASSESSMENT

1.0 INTRODUCTION/PURPOSE AND NEED

1.1 INTRODUCTION

Hecla Ventures Corporation (Hecla) proposes to conduct underground exploration at the existing Ivanhoe/Hollister Mine site on public lands administered by the Bureau of Land Management (BLM), Elko Field Office. The Proposed Action is described in the Hollister Development Block (HDB) Project Plan of Operations (POO) and Reclamation Plan dated December 2002 and revised January 2004. The HDB Project is a small-scale underground exploration project that would include geologic mapping, core drilling, and collection of bulk samples for metallurgical testing. The project time frame is 2004-2006. The Proposed Action would create 51 acres of surface disturbance on public lands. The HDB Project is located in Elko County, approximately 47 miles northwest of Elko (Figure 1).

Authorizing actions by the BLM must comply with requirements of the National Environmental Policy Act (NEPA) of 1969. The BLM has determined that an Environmental Assessment (EA) would be prepared to analyze potential effects of the project, in compliance with NEPA. The EA follows regulations promulgated by the Council on Environmental Quality for implementing the procedural provisions of NEPA (40 CFR 1500-1508) and the BLM NEPA Handbook (H-1790-1).

The HDB Project resides within the larger Ivanhoe Mining District, which is located on the Carlin Trend gold belt in northeast Nevada. For many thousands of years, Native Americans recognized the white chert (quartz) outcroppings as a source of raw materials for tool making. Exploration and modern mining activities have been conducted in the Ivanhoe Mining District over the past 100 years, with the majority of activity occurring from 1980 to the present.

The district has been actively explored for mercury, molybdenum, uranium, and gold. Several companies including U.S. Steel Corporation, Touchstone Resources Corporation, Newmont Exploration Ltd., and Great Basin Gold, Inc. have recently been involved with gold exploration.

The largest of the mines in the Ivanhoe Mining District was the Hollister Mine, which operated from 1990 to 1992. The Hollister Mine is also known as the Ivanhoe Mine. Material was mined from two pits, and heap-leaching activities were conducted until 1996 to extract an estimated 116,000 ounces of gold. A total of 268 acres was disturbed by the mining and heap leach activities. Much of the associated surface disturbance has been reclaimed, though reclamation and closure activities continue in the area.

Previous NEPA analyses have been conducted in the vicinity of the HDB Project. These include the Proposed Ivanhoe/USX Project, Final Environmental Assessment (BLM, 1988a); Hollister Project Area Ivanhoe District Expanded Exploration Drilling Program Environmental Assessment (BLM, 1991); Great Basin Gold, Inc. Ivanhoe Exploration Project (BLM, 1999); and Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project (BLM, 2000).

1.2 Purpose and Need

The purpose of the HDB Project is to further assess the geological and metallurgical characteristics of the vein system previously identified by surface drilling, to assess the economic value of the precious metals-bearing system, and to evaluate the technical and economic feasibility of a future underground mining project. Underground exploration is required to further define the geological and metallurgical characteristics of the vein system because surface exploration accessibility is limited or not allowed due to the potential to adversely impact cultural resources. The need for the proposed project is to obtain information required to determine the viability of an underground mining operation.

1.3 Issues

The following issues, as stated in Table 1, were identified by the public and BLM during the scoping process. The issues presented in Table 1 are direct quotes from letters and other sources of information received during the scoping process. The issues are addressed within the sections of this EA as referenced by the table.

Table 1 Public Scoping Issues

ISSUE	REFERENCE
Difference between underground exploration and surface exploration. Why won't standard drill hole exploration work? Why is it necessary to build a mine to do exploration of this site?	Section 2.1.2
Decline closure	Section 2.1.10.1
Potential for acid rock drainage (ARD) and water quality. Will the waste rock material removed from the decline be suitable to backfill the decline or create water quality problems?	Sections 2.1.5, 2.1.10.1, and 3.1.2.3,
Grouting can be used to reduce flows in the decline.	Section 2.1.5

Table 1 continued

ISSUE	REFERENCE
Will the rapid infiltration basins (RIBs) cause groundwater pollution either from the infiltrated water quality or from leaching salt from the alluvium into which the basins discharge?	Section 2.1.5 and 4.1.7.2
Size of the RIBs seems to create excessive amount of disturbance.	The disturbance associated with the proposed RIBs is approximately 16 acres. The RIBs will account for approximately three acres of the total 16 acres. Other disturbance associated with the RIBs include the overburden stockpiles, growth medium stockpiles, relocation of the access road, fencing, and monitoring wells.
Ancillary facilities including the pipeline from the exploration to the RIBs should be permitted under standard BLM right-of-way procedures.	Mill site claims have been staked in the location of the RIBs. After considerable review and evaluation in permitting the pipeline and RIBs under a right-of-way or 3809 regulations, an administrative decision was made to permit the action under the 3809 regulations. The RIBs are the proposed means to return water encountered in the decline back to the water basin.
Will dewatering occur from wells adjacent to the decline or water pumped from inside the decline as encountered?	Section 2.1.5
Dewatering may affect Tosawihi Quarry; cumulative impact.	Sections 2.1.11.2, 3.1.7.1, 3.1.12, 3.1.13, 4.1.12, 4.1.13, and 4.5
Potential effect of the RIBs location with the Sierra Pacific Power Company right-of-way.	Sierra Pacific Power Company has been consulted and involved in the process of locating and designing the RIBs.
Potential for ARD from the waste rock material. How will acid generation be controlled during construction of the waste rock disposal facility?	Section 2.1.5
Will the water that enters the decline be impacted by exposure to air and water as the decline fills?	Sections 2.1.10 and 4.1.7.2
What is the potential for the water filling the decline following the end of exploration to degrade the surrounding groundwater?	Sections 2.1.10 and 4.1.7.2
Will a sampling plan during the active exploration phase verify the water quality before it is discharged to the infiltration system?	Section 2.1.12
Fencing around the water management ponds and RIBs	Section 2.1.9
Proposed seed mix.	Section 2.1.10

Table 1 continued

ISSUE	REFERENCE
Wildlife mortality reporting.	Nevada Division of Wildlife requires wildlife mortality reporting through the Industrial Artificial Pond Permit.
Native American concerns related to the project.	Sections 2.1.11.2, 3.1.12, 3.1.13, 4.1.12, and 4.1.13
Potential effects to the air quality in the project area.	Sections 3.1.1 and 4.1.1
Potential effects to cultural resources.	Sections 3.1.12, 4.1.12, and 4.5
Potential for ARD generation.	Sections 2.1.5, 2.1.10.4, 2.1.13.3, 3.1.2.3, and 4.1.2
Potential effects to groundwater quality and quantity.	Sections 2.1.5, 2.1.11.5, 3.1.7.2, 4.1.7.2, and 4.5
Potential effects to springs.	Sections 3.1.7.1, 4.1.7.1, and 4.5
Potential effects to native vegetation and special status plant species.	Sections 2.1.11.3, 3.1.4, 3.1.10.1, 4.1.4, 4.1.10.1, and 4.5
Potential effects to wildlife and special status animal species.	Sections 2.1.11.3, 3.1.8, 3.1.9, 3.1.10.2, 4.1.8, 4.1.9, 4.1.10.2, and 4.5
Potential cumulative effects of the project.	Section 4.5

1.4 LAND USE PLAN CONFORMANCE STATEMENT

The Proposed Action and alternative described in Chapter 2 are in conformance with the Elko Resource Management Plan, Issue Minerals, management prescription 1, and are consistent with Federal, State and local laws, regulations, and plans to the maximum extent possible.

2.0 PROPOSED ACTION AND ALTERNATIVES

The HDB Project is a joint effort between Hecla Ventures Corporation, a wholly owned subsidiary of Hecla Mining Company, and Rodeo Creek Gold Inc., a wholly owned subsidiary of Great Basin Gold Ltd. The venture was formed for the purpose of furthering the exploration activities on the Ivanhoe property. The planned underground exploration is designed to characterize the mineral resource originally identified by Great Basin Gold Ltd.

The operator of the Proposed Action will be Hecla Ventures Corporation. The following provides information on the operator of the proposed project:

Hecla Ventures Corporation
P.O. Box 2610
Winnemucca, Nevada 89446

The proposed project is located in Elko County, Nevada, approximately 47 miles northwest of Elko, 38 miles northeast of Battle Mountain, and 64 miles northeast of Winnemucca (Figure 1). The majority of the project components would be located on pre-existing disturbance associated with the Hollister Mine. Access to the HDB Project is from Winnemucca via Interstate 80 east to the Golconda exit, northeast on State Route (SR) 789 to County Road (CR) 724 (Midas road) to the project access road. The project area is located approximately nine miles south of CR 724. Figure 2 shows the project area and existing access road to the project area. The project area includes the existing Ivanhoe Mine East Pit, the area around and including an existing water well, a pipeline route to the rapid infiltration basins (RIBs), and the area associated with the RIBs.

2.1 PROPOSED ACTION

The Proposed Action is an underground exploration and bulk sampling project to be located in and near the existing Hollister Mine. Bulk samples of mineralized material would be removed from a proposed underground decline and evaluated off-site to determine the material's metallurgical characteristics. The project would consist of an underground decline, a waste rock disposal facility, a temporary bulk sample stockpile, water management facilities, and ancillary support facilities. Water handling facilities would include de-silting basins, recycle pond, surge pond, RIBs, associated pumps and piping, stormwater control basins, and diversion channels. Ancillary and support facilities include offices, a change house, maintenance facilities, fuel storage, generators, air compressors, explosive storage facilities, and other facilities. Figures 3a and 3b show the location of the project facilities and other project components. All proposed project components, except the waste rock facility, would be temporary, and with the exception of the water well, RIBs, and pipeline, would be designed to fit within the confines of the existing East Pit of the Hollister Mine (Figures 3a and 3b).

The proposed project would begin in March 2004. Initial construction of the surface facilities (construction phase) is expected to take two months. Portal collaring is targeted to begin as soon as practical, which begins the underground exploration phase. The start of the underground exploration phase is tied to key facility construction. The exploration phase is expected to last approximately 18 months, with an anticipated completion date in the latter part of 2005.

Approximately 40 people would be employed during the life of the project. During exploration activities, there would be two 10-hour shifts per day with six employees per shift. Each shift of six would include a shift boss, lead miner, miner, truck driver, mechanic, and electrician. To meet the Federal 40-hour workweek guidelines, four crews of six are required. To maintain equipment during non-usage periods and personnel presence between shifts, two additional mechanics would be scheduled daily. Again, to meet the Federal guidelines for a 40-hour workweek, a total of four personnel would be required for this maintenance crew. This brings the total daily exploration personnel to 28. Supervisory staff, surveyors, engineers, geologists, and administrative staff would bring the total to 40 personnel.

2.1.1 Surface Disturbance

The project would be located on an estimated 51 acres of land managed by the BLM. Table 2 provides a breakdown of the estimated disturbance associated with the proposed project. Approximately 35 acres would be located on previously disturbed land associated with the Hollister Mine and the existing road to the south along Little Antelope Creek. The project facilities would be located within the existing East Pit. The project facilities include the portal to the exploration decline, water management facilities excluding the RIBs and associated pipeline, waste rock disposal facility and associated components, all buildings and maintenance facilities, and the explosives storage area.

Approximately 16 acres of new disturbance would result from the proposed project. These 16 acres of new disturbance would be associated with construction of the RIBs. The RIBs would be located approximately 4.5 miles south of the project facilities, which are located in the East Pit (Figure 4), and would be accessed via the existing road along Little Antelope Creek. The pipeline to the RIBs would be constructed within the existing road disturbance.

Table 2 Estimated Surface Area Disturbance

Area	Acres	Disturbance Status
Project Facilities	28.5	Previously disturbed areas including the East Pit
Impassable Portion of proposed RIB Access Road	0.5	Approximately 1,500 lineal feet (15 feet wide) have been made impassable through a BLM exclosure.
Water Well 1	0.5	Previously Disturbed
Pipeline to RIBs	5.5	Previously Disturbed - Within footprint of existing road along Little Antelope Creek.
Rapid Infiltration Basin (RIB) System	16.0	Currently Undisturbed
TOTAL	**51**	

2.1.2 Underground Exploration Activity

Underground exploration for the HDB Project is necessary because the targeted mineralized zone is beneath the Tosawihi Quarries Archaeological District. The configuration and number of drill sites required to adequately delineate the mineralized zone is not compatible with the surface disturbance restrictions within the Tosawihi Quarries. Also, due to the geometry and depth from the surface of the vein, drilling from underground would more accurately define the extent and true thickness of the mineralization. Underground exploration activities would include collection and removal of bulk samples, underground core drilling, and data collection. Activities necessary to accomplish the exploration goal include construction of a portal and excavation of a decline, muck bays, drill stations, and crosscuts to access the mineralized zone. Waste rock and mineralized material would be removed during the project.

The underground exploration program utilizes underground mining techniques, but the exploration project differs from a mining project by limiting the activities to those that would provide direct access to the area of interest, establish drill stations, and provide bulk samples of the mineralization to determine the metallurgical characteristics. As underground excavation progresses, the potential for future mine development would be evaluated from information gained regarding: 1) the potential ore body; 2) the geology of the exposed rock and drill samples; 3) conditions of excavated areas; 4) hydrology; 5) metallurgical characteristics of the mineralization; and 6) and potential mining methods.

The portal is the surface opening that allows access to the decline. The elevation of the portal would be 5,550 feet above mean sea level (AMSL). The decline would consist of a tunnel excavated from the surface to the desired location underground. The portal and decline would be developed using drill and blast methods. The decline for the HDB Project would be approximately 5,000 feet in length. The elevation at the end of the decline would be 5,000 feet AMSL. The cross-sectional dimensions of the decline would be approximately 15 feet wide by 15 feet high. There would be no visible surface manifestations of the underground workings with the exception of the portal located within the existing East Pit of the Hollister Mine (Figure 3a).

Other features associated with the underground exploration project would include muck bays, drill stations, and crosscuts. Muck bays are excavated areas where waste rock and bulk samples are temporarily stored underground prior to transportation by loaders or haul trucks to the surface. Muck bays would be approximately 13 feet wide, 15 feet high, and 40 feet long, and would be spaced at approximately 600 foot intervals. As drilling progresses, drill stations no longer needed may be used as muck bays.

Core drilling of the ore body would be conducted from drill stations constructed along the main decline and/or from crosscuts or other underground excavations. Core drilling from underground locations would allow for more accurate determination of the true thickness of the ore body, due to the ability to penetrate mineralized zones from the proper angle. Surface drilling does not allow perpendicular drilling through the mineralized zone. Drill stations would be approximately 13 feet wide, 16 feet high, and 30 feet long. The drill stations would be spaced at approximately 100 to 200 foot intervals. Core drilling would begin shortly after excavation of the first drill station; the second drill rig would be brought in as the next drill station becomes available. Drilling would continue through the end of the project. Drilling would take place on two 10-hour shifts per day, and would be operated on a 10-day-on, four-day-off schedule. A total of approximately 55,000 feet of core drilling is anticipated during the project with each drill hole measuring between 250 and 600 feet in length.

Crosscuts from the main decline would be used to access known mineralized areas (veins). From one to three crosscuts would be driven, each with a cross-section measuring approximately 13 feet wide by 13 feet high. Drifts or vertical raises would be located on the veins to remove bulk sample material. Drifts would be approximately 8 feet wide by 10 feet high and approximately 500 feet long. Raises would measure 6 feet by 6 feet and 200 to 250 feet high. The Nevada Division of Environmental Protection (NDEP) Small-Scale Facility Water Pollution Control Permit (WPCP) allows up to 36,500 tons per year or approximately 17,500 cubic yards (cy) of mineralized material to be extracted for characterization. Results from the bulk sample and core sample analyses would be used to determine if sufficient gold reserves are present to allow for future mining and to identify the most efficient processing methods.

Conventional drilling and blasting would be used to excavate the decline, muck bays, crosscuts, raises, and drifts. Rock material blasted during the construction of the decline would be hauled to the surface using underground earthmoving equipment. Non-mineralized rock would be hauled to the surface and placed on the waste rock disposal facility. Selected mineralized rock (bulk sample material), excavated from the intersected veins, would be removed and placed in a temporary bulk sample stockpile located on the waste rock disposal facility. This material would be shipped off-site for metallurgical testing and analysis.

2.1.3 Bulk Sample Handling

Mineralized material (bulk samples) removed from the underground workings would be transported to a temporary stockpile located on the surface. This temporary stockpile would be located on a section of the waste rock disposal facility (described in Section 2.1.4). As a requirement of the NDEP Small-Scale Facility WPCP, the base of the bulk sample stockpile would be lined with a low-permeability soil liner, as described in Section 2.1.4. The estimated size of the stockpile would be 60 feet by 100 feet by 6 feet high. The material would be periodically transported off-site to eliminate the need for a larger stockpile. Stockpiled bulk sample material would be loaded onto over-the-road trucks for transportation to off-site testing facilities to obtain relevant information required to assess the metallurgical characteristics of the material. No mineralized material would be processed on-site.

2.1.4 Waste Rock Handling

An estimated 100,000 tons or approximately 46,000 cy of waste rock (quartzite and argillite/siltite) would be removed during the excavation of the exploration decline. Based on results from the waste rock characterization, it was determined that the waste rock demonstrates a potential for formation of acid rock drainage (ARD). For this reason, specific design features have been incorporated into the waste rock disposal facility to protect groundwater and surface water resources. The waste rock would be permanently placed in an existing depression located near the southeast portion of the East Pit (Figures 3a and 3b). The waste rock disposal facility would cover an area of approximately 2.5 acres.

Prior to waste rock placement, a low-permeability soil liner would be constructed beneath the dump area. Per requirements in the Small-Scale Facility WPCP, this liner would consist of 12 inches of compacted material providing a minimum hydraulic conductivity of $1x10^{-5}$ cm/sec.

A water collection system would be installed on the liner to route meteoric water percolating through the waste rock to an evaporation sump. This sump would be used for monitoring of potential percolating solutions and allow for evaporation or removal of these solutions.

Based on technical evaluations, without mitigation, the waste rock can be expected to produce ARD. The waste rock has an acid neutralizing potential (ANP) to acid generating potential (AGP) ratio of less than the BLM standard of 3:1 and the NDEP standard of 1.2:1. Therefore, neutralizing agents such as dolomite, a high calcium-magnesium carbonate rock, would be added to the waste rock at a rate sufficient to increase the ANP:AGP ratio. The addition of dolomite is designed to prevent ARD by effectively neutralizing solutions that may come in contact with the potentially acid generating rock. Dolomite would be stockpiled adjacent to the waste rock evaporation sump. Operational monitoring would be conducted to confirm the effectiveness of neutralization.

2.1.5 Water Management

Based on hydrogeologic testing and evaluation, the proposed decline would encounter groundwater, requiring pumping of the intercepted groundwater to allow for underground activities to proceed. Interception of water during the first 1,700 to 1,800 feet of the decline excavation is expected to be minimal. This represents a time period of approximately four to six months from the time the portal is constructed (Hecla, 2003a) before greater inflows of water are anticipated. During this initial period, the main source of water for the project utility needs would be met by an existing supply well, WW-1, supplemented by small amounts of water that may be intercepted underground. As the decline progresses beyond 1,800 feet, groundwater inflow rates are expected to increase as the decline advances.

Brown and Caldwell (2003a) completed a hydrogeologic evaluation to predict the anticipated groundwater inflows into the decline. Predicted groundwater inflows could range between 335 and 385 gallons per minute (gpm) providing a sustained average rate of approximately 360 gpm. Short-duration surge flows could reach 900 gpm. These maximum sustained flows would not be anticipated until near completion of the exploration decline excavation. A grouting study conducted by Phillips Mining, Geotechnical & Grouting, Inc. (Phillips, 2003) indicated that grouting in the decline would reduce the average steady-state inflows more than 50 percent. Grouting is a method of forcing cement into the bedrock fractures, the groundwater conduits, to prevent or reduce flow through the fractures. Based on the results of the Brown and Caldwell study and the Phillips grouting study, Hecla would grout water-bearing fractures in the decline to achieve an approximate 50 percent reduction in water inflow to the decline.

Since complete elimination of groundwater inflow into the underground exploration workings is not practical or economically feasible, a water handling system would be installed and maintained during the life of the exploration project. This system has been designed to handle the maximum anticipated flow, based on Brown and Caldwell inflow predictions minus the reduced flow with the implementation of grouting. Although greater than a 50 percent reduction in inflow rates may be achievable through grouting, a 50 percent reduction in inflow rates is assumed in the design of the water management system.

Based on the predicted average sustained inflow of 360 gpm into the underground excavation, reduced by 50 percent due to grouting, plus an additional 10 gpm for meteoric water inflows to the surface components of the system, the proposed water management system is designed to handle a sustained inflow rate of 190 gpm. As surge flows are anticipated, the water management system is also designed to handle short-duration surge flows. A designed surge flow of 450 gpm was accounted for in the water management system. This is based on a predicted surge inflow of 900 gpm to the underground workings reduced 50 percent by grouting. In the event that groundwater inflows exceed the above-described design criteria, additional grouting and/or temporarily halting the advance of the decline would take place to manage any potential volume of water above the design rate of the underground pumping/piping system and the surface water management system.

Groundwater entering the exploration decline would be pumped to the surface and discharged into the equipment wash bay sump. This would allow the primary solids to settle. The water would then pass through a series of synthetically-lined de-silting basins with skimming booms to remove suspended solids and hydrocarbons (Figure 3a). The three proposed de-silting basins each have a capacity of 26,000 gallons with a resultant total residence time of 6.75 hours. From there the water would be gravity fed to one of two lined ponds: the recycle pond or surge pond (Figure 3a).

The primary water management pond is the recycle pond, which is designed with a capacity of 1.4 million gallons. The recycle pond would be used for storage of decline water for reuse in the underground drilling program, underground dust suppression, and for fire protection. The surge pond, to be located adjacent to the recycle pond (Figure 3a), also has a design capacity of 1.4 million gallons. This pond would be used for extra storage capacity during surge flows from the underground and as a back-up pond in the event the recycle pond is shut down for maintenance.

Excess water, beyond the working capacity of the surge pond and project water needs, would be pumped via a pipeline to a holding tank (utility tank) located near the pit rim, south of the portal (Figure 3b). An overflow pipeline from the utility tank would allow water to be gravity fed to the RIBs, located approximately 4.5 miles south of the portal area. The pipeline from the holding tank to the RIBs would be buried in the roadbed of the existing access road along Little Antelope Creek. The six-inch pipeline would be able to transport approximately 450 gpm to the RIBs, which is the anticipated short-duration surge flow. The gravity water line would terminate at a manhole structure where energy dissipation and flow control would be established.

RIBs would be used to replace excess water back into the groundwater system. The minimum design criteria for RIBs, as provided in Water Technical Sheet 3 (WTS-3) Guidance Document for an Application for Rapid Infiltration Basins (NDEP), requires that no fewer than two basins per site be constructed. The layout of the RIBs and associated pipeline are shown on Figure 5. The RIBs would be located on an alluvial/colluvial terrace near the confluence of Little Antelope Creek and Antelope Creek. Each basin has been designed to handle the average sustained rate of 190 gpm. The two basins could also be operated simultaneously to handle the estimated short-duration surge flows of 450 gpm.

Each basin would have a bottom area of approximately 45,000 square feet or 1.03 acres. The RIBs would be excavated to expose a gravel layer, which would allow for the most efficient infiltration of water. The gravel layer is at an estimated depth of 8 feet below the ground surface. Side slopes of the RIBs would be graded to a 3H:1V (Horizontal:Vertical) slope. A total of 16 acres would be affected by construction and operation of the RIBs, including the excavated basins, growth medium and overburden stockpiles, diversion ditches, service roads, and livestock fencing (Figure 5).

Based on the proposed location of the RIBs, a portion of the existing access road from the East Pit to the RIBs would require re-routing. The proposed new route for the access road is to the west of the proposed RIBs. The proposed location for the road is shown in Figure 5. The disturbance associated with the proposed re-route of the existing road is included in the 16 acres of new disturbance.

Surface water run-on would be diverted around the RIBs via stormwater diversion ditches. Four-strand barbed wire fencing would be installed around the perimeter of the RIBs to exclude livestock, but allow wildlife access. Periodically, the bottom of each basin would be inspected and, if necessary, lightly scarified to break up any consolidated areas and maintain design permeability.

2.1.6 Power Supply and Fuel Storage

Diesel generators are planned to provide electric power for the exploration project. The diesel generators and fuel storage tanks would be located on the southwest side of the East Pit. One generator would supply the necessary power for the exploration activities, with a second generator available for back-up power.

On-site fuel storage would include aboveground gasoline and diesel tanks. A 1,000-gallon capacity gasoline tank would be installed to fuel light vehicles used during the proposed exploration project. Diesel fuel, stored in two 10,000-gallon tanks, would be used for the diesel generators and for fueling underground mobile equipment. Secondary containment, sufficient for the size of the largest tank plus 10 percent, would be provided to meet regulatory requirements.

A 1,000-gallon certified propane tank would be located adjacent to the maintenance shop.

2.1.7 Chemical and Explosive Use and Storage

Some chemicals and potentially hazardous materials would be used in the normal day-to-day activities associated with the underground exploration project, particularly in the maintenance shop where various solvents, greases, coolants, and lubricants would be used. All chemicals used on-site would be handled in a safe and environmentally conscious manner. Used chemicals such as solvents, coolants, and lubricants would be recycled or disposed off-site in a manner consistent with Federal, State, and local regulations.

Explosives would be used during the excavation of the underground workings, thus requiring storage of explosive materials on-site. The explosive storage area would be located in the extreme southwest portion of the East Pit, as shown on Figures 3a and 3b. Fencing with a locked gate would be placed around the storage facility to the pit highwall, and berms would be placed around the storage area and between the explosives and primers. Growth medium material removed from the bottom of the East Pit would be used to create the berms around the explosives storage area. Only qualified personnel would be allowed to handle and/or use the explosives. Explosives would be stored and used in a manner consistent with Federal, State, and local regulations.

Table 3 provides a list of chemicals, fuels, and explosives, as well as the anticipated quantities, to be stored on-site during the project.

Table 3 List of Chemicals, Fuels, and Explosives Stored

Chemical/Fuel	Quantities Stored*
Diesel Fuel	20,000 gallons
Gasoline	1,000 gallons
Lubricating Oil	2,300 gallons
Propane	1,000 gallons
Antifreeze	110 gallons
Solvents	55 gallons
Explosives - emulsion based blasting agent	30,140 pounds
Explosives - blasting detonators	10,125 each
Chlorine	55 gallons

*Quantities indicated are those of maximum amounts stored at any one time during the life of the project.

2.1.8 Solid and Sanitary Waste

Trash receptacles would be placed on-site during exploration activities. All solid, non-hazardous wastes would be removed from the site and disposed at an appropriate location permitted to accept such waste. Any hazardous wastes would be removed from site and recycled or disposed at a licensed off-site facility. No potentially harmful materials or substances would be left on-site following completion of the exploration project. The HDB Project would be a Conditionally Exempt Small Quantity Generator, which is defined by Federal regulations as generating less then 200 pounds of hazardous waste per month. The estimated quantity of hazardous waste would be less than 120 pounds per year. Table 4 provides a list of non-hazardous generated waste streams and proposed disposal methods. Table 4 does not include office waste such as paper, plastics, etc.

Table 4 Project Generated Waste Streams

Waste	Estimated Volume	Disposal Method
Used Oil	800 gallons/month	Returned to supplier for recycling
Lead-Acid Batteries	1each/month	Returned to supplier for recycling
Scrap metal	Unknown quantity	Recycled
Used antifreeze	100 gallons/month	Returned to supplier for recycling
Cleaning solvents (safety non-halogenated solvents)	20 gallons/month	Returned to supplier for recycling
Aerosol cans	25 each/month	Punctured and drained prior to disposal with general solid wastes
Oil filters	25 each/month	Punctured and hot drained for 24 hours prior to disposal with general solid wastes

Sanitary wastes would be handled in a 3,000-gallon septic tank and two 5,000-gallon effluent storage tanks. A licensed contractor would pump and haul the septic tank sludge and effluent to a licensed Winnemucca sewage treatment facility for disposal. The sanitary waste system would be designed and permitted in accordance with Nevada Administrative Code (NAC) 444 regulations, the Uniform Plumbing Code and Elko County requirements.

2.1.9 Ancillary and Miscellaneous Facilities

The ancillary and support facilities that would be required for the proposed exploration project include the following, which are shown on Figures 3a and 3b:

- Office trailer;
- Miner's change house (dry);
- Maintenance shop and warehouse/storage facility
- Equipment wash bay;
- Shift foremen's office trailer;
- Lay-down area;
- Propane tanks;
- Fueling station;
- Water tanks (utility and potable water)
- Potable water treatment plant; and
- Water supply well.

A four-strand barbed wire perimeter fence with locking gates was installed during previous mining activities at the Hollister Mine. The fence and gates would be maintained throughout the life of the project. The gate on the main entrance road to the property would be closed but unlocked to allow employee, vendor, and visitor access from Monday through Friday. This gate would be locked following the day shift and on weekends to prevent unauthorized access. Access would be allowed for project related activities. Other fences include an eight-foot fence around a portion of the explosives storage area (Section 2.1.8), a wildlife fence around the water management ponds and waste rock dump evaporation pond in the east pit, a fence at the portal entrance, and a barbed wire fence around the RIBs. All fences would have access gates.

2.1.10 Reclamation

Detailed reclamation plans are provided in the Revised POO for the HDB Project (Hecla, 2004). Closure and reclamation would be consistent with the 43 Code of Federal Regulations (CFR) 3809 Regulations and Nevada Revised Statute (NRS) and NAC 519A and 445A regulations. Revegetation success is evaluated in accordance with the Nevada Guidelines for Successful Revegetation for the NDEP, BLM, and the USDA Forest Service (BLM Instruction Memorandum No. NV-99-013).

The goal of reclamation is to physically stabilize the disturbed areas and return them to the pre-exploration land use. This would be accomplished by regrading the disturbed areas to blend with the surrounding topography and revegetating disturbed areas to be compatible with post-exploration land uses. To ensure this goal, Hecla would post a reclamation bond that meets the requirements of the BLM and NDEP.

Due to the nature of the underground exploration project, concurrent reclamation opportunities are limited. However, when possible, Hecla would conduct concurrent reclamation. This would include revegetation of disturbed areas including berms and stockpiles to minimize wind and water erosion, and to deter the establishment of noxious weeds or other undesirable species.

Actual seed mixes to be used during reclamation would be selected from the BLM's plant list provided in Table 5 (Reclamation Plant List). The species used would be dependent on availability and cost, and would be applied at a rate of approximately 15 pounds pure live seed per acre. Modifications in the seed list, application rates, cultivation methods, and techniques could occur based on success of concurrent reclamation. Changes and/or adjustments to seed mixtures and application rates would be developed through consultation with and approval by the BLM and NDEP. Seedlings may be substituted for seeds. The seed mix selected would represent a Reclaimed Desired Plant Community and the mix would be appropriate for each ecological site in the project area.

The majority of the proposed project facilities would be located within the existing East Pit, which was created by previous mining operations. The bottom of the East Pit was reclaimed by the previous operator. This reclaimed area would be redisturbed by the proposed exploration project and would be reclaimed following completion of the project. When possible, growth medium placed in the bottom of the pit during previous reclamation would be removed from areas that would be affected by the exploration project and stockpiled. These stockpiles would be used during final reclamation.

Table 5 Reclamation Plant List

Common Name	Species Name
Grasses	
Bluebunch wheatgrass	*Agropyron spicatum*
Thickspike wheatgrass	*Agropyron dasystachyum*
Streambank wheatgrass	*Agropyron riparium*
Western wheatgrass	*Agropyron smithii*
Crested wheatgrass	*Agropyron cristatum*
Slender wheatgrass	*Agropyron trachycaulum*
Sandberg bluegrass	*Poa sandbergii*
Canby bluegrass	*Poa canbyi*
Big bluegrass	*Poa ampla*
Great Basin wildrye	*Elymus cinereus*
Indian ricegrass	*Oryzopsis hymenoides*
Webber ricegrass	*Oryzopsis webberi*
Idaho fescue	*Festuca idahoensis*
Sheep fescue	*Festuca ovina*
Green needlegrass	*Stipa viridula*
Bottlebrush squirreltail	*Sytantion hystrix*
Sand dropseed	*Sporabolus cryptandrus*
Alkali sacaton	*Sporabolus airoides*
Forbs	
Cicer milkvetch	*Astragalus cicer*
Northern sweetvetch	*Hedysarum boreale*
Buckwheat	*Eriogonum*
Common sainfoin	*Onobrychis viciaefolia*
Annual ryegrass	*Lolium perenne multiflorum*
Western yarrow	*Achillea millefolium*
Blue flax	*Linum lewisii*

Table 5 continued

Common Name	Species Name
Forbs (continued)	
Small burnet	*Sanguisorba minor*
Gooseberry leaf globemallow	*Sphaeralcea grossulariaefolia*
Scarlet globemallow	*Sphaeralcea coccinea*
Desert globemallow	*Sphaeralcea ambigua*
Arrowleaf balsamroot	*Balsamhoriza saggitata*
Palmer penstemon	*Penstemon palmeri*
White sweetclover	*Meiilotus alba*
Alfalfa	*Medicago sativa*
Shrubs	
Wyoming big sagebrush	*Artemisia tridentata var. wyomingensis*
Big sagebrush	*Artemisia tridentata*
Black sagebrush	*Artemisia nova*
Antelope bitterbrush	*Purshia tridentata*
Serviceberry	*Amelanchier (ainifolia) utahensis*
Winterfat	*Ceratoides lanata*
Chokecherry	*Prunus virginiana*
Snowbrush	*Ceanothus spp.*
Fourwing saltbush	*Atriplex canescens*
Prostrate kochia	*Kochia prostrata*
Rubber rabbitbrush	*Chrysothamnus nauseosus*
Currant	*Ribes spp.*
Woods rose	*Rosa woodsii*
Snowberry	*Symphoricarpos spp.*

Reclamation activities associated with the exploration project would include the following;

- Portal closure;
- Closure and reclamation of the water management facilities within the East Pit;
- Closure and reclamation of the RIBs;
- Waste rock disposal facility closure and reclamation;
- Removal of structures and facilities;
- Road reclamation; and
- Post-closure monitoring.

2.1.10.1 Portal Closure

At the completion of the exploration activities, the decline portal would be closed using concrete blocks and backfilled material. The concrete blocks would be used to provide a backstop for waste fill. The blocks would be placed at a minimum of 100 feet into the excavation from the portal collar. Material used for backfill would consist of non-acid generating waste rock removed during the excavation of the decline. This material would be loosely compacted to within 15 feet of the portal opening. Uncompacted rock would then be used to finish filling the portal. This closure method would prevent future unauthorized access to the underground workings.

2.1.10.2 Closure of East Pit Water Management Facilities

Reclamation of the recycle and surge ponds would be initiated by disposal of water at the RIBs facility or through evaporation. Sediments or sludge in the ponds would be analyzed for contaminants. Depending on the analysis results, the sediments or sludge would either be removed and disposed of according to applicable regulations or buried in place. Reclamation of the ponds would include cutting and folding the synthetic liner, then placing the liner in the bottom of the pond. Broken concrete foundations would also be buried within the surge and recycle ponds. The pond berm material would be used to bury the liner and concrete material. The site would be graded to blend with the surrounding area. A six-inch growth medium layer would be placed and revegetated with an approved seed mix.

Reclamation of the de-silting basins would be similar to the surge and recycle pond reclamation. Water would be removed, and then sediments would be analyzed for contaminants and disposed of properly. The wash bay concrete and synthetic liner would be removed and buried in the surge and recycle ponds, to allow for maximum burial depth. Berm material would be used to fill the basins. The backfilled basins would be graded to blend with the surrounding area and covered with a six-inch layer of growth medium. The de-silting area would be revegetated using an approved seed mix.

2.1.10.3 Closure and Reclamation of the RIBs

The RIBs would be allowed to dewater prior to reclamation. Reclamation activities would include backfilling the RIBs with the berm material and material from the overburden stockpile, grading the area to blend with the surrounding topography, placing one foot of growth medium, and revegetation with an approved seed mix. Ground preparation such as ripping may be required prior to reseeding in the areas used for service roads and stockpiles. All surface conveyance and distribution piping would be removed. Buried pipelines would be left in place with surface ends cut off, capped, and covered.

2.1.10.4 Waste Rock Disposal Facility Closure and Reclamation

Following completion of waste rock placement on the waste rock disposal facility, the surface would be graded to promote precipitation run-off and reduce infiltration. Any solutions remaining in the sump would be extracted and the sump would be filled with waste rock during the grading of the dump. A low-permeability cover would be placed over the waste rock disposal facility to minimize meteoric water infiltration, and promote run-off and evapotranspiration of meteoric water. The cover would consist of 12 inches of low permeability ($1x10^{-5}$ cm/sec) compacted soil covered with 24 inches of common fill and six inches of growth medium. Revegetation would be completed using an approved seed mix.

2.1.10.5 Structures and Facilities Removal

All trailers and buildings would be decommissioned and removed from the property. Salvageable equipment and materials would be removed from the project area and either used at another facility, sold, or properly disposed off-site. All consumables such as unused solvents, petroleum products, and explosives would be removed from the site and used at another facility or returned to the vendor. Concrete building foundations would be broken up and buried on-site. Synthetic liners used in water management facilities would be cut and buried on-site. Unsalvageable material and equipment such as construction debris and piping would be removed from the project area and disposed in accordance with applicable local, State, and Federal regulations. Areas that previously had growth medium within the East Pit would be graded and six inches of growth medium would be applied followed by revegetation using an approved seed mix. Compacted areas would be ripped prior to placement of the growth medium.

2.1.10.6 Road Reclamation

Roads that will be reclaimed include the access road within the East Pit, the access road from the East Pit to the northern extend of the BLM exclosure, and the 1,500 feet of road through the BLM exclosure. The Little Antelope Creek road from Antelope Creek to the southern end of the BLM exclosure will not be reclaimed and will remain open. The road constructed around the RIBs would remain open for access, while the section of road disturbed by the construction of the infiltration basins would be reclaimed. Reclamation activities for roads would include ripping the compacted surface, grading the area to blend with the surrounding topography, placement of growth medium as necessary, and revegetation using an approved seed mix.

2.1.11 Environmental Protection Measures

Hecla has incorporated several environmental protection measures into the Proposed Action to reduce effects to the environment, ensure protection of cultural resources, and comply with regulatory protective and monitoring requirements of applicable permits and plan approvals. The following sections describe the environmental protection measures incorporated into the proposed project.

2.1.11.1 Air Quality

Hecla would implement the following measures to protect air quality:

- All applicable State and Federal air quality standards would be met through the use of the best available control technology to control emissions, as described in the NDEP air quality permit.

- Fugitive dust is specifically addressed as a condition in the Fugitive Dust Control Plan portion of the NDEP Surface Area Disturbance Permit Application. Hecla would implement an ongoing program to control fugitive dust from disturbed areas using Best Management Practices (BMPs). It is anticipated that Hecla would control fugitive dust emissions primarily by watering surface and underground roads. Additional BMPs may be used if watering is not sufficient in controlling fugitive dust emissions.

- Access roads, project area roads, and other traffic areas would be maintained on a regular basis to minimize dust and provide for safe travel conditions.

- The diesel generators would be operated under permit from NDEP, Bureau of Air Pollution Control. Generators and mobile equipment would be maintained on a regular basis to ensure proper operation and to minimize emissions. Monitoring would be carried out as dictated by permit requirements, which includes reporting of operating hours, throughput, production, and fuel consumption. Records would be maintained on-site.

2.1.11.2 Cultural Resources

The general region of the project is known to have important prehistoric cultural resources. Hecla, in consultation and coordination with the BLM, commissioned a Class III cultural resources inventory of the project area in order to identify significant cultural resources and to guide location of project facilities to avoid effects to identified resources. Based on the cultural resource inventory, the project facilities were located to avoid eligible or potentially eligible cultural resource sites. The following cultural resource protection measures will be observed during operations:

- Hecla would avoid eligible and potentially eligible cultural resource sites through design, construction, and operation of the project;

- A 30-meter (approximately 100 feet) buffer zone would be established around eligible and potentially eligible cultural resource sites to help provide protection to the sites. Project facilities would not encroach into the established 30-meter buffer zone;

- The project facilities would be operated in a manner consistent with the engineered design to prevent problems associated with the run-off that could affect adjacent cultural sites. This includes the use of BMPs to minimize off-site erosion and sedimentation;

- Where the installation of project facilities could impact eligible or potentially eligible cultural sites(s), Hecla would retain qualified archaeologist to serve as a cultural monitor during construction of the facility in order to avoid potential effects to cultural site(s). The BLM will decide when cultural monitors are necessary;

- Hecla would limit vehicle and equipment travel to roads and construction areas that have been determined by the BLM to not affect cultural resources;

- Prior to construction, Hecla would train workers and individuals involved with the project regarding the potential to encounter historic or prehistoric sites and objects, the proper procedures in the event that cultural items or human remains are encountered, prohibitions on artifact collection, prohibitions on disclosing the location of culturally sensitive areas and/or areas important to Native American Tribes, and respect for Native American religious concerns; and

- Any suspected cultural object or site (prehistoric or historic) or Native American funerary item or sacred object, or human remains discovered during construction would be immediately reported to the BLM Authorized Officer by telephone, and with written confirmation. Work would be suspended in the immediate area of such a discovery until it is evaluated by the BLM, and until the BLM gives authorization to proceed.

2.1.11.3 Wildlife and Livestock

Hecla would implement the following measures to minimize impacts to wildlife and livestock resources in the project area:

- To meet the requirements of the Migratory Bird Treaty Act (MBTA) and avoid destruction of birds, nests, eggs, or young, Hecla would avoid land clearing of native vegetation during the avian breeding season (April 1 to August 31, annually). If it becomes necessary to clear any area during the breeding season, a survey for active nests would be conducted by a qualified biologist. If active nests are located, a protective buffer would be delineated around the nest and vegetation clearing within the buffer would be delayed until it is confirmed that the young have fledged;

- Trash and other waste products would be properly managed and Hecla would control garbage that could attract wildlife;

- Company vehicles would be provided, and usage promoted, that would effectively reduce traffic on the access roads;

- Speed limits would be posted, and if necessary, speeds would be reduced, especially when wildlife is active near access and service roads. Hecla would report any vehicle/wildlife collisions on the project area roads and other observed wildlife mortalities on the property to the BLM and Nevada Division of Wildlife (NDOW);

- Hecla would erect wildlife fences around the water management ponds (de-silting basins, recycle and surge ponds), and the waste rock disposal facility evaporation sump to restrict entry by wildlife and livestock. Four-strand barbed wire fences would be installed around the RIBs to eliminate livestock entry, but allow access by local wildlife;

- Employees and contractors would be prohibited from carrying firearms on the job site to discourage illegal hunting and harassment of wildlife. Hunting is prohibited within the perimeter fence. Hecla would provide a wildlife education program to acquaint all workers with laws protecting wildlife;

- Any potential damage to livestock fences from construction would be repaired immediately. Hecla's employees and contractors would close livestock gates when traveling through the project area for public safety and also to ensure livestock are confined to the appropriate allotment; and

- Reclamation of the disturbed areas would be completed to return these areas to a productive grazing and wildlife habitat.

2.1.11.4 Noxious Weeds

To minimize the introduction and establishment of noxious weeds in the disturbed areas, the following measures would be incorporated into the proposed project:

- Hecla would implement a BLM approved weed control program. Weed control, if necessary, would include application of approved herbicides;

- Hecla would use a certified weed-free seed mix during revegetation of disturbed areas;

- Hecla would revegetate growth medium and overburden stockpiles with a weed-free seed mix as soon as possible following stockpile completion; and

- Vehicle traffic would be restricted to defined roads to reduce potential mechanical transport of noxious weed seeds.

2.1.11.5 Water Resources

Water management measures would be implemented for the protection of groundwater and surface water resources as follows:

- Water entering the underground workings would be managed as described in Section 2.1.5;

- Hecla would develop a stormwater management plan for the project area that would include construction and maintenance of diversion channels to route precipitation run-off away from project facilities. The stormwater management plan would also provide methods for minimizing erosion and sedimentation in accordance with the NDEP Handbook of Best Management Practices (1994);

- Travel across drainages would be limited to existing roads;

- Construction of the pipeline to the RIBs may affect some areas of jurisdictional waters of the U.S. associated with crossing of Little Antelope Creek. If required, an Army Corps of Engineers (COE) permit would be acquired prior to construction. Construction of the pipeline would be in accordance with permit requirements and BMPs;

- The waste rock disposal facility would be graded to promote surface water run-off and minimize infiltration of meteoric water into the waste rock during operation and would be closed with an engineered cover to minimize infiltration of meteoric water after closure; and
- Hecla would maintain a compact operation with implementation of concurrent reclamation activities, to the extent possible.

2.1.12 Monitoring Plan

Hecla would implement an environmental compliance monitoring program during the construction and operation of the exploration project. The main goals of the monitoring program would be to identify potential environmental effects or changes during the exploration project and determine the effectiveness of the mitigation measures implemented as part of the project.

A monitoring program would also be implemented during and after reclamation activities to ensure that proper stability of the reclaimed areas is achieved, revegetation is successful, and water quality has not been impacted. Results of the monitoring program would be used to determine the need for additional reclamation activities.

2.1.12.1 Air Quality

Hecla has obtained a Class I Air Quality Operating Permit whose provisions include monitoring and reporting requirements and inspection authority by NDEP Bureau of Air Pollution Control. Project specific monitoring requirements are addressed in the permit specific to the project.

2.1.12.2 Water Resources

Surface and groundwater monitoring would be conducted as per permit stipulations in the two WPCPs issued to Hecla. A small-scale facility WPCP was issued on December 26, 2003. This WPCP authorizes construction and operation of the mining facilities, except the operation of the RIBs, which would be authorized under an infiltration WPCP.

Monitoring requirements set forth in the small-scale facility WPCP include monitoring the water supply well (WW-1), exploration decline discharge, clarified recycle water pumped to the utility tank, seepage from the waste rock that collects in the evaporation sump, waste rock and bulk sample material, sediments within the de-silting basin, and two monitoring wells. The first monitoring well would be located on the south edge of the East Pit and the second located between the East and West Pits. Specific monitoring parameters, monitoring frequency, and reporting requirements are specified in the small-scale facility WPCP.

The second WPCP is for the RIBs located approximately 4.5 miles south of the East Pit. The application for this permit was submitted to NDEP in November 2003. Groundwater and surface water monitoring requirements and reporting requirements for operation and closure of the RIBs would be specified in the infiltration WPCP.

Monitoring approved by NDEP would be required for permanent closure of the exploration project facilities. The length of the post-closure monitoring under the WPCP would be determined by NDEP based on specific site characterizations. The NAC 445A regulations governing the WPCP allow for NDEP to require monitoring up to 30 years.

2.1.12.3 Waste Rock

Waste rock and bulk sample material extracted during the exploration project would be sampled and characterized during operations. Characterization procedures for ARD would include static Acid Base Accounting (ABA) testing and Meteoric Water Mobility Procedures (MWMP). The monitoring effort would aid in determining the effectiveness of the proposed neutralizing protocol. Neutralization procedures, such as dolomite addition, may be adjusted based on the results of the monitoring.

Solutions observed in the waste rock disposal facility evaporation sump would be monitored and sampled during routine quarterly sampling, and analyzed for Profile II constituents. If present, solution volume and pH would be monitored weekly. If accumulation exists, solutions would be removed to containment within 20 days. If solutions were determined to be within water quality standards, they would be allowed to evaporate.

2.2 ALTERNATIVES

The following sections discuss the No Action Alternative as well as several alternatives to the Proposed Action that were eliminated from consideration for the reasons discussed.

2.2.1 No Action Alternative

Under the No Action Alternative, the BLM would not approve the POO for the proposed exploration project. As a result, Hecla would be unable to conduct exploration activities as outlined in the Proposed Action within the HDB Project area. Hecla would not be able to further define and characterize the known mineralization occurring on public lands, which would reduce or eliminate the possibility of making a potential discovery of a precious metal resource reserve or deposit. Since these lands are open to mineral entry, the Mining Law of 1872 grants the claim holder access and the right to explore their claims in a prudent and diligent manner. Potential impacts predicted to result from the Proposed Action would not be realized.

2.2.2 Alternatives Considered but Eliminated from Detailed Analysis

The following alternatives were explored but were eliminated from further consideration for the reasons discussed below and are not considered further in this EA.

2.2.2.1 Alternate Locations and Utilities

Facilities

Facilities associated with exploration activities are proposed to be located in the existing East Pit. An alternative location for project facilities was evaluated at a location approximately one-half mile east of the pit, near the previous Hollister Mine office and process structures. It was determined that there was no advantage to this option since the East Pit area is previously disturbed and the project facilities located in the East Pit would be adjacent to the portal. Additionally, location of the facilities outside the East Pit could increase new surface disturbance.

Waste Rock Disposal Facility

Locating the waste rock disposal facility on top of the reclaimed Hollister Mine waste rock facility was considered but eliminated due to concerns regarding placing HDB Project waste rock on previous waste rock disposal facilities that are currently in closure. Treatment options would be limited since Hecla would not be able to adequately neutralize or otherwise treat the waste rock if it were to be placed on top of the existing waste rock disposal facility. Environmental closure issues with the existing facility preclude the placement of additional waste rock on top of the existing facility.

Power

Hecla performed an analysis of power generation via diesel generators versus construction of a power line. Construction of a power line would cause additional surface disturbance over areas that may impact sensitive resources. In addition, analysis of the cost associated with power generation versus line power showed line power installation was cost prohibitive based on the short duration of the proposed project. It was determined that, based on the anticipated short duration of the exploration project and the unknown feasibility of a subsequent mine development, construction of power lines was not a reasonable alternative.

Communications

No capabilities exist to provide line communications into the project area. The following alternatives to the standard phone line were evaluated: 1) no phone capabilities; 2) sole use of hand-held cellular phones; 3) cellular or satellite phone service; and 4) microwave transmission. For safety reasons and in order to conduct every day business, the first two options were rejected. Hand-held cellular service is not reliable in the remote project area. A field investigation was completed to evaluate both on-site cellular and/or satellite service, and microwave communications. It was determined that an on-site cellular and microwave transmission would be sufficient to meet the needs of the project. The microwave communication system would require a microwave tower and associated building, thus increasing the surface disturbance. For this reason, the microwave communication system was rejected.

Although the on-site cellular service would require three booster antennas, these antennas would be small and would be placed on the proposed freshwater treatment building located on previously disturbed land near the East Pit.

Rapid Infiltration Basins

Four potential locations were initially investigated for placement of the RIBs. These included the current location, an area approximately 1,000 feet to the northwest of the proposed location, an area approximately 1.5 miles south of the East Pit, and an area approximately 1.0 mile north of the proposed location. During the investigation, it was determined that only the proposed site had sufficient alluvial material for proper infiltration.

Through consultation with the BLM, a number of configurations were investigated to provide adequate infiltration, minimize disturbance, and avoid sensitive areas. It was determined that the location and configuration described in the Proposed Action provide the necessary infiltration capacity, while minimizing disturbance and avoiding environmentally sensitive areas.

2.2.2.2 Alternate Methods of Handling Decline Water

Discharge to Little Antelope Creek

Direct discharge to Little Antelope Creek, an intermittent stream, was considered for disposal of water encountered in the exploration decline. This alternative would eliminate about 16 acres of new surface disturbance associated with the RIBs. Little Antelope Creek is intermittent and may not flow for several months of the year. Based on the anticipated rate of discharge required for decline water (sustained flows of 190 gpm), the decline water would likely represent the entire flow of the creek during much of the year and would potentially reach Rock Creek. Rock Creek is a State of Nevada designated Class C water for water quality standards, which has a designated beneficial use of municipal or domestic water supply following complete treatment. All Class C waters have the same designated beneficial uses, of which municipal or domestic supply are some, along with wildlife propagation, industrial supply, recreation, and watering of livestock.

Based on the beneficial use of Rock Creek and the fact that the decline discharge may represent the entire flow of the creek during much of the year, the discharge would be required to meet the Municipal or Domestic Water Supply standards set forth in NAC 445A.144, Standards for Toxic Materials Applicable to Designated Waters. NDEP is currently reviewing the Municipal or Domestic Water Supply standards for arsenic and antimony, based on recent changes to the Environmental Protection Agency's drinking water standards. Possible changes to these standards would include acceptance of 0.006 mg/l and 0.01 mg/l for antimony and arsenic, respectively. These proposed new standards are significantly more stringent than the current Nevada maximum contaminant levels (MCL) of 0.146 mg/l and 0.05 mg/l for antimony and arsenic, respectively. A decision regarding the changes is expected during the first quarter of 2004. Revised standards would apply to any surface discharge permit obtained after the change occurred, which is likely for the HDB Project. If these changes in water quality standards were to be adopted and either direct discharge to Little Antelope Creek or underground injection were to be used for disposal of decline water, treatment of the decline water would be required.

In addition, NDEP's Bureau of Mining Regulation and Reclamation, which is responsible for WPCPs for mining facilities, indicated the discharge water would need to meet Nevada Profile I standards prior to discharge. These standards are similar to Municipal and Domestic Water Supply standards (NAC 445A.144), and also include the current secondary drinking water standards.

Preliminary analysis of the decline water from borehole sampling indicates that the decline water currently exceeds the Profile I or secondary drinking water standard for manganese (0.05 to 0.10 mg/l) and would exceed the proposed changes to the Municipal or Domestic Water Supply standard for antimony and arsenic. Thus, direct discharge of the decline water would require treatment to meet the standards. Reverse osmosis (RO) would likely be required to meet the new standards. The estimated cost for treating up to 190 gpm with an RO system was estimated at $2,000,000 capital cost plus operating expenses.

Use of wetland vegetation within Little Antelope Creek, and potentially Antelope Creek, to treat the water and/or infiltrate the water was not a viable option. The use of wetland vegetation would not be viable because the discharged water would not have sufficient residence time needed for treatment within the limited wetland areas in the creeks. To provide sufficient residence time for wetland vegetation to treat the discharged water, significant modifications would be required to the stream channel. In addition, the creeks would not be capable of rapidly infiltrating the estimated volume of water without significant modifications to the creek channels. The use of Little Antelope Creek to infiltrate the discharged water would also require an National Pollutant Discharge Elimination System (NPDES) permit and possible water treatment to meet the applicable standards.

Finally, the time frame necessary to obtain a NPDES permit is approximately nine to 12 months, in addition to a requirement of a one-year baseline water quality study prior to permit application. Based on the uncertainty of the applicable standards (i.e. potential changes in the antimony and arsenic standard), the potential requirement for an expensive treatment system, and the lengthy permitting time frame, the direct discharge of decline water was not considered a reasonable alternative method for the disposal of water.

Underground Injection

Direct injection of the decline water back into the groundwater was considered as an alternative. Hecla designed a testing program to evaluate the potential of using two injection wells (WW-1 and WW-3) used by Newmont Mining Corporation (Newmont) during previous mining operations for the injection. This testing program would have used water from water well WW-5 and injected the water into one or both of the existing injection wells. Analytical tests indicated that water from WW-5 was of poorer quality than the receiving water in WW-1 and WW-3, thus NDEP denied a temporary permit for the test. Based on the analytical tests and the denial of the injection test permit by NDEP, it was determined that treatment using an RO system would be required to meet receiving water quality standards if WW-1 and WW-3 were to be used for injection. In addition, the two existing wells would not be sufficient to inject the anticipated 190 gpm associated with the project, nor would they be able to handle the surge flows of 450 gpm, thus additional wells would be required. Thus, the RIBs would likely be required to handle anticipated flows. Due to the costs associated with an RO treatment system, as discussed previously, the use of existing injection wells for disposal of decline water was not considered as a reasonable alternative.

Hecla also investigated the installation of new injection wells to be located closer to the decline in an attempt to inject the decline water closer to the original source, thus possibly eliminating the need for treatment. Installing new wells would involve additional disturbance associated with the wells, piping, pumping infrastructure, and service roads. Installing the wells closer to the decline area would require placement within culturally sensitive areas associated with the Tosawihi Quarries Archaeological District. In addition, pumping requirements in the decline would likely increase as the injected water plus additional inflow would be recirculated through the water management system. Based on the potential disturbance within cultural sensitive areas, the cost associated with installation of injection wells and increased pumping, and the uncertainty about the need for water treatment, injection of decline water was not considered as a reasonable alternative.

Land Application

Two methods of land application were initially considered as an alternative for disposal of decline water, including a spray or drip system and a buried infiltration field. Both of these methods would require a substantially larger land area than the preferred method of infiltration basins. Several previously disturbed areas were investigated but were deemed unsuitable for land application, thus undisturbed land would be required. This alternative would also decrease the amount of water returned to the groundwater system and would be limited to seasonal use, thus requiring the use of other disposal methods during the winter months. Due to the culturally sensitive lands near the project site, the need for a larger disturbance area, and seasonal applicability of this method, land application was not considered a reasonable alternative.

Evaporation

Several methods of evaporation were reviewed as an alternate means to dispose of decline water. These included the use of proposed ponds associated with the project and/or the existing pond associated with previous mining operations, and use of evaporation equipment. The use of the proposed pond, or the existing pond associated with previous mining operations was deemed inadequate for the volume of water anticipated with the proposed project. Using proposed or existing basins, evaporation could manage only 40 to 60 gpm, thus this method was eliminated as a viable option for disposal of water.

Evaporator equipment is currently used at several mines in Nevada to dispose of water. This equipment works by spraying and fracturing water particles, thus increasing particle surface area for ultimate evaporation. This equipment has been reported to manage up to 50 gpm on an average annual basis, but seasonal variations would minimize the usefulness of this method year-round. Each evaporation unit would require approximately five acres of lined area for containment. Based on the land requirements, Hecla determined that 61 acres of land would be required for a peak flow of 450 gpm and 28 acres for a sustained flow of 180 gpm. Additional land space would be required for meteoric additions. The estimated costs for this method of disposal range from $2.9 million at 180 gpm to $5.9 million at 450 gpm. Due to the expected surface disturbance and the cost associated with this option, evaporation was not considered a viable alternative for disposal of decline water.

Combination of Methods

Hecla considered using a combination of methods for excess water disposal including; surface discharge to Little Antelope Creek, rapid infiltration, injection, evaporation, and land application. Analysis of use of a combination of the various methods described above would likely result in an increase in surface disturbance within culturally sensitive areas, an increase in costs associated with potential water treatment, and/or limited seasonal use.

3.0 AFFECTED ENVIRONMENT

3.1 PROPOSED ACTION

The HDB Project area is located on the northern edge of the Great Basin, within the Basin and Range physiographic province. The Basin and Range physiographic province is characterized by short mountain ranges of moderate to high relief, separated by broad, alluvial-filled valleys or basins. The project is located within the Butte Creek Range, which is north of the Sheep Creek Range, south of the Owyhee Desert, and west of the Tuscarora Mountains. Elevations in the Butte Creek Range reach up to approximately 7,000 feet AMSL, with elevations at the project area ranging from approximately 5,500 to 5,900 feet AMSL.

Several studies were completed to characterize the site environment. A wetland and waters of the U.S. delineation was completed (JBR, 2003a). Baseline surveys of the project area were completed for Special Status plant and animal species that also characterized vegetation and wildlife at the site (JBR, 2003b). Class III cultural resource surveys were completed (Summit, 2003). Brown and Caldwell (2003a) characterized the hydrogeologic environment of the site.

The following critical elements of the human environment are not present or are not affected by the Proposed Action or alternatives in this EA.

- Areas of Critical Environmental Concern
- Farmland (prime or unique)
- Floodplains
- Environmental Justice
- Wilderness
- Wild and Scenic Rivers

Bureau specialists have further determined that the following resources, although present in the project area, are not affected by the Proposed Action.

- **Solid or Hazardous Materials and Wastes:** No chemicals subject to SARA Title III in amounts greater than 10,000 pounds would be used. No hazardous substances as defined in 40 CFR 355 above threshold planning quantities would be used. Trash receptacles would be placed on-site for the full duration of the project. All wastes would be disposed off-site at licensed facilities. Chemicals, fuels, and explosives that would be used and stored on-site are listed in Table 3 (Section 2.1.7).

- **Socioeconomics:** The proposed project would employ approximately 40 people for 18 months. It is anticipated that the majority of the work force would be employed from the existing work force in Winnemucca, Battle Mountain, and Elko, Nevada. However, some positions may require hiring from other locations resulting in a small number of people moving to Winnemucca, Battle Mountain, or Elko.

- **Recreation:** There are no established recreation trails, campsites, or parks in the vicinity of the proposed project. No additional restrictions or limitations would occur on recreation use in the area. Recreation use is already limited at the existing Hollister Mine. Public access through the Hollister Mine is restricted due to the ongoing closure and reclamation activities. Access along the Little Antelope Creek Road is already restricted at the Little Antelope Creek riparian exclosure because the road has been closed through the exclosure. Recreation use in the vicinity of the project area is moderate and dispersed. Recreation use consists mostly of hunting, sight seeing, photography, rock hounding, and four-wheel driving.

- **Lands**: The HDB Project is located in Elko County, approximately 47 miles northwest of Elko, 38 miles northeast of Battle Mountain, and 64 miles northeast of Winnemucca, Nevada. The project is located in portions of Township 37 North, Range 48 East, Sections 4, 8, 9, 16, 21, 28, 32, and 33 Mount Diablo Baseline and Meridian (MDBM). The HDB Project is located on public lands administered by the BLM. There are mining claims located on public lands that are owned by several different claimants.

  The rights-of-way in the vicinity of the project include two rights-of-way for the Ivanhoe Mine access road and one for the 345 kV power line, which is located in the vicinity of the RIBs. The two rights-of-way for the Ivanhoe Mine access road were granted to Newmont (file number N-48616) and Great Basin Gold, Inc. (file number N-77637), respectively. The right-of-way for the 345 kV power line was granted to Sierra Pacific Power Company (file number N-7639). Hecla would apply for a right-of-way grant for the Ivanhoe Mine access road.

  Access to the HDB Project area is from Winnemucca, Nevada via Interstate 80 east to the Golconda exit, northeast on SR 789 to CR 724 (Midas Road), and travel east to the Ivanhoe Mine access road. The Ivanhoe Mine access road is a BLM road (number 1065). The HDB Project is located approximately 9 miles south of CR 724 on the Ivanhoe Mine access road.

  The Little Antelope Creek road is also designated as a BLM road (number 1065).

- **Range Resources**: The project area lies within the Twenty-Five Grazing Allotment. The existing Hollister Mine area was fenced previously to exclude livestock grazing in areas of mining activity. New disturbance associated with the RIBs would result in a short-term loss of about two animal unit months (AUMs) within the Antelope Creek/Santa Renia Pasture. Since the loss of AUMs is less than one percent of the total permitted use, no reduction in permitted grazing would be made due to this proposed exploration project.

Resources present and brought forward for analysis are described in the following sections.

3.1.1 Air Quality

Climatic conditions in the project area are generally arid, but vary due to topographic changes. The mean annual precipitation in the vicinity of the project area is estimated at 12 inches, most of which occurs as snow in the winter and as rain in May and June; precipitation during the rest of the year is minimal. The mean pan evaporation rate in the area exceeds the precipitation rate and is estimated at approximately 51 inches per year. After accounting for pan characteristics, the expected free water surface evaporation rate ranges from 36 to 41 inches per year.

Mean monthly temperatures, as recorded at the Tuscarora Meteorological Station, range from 27 degrees Fahrenheit (EF) to 67EF. Temperatures in the area are moderate with maximum daytime summer temperatures generally under 100EF and summer nighttime temperatures generally above 40EF. Winter temperature extremes vary between highs in the 50s to lows of 30EF below zero. The high elevation and proximity of the mountains contribute to the wide temperature range.

Average wind speed is approximately seven miles per hour and southwesterly winds are generally the strongest. The project is located in a hilly terrain where winds are likely to be affected by topographic influences.

Generally, air quality in the project area is good. The project area is located in an unclassified area, and thus is considered to be in attainment for all criteria air pollutants. The project area is also within a designated Prevention of Significant Deterioration Class II area, which allows for moderate incremental increases in emission concentrations as long as the concentrations do not reach standards set by the State of Nevada and the Federal government.

3.1.2 Geology and Geochemistry

3.1.2.1 Geology

The HDB Project is located in the Butte Creek Range, which is a tilted fault block that trends northeast-southwest. The fault block is composed of Paleozoic rocks overlain by Tertiary volcanic rocks. Tertiary volcanic, intrusive, epiclastic rocks, and an underlying Ordovician sedimentary sequence are present in the project area. The Ordovician sedimentary sequence hosts the current exploration targets (Hecla, 2004).

The oldest rocks in the area of the existing Hollister Mine pits and proposed exploration decline occur juxtaposed against a regional thrust fault that places Ordovician rocks (older rocks) on top of Devonian rocks (younger rocks). The thrust fault contact occurs beneath the mineralized zone to be investigated by the Proposed Action. The Rodeo Creek Formation, a sedimentary rock unit consisting of interbedded quartzite and carbonate layers, occurs below the thrust fault contact. The Ordovician Valmy Formation occurs above the thrust fault and is the host to the known mineralization of interest. The Valmy Formation is part of the western siliceous eugeosynclinal assemblage and occupies the "upper plate" of the Roberts Mountains' Thrust. The Valmy Formation is composed of coarsening-upward sequences of orthoquartzites, muddy quartzites, siltites, and bedded to laminated argillites. Minor calcareous siltstones and sandstones are present in some of the Valmy Formation's fine-grained facies. In the area of the proposed decline, the Valmy Formation comprises thick (+25 feet) units of massive orthoquartzite interbedded with thick sequences of alternating, relatively thin-bedded siltites and argillites.

The geologic formations above the Valmy Formation include a Tertiary volcanic section divided into groups that are separated by an unconformity. The upper section is comprised of a group of tuffs, breccias, and epiclastic sediments overlain by rhyolite flows. Below the unconformity, tuffs and flows of intermediate to mafic composition compile the lower unit. The unconformity, which marks the Tertiary-Ordovician surface, was irregular at the time of volcanic and epiclastic deposition. Tertiary units therefore appear to be draped over a structural and topographic arch in the Valmy Formation, and the lowest tuff units do not appear to have covered the arch. The Tertiary units are locally heterogeneous in thickness, and appear to form irregular sheets and lenses. Minor intrusive dikes are locally present in drill hole intersections. Some lithologic differences between Tertiary units are obscured by later, superimposed hydrothermal alteration. The Tertiary section is as much as 600 feet thick in the project area, but reaches a maximum thickness of approximately 2,500 feet elsewhere in the Ivanhoe Mining District. The Tertiary rocks crop out over the entire block except: 1) where they are covered by Pliocene and younger alluvium and colluvium, and 2) in a small window of Ordovician rocks exposed in the bottom and lower walls of the East Pit (Hecla, 2004).

The Pliocene and younger sediments occur in gullies on the east side of the project area and have limited areal extent (Hecla, 2004).

Faults of various ages cut the stratigraphic section, and some of the older faults host quartz veins and gold mineralization. The mineralization is related to a district-scale hydrothermal center that affected much of the Ivanhoe Mining District and altered most of the Tertiary rocks exposed at the surface in the project area (Hecla, 2004).

The geologic units of the RIBs area are primarily Quaternary alluvial/colluvial deposits. The alluvial deposits include gravel, sand, and silt and are found in and adjacent to modern drainages. Colluvium consists of thin deposits and aprons of undifferentiated gravel, sand and silt outside of modern drainages. The colluvium includes fans transported off Big Butte and Rock Creek rhyolites (Hecla 2003b).

Underlying and surrounding the Quaternary deposits are Tertiary sediments and volcanic units. The Tertiary sediments consist primarily of the Miocene to Pliocene Carlin Formation. The Carlin Formation includes poorly indurated tuffaceous sandstone, siltstone, and conglomerate, thin to thick bedded, of combined lacustrine and fluviatile origin. Also contained in the Carlin Formation are beds of light gray-white to buff rhyolitic vitric air-fall tuff. The tuff beds commonly form gently dipping, light-colored cuestas that can be traced for several miles (Hecla, 2003b).

The dominant volcanic unit in the vicinity of the proposed RIBs is the Miocene Craig Rhyolite, which consists of red-brown to blue-gray coarsely porphyritic rhyolite flows and flow-domes. This unit outcrops to the northeast of the proposed RIBs site. The lower outflow member of the Craig Rhyolite has a glassy to frothy groundmass, common flow breccias, and forms hummocky outcrops. The upper dome member forms massive, resistant outcrops with flow foliation dipping moderately to steeply toward dome vents. Also present in the general area of the proposed RIBs are a Tertiary vesicular and massive andesite flow and an extensive unit of non-welded air-fall lapilli tuff and welded vitric tuff (Hecla, 2003b).

The main geologic features associated with Ivanhoe and Buttercup Springs, located on the northwest flank of Big Butte, is a large Miocene rhyolite flow dome. Tertiary air-fall tuffs and tuffaceous sediments overlie the area immediately north and northwest to Big Butte. The tuffaceous rocks and Big Butte rhyolite are separated by a prominent northeast trending fault structure. Tertiary Carlin Formation (poorly indurated tuffaceous sandstone, siltstone, and conglomerate) forms an arcuate, horseshoe-shaped apron around the east, west, and south sides of Big Butte. Discharge at Ivanhoe and Buttercup springs occurs from a flow breccia capped by a glassy lava flow originating from the rhyolite flow dome of Big Butte, suggesting that the groundwater supplying the springs is released precipitation storage from the upper portion of Big Butte and/or the surrounding rhyolite dome complexes.

3.1.2.2 Area Seismicity

The HDB Project lies in the Great Basin seismic zone, which is characterized by moderately high seismic activity. Seismic data for the area was obtained from the Draft Environmental Impact Statement, Leeville Project (BLM, 2002). Historic earthquakes in the region have ranged from barely detectable to magnitude 5.1. Recent earthquake activity has included two 5.1 magnitude earthquakes on September 18, 1945 and October 22, 1966, and a 3.4 magnitude earthquake on August 25, 2001, which had an epicenter located approximately 20 miles west of Tuscarora and approximately 15 miles north of the HDB Project. The closest evidence of historic surface faulting is in Pleasant Valley, approximately 100 miles southwest of the HDB Project, which is the site of a 7.8 magnitude earthquake on October 15, 1915. Because all structures at the HDB Project are mobile and temporary, a site specific seismic loading analysis was not conducted for the facilities. However, all temporary structures placed on site have been designed and constructed for the seismic zone for northeast Nevada.

3.1.2.3 Geochemistry

Sulfide-rich rock has the potential to produce acid upon exposure to water and oxygen. Mineralized rock also has the potential to release trace metals. Rock samples were collected from core holes and boreholes drilled in the vicinity of the proposed decline to determine the geochemical characteristics of the material. The samples collected and analyzed represent the major rock types to be encountered during exploration activities. The average pH of water collected in the boreholes was 7. Hecla commissioned Walker & Associates, Inc. to complete a waste rock characterization report for the HDB Project. Three types of analyses were completed including ABA, MWMP, and kinetic humidity cell (HC) testing. These analyses on the waste rock samples indicate that without mitigation, the majority of the material has the potential to oxidize and generate ARD, lower the pH of water that comes in contact with the waste rock material, and increase the sulfate and metal concentrations or solubilities. If ARD formation were to occur, the water quality would not meet current water quality guidelines.

The ABA test indicates the potential of the material to be acid generating by comparing the amount of pyrite and other oxidizable sulfur minerals to neutralizing materials such as calcium carbonate. When a particular sample shows the pyrite content to be in excess of available neutralizing materials, then the rock is considered to be potentially acid generating (PAG). ABA tests were completed on 71 samples. The rock type classes in the samples were andesite, quartzite, and interbedded argillite/siltite. The quartzite includes quartzite, quartzite/siltite, and quartzite/argillite. Argillite and siltite usually occur as interbedded rock layers, which includes argillite, argillite/quartzite, argillite/siltite, and siltite. Appendix A contains the results of the ABA tests. Pyritic sulfur (pyrite) content (weight percent) ranges from non-detectable to 3.07 percent in these samples. Results of the ABA tests showed that 70 of 71 samples collected from the coreholes and boreholes were considered to be acid generating due to the lack of acid neutralizing potential to percent pyrite or total sulfur, based on NDEP guidelines. Of the four major rock types, andesite was the least likely to generate acidity. Siltites tended to have a higher concentration of pyrite and thus had a greater acid generating potential (AGP). Over half of the samples (39 of 71) contained less than one percent pyrite. However, the Canadian Mine Environment Neutral Drainage (MEND) program has documented that rock containing pyrite contents of less than 1 percent does not always generate ARD.

MWMP and kinetic HC testing were also completed to further characterize the material. MWMP was completed on the samples to predict the potential water quality after water interacted with the waste rock material. The MWMP results (Appendix A) illustrated that the pH ranged from 3.1 to 6.4 in the leachate, with all but one sample falling below pH 6.5. Results of the MWMP testing indicated a range of results, but significant changes in water quality were observed including a decrease in pH, an increase in acidity, and an increase in metal concentrations above acceptable water quality standards. The constituents, with the lower pH, that commonly exceeded water quality standards included total dissolved solids (TDS), sulfate, aluminum, arsenic, beryllium, cadmium, chromium, copper, iron, manganese, nickel, antimony, selenium, thallium and zinc. The increase in these constituents is consistent with the fact that metal solubility increases with lower pH. Most metals follow a distinct trend where metal concentration is inversely proportional to the observed pH. The exceptions are arsenic, chromium, cadmium, antimony, selenium, and thallium. These metals and other constituents are low in concentration, and follow no discernible trend with pH. However aluminum, iron, manganese, copper, nickel, lead and zinc show a distinct change with changes in pH. Therefore, MWMP testing illustrated that the leachate samples with the lowest pH exhibited the highest soluble metal concentrations (aluminum, iron, manganese, copper, nickel, lead, and zinc). MWMP testing also identified that if the pH is maintained above 6.5 all of the metals and other constituents would meet current water quality guidelines. In general, the leachates are composed of calcium-sulfate water with smaller amounts of magnesium and potassium.

The kinetic HC testing is used to predict how weathering may occur as a function of time by comparing the rates of acid generation to the rates of acid neutralization. Twenty-two samples were used in the kinetic testing. The rock types included in the testing are quartzite, interbedded argillite/siltite, and andesite. The pyrite content ranges from 0.02 to 3.07 percent. Results indicate low- and high-pyrite containing samples show a rapid decrease in pH during the first week of testing, with pH values as low as 3.4. Each subsequent week showed a smaller decrease with ultimate pH values as low as 2.5. The analysis indicates that two reactions govern the rock oxidation. The first reaction is the result of stored, small pyrites oxidizing rapidly to increase sulfate concentrations and decrease pH. The first reaction is then followed by a second slower reaction that also results in increases in sulfate concentrations and lower pH.

The Profile I chemical analysis showed the effluent dissolved iron and sulfate. Pyrite oxidation led to the increase in iron concentrations. Increased sulfate concentrations in the form of sulfuric acid were the result of the sulfate oxidations, which lowered the pH. Over time, testing showed a decrease in the concentrations of sulfate and iron. This suggests that a fast initial oxidation occurred followed by a slower oxidation reaction. Over time, concentrations of lead, nickel, zinc and cadmium decreased by fifty percent or more. Copper and arsenic appeared to vary weekly with no apparent trend. The approximate ranges of metals and other constituents in the most acid generating rocks were found to be arsenic at 0.01 to 25 mg/l, copper at 0.02 to 8 mg/l, zinc at 0.03 to 30 mg/l, nickel at 0.1 to 5 mg/l and lead at 0.01 to 0.03 mg/l. In conclusion, the lower range of the constituents meet the Nevada water quality standards but the upper range exceed the Nevada water quality standards.

The major rock types that would be removed during the construction of the decline consist of andesite, quartzite, and interbedded argillite/siltite. It is estimated that approximately 4,000 tons of andesite would be removed during the initial construction of the decline. Andesite does not contain detectable percentages of pyrite. Andesite would not be placed in the waste rock disposal facility, instead it would be used as the based for the ancillary facilities. It is estimated that 100,000 tons of waste rock material would be composed of approximately 50,000 tons each of quartzite and interbedded argillite/siltite material. The quartzite was found to have approximately 0.92 percent detectable pyrite and the interbedded argillite/siltite was found to contain approximately 1.6 percent detectable pyrite. The average concentration of pyrite was determined to be 1.26 percent for the waste rock material. As a result, rock with a 1.26 percent pyrite content was calculated to have an acid base potential deficit of approximately 39 tons of calcium carbonate per 1,000 tons of waste rock.

The regulatory criteria for the ANP:AGP ratio is 1.2:1 for NDEP and 3:1 for BLM. Although the ANP:AGP ratio must meet the BLM criteria because it is the most stringent, testing was completed on both regulatory requirements for comparison. Therefore, to determine which material would make the most effective neutralizing agent for the HDB Project, Hecla began additional kinetic HC testing. Three neutralizing materials, limestone, pebble lime, and dolomite, were tested alone and in combination at ratios of 1.2:1 and 3:1. Parameters measured during the testing included pH, ferrous and ferric iron concentrations, sulfate, alkalinity, and acidity. Results varied significantly with the different neutralizing agents. The addition of limestone was ineffective at preventing ARD mainly due to having high marble content. Therefore, the limestone testing was discontinued. The addition of pebble lime was effective at preventing the formation of ARD, but increased the pH above the Nevada water quality standard of 8.5. Dolomite was also effective at preventing the formation of ARD and yielded pH values within the Nevada water quality standard range of 6.5 to 8.5. pH results from the testing are shown in Table 6.

Preliminary results through a minimum of 13 weeks of kinetic HC testing (waste rock composite and dolomite) indicate that both of the tested ANP:AGP ratios (1.2:1 and 3:1) using dolomite was sufficient in preventing ARD formation. Duplicate samples for each ratio were tested to confirm consistency of results for the composite samples. After 13 weeks, effluent from all of the cells had pH levels above 6.5. In addition, iron concentrations remained low, sulfate concentrations decreased over time, acidity was zero or decreased rapidly over time, and alkalinity was present in varying concentrations, which indicates excess buffering capacity.

Table 6 Effluent pH (su) Results from Kinetic HC Testing Composite Waste Rock with Varying Dolomite Ratios (minimum 13 weeks of 20 week test)

Week	ANP:AGP Ratio			
	1.2:1	1.2:1 (Duplicate)	3:1	3:1 (Duplicate)
1	5.64	6.99	5.32	7.19
2	6.53	7.02	6.65	7.36
3	6.93	7.02	6.93	7.33
4	7.09	7.18	6.98	7.48
5	7.21	7.30	7.08	7.44
6	7.22	7.31	7.09	7.53
7	7.23	7.32	7.05	7.45
8	7.10	7.16	7.08	7.35
9	7.35	7.34	7.21	7.58
10	7.25	7.30	7.29	7.47
11	7.22	7.22	7.22	7.41
12	7.14	7.14	7.38	7.49
13	7.09	7.06	7.22	7.22
14			7.41	
15			7.24	
16			7.20	
17			7.28	
18			7.21	

3.1.3 Soils

The areas proposed for the decline and project facilities associated with the underground exploration activities are located within the existing East Pit, thus native soils are not present.

The existing Little Antelope Creek Road to be used for access from the project facilities to the RIB location and as the corridor for the pipeline to the RIBs passes through five soil associations. These include, from the East Pit to the proposed RIBs, Ninemile-Carstump association; Quarz-Alyan-Ninemile association; Bregar-Ninemile-Pequop association; Vanwyper-Rock outcrop-Trunk association; and Skull Creek-Shabliss-Puett association (NRCS, 1997). Soils in the road have been impacted by construction of the road and continued vehicular travel over the road, thus the original structure of these associations has been altered. The following provide general characteristics of each of the soil associations, with Appendix B providing additional information:

- Ninemile-Carstump association - this association consists of gravelly loam located on slopes from 8 to 30 percent. Inclusions make up approximately 15 percent of this association with Susie Creek loam being the most prevalent inclusion. The parent material for this association is residuum derived from volcanic rocks. The surface consists of gravelly loam, which is well drained. The predominant vegetation species includes big sagebrush, low sagebrush, bluegrass, bottlebrush squirreltail, and cheatgrass. The Ninemile component of this association is considered poorly suited for rangeland seeding due to its shallow rooting depth, while the Carstump is considered suited for rangeland seeding with the restrictive factor being too arid. This association is considered to support fair wildlife habitat and has a moderate water erosion factor and moderate to slight wind erosion potential.

- Quarz-Alyan-Ninemile association - this association consists mainly of very gravelly loam to very cobbly loam with about five percent rock outcrops. The soils are derived from volcanic rocks and are well drained. The dominant vegetation consists of Antelope bitterbrush, basin wildrye, big sagebrush, bluebunch wheatgrass, Idaho fescue, bluegrass, bottlebrush squirreltail, and low sagebrush. The components of this association are considered poorly suited for rangeland seeding due to rooting depth, small stones, and droughty conditions. The association is considered to provide fair rangeland wildlife habitat. The components of this association have a low to moderate water erosion factor and have very slight to no wind erosion potential.

- Bregar-Ninemile-Pequop association - this association consists primarily of gravelly loam to very gravelly loam and is observed on slopes from 4 to 30 percent. Inclusions can make up approximately 15 percent with rock outcrops and Quarz very gravelly loams being the most common. The parent material for this association consists of residuum, colluvium or both derived from volcanic material. This association is well drained. The dominant vegetation species supported by this association includes bluegrass, low sagebrush, bottlebrush squirreltail, Idaho fescue, and mountain big sagebrush. The Bregar and Ninemile components of this association are considered poorly suited for rangeland seeding due to small stones, arid and droughty conditions, while the Pequop component is considered well suited. The Bregar and Ninemile components are considered fair for potential rangeland wildlife habitat, while the Pequop component is considered good. This association has a low to moderate water erosion factor and a moderate to very slight wind erosion potential.

- Vanwyper-Rock outcrop-Trunk association - this association, found primarily on slopes from 4 to 50 percent, consists of cobbly loam and rock outcrops. Inclusions include Aridic Haploxerolls cobbly loam, Xerollic Camborthids gravelly loam, and rubble and fragmental material. The association is well drained to excessively drained (rock outcrops). The parent material of the Vanwyper and Trunk components is residuum and colluvium derived from volcanic rocks. Dominant vegetation species include big sagebrush, bluebunch wheatgrass, cheatgrass, and bottlebrush squirreltail. The Vanwyper and Trunk components are considered poorly suited for rangeland seeding due to rooting depth, small stones, and droughty conditions, and considered fair for the potential to support rangeland wildlife habitat. The soils have a low to moderate water erosion factor and a moderate to very slight wind erosion potential.

- Skull Creek-Shabliss-Puett association - this association, found on slopes from 2 to 30 percent, consists of sandy loam to very fine sandy loam. Inclusions, which can make up to 15 percent of the association, include rock outcrops, Tweba very fine sandy loam, Wieland loam, and Xeric Torripsamments fine sand. The components of this association are well drained. The parent material of the Skull Creek and Shabliss components is alluvium derived from mixed rock, loess and volcanic ash, while the parent material of the Puett component is residuum and colluvium derived from tuffaceous rocks. Dominant vegetation species include Wyoming big sagebrush, bluegrass, bottlebrush squirreltail, cheatgrass, and rabbitbrush. The Skull Creek component is considered suited for rangeland seeding with limiting factors of too arid and excess salts. The Shabliss and Puett components are considered poorly suited with limiting factors being too arid and droughty. This association is considered to have a fair potential to support rangeland wildlife habitat. All components of this association have a moderate water erosion factor and are highly susceptible to wind erosion.

Soils in the area of the proposed RIBs consist of the Skull Creek-Shabliss-Puett association. The characteristics of this association are described in the previous paragraph (NRCS, 1997).

3.1.4 Vegetation

Vegetation within the project area consists primarily of sagebrush-grassland community (BLM, 1999). Table 7 presents a list of vegetation species present within the project area based on information from the BLM and from recent field surveys (JBR, 2003b). Vegetation in the southern portion of the survey area (proposed RIBs) includes Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) and green rabbitbrush (*Chrysothamnus viscidifloris*), with an understory of annual cheatgrass (*Bromus tectorum*), and bluegrass (*Poa secunda*) (JBR, 2003b). At middle and higher elevations in the survey area, low sagebrush (*Artemesia arbuscula arbuscula*) occurs on shallow soils on ridge tops and on some slopes. Basin wildrye (*Elymus cinereus*) occurs on areas of deeper soils. The floor and a large bench on the western side of the East Pit have been reclaimed and support dense stands of grasses (JBR, 2003b).

Approximately one-half of the project area was affected by the Hot Lakes wildfire in 2001. The 2001 Hot Lakes wildfire burned around the western and northern sides of the existing Hollister Mine. Portions of the pipeline and RIBs fall within the Hot Lakes wildfire perimeter. The shrub component in this area was lost due to the fire and much of the area has been colonized by the non-native annual cheatgrass, although perennial grasses and forbs are expected to recover. A portion of the project area where the pipeline to the RIBs would be installed is located within the burned area, which was seeded within selected ephemeral drainages, draws, and swells with Wyoming big sagebrush, basin big sagebrush, and Western yarrow in the winter of 2001-2002 to rehabilitate wildlife habitat with the emphasis on sage grouse habitat.

Table 7 Typical Plant Species in the Vegetation Communities of the Project Area

Common Name	Scientific Name
Sagebrush/Grass Community	
Big sagebrush	*Artemisia tridentata*
Low sagebrush	*A. arbuscula arbuscula*
Serviceberry	*Amelanchier utahensis*
Snowberry	*Symphoricarpos alba*
Antelope bitterbrush	*Purshia tridentata*
Low rabbitbrush	*Chrysothamnus viscidiflorus*
Green rabbitbrush	*Chrysothamnus viscidifloris*
Little leaf horsebrush	*Tetradymia glabrata*
Balsamroot	*Balsamorhiza hookeri*
Bluebunch wheatgrass	*Agropyron spicatum*
Bottlebrush squirreltail	*Sitanion hystrix*
Bluegrass	*Poa secunda*
Idaho fescue	*Festuca idahoensis*
Squawbush	*Rhustrilobata*
Great Basin wildrye	*Elymus cinereus*
Cheatgrass	*Bromus tectorum*

Source: BLM, 1999; JBR, 2003a; JBR, 2003b

3.1.5 Wetlands and Riparian Zones

Riparian and wetland areas are limited in size and number within the project area. The riparian and wetland areas within the project area are restricted to Little Antelope Creek, an intermittent tributary to Antelope Creek. A wetlands/waters of the U.S. survey was conducted in June 2003 by JBR Environmental Consultants (JBR, 2003a). Approximately 1.01 acres of potential wetlands were identified within the project area (JBR, 2003a). Figures 6 through 8 show the locations of the wetlands identified along Little Antelope Creek. In addition, approximately 2.42 acres of potential waters of the U.S. and 0.87 acres of potential hydrophytic vegetation were identified in the project area during the June 2003 surveys (JBR, 2003a). Concurrence by the COE on the survey results are pending.

Vegetation bordering wetter portions of Little Antelope Creek includes Baltic rush (*Juncus balticus*), meadow barley (*Hordeum brachyantherum*), sandbar and yellow willow (*Salix exigua* and *S. lutea*, respectively), and smaller amounts of creeping spikerush (*Eleocharis macrostachya*), meadow foxtail (*Alopecurus pratensis*,) and common monkeyflower (*Mimulus guttatus*) (JBR, 2003a).

As a result of the loss of wetland/riparian zones from the development of the Hollister Mine, Touchstone Resources was required to install and construct an exclosure along Little Antelope Creek for off-site mitigation (BLM, 1999). This riparian exclosure was constructed on two reaches of Little Antelope Creek and was designed to limit cattle grazing and enhance the development of a riparian community on the creek. The exclosure was installed and constructed in 1991 and was still operational in 2003 (Stadelman, 2003). After installation of the exclosure, the wetland/riparian vegetation was reported to be vigorous and thriving, and a small area of perennial water flow was noted along Little Antelope Creek within the exclosure (Stadelman, 2003).

3.1.6 Invasive, Non-Native Species

No invasive, non-native weed species, which include noxious weeds, were observed within or adjacent to the project area during the 1998 site review for the 1999 EA (BLM, 1999). However, hoary cress was previously found along the access roads in the vicinity of the project area (BLM, 1999). In addition, two small patches of Scotch thistle existed at the Ivanhoe Mine site in 2002. Each patch consisted of approximately 5 to 10 plants. One patch is located on the northwestern edge of the existing waste rock disposal facility and the other patch is located in the vicinity of the old office site for the Ivanhoe Mine. Newmont has been treating these two locations as part of the closure and reclamation responsibility for the Ivanhoe Mine site.

Noxious weeds within Nevada are defined in the NRS (555.005) as "any species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate". The Nevada Weed Action Committee website provides a list of all weeds currently listed as noxious for the State of Nevada (NWAC, 2002). Noxious weeds were not identified by BLM fire and fire rehabilitation crew members in the aftermath of the Hot Lakes wildfire, which occurred in August 2001. No noxious weeds were observed during the June 2003 field surveys of the site.

Cheatgrass is an invasive and non-native plant that is not on the list of noxious weeds. It is prevalent in burned and disturbed areas in and around the project area, and occurs as an invader species on some reclaimed sites. It also occurs as a minor component in adjacent undisturbed vegetation communities.

3.1.7 Water Resources

3.1.7.1 Surface Water

The project area is located entirely within the Little Antelope Creek drainage basin, which is part of the Rock Creek Valley Hydrologic Basin. Little Antelope Creek is an intermittent stream with the headwaters located east of Big Butte. A number of ephemeral drainages within and adjacent to the project area are tributary to Little Antelope Creek. Tributaries to Little Antelope Creek within the project area flow only during spring run-off and seasonal storm events (BLM, 1999). Several small areas of perennial water and wetlands, within the BLM exclosure, are present along Little Antelope Creek. Figures 7 and 8 show the identified wetland areas along Little Antelope Creek.

Little Antelope Creek flows south into Antelope Creek approximately five miles south of the project facilities and approximately one-half mile east of the location of the proposed RIBs (Figure 4). Antelope Creek flows southwest and discharges into Rock Creek approximately six miles west of the confluence of Little Antelope and Antelope Creeks. Rock Creek flows into the Humboldt River near Battle Mountain, Nevada.

The majority of the Little Antelope Creek drainage basin within and adjacent to the project area, with the exception of areas within the exclosure, is covered with sagebrush and grasses with unvegetated areas consisting of thin soils or exposed bedrock. The basin has a palmate, dendritic drainage pattern with a channel slope of 79 feet per mile. Little Antelope Creek has a broad, flat, poorly defined channel and the bottom of the channel consists of gravel, cobbles, and boulders (BLM, 1988a). The channel is well armored (JBR, 2003a), and was previously reported to have up to 40 percent vegetative cover (BLM, 1988a). During analysis for the 1999 EA (BLM, 1999), there was no evidence of active channel erosion and only minor amounts of bank erosion.

No other surface waters are present within the project area. However, seven identified springs within a four-mile radius to the north, east, and west of the proposed decline exists. Of these seven springs, three have been identified as springs of concern including two perennial springs (Ivanhoe and Buttercup) and one intermittent spring (Antelope). Three other springs have been developed with either troughs or ponds. Of these three developed springs, two appear to have perennial flow and are located in T38N, R48E, Section 35 and T37N, R48E, Section 18. With the exception of the four springs identified as having perennial flow, all other identified springs have intermittent flow in response to seasonal precipitation events and snowmelt.

Three springs of concern, Antelope, Ivanhoe, and Buttercup, are located north of the project area, within T38N, R48E. These springs have been identified as a concern due to their importance to Native Americans. Antelope Spring is an intermittent spring located approximately one mile north of the proposed decline in the S½NE¼ of Section 32, T38N, R48E. This spring is located in a topographic depression immediately adjacent to the road and is recharged through snowmelt and precipitation that infiltrates into surrounding hills (Brown and Caldwell, 2003a). Antelope Spring has previously been altered through use of machinery to expand the surface area to collect water. No water movement was evident during the site visit by Hecla and JBR on April 28, 2003.

Ivanhoe and Buttercup springs are perennial springs located approximately three miles north of the proposed project facilities in the NW¼ of Section 20, T38N, R48E. During the site visit by Hecla and JBR on April 28, 2003, there was observed flow at both springs, and the flow from Ivanhoe Spring was approximately three times the flow at Buttercup Spring. Some minor development of the area has occurred in the past including the placement of small-diameter piping from the springs and the construction of a low earthen berm across the drainage (to the north of the springs), apparently to enhance collection of spring waters.

An investigation conducted by Brown and Caldwell (2003a) was completed to determine the source of water for Ivanhoe, Buttercup, and Antelope springs. The goal was to determine if these springs were recharged from the Valmy Formation aquifer, the aquifer to be intercepted by the proposed decline, or another source. Based on the investigation it was determined that the source of water for Antelope Spring was seasonal recharge, while Ivanhoe and Buttercup springs were recharged from the Big Butte flow dome complex (Brown and Caldwell, 2003a). These springs, located at elevations between 5,800 and 5,900 feet AMSL, are approximately 500 feet above the Valmy Formation aquifer. In addition, the Big Butte flow dome complex creates a barrier between the Valmy Formation aquifer and Ivanhoe and Buttercup Springs (Figure 9).

Several additional studies were conducted to confirm the results of the Brown and Caldwell study. An isotope analysis study was conducted by Mayo and Associates to determine the origins of the waters from the springs and the Valmy Formation. Samples were collected from five sites, which included the three springs and two boreholes (BH-01 and BH-09). BH-01 represented water from the Valmy Formation near the proposed decline and BH-09 represented water from the shallow aquifer near Antelope Spring. Locations of BH-01 and BH-09 are shown on Figure 10.

Samples were collected in June 2003 and analyzed for stable isotopes by Brigham Young University, Laboratory of Isotope Geochemistry, and by the University of Georgia Center for Applied Isotope Studies (Mayo, 2003). Stable isotopic compositions of water are often useful in hydrogeologic investigations because they track the origin and history of waters independently of their solute compositions (Mayo, 2003). Carbon-14 isotopes were used to determine groundwater residence times.

Results from the stable isotope analyses indicate that groundwater from the two boreholes and Ivanhoe and Buttercup Springs were recharged under similar climatic and seasonal conditions, whereas Antelope Spring was recharged under warmer climatic conditions. The warmer climatic conditions indicate that the water discharging from Antelope Spring is from near surface conditions, such as significant precipitation events or seasonal recharge, which is confirmed by the intermittent nature of Antelope Spring. Spring water analyzed at Ivanhoe and Buttercup springs show no hydrochemical relationship to the groundwater in the project area.

Results from the Carbon-14 isotope analyses indicate that groundwater feeding Antelope Spring contains a significant portion of water from recent precipitation. In addition, all of the groundwater systems, except the system associated with BH-01 (Valmy Formation) has received all or a significant portion of recharge since approximately 1954. Waters recharged after 1954 have trace amounts of tritium due to nuclear testing, while waters recharged before that date do not show evidence of tritium. The residence time of water from BH-01 (900 to 1,700 years) indicates that it is not actively connected to the upper groundwater table or the groundwater sources that feed the three springs (Mayo, 2003). The very low tritium content and calculated age of the water from BH-01 suggest that this groundwater system is hydrodynamically isolated from the other groundwater systems. The residence time for the water in Antelope and Ivanhoe springs was determined to be modern, which means that the groundwater system is recharged annually. The residence time for the water in Buttercup Spring and BH-09 were determined to be less than 50 years. The low tritium content combined with the Carbon-14 isotope in Buttercup spring and BH-09 suggest that these groundwater systems do not respond rapidly to recharge events (Mayo, 2003). Due to the residence time of water from BH-01, stable isotopes indicate that the Valmy aquifer is not connected to the Tertiary volcanic aquifer or the springs in the area (SRK, 2003).

In addition to isotope analysis, an assessment of the springs and borehole groundwater chemistry as it related to the age of the aquifer was also conducted. The geochemical assessment included comparisons of major elements, as well as trace metals, from the three springs (Antelope, Ivanhoe, and Buttercup) and groundwater from boreholes BH-01 and BH-09. Results of the assessment identified clear distinctions between the spring water and the groundwater chemistry (SRK, 2003). The water chemistry of Antelope Spring is similar to the chemistry of BH-09 but not BH-01. Based on the isotopic relationships Antelope Spring water is formed under different conditions to groundwater in BH-09. Lead is present as a significant trace element in Antelope Spring, but is not present in BH-09. Antelope Spring chemistry is consistent with rain water and snow melt recharge. Water from BH-01, Valmy formation groundwater, shows a contrasting different chemistry to any of the springs indicating that they are fed from different sources. This water is in connection with the sulfide-bearing mineralization and as such has a markedly higher sulfate and chalcophile (e.g.

arsenic, antimony, mercury, zinc, etc.) concentration that distinguishes the water from other sources analyzed in the study (SRK, 2003).

Evidence from the Brown and Caldwell report, isotope analysis and geochemical analysis indicates that groundwater sources that feed the three springs are not connected to the regional groundwater system in the Valmy Formation, which is the groundwater system that would be encountered by the decline.

3.1.7.2 Groundwater

Groundwater in the project area occurs in both shallow alluvial aquifers and in fractures, joints, and faults within the bedrock (BLM, 1999). Dependent on the permeability of the rock, groundwater would also exist in the interstices. Based on drill hole data at least three groundwater systems exist in the area of the proposed decline. The lower system (regional groundwater) is located in the Ordovician Valmy Formation. The upper or shallow system is located in the Tertiary-age Tuff Formation (Upper Tuff) overlying the Valmy Formation. The third system is a near surface system that is seasonally influenced.

Approximately 3,200 to 3,300 feet of the proposed decline would be located in the lower groundwater system. The groundwater elevation of the lower system is approximately 5,500 feet AMSL. This is approximately 55 feet below the elevation of the proposed portal (Brown and Caldwell, 2003a). Approximately the first 1,700 to 1,800 feet of the proposed decline would be located in the shallow aquifer, which is discontinuous and topographically controlled.

The upper aquifers in the Tertiary-age tuffs, above the proposed decline area, are separated from the lower regional aquifer by a clay-rich zone, which appears to act as a barrier between the aquifers. The regional water table, within the fractured Valmy Formation, ranges in depth from 30 to 300 feet below the ground surface (BLM, 1999, Brown and Caldwell, 2003a). This regional groundwater appears to be primarily recharged from the Tuscarora Mountains to the east of the project site with the potentiometric surface gradient to the west. This is based on the groundwater depths measured in a series of boreholes drilled to investigate the groundwater quality and quantity associated with the proposed project.

Brown and Caldwell conducted a hydrogeologic study of the project area and adjacent areas that included a site-specific assessment of surface hydrology and investigation of the sub-surface hydrogeologic conditions in the area of the proposed underground exploration (Brown and Caldwell, 2003a). The study also incorporated and evaluated the results of previous hydrogeologic investigations in the area relevant to the proposed project. As part of the Brown and Caldwell study nine boreholes were drilled (BH-01, -02, -03, -04, -05, -06, -07, -08 and -09) to investigate the hydrogeologic characteristics associated with the proposed project. Boreholes BH-01 through BH-06, and BH-08 were drilled to investigate the water quantity and quality in the area of the proposed decline. Boreholes BH-07 and BH-09 were drilled to investigate the groundwater near Antelope Spring, within the Tertiary tuff formation, and determine if there was a connection to water expected to enter the proposed decline. Water quality data for boreholes BH-07 and BH-09 is shown in Table 8.

Water quality results show that water from BH-07 meets all Nevada primary and secondary MCLs with the exception of manganese. Water collected from BH-09 meets all primary and secondary MCLs with the exception of aluminum, iron, and mercury.

Three boreholes were completed as piezometers to monitor groundwater (BH-01, -02, and -04). Boreholes BH-03 and BH-08 were abandoned following the first sampling in 2002. Two of the boreholes (BH-05 and BH-06) did not encounter water, thus no water quality data was collected. Water quality parameters for sampled boreholes are presented in Table 9, along with relevant current Federal Primary and Nevada Secondary Drinking Water Standards for reference.

Results of the water quality sampling indicate that three parameters (antimony, arsenic, and manganese) in the Valmy Formation groundwater exceeded the drinking water standard. The exceedance of the arsenic standard is based on the new Federal standard that would take effect in January 2006.

Table 8 Borehole BH-07 and BH-09 Water Quality Data

Parameter[1]	Unit	Primary MCL	Nevada Secondary MCL	BH-07 (13 March 03)	BH-09 (13 March 03)
Alkalinity	mg/L	--	--	68	102
Bicarbonate	mg/L	--	--	68	102
Carbonate	mg/L	--	--	0	0
Hydroxide	mg/L	--	--	0	0
Aluminum	mg/L	--	0.05 - 0.2	<0.020	2.31
Antimony	mg/L	0.146 (0.006)[2]	--	<0.003	<0.003
Arsenic	mg/L	0.05 (0.01)[3]	--	<0.005	0.008
Barium	mg/L	2	--	0.042	0.095
Beryllium	mg/L	0.004	--	<0.002	<0.002
Boron	mg/L	--	--	<0.10	0.14
Cadmium	mg/L	0.005	--	<0.002	<0.002
Calcium	mg/L	--	--	22	28
Chloride	mg/L	--	250 - 400	14	18
Chromium	mg/L	0.1	--	<0.005	<0.005
Copper	mg/L	1.3	1	<0.010	<0.010

Table 8 continued

Parameter[1]	Unit	Primary MCL	Nevada Secondary MCL	BH-07 (13 March 03)	BH-09 (13 March 03)
Fluoride	mg/L	4	2	0.8	0.8
Iron	mg/L	--	0.3 - 0.6	<0.020	1.2
Lead	mg/L	0.015	--	<0.007	<0.007
Magnesium	mg/L	--	125 - 150	7.0	7.4
Manganese	mg/L	--	0.05 - 0.1	0.239	0.019
Mercury	mg/L	0.002	--	0.0005	0.01065
Nickel	mg/L	0.1	--	<0.020	<0.020
Nitrate as N	mg/L	10	--	1.4	2.1
Nitrite as N	mg/L	1	--	0.076	<0.010
Nitrate and Nitrite as N	mg/L	--	--	1.4	2.1
pH	su	--	6.5 - 8.5	7.23	7.63
Potassium	mg/L	--	--	1.58	2.50
Selenium	mg/L	0.05	--	<0.010	<0.010
Silver	mg/L	--	0.1	<0.010	<0.010
Sodium	mg/L	--	--	19	25
Sulfate	mg/L	--	250 - 500	21	26
Thallium	mg/L	0.002	--	<0.001	<0.001
TDS	mg/L	--	500 - 1000	177	185
WAD Cyanide	mg/L	0.2	--	<0.010	<0.010
Zinc	mg/L	--	5	<0.050	<0.050

[1] Results for the metal constituents indicate dissolved metals.
[2] The state of Nevada MCL for antimony is currently 0.146 mg/L. NDEP is currently investigating revision of this standard to the EPA drinking water standard of 0.006 mg/L.
[3] The EPA has removed the 0.05 mg/L standard from their list and currently list the arsenic standard at 0.01 mg/L, which is enforceable on 01/23/06.

Results indicate that samples from all the boreholes exceeded the manganese MCL except for BH-02 in 2003 and BH-04 in 2002. All other constituents met the current primary and secondary MCL. A decision on changing the Nevada MCL in NAC 445A.144 for antimony and arsenic to meet the current Federal standard of 0.006 and 0.01 mg/l, respectively, is likely to be made in the first quarter of 2004. If the Nevada MCLs are revised to meet the Federal MCL, samples from the boreholes in 2003 would exceed the new MCLs.

Significant findings from the Brown and Caldwell (2003a) groundwater hydrogeologic investigation include:

- Groundwater within the Valmy Formation appears to be recharged from the Tuscarora Mountains to the east (i.e., local recharge is insignificant or nonexistent), based on the observed groundwater flow direction to the west;

Table 9 Water Quality Parameters for Boreholes

Parameter [1]	Unit	Primary MCL	Secondary MCLs	BH-01		BH-02		BH-03	BH-04		BH-08
				2002	2003	2002	2003	2002	2002	2003	2002
Alkalinity, Total	mg/L	--	--	127	104	54	51	2	88	62	118
Bicarbonate (HCO_3)	mg/L	--	--	127	104	54	51	42	88	62	118.4
Aluminum	mg/L	--	0.05-0.20	<0.02	<0.02	<0.02	<0.02	<0.02	0.099	<0.02	0.106
Antimony	mg/L	0.146 (0.006)[2]	--	0.074	<0.003	0.019	<0.003	0.018	<0.003	<0.003	0.074
Arsenic	mg/L	0.05 (0.01)[3]	--	0.031	<0.005	0.009	<0.005	0.014	0.016	<0.005	0.007
Barium	mg/L	2	--	0.134	0.071	0.134	0.196	<0.02	0.032	0.031	0.036
Beryllium	mg/L	0.004	--	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Boron	mg/L	--	--	0.22	0.10	0.14	<0.10	<0.10	0.07	<0.10	<0.10
Cadmium	mg/L	0.005	--	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Calcium	mg/L	--	--	45.3	48	20	23	30	30	28	40
Chloride	mg/L	--	250-400	15	15	24	24	40	26	25	20
Chromium	mg/L	0.1	--	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Copper	mg/L	1.3	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/L	4	2	0.9	0.9	1.3	1.3	<1	0.9	0.9	0.9
Iron	mg/L	--	0.3-0.6	1	0.038	<0.02	0.036	0.084	0.045	0.021	0.037
Lead	mg/L	0.015	--	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007
Manganese	mg/L	--	0.05-0.10	0.219	0.375	0.12	0.01	0.064	0.039	0.092	0.087
Magnesium	mg/L	--	125-150	14	14.8	6	6.2	10	10	7.9	20
Mercury	mg/L	0.002	--	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Nickel	mg/L	0.1	--	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrate-N	mg/L	10	--	<1	<0.01	<1	<0.01	NR	<1	0.7	<10
pH	su	--	6.5-8.5	8.26	7.29	7.58	7.97	7.63	8.27	7.58	8.09
Potassium	mg/L	--	--	5	4.75	3	2.74	3	2	2.29	3
Selenium	mg/L	0.05	--	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Silver	mg/L	--	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium	mg/L	--	--	31	26	30	68	20	30	32	20
Sulfate	mg/L	--	250-500	72	60	50	110	60	57	58	50
Thallium	mg/L	0.002	--	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
TDS	mg/L	--	500-1000	280	244	180	183	190	260	238	230
Zinc	mg/L	--	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Source: Brown and Caldwell, 2003a

[1] Results for the metal constituents indicate dissolved metals.

[2] The state of Nevada MCL for antimony is currently 0.146 mg/L. NDEP is currently investigating revision of this standard to the EPA drinking water standard of 0.006 mg/L.

[3] The EPA has removed the 0.05 mg/L standard from their list and currently list the arsenic standard at 0.01 mg/L, which is enforceable on 01/23/06.

- Groundwater occurs under confined to semi-confined conditions in the area of the proposed exploration decline, with a potentiometric surface elevation of approximately 5,400 to 5,500 feet AMSL;

- The groundwater flow system in the Ordovician Valmy Formation (to be intercepted by the proposed exploration decline) is separated from the overlying flow system in the Tertiary-age tuffs by significant clay-rich horizons. The unconformity between the Tertiary volcanic rocks and the Valmy Formation appears to act as an aquitard in some areas, separating upper and lower groundwater flow systems over much of the site;

- The potentiometric surface in the Valmy Formation is generally lower to the west, reflecting a downward vertical gradient as the boreholes were drilled to the depth of the proposed decline (i.e., the groundwater is under less pressure in the deeper boreholes). This potentiometric surface is lower than, and separated from, the potentiometric surface in the volcanic rocks that underlie Antelope Spring. The depth to groundwater in the volcanic tuff units beneath Antelope Spring is approximately 200 feet below ground surface (bgs); and

- Groundwater within the Valmy Formation occurs within, and is transmitted through, fracture systems within the rock mass. The density of water-bearing fractures along the north-south aligned portion of the exploration decline is less than that of the east-west portions, and less water would be produced in the north-south portion of the decline. The higher density of water-bearing fractures along the east-west portion of the exploration decline would contribute more groundwater to the workings.

Previous water samples have been collected and analyzed during past operations. These previous sampling events have focused on the groundwater quality south of the proposed decline area, thus this data does not reflect water quality that has the potential to be affected by the proposed project. Samples from BH-07 and BH-09 provide more recent data to determine the quality of water within the Tertiary-age tuff formation.

Groundwater depth in the area of the proposed RIBs is approximately 23 to 25 feet bgs. The aquifer is contained within a lower silty sand unit with the underlying bedrock likely acting as a no-flow boundary. The lower silty sand unit has a minimum thickness of 25 feet, based on maximum depths of boreholes. Table 10 provides water quality data for water collected from two temporary monitoring wells (A-6 and A-10) installed at the proposed RIBs location. Temporary monitoring well A-6 was located near the northern proposed RIB and A-10 was located near the southern proposed RIB.

Table 10 Groundwater Quality Data from Proposed RIB Site

Parameter[1]	Unit	Nevada Primary MCL	Nevada Secondary MCL	A-6 (6 March 03)	A-10 (6 March 03)
Alkalinity	mg/L	--	--	77	81
Bicarbonate	mg/L	--	--	77	81
Carbonate	mg/L	--	--	0	0
Hydroxide	mg/L	--	--	0	0
Aluminum	mg/L	--	0.05 - 0.2	5.11	6.25
Antimony	mg/L	0.146 (0.006)[2]	--	<0.003	<0.003
Arsenic	mg/L	0.05 (0.01)[3]	--	0.016	0.02
Barium	mg/L	2	--	0.849	0.849
Beryllium	mg/L	0.004	--	0.0395	0.0303
Boron	mg/L	--	--	0.12	<0.10
Cadmium	mg/L	0.005	--	<0.002	<0.002
Calcium	mg/L	--	--	85	69
Chloride	mg/L	--	250 - 400	10	12
Chromium	mg/L	0.1	--	<0.005	<0.005
Copper	mg/L	1.3	1	0.012	0.016
Fluoride	mg/L	4	2	0.40	0.70
Iron	mg/L	--	0.3 - 0.6	0.59	0.767
Lead	mg/L	0.015	--	0.001	0.0093
Magnesium	mg/L	--	125 - 150	12.9	12.6
Manganese	mg/L	--	0.05 - 0.1	0.37	0.443
Mercury	mg/L	0.002	--	0.00067	<0.0005
Nickel	mg/L	0.1	--	<0.002	<0.020
Nitrate as N	mg/L	10	--	<1.0	1
Nitrite as N	mg/L	1	--	<0.010	<0.010
Nitrate and Nitrite as N	mg/L	--	--	<0.10	1
pH	su	--	6.5 - 8.5	7.47	7.27
Potassium	mg/L	--	--	13.5	12.5
Selenium	mg/L	0.05	--	<0.010	<0.010
Silver	mg/L	--	0.1	<0.010	<0.010
Sodium	mg/L	--	--	28	28
Sulfate	mg/L	--	250 - 500	15	16
Thallium	mg/L	0.002	--	0.001	0.001
TDS	mg/L	--	500 - 1000	175	201
WAD Cyanide	mg/L	0.2	--	<0.010	<0.010
Zinc	mg/L	--	5	0.085	0.073

[1] Results for the metal constituents indicate dissolved metals.
[2] The state of Nevada MCL for antimony is currently 0.146 mg/L. NDEP is currently investigating revision of this standard to the EPA drinking water standard of 0.006 mg/L.
[3] The EPA has removed the 0.05 mg/L standard from their list and currently list the arsenic standard at 0.01 mg/L, which is enforceable on 01/23/06.

Results show that groundwater at the proposed RIBs site meets all Nevada primary MCLs except beryllium, and all secondary MCLs were met except aluminum, iron and manganese.

3.1.7.3 Water Appropriations

Hecla has applied for a permit, serial number 69732, to appropriate water from an underground source for exploration purposes. The Nevada Division of Water Resources (NDWR) issued the appropriation to Hecla on January 8, 2004. The amount of water allowed by the permit is 1.5 cubic feet per second with an annual use not to exceed 200 acre-feet. There are no domestic water or other wells within five miles of the project area.

3.1.8 Wildlife

There are approximately 350 species of vertebrate wildlife species which occur in northeastern Nevada. There are approximately 100 bird species, 70 mammal species, and several reptile and amphibian species that are found in sagebrush-grassland habitats in northeastern Nevada (Appendix C). Many of these species could inhabit the project area on a seasonal or year-long basis. Suitable habitat exists for wildlife species such as coyotes, badger, mountain lions, rabbits, shrews, rodents, and several reptile and amphibian species. A variety of resident birds including upland game species, perching birds (passerines), and raptors inhabit the sagebrush-grassland habitats. Upland game birds that may be present include sage grouse, Hungarian partridge, chukar partridge, and mourning doves. Additional information on sage grouse is provided in Section 3.1.10.2.

Big game species include mule deer, pronghorn antelope, bighorn sheep and mountain lions. The project area is located within the NDOW Mule Deer Management Unit 068 of Management Area 6, within a mule deer linkage or transitional range and a mule deer migration corridor. This habitat is utilized by mule deer during spring and fall migration between winter ranges to the west (Izzenhood Basin) and summer ranges to the north and east (Independence Mountains) (BLM, 1999).

The project area is within a larger area that has been identified as crucial pronghorn antelope summer range. Pronghorn antelope would typically be in the vicinity from spring through early winter, migrating to the west to the winter range in Izzenhood Basin and south to the winter range in Boulder Valley (BLM, 1999). During mild winters, pronghorn antelope may remain in and near the project area throughout the winter (BLM, 1999).

Bighorn sheep were transplanted into the Rock Creek Drainage approximately 12 miles southwest of the project area in the early 1990s and were also transplanted a few years earlier into the Snowstorm Mountains, approximately 20 miles northwest of the project area (BLM, 1999). Although bighorn sheep had been observed in the area of the Hollister Mine in the mid to late 1990s, according to correspondence obtained from the NDOW, no sightings of bighorn sheep at the Hollister Mine area have been reported in the last three years.

Since the cessation of the reclamation activities at the Ivanhoe Mine, BLM personnel have observed mountain lions, in the vicinity of the proposed project on several occasions (Stadelman, 2003).

Aquatic resources in the project area are limited to small areas of perennial water in Little Antelope Creek and during periods of ephemeral flow in Little Antelope Creek and its tributaries. The only aquatic species identified during the June 2003 survey was the Pacific chorus frog. Aquatic insects are also likely to be present in areas of perennial water within Little Antelope Creek. No fish were observed or are likely to exist in Little Antelope Creek due to the intermittent nature of the creek. The riparian habitat along Little Antelope Creek is described in Section 3.1.5. Riparian areas are extremely important as a habitat component for approximately 75 to 80 percent of the terrestrial wildlife species that occur in the area.

3.1.9 Migratory Birds

Migratory birds are protected under the MBTA. Destruction of individual birds, their nests, eggs, or young are prohibited under the Act. Most of the bird species occurring in habitats within the project area (with the exception of the house sparrow and the European starling) are protected as migratory birds under the Act. These species include the numerous species of songbirds, all raptor species, and shorebirds and waterfowl that may occasionally use the limited water habitats in the project area and adjacent areas.

On January 11, 2001, President Clinton signed the Migratory Bird Executive Order 13186. A list of migratory birds affected by the President's executive order is contained in 43 CFR 10.13. References to "species of concern" pertain to those species listed in the periodic report "Migratory Nongame Birds of Management Concern in the United States"; priority migratory bird species as documented by established plants, such as Bird Conservation Regions in the North American Bird Conservation Initiative or Partners in Flight physiographic areas; and those species listed in 50 CFR 17.11. The 1999 Nevada Partners in Flight Bird Conservation Plan identifies the following bird species for prioritization for management actions, as listed by habitat type in Appendix D.

3.1.10 Special Status Species

Special Status Species considered in this EA include the following species per BLM Nevada State Office Instruction Memorandum No. NV-98-013:

1) Species that are federally listed as endangered or threatened per the Endangered Species Act, species that are proposed for listing under this Act, and species that are formally designated by the U.S. Fish and Wildlife Service (USFWS) as candidates for potential future listing;

2) State of Nevada protected species that are protected based on potential endangerment, extinction, extirpation, or local rarity; and also meet BLM criteria for protection under BLM Manual Section 6840; and

3) Nevada Sensitive Species as designated by the State BLM Director in cooperation with the State of Nevada that are managed by BLM as candidate species.

Appendix C presents the Special Status Species identified through consultation and coordination as potentially occurring in the project area and adjacent areas, along with an evaluation of their potential to occur within the HDB Project area. Species identified as potentially occurring within or near the project area are discussed in detail in the following sections.

3.1.10.1 Plant Species

No federally listed endangered, threatened, proposed, or candidate plant species occur in the project area.

All cacti, yuccas, and Christmas trees are protected by Nevada state law (NRS 527.060-1220) and are thus managed as Special Status Species under category 2 above. No cacti, yucca, or trees meeting the Nevada Natural Heritage Program (NNHP) definition of a Christmas tree were observed within the project area nor are expected to occur in the areas adjacent to the project area.

USFWS consultation indicated Lewis buckwheat, a BLM Nevada Sensitive Species, may occur in the project area. However, Lewis buckwheat is known to occur on exposed rocky ridges with low sagebrush at elevations above 7,800 feet AMSL with populations identified in the Independence Range and south of Elk Mountain in northeastern Nevada, Elko County (USDA FS, 1991). The project area is below the species elevation range. No species resembling Lewis buckwheat was observed in the survey area (JBR, 2003b). With regard to other plant species on the list of BLM Nevada Sensitive Species, the project area is either beyond the species range, or does not contain suitable habitat for the species. Field surveys of the site in 2003 failed to locate any other plant species on the BLM Nevada Sensitive Species list (JBR, 2003b).

3.1.10.2 Wildlife Species

Federally Listed Species

USFWS consultation indicated that no federally listed endangered, threatened, proposed, or candidate species are considered to potentially occur in the project area. Federally listed species that occur in the larger region around the project area include the bald eagle (listed as threatened, but currently proposed for de-listing) and the Lahontan Cutthroat Trout (LCT) (listed as threatened). All raptors, although not listed as a threatened and endangered species are protected by the USFWS. One candidate species, the Columbia spotted frog may occur in the larger project region.

In general, bald eagles breed and winter in association with large bodies of open water with appropriate trees for nesting and roosting (Herron et. al., 1985). Such habitat is lacking in and adjacent to the project area. Elko District bald eagle surveys and random observations have resulted in site record documentation on upland areas many miles away from large bodies of open water. A bald eagle was documented nearby in Squaw Valley on expansive sagebrush-perennial grass habitat during the winter period. Use of this habitat is extremely dispersed throughout the area.

Several raptor species including red-tailed hawks, prairie falcons, northern harriers, American kestrels, and great-horned owls were observed in the vicinity of the project area during surveys for the 1999 EA (BLM, 1999). The project area was surveyed for nesting raptors in June 2003. The only nesting raptors observed in the area were prairie falcons and burrowing owls, both are BLM Nevada Sensitive Species and are discussed in greater detail in the following section. NDOW reported that prairie falcons and ferruginous hawks have been found nesting in or near the project area. No ferruginous hawks were observed during the survey and no nests were located on-site or in the immediate vicinity (JBR, 2003b). Red-tailed hawks were observed near the existing mine pits and one bird observed near the West Pit showed territorial behavior, but no nest was located (JBR, 2003b). A golden eagle was observed flying over the slopes east of the project area (JBR, 2003b). Rock outcrops and cliffs are common in this area, offering a variety of potential nest sites. No golden eagle nests were located within the project area or adjacent areas.

The LCT is established in a variety of cold waters throughout the state (Sigler and Sigler, 1987). The ephemeral and intermittent streams in and near the project area are not known to support LCT. LCT have historically been known to occur in Rock Creek, approximately six miles west of the confluence of Little Antelope and Antelope Creeks, and Willow Creek Reservoir, located approximately five miles north of the project area (BLM, 1999).

Columbia spotted frogs typically occur along marshy edges where permanent ponds or lakes are present, in overflow pools of streams with algae, and near permanent springs with emergent vegetation (USDA FS, 1991). Flow in Little Antelope Creek in the project area is intermittent. Although the creek was observed to have limited areas of permanent water, these sources are small and most likely dry in some years. These sites were searched for frogs and tadpoles during the 2003 field survey of the project area. No spotted frogs were observed, and the limited aquatic habitat present appeared unlikely to support this species (JBR, 2003b).

State Protected and Sensitive Species

Sensitive mammal species identified as potentially occurring in the area include several bat species, Preble's shrew, and the pygmy rabbit. Based on field surveys of the project area, habitat for the Preble's shrew and the pygmy rabbit do not occur on the site. The Preble's shrew occurs in floodplain habitats near creeks that are dominated by a dense overstory of upland shrubs with a diverse understory of grasses and forbs (Ports and George, 1990). No such suitable habitat for the Preble's shrew was noted during surveys of the project area (JBR, 2003b). Pygmy rabbits generally occur in dense sagebrush habitats that contain large sagebrush and a dense understory of grasses with soils suitable for burrowing (Green and Flinders, 1980). The pygmy rabbit burrows are distinctive and are typically placed at the base of sagebrush. Distinctive pellets are generally observed near the burrow entrances and distinctive trail systems are established through the vegetation, often leading to burrow entrances. No pygmy rabbits were sighted during project area surveys, and no evidence of pygmy rabbit burrows or trails were observed (JBR, 2003b).

Several of the sensitive bat species listed in Appendix C could occur in or near the project area. Rock outcrops and the walls of the existing mine pits represent potential bat roosting habitat. Agency correspondence indicated long-eared and small-footed myotis have been recorded in the area. A NNHP database search indicated that Townsend's big-eared bats may also occur in the area. An ultrasonic bat detector (Anabat) was utilized during the field survey to obtain recordings that contained sufficient information to tentatively identify the species of bat recorded. Calls and published range maps were used to determine that the recorded calls were the western pipistrelle and a Myotis species that was determined likely to be the California myotis. Both are recently designated BLM Nevada Sensitive Species. The western pipistrelle is known to roost in cracks and crevices in canyon walls, while the California myotis roosts in a variety of locations (Western Bat Working Group, 1998). Flying insects were common in the area at the time of the survey, and presumably attract foraging bats. Some of the sensitive bat species may roost in the existing pit walls, but no adits or caves (sites that might support large concentrations of roosting bats) were noted in the project area or adjacent areas (JBR, 2003b).

Eight State of Nevada listed and protected bird species, and eight BLM Sensitive bird species were identified through agency consultation as potentially occurring in and near the project area (Appendix C). Based on known habitat requirements of the species, it was determined that habitat is lacking on or near the project area for four of the State of Nevada protected species (goshawk, osprey, white pelican, white-faced ibis) and two of the BLM sensitive bird species (black tern, mountain quail). Based on the lack of habitat, there would be no potential for these species to occur in the project area (JBR, 2003b).

State of Nevada protected bird species that have the potential to occur in or near the project area include the golden eagle, burrowing owl, ferruginous hawk, and Swainson's hawk. The ferruginous hawk was reported by NDOW to be nesting in or near the project area, but a survey of the project area failed to locate any ferruginous hawk nests in the project area or in adjacent areas and no ferruginous hawks were observed during the June 2003 field surveys (JBR, 2003b). No Swainson's hawks were observed in or near the project area during the June 2003 surveys. A pair of burrowing owls was observed near the project area and is described in further detail in this section.

BLM Sensitive bird species (Appendix C) that have the potential to occur include the prairie falcon, greater sage grouse, long-eared owl, short-eared owl, loggerhead shrike, and vesper sparrow. Of these six BLM Sensitive species, only the prairie falcon was observed on or near the project area during the June 2003 survey. Additional information on the prairie falcon is provided later in this section. The vesper sparrow is a ground-nesting bird that frequents open ground habitat with low shrubs and sparse grass cover. The loggerhead shrike frequents a variety of shrub and grassland habitats, perching conspicuously on shrubs and fences, and nesting in shrubs. The long-eared owl is widespread throughout Nevada, nesting in dense riparian habitat, often with a deciduous tree component (Ryser, 1985; Terres, 1980). Short-eared owls are common summer and sometimes winter resident throughout the Great Basin in Nevada in open country. This owl nests on the ground and is often actively hunting in afternoon and evenings (Ryser, 1985; Terres, 1980).

Western Burrowing Owl

The burrowing owl occurs in Nevada as a breeding species and may overwinter in some areas (Herron et. al., 1985). The owls prefer open treeless flatlands. Abandoned burrows of ground dwelling animals such as badger, coyote, and ground squirrel are used to roost and nest (Herron et. al., 1985). Active burrows can usually be determined by the presence of insect exoskeletons and owl pellets near the entrance.

Consultation with NDOW indicated burrowing owls had been known to nest in or near the project area, which was confirmed during the survey conducted in 2003. Burrowing owls were observed during the field surveys conducted in June 2003. The burrowing owls and two apparently active burrows were located west of the Little Antelope Creek Road and Little Antelope Creek (JBR, 2003b). Whitewash was found on the dirt mounds adjacent to the burrow openings, and burrowing owl pellets were found next to one burrow (JBR, 2003b).

Greater Sage Grouse

The presence of small meadows along the creeks with adjacent sagebrush covered benches and hills provide favorable habitat for sage grouse (BLM, 1999). Three documented leks have been surveyed within 1.5 miles of the proposed project in Section 33 of T38N, R48E and Sections 3 and 8 of T37N, R48E (BLM, 1999). Several additional leks are located within five miles of the proposed underground exploration. NDOW notes that two sage grouse leks have been documented south of the project area, and that the project area may be used as sage grouse brood-rearing habitat (JBR, 2003b). No sage grouse were observed during the June field surveys, and no pellet groups or other evidence of sage grouse was found during the survey (JBR, 2003b). However, wet meadow and riparian areas, such as those found within the riparian exclosure on Little Antelope Creek, represent favored sage grouse brood-rearing habitat.

Prairie Falcon

This species was recently added to the list of BLM Nevada Sensitive Species (August 2003). A pair of prairie falcons was observed during the June field survey of the site, frequenting outcrops above upper Little Antelope Creek, east of the upper end of the riparian exclosure on upper Little Antelope Creek (JBR, 2003b). These outcrops included a variety of crevices and pockets, and concentrations of whitewashing were observed at two locations. One site was confirmed to be occupied by nesting ravens, but the second was determined to be likely to be occupied by the pair of prairie falcons (JBR, 2003b).

Other Species

Two BLM Nevada Sensitive fish species were identified through agency coordination as occurring in Elko County near the project area (Appendix C), but neither would occur in the project area. The interior redband trout is known only from the Owyhee River drainage and does not occur within the drainage basin of the project area. Relict dace occur in remnants of former Pluvial lakes in eastern and central Nevada (Hubbs et. al., 1974). Habitat for this species includes small thermal springs, creeks, and marsh areas in Nevada that are characterized by heavy growth of filamentous algae, rushes, and mosses (Sigler and Sigler, 1987). No such habitats occur within the project area (JBR, 2003b).

Three BLM Nevada Sensitive butterflies species were identified through agency consultation as occurring in Elko County, but none would occur in the project area based on range and habitat requirements (Appendix C). The Mattoni's blue butterfly occurs at low elevations in the Jarbidge area of Elko County (Austin, et al., 2001). The host plant for the species is *Eriogonum microthecum*, which was not recorded during recent surveys of the project area (JBR, 2003b). The Nevada viceroy occurs along the Humboldt River and its tributaries, and near Fernley and Fallon. The host plant for the species is sandbar willow. Very small amounts of sandbar willow occur in the survey area within the riparian exclosure on Little Antelope Creek. Because these willows are quite isolated from other willow stands, the Nevada Viceroy is highly unlikely to occur in the survey area (JBR, 2003b). Grey's silverspot occurs in the Ruby Mountains and East Humboldt Range, at elevations between

8,500 to nearly 10,000 feet (Howe, 1975). The project area is well below this species elevation range.

One other invertebrate species, the California floater, a mussel, was identified through agency consultation as occurring in the Elko County, but habitat for the species does not occur in the project area. This species inhabits sand and softer mud bottoms of lotic waters in reservoirs and lakes.

Although no springsnails have been found in water sources, such as Little Antelope Creek, located within the project area, several springs within a five to ten mile radius of the HDB Project are known to support springsnails. Depending on the identified species of springsnails, the springsnails have either been designated as Nevada BLM sensitive species or a species of special concern due to their uniqueness and rarity.

3.1.11 Visual Resource Management

The proposed project falls completely within Visual Resource Management (VRM) Class IV. The Class IV VRM objective is to allow for management activities that involve major modifications of the existing character of the landscape. The level of contrast can be high, dominating the landscape and the focus of the viewer's attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements of the characteristic landscape.

The project area is located within a previously mined and partially reclaimed open pit. General land forms in this area have been highly modified by previous mining activities. The most dominant man-made features are the East and West open pits associated with the Hollister Mine, and existing access roads and two-track roads (BLM, 1999).

Landscape colors consist mainly of the grays and browns of the exposed ground. Landforms are rolling and rounded with moderate to steep slopes. Relatively little vegetation is present. Strong horizontal, vertical, and diagonal lines occur as a result of the Hollister Mine. The reshaped and reclaimed waste rock disposal facilities and heap leach pad create rounded horizontal, vertical and diagonal lines. The surrounding hills create strong, broken diagonal lines. Previous mining activities have created various horizontal, vertical, and diagonal lines exposing the mottled colors of the soil (BLM, 1999).

The location of the proposed RIBs consists of sagebrush and grasses on generally flat or slightly rolling terrain. Landscape colors consist of the green to slightly grayish-green vegetation that is present on the site. Dominant man-made features on the landscape in the vicinity of the proposed RIBs site include fences and a high-voltage power line that bisect the area, and existing access roads.

These features present moderate vertical and horizontal lines on the landscape. Few other man-made features exist in this portion of the proposed project.

3.1.12 Cultural Resources

A portion of the proposed project is located within the boundaries of the Tosawihi Quarries Archaeological District (26EK6623); the project also encompasses areas to the west and south of the District boundaries. The District represents one of the largest chert quarries in western North America. Archaeological sites found within 50 miles of the District are typically dominated by chert that originates from the Tosawihi Quarries (Elston et al., 1987a; Elston et al., 1987b; Elston and Raven, 1992). In addition, the chert is a sacred resource to many current members of the Western Shoshone (Section 3.1.13).

The Tosawihi Quarries Archaeological District has been determined eligible for the National Register under criteria “a” and “d”. Thus, the District is eligible both as a unique resource worthy of in-situ preservation and protection, as well as its data potential for addressing significant research questions about the prehistory of the region. Archaeological site density surrounding the District is high; numerous eligible sites have been previously recorded within several miles of the District boundaries (Hockett, 2000).

For the current project proposal, Summit Envirosolutions, Inc. (Summit) completed several Class III surveys in the months of May and August 2003. Summit completed surveys along the proposed pipeline route and the proposed location of the RIBs (Figure 4). The proposed pipeline route follows the Little Antelope Creek road. The road had been partially surveyed during two previous mining-related projects; summarized in Summit Envirosolutions (2003). Summit was asked to resurvey the proposed pipeline route along the road and update the older site records, as well as record any new cultural resources encountered that were not previously recorded. Approximately 25 acres were surveyed along this route. The BLM had recently completed several surveys near the location of the proposed RIBs (Hockett, 2003a, 2003b, 2003c), for a total of approximately 44 acres. Summit completed an additional 37-acre survey in the RIBs area (Summit, 2003).

The combined BLM and Summit surveys totaled approximately 107 acres. In total, BLM and Summit updated eight previously recorded sites, and recorded 11 new sites and 10 isolated artifacts. All eight of the previously recorded sites had been determined eligible for the National Register under criterion “d”. The BLM reaffirmed these determinations. Of the 11 newly recorded sites, the BLM determined that 10 of them were eligible for the National Register under criterion “d”, and one was ineligible. Per the Statewide Protocol Agreement between the BLM and the Nevada State Historic Preservation Office (SHPO), these reports and determinations have been sent to the SHPO’s office for incorporation into the statewide inventory. These findings are documented in reports BLM1-2285(P), BLM1-2288(P), BLM1-2312(P), and BLM1-2330(P).

No surveys were completed at the location of the proposed portal and associated facilities because these would be placed within an existing pit.

3.1.13 Native American Religious Concerns

The Tosawihi Quarry area is currently eligible for the National Register of Historic Places as a Traditional Cultural Property and has been designated an Archaeological District by the BLM Elko Field Office. The Tosawihi Quarry area is perhaps the most unique and well-documented traditional/cultural/spiritual use site on lands administered by the BLM Elko Field Office and perhaps the entire Western Region. Known for an abundance of artifacts supporting human occupation for approximately 10,000 to 11,000 years, the Tosawihi Quarry hold great significance to local and regional tribes as a traditional/cultural/spiritual use site. Renowned for the quality of white chert used in ceremony and tool making, the Tosawihi Quarries support ongoing traditions practiced by contemporary Native people. Documentation of such support exists at the BLM Elko Field Office and is considered confidential.

3.2 ALTERNATIVES

The description of the affected environment for the No Action Alternative would be the same as that for the Proposed Action.

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 PROPOSED ACTION

4.1.1 Air Quality

Surface disturbance related to construction would result in a short-term increase in particulate emissions from generation of fugitive dust. Dust would also be generated by materials handling and traffic on the roads. Environmental protection measures incorporated into the Proposed Action (Section 2.1.11.1) include measures to minimize and control fugitive emissions.

Hecla prepared a Class I Air Quality Permit Application for NDEP and received approval for the permit on September 26, 2003. The HDB Project is a Class I source only under the operating permit rules, but not under the Prevention of Significant Deterioration rules. The primary emissions source would be the diesel generators, which would be used to supply power to the project. One generator would supply the main power, while a second would be available for backup purposes. Only one unit would be operated at a time, except during periods when emissions or mechanical testing operations are being preformed.

As a requirement of the air quality permit application, emission and dispersion modeling was conducted for the sources associated with the proposed project. Table 11 provides the modeled emissions.

Table 11 Modeled Air Emissions

Emission Source	Emission (tons per year)					
	NO_x	SO_x	CO	PM	PM-10	HC
Diesel Fired Equipment	153.36	24.75	30.41	5.80	5.80	8.43
Waste Rock Handling				5.45	2.72	
Mineralized Bulk Sample Handling				0.87	0.44	
Total Project Emissions	**153.36**	**24.75**	**30.41**	**12.11**	**8.96**	**8.43**

Results from the dispersion modeling show that emissions from the proposed project do not cause or contribute to a violation of the National Ambient Air Quality Standards (AAQS). These standards are provided in Table 12. This determination is based on modeled concentrations of each pollutant for appropriate averaging times with appropriate background concentrations included (Hecla, 2003). Compliance with the requirements of the Class I Air Quality Operating Permit would result in minimal impacts to the air quality during the life of the proposed project.

Table 12 National Ambient Air Quality Standards

Emission Source	Primary Standard	Averaging Times	Secondary Standard
Carbon Monoxide (CO)	9 ppm (10 mg/m^3)	8-Hour	None
	35 ppm (40 mg/m^3)	1-Hour	None
Lead	1.5 Fg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide (NO_x)	0.053 ppm (100 Fg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (PM_{10})	50 Fg/m^3	Annual (Arithmetic Mean)	Same as Primary
	150 Fg/m^3	24-Hour	
Particulate Matter ($PM_{2.5}$)	15 Fg/m^3	Annual (Arithmetic Mean)	Same as Primary
	65 Fg/m^3	24-Hour	
Ozone	0.08 ppm	8-Hour	Same as Primary
	0.12 ppm	1-Hour	Same as Primary
Sulfur Oxides (SO_x)	0.03 ppm	Annual (Arithmetic Mean)	
	0.14 ppm	24-Hour	
	---	3-Hour	0.5 ppm (1300 Fg/m^3)

4.1.2 Geology and Geochemistry

4.1.2.1 Geology

The geologic structures in the area of the decline would be altered by removal of mineralized and non-mineralized material during construction of the proposed decline and associated excavations (drill stations, muck bays, crosscuts, and raises). Non-mineralized material from the proposed decline would be permanently stored in a waste rock disposal facility as described in Section 2.1.4. An estimated 100,000 tons of waste rock would be removed. Excavation of bulk samples for testing purposes would also require permanent removal of mineralized material. The small-scale facility WPCP allows for removal of up to 36,500 tons or approximately 17,500 cy of mineralized material, per year, which could be used for testing. Extraction of this material would result in permanent removal of the geologic structure within the decline and associated excavations. This would not adversely impact the overall geologic structure of the project area.

4.1.2.2 Geochemistry

Results from geochemical analyses of the waste rock samples indicate the potential to generate ARD (Section 3.1.2.3). Permanent removal of the waste rock and placement of the material on the surface would expose the material to oxygen and water, which, when in contact with potential ARD material, may initiate the generation of ARD. The generation of ARD could have adverse impacts to both surface water and groundwater within the project area as discussed in Section 4.1.7.

As waste rock is moved to the surface and placed in the waste rock disposal facility, weathering of rock (oxidation) could occur, possibly resulting in a reduction in the pH of meteoric water coming into contact with the material and potential leaching of metals and other constituents. Weathering of the waste rock could result in alteration of the geochemical make-up of the rock. Design of the waste rock disposal facility and the planned operating procedures to be implemented for the proposed project (Section 2.1.4) would reduce the production of ARD and allow for containment of all meteoric solutions that may infiltrate through the waste rock. Treatment of this solution would be conducted if necessary prior to use as utility water for the project. The proposed closure of the waste rock facility (Section 2.1.10.4) would limit or eliminate the exposure of the waste rock to air and water, resulting in cessation of ARD generation.

4.1.3 Soils

The Proposed Action would affect native soils on 16 acres of new disturbance at the RIBs site, and previously disturbed soils on a total of 35 acres within the facilities area of the East Pit, along the water pipeline corridor, and near the existing Water Well #1. The majority of the in-place native soils have a low to moderate potential for wind and water erosion. Once disturbed, the native soils would lose these characteristics and become more susceptible to wind and water erosion.

Direct effects to soils would include soil loss during soil handling and stockpiling operations, erosion, and modification to soil chemical and physical characteristics. Chemical and biological changes would result from mixing surface soil with subsoil during salvage operations and reduction of organic matter in the salvaged soil. Effects to physical characteristics would include compaction, pulverization and loss of finer grained materials. Implementation of BMPs would minimize soil loss due to wind and water erosion. These BMPs may include revegetation of stockpiles and installation of silt fences or hay bales downgradient of the stockpiles.

All soil and overburden removed during construction would be stockpiled for later use during reclamation. Stockpiling of native soils and previously disturbed soils would provide growth medium for reclamation. If the growth medium stockpiled during construction is insufficient for reclamation activities, additional growth medium may be available from existing stockpiles associated with previous mining activities conducted by Newmont.

Approximately 7,500 cy of growth medium (previously placed by Newmont) in the East Pit would be removed prior to construction and stockpiled for reclamation activities. Approximately 26,000 cy of growth medium would be removed and stockpiled in the RIBs area during construction. This stockpiled material would be used during reclamation as a growth medium cover for the reclaimed RIBs disturbance and, if needed, the waste rock disposal facility.

Other potential impacts to soils could be the result of spilled petroleum products within the East Pit. Maintenance and fueling activities would be accomplished on prepared pads where containment and collection areas are provided; therefore spills outside of containment are not likely to occur. Spills outside of these areas are expected to be localized and small. Proper clean-up procedures for the type of material spilled would be used to minimize the risk of off-site contamination.

4.1.4 Vegetation

Effects to vegetation associated with the proposed project include vegetation removal and loss or reduction of plant productivity. Direct effects would include removal of 16 acres of native sagebrush-grassland vegetation from new disturbance areas and removal of 29 acres of vegetation in reclaimed areas of the East Pit and along the reclaimed portion of the road through the exclosure. Vegetation species that would be affected are widespread and common throughout northeastern Nevada and in areas adjacent to the project area.

Reclamation of affected areas as described in the Proposed Action and the Reclamation Plan submitted with the Revised POO (Hecla, 2004), and in Section 2.1.10 of this EA, would result in establishment of self-perpetuating plant communities on revegetated areas. Other native vegetation species would likely become reestablished by re-colonization of reclaimed areas. As a result of the proposed reclamation, there would be no long-term impacts to vegetation.

4.1.5 Wetlands and Riparian Zones

Approximately 1.01 acres of wetlands exist within the project area and are located in or adjacent to Little Antelope Creek (Figures 6 through 8). Construction of the water pipeline from the project facilities to the RIBs would result in temporary impacts to 0.025 acres of identified potential wetlands at one location where the pipeline corridor crosses Little Antelope Creek. This crossing, shown on Figure 7, is located within the BLM exclosure. Impacts to the wetlands would include removal of wetland vegetation and hydric soils in the pipeline corridor during construction. The material would be temporarily stockpiled and placed back into the pipeline trench following pipeline installation. Additional impacts to the wetlands would result from vehicular traffic along the access road to the RIBs. This would result in a temporary loss of wetland vegetation in the road.

The pipeline corridor within the footprint of the existing access road would also cross Little Antelope Creek and its tributaries a total of eleven times resulting in impacts to 0.005 acres of identified potential waters of the U.S. Impacts to the waters of the U.S. would be limited to temporary removal of channel sediments and armoring during construction of the pipeline. The material removed for the pipeline trench would be replaced following completion of construction.

Additional impacts to waters of the U.S. would include a potential increase in sedimentation due to vehicular traffic and erosion of the road during periods of flow in Little Antelope Creek. BMPs would be used to protect the channel and receiving waters from sedimentation during construction of the pipeline and throughout use of the road for the duration of the project. BMPs would reduce impacts associated with sedimentation and may include the following:

- Construction staging areas would be placed no closer than 150 feet from any defined drainages in the project area, unless authorized by the BLM and NDEP;
- Silt fences would be properly installed and maintained in staging areas and other areas where appropriate;
- Trench backfill material over the pipeline would be compacted to minimize settling of the material, thus preventing the formation of a depression over the pipeline that could channel water and increase erosion. Hecla would monitor the pipeline corridor and add material in areas of significant settling; and
- Channel armoring removed during construction would be replaced to minimize the risk of increased erosion from the road area.

Hecla has prepared a Pre-Discharge Notification to the COE for a Nationwide Permit 12 (Utility Line Activities) and a Nationwide Permit 33 (Temporary Construction, Access, and Dewatering). In addition, concurrence by the COE of the wetland and waters of the U.S. survey results is pending.

Based on the Proposed Action, impacts to wetlands and waters of the U.S. are expected to be temporary and minimal. Hecla received the 401 Water Quality Certification Letter and a Temporary Permit for Working in Waterways from NDEP.

4.1.6 Invasive, Non-Native Species

The project area has not been identified as an area of high or moderate risk for noxious weeds (Section 3.1.6). Soil disturbance provides an opportunity for invasive species and noxious weeds to establish. The proposed project would create approximately 51 acres of disturbance. Disturbance of these 51 acres of land would provide a potential habitat for the establishment of noxious weeds. Increased vehicle travel, livestock and wildlife use, and wind could increase the potential for entry and spread of noxious weeds species into disturbed areas.

Hecla has incorporated measures to control noxious weeds into the Proposed Action (Section 2.1.11.4). These measures would be employed throughout the life of the exploration project and during reclamation to prevent establishment of noxious weeds and to ensure the establishment of desirable species.

4.1.7 Water Resources

4.1.7.1 Surface Water

Quantity

The proposed project would not affect the quantity of flow or water quality in Little Antelope Creek or its tributaries within the project area. Existing diversion channels, which were installed during previous operations to divert water around the Hollister Mine to Little Antelope Creek, would remain in-place.

Impacts to springs of concern (Antelope, Ivanhoe, and Buttercup) are not anticipated based on data obtained through a number of studies conducted during the planning of the proposed project. These studies, as described in Section 3.1.7.1, indicate that the source of water discharging from these springs is different from the source water that would be pumped from the proposed decline (Brown and Caldwell, 2003a; Mayo, 2003; SRK, 2003).

Predictions of no effects to all springs, due to removal of water from the decline, from recent site specific hydrogeologic studies are supported by observations that previous groundwater pumping associated with mining at the site during the early 1990s had no apparent effects on spring flows. Information obtained from Newmont indicates that four of the five production wells utilized from June 1990 through December 1991 were pumped at an average rate of between 136 to 149 gpm. The fifth well was used for domestic purposes. This pumping rate is similar to the amount of water anticipated to be removed by the proposed underground exploration operation. Historic aerial photos from July 1982, June 1988, May 1993, and August 1998 were reviewed to determine spring flow in the site vicinity. The 1982 and 1988 photos pre-date past mining and groundwater pumping at the site; the 1993 photos represent post-mining conditions during heap leach rinsing; and the 1998 photos represents post-mining and post-heap leach rinsing. Flow was evident from Ivanhoe and Buttercup springs in all photos. Flow was evident from Antelope Spring in all photos except the 1982 photo (pre-mining).

To further define the affects of removing water from the proposed decline, Brown and Caldwell conducted hydrogeologic modeling to determine the anticipated drawdown cone from the water removal. The maximum extent of the 10-foot drawdown cone at the end of the proposed project, as shown on Figure 10, indicates that the drawdown cone does not intersect the springs of concern (Antelope, Buttercup, and Ivanhoe). This modeling, in conjunction with results of other studies (Brown and Caldwell, 2003a; Mayo, 2003; SRK 2003), confirms the proposed project would not result in dewatering the springs of concern.

Water Quality

No direct discharges to surface waters in Little Antelope Creek would be associated with the proposed project. Impacts to Little Antelope Creek would include increased sedimentation during construction of the water pipeline from the project facilities to the proposed RIBs location, and during vehicular traffic along the access road. This increase in sedimentation would likely occur at the eleven locations where the existing access road to the RIBs crosses Little Antelope Creek and its tributaries (Figure 6). Erosion and sediment release to Little Antelope Creek and to Antelope Creek would be minimized with the implementation of BMPs incorporated into the Proposed Action (Section 2.1.11.5). BMPs would include the following:

- To the extent possible, construction activities on the pipeline would be conducted during periods of low flow or during periods when the water is frozen;
- If necessary, installation of proper temporary diversion structures, such as culverts, to reroute flow around construction areas;
- Reestablishment of proper armoring of the creek bed following construction activity;
- Installation of proper sediment control devices such as silt fences or straw bales, where necessary; and
- Limitation of vehicular traffic on the RIBs access road.

Hecla has developed a waste rock handling plan to minimize the formation of ARD from the waste rock and prevent degradation of surface water and groundwater quality. Details of the plan are provided in Section 2.1.4 of this EA, in the Revised POO (Hecla, 2004), and the small-scale facility WPCP application (Hecla, 2003a). The waste rock handling plan identifies proposed strategies to provide both short-term and long-term environmental stability and would not degrade the surface or groundwater quality (Walker & Associates, 2003). Primarily, the prevention of impacts to water quality would be accomplished by:

- Construction of an engineered soil liner for the waste rock disposal facility with a minimum hydraulic conductivity of 1 x 10^{-5} cm/sec to minimize vertical migration of meteoric solutions;
- Placement of a synthetic barrier between the pit highwalls and the waste rock to minimize lateral migration of meteoric solutions;
- The addition of dolomite, as neutralizing material, during the placement of waste rock on the surface in sufficient quantities to raise the ANP:AGP ratio to neutralize the material;

- Installation of a system to collect meteoric water that infiltrates through the waste and would then convey the water to a lined evaporation sump;

- Implementation of a monitoring plan to collect and analyze meteoric water that may infiltrate through the waste rock. The results of monitoring would be used to identify the effectiveness of neutralization and identify any changes that may need to be made to the waste rock handling plan;

- Following completion of the exploration project, a low-permeability cover would be placed over the top of the waste rock disposal facility to restrict water and oxygen access into the waste rock. The cover would also provide for evapotranspiration, reducing the amount of water able to infiltrate into the waste rock; and

- Construction and maintenance of diversion channels to convey precipitation run-off around the waste rock facility and into Little Antelope Creek or the Stormwater Basin.

The storage and use of some materials on-site during the proposed exploration activity have the potential, if spilled, to contaminate surface waters within the project area and along the access road. Proper transportation, storage, handling, and use of these products would be implemented. All hazardous materials and wastes would be stored within the East Pit perimeter, thus preventing any discharge to Little Antelope Creek. Proper placarding of vehicles carrying hazardous materials and wastes would be used to identify the material in the event of an accident. Proper emergency procedures would be implemented in the event of an accident or spill.

Implementation of the above measures would effectively minimize the potential for degradation of surface water quality during the proposed project. Minimal effects to surface water quality associated with an increase in sedimentation are the only anticipated effects, and these would be minimized with the proper use of BMPs.

4.1.7.2 Groundwater

Quantity

The proposed exploration activities would result in a short-term drawdown of groundwater within the regional (Valmy Formation) groundwater aquifer. The 10-foot drawdown contour of the potentiometric surface, as shown in Figure 10, is approximately 6,750 feet from north to south and 5,250 feet east to west centered near the proposed decline. There are no current groundwater users within five miles of the proposed project, thus no users would be affected by the removal of water from the decline. As previously discussed in Sections 3.1.7.1 and 4.1.7.1, groundwater within the Valmy Formation is not connected to surface water associated with the three springs of concern (Antelope, Buttercup, and Ivanhoe), thus removal of water from the proposed decline would not impact the springs.

Excess water from the decline, greater than the utility needs of the underground exploration project, would be recharged back into the local (upper) groundwater system by the use of RIBs. Based on modeling of the proposed RIBs conducted by Brown and Caldwell, which was presented in the infiltration WPCP Application (Hecla, 2003b), no surface discharges are anticipated due to the operation of the RIBs. Thus, no changes in flow in Antelope Creek or Little Antelope Creek are expected. In addition, no known existing or historic springs in the RIBs area were identified, thus it is unlikely that the use of the RIBs would affect downgradient springs or result in new springs.

Quality

Impacts to groundwater quality could occur through infiltration of water into the upper aquifer at the proposed RIBs location, formation of ARD from waste rock, spills or leaks from the project facilities or water management facilities, or deterioration of water quality within the decline following closure. Each of these potential effects to groundwater quality are addressed in this section.

McClelland Laboratories, Inc. evaluated the potential effects to groundwater quality due to infiltration of water from the proposed RIBs using soil attenuation column testing to predict the final water quality after percolation through on-site soils and subsoils. The column tests were conducted using gravel and soils obtained from the proposed RIBs site and using groundwater obtained from a borehole (BH-01) that represents water quality from the proposed decline. The results indicate that water entering groundwater at the RIBs would meet all drinking water MCLs (McClelland, 2003). Manganese concentrations in the water from BH-01 exceeded Nevada secondary drinking water MCLs (Table 9), but attenuation test results on a mass basis showed that 96 percent of the manganese was attenuated by the soils. Although full attenuation of manganese was not achieved in laboratory testing, the levels noted in the effluent did not exceed Nevada secondary drinking water MCLs. Antimony concentrations from BH-01 groundwater exceeded Federal Drinking Water Standards, however attenuation results indicate that 100 percent of the antimony is attenuated by the soils (McClelland, 2003). Test results also indicated that arsenic, barium, chromium, nitrogen (primary), chlorine, fluoride, magnesium, and TDS were partially mobilized from the soils, but all constituents in the laboratory column effluent were below the Federal Primary and Nevada Secondary Drinking Water Standards.

Tests indicate that the waste rock has the potential to generate ARD once placed within the waste rock disposal facility. Hecla has developed a waste rock handling plan, as part of the Revised POO (Hecla, 2004), designed to minimize ARD formation and to contain meteoric waters that infiltrate through the waste rock disposal facility (Section 2.1.4). The waste rock handling plan includes the following measures to minimize the generation of ARD and contain solutions infiltrating through the waste rock disposal facility:

- Potentially acid generating waste rock would be mixed with dolomite, a rock type containing a high percent of calcium and magnesium, to prevent acid formation;

- A low permeability soil liner would be placed on the bottom of the waste rock disposal facility to prohibit vertical migration and promote lateral migration of seepage towards a lined evaporation sump for collection;

- Slotted pipes placed in a coarse material layer would be placed on top of the soil liner to further enhance seepage flow to the lined evaporation sump;

- The exposed pit wall that abuts the waste rock disposal facility would be covered with a synthetic liner prior to waste rock placement. This would prevent seepage from flowing laterally into the fractured rock of the pit wall; and

- Seepage collected in the synthetically-lined evaporation sump would be sampled to determine water quality. If the contained seepage meets all applicable standards, the water would be used as needed for the project or allowed to evaporate. If the water does not meet water quality standards the water would be neutralized per NDEP permit requirements.

Based on implementation of these measures, deterioration of groundwater quality due to ARD generation within the waste rock disposal facility would not occur.

The on-site storage and use of some materials during the proposed exploration activity have the potential, if spilled, to contaminate groundwater within the project area. Proper transportation, storage, handling, and use of these products would be implemented. All hazardous materials and wastes would be stored within the East Pit perimeter, thus discharge to the aquifer below the East Pit is possible if proper handling and storage procedures are not followed. Areas where hazardous materials would be stored or used would be placed within proper containment to prevent discharge to the ground. Water management ponds would be synthetically lined to prevent decline water, which may contain petroleum products from the operation, from infiltrating into the groundwater. Residual petroleum-based products would be removed by the use of skimming devices at the wash bay and within the de-silting basins. Proper emergency and clean up procedures would be implemented in the event of a spill to reduce the risk of infiltration to the groundwater.

Following cessation of exploration activities, the decline would begin to flood until the pre-project piezometric surface is once again attained. The long-term post-project conditions of the underground workings would be the same as the pre-project conditions. It is possible that during the initial flooding of the decline, ARD may begin to form and a release of constituents that could exceed drinking water standards may occur in the decline. Once recharging waters fill the decline excavation and oxygen is limited by sealing the portal, the groundwater would eventually become anoxic and constituent release would cease. Monitoring of groundwater by permitted monitoring wells would continue after cessation of the exploration activities until final release by NDEP and BLM.

Based on the potential impacts described in this document and the proposed environmental measures, degradation of groundwater quality would not occur.

4.1.7.3 Water Appropriations

Hecla has applied for a permit to appropriate water from an underground source. The NDWR has reviewed this permit application and determined that the proposed project would not adversely affect other existing groundwater rights in the vicinity. The permit to appropriate water was issued to Hecla on January 8, 2004.

4.1.8 Wildlife

The proposed project could create 16 acres of new disturbance primarily to sagebrush/grassland wildlife habitat at the RIB site. This habitat is abundant and widespread throughout the project region. Animals displaced as a result of project disturbance would likely relocate to adjacent undisturbed habitat. The loss of habitat as a result of the project would be short-term. Habitat would be restored following successful reclamation efforts, which will return the area to productive wildlife habitat.

There would be a temporary loss of California bighorn sheep habitat created by previous mine reclamation within the East Pit. As discussed in Section 3.1.8, bighorn sheep were transplanted in an area south of the project area by NDOW in the late 1980s and early 1990s and were observed in the pit areas, attracted by the newly reclaimed habitat. Although no sightings of bighorn sheep have been reported at the project in the last three years, bighorn sheep would avoid the project area during the proposed project due to increased human activity associated with operations. The bighorn sheep would have the opportunity to return following successful completion of reclamation of project disturbance in the East Pit area.

Additional impacts to other wildlife would also be expected from increased noise and human activity. Species such as deer, antelope, small mammals, and birds may avoid the available habitat around the East Pit and RIBs site. This impact would not likely be significant due to the abundance of similar habitat throughout the area around the proposed project. Additional impacts to wildlife expected to occur includes increased vehicle/wildlife collisions and illegal hunting due to increased traffic along the access road. These effects would be minimized by the implementation of car pooling, posting and enforcing speed limits, and prohibiting guns and hunting within the project area.

Considering the relatively small area of habitat disturbance, the short duration of the proposed exploration project, and the protection measures incorporated into the Proposed Action, effects to wildlife species from the project would be temporary and minimal.

4.1.9 Migratory Birds

The majority of birds in the project area are considered migratory and are protected by the MBTA and the migratory bird Executive Order 13186. There is the potential for destruction of migratory birds, nests and young if vegetation clearing is conducted during the nesting season. In addition, 16 acres of bird habitat would be temporarily removed during construction and operation of the RIBs. Although no active nests were observed within the East Pit, nesting and/or perching habitat within the East Pit would likely be avoided by migratory birds during the life of the proposed project.

Hecla would avoid, to the extent possible, conducting land clearing activities associated with construction of the project facilities, RIBs or water pipeline during the nesting period. If it becomes necessary to clear any areas during the breeding season, a survey of the area for active nests would be conducted by a qualified biologist. If active nests are located, a protective buffer would be established around the nests. Buffer zone would be decided as appropriate for a specific species by a qualified biologist in consultation with and approved by the BLM. Vegetation clearing within the buffer zone would be delayed until the nests were no longer active. With appropriate implementation of measures proposed by Hecla the effects to migratory birds is expected to be short-term.

4.1.10 Special Status Species

4.1.10.1 Plant Species

No Nevada protected or sensitive plant species occur in the project area, thus no impacts would occur.

4.1.10.2 Wildlife Species

No federally listed, proposed, or candidate wildlife species occur in the project area. Several State of Nevada-protected and BLM-designated sensitive wildlife species were confirmed to occur in the project area or in surrounding areas (Section 3.1.10.2). Potential effects to these species are discussed below.

Bats

During a field survey in June 2003, it was noted that some roosting is likely to occur in the existing pit walls, but no adits, caves, or sites that might support concentrations of roosting bats (JBR, 2003b) exist in the project area. Due to the human activity and noise associated with the proposed project, it is unlikely roosting would occur in the walls of the East Pit during the duration of the project. Concentrated food sources may be enhanced for bats in the East Pit due to lights associated with the project. The lights are likely to attracted flying insects at night and thus attract feeding bats.

The loss of roosting habitat would be a short-term impact due to other available roost habitats in the area including the existing West Pit and rock outcrops throughout the area. The project may also have a positive affect by concentrating food sources by the use of lights.

Western Burrowing Owl
Two active burrowing owl burrows were located west of the Little Antelope Creek road, about 150 feet from the area of proposed pipeline construction. Construction activities during the nesting season would likely disturb nesting owls, thus Hecla would avoid construction of the pipeline to the RIBs during the nesting season. Burrowing owls generally arrive on territories and begin nesting in April and young are usually fledged by mid-July (Call, 1978). Construction activities completed prior to April or initiated after mid-July are unlikely to disturb the burrowing owls. Alternately, preconstruction surveys can be used to determine whether the burrows are occupied and avoid construction activities as appropriate near the burrows until young have fledged.

Greater Sage Grouse
It is not expected that the proposed project would have direct impacts to sage grouse. The nearest identified lek is 1.5 miles from the site. Sound associated with the proposed project is unlikely to affect breeding activity associated with the lek. No sage grouse or signs of sage grouse were identified in or near the project area. Potential sage grouse brood rearing habitat along Little Antelope Creek would not be affected by construction of the pipeline since the pipeline would be placed in the existing road corridor. However vehicular traffic along Little Antelope Creek may reduce or inhibit sage grouse use of the riparian areas along Little Antelope Creek. Indirect impacts to identified existing sage grouse leks are from underground blasting, ground vibration, noise or combinations are considered unlikely due to the distance. Environmental control measures incorporated into the Proposed Action would minimize the potential for indirect effects from vehicle mortality or illegal hunting. Therefore, adverse effects to sage grouse are not expected.

Prairie Falcons
An active prairie falcon nest was located within the rock outcrops about 250 feet above Little Antelope Creek and approximately 250 feet east of the proposed pipeline route. Construction activities during the nesting season could disturb nesting falcons. Effects could be avoided by timing construction activities such that disturbance occurs outside the nesting season. In Nevada, prairie falcons usually begin nesting in March, and young are usually fledged by mid- to late-June, with some young fledging as late as mid-July (Call, 1978). The most critical time for avoidance of

disturbance is during early nest establishment and egg brooding (from March through May). Construction activities completed prior to March or initiated after mid-July are unlikely to disturb nesting prairie falcons. Alternately, preconstruction surveys can be used to determine whether the falcons are nesting in this location in the following year and if so, avoid construction activities as appropriate until young have fledged.

4.1.11 Visual Resource Management

Modifications to the landscape anticipated from the proposed project are consistent with BLM management objectives for a Class IV VRM area. Additionally, the landscape in the project area, specifically the East Pit and Little Antelope Creek access road, has already been modified by previous mining activities.

Construction of the RIBs would create a slight change in the topography and a change in color distinction that would provide a contrast to the surrounding undisturbed areas. The landscape in the area of the RIBs has already been modified to some extent by the existing access roads and a power line. Additional visual impacts including construction of berms around the RIBs, growth medium stockpiles, and realignment of the access road would occur with the construction of the RIBs. Impacts associated with the RIBs would be short-term.

Upon completion of reclamation activities, visual contrasts would be reduced. However, the open pit created by past mining activities would still remain. Considering the limited area of affect, the existing modifications to the landscape, the project's location in a Class IV VRM area, and the reduction of disturbance associated with reclamation, effects to visual resources would be minimal.

4.1.12 Cultural Resources

The portal and associated facilities for the proposed project would be constructed within the East Pit. This land was previously surveyed for cultural resources prior to disturbance. Although the East Pit is located within the Tosawihi Quarries Archaeological District boundary, previous mining has disturbed the area, thus the proposed project would not affect any cultural sites within this District.

The proposed pipeline would be buried within the footprint of the existing Little Antelope Creek road. Since the road passes through or near seven eligible sites, the pipeline would also pass through or near these sites. However, the Little Antelope Creek road was graded during earlier mining operations. At that time, no mitigation was proposed to these sites prior to road grading. It is unknown whether the grading activities destroyed all significant artifacts and/or features that may have been buried under the original two-track road. It is possible that the buried artifacts and features associated with the seven eligible sites along the road were shallow, and if that was the case, then no additional cultural resources may exist under the roadway. However, it is also possible that one or more of these seven eligible sites contain deeply buried artifacts and features that lie below the current zone of disturbance. Since the pipeline would be buried deeper than the graded disturbance zone, it is possible that the installation of the pipeline could adversely impact cultural resources. As a result, Hecla would implement the measures stated in Section 2.1.11.2. Hecla would hire a qualified archaeologist to monitor the installation of the pipeline through these seven eligible sites. If intact, buried artifacts or features are encountered during pipeline construction, all activities within 10 meters (approximately 30 feet) of the site(s) would be halted until the Elko Field Office Manager has been contacted and the area has been inspected by a BLM archaeologist. At that time, the BLM archaeologist, in consultation with the Nevada SHPO, would determine if mitigation measures are necessary before proceeding with the final installation of the pipeline through the eligible site(s) affected.

The RIBs and nearby overburden stockpiles, growth medium stockpiles, monitoring wells, and road reroute have been designed to avoid all eligible sites. The design consists of a minimum 30-meter (approximately 100 feet) buffer zone around all eligible sites in the area. BLM archaeologists would relocate and flag the avoidance areas that would include archaeological sites and buffer zones. Hecla would be required to mark these exclusion zones with steel t-posts, and concrete barriers would be placed during construction activities to ensure that a visible, stable barrier is present between each eligible site and the surrounding operations in order to protect the sites from damage. Although these measures would be taken to protect all eligible cultural sites in the project area, impacts to eligible cultural sites could occur if the barrier is removed or looting occurs.

Providing that Hecla implements the environmental protection measures stated in section 2.1.11.2, the BLM has determined that the proposed project would have no adverse effect to significant cultural resources.

4.1.13 Native American Religious Concerns

Out of past consultations and as a result of dialogue exchange and information gathering and sharing, the following issues were identified: access to certain sites being hindered or blocked due to mining activities; water being contaminated due to mining activities; springs drying up due to any dewatering; mining employees and contractors looting the archaeological resources; the quiet and solitude required during certain ceremonies being interrupted by mining activities (noise pollution).

At this time, it is believed that this proposed action (underground exploration) does not pose a direct and permanent threat to traditional/cultural/spiritual activities, sites of ceremony, and archaeological resources. The following information addresses the issues and concerns noted above. Due to the location of temporary (non-permanent) mobile project facilities and supporting structures, tribal cultural activities and sites described above will not be compromised. The location of all surface activities will be within the existing Ivanhoe East Pit, except for the RIBs, which are to be located 4.5 miles south of the East Pit. All cultural resources will be avoided during and after RIBs construction. Access routes will not be blocked or hindered, although access to and from the mining operation itself will be monitored. All state and federal requirements and measures to prevent any contamination due to project activities will be put into affect. It is believed that the water to be extracted from the portal itself is not associated with springs that are of concern to the tribes. Antelope Spring is ephemeral, and flow is in response to snowmelt and precipitation/run-off events. Buttercup and Ivanhoe springs are perennial, and appear to originate from recharge to the Big Butte flow dome complex. As a result, all three springs are not related to the aquifer systems that would be encountered by the decline. During the height of mining operations at the old Ivanhoe open pit, no affects to nearby springs were noted. Because exploration operations are limited to the East Pit and the underground portal, noise, compared to most mining operations, will be quite minimal.

Although not required, certain tribes that participate in traditional, cultural, spiritual activities in the Tosawihi area have chosen to inform the BLM of the dates, times, and locations of their activities so that BLM can ensure that traditional practitioners can have their privacy and are not interrupted by the public, mining activity, and BLM employees. Hecla has been made aware of the fact that tribal members utilize the area for traditional/cultural purposes. Hecla has been committed to reducing any negative impacts their operations may have to tribal practices and cultural resources in general. Hecla has also committed to informing their employees and any contractors of the significance of the area and will inform them of the implications of any violations of all laws, rules, and regulations pertaining to cultural resources, artifacts, and Native American religious freedom. When tribes inform BLM of any plans to partake in spiritual, cultural, traditional activities, BLM will inform all federal employees in the area and the HDB Project personnel so that impacts to such activities can be limited, reduced, or prevented entirely. BLM Law Enforcement and other personnel will continue to regularly monitor the area.

4.2 ALTERNATIVES

Implementation of the No Action Alternative would result in the denial of the proposed HDB Project as designed. Implementation of the No Action Alternative would also avoid potential direct and indirect effects associated with the Proposed Action. Under the No Action Alternative, the potential ore reserve and deposit would remain unevaluated and undefined, resulting in a possible loss of future opportunities to recover economic gold values. Under this alternative, the pipeline and RIBs would not be constructed. The 1,500 feet of the existing access road within the Little Antelope Creek riparian exclosure rendered impassable following the Hot Lakes fire would remain disjunct and unreclaimed.

4.3 MITIGATION

4.3.1 Wetlands and Riparian Zones

As a result of the construction of the water pipeline and reconstruction of the Little Antelope Creek access road through the BLM exclosure on Little Antelope Creek, 0.025 acres of identified potential wetlands would be temporarily impacted. During reclamation of this section of the Little Antelope Creek road following completion of the project, the 0.025 acres of wetlands would be restored. Reclamation of this area would include regrading or reshaping the access road to make it impassable for vehicular travel and seeding and/or planting vegetation such as willows.

4.3.2 Migratory Birds

When active nests are located, a protective buffer around the nest would be delineated. Buffer distance would be decided as appropriate for a specific species by a qualified biologist in consultation with and approved by the BLM.

4.3.3 Cultural Resources

The BLM will reestablish the boundaries, if necessary, of eligible cultural sites that could be impacted by the Proposed Action and flag off the avoidance and buffer zones.

Prior to the implementation of the Proposed Action, Hecla will ensure avoidance of the eligible cultural sites by:

1. Placing exclusion barriers a minimum of 30 meters (100 feet) from the perimeter of known cultural sites. The exclusion barrier perimeter will be marked with steel t-posts and/or concrete barriers to ensure that a visible barrier is present between the cultural sites and the surrounding operations area in order to protect the cultural sites from damage;

2. Restricting maintenance and off-road travel to the existing roadbed when using roads that are located within or adjacent to a cultural site. Neither road widening nor construction of wing ditches will be authorized. A t-post barrier line shall be established on the outside edges of the berms of primary access routes through eligible cultural sites; and

3. Directing its personnel and the personnel of its contractors to avoid all staked areas under penalty of Archaeological Resources Protection Act of 1979 (16 U.S.C. 470).

4.4 RESIDUAL IMPACTS

Residual impacts resulting from the Proposed Action after implementing the reclamation measures would be the loss of the mineralized material that was removed for bulk sampling, loss of waste rock material due to the excavation of the decline, and the creation of an opening that is approximately 4,900 feet in length and 15 feet wide by 15 feet high remaining beyond the sealed entrance. In addition, the reclaimed areas have the potential to be invaded by cheatgrass and other invasive, non-native species. Cheatgrass and invasive, non-native species would occur if revegetation of the reclaimed disturbance areas with desirable self-sustaining plant communities and eradication treatments were to fail.

4.5 CUMULATIVE IMPACTS

All resource values have been evaluated for cumulative impacts. As a result of the Proposed Action or No Action Alternative, it has been determined that cumulative impacts would be negligible for most resources. The Proposed Action would result in an incremental impact to water resources and cultural resources. The primary activities that would contribute to cumulative impacts include past, present, proposed, and reasonably foreseeable future actions in mining, exploration, grazing, fire and fire rehabilitation, roads, power lines, and recreation. Past, present, proposed, and reasonably foreseeable future actions are described in this section with respect to the cumulative assessment areas. A 10-year reasonable foreseeable time frame was used for this analysis.

Cumulative impacts are analyzed for water resources and cultural resources. The cumulative assessment area for the water resources includes the cone of depression area associated with Barrick Goldstrike Mines Inc.'s (Barrick) Goldstrike Mine (Betze and Meikle operations), Newmont's Leeville and South Operations Area Project (SOAP), and the Proposed Action. Barrick's Goldstrike Mine is located approximately 11 miles southeast of the HDB Project. Newmont's Leeville and SOAP operations are located approximately 15 and 26 miles southeast of the HDB Project, respectively. The cumulative assessment area for water resources is shown on Figure 11. The cumulative assessment area for cultural resources includes areas associated with past, present, proposed, and reasonably foreseeable future actions, as shown on Figure 12.

For many thousands of years, Native Americans have mined and quarried this area. Exploration and modern mining activities have been conducted in the Ivanhoe Mining District over the past 100 years, with the majority of activity occurring from 1980 to the present. Prospecting for mercury began in the area at the turn of the twentieth century and multiple mining projects have taken place here over the past 100 years. The district was inactive from 1916 to the late 1920s, but production resumed from 1929 to 1943. Since 1963, the area has been actively explored for mercury, molybdenum, uranium, and gold. Construction of the Hollister Mine began in 1990, with excavation of the USX East and West pits (East Pit and West Pit, respectively) completed by 1992. A total of 268 acres of surface disturbance took place during this mining operation that included pits, overburden stockpiles, heap leach pad and ore process facilities, access and haul roads, and ancillary facilities. Much of this area has been reclaimed. In 1997, a surface-drilling exploration program was initiated by Great Basin Gold, Inc., which identified high-grade veins in the area of the HDB Project.

A high-voltage power line is located across the southern portion of the project area, adjacent to the proposed RIB location. No paved roads and few improved gravel roads exist within the cumulative assessment areas. Multiple two-track roads and trails are present and are utilized for power line maintenance, while other two-track roads provide access for recreation opportunities.

The 2001 Hot Lakes wildfire impacted approximately 71,900 acres. Portions of the cumulative assessment areas were burned during this fire. Within the cumulative assessment areas, livestock grazing is authorized for various seasons of use depending on the allotment and permittee, with all months of the year receiving some grazing use. The project area lies within the Twenty-Five (25) Grazing allotment. A livestock fence surrounds the former Hollister Mine area and fencing also exists surrounding the Willow Creek Seeding and the Antelope Creek/Santa Renia Pasture.

Present and proposed activities include the proposed activity described in this EA. Proposed disturbance for the HDB Project consists of approximately 51 acres and would include project facilities construction, construction of a decline, and RIBs construction. Road improvement projects may also occur within the cumulative assessment areas. Future reclamation activities would include reclamation of the disturbance associated with the proposed project.

Other present activities include active mineral exploration, mining, and reclamation. Modern mining activities in the Carlin Trend began in the 1940s at the Rossi Mine and 1960s at the Carlin Mine. From the 1980s to the present, mining activity increased. In the mid to late 1980s Barrick began dewatering operations related to the mining activities at the Goldstrike Mine. In the early 1990s Newmont began dewatering operations related to the mining activities at SOAP. In 2003, Newmont began dewatering operations at the Leeville Project. Mining and dewatering are projected to continue through the year 2010 at the Goldstrike Mine, year 2018 at the Leeville Project, and 2012 at the SOAP with reclamation projected to last up to another 10 years (BLM, 2000). The April 2000 Cumulative Impact Analysis (CIA) of Dewatering and Water Management Operations for the Betze Project, SOAP Amendment, and Leeville Project analyzed the potential cumulative environmental impacts associated with the groundwater pumping and water management operations of these mines. The Goldstrike Mine and Leeville Project are located in the Boulder Flat Hydrologic Basin. The SOAP is located in the Maggie Creek Hydrologic Basin. The HDB Project is located in the Rock Creek Valley Hydrologic Basin.

Livestock grazing is conducted during all months of the year. Recreational use is likely to occur during all seasons and would include hunting, fishing, camping, four-wheel use, snowmobile use, sightseeing, and rock hounding.

Reasonably foreseeable future actions include the development of an underground mining operation at the Hollister Mine. Development of an underground mining operation at the Hollister Mine would likely result in minor increases in surface disturbance and continued removal of water from the underground operation. It is anticipated that a 20 percent increase in the amount of water removed from the underground workings could occur if a mine was developed following completion of the proposed project. Surface disturbances could include the construction of an overhead power line or continued use of diesel generators for electrical needs. It is anticipated that project support facilities proposed within the East Pit would not change, except with the possible addition of one administrative building and permanent maintenance shop constructed within the East Pit perimeter. The waste rock disposal facility within the East Pit could increase in size and capacity depending on the chosen mining method. Ore removed from a commercial mine would be hauled off-site for beneficiation, thus no processing facilities would be constructed in the project area. It is also possible that the size of the RIBs could be increased and/or the placement of additional RIBs may be required.

The following sections discuss the cumulative impacts of the proposed HDB Project when combined with past, present, and reasonably foreseeable future actions within the cumulative assessment areas.

Water Resources

Impacts to water resources through dewatering, underground injection, fires, grazing, and other activities have occurred as a result of past activities and natural events, and may occur with the proposed exploration activity, reasonably foreseeable future actions, and future natural events such as fires. Cumulative impacts to water resources have not occurred all at once, nor did they occur at one location. Impacts occurred sporadically in the past and were dispersed over the cumulative assessment areas. Cumulative impacts to water resources from past mining activities have been addressed in previous EAs and Environmental Impact Statements (EISs) (BLM, 1988a; BLM, 1999) and the CIA of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project (BLM, 2000). Impacts to water resources would continue from other activities such as livestock grazing, recreational activities, and fire.

With the development of the decline during the proposed exploration operation and with reasonably foreseeable future mining activities, removal of groundwater from the decline would be required. It is estimated that a sustainable flow of 190 gpm and short-duration surge flows of 450 gpm would be removed during the life of the project. Reasonably foreseeable future mining at the project site may result in a 20 percent increase in water entering the underground workings. Discharge of decline water to surface waters is not anticipated as a reasonably foreseeable future action.

Figure 11 illustrates the modeled prediction of the maximum extent of the 10-foot drawdown area from the cumulative dewatering of the Goldstrike Mine, Leeville Project, and SOAP relative to the HDB Project. The current cumulative drawdown area is elongated in a northwest to southeast trend. As of the end of 1998, the cumulative drawdown area for the Goldstrike Mine, Leeville Project, and SOAP crossed into the Rock Creek Valley Hydrologic Basin (BLM, 2000). The northwest edge of the drawdown curve is located just south of Antelope Creek. Figure 13 illustrates the quasi-elliptical shape of the drawdown area relative to the HDB Project. If this trend for the cumulative drawdown area of these mines continues, the proposed HDB Project would be located in the direct path of the cumulative dewatering cone of depression.

The estimated pumping and discharge rates for the Goldstrike Mine, Leeville Project, and SOAP range from 2,000 gpm to approximately 56,000 gpm over the life of the mines and into reclamation (BLM, 2000). The estimated volumes of pumping and discharging for these mines are predicted to be at least 10 times greater than the predicted discharge volume for the HDB Project during the proposed exploration and at least 8 times the predicted discharge volume for a reasonably foreseeable future mine.

Based on predictions for the cone of depression associated with Barrick's and Newmont's Carlin Trend operations, the 10-foot drawdown contour for the groundwater aquifer extends beyond the proposed HDB exploration project and reasonably foreseeable future mining activity at the Hollister Mine (BLM, 2002). Since Barrick's and Newmont's predicted groundwater cone of depression extends far beyond the HDB exploration project and reasonably foreseeable future mining activity at the Hollister Mine, no cumulative impact would likely be realized by the proposed exploration project or reasonably foreseeable mining activity. Due to the extent of Barrick's and Newmont's predicted cone of depression, a cessation or a reduction of groundwater inflow may be realized with the proposed project and/or reasonably foreseeable future mining operations at the HDB Project.

However, the dewatering operations for the Goldstrike Mine, Leeville Project, and SOAP are predicted to last until the years 2010, 2018, and 2012, respectively. Based on a 10-year period or until the year 2014 for the reasonably foreseeable future scenario of an underground mining operation, the HDB Project could extend the incremental and cumulative impacts to the groundwater aquifer by a minimum of two years. The duration of incremental and cumulative impacts to the groundwater aquifer would be dependent upon whether the dewatering of just the Goldstrike Mine in combination with the HDB Project influenced the cone of depression or whether the dewatering of one or all three of these mines in combination with the HDB Project would influence the cone of depression in the area of the HDB Project. Factors of influence on the incremental and cumulative impacts to the groundwater aquifer would include, but are not limited to, the distance and rate of pumping of these other mines, time frames, the proposed decline and reasonably foreseeable future mining action in relation to the geologic structures and actual groundwater conditions, hydrostratigraphic and hydrostructural conditions, recharge and evapotranspiration processes, and groundwater flow patterns on a localized and regional basis. It is possible that unknown or undetected conditions may exist, such as hydraulic barriers or zones of unusually high permeability, which could influence the future drawdown patterns of these operations. It is important to understand that the actual hydrogeologic conditions in the vicinity of the HDB Project and mines in the Carlin Trend are complex and unknown conditions exist.

There are numerous springs and other water resources throughout the water resources assessment area. The sources of water for these resources include precipitation run-off and groundwater recharge. Intermittent springs are not recharged from the lower groundwater aquifer (Valmy Formation) and thus would not be impacted by the cumulative dewatering cone of depression or dewatering of this aquifer. Perennial springs recharged by the lower groundwater aquifer (Valmy Formation) would likely be impacted by the cumulative dewatering cone of depression or dewatering of this aquifer. If the dewatering associated with Barrick and Newmont operations affect the upper Tertiary-age aquifer, loss of recharge to some of the springs may also occur.

Cultural Resources

For the purposes of Section 106 Compliance with the National Historic Preservation Act (NHPA), there would be no adverse effect to National Register eligible properties as a result of the proposed project or reasonably foreseeable future actions. Persons, companies, or agencies associated with future actions would work with the BLM to avoid or mitigate any impacts to cultural sites. There would be no anticipated cumulative adverse impacts associated with the proposed project.

The April 2000 CIA of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project analyzed the cumulative impacts to issues of Native American concern. The issues of concern for impacts to plants, animals, water, traditional cultural properties, grave sites, historic sites, and traditional religious practices and cosmology would be the same. However, the HDB Project would have a greater direct impact and cumulative impact specifically to the Tosawihi Quarries area.

4.6 MONITORING

A BLM representative would conduct regular field inspections throughout construction, operation, and reclamation activities associated with the Proposed Action. All field compliance inspections would be documented in the project file at the BLM Elko Field Office.

Periodic monitoring and documentation of erosion and sediment control structures throughout construction, operation and reclamation would occur. Surface erosion relative to individual activities would be evaluated. If erosion, sedimentation, or other surface water and groundwater quality impacts occur, the situation would be evaluated for the potential source(s) and the problem would be corrected. Corrective action measures would be performed in consultation with and approved by BLM and NDEP.

Hecla must submit, on a quarterly basis, waste rock material characterization reports to the BLM. Hecla would submit, to the BLM, a copy of the Water Pollution Control Monitoring Reports and closure plan required by NDEP as a condition of the WPCP. These monitoring reports include characterization of water quality, de-silting basin sediment, mine materials, mine materials discharge, and spill reports.

Hecla would submit to the BLM, a copy of the Wildlife Mortality Reports required by NDOW as a condition of the Industrial Artificial Pond Permit.

The WPCP issued by NDEP allows for continued monitoring of the project as determined by NDEP up to 30 years. Monitoring as determined by the BLM under 43 CFR 3809 regulations is discretionary. The monitoring period would be reviewed periodically by the agencies to determine if modifications are warranted and whether long-term bonding would be necessary.

5.0 CONSULTATION AND COORDINATION

5.1 List of Preparers

BLM Specialist

Janice Stadelman	Project Lead/Geology/Minerals/Environmental Justice
Jason Allen	Lands
Nycole Burton	Aquatics/Riparian
Mark Coca	Invasive, Non-Native Species
Gerald Dixon	Native American Religious Concerns
Bryan Hockett	Cultural and Paleontological Resources
Carol Marchio	Soil/Water/Air
Deb McFarlane	Hazardous Materials/Waste
Donna Nyrehn	Range Resources/Vegetation
JuLee Pallette	Recreation/Visual Resource Management/Wilderness
Lorrie West	Environmental Coordinator
Ken Wilkinson	Wildlife/Special Status Species

JBR Environmental Consultants, Inc.

Catherine Clark	Senior Scientist
Dulcy Engelmeier	Administrative Assistant
Karen Kinsella	Environmental Scientist
Kristi McKinnon	Environmental Analyst
Kathy Oakes	Senior Scientist
Connie Pixton	Draftsperson
Pat Rogers	Division Manager
Richard Weber	Project Manager

5.2 Persons, Groups, and Agencies Consulted

Nevada Division of Wildlife, Western Region

Rory Lamp	Biologist III

Nevada Natural Heritage Program

Eric Miskow	Biologist III/Data Manager

U.S. Fish and Wildlife Service

Robert D. Williams	Acting State Supervisor

Hecla Ventures Corporation

Richard Appling	Project Manager
Paul Glader	Environmental Manager
Cindy Gross	Environmental Engineer
Chris Gypton	Senior Project Engineer
Dave Holland	Senior Environmental Analyst
Cindy Moore	Project Engineer
Rick Rukavina	Independent Contractor
Bob Tridle	Chief Chemist

Sierra Pacific Power Company

John Berdrow, P.E.	Manager, Major Projects

5.3 TRIBAL ENTITIES CONTACTED

BLM is required to inform, update and provide the tribes, under the following mandates, the opportunity to comment and consult, work in cooperation, and take part in the decision making process regarding federal land management proposed actions. Those mandates directing BLM are the NHPA (P.L. 89-665), the NEPA (P.L. 91-190), the Federal Land Policy and Management Act (P.L. 94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601) and Executive Order 13007.

Because the Tosawihi Quarry area is renowned as an area of traditional, cultural, and spiritual use, and considered sacred to the Western Shoshone and other tribal groups, BLM did not hesitate to initiate formal consultation with the following tribal entities: Duckwater Shoshone Tribe, Temoak Tribe of Western Shoshone (Elko, Battle Mountain, Wells, South Fork Band), Yomba Shoshone Tribe, Fort McDermitt Paiute-Shoshone Tribe, Summit Lake Paiute Tribe, Goshute Tribe, Ely Shoshone Tribe, Fort Hall Shoshone-Bannock Tribes, Duck Valley Shoshone-Paiute Tribes of Nevada and Idaho, and the Western Shoshone Defense Project. Letters initiating formal consultation were mailed on April 14, 2003. Of all the tribal entities listed, the Duck Valley Shoshone-Paiute Tribes of Idaho and Nevada and the Fort Hall Shoshone-Bannock Tribes expressed the greatest interest in the proposed action and participating in the identification of possible issues, conflicts, and concerns.

The Fort Hall Heritage Tribal Office requested further and more detailed information and gave technical input regarding possible affects to cultural resources. Requested information was sent to Fort Hall Heritage Tribal Office staff. The Duck Valley Shoshone-Paiute Tribe also made it known to the BLM the sacredness and importance of the area to the tribe in maintaining continued traditional use by tribal members. This was made known through personal contact, letter, email, and documentation of past consultation efforts. Correspondence with this particular tribe (Duck Valley Shoshone Paiute Tribes) and all other tribes, regarding this sacred area, is on file at the BLM Elko Field Office and, again, is considered strictly confidential.

BLM management and staff met with Duck Valley Shoshone-Paiute Tribal leadership and cultural staff on October 10, 2003, in which the HDB Project was one of many topics. Since the project's introduction to the tribes on April 14, 2003, the HDB Project has also been an agenda item at the various Western Shoshone Information meetings; however, these meetings are not considered true consultation. On November 6, 2003, a follow up letter to the October 10, 2003, meeting was sent to the Duck Valley Shoshone-Paiute Tribal Chair and Cultural Resources Department inquiring as to the identification of any specific tribal concerns as a result of the proposed underground exploration project. This letter also served as an invitation to the Tribe to participate in further discussions. On November 25, 2003, a letter was received by BLM from the Chairman of the Duck Valley Shoshone-Paiute Tribe expressing great interest in working towards the development of a consultation protocol. However, specific information regarding the specific action (HDB Project) was not given. On December 18, 2003, a letter was sent to the Duck Valley Shoshone-Paiute Tribe as a follow up to the Chairman's November 25, 2003 letter. In this letter, BLM stated, "Although BLM has information regarding the cultural/spiritual/traditional use of this important area, to date, we have received little input from the tribes that specifically state the affects any underground exploration may have to traditional activities in the area." A date of January 9, 2004, was given in the letter as the final comment date for the Duck Valley Shoshone-Paiute Tribe regarding this specific action. Although the Duck Valley Shoshone-Paiute Tribe has informed BLM of their desire to develop an overall consultation protocol and to be informed of all activities in the Tosawihi area, specific comments regarding the proposed action were not received.

Tribal representatives (South Fork Band, Battle Mountain Band, Duck Valley Shoshone-Paiute Tribe, Duckwater Shoshone Tribe, Western Shoshone Defense Project) were informed of the fact that BLM would be closing the comment period at the January 29, 2004, Western Shoshone Information meeting. Letters closing the tribal comment period for this specific project were mailed to all other tribal entities on the original mailing list on February 4, 2004.

Although the comment period for this specific action (HDB Project) has been closed, the BLM Elko Field Office remains in contact and correspondence with not only the Duck Valley Shoshone-Paiute Tribe, but all other tribes who value the area, utilize the resources, and/or practice traditional/cultural activities in the Tosawihi area. Efforts to better manage the Tosawihi Quarry area with participation from the affected tribes are ongoing with consultation not necessarily being tied to a specific project.

In a letter dated February 17, 2004 from the Yomba Shoshone Tribe, they stated that no disturbance should occur in the Tosawihi Quarries area and they encouraged the BLM to deny the HDB Project.

The following tribal entities were contacted during the consultation process:

Duckwater Shoshone Tribe
- Annette George - Environmental
- Perline Thompson - Chair

South Fork Band Council
- Larson Bill - Chair
- Dallas Smalles - Environmental
- Ronnie Woods - Chair

Wells Band Council
- Aurora Aboite - Environmental
- Willie Johnny - Chair

Yomba Shoshone Tribe
- James Birchim - Chair
- Bonnie Bobb - Environmental
- Gerald John - Chair

Fort McDermitt Paiute-Shoshone Tribe
- Robert Garfield - Chair
- Edmond Garfield - Environmental

Temoak Tribe of Western Shoshone
- Jennifer Bell - Environmental
- Felix Ike - Chair
- Brandon Reynolds - Vice-Chair
- Hugh Stevens - Chair

Summit Lake Paiute Tribe
- Robyn Burdette - Chair

Elko Band Council
- Alfred Jake - Environmental

Fermina Stevens - Chair
Glory Two Eagles - Chair

Goshute Tribe
Amos Murphy - Chair
Rupert Steele - Chair
Ken Williams - Environmental

Ely Shoshone Tribe
Diana Buckner - Chair
Cindy Marques - Environmental

Fort Hall Shoshone Bannock Tribes
Fredrick Auck - Chair
LaRae Buckskin - Environmental
Blain Edmo - Chair

Battle Mountain Band Council
Joseph Holley - Chair
Stanford Knight - Chair
Bernice Lalo - Environmental

Western Shoshone Defense Project
Christopher Sewall

Duck Valley Sho-Pai Tribe
Terry Gibson - Chair
Ted Howard - Cultural Resources

5.4 PUBLIC NOTICE AND AVAILABILITY

As part of the preparation of the HDB Project EA, the BLM solicited comments by letter on the project from numerous agencies, organizations, and the public from April 25, 2003 to May 25, 2003.

The BLM Elko Field Office issued a news release on April 25, 2003 to several news organizations soliciting comments from the public. Notification of this project was included in the BLM Elko Field Office Project and Planning Schedule. Copies of the HDB Project EA can be obtained at the BLM Elko Field Office.

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FIGURES

APPENDIX A

ABA and MWMP Test Results

APPENDIX B

NRCS Soil Map Units

APPENDIX C

Special Status Species Information

Appendix C
Special Status Species Identified Through Agency Consultation as Potentially Occurring in Project Area and Evaluation of their Potential to Occur in the Project Area[1]

Common Name	Scientific Name	Project Area Status
Federally Threatened Species		
Bald eagle	*Haliaeetus leucocephalus*	Occasional migrant over site, unlikely to nest or roost on-site as habitat is lacking
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	Unrecorded/Habitat lacking in project area
Federal Candidate Species		
Columbia spotted frog	*Rana luteiventris*	Unrecorded/Habitat lacking in project area
State of Nevada Listed and Protected Species[2]		
Spotted bat	*Euderma maculatum*	Unrecorded on-site/suitable habitat lacking
Goshawk	*Accipiter gentilis*	Unrecorded/Habitat lacking in project area
Golden eagle	*Aquila chrysaetos*	Recorded as flying over site, not recorded as nesting on or near site
Burrowing owl	*Athene cunicularia*	Confirmed to be nesting on-site
Ferruginous hawk	*Buteo regalis*	Reported by NDOW as nesting in general area/no nests located on-site and species not observed on or near the site
Swainson’s hawk	*Buteo swainsoni*	No nests located on-site and species not observed on or near the site
Osprey	*Pandion haliatus*	Unrecorded/Habitat lacking in project area
White pelican	*Pelecanus erythrorhynchos*	Unrecorded/Habitat lacking in project area
White-faced ibis	*Plegadis chihi*	Unrecorded/Habitat lacking in project area
Relict dace	*Relictus solitarius*	Unrecorded/Habitat lacking in project area
Nevada BLM Sensitive Species[3]		
Silver-haired bat	*Lasionycteris noctivagans*	Unrecorded but possibly could occur on-site
Hoary bat	*Lasiurus cincereus*	Unrecorded but possibly could occur on-site
California myotis	*Myotis californicus*	Possibly recorded on-site via Anabat detection
Small-footed myotis	*Myotis ciliolabrum*	Unrecorded but possibly could occur on-site
Long-eared myotis	*Myotis evotis*	Unrecorded but possibly could occur on-site
Little brown myotis	*Mytois lucifigus*	Unrecorded but possibly could occur on-site
Fringed myotis	*Myotis thysanodes*	Unrecorded but possibly could occur on-site
Long-legged myotis	*Myotis volans*	Unrecorded but possibly could occur on-site
Yuma myotis	*Myotis yumanensis*	Unrecorded but possibly could occur on-site
Big free-tailed bat	*Nyctinomops macrotis*	Unrecorded but possibly could occur on-site
Western pipistrelle bat	*Pipistrellus hesperus*	Recorded on-site by Anabat detection
Pale Townsend's big-eared bat	*Plecotis townsendii pallescens*	Unrecorded but possibly could occur on-site
Pacific Townsend’s big-eared bat	*Plecotis townsendii townsendii*	Unrecorded but possibly could occur on-site
Brazilian free-tailed bat	*Tadarida braziliensis*	Unrecorded but possibly could occur on-site

Common Name	Scientific Name	Project Area Status
Pygmy rabbit	*Brachylagus idahoensis*	Unrecorded but possibly could occur on-site
Preble's shrew	*Sorex preblei*	Unrecorded/ habitat lacking on-site
Prairie Falcon	*Falco mexicanus*	Recorded as strongly likely to be nesting on-site
Greater sage grouse	*Centrocercus urophasianus*	Leks within 1.5 mile of the site. Potential brood rearing habitat on-site, but no evidence of sage grouse use in the project area
Black tern	*Chlidonias niger*	Unrecorded/Habitat lacking in project area
Long-eared owl	*Asio otus*	Unrecorded but possibly could occur on-site
Short-eared owl	*Asio flammeus*	Unrecorded but possibly could occur on-site
Mountain quail	*Oreortyx pictus*	Unrecorded/Habitat lacking in project area
Loggerhead shrike	*Lanius ludovicianus*	Unrecorded but possibly could occur on-site
Vesper sparrow	*Pooecetes gramineus*	Unrecorded but possibly could occur on-site
Interior redband trout	*Onchorhyncus mykiss gibbsi*	Unrecorded/Habitat lacking in project area
California floater	*Anodonta californiensis*	Unrecorded/Habitat lacking in project area
Mattoni's blue butterfly	*Euphilotes rita mattoni*	Unrecorded/Habitat lacking in project area
Grey's Silverspot	*Speyeria hesperis greyi; Speyeria atlantis greyi*	Unrecorded/Habitat lacking in project area
Nevada viceroy	*Limenitus archippus lahontani*	Unrecorded/Habitat lacking in project area
Lewis buckwheat	*Eriogonum lewisii*	Unrecorded/Habitat lacking in project area

Source: Wilkinson, 2003, consultation and coordination with USFWS, NDOW, and NNHP database search

[1] Based on input provided by BLM, NDOW, and USFWS, BLM Instruction Memorandum No. NV-98-013 (February 27, 1998) and BLM Special Status Species list (Updated 12/1/99 and August, 2003) and the Elko Field Office list of "Former Candidate Category 2 Species On Or Suspected On Elko District -BLM Lands Recommended As BLM Sensitive Species As Of 5/96".

[2] Includes only Nevada listed and protected species (per NAC 501.100 - 503.104) that also meet BLM criteria for protection under BLM Manual Section 6840.

[3] Species designated by the BLM State Director, in cooperation with the State of Nevada Department of Conservation and Natural Resources, that are not already included as BLM Special Status Species under (1) Federally listed, proposed, or candidate species; or (2) State of Nevada listed species. Includes species newly listed on the August, 2003 update of BLM Nevada Sensitive Species.

APPENDIX D

Migratory Birds by Habitat Type

Appendix D
Migratory Birds by Habitat Type

Montane Riparian	Montane Shrub	Sagebrush	Cliffs and Talus
Obligates: Wilson's Warbler MacGillivray's Warbler Other: Cooper's Hawk' Northern Goshawk Calliope Hummingbird Lewis's Woodpecker Red-Naped Sapsucker Orange-crowned Warbler Virginia's Warbler Yellow-breasted Char **Other Associated Species** Warbling Vireo Broad-tailed Hummingbird Fox Sparrow Blue Grouse	Obligates: None Other: Black Rosy Finch Black-throated Gray Warbler Calliope Hummingbird Cooper's Hawk Loggerhead Shrike Blue Grosbeak Vesper Sparrow MacGillivray's Warbler Orange-crowned Warbler Swainson's Hawk Western Bluebird	Obligates: Sage Grouse Other: Black Rosy Finch Ferruginous Hawk Gray Flycatcher Loggerhead Shrike Vesper Sparrow Prairie Falcon Sage Sparrow Sage Thrasher Swanson' Hawk Burrowing Owl Calliope Hummingbird **Other associated Species:** Brewer's Sparrow Western Meadowlark Black-throated Sparrow Lark Sparrow Green-tailed Towhee Brewer's Blackbird Horned Lark	Obligates: Prarie Falcon Black Rosy Finch Other: Ferruginous Hawk **Other associated species:** Golden Eagle White-throated Swift Say's Phoebe Common Raven Cliff Swallow Canyon Wren Rack Wren

* "Obligates" are species that are found only in the habitat type described in the section. (Habitat needed during life cycle even through a significant portion of their life cycles is supported by other habitat types)
** "Others" are species that can be found in the habitat type described the Nevada Partners in Flight Bird Conservation Plan.