

# Little Rock Mine Biological Resources Analysis

Submitted to:  
Bureau of Land Management  
Las Cruces District Office  
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Las Cruces, New Mexico 88005

On behalf of:  
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## INTRODUCTION

This supplemental documentation updates the project record for biological resources and assists the Bureau of Land Management (BLM) in their evaluation of whether new information or changes in conditions or circumstances affect the original National Environmental Policy Act (NEPA) determination in support of the Approved Proposed Action as described in the 1997 Final Environmental Impact Statement (FEIS; with the exception of the stockpile reclamation). The requests/ questions posed by the BLM and US Forest Service (USFS) related to biology include:

1. Re-evaluate potential effects to the Chiricahua leopard frog (CLF).
2. Determine the unknown impact to several springs due to pit de-watering, giving consideration to the potential for these springs to be Chiricahua leopard frog habitat.
3. Update the list of the current special status species lists that need consideration and identify critical habitat. Provide definitive affects determinations with appropriate rationale.
4. Provide a stand-alone affects determination for identified critical habitat in the project vicinity (southwestern willow flycatcher (SWFL), loach minnow, and spikedace).
5. Describe the area of potential impacts. Discuss possible impacts to water quality and flow regime in Mangas Creek and the Gila River, and thus, species that may occur there.
6. Review and analyze potential affects to Southwestern Region 3 sensitive species for the Gila National Forest (GNF).
7. Review and analyze potential affects to Management Indicator Species for the GNF.

The documentation presented herein provides information to the BLM regarding the potential for occurrence and the determination of potential effects from mining activities at the Little Rock Mine on federally listed species including the CLF, SWFL, and spikedace and loach minnow. This memorandum also addresses the northern goshawk, species regulated under the Migratory Bird Treaty Act (MBTA), and Management Indicator Species listed for the GNF.

Additional analysis for other sensitive, candidate, threatened, and endangered species listed by the state of New Mexico, BLM, and GNF is attached to this supplemental documentation as Appendix B. The information presented in this memorandum serves as the basis for the biological analysis portion of the DNA.

## BACKGROUND AND REGULATIONS

Section 7(a)(2) of the Endangered Species Act (ESA) states that each federal agency shall, in consultation with the Secretary of the Interior/Secretary of Commerce, ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. The BLM has requested preparation of an update to the biological resources analysis to determine whether previously approved mining activities at the Little Rock Mine are likely to: (1) adversely affect listed species or designated critical habitat; (2) jeopardize the continued existence of species that are proposed for listing; or (3) adversely modify proposed critical habitat.

Based on the BLM and USFS review of the prior NEPA analyses conducted for this proposed project, as requested by FMI in January 2010, the agencies have indicated that the species listed above and/or their critical habitat require updated/specific analyses to determine if they would be affected by the previously approved proposed action for the Little Rock Mine.

To satisfy the above referenced requirements, Tierra EC has reviewed the known historical range, distribution, and location of designated or proposed critical habitat for the CLF, SWFL, spikedace, and loach minnow, and recently (April 26-28, 2010) conducted a field survey to evaluate habitat features proximate to the approved, proposed mining activities. The primary purpose of the field survey was to evaluate known surface water features within five miles of the proposed Little Rock Mine permit boundary that could function as potential suitable habitat or facilitate dispersal of CLF. A current/updated hydrogeologic flow model indicates that a five-mile radius around the mine permit boundary generously encompasses a projected cone of depression due to groundwater withdrawal and drawdown, and considers potential effects on springs and seeps (refer to the Hydrology Section). Correspondingly, Tierra EC established an Area of Potential Effect (APE) at a five-mile radius around the mine permit boundary. The APE also considers dispersal distances for CLF (Southwest Endangered Species Act Team 2008). A report that details the methods and results of the CLF field survey is attached as Appendix C.

The first step in the biological evaluation process was to determine if listed, proposed, or candidate species or their habitat occurs within the APE. The four potential for occurrence categories that were applied in this analysis are defined below.

- **Known to Occur** – the species has been documented in the project area by a reliable observer.
- **May Occur** – the project area is within the species currently known range and habitat/vegetation communities resemble those known to be used by the species.
- **Unlikely to Occur** – the project area is either within the species currently known range but habitat/vegetation communities do not resemble those known to be used by the species or the project area is clearly outside the species currently known range.
- **Does not Occur** – the project area is outside of the known range and distribution for the species, none of the documented and required habitat elements for the species is present on or near the site, and/or focused species-specific surveys have not detected the presence of the species.

Based on the categories described above, the potential for the identified species to occur in the APE is summarized below. The species protection status and preferred habitat elements are also briefly described.

### **Chiricahua Leopard Frog (*Lithobates [Rana] chiricahuensis*)**

#### Protection Status

Federal – Threatened, State – Sensitive, BLM – none, USFS Region 3 – Threatened

#### Preferred Habitat Elements

**Suitable Aquatic Habitat** – This species occurs at elevations from 3,280-8,890 feet (1,000-2,600 meters) amsl. It is known to occur in a variety of permanent aquatic habitats where adequate depth and

wetland vegetation provide escape from predators. Suitable habitat includes montane springs, streams, ponds, lakes, marshes, and plunge pools of canyon streams. CLF has also been documented to utilize man-made stock tanks, spring boxes, open wells and other unnatural surface water sources within its distribution range (BisoN-M 2010a).

The following habitat features are likely required to maintain a reproducing population of CLF (Southwest Endangered Species Act Team 2008):

- Permanent or nearly permanent water that is free or relatively free from non-native predators;
- Aquatic habitat diversity, including:
  - Shallow water with emergent and perimeter vegetation that provide egg deposition, tadpole and adult thermoregulation sites, and foraging sites; and
  - Deeper water, root masses, undercut banks that provide refuge from predators and potential hibernacula during the winter.
- Substrate that includes some mud that allows for the growth of alga and diatoms (food for tadpoles) and to allow for hibernacula; relatively clean water not overly polluted by livestock excrement or chemical pollutants.
- A diversity or complex of nearby aquatic sites including a variety of lotic and lentic aquatic habitats, to provide habitat for breeding, post-breeding, and dispersing individuals. In these situations, a metapopulation may be established, enhancing the likelihood of the frogs' continued existence.

**Dispersal Habitat** – Adult CLF are known to move up and down a drainage, or disperse in response to environmental (drying of breeding pond) and other factors such as competition, predation etc. Perennial corridors are thought to be important for the dispersal of individual CLF, however in the absence of perennial corridors, CLF may use seasonal surface waters (lentic or lotic) and otherwise wet conditions during the summer rainy season that would permit overland movement in typically ephemeral<sup>1</sup> environments. According to the U.S. Fish and Wildlife Service (USFWS), the estimated dispersal distance for CLF are (1) one mile overland, (2) three miles along intermittent<sup>2</sup> drainages, and (3) five miles along permanent water courses, or some combination of the above.

**Water Quality** – In 2008, the USGS, in conjunction with the USFWS, reported the results of toxicity testing to CLF in *Toxicity of Herbicides, Piscicides, and Metals to the Threatened Chiricahua Leopard Frog* (Little and Calfee 2008). Acute and chronic tests included exposure of Stage 25 (42 days post-hatch) CLF tadpoles to cadmium, copper, and zinc, individually and in mixtures. For copper, the Lowest Observed Effective Concentrations (LOEC) in chronic tests was reported as:

- |                           |                                   |
|---------------------------|-----------------------------------|
| ▪ Survival (100% dead)    | 0.165 milligrams per liter (mg/L) |
| ▪ Development and length  | 0.047 mg/L                        |
| ▪ Weight (reduced weight) | 0.007 mg/L                        |

The acute tests in this study indicate that the 96-hour LC<sub>50</sub> concentration (50 percent mortality) for copper is 0.47 mg/L. The New Mexico Administration Code (NMAC) Standards for Interstate and

<sup>1</sup> A stream channel which carries water only during and immediately after periods of rainfall or snowmelt.

<sup>2</sup> A stream which carries water a considerable portion of the time, but which ceases to flow occasionally or seasonally because bed seepage and evapotranspiration exceed the available water supply.

Intrastate Surface Waters (Part 20.6.4) would apply to surface waters at the site, and include narrative and numeric criteria for numerous water quality parameters.

### Potential for Occurrence in the Project Area

The potential for occurrence is based on: 1) evaluation of the known historic range and distribution of the species; 2) current status in Recovery Unit 7 in New Mexico described in the CLF Recovery Plan and meeting minutes from the CLF Recovery Team West-Central New Mexico Stakeholders; 3) results of the recent (April 26-28, 2010) field survey (Appendix C) and comparison between the suitable habitat and dispersal requirements within the APE; 4) surface disturbance from the existing Tyrone Mine to the north and east of the APE that would impair the dispersal of CLF within the APE; 5) historical accounts of focused surveys conducted on the GNF by the USFS Silver City Ranger District in 2006 with no CLF observations; 6) past and current cattle grazing activity within the drainages that cross the project area (Deadman Canyon, Whitewater Canyon, and California Gulch) and on the GNF and private lands surrounding the mine site; 7) unsuccessful translocation of CLF at two sites in Grant County in 2008 (Jennings 2008); 8) the presence of chytrid fungus in the Big Burro Mountains and throughout the CLF range in New Mexico (Jennings 2010); and 9) the ephemeral nature of the drainages and surface water features in the APE. Review of these evaluations and factors indicates that the APE would not contribute to CLF dispersal or provide year-round suitable habitat for populations or metapopulations of CLF. For these reasons, it is our opinion that suitable habitat and/ or populations of CLF **do not occur** in the APE.

### Field Survey

Four biologists conducted pedestrian reconnaissance surveys over a three-day period from April 26 through 28, 2010, to evaluate potential habitat for the CLF in the Big Burro Mountains within the APE (Figure 1). Specifically, surveys were conducted to evaluate the potential for suitable habitat for CLF associated with seeps, springs, stock tanks, creeks, and other surface water features, and to investigate the connectivity of suitable habitat to the future pit lake at the Little Rock Mine. The field survey methodologies are further described in Appendix C.

Surface water features were visited during the field survey including springs, stock tanks, wildlife water troughs, and ephemeral drainages. Table 1 provides a description of each of surface water feature and the distance from each feature to the proposed pit lake surface at the Little Rock Mine. Figure 1 depicts the locations of these features. The nearest surface water features to the proposed pit lake are Sugarloaf Spring (0.9 linear miles), McCain Spring (0.9 linear miles) and the spring labeled Deadman Canyon (0.9 linear miles). These distance measurements represent straight-line pathways between each surface water feature and the edge of the previously approved future pit lake and do not take into account the change in elevation, terrain and other obstacles. Thus, the actual distances CLF would have to travel overland from the closest surface water features (Sugarloaf Spring, Deadman Canyon, McCain Spring) would exceed the reported 1-mile overland travel distance. While these features exhibited a small amount of surface water at the time of the site visit, it is unlikely that these features would contribute to dispersal of CLF into the proposed pit lake during the dry season. During the summer monsoon period, it is likely that temporary puddles or streams could occur to facilitate CLF dispersal, however due to the steep gradients in the area, any temporary surface water sources would rapidly

dissipate once the storm event has passed. These considerations are further explained in the following discussion.

**Table 1. Chiricahua Leopard Frog Survey Locations and Habitat Suitability Assessment**

Location	Direct Distance to Pit Lake (Miles)	Field Survey	Suitable Habitat
Sugarloaf Spring	0.9	Y	<b>No</b> – seep/ spring located in between large rock outcrops. Water in bottom of the drainage, less than 2 inches deep. Emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae.
Deadman Canyon	0.9	Y	<b>No</b> – water ponding located near a four-way intersection of FMI utilized dirt roads. Contains water in the bottom of drainage, less than 3 inches deep. Emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae.
McCain Spring	0.9	Y	<b>No</b> – ponded area approximately 50 feet in length and 50 feet in width. Emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae. No aquatic species observed. Historical water data shows periods of elevated copper levels, low pH, and extended dry periods. Area has been surveyed for CLF by Dr. Jennings in the past. No historical populations of CLF known to occur.
Whitewater Tank	1.4	N	Site not located. Not accessible; remote site.
Camp Creek Tank	2.0	Y	<b>No</b> – Dry tank; bottom covered with a thick layer of dry leaf litter and no aquatic or wetland vegetation present. Excavated area approximately 10 feet deep by 30 feet wide; does not appear to hold water. No evidence indicating that the tank has held water for any length of time.
Willow Creek	2.2	Y	<b>No</b> – mostly dry creek with a small water flow in bottom of drainage, less than 5 inches deep. Soils contained a sandy and rocky substrate that did not support emergent or submergent vegetation.
Deadman Box Seep	2.3	Y	<b>No</b> – man made box seep constructed from rock and cement, containing water approximately 9 inches deep. No emergent or submergent vegetation present.
Deadman 1 Creek	2.4	Y	<b>No</b> – This location is a small ephemeral drainage approximately 1-2 feet wide located where Old Tyrone Road crosses the Deadman Canyon drainage. Shallow trickle of water in bottom of drainage approximately 1-2 feet wide; less than 5 inches deep; no deep pools observed; filamentous algae observed, but no emergent vegetation present.
Siphon Spring	3.0	N	Site not located.

Location	Direct Distance to Pit Lake (Miles)	Field Survey	Suitable Habitat
Mangas Pond	3.1	Y	<b>No</b> – man-made pond, estimated depth 2 feet. Emergent vegetation present but not suitable for cover; no submergent vegetation with the exception of filamentous algae; heavily disturbed by cattle. Predator species such as waterbirds were observed.
Siphon Spring (Adjacent)	3.2	Y	<b>No</b> – mostly dry wash with a small water flow in bottom of drainage, less than 5 inches deep. Area has been disturbed by cattle. Soils contained a sandy and rocky substrate, no emergent or submergent vegetation present, with the exception of filamentous algae.
Drainage North of Mud Spring	3.3	Y	<b>No</b> – Shallow trickle of water in bottom of drainage 1-2 feet wide drainage; less than 5 inches deep; no deep pools observed; filamentous algae observed, but no emergent vegetation present. Metal wildlife water trough located in bottom of drainage; no aquatic or wetland vegetation.
003 Spring	3.7	N	Private Land - no access
Mud Spring	3.8	Y	<b>No</b> - Developed springhead consisting of a 3-foot diameter, shallow pool. Water is piped to a metal trough located approximately 20 feet downhill. No wetland or aquatic vegetation; water was cloudy.
Wildlife Water Trough	4.0	Y	<b>No</b> – This feature is a metal trough that is fed by well water from a solar operated pumping system. The trough is located on a concrete pad adjacent to Forest Road 828 approximately 3 miles west of Highway 90.
004 Spring	4.1	N	Private Land – no access
Granite Well	4.2	N	Site not located.
Redrock Tank	4.6	N	Site not accessible due to fenced land – From afar, observed a small metal tank/ structure.
Willow Creek (2)	4.6	N	Site not located.
CF Spring	4.8	Y	<b>No</b> – wash approximately 10 feet across in width, with water flow in the bottom of drainage, depth is less than 4 inches deep. Sparse emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae.
Mulberry Tank	~ 5.0	Y	<b>No</b> – stock tank with no standing water, only mud; heavily disturbed by cattle. No emergent or submergent vegetation and no evidence indicating that the tank has held water for any length of time.

Location	Direct Distance to Pit Lake (Miles)	Field Survey	Suitable Habitat
Fleming Pond	< 5.0	Y	<b>No</b> – This is a small man-made pond created in uplands to mitigate for MBTA impacts from nearby mining operations. The surface water pool is approximately 200 by 300 feet and 2-3 feet deep. The pond is maintained artificially by pumping groundwater from a shallow aquifer. Emergent hydrophytic vegetation has developed around the edge of the pond, but the vegetation is sparse and there are no cut banks, logs, or other habitat elements that would provide refugia for CLF. No fish or amphibians were observed, however known CLF predators such as aquatic birds and insects (dragonflies) were observed around the pond. The artificial water supply to this pond may be disconnected once the MBTA mitigation obligations are met. Thus, this pond would provide only marginal conditions for some stages of the frog's life cycle, and due to uncertain hydrology, would not be viable over the long term.
Gold Gulch	< 5.0	Y	<b>No</b> – 18-inch metal pipe, approximately 15 feet deep located on terrace above the bottom of an ephemeral drainage. No water observed in the pipe. Does not appear to collect water.
Grapevine Spring	< 5.0	Y	<b>No</b> – Concrete spring box located near the top of the drainage. There was approximately 5 inches of water at the time of the site visit, but this is likely from snow or precipitation falling directly into the box. The spring was not flowing at the time of the site visit. No aquatic or wetland vegetation is present and several forms of aquatic insects were observed in the trough.
Mangas Creek/ Gila River Confluence	< 5.0	Y	<b>No</b> – a healthy population of bullfrogs were observed in a backwater slew near the Highway 180 Bridge on the Gila River.
Barry Ford Stock Tank	< 5.0	Y	<b>No</b> – This is a large stock tank that is maintained by pumping groundwater. The pond was covered with filamentous algae, but no emergent or wetland vegetation had formed on the edge of the tank. Predator species including bullfrogs, warm water fish, and birds were observed in and around the tank.
Oak Grove Residential Area	3.0 - 5.0	Y	<b>No</b> – residential area; mostly closed wells.

Many of the sites that were visited are man-made features that included metal and concrete troughs and spring boxes and stock tanks constructed within ephemeral drainages. No CLF adults, tadpoles or egg masses were observed at any of the sites. None of the surface water features exhibit dense emergent vegetation, permanent deep pools, undercut banks or other refugia, or habitat features that

would provide potential habitat for CLF. Thus, the quality of habitat available in the project area to support CFL populations is poor.

Known predators of CLF, such as bullfrogs, fish, water birds, and dragonflies were noted at several sites north and south of the project area. Three adult bullfrogs, non-native warm water fish, and dragonflies were observed in the Barry Ford Stock Tank and at least 20 adult bullfrogs were observed in a backwater slough on the Gila River near southeast abutment on the Highway 180 Bridge. Wading birds and dragonflies were noted at Fleming Pond. Both McCain Spring and Fleming Pond support a pool of water at least most of the year; however, McCain Spring has been continually surveyed in the past with no occurrences of CLF. Fleming Pond supports marginal or sparse vegetation that is unsuitable as adequate cover for frogs; in addition, several known CLF predator species were observed.

McCain Spring (monitored quarterly under the Discharge Permit for the Tyrone Mine) is known to dry up for extended periods of time (e.g., from February 2002 to July 2004). This spring is surrounded by surface disturbance from the Tyrone Mine (i.e., tailings and waste rock facilities) which would preclude CLF dispersal to this spring and the project area in general from the north and east. Further, the 'wildlife ramp' to the pit lake mandated by the NMED and New Mexico Mining and Minerals Department (NMMMD) in their approval of the 1999 *Closure/Closeout Plan for the Little Rock Mine*, slopes from the western edge of the pit to the pit lake(s) to the east. While the direct overland distance from McCain Spring to the pit lake is 0.9 miles, the practical path for overland travel to the pit lake due to elevation changes and topography would exceed the estimated 1-mile overland dispersal distance. Other barriers to a direct route would be the pit walls and 50-foot benches that would be created within the open pit.

Sugarloaf Spring, located approximately 0.9 miles west of the projected pit lake surface, is also monitored quarterly under the Discharge Permit for Little Rock. The ephemeral nature of this spring is well documented; extended dry periods have been recorded for this location (November 2001 to November 2002, August 2005 through May 2006, July 2007 through May 2008, and September 2008 through November 2009). The practical path for overland travel to the pit lake from Sugarloaf Spring, located to the west of the pit lake, would exceed the estimated 1-mile CLF overland dispersal distance.

The spring labeled Deadman Canyon is located approximately 0.9 linear miles from the proposed pit lake. While a small amount of water was flowing in the channel, past survey efforts (R. Jennings 1998) indicate that this area is not suitable for CLF habitat, and flow is ephemeral in nature. The practical path for overland travel to the pit lake would exceed the one-mile threshold.

Several other springs or stock tanks that were visited within the APE during the field survey had at least some surface water, but did not have deep water, vegetation, or other biotic and abiotic features consistent with suitable habitat requirements for the CLF. Dr. Randy Jennings documented the potential for CLF or its habitat to occur within the major drainages on and near the Little Rock Mine site (Deadman Canyon, California Gulch and Whitewater Canyon) in 1998 (Jennings 2008). He indicated that any surface water in the drainages was sparse and/or intermittent and did not develop large or deep pools. No CLF or CLF habitat were reported. Following runoff from snowmelt, these drainages are normally dry; no large pools of surface water remain throughout the spring and summer months to provide suitable habitat or dispersal opportunities for CLF.

In general, the connectivity between mapped surface water features within the APE and the proposed pit lake appear to be discountable. Even as connectivity between ephemeral drainages and springs may allow CLF to gain access to Sugarloaf Spring (which has the shortest, practical pathway to the pit lake via overland travel), this distance would still exceed the one-mile threshold for overland travel. Given that the drainages in this area are ephemeral, and not intermittent, the potential for connectivity along these drainages is even further reduced. Furthermore, the surface water features located on the outer 5-mile limit of the APE are over five miles from any known CLF populations (Burro Cienega). Thus, it is unlikely that the surface water features found within the APE would be considered critical habitat or would be considered essential to the recovery of the species.

The nearest extant population of CLF are located more than 15 miles from the projected pit lake. Additional background regarding the field survey and CLF occurrence in the project area is summarized below.

Populations of CLF known to exist (or to have existed historically) within Grant County include (Figure 2): the Mimbres drainages on Pacific Western property at Martin Canyon, Rustler Canyon, Lucky Bill Canyon, Lamp Bright Draw, and near the Chino Mine on FMI property. The USFS conducted surveys in 2006, including springs within USFS lands where no CLF were found (Ybarra 2010). Additionally, a population was known to occur in Black Hawk Tank located approximately 6.9 miles northwest of the mine permit boundary, although this population has since died out. Some re-introduction efforts in the region have failed due to chytridiomycosis, an infection caused by the chytrid fungus which affects many amphibian species in New Mexico.

### **Southwestern Willow Flycatcher (*Empidonax traillii extimus*)**

#### **Protection Status**

Federal – Endangered with Critical Habitat, State– Endangered, BLM – none, USFS Region 3 – Endangered

#### **Habitat Primary Constituent Elements and Critical Habitat**

Although occurring widely in New Mexico during migration, willow flycatchers are confined to riparian woodlands in the breeding season. The SWFL occurs in riparian habitats along rivers, streams, or other wetlands, where dense growths of willows (*Salix* sp.), baccharis, arrowweed (*Pluchea* sp.), tamarisk (*Tamarix* sp.), or other plants are present, often with a scattered overstory of cottonwood (*Populus* sp.; USFWS 1995, 2005). These riparian communities provide nesting and foraging habitat.

- The lateral extent of critical habitat for the SWFL includes areas within the 100-year floodplain that include the following primary constituent elements (PCEs):
  - Riparian habitat in a dynamic, successional, riverine environment (for nesting, foraging, migration, dispersal, and shelter) that comprises:
  - Trees and shrubs that include, but are not limited to, willow species, box elder, tamarisk, Russian olive, cottonwood, stinging nettle, alder, ash, poison hemlock, blackberry, oak, rose, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut;

- Dense riparian vegetation with thickets of trees and shrubs ranging in height from 2 to 30 m (6-98 feet). Lower-stature thickets (2-4 m, or 6-13 feet) are found at higher elevation riparian forests, and tall-stature thickets are found at middle- and lower-elevation riparian forests;
  - Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 feet) aboveground or dense foliage only at the shrub level, or as a low, dense tree canopy;
  - Sites for nesting that contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground; i.e., a tree or shrub canopy with densities ranging from 50%–100%); or
  - Dense patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter/sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 hectare (0.25 acre) or as large as 70 hectare (175 acres).
- A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including: flying ants, wasps, and bees; dragonflies; flies; true bugs; beetles; butterflies, moths and caterpillars; and spittlebugs.

River features that help develop and maintain these PCEs include broad floodplains, water, saturated soil, hydrologic regimes, elevated groundwater, fine sediments, etc. (USFWS 2005).

**Critical Habitat** – Critical habitat for SWFL was designated in 1997 and re-designated in 2005 (USFWS 2005). Maps obtained from the USFWS indicate that the nearest designated critical habitat for SWFL is located on the Gila River over 20 miles west of the mine site. No impacts to this habitat would occur from mining activities that are proposed on the project area. Figure 2 depicts the location of designated critical habitat for this species.

#### Potential for Occurrence in the Project Area

SWFL **does not occur** in the APE. Vegetation found on the Little Rock Mine site has none of the documented and required habitat elements for the species; no suitable habitat is present within the APE. The closest known locations for SWFL are located on the Gila River approximately 20 miles downstream from the project area (Ybarra 2009).

#### **Loach Minnow** (*Tiaroga cobitis*)

##### Protection Status

Federal– Threatened with Critical Habitat, State– Threatened, BLM – none, USFS Region 3 – Threatened

##### Habitat Primary Constituent Elements and Critical Habitat

PCEs for the loach minnow are described in the final rule designating critical habitat for the spikedace and loach minnow (USFWS 2007b). In general, this species inhabits small to large perennial streams that have riffle areas with moderate to rapid water velocities and moderate to high gradients. The species is most common in a substrate of elevated cobble and rubble, particularly where sediments have not filled-in crevices. Such areas are usually along the margins and at the heads of riffles. Habitat for this

species is known to occur approximately 20 miles downstream of the project site at the confluence of Mangas Creek and the Gila River.

PCEs for this species include:

- Permanent, flowing water with no or minimal pollutant levels including:
  - Living areas for adult loach minnow with moderate to swift flow velocities between 9 to 32 inches per second in shallow water between approximately 1 to 30 inches in depth, with gravel, cobble, and rubble substrate;
  - Living areas for juvenal loach minnows with moderate to swift flow velocities between 1 to 34 inches per second in shallow water 1 to 30 inches in depth, with gravel, cobble, and rubble substrate;
  - Living areas for larval loach minnow with slow to moderate velocities between 3 and 20 inches per second in shallow water with sand, gravel, and cobble substrates;
  - Spawning areas with slow to swift velocities with in shallow water where cobble and rubble and the spaces between them are not filled in by fine dirt or sand; and
  - Water with dissolved oxygen levels greater than 3.5 cubic centimeters per liter (cc/L) and no or minimal pollutant levels for pollutants such as copper, arsenic, mercury and cadmium, human and animal waste, etc.
- Sand, gravel, and cobble substrates with low or moderate amounts of fine sediments and substrate embeddedness.
- Streams that have:
  - Low gradients of less than 2.5 percent;
  - Water temperatures in the range of 35 to 82 degrees Fahrenheit.
  - Pool, riffle, run and backwater components; and
  - An abundant aquatic insect food base.
- Habitat devoid of nonnative aquatic species.
- Areas within perennial, interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

**Critical Habitat** – The USFWS designated critical habitat for the loach minnow on April 25, 2000. Maps obtained from the USFWS indicate that designated critical habitat for this species occurs in the main Gila River channel over 20 miles downgradient from the project area. No critical habitat is located on the project area and no impacts to designated critical habitat would occur from mining activities that are proposed on the project area. Figure 2 depicts the location of designated critical habitat for this species.

### Potential for Occurrence in the Project Area

It is our opinion that Loach Minnow **does not occur** in the project area or within the 5-mile APE. The rationale for this determination is summarized below.

There are no perennial streams or rivers on the project area. Surface drainages in the project area are ephemeral, flowing only in response to runoff from snowmelt or seasonal rainfall events. Thus, none of the documented and required PCEs for the species or other suitable habitat is present on or near the site. The closest known population occur outside of the APE, nearly 15 river miles downgradient from

the pit boundary at Mangas Spring. Additionally, designated critical habitat occurs approximately 21 miles downgradient of the pit boundary in the Gila River (USFWS 2000, Ybarra 2009).

### **Spikedace (*Meda fulgida*)**

#### Protection Status

Federal – Threatened with Critical Habitat, State – Endangered, BLM – none, USFS Region 3 – Threatened

#### Habitat Primary Constituent Elements and Critical Habitat

PCEs for the spikedace are described in the final rule designating critical habitat for the spikedace and loach minnow (USFWS 2007b). In general, spikedace are found in clear, low-to-moderate gradient, permanently flowing streams of the Gila drainage. The larvae and juveniles tend to occupy shallow, peripheral portions of streams that have slow currents and sand or fine gravel substrates but will also live in backwater areas. Adults prefer sand, gravel or rubble substrates in shallow areas, i.e., less than 40 inches deep, with a swift laminar flow. Adults in the Gila drainage of New Mexico are found most frequently over gravel and cobble substrates.

**Critical Habitat** – The USFWS designated critical habitat for the spikedace on April 25, 2000. Maps obtained from the USFWS indicate that designated critical habitat for this species occurs on the main Gila River channel over 20 miles downgradient from the project area. No critical habitat is located on the project area and no impacts to designated critical habitat for this species would occur from mining activities that are proposed on the project area. Figure 2 depicts the location of designated critical habitat for this species.

#### Potential for Occurrence in the Project Area

It is our opinion that spikedace **do not occur** in the APE. The rationale for this determination is summarized below.

There are no perennial streams or rivers on the APE. Surface drainages in the project area are ephemeral, flowing only in response to runoff from snowmelt or seasonal rainfall events. Thus, none of the documented and required PCEs for the species or other suitable habitat is present on or near the site. The closest known population and designated critical habitat for this species occurs in the Gila River 21 miles downgradient from the pit boundary (Ybarra 2009).

### **Northern Goshawk (*Accipiter gentilis atricapillus*)**

#### Protection Status

Federal– Species of Concern, State– none, BLM – Sensitive, USFS Region 3 – Sensitive

### Preferred Habitat

The principal forest types occupied by the goshawk in the southwest are ponderosa pine, mixed-species, and spruce-fir. Breeding habitat includes pine-oak (*Pinus/Quercus*) woodlands in southwestern North America. The goshawk is known to occur at elevations where stream conditions provide sufficient permanent moisture for emergent plants, or for a narrow band of deciduous trees and shrubs; at low elevation characterized by cottonwood and sycamore, at mid-elevation by white alder (*Alnus rhombifolia*) and bigleaf maple (*Acer macrophyllum*), and at high elevation by willow (Bison-M 2010b).

### Potential for Occurrence in the Project Area

Northern goshawk **may occur** as the APE is within the species' currently known range and vegetation communities resemble those known to be used by the species. While this species has not been documented in the project area, the closest known nest site is approximately 2 miles from the Little Rock Mine permit boundary (Ybarra 2009). The goshawk may occasionally fly over and forage in the APE.

## EFFECTS DETERMINATION

The potential for effects to listed species or designated critical habitat that occurs or may occur in the APE is evaluated using one of the following determinations listed in the USFWS Section 7 Consultation Handbook:

- **No effect** – the proposed action will not affect listed species or critical habitat.
- **Is not likely to adversely affect** – the effects of the proposed action on listed species are expected to be discountable, or insignificant, or completely beneficial. Insignificant effects relate to the size of the impact and should not reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.
- **Is likely to adversely affect** – if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial. In the event the overall effect of the proposed action is beneficial, but also is likely to cause some adverse effects, then the proposed action “is likely to adversely affect” the listed species (formal consultation would be required).

The following preliminary effects determination for each of the species is described below.

### **Chiricahua Leopard Frog**

**No effect** – It is our opinion that the mining activities of the Little Rock Mine will not affect the CLF. The rationale for this determination is listed below.

- There are no known populations or metapopulations of CLF within the footprint of the proposed action. The nearest known population of CLF is found at Burro Cienega Tank in the Walking X Canyon Watershed, approximately 26.8 linear miles from the projected pit lake. The nearest historic population was located at Black Hawk Tank, approximately 6.9 miles northwest from the

projected pit lake surface; this population has since expired. Several CLF re-introduction efforts in the region have failed.

- Based on the recent field survey, the proposed action will not directly or indirectly affect habitat that would sustain populations or metapopulations of CLF within the APE.
- The connectivity between mapped surface water features within the APE and the proposed pit lake are discountable. Even as connectivity between ephemeral drainages and springs may allow CLF to gain access to Sugarloaf Spring (which has the shortest, practical pathway to the pit lake via overland travel), this distance would still exceed the one-mile threshold for overland travel.
- Given that the drainages in this area are ephemeral, and not intermittent, the potential for connectivity along drainages in the APE is even further reduced. No perennial drainages occur within the APE.
- Existing surface disturbance associated with the Tyrone Mine facilities likely disrupts habitat connectivity and precludes the dispersal of CLF onto the project site from the north and east sides of the project area.
- The surface water features located on the outer 5-mile limit of the APE are over five miles from any known CLF populations (Burro Cienega).
- CLF predators such as bullfrogs, wading birds, warm water fish, and insects were noted in both natural and man-made surface water features north (Gila River near Mangas Creek) and south (Barry Ford Stock Tank) of the mine site. At least 10 adult bullfrogs were noted in a backwater slough near the southeast abutment of the Highway 180 Bridge over the Gila River. Three adult bullfrogs, bass, sunfish, and dragonflies were noted in the Barry Ford Stock Tank. This evidence indicates that the presence of CLF predators within the 5-mile APE would likely preclude the establishment of CLF populations and would impair dispersal of CLF.
- The project site is immediately adjacent to existing mining facilities and located within a mining district that has extensive surface disturbance. Other than development of the open pit and haul road, the footprint of previously approved disturbance is minimized by using many of the existing processing facilities located at the adjacent Tyrone Mine.
- Hydrogeologic modeling indicates that the groundwater sources for the springs and seeps are not connected with the regional aquifer system; springs and seeps in the APE are fed by perched groundwater, and will not be impacted by groundwater withdrawals to support mining activities (refer to Hydrology Section).
- In general, the hydraulic time of concentration of watersheds within the Big Burro Mountains and surrounding region are short; canyon (drainage) slopes are steep (6 to 13 or more percent channel slope) and any appreciable rainfall rapidly discharges from mountainous drainages to lower elevations. Furthermore, channel beds are comprised of sands and gravels, which also preclude the development and persistence of short-term puddles and long-term surface water sources that are required for both dispersal and suitable habitat for population.
- It is unlikely that the surface water features found within the APE would be considered critical habitat or would be considered essential to the recovery of the species.
- Impacts to downstream water quality are not anticipated; FMI must comply with applicable state and federal water pollution regulations to prevent the degradation of downstream water quality.
- A MSGP for stormwater discharges, in compliance with 40 CFR Part 122, will require implementation of BMPs as specified in a SWPPP. The SWPPP requires that impacts from erosion and sedimentation in downgradient surface waters be controlled.
- Management of petroleum products and prevention of spills will be managed in a SPCC, in compliance with 40 CFR Part 112.

### Southwestern Willow Flycatcher

**No effect** – It is our opinion that the mining activities of the approved Little Rock Mine will not affect the SWFL or designated critical habitat for this species that is located on the Gila River 20 miles downgradient from the pit boundary. The rationale for this determination is listed below.

- None of the PCEs for SWFL occur on or within the five-mile APE, thus direct impacts to this species or its critical habitat will not occur as a result of this project.
- The nearest suitable habitat occurs more than 20 miles downgradient from the project area where Mangas Creek meets the Gila River.
- Groundwater pumping and the diversion of a portion of the Deadman Canyon, California Gulch and Whitewater Canyon watersheds are not anticipated to impact riparian vegetation that occurs on Mangas Creek or the Gila River.
- Hydrogeologic modeling indicates that the groundwater sources for the springs and seeps are not connected with the regional aquifer system; springs and seeps in the APE are fed by perched groundwater, and will not be impacted by groundwater withdrawals to support mining activities (refer to the Hydrology Section).
- Indirect impacts to the base flow of the Gila River and designated critical habitat for this species downstream from the mine are not anticipated. The diversion of the ephemeral watersheds on the project site represents approximately 0.5 percent of the total watershed for the Mangas Valley and 0.06 percent of the Upper Gila-Mangas watershed. Impacts to riparian vegetation and designated critical habitat located more than 20 miles downstream of the pit boundary would not occur.
- Impacts to downstream water quality are not anticipated; FMI must comply with applicable state and federal water pollution regulations to prevent the degradation of downstream water quality.
- A MSGP for stormwater discharges, in compliance with 40 CFR Part 122, will require implementation of BMPs as specified in a SWPPP. The SWPPP requires that impacts from erosion and sedimentation in downgradient surface waters be controlled.
- Management of petroleum products and prevention of spills will be managed in a SPCC, in compliance with 40 CFR Part 112.
- The generation, transportation, treatment, storage, and disposal of hazardous waste will be in accordance with the Resource Conservation and Recovery Act (RCRA), which also sets forth a framework for the management of non-hazardous solid wastes.

### Loach Minnow

**No effect** – It is our opinion that the mining activities of the Little Rock Mine will not directly or indirectly affect the loach minnow or its designated critical habitat located 20 miles downgradient from the site. The rationale for this determination is listed below.

- No habitat for this species occurs within the APE, thus direct impacts to loach minnow or loach minnow critical habitat will not occur as a result of this project.
- Surface and groundwater modeling for the project site indicates that downstream effects on water resources in the Mangas Valley would be insubstantial and discountable (refer to Hydrology Section).

- Impacts to downstream water quality are not anticipated; FMI must comply with applicable state and federal water pollution regulations to prevent the degradation of downstream water quality.
- A MSGP for stormwater discharges, in compliance with 40 CFR Part 122, will require implementation of BMPs as specified in a SWPPP. The SWPPP requires that impacts from erosion and sedimentation in downgradient surface waters be controlled.
- Management of petroleum products and prevention of spills will be managed in a SPCC, in compliance with 40 CFR Part 112.
- The generation, transportation, treatment, storage, and disposal of hazardous waste will be in accordance with RCRA, which also sets forth a framework for the management of non-hazardous solid wastes.
- Indirect impacts to the base flow of the Gila River and designated critical habitat for this species downstream from the mine are not anticipated. The diversion of the ephemeral watersheds on the project site represents approximately 0.5 percent of the total watershed for the Mangas Valley and 0.06 percent of the Upper Gila-Mangas watershed. Impacts to the floodplain habitat and base flow in Mangas Creek or the Gila River more than 20 miles downstream of the pit boundary would not occur.

### Spikedace

**No effect** – It is our opinion that the mining activities of the Little Rock Mine will not directly or indirectly affect the spikedace or its designated critical habitat located 20 miles downgradient from the site. The rationale for this determination is listed below.

- No habitat for this species occurs within the APE, thus direct impacts to spikedace or spikedace critical habitat are will not occur as a result of this project.
- Surface and groundwater modeling for the project site indicates that downstream effects on water resources and in the Mangas Valley and Gila River would be insignificant (refer to the Hydrology Section).
- Impacts to downstream water quality are not anticipated; FMI must comply with applicable state and federal water pollution regulations to prevent the degradation of downstream water quality.
- A MSGP for stormwater discharges, in compliance with 40 CFR Part 122, will require implementation of BMPs as specified in a SWPPP. The SWPPP requires that impacts from erosion and sedimentation in downgradient surface waters be controlled.
- Management of petroleum products and prevention of spills will be managed in a SPCC, in compliance with 40 CFR Part 112.
- The generation, transportation, treatment, storage, and disposal of hazardous waste will be in accordance with RCRA, which also sets forth a framework for the management of non-hazardous solid wastes.
- Indirect impacts to the base flow of the Gila River and designated critical habitat for this species downstream from the mine are not anticipated. The diversion of the ephemeral watersheds on the project site represents approximately 0.5 percent of the total watershed for the Mangas Valley and 0.06 percent of the Upper Gila-Mangas watershed. Impacts to the floodplain habitat and base flow in Mangas Creek or the Gila River more than 20 miles downstream of the pit boundary would not occur.

## Northern Goshawk

The northern goshawk is not currently federally protected under the ESA; however, it is protected under the MBTA.

**The project is not likely to adversely affect this species** – It is our opinion that the mining activities of the Little Rock Mine are not likely to adversely affect the northern goshawk. The rationale for this determination is listed below.

- Direct impacts to the northern goshawk are not anticipated as a result of the proposed action. The closest known nest site is located in the upper reach of California Gulch approximately 2 miles from the project site (Ybarra 2010).
- Habitat attractive to goshawks includes the woodland vegetation (piñon-juniper woodland, juniper grassland, and ponderosa pine forest) within the APE. Potential impacts may include a loss of nesting, foraging, and breeding habitat as a result of vegetation removal and development of the proposed action; however, similar habitat surrounding the APE is available and this species will likely continue to nest, forage, and breed outside of the APE.

## Migratory Bird Treaty Act

Under the MBTA of 1918 and subsequent amendments (16 United States Code 703-711), it is unlawful to take, kill or possess migratory birds. Executive Order 13186, issued on January 11, 2001, further defines the responsibilities of federal agencies to protect migratory birds; a list of those protected birds can be found in 50 CFR 10.13. To date, there has been no regional or USFS policy developed to provide guidance on how to incorporate migratory birds in to NEPA analyses. The Regional Office of the USFS recommends analyzing the effects as follows: 1) effects on Species of Concern listed by State Partners in Flight programs; 2) effects on Important Bird Areas (IBAs); and 3) effects on important overwintering areas. The following points evaluate the potential for impacts on migratory birds from the proposed action.

It is our opinion that the mining activities of the Little Rock Mine are **would not adversely affect** migratory birds. The rationale for this determination is listed below.

- According to the New Mexico Audubon Society, the APE is not within any designated IBAs in New Mexico. The nearest IBAs are located at the Gila Cliffs, Lower Gila Box, and Gila River (and associated valley) from the GNF boundary below Bill Evans Lake downstream through the Gila Bird Area into the Middle Box (BLM) to the southern limit of BLM ownership near Redrock, New Mexico.
- According to the USGS North American Breeding Birds Survey (BBS), the project area is not within a major migratory pathway, either for diurnal or nocturnal migrants (2008). The nearest avian migratory pathway, identified as Red Rock, occurs approximately 19 miles west of the project area.
- Habitat attractive to migratory birds includes the woodland vegetation (piñon-juniper woodland, juniper grassland, and ponderosa pine forest) within the project area. Potential impacts may include a loss of nesting, foraging, and breeding habitat as a result of vegetation removal and development of the proposed action. Table 2 lists the amount of disturbance projected to occur as a result of the Approved Proposed Action, including disturbances for the

pit and haul road construction. The amount of disturbance (up to 190 acres for the pit and approximately 40 acres for the haul road) is only a small fraction of the same habitat types found in the region and surrounding the project area that that would continue to provide nesting, foraging, and breeding opportunities for migratory birds outside of the project area. Additionally, much of the project area has been previously disturbed, which minimizes the area of new impact. The project area is also covered under a permit with the New Mexico Mining and Minerals Division, which mandates that measures be taken after mining to restore wildlife habitat.

**Table 2. Habitat Types Occurring within the Project Area**

Proposed Action Disturbance Type	Previously Disturbed (acres)	Grasslands/ Juniper Grassland (acres)	Grasslands/ Piñon-Juniper Woodlands (acres)	Piñon-Juniper Woodlands (acres)	Ponderosa Pine Forest (acres)	Total Area of Disturbance (acres)
Proposed Pit	63	13	110	--	2	~190
Haul Road B	--	3	--	37	--	~40
Total Disturbance	63	16	110	37	2	~230

- Because birds are highly mobile, it is unlikely that adult birds would be directly taken from development of the mine.
- Following mine operations, a resulting pit lake would be subject to standards for a post-mining land use of wildlife habitat. The pit lake would also be subject to the Standards for Interstate and Intrastate Surface Waters (NMAC 20.6.4). The standards have been established to ensure a safe supply of water to wildlife. The pit lake eventually could be utilized by wildlife, where accessible, including migratory birds passing through the area. Thus, as stated in the 1997 FEIS, given that the water quality is mandated to meet standards for wildlife, the pit lake could potentially constitute a beneficial effect for wildlife and migratory birds.
- The area has not been designated an important wintering area for birds. The project is not expected to result in the loss of important overwintering habitat or a trend toward the federal listing of any bird species as threatened or endangered.

## USFS MANAGEMENT INDICATOR SPECIES

Management Indicator Species (MIS) are addressed in order to implement National Forest Management Act (NFMA) regulations. There are currently ten MIS species (Table 3) representing nine habitat and/or vegetation types listed for the GNF. These species were selected for what is thought to be their ability to indicate changes in habitat and/or ecosystems that are related to land management activities (e.g., mining, grazing, transportation, etc.) on the GNF (36 CFR 219.19(a)(1)).

Since the MIS generally occur and range far beyond the project APE, population trends must be evaluated more broadly. It is technically and practically inappropriate to conduct population trend sampling on MIS at the scale of an individual project. Thus, for NFMA implementation, the appropriate scale for the proposed project is the GNF.

**Project Level Analysis**

Habitat that occurs within the project area consists of four ecotypes described as grassland/juniper grassland, grassland/ piñon-juniper, piñon-juniper woodlands, and ponderosa pine forest. Approximately 230 acres would be impacted during mining operations, including approximately 63 acres that have been disturbed from previous mining activity; new disturbance amounts to approximately 165 acres, as depicted in Figure 3. The area of disturbance for the pit and haul road within each habitat type is listed in Table 2 (in the Migratory Bird Treaty Act discussion).

Table 6 lists the ten MIS, their indicator habitat types and the rationale for elimination or inclusion in the MIS analysis for the proposed project. Five of the ten MIS species may occur, or their preferred habitat type occurs, within the APE including mule deer, northern goshawk, Mearns’ quail, hairy woodpecker, and plain titmouse. These five species were selected and analyzed within the context of the impacts associated with the proposed project. The rationale for elimination or inclusion as MIS is provided in Table 6. An expanded evaluation for one species, the mule deer, is provided below.

**Table 3. Management Indicator Species**

Management Indicator	Management Indicator for:	Selected for Analysis		Rationale for Elimination or Inclusion as MIS for this Action
		YES	NO	
Mule Deer ( <i>Odocoileus hemionus</i> )	Desert shrub, piñon-juniper, shrub oak woodland communities	X		Habitat exists in the project area for this species. Long-term population trends for the GNF appear to be decreasing.
Mearns’ [Montezuma] Quail ( <i>Cyrtonyx montezumae mearnsi</i> )	Plains and mountain grassland communities		X	This species is an uncommon, breeding resident of the GNF (GNF 2008). Quail populations fluctuate from year to year for a number of reasons, primarily local weather conditions and predators. Although grasslands will be impacted from the proposed project, it would be difficult to predict impacts from the removal of 123 acres of mixed grassland/ juniper habitat on local quail populations. Based on the 2008 Annual Monitoring Report, Mearns’ quail populations on the GNF are stable to increasing.
Long-tail Vole ( <i>Microtus longicaudus</i> )	Wet meadows and wetlands		X	Effects to this species were not analyzed because habitat for this species does not occur in the project area.
Beaver ( <i>Castor canadensis</i> )	Low and mid elevation riparian areas		X	Effects to the beaver were not analyzed because habitat for this species does not occur in the project area.

Management Indicator	Management Indicator for:	Selected for Analysis		Rationale for Elimination or Inclusion as MIS for this Action
		YES	NO	
Plain [Juniper] Titmouse ( <i>Baeolophus ridgwayi</i> )	Piñon-juniper and shrub oak woodlands.		X	According to the 2008 Annual Monitoring Report, habitat conditions for this species remain stable on the GNF (GNF 2008). With the large acreage of woodland vegetation type on the GNF, nesting cavities are expected to be abundant for this species. The proposed action would not significantly alter habitat for this species.
Hairy Woodpecker ( <i>Picoides villosus</i> )	Ponderosa pine and mixed conifer snag component		X	Effects to this species were not analyzed because only 2 acres of potential habitat for this species would be impacted from development of the pit. Results of the 2008 Annual Monitoring Report indicate that the population trend for this species on the GNF is estimated to be stable and recent monitoring data for the Burro Mountains indicate that this species is common (GNF 2008). The removal of 2 acres of habitat is not likely to cause a detectable change in the availability of habitat or local populations of this cavity nesting species.
Mexican Spotted Owl ( <i>Strix occidentalis lucida</i> )	Mixed conifer community		X	Effects to this species were not analyzed because habitat for this species does not occur in the project area.
Black Hawk ( <i>Buteogallus anthracinus</i> )	Riparian habitat at low and mid elevations		X	Effects to this species were not analyzed because habitat for this species does not occur in the project area.
Northern Goshawk ( <i>Accipiter gentiles</i> )	Ponderosa pine community	X		The northern goshawk is considered a USFS sensitive species, but only 2 acres of ponderosa pine habitat would be impacted from the proposed project. Potential effects to this species are discussed under the MBTA section in this report. According to the 2008 Annual Monitoring Report, goshawk populations of the GNF are stable (GNF 2008). The affects to the Goshawk have been previously evaluated, above.
Gila Trout ( <i>Oncorhynchus gilae</i> ) Rio Grande Cutthroat ( <i>Oncorhynchus clarki virginalis</i> )	Riparian habitat at high elevations		X	Effects to this species were not analyzed because habitat for the Gila trout does not occur on or downstream of the project area.

**Mule Deer** (*Odocoileus hemionus*) – The mule deer was picked as a management indicator species for desert shrub, piñon-juniper shrub, and shrub oak woodland communities. Habitat conditions suitable for mule deer reflect the vegetative conditions in these communities that the GNF is striving to attain and maintain based on the types of management directed by the Forest Plan. Notably, a management unit that has the vegetative conditions that provide key components of deer habitat can have other limiting factors that affect the population in the area.

Recent monitoring information indicates an overall decrease in this species abundance in the GNF (GNF 2008), however the overall acreage of desert shrub and woodland communities has not changed significantly since the Forest Plan was developed in 1986. In 1986, an estimated 43,454 acres of desert shrub and 1,591,082 acres of woodland habitat estimated to occur in the GNF. This included 857,752 acres of key mule deer reproduction and/or winter range forest-wide. The estimated mule and whitetail deer breeding population in 1986 was 14,834 forest-wide.

In addition to habitat availability, other limiting factors on mule deer populations include climate and weather patterns. While periods of significant rainfall produce ample forage and vegetative cover, which improves fawn survival, harsh winters or prolonged periods of drought can have devastating effects on fawn survival and overall deer numbers. Other limiting factors such as lack of water, predation, and competition with other species also contribute to the decreasing trend in the mule deer population. The New Mexico Department of Game and Fish (NMDGF) manages mule deer populations through annual hunting permits, which also affects population levels. The NMDGF is currently striving to achieve increased deer survival, and higher population numbers.

Mule deer population trends on the GNF are synonymous with what has been occurring throughout New Mexico and other western states. It is widely acknowledged that current populations of mule deer are declining throughout the west. Many biologists believe that the mule deer populations of the 1960s may have been unnaturally high. The high numbers are often attributed to periods of high precipitation, temporarily improved deer habitat, and declining predator populations.

Many factors have led to the decline in deer numbers throughout the Silver City Ranger District. Suitable habitat may have decreased because habitat successional changes have reduced shrub and herbaceous vegetation quantity, as well as quality and availability of forage and cover. Mule deer populations have declined since about the mid twentieth century; this is a long-term population trend. The cause of this downward trend appears to be a decline in the habitat carrying capacity and not by any specific agent of mortality. Juniper encroachment reduces the quantity and quality of shrubs and herbaceous vegetation. Restrictions on the implementation of natural- or management-ignited fire may accelerate juniper encroachment and therefore affect habitat suitability for mule deer.

### Proposed Project Impacts on Mule Deer

The approved project is fully described in the 1997 FEIS (BLM 1997). Development of the mine pit and haul road would span up to 230 acres. Of this area, approximately 63 acres has been previously disturbed, and 165 acres of new disturbance would occur (Table 5 and Figure 3). The impacted habitat from the proposed project represents a small portion of the total acreage of scrub and woodland habitat available for mule deer within the GNF and surrounding lands.

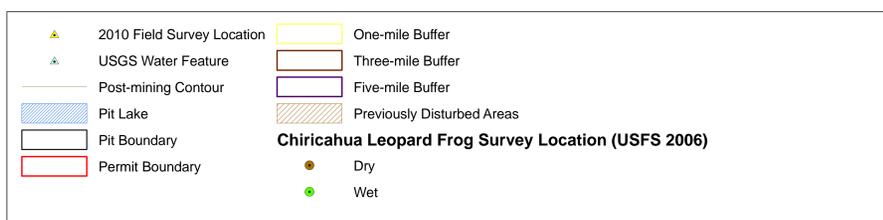
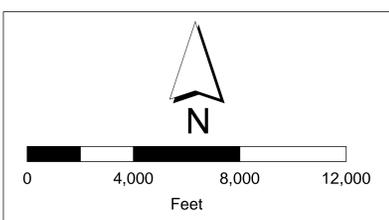
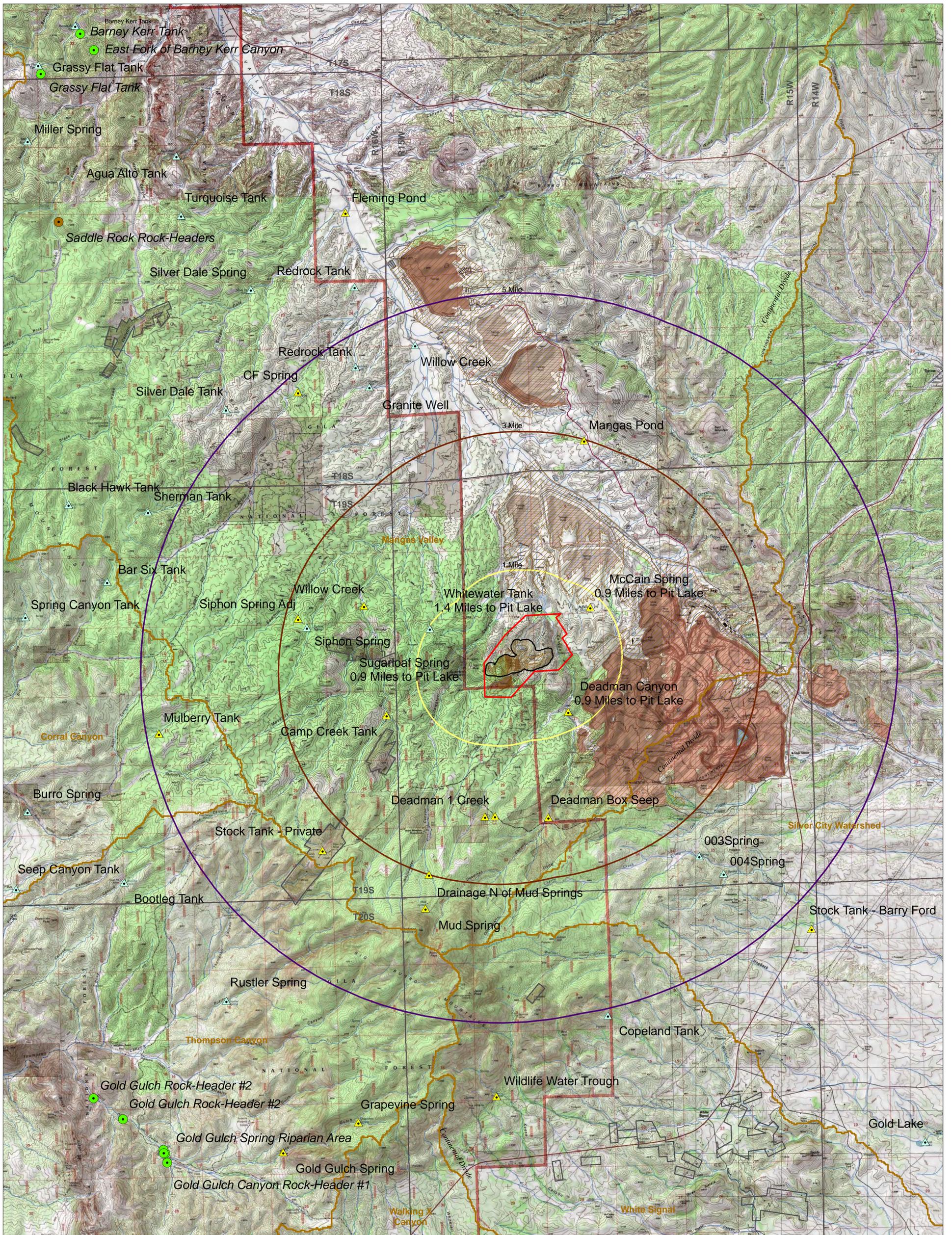
The project would result in direct impacts to mule deer habitat that consists of mixture of approximately 165 acres of undisturbed piñon-juniper woodland, grassland/ juniper-grassland, grasslands/ piñon-juniper, and Ponderosa pine forest. However, the loss of 165 acres of habitat is not anticipated to produce long-term impacts on foraging or fawning area or mule deer populations in the area. Based on the hydrologic evaluation, groundwater drawdown is not likely to impact seeps and springs in the APE (refer to the Hydrology Section). Furthermore, at the completion of mining, the pit lake would be managed for wildlife usage. Noise and traffic could directly and indirectly affect mule deer activity in the immediate vicinity of the mining operation, however deer have been observed frequently around the similar operations ongoing at the adjacent Tyrone Mine property. The Approved Proposed Action may affect, but is not likely to adversely affect mule deer.

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- USFWS. 2007b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Spikedace (*Meda fugida*) and the Loach Minnow (*Tiaroga cobitis*); Final Rule. 50 CFR Part 17. March 21, 2007.
- USFWS. 2010. News Bulletin. Arizona Ecological Services Field Office. Fish and Wildlife Service will Propose Critical Habitat for the Chiricahua Leopard Frog by Dec. 8, 2010

## **Appendix A – Figures**

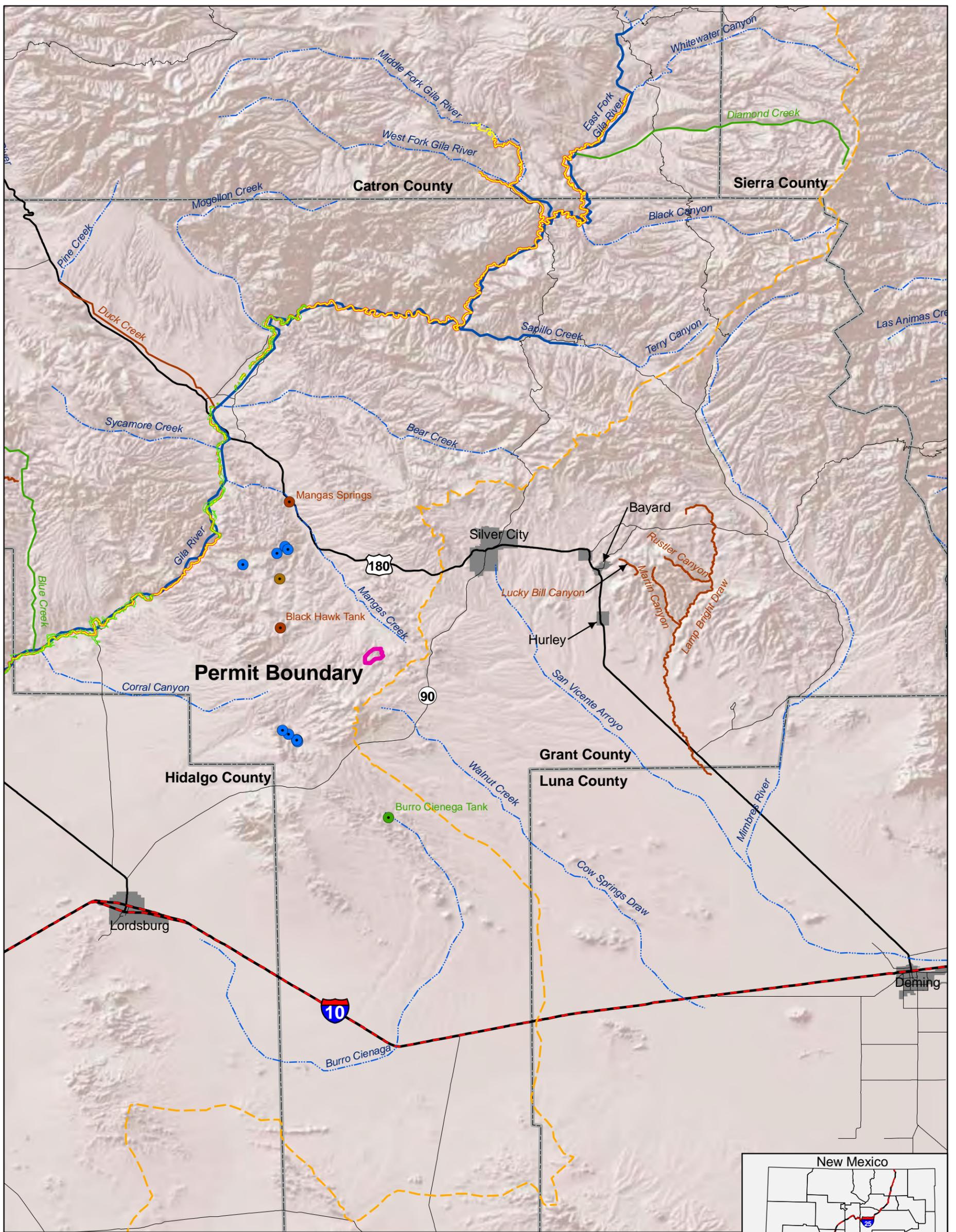


**Little Rock Mine**

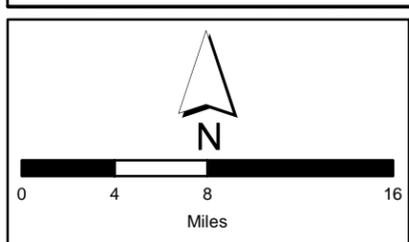
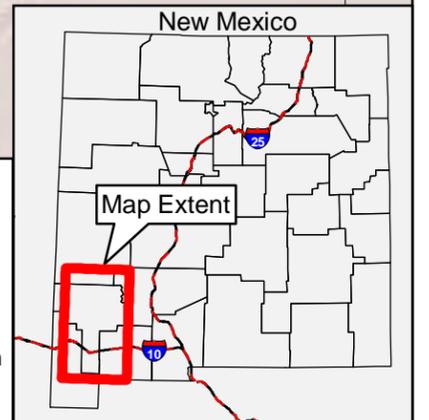
Figure 1  
Water Features and  
Field Survey Locations



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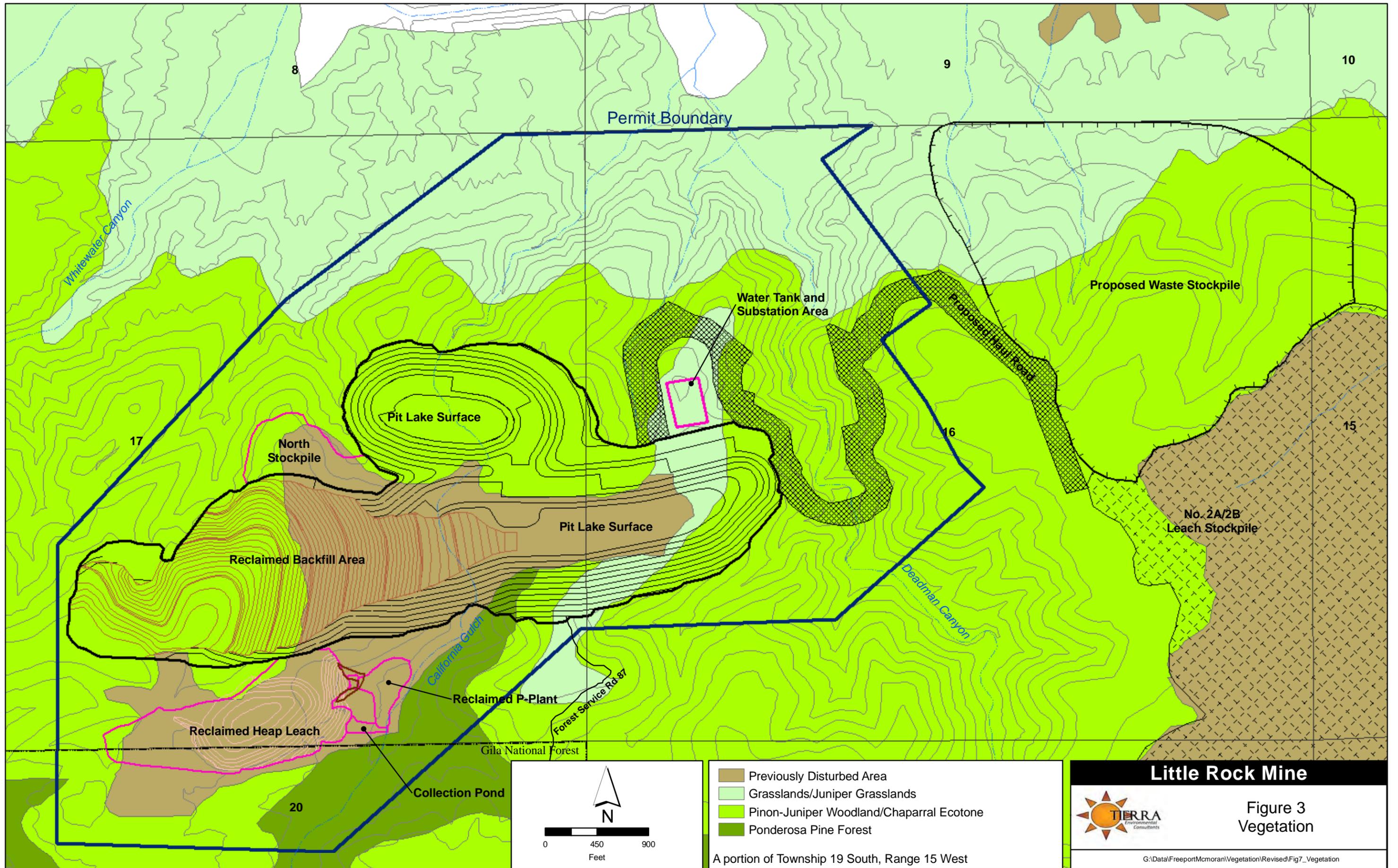
- Historic Chiricahua Leopard Frog (CLF) Location
- Current CLF Population
- Drainage with Historic CLF Population
- Drainage with Current CLF Population
- Loachminnow Critical Habitat
- Spikedace Critical Habitat
- ▨ Southwest Willow Flycatcher Critical Habitat
- ▭ Permit Boundary
- City Boundary
- CLF Survey Location (USFS 2006)**
- Dry
- Wet
- Interstate
- US Highway
- State Highway
- Continental Divide
- Ephemeral Stream
- Perennial Stream



**Little Rock Mine**

Figure 2  
Critical Habitat

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**Appendix B – Special Status Species with  
Potential to Occur in Grant County, New Mexico**

Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
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<b>Fish</b>													
Chihuahua Chub	<i>Gila nigrescens</i>	T	E		S		X	X	X	In New Mexico, the Chihuahua chub is found in reaches of the Mimbres River where there are deep pools bordered by undercut banks or containing downed trees and other cover.	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Gila Chub	<i>Gila intermedia</i>	E	E	S	S		X	X	X	The Gila chub generally occurs in pool habitats of small streams or springs, but it may have formerly occupied larger, more complex habitats as well.	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Roundtail Chub	<i>Gila robusta</i>	SC	E	S	S			X	X	Roundtail chub occurs in cool to warm water, mid-elevation streams and rivers where typical adult microhabitat consists of pools up to 6.5 ft (2 m) deep adjacent to swifter riffles and runs. Cover is usually present and consists of large boulders, tree rootwads, submerged large trees and branches, undercut cliff walls, or deep water. Smaller chubs generally occupy shallower, low velocity water adjacent to overhead bank cover.	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Headwater Chub	<i>Gila nigra</i>	C	E		S			X	X	Headwater chubs are endemic to the Gila River basin of Arizona and New Mexico where they occupy the middle and headwater reaches of middle-sized streams. Adult headwater chub occupy cool to warm water in mid- to headwater stretches of mid-sized streams of the Gila River basin. They are associated with deep, near shore pools adjacent to swift riffles and runs, and near obstructions. Cover consists of root wads, boulders, undercut banks, submerged organic debris, or deep water.	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Longfin Dace	<i>Agosia chrysogaster</i>			S	S			X	X	The habitat of the longfin dace ranges from clear, cool mountain brooks to small, intermittent desert streams with a sand or gravel substrate. Saucer-shaped depressions in sandy bottom streams are used as nests which are located along shorelines at depths of 2 - 8 in (5-20 cm).	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Speckled Dace	<i>Rhinichthys osculus</i> (Gila pop.)			S				X	X	This species is a bottom dwelling species which inhabits shallow, rocky, headwater streams with relatively swift flow, sometimes in areas with considerable aquatic vegetation. The Federal Register does not show New Mexico as part of the historic range.	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Loach Minnow	<i>Tiaroga cobitis</i>	T	T		T		X	X	X	The loach minnow is federally listed threatened with Designated Critical Habitat approximately 20 miles (32 km) downstream of the project site in the Gila River (Ybarra 2009). The loach minnow inhabits riffle areas with moderate to rapid water velocities and moderate to high gradients. The species is most common in a substrate of elevated cobble and rubble-particularly where sediments have not filled-in crevices. Such areas are usually along the margins and at the heads of riffles.	No - There is no aquatic habitat for this fish on the site. Habitat for this species is known to occur approximately 20 (32 km) miles downstream of the project site at the confluence of Mangas Creek and the Gila River. The Biology Section of this memorandum discusses the potential for occurrence of this species within the project area in detail.	No effect	No habitat for this species occurs within the APE, thus direct impacts to loach minnow or loach minnow critical habitat will not occur as a result of this project. Refer to discussion of loach minnow under the Effects Determination portion of the Biology Section of this memorandum.
Beautiful Shiner	<i>Cyprinella formosa</i>	T					X			Deep, vegetated pools and undercut banks with instream cover, such as uprooted trees and deep pools with adjacent rapid velocity water. Is known to thrive only in a 4.7 mile (7.5 km) stretch of the Mimbres River from Allie Canyon to the town of Mimbres, New Mexico.	No – lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site

Note: Species highlighted in blue were not analyzed in the 1997 FEIS.  
Species highlighted in green were not addressed in any of the prior biological assessments (1997 FEIS, 2008 MSGP, and/or 2009 Final EA).

Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
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Spikedace	<i>Meda fulgida</i>	T	E		T		X	X	X	The Spikedace is federally listed threatened with Designated Critical Habitat approximately 20 miles (32 km) downstream of the project site in the Gila River (Ybarra 2009). Spikedace are found in clear, low-to-moderate gradient, permanently flowing streams of the Gila drainage. The larvae and juveniles tend to occupy shallow, peripheral portions of streams that have slow currents and sand or fine gravel substrates but will also live in backwater areas. Adults prefer sand, gravel or rubble substrates in shallow areas, i.e., less than 30 cm deep, with a swift laminar flow. Adults in the Gila drainage of New Mexico are found most frequently over gravel and cobble substrates.	No - There is no suitable habitat for this fish on the site. The closest known population and designated critical habitat for this species occurs on the main Gila River channel over 20 miles downstream from the project area. The Biology Section of this memorandum discusses the potential for occurrence of this species within the project area in detail.	No effect	No habitat for this species occurs within the APE, thus direct impacts to spikedace or its critical habitat would not occur as a result of this project. Refer to discussion of spikedace under the Effects Determination portion of the Biology Section of this memorandum.
Desert Sucker	<i>Catostomus clarki</i>	SC	S	S	S			X	X	The desert sucker is found in rapids and flowing pools of streams, primarily over bottoms of gravel-rubble with sandy silt in the interstices.	No - lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Rio Grande Sucker	<i>Catostomus plebeius</i>	SC			S			X	X	The Rio Grande sucker lives in small to large, middle elevation 6500 - 8500 ft (2000 - 2600 m) streams usually over gravel and/or cobble, but also in backwaters and in pools below riffles. It is rarely found in waters with heavy loads of silt and organic detritus.	No - lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Sonora Sucker	<i>Catostomus insignis</i>	SC	S	S	S			X	X	Sonora suckers inhabit lentic and pool habitats and are found in a variety of habitats from warm water rivers to trout streams.	No - lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site
Gila Topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	E	T		S		X	X	X	The Gila topminnow typically inhabits lower elevation below 4900 ft (1500 m) springs, streams, and the margins of larger bodies of water, where it shows an affinity for areas containing emergent or aquatic vegetation. Gila topminnows prefer shallow warm water and are associated with dense aquatic vegetation and algae mats. They can withstand varying temperatures, chemistries, and salinities ranging from tap water to sea water.	No - lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present and the species typically inhabits lower elevations than in the Project site
Gila Trout	<i>Oncorhynchus gilae</i>	T	T		S		X	X	X	The Gila trout inhabits small, cool, clear mountain streams, along which riparian vegetation provides a fairly complete canopy. Deep pools are important for the survival of the fish during droughts. Streams containing populations of Gila trout encompass two riparian vegetative communities. The arctic-boreal riparian community occurs within subalpine forest 5,446 - 9,220 ft (1,660 - 2,810 m) elevation and extends to lower elevations in cool microclimates.	No - lack of habitat in Project site or downstream area of potential impact.	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
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<b>Amphibians and Reptiles</b>													
Chiricahua Leopard Frog	<i>Rana chiricahuensis</i>	T	S		T	X	X	X	X	This species occurs from 3,281 – 8,890 ft (1000-2710 m) elevation and in a variety of permanent aquatic habitats where adequate depth provides escape from predators. These habitats include montane springs, streams, ponds, lakes, marshes, stock ponds, and plunge pools of canyon streams. It invades stock tanks in many areas.	No – Recent, focused field surveys were conducted within a five-mile radius of the proposed pit lake area to determine if seeps, spring, stock tanks and other surface water features could function as suitable habitat for this highly aquatic frog. The survey results indicate that none of these features could support CLF. Due to the ephemeral nature of the surface water features in the Burro Mountains and surrounding areas, and overland travel distance between these features, CLF would not be able to successfully disperse to the pit lake that may form at the project site. Furthermore, potential habitat for this species is distant from the project site, and re-introduction efforts for this species have failed primarily due to presence of Chytrid fungus in the area and lack of suitable habitat. For more details on the field survey regarding CLF and the potential for occurrence of this species in the project area, see the memo on the Little Rock Mine Biological Resources Analysis.	No effect	Refer to discussion of CLF under the Effects Determination portion of the Biology Section of this memorandum.
Lowland Leopard Frog	<i>Rana yavapaiensis</i>	SC	E	S	S	X		X	X	Lowland leopard frogs are aquatic and normally found at elevations below 5,960 ft (1817 m) in small to medium-sized streams and occasionally in small ponds. They often concentrate near deep pools in association with root masses of large riparian trees. In New Mexico, this species inhabits riparian areas in areas of grasslands, chaparral, and evergreen woodlands. Associated vegetation includes the Arizona sycamore, seep-willow ( <i>Baccharis glutinosa</i> ), other trees and shrubs, and various forbs and graminoid plants.	Low – lack of habitat in Project site; potential habitat for this species is located on Mangas Creek approximately 12 miles (19 km) downgradient from the project site.	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Arizona Toad	<i>Bufo microscaphus microscaphus</i>		S	S	S	X		X	X	During a study of distribution and habitat associations of herpetofauna, <i>Bufo microscaphus</i> was found in closed chaparral, mixed broadleaf riparian, cottonwood-willow riparian, and mesquite bosque (floodplain woodland) habitat types. Occurs at elevations near sea level to around 8,000 ft (2,440 m).	Low – lack of habitat in Project site; potential habitat for this species is located on Mangas Creek approximately 12 miles (19 km) downgradient from the project site.	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Texas Horned Lizard	<i>Phrynosoma cornutum</i>			S	S	X		X	X	This lizard inhabits flat, open, generally dry country with little plant cover, except for bunchgrass and cactus. Strictly terrestrial, this lizard can bury itself in loose soil that is sandy, loamy, or rocky. It seeks shelter under rocks. Texas Horned Lizard also occupies arid and semiarid open country with loose soil supporting bunchgrass, cactus, juniper, mesquite, or acacia. Occurs at elevation ranges from sea level to around 6,000 ft (1830 m).	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Reticulate Gila Monster	<i>Heloderma suspectum suspectum</i>		E		S	X		X	X	The species typically inhabits the lower slopes of mountains and nearby outwash plains especially in canyons and arroyos where water is at least periodically present. In some areas, they also frequent irrigated farmlands that adjoin those habitat types. Other cover in such areas often includes boulders, rock crevices, downed vegetation, and litter. Gila monsters dig burrows for shelter, or use those made by other animals or formed by nature. These are occupied both as winter hibernacula and as warm-season retreats from heat and coolness.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
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Mexican Garter Snake	<i>Thamnophis eques megalops</i>	C (SC)	E	S	S			X	X	This species is associated with a variety of habitats, but most of the range is centered on the lower parts of highland areas and adjacent basins. Habitats in which the species has been found include woodlands of pines and oaks, grasslands with mesquites, and low to middle elevation watercourses in which cottonwoods, willows, and other riparian plants are found. In New Mexico, the three areas where this species has been found are of the riparian type, as described above at elevations of 4,200 - 5,900 ft (1,300-1,800 m), but may reach elevations of 8,500 feet (2,593 m). Whatever the terrestrial habitats may be in an area of occurrence, the Mexican garter snake is typically an aquatic species. Stream situations frequented by the species in New Mexico are generally characterized by shallow, slow moving, and at least partially vegetated bodies of water such as around springs.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Narrowhead Garter Snake	<i>Thamnophis rufipunctatus rufipunctatus</i>	SC	T	S	S	X		X	X	This is a highly aquatic species of garter snake, and it is restricted to montane and immediately adjacent regions. This snake typically inhabits clear, cool, rocky streams, although in New Mexico it ranges down the Gila River to the Arizona border at about 4,200 ft (1300 m). At the other end of the spectrum, the species ranges up to 7,500 ft (2300 m) or higher where coniferous woodlands and forests are the dominant upland vegetation. Riparian growth in such areas consists of Arizona alders ( <i>Alnus oblongifolia</i> ), willows ( <i>Salix spp.</i> ), narrowleaf cottonwoods ( <i>Populus angustifolia</i> ), and Arizona sycamores ( <i>Platanus wrightii</i> ). Although the narrowhead garter snake frequently basks along the shore, when disturbed it almost invariably slides into the water and dives to the bottom to hide.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Desert Kingsnake	<i>Lampropeltis getula splendida</i>				S			X	X	Common kingsnakes are uncommon to rock slopes and mesquite dominated bajada, abundant in grassland flats and mesquite-dominated flats.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
<b>Birds</b>													
N. Beardless Tyrannulet	<i>Camptostoma imberbe ridgwayi</i>		E		S			X	X	In the Southwest, the species typically occurs at lower elevations in dense stands of mesquite ( <i>Prosopis spp.</i> ) and associated growth typically along stream courses.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Common Black-Hawk	<i>Buteogallus anthracinus anthracinus</i>	SC	T		S			X	X	It is characteristically found in the Southwest in cottonwood ( <i>Populus spp.</i> ) and other woodlands along permanent lowland streams. Breeding common black-hawks require mature, well developed riparian forest stands (e.g., cottonwood bosques) that are located near permanent streams where principal prey species are available. Commonly occurs in elevations between 1,750 - 7,080 ft (533-2158 m).	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Varied Bunting	<i>Passerina versicolor versicolor</i>		T		S			X	X	Buntings of the genus <i>Passerina</i> are characteristic of shrub lands, second growth, and similar habitats, and the varied bunting inhabits such over a large portion of Mexico. In New Mexico the species seems to prefer dense stands of mesquite ( <i>Prosopis spp.</i> ) and associated growth in canyon bottoms. There the males set up territories, which they proclaim by frequent singing.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

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Gray Catbird	<i>Dumetella carolinensis ruficrissa</i>				S			X	X	Gray catbirds summer locally in the Northern Highlands and middle Rio Grande Valley. They are occasional in the summer in the Mogollon Highlands and east of the Rio Grande. They migrate almost statewide but only occasionally west of the Jicarilla Apache Indian Reservation and the middle Rio Grande and lower Pecos valleys. They are found in ponderosa pine, aspen (hardwoods), and pinyon-juniper forest types. In New Mexico, Gray Catbirds inhabit riparian shrubland/woodland at lower 2,800-5500 ft (850 - 1,676 m) and middle 5,000-7500 ft (1,524 - 2,286 m) elevations.	Low—may migrate through the Project site	May affect, not likely to adversely affect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Neotropic Cormorant	<i>Phalacrocorax brasilianus</i>		T		S			X	X	In New Mexico, cormorants are generally found on larger bodies of water such as reservoirs, where they prey on fish probably mainly "rough" species in New Mexico. They nest near or over water, in vegetation such as dead snags or trees. The expanse of open water is probably a major stimulus in attracting these birds.	No—lack of habitat in Project site	No effect	No habitat is present in the Project site
Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis (western pop)</i>	C	S		S		x	X	X	The western race of the yellow-billed cuckoo is associated with lowland deciduous woodlands, willow and alder thickets, second-growth woods, deserted farmlands, and orchards.	No—lack of habitat in Project site	No effect	No habitat is present or the species is not within the elevation range of the Project site
Bald Eagle	<i>Haliaeetus leucocephalus alascanus</i>		T		S			X	X	In New Mexico, Bald eagles occur casually to occasionally in summer and are considered rare and local near water. They migrate and winter almost statewide. Seem to prefer timbered areas along coasts, large lakes, and rivers, but also occupy other areas. They are found in Douglas fir, Hemlock-Sitka spruce, redwood, ponderosa pine, larch/white pine, lodge pole pine, fir-spruce, aspen (hardwoods), chaparral, and pinion-juniper forest types.	Low—lack of habitat in Project site; may migrate through project site.	No effect	No habitat is present in the Project site
Great Egret	<i>Ardea alba egretta</i>				S			X	X	Occurs in areas characterized by open expanses of shallow water bordered by relatively little vegetative cover. Desert Riparian Deciduous Woodland, Marsh Woodlands, especially of cottonwoods, that occur where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins. Occurs at elevations where stream conditions provide sufficient permanent moisture for emergent plants, or for a narrow band of deciduous trees and shrubs; at low elevation characterized by cottonwood and sycamore, at mid-elevation by white alder ( <i>Alnus rhombifolia</i> ) and bigleaf maple ( <i>Acer macrophyllum</i> ), and at high elevation by willow.	No—lack of habitat in Project site	No effect	No habitat is present in the Project site
Aplomado Falcon	<i>Falco femoralis septentrionalis</i>	E, NEP	E		S	X	X	X	X	The habitat of the Northern Aplomado Falcon consists of grassy plains interspersed with mesquite, cactus, and yucca. Past records indicate that in New Mexico it has been typically associated with yucca grasslands and adjacent shrubby habitats at lower elevations. Historic range in Grant County. Most elevation records from southwestern United States are from 3,300-4,900 feet (1007-1495 m) above sea level.	No—lack of habitat in Project site	No effect	No habitat is present, and species typically occurs in elevations less than in the Project site
Peregrine Falcon	<i>Falco peregrinus anatum</i>	SC	T		S	X		X	X	In New Mexico, the breeding territories of peregrine falcons center on cliffs that are in wooded/forested habitats, with large "gullies" of air nearby in which these predators can forage. The nest sites are typically ledges or potholes, with the 3-4 eggs being laid directly on the bare substrate.	No—lack of nesting habitat and foraging habitat in and surrounding the Project site	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

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Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	SC	T		S			X	X	In New Mexico, the tundra subspecies of Falco peregrinus, is a very rare migrant through the State.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
South Western Willow Flycatcher	<i>Empidonax traillii extimus</i>	E	E		S	X	X	X	X	Although occurring widely in New Mexico during migration, willow flycatchers are confined to riparian woodlands in the breeding season. The southwestern willow flycatcher occurs in riparian habitats along rivers, streams, or other wetlands, where dense growths of willows ( <i>Salix sp.</i> ), Baccharis, arrowweed ( <i>Pluchea sp.</i> ), tamarisk ( <i>Tamarix sp.</i> ) or other plants are present, often with a scattered overstory of cottonwood ( <i>Populus sp.</i> ) These riparian communities provide nesting and foraging habitat.	No – lack of habitat in Project site; known to occur over 20 miles (32 km) downstream along the Gila River (Ybarra 2009). For more information, refer to the Biological Resources Analysis.	No effect	No habitat is present in the Project site. Maps obtained from the USFWS indicate that the nearest designated critical habitat for SWFL is located on the Gila River over 20 miles (32 km) west of the mine site. Direct or indirect impacts to SWFL or designated SWFL critical habitat will not occur as a result of this project. Refer to discussion of SWFL under the Effects Determination portion of the Biology Section of this memorandum.
Northern Goshawk	<i>Accipiter gentilis atricapillus</i>	SC		S	S	X		X	X	The principal forest types occupied by the goshawk in the Southwest are ponderosa pine, mixed-species, and spruce-fir. Breeding habitat includes pine-oak ( <i>Pinus/Quercus</i> ) woodlands in southwestern North America. Occurs at elevations where stream conditions provide sufficient permanent moisture for emergent plants, or for a narrow band of deciduous trees and shrubs; at low elevation characterized by cottonwood and sycamore, at mid-elevation by white alder ( <i>Alnus rhombifolia</i> ) and bigleaf maple ( <i>Acer macrophyllum</i> ), and at high elevation by willow. Goshawks have been located at elevations of 4,750-9,120 ft (1,448-2,780m).	Moderate – may occur as the APE is within the species' currently known range and vegetation communities resemble those known to be used by the species. A nest site for this species has been documented approximately 2 miles (3.2 km) from the Little Rock Mine permit boundary (Ybarra 2009). The goshawk may occasionally fly over and forage in the APE. For more information, refer to the Biological Resources Analysis.	May affect, not likely to adversely affect	Refer to discussion of Northern Goshawk under the Effects Determination portion of the Biology Section of this memorandum.
Common Ground-dove	<i>Columbina passerina pallescens</i>		E		S			X	X	Common ground-doves prefer native shrublands and weedy areas, including such habitats in riparian areas. Inhabit desert riparian deciduous woodland, especially of cottonwoods, that occur where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Ferruginous Hawk	<i>Buteo regalis</i>			S	S	X		X	X	Ferruginous hawks occur casually in open grassland and pinion-juniper mesas. Open to dense stands of shrubs and low trees, including big sagebrush ( <i>Artemisia tridentata</i> ), saltbush ( <i>Atriplex confertifolia</i> ), greasewood ( <i>Sarcobatus vermiculatus</i> ), or creosote bush ( <i>Larrea divaricata</i> ). Also inhabits open stands of creosote bush and large succulents ( <i>Ferocactus pringlei</i> , <i>Echinocactus platyacanthus</i> ) in southern New Mexico and southwest Texas.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Northern Gray Hawk	<i>Asturina nitida maximus</i>	SC		S	S			X	X	Desert Riparian Deciduous Woodland, Marsh. Woodlands, especially of cottonwoods, that occurs where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Swainson's Hawk	<i>Buteo swainsoni</i>				S			X	X	In New Mexico, the species breeds in fairly low numbers in appropriate habitat statewide. Swainson's Hawk breeds and forages in grasslands, shrublands, and small, open woodlands. It also has adapted to foraging in agricultural areas, such as wheat and alfalfa fields, where crops do not exceed the typical height of native grasses. Typical landscapes for Swainson's Hawk include a mixture of grassland, cropland, and shrub vegetation.	Low – may migrate through the Project site	May affect, not likely to adversely affect	Although there is a low likelihood of occurrence, low quality foraging habitat at the project site would be removed.

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

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Zone-tailed Hawk	<i>Buteo albonotatus</i>				S			X	X	Zone-tailed hawks migrate and summer in the south-northward very locally to the Jemez Mountains and are considered rare to uncommon. They are casual in winter in the southwest. River, Riparian Woodland, Subalpine Marsh. Occurs at elevations where stream conditions provide sufficient permanent moisture for emergent plants, or for a narrow band of deciduous trees and shrubs; at low elevation characterized by cottonwood and sycamore, at mid-elevation by white alder ( <i>Alnus rhombifolia</i> ) and bigleaf maple ( <i>Acer macrophyllum</i> ), and at high elevation by willow.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Blue-throated Hummingbird	<i>Lampornis clemenciae bessophilus</i>				S			X	X	Blue-throated hummingbirds are occasional in summer and migration in the southwest and Guadalupe Mountains. Open stands of creosote bush and large succulents ( <i>Ferocactus pringlei</i> , <i>Echinocactus platyacanthus</i> ) in southern New Mexico and southwest Texas. Occur in desert riparian deciduous woodland, marshes. Woodlands, especially of cottonwoods, that occur where desert streams provide sufficient moisture for a narrow band of trees and shrubs along the margins.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Broad-billed Hummingbird	<i>Cyananthus latirostris magicus</i>		T		S			X	X	Open stands of creosote bush and large succulents ( <i>Ferocactus pringlei</i> , <i>Echinocactus platyacanthus</i> ) in southern New Mexico and southwest Texas; are considered rare to uncommon.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Costa's Hummingbird	<i>Calypte costae</i>		T		S			X	X	In New Mexico, Costa's Hummingbird is an uncommon and sporadic breeder in the southwest and south-central mountains. It occurs most regularly in Guadalupe Canyon and in side canyons along the lower Gila River from Cliff south. It occupies more characteristic Chihuahuan Desert Shrub and foothill/montane shrub habitats.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Lucifer Hummingbird	<i>Calothorax lucifer</i>		T		S			X	X	The lucifer hummingbird is a regular breeder in New Mexico. Habitat use by this species over much of its range seems to center on slopes and adjacent canyons in arid montane areas, especially where there are flowering species such as agaves ( <i>Agave spp.</i> ), ocotillo ( <i>Fouquieria splendens</i> ), and other chaparral-type plants.	No – lack of habitat in Project site; may occur nearby.	No effect	No habitat is present in the Project site
White-eared Hummingbird	<i>Hylocharis leucotis borealis</i>		T		S			X	X	This species typically occurs in montane habitats in Mexico. In the United States it has been found in similar types including pine ( <i>Pinus spp.</i> ) forest, in oak ( <i>Quercus spp.</i> ), and pine-oak woodland and adjacent riparian sites.	Low – may forage in the Project site	No effect	Although there is an extremely low likelihood of occurrence, only a small amount of low quality foraging habitat for this species that occurs on the project site would be removed.
Yellow-eyed Junco	<i>Junco phaeonotus palliatus</i>		T		S			X	X	Open to dense vegetation of shrubs, low trees, and succulents, dominated by paloverde ( <i>Cercidium microphyllum</i> ), pricklypear ( <i>Opuntia spp.</i> ), and giant saguaro ( <i>Cereus giganteus</i> ). Also known to occur in woodlands, especially of cottonwoods, that occur where desert streams provide sufficient moisture for a narrow band of deciduous trees and shrubs along the margins.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Thick-billed Kingbird	<i>Tyrannus crassirostris</i>		E		S			X	X	Thick-billed kingbirds inhabit thorn forests and adjacent habitats in western Mexico and Guatemala, but in the United States they are confined to riparian habitats. They breed in riparian woodlands especially near running water.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Belted Kingfisher	<i>Ceryle alcyon caurina</i>				S			X	X	These birds occupy riparian habitats exclusively or nearly so during the breeding season.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

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Mississippi Kite	<i>Ictinia mississippiensis</i>				S			X	X	In New Mexico, most of the current populations are ones that breed on golf courses. They build stick nests in the upper parts of trees, with Chinese or Siberian elms ( <i>Ulmus pumila</i> ) being frequently selected in the Southwest. Mississippi kites are causal in dense riparian woodland-shrubland. Documented to occur in elevation ranges 1,400-3,040 ft (427-927m).	No – lack of habitat in Project site	No effect	No habitat is present, and species typically occurs in elevations less than in the Project site
Buff-collared Nightjar	<i>Caprimulgus ridgwayi ridgwayi</i>		E		S			X	X	This species has been recorded in a wide variety of habitats. In Arizona and New Mexico, the species has generally been reported only in areas that support rather arid shrublands and woodlands, generally in canyons and washes. In New Mexico, areas where the species has been found typically support rather open stands of mesquite ( <i>Prosopis glandulosa</i> ) and other small trees and large shrubs.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Burrowing Owl	<i>Athene cunicularia hypugaea</i>	SC		S	S			X	X	Uncommon to fairly common in open grassland areas, particularly in or adjacent to prairie dog towns and along canals. These owls occupy non-riparian habitats during the breeding season, except for drinking and bathing.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Elf Owl	<i>Micrathene whitneyi whitneyi</i>				S			X	X	Elf owls migrate and summer in the extreme southwest north to the southwestern Mogollon Plateau and are considered rare to common. Open stands of creosote bush and large succulents ( <i>Ferocactus pringlei</i> , <i>Echinocactus platyacanthus</i> ) in southern New Mexico and southwest Texas.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Flammulated Owl	<i>Otus flammeolus</i>				S			X	X	In New Mexico, this species was heard regularly in fir forest near Bursum Camp and also at Silver Creek divide, both in the Mogollon Mountains. Foraging for flammulated owls includes areas of mature open stands of pine, douglas-fir, quaking aspen, blue spruce, oaks, and various others. Breeding habitat ranges from dry submontane interior douglas-fir forests to ponderosa pine to admixture of oak, pinyon and juniper to ponderosa pine mixes with Douglas-firs, true firs, larch, incense cedar, spruce, and stands of aspens.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T	S		S		X	X	X	Spotted owls are found in Douglas fir, Hemlock-Sitka spruce, redwood, ponderosa pine, larch/white pine, lodgepole pine, fir-spruce, aspen/hardwood, and pinyon-juniper forest types. Habitat characteristics highly sought by Mexican spotted owls include high canopy closure, high stand density, a multilayered canopy, uneven-aged stands, numerous snags, and downed woody matter. These are best expressed in old growth mixed-conifer forests (usually more than 200 years old).	No – lack of habitat in Burro Mountains, including Project site.	No effect	No habitat is present in the Project site
Brown Pelican	<i>Pelecanus occidentalis carolinensis</i>		E		S			X	X	The brown pelican is usually found in marine habitats in warmer waters in North America; except for the lower Colorado Basin and vicinity, it only rarely occurs inland. Given the rarity of the latter species in New Mexico, next to nothing is known about its habits in the State. The reliable records are all of solitary birds, generally in subadult plumages and near water. One would presume that most occurrences in the State would be of storm-driven birds that moved inland under duress.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site

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Mountain Plover	<i>Charadrius montanus</i>	SC	S		S			X	X	In New Mexico, it breeds locally in dry, open short grass prairie habitats from the eastern plains west locally to central-western areas, and migrates through the State. This is a lowland grassland species and is not found in the mountains. The mountain plover is also attracted to man-made landscapes (e.g., sod farm, cultivated fields) that mimic the natural habitat associations, or sites with grassland characteristics. Occurs in moderate elevations of 3,000 - 8,000 ft (915-2440 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Loggerhead Shrike	<i>Lanius ludovicianus excubitorides</i>		S	S	S			X	X	Occur in open stands of creosote bush and large succulents ( <i>Ferocactus pringlei</i> , <i>Echinocactus platyacanthus</i> ) in southern New Mexico and southwest Texas. Loggerhead shrikes are known to use Mixed Shrub, Sagebrush, Pinyon/Juniper, and Agriculture habitats in New Mexico.	Low - may forage in the Project site	No effect	Although there is an extremely low likelihood of occurrence, only a small amount of low quality foraging habitat at the project site would be removed.
Sora	<i>Porzana carolina</i>				S			X	X	The sora is a bird of the wet, soggy marshes. Although freshwater marshes are their preferred habitat, many thousands of soras use the brackish and salt marshes also, particularly during migration. Generally found within heavily vegetated areas, often in proximity to at least some open water. The vegetation within these areas was dominated by cattails and rushes.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Baird's Sparrow	<i>Ammodramus bairdii</i>	SC	T	S	S			X	X	Shortgrass prairies with scattered low bushes and matted vegetation. In migration and winter, found in desert and open grasslands, and overgrown fields.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Black Swift	<i>Cypseloides niger borealis (NM)</i>		S						X	Found on high inaccessible cliffs near water. In the Western U.S., habitat includes Douglas-fir, Hemlock-Sitka Spruce, Fir-Spruce, Aspen-Hardwoods habitats: Douglas-fir - Douglas-fir composes most of the stocking. Common associates are western hemlock, western redcedar, true firs, redwood, ponderosa pine, and larch. The type group predominates in the Pacific Northwest, but also occurs (decreasing southward) throughout the Rocky Mountains south to northern New Mexico. Several transient sightings have occurred, but New Mexico's only known breeding locality was discovered at Jemez Falls in 1990.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Abert's Towhee	<i>Pipilo aberti aberti</i>		T		S			X	X	Abert's towhee uses thickets of seepwillow ( <i>Baccharis glutinosa</i> ) and other riparian habitats in its New Mexico range. Farther west, including in the Phoenix area of Arizona and the Imperial Valley of California, the species is neither so habitat-restricted. It is found in the Sonoran Desert Scrub; Chihuahuan Desert Scrub; Desert Riparian Deciduous Woodlands, Marshes: Sonoran Desert Scrub - Open to dense vegetation of shrubs, low trees, and succulents, dominated by palo verde ( <i>Cercidium microphyllum</i> ), pricklypear ( <i>Opuntia</i> spp.), and giant saguaro ( <i>Cereus giganteus</i> ).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site

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Elegant Trogon	<i>Trogon elegans canescens</i>		E		S			X	X	Elegant trogons are rare summer residents of some of New Mexico's riparian habitats in montane canyons. Habitat includes desert riparian deciduous woodland, and marshes. Occurs at elevations where stream conditions provide sufficient permanent moisture for emergent plants, or for a narrow band of deciduous trees and shrubs; at low elevation characterized by cottonwood and sycamore, at mid-elevation by white alder ( <i>Alnus rhombifolia</i> ) and bigleaf maple ( <i>Acer macrophyllum</i> ), and at high elevation by willow.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Bell's Vireo	<i>Vireo bellii arizonae</i>	SC	T		S			X	X	In New Mexico this species characteristically occurs in dense shrubland or woodland along lowland stream courses, with willows ( <i>Salix spp.</i> ), mesquite ( <i>Prosopis spp.</i> ), and seepwillows ( <i>Baccharis glutinosa</i> ) being characteristic plant species. These vireos feed on insects, moving slowly about for the most part, gleaning food from branches and leaves.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Gray Vireo	<i>Vireo vicinior</i>		T		S			X	X	Occurs in New Mexico only in the warmer months. The breeding habitat is generally open woodlands/shrublands featuring evergreen trees and shrubs of various kinds. Junipers ( <i>Juniperus spp.</i> ) are the dominant element in most areas of occurrence in New Mexico, although oaks ( <i>Quercus spp.</i> ) are also frequent in the southern part of the range.	Low – may forage in the Project site	No effect	Although there is an extremely low likelihood of occurrence, only a small amount of low quality foraging habitat that could be utilized by this species on the project site would be removed.
Gila Woodpecker	<i>Melanerpes uropygialis uropygialis</i>		T		S			X	X	In New Mexico, it is resident in the Gila Valley and in Guadalupe Canyon, which are key habitat areas for it in the State. Vagrants have been reported near Glenwood, at Silver City, and in Hidalgo County. In New Mexico, however, it is confined to lower elevational woodlands, especially those dominated by cottonwoods ( <i>Populus fremontii</i> ), along stream courses.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
<b>Mammals</b>													
Allen's Big-eared Bat	<i>Idionycteris phyllotis</i>	SC	S	S	S			X	X	This big-eared bat seems to be largely a dweller in forested zones, from the yellow pine zone down to the riparian forest of sycamores, cottonwoods, and walnuts. In New Mexico, known from ponderosa pine forest, oak-pinyon- juniper-pine transition, and riparian cottonwood-sycamore forest. Elevation ranges include 1,320 - 9,800 ft (403-3,225 m), but most specimens are at altitudes between 3,500 - 7,500 ft (1,100-2,500 m).	Low – no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Arizona Occult Bat	<i>Myotis lucifugus occultus</i>		S	S	S	X		X	X	This species, like <i>M. yumanensis</i> , is a water bat in that most specimens have been taken in the vicinity of large permanent water sources, such as streams, drainage ditches, or lakes. Vegetation zone seems unimportant in determining their distribution.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Cave Myotis	<i>Myotis velifer incautus</i>		S	S	S			X	X	In New Mexico, the cave myotis is primarily a desert and lower elevation grassland species but has been collected from juniper-pinyon woodland. Cave myotis inhabit mine shafts, tunnels, caves, and even under bridges, in desert areas of creosote bush, palo verde, brittlebush and cacti of Arizona. Even though they are found in xeric areas, they are never more than a few miles from some water source such as tanks, canals, or creeks. Elevation ranges mostly between 300 and 5,000 feet (92 - 1,525 m).	Low – no roosting habitat; may forage in the Project site	No effect	No habitat is present, and species typically occurs in elevations less than in the Project site

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Fringed Myotis	<i>Myotis thysanodes thysanodes</i>		S	S				X	X	They are found in desert-shrub grassland, shortgrass plains, sacaton grassland, sycamore, cottonwood, rabbitbrush; pinonjuniper, chaparral, and oak woodlands; and oak savanna. Elevation ranges from 4,000 - 8,437 feet (1,220 - 2,571 m).	Low – may inhabit areas near the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Greater western mastiff bat	<i>Eumops perotis californicus</i>					X (see Note 1 below)				This large bat roosts on high cliffs, preferring rugged rocky canyons with abundant crevices. They crowd into tight crevices at least a foot deep and two inches or more wide where they wedge themselves in the backs of cracks of crevices or crevices where they narrow down considerably. Colonies of this species prefer crevices even deeper, to ten or more feet. Entrances to roosting crevices are usually horizontal but facing downward which facilitates entry and exit. <i>E. p. californicus</i> occurs principally in the southwest desert regions of the United States along the border with Mexico. Elevation ranges from 240 - 8,475 ft (73 - 2583 m).	Low – no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Long-eared Myotis	<i>Myotis evotis evotis</i>		S	S				X	X	This species occurs in New Mexico in the following habitat type(s): The pinyon/juniper habitat type occurs on the benches and mesa tops which are above 6,700 ft (2,042 m) elevation. Pinyon pine and one-seed juniper are the dominant species. Ponderosa pine occurs sporadically in this type. Shrubs also occurring in this type include Gambels oak, fourwing saltbush, antelope bitterbrush, mountain mahogany, and big sagebrush. Grasses include sideoats grama, blue grama, muttongrass, galleta, sand dropseed, and Indian ricegrass.	Low – no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Long-legged Myotis	<i>Myotis volans interior</i>		S	S				X	X	A western species, the long-legged myotis is relatively common in ponderosa pine forests and pinyon-juniper woodlands. This bat roosts in a variety of sites including trees, buildings, crevices in rock faces, and even fissures in the ground in evenly eroded areas. Caves and mines do not appear to be important as day roosts, but are used as night roosts if available. Elevation ranges from 2,200 - 10,000 ft (670 - 3050 m).	Low – no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Pale Townsend's Big-eared Bat	<i>Corynorhinus townsendii pallascens</i>	SC	S	S	S			X	X	Townsend's big-eared bat is a western species occupying semidesert shrublands, pinyon-juniper woodlands, and open montane forests. It is frequently associated with caves and abandoned mines for day roosts and hibernacula but will also use abandoned buildings and crevices on rock cliffs for refuge. Townsend's big-eared bats are relatively sedentary. They do not move long distances from hibernacula to summer roosts nor do they move or forage far from their day roosts. <i>Corynorhinus townsendii pallascens</i> has been found from 550-8,437 ft (168-5272 m).	Low – no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Small-footed Myotis	<i>Myotis ciliolabrum melanorhinus</i>		S	S				X	X	Small-footed myotis are commonly associated with willows along streambanks. They are found in sycamore, cottonwood, and rabbitbrush riparian habitats; also in desert, chaparral, pinyon-juniper, and conifer. Elevation ranges from 2120-8670 ft (646- 2644 m).	Low – no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/ or foraging habitat only
Spotted Bat	<i>Euderma maculatum</i>		T	S	S	X		X	X	In New Mexico, the preferred habitat of this species is meadows in Subalpine Coniferous Forest. The species has been taken from the lower Rio Grande Valley near Las Cruces 3,936 ft (1,200 m) to near the summit of Mt. Taylor 10,594 ft (3,230 m), but most records are in or near forested areas usually of bats captured in nets placed over bodies of water. Occur near cliffs over perennial water, but individuals range from low deserts to evergreen forests.	Low – no roosting habitat; may forage in the Project site	No effect	No habitat is present or the species is not within the elevation range of the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
Common Name	Scientific Name	ESA	New Mexico	BLM	USFS Region 3	Final EIS Little Rock Mine Project Sept 1997	Biological Evaluation in Support of Endangered Species Act Certification MSGP 2008	Little Rock Mine Stockpile Reclamation Project Final EA Sept 2009	December 23 & 29, 2009 Species List (BISON-M, nmrareplants, unnm.edu, USFWS County Species List)				
Western Red Bat	<i>Lasiurus blossevillii</i>	SC	S		S			X	X	In New Mexico this is a species of riparian associations of deciduous trees. <i>L. blossevillii</i> is typically solitary, roosting primarily in the foliage of trees or shrubs. There may be an association with intact riparian habitat (particularly willows, cottonwoods, and sycamores). Occasionally use caves. Elevation ranges from 1,900 - 7,200 ft (580 - 2,196 m).	No-lack of habitat in Project site	No effect	No habitat is present in the Project site
Yuma Myotis	<i>Myotis yumanensis yumanensis</i>		S	S				X	X	In New Mexico, the zonal center of abundance of this species seems to be in desert, grassland, and woodland, and the riparian communities of these zones, elevation commonly ranges from 180 - 4,760 ft (55-1,450 m). Published records suggest railroad bridges and buildings are common kinds of summer retreats for the species.	Low - no roosting habitat; may forage in the Project site	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
White-nosed Coati	<i>Nasua narica</i>		S		S			X	X	In New Mexico the coati inhabits canyons characterized by riparian vegetation such as sycamore and oaks.	Low - no roosting habitat; may transition through the Project site	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
Red Fox	<i>Vulpes vulpes fulva (NM); macroura (NM)</i>		S						X	Red fox have been found from in northwestern New Mexico (San Juan, McKinley, and Cibola counties). These records have included sagebrush flats, the boulder accumulations in pinyon-juniper/juniper savanna/sagebrush habitats at the base of mesas, and a golf course. Additional records are also available from eastern New Mexico in association with agricultural areas.	Low - although this species is wide-ranging throughout the U.S., they are uncommon in New Mexico, especially the west-central part of the state.	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
Botta's Pocket Gopher	<i>Thomomys bottae albatus</i>				S			X	X	Botta's pocket gophers prefer sandy soils of valley bottom riparian areas but will use many other areas except soils high in clay or extremely coarse substrates. They can be found in a variety of vegetation types, including agricultural land, grasslands, roadsides, open parklands, pinyon-juniper woodlands, open montane forest, montane shrublands, and semidesert shrublands.	No-lack of habitat in Project site (site is rocky and lacking developed soils)	No effect	No habitat is present in the Project site
Chihuahuan Pronghorn	<i>Antilocapra americana mexicana</i>				S			X	X	Pronghorn have been found to inhabit Great Basin Desert Scrub habitat, and are typical of Plains-Mesa Grasslands in New Mexico.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Yellow-nosed Cotton Rat	<i>Sigmodon ochrognathus</i>	S		S	S				X	<i>Sigmodon ochrognathus</i> range in New Mexico is limited from the upper grassland to pine-oak forest. It is most commonly associated with very rocky hillside that support stands of bunch grass, Yucca, Agave, prickly pear cactus, Dasyliion, oaks and leguminous shrubs.	Low - not likely in Project site but may occur in adjacent areas.	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
Ringtail	<i>Bassariscus astutus arizonensis</i>		S		S			X	X	In New Mexico, ringtails live in extensive rocky areas and cliffs in grassland and woodland. They may be common in such places, but observations and specimens are rare. The species is most common in the southern half of the State. Ringtail cats are found primarily in montane habitats, but are also found in lowlands in rough, rocky country.	Low - not likely in Project site but may occur in adjacent areas.	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
Rocky Mountain Bighorn Sheep	<i>Ovis canadensis canadensis</i>				S			X	X	Bighorns inhabit rugged cliffs and other extremely rocky areas adjacent to suitable feeding sites, which include grass as well as browse plants.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Desert Bighorn Sheep	<i>Ovis canadensis mexicana (endangered pops)</i>		E		S			X	X	The desert subspecies of the bighorn occurs in arid, rocky mountains, mainly in open habitats. Typical plant species of these areas include various sclerophyllic, succulent, and semi-succulent trees, shrubs, and semi-shrubs, as well as grasses and forbs.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
Common Name	Scientific Name	ESA	New Mexico	BLM	USFS Region 3	Final EIS Little Rock Mine Project Sept 1997	Biological Evaluation in Support of Endangered Species Act Certification MSGP 2008	Little Rock Mine Stockpile Reclamation Project Final EA Sept 2009	December 23 & 29, 2009 Species List (BISON-M, nmrareplants, unnm.edu, USFWS County Species List)				
Common Hog-nosed Skunk	<i>Conepatus leuconotus mearnsi</i> (NM); <i>venaticus</i> (NM,AZ)		S						X	Primary habitat types include rocky areas within Coniferous and Mixed Woodlands, Juniper Savanna, Montane Scrub, Chihuahuan Desert Scrub, Closed Basin Scrub, Desert Grassland, Lava Beds and Sand Dunes.	Low - This species is found occasionally in the southern and eastern portions of the state along the Texas border.	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
Hooded Skunk	<i>Mephitis macroura milleri</i>		S		S			X	X	Hooded skunks seem to prefer rocky slopes, bases of cliffs, or rocky sides of arroyos. They seem to prefer intermediate elevations, above the deserts but not in the highest mountains. The hooded skunk uses approximately 2,251 out of 11,684 miles (or 3,632 out of 18,845 km) of Chihuahuan Desert Scrub habitat within New Mexico.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Western Spotted Skunk	<i>Spilogale gracilis</i>		S						X	Preferred habitat for the Western spotted skunk includes rocky bluffs, cliffs and brush-bordered canyon streams and streambeds. In New Mexico this species is found mainly in the eastern portion of the state.	Low - lack of habitat at the Project site. Also, although this species is listed in Grant County, they are mostly found in eastern New Mexico.	No effect	No documentation, low/ poor habitat quality, and/or foraging habitat only
Arizona Gray Squirrel	<i>Sciurus arizonensis arizonensis</i>				S			X	X	Arizona gray squirrels primarily associate with riparian habitats in New Mexico. Its preferred habitat includes walnuts, sycamores, and cottonwoods.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
White-sided Jackrabbit	<i>Lepus callotis gaillardi</i>					X (see Note 2 below)				In the United States portion of its range, the white-sided jackrabbit appears to be a virtual obligate in areas of pure grasslands. They spend the daylight hours hiding in the grass, and almost all observations of the species at that time are of animals flushed from cover. In areas where grassland is invaded by shrubs and forbs, the blacktail jackrabbit outnumbers white-sided jackrabbits proportional to the extent of invasion. The white-sided jackrabbit feeds primarily on the nutgrass sedge ( <i>Cyperus rotundus</i> ) and various grasses, including buffalo-grass ( <i>Buchloe dactyloides</i> ) and other shortgrass plains species.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Long-tailed Vole	<i>Microtus longicaudus longicaudus</i>				S			X	X	<i>M. longicaudus</i> is found in coniferous forests, but are most abundant where there is at least some grassy vegetation present on the forest floor. They are also found from time to time in rockslides and are common in areas that were recently cut or burned.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Mexican Gray Wolf	<i>Canis lupus baileyi</i>	E, NEP	E		S		x	X	X	Historically, Mexican wolves are known to be associated with montane woodlands characterized by sparsely- to densely-forested mountainous terrain and adjacent grasslands at elevations of 4,000 - 5,000 ft (1,219-1,524 m). These preferred habitats range from foothills characterized by evergreen oaks ( <i>Quercus</i> spp.) or pinyon ( <i>Pinus edulis</i> ) and juniper ( <i>Juniperus</i> spp.) to higher elevation pine ( <i>Pinus</i> spp.) and mixed conifer forests.	Low - There are no naturally occurring populations of Mexican wolves in the U.S. However, a nonessential-experimental population of wolves has been reintroduced into suitable habitat located within the Blue Range Recovery Area (BRRA) that straddles the Arizona-New Mexico border and includes Grant County. While the Project site occurs within the secondary recovery zone of the BRRA and suitable habitat for the wolf exists in areas surrounding the site, no wolves have been documented on the Little Rock Mine site or vicinity. However, due to the high mobility of this species, it is possible that an occasional single wolf could disperse through the area.	No effect	Project activities will disturb approximately 343 acres of primarily grassland, piñon-juniper grassland and piñon-juniper woodland. This disturbance represents only 0.008% of the entire 4.4 million-acre BRRA. Given the extremely low potential for occurrence on the mine site and surrounding area, high mobility of the species, and the removal of only a tiny fraction of suitable habitat implementation of the project would not directly or indirectly impact any wolves. Furthermore, the analysis presented in previous biological reports prepared for the mine site indicate that development of the project is "not likely to jeopardize" the continued existence of the species.
Black-footed Ferret	<i>Mustela nigripes</i>	E					X			This species is found on grassland plains, in association with prairie dog towns.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site

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Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
Common Name	Scientific Name	ESA	New Mexico	BLM	USFS Region 3	Final EIS Little Rock Mine Project Sept 1997	Biological Evaluation in Support of Endangered Species Act Certification MSGP 2008	Little Rock Mine Stockpile Reclamation Project Final EA Sept 2009	December 23 & 29, 2009 Species List (BISON-M, nmrareplants, unnm.edu, USFWS County Species List)				
<b>Mollusks</b>													
New Mexico Hot Springsnail	<i>Pyrgulopsis thermalis</i>	C	T		S		X	X	X	Within New Mexico, the species is restricted to a series of thermal springs along the Gila River in Grant Co., four along a 2.9 miles (4.8 km) stretch of the lower East Fork and a fifth on the mainstem 1.4 mile (2.4 km) below the confluence of the East and West forks. These sites are key habitat areas for this species in the State and overall. The New Mexico hot spring snail is an aquatic, gilled species. It is unique in its genus for its occurrence in a habitat of thermal springs where temperatures are up to 11.2 °F (44 C) at the point of issuance. Waters inhabited by the snail are as warm as 100.4°F (38 C), but the species is more common where temperatures are 91 - 95°F(33-35 C). The major substrate occupied by these animals is areas of steep or even vertical rock, covered with thin sheets of water. Also inhabited are minor spring flows on algal film and crusts of lime-depositing algae. The species possibly also occurs in dense grasses and sedges bordering the springs. Such features as the compact shell and the comparatively large foot are also unique, and they may be interpreted as adaptations for life in the habitat of wetted rock walls.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Gila Springsnail	<i>Pyrgulopsis gilae</i>	C	T		S		X	X	X	The species is limited to a series of thermal springs along the Gila River in Grant Co., four in a 2.9 miles (4.8 km) stretch of the lower East Fork and a fifth on the mainstem 1.4 mile (2.4 km) below the confluence of the East and West forks. These sites are the key habitat areas for this species in the State and overall. The habitat of the major population is a cool spring and its brook, but a few of the animals have also been found in a nearby thermal spring occurring in association with the New Mexico hot spring snail. The Gila spring snail occurs in mud, debris, and vegetation, rather than on rock vertical faces as in the latter species. Typical habitat of the Gila spring snail is a rivulet about 3.28 ft (1 m) wide and grown up with watercress ( <i>Nasturtium officinale</i> ).	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Subalpine Mountainsnail	<i>Oreohelix subrudis</i>		S		S			X	X	In New Mexico, <i>Oreohelix subrudis</i> has been taken in a wide range of habitats. It occurs from the higher peaks of the Mogollon Mountains, Catron County, in forests of the Canadian Life Zone, downward to arid slopes in the Upper Sonoran Life Zone, where it inhabits igneous-rock talus. In the Black Range, it is widespread in the higher forests, occurring in areas of both limestone and igneous bedrock. It has been taken only in the southern part of the San Mateo Mountains, occurring in rhyolitic talus, which is widespread in this area.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Morgan Creek Mountainsnail	<i>Oreohelix swopei</i>				S			X	X	Terrestrial and montane habitat associations. Limited data available.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Subalpine Mountainsnail	<i>Oreohelix subrudis</i>				S				X	<i>Oreohelix subrudis</i> lives in a wide range of habitats from the higher peaks of the Mogollon Mountains, Catron Co., in forests of the Canadian Life Zone, to arid slopes in the Upper Sonoran Life Zone. It inhabits igneous-rock talus and in higher forests of the Black Range on areas of both limestone and igneous bedrock. It has also been found in the southern part of the San Mateo Mountains, occurring in rhyolitic talus.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site

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Black Range Mountainsnail	<i>Oreohelix metcalfei concentrica</i>				S			X	X	This subspecies inhabits the extensive limestone-bedrock area around the head of the Silver Creek Canyon complex on the west side of Sawyer Peak, and continues southward.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Black Range Mountainsnail	<i>Oreohelix metcalfei radiata</i>				S			X	X	In New Mexico, <i>Oreohelix metcalfei radiata</i> occurs along the canyons of Iron and Spring Creeks, the next complex north of the Silver Creek Canyon complex. Its range to the north of Iron Creek Canyon is not known. Has been found living along both Iron Creek and Spring Creek Canyons.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Bearded Mountainsnail	<i>Oreohelix barbata</i>				S			X	X	In the Mogollon Mountains, the species occurs in southwestern canyons of the range, at least from Little Dry Creek Canyon northwestward to Whitewater Creek Canyon, and then northeastward at least to Willow Creek Canyon. The species is found along creeks at the bottom of such canyons in riparian forest. In New Mexico, it occurs in rock rubble where there is also an abundance of leaf litter from deciduous trees (Metcalfe and Smartt 1997; Bison-M).	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Blunt Ambersnail	<i>Oxyloma retusum</i>				S			X	X	Streams that support a lush growth of moisture-loving and aquatic plants, such as cattails, sedges, rushes, and watercress. Especially important to the blunt ambersnail seem to be the emergent leaves and stems of watercress ( <i>Nasturtium officinale</i> ). These snails are found commonly on watercress and other plants overhanging the water, or not far away.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Black Range Woodland Snail	<i>Ashmunella cockerelli cockerelli</i>				S			X	X	Open woodland, verging on semiarid. Snails live in limestone talus in sheltered, undisturbed areas.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Black Range Woodland Snail	<i>Ashmunella cockerelli argenticola</i>				S			X	X	Mesic habitats with a rich mixture of leaf litter amidst loose limestone rocks.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
Black Range Woodland Snail	<i>Ashmunella cockerelli perobtusa</i>				S			X	X	Terrestrial and montane habitat associations. Limited data available. Located in New Mexico; southeastern Black Range, Grant County, New Mexico.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present or the species is not within the elevation range of the Project site
Silver Creek Woodlandsnail	<i>Ashmunella binneyi</i>				S			X	X	Local endemic found only on the west side of the Black Range.	No – lack of habitat in Project site; does not occur in Burro Mountains (USFS 2008)	No effect	No habitat is present in the Project site
Iron Creek Woodlandsnail	<i>Ashmunella mendax</i>				S			X	X	Occurs in wooded canyons down into the Upper Sonoran-Transition Zone boundary. Although a "canyon snail" at lower elevations, it is more widespread in the forested zone of higher elevations.	No – lack of habitat in Project site (USFS 2008)	No effect	No habitat is present in the Project site
<b>Mayfly</b>													
Mayfly	<i>Lachlania dencyannae</i>				S			X	X	Aquatic, semi-aquatic, and riparian habitat associations. Limited data available. Reported in the Lower Colorado River Basin, Upper Gila, and the Upper Gila-Mangas.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
<b>Moths and Butterflies</b>													
Four-spotted Skipperling	<i>Piruna polingii</i>				S			X	X	Occurs in moist woodland openings with lush vegetation, meadows, and ravines. Ranges from central New Mexico and central Arizona south to Mexico.	No – lack of habitat in Project site	No effect	No habitat is present in the Project site
Silverspot Mountain Butterfly	<i>Speyeria nokomis nitocris</i>	SC			S			X	X	Found in streamside meadows and open seepage areas with an abundance of violets in generally desert landscapes. The colonies are often isolated. Host plant is <i>Viola nephrophylla</i> .	No – lack of habitat in Project site, host plant not likely to occur in Project site	No effect	No habitat is present in the Project site
Obsolete Viceroy Butterfly	<i>Basilarchia archippus obsoleta</i>	SC			S			X	X	Found in association with stands of willow along major water courses. Desert grassland, scrub. Host is genus <i>Salix</i> (willow).	No – lack of habitat in Project site	No effect	No habitat is present in the Project site

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<b>Plants</b>													
Wright's dogweed	<i>Adenophyllum wrightii</i>	SC				X (see Note 3 below)				This annual herb prefers sandy or silty soils in swales and drainages in piñon-juniper woodland; 7,000-7,200 ft (2,100-2,200 m) in New Mexico. It is reported to occur in low lying areas that form ephemeral pools in late summer; however, more data must be collected to determine more specific habitat requirements and ecological needs of Wright's dogweed.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Giant hyssop	<i>Agastache cana</i>	SC	SC					X	X	Crevices and bases of granite cliffs or in canyons with small-leaved oaks at the upper edge of the desert and lower edge of the piñon-juniper zone, at 4,600-5,900 ft (1,402 -1,799 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Dwarf milkweed	<i>Asclepias uncialis var uncialis</i>	SC		S		X (see Note 4 below)				Often in plains grassland and shortgrass communities on open hills and lower side slopes at the base of mesas, canyons, and bluffs at elevations from 4,000 to 6,400 ft (1,219 - 1,951 m). Also found in open piñon-juniper woodland communities and in open grassland areas within madrean evergreen woodland communities. This species has most often been found on bare, open patches of soil between clumps of grasses within these habitats. It has also been found in areas with vehicular and other disturbances. m). In New Mexico, the largest known population occurs on the Piñon Canyon Army Tank Maneuver Area.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Gila brickellbush	<i>Brickellia chenopodiina</i>	SC	SC					X	X	Restricted to alluvial soils along the Gila River; 4,500 ft (1,372 m).	No - lack of habitat in Project site.	No effect	No habitat is present, and species typically occurs in elevations less than in the Project site
Slender spiderflower	<i>Cleome multicaulis</i>	SC	E	SS		X		X	X	Wet, saline or alkaline soils; often in and around alkali sinks, alkaline meadows, or old lake beds.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Wootin's hawthorn	<i>Crataegus wootiana</i>	SC	SC		S			X	X	Canyon bottoms and forest understory in lower montane coniferous forest; 6,500-8,000 ft (1,982 - 2,439 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Davidson's cliff carrot	<i>Cymopterus davidanii</i>	SC	SC		S			X	X	Cool, rocky places in piñon-juniper woodland and lower montane coniferous forest; 6,500-8,000 ft (1,982 - 2,439 m).	Moderate - no documentation but suitable habitat within range	May affect, not likely to adversely affect	37 acres of piñon-juniper woodland will be removed from the project site
Metcalfe' sticktrefoil	<i>Desmodium metcalfei</i>	SC	SC		S			X	X	Rocky slopes, canyons, and ditches in grasslands and oak/piñon-juniper woodlands; 4,000-6,500 ft (1,219 - 1,982 m).	Low - no documentation, low/ poor habitat quality	May affect, not likely to adversely affect	37 acres of piñon-juniper woodland will be removed from the project site
Mogollon whittlowgrass	<i>Draba Mogollonica</i>	SC	SC					X	X	Cool, moist northern slopes of mountains, ravines and canyons on volcanic rocks and soil in montane forests; 5,000-9,000 ft (1,524 - 2,744 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
New Mexico gunweed	<i>Grindelia arizonica var neomexicana</i>	SC	SC					X	X	Rocky slopes and ledges in piñon-juniper woodland and lower montane coniferous forest; 6,500-7,500 ft (1,219 - 2,287 m).	Moderate - no documentation but suitable habitat within range	May affect, not likely to adversely affect	37 acres of piñon-juniper woodland will be removed from the project site
Pringle hawkweed	<i>Hieracium pringlei</i>					X (see Note 3 below)				Piñon juniper woodland and Rocky Mountain Montane Conifer forest. Approximately 6,000-7,400 ft elevation (1,829 - 2,256 m).	Moderate - no documentation but suitable habitat within range	May affect, not likely to adversely affect	37 acres of piñon-juniper woodland will be removed from the project site
Green flowered pincushion cactus	<i>Mammillaria viridiflora</i>			S		X (see Note 5 below)				Sandy granitic soils of high hills and mountainsides in oak woodland and at edge of forest at 4,920 - 6,888 ft (1,500-2,100 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Wright's pincushion cactus	<i>Mammillaria wrightii var. wrightii</i>			S		X (see Note 5 below)				Occurs among grasses; clay soils of low hills in grassland and woodland at 4,920 - 7,872 ft (1,500-2,400 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site

Note: Species highlighted in blue were not analyzed in the 1997 FEIS. Species highlighted in green were not addressed in any of the prior biological assessments (1997 FEIS, 2008 MSGP, and/or 2009 Final EA).

Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>a</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
Common Name	Scientific Name	ESA	New Mexico	BLM	USFS Region 3	Final EIS Little Rock Mine Project Sept 1997	Biological Evaluation in Support of Endangered Species Act Certification MSGP 2008	Little Rock Mine Stockpile Reclamation Project Final EA Sept 2009	December 23 & 29, 2009 Species List (BISON-M, nmrareplants, unnm.edu, USFWS County Species List)				
Grama grass cactus	<i>Pediocactus papyracantha</i>			S		X (see Note 5 below)				Southern juniper-pinyon woodlands, Great Plains grasslands, and Chihuahuan Desert grassland. Usually found on sandy soils with a calcareous or gypseous component, on open flats or gentle slopes from 4,920 - 7,216 ft (1,500 - 2,200 m) elevation. The plants often grow in or near blue grama grass ( <i>Bouteloua gracilis</i> ), and can go unnoticed because the spines resemble the dried leaves of the grass.	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Night-blooming cereus, queen of the night, deer-horn cactus	<i>Peniocereus greggii</i> var. <i>greggii</i>	SC	E	SS				X	X	Mostly in sandy to silty gravelly soils in gently broken to level terrain in desert grassland or Chihuahuan desert scrub. Typically found growing up through and supported by shrubs, especially <i>Larrea divaricata</i> and <i>Prosopis glandulosa</i> .	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Maguire's beardtongue	<i>Penstemon linarioides</i> ssp. <i>maguirei</i>	SC	SC		S			X	X	Limestone cliffs in pinyon-juniper woodland; 6,000-6,500 ft (1,829 - 1,982 m).	Low - no documentation, low/ poor habitat quality,	May affect, not likely to adversely affect	37 acres of pinyon-juniper woodland will be removed from the project site
Pinos Altos fame flower	<i>Phemeranthus humilis</i>	SC	SC	SS	S	X ( <i>Talinum humile</i> )		X	X	Shallow, gravelly, usually clayey soils overlying rhyolite, usually on rock benches in sloping terrain, but also in soil pockets overlying rock in nearly level areas; Madrean grassland, oak woodland, or piñon-juniper woodland, often with <i>Nolina microcarpa</i> and <i>Agave</i> .	No - lack of habitat in Project site	No effect	No habitat is present or the species is not within the elevation range of the Project site
Parish's alkali grass	<i>Puccinellia parishii</i>	SC	E	SS	S	X		X	X	Alkaline springs, seeps, and seasonally wet areas that occur at the heads of drainages or on gentle slopes at 2,600-7,200 ft (800-2,200 m) range-wide. The species requires continuously damp soils during its late winter to spring growing period. It frequently grows with <i>Distichlis stricta</i> (salt grass), <i>Sporobolus airoides</i> (alkali sacaton), <i>Carex</i> spp. (sedges), <i>Scirpus</i> spp. (bulrushes), <i>Juncus</i> spp. (rushes), <i>Eleocharis</i> spp. (spike rushes), and <i>Anemopsis californica</i> (yerba mansa).	No - lack of habitat in Project site	No effect	No habitat is present or the species is not within the elevation range of the Project site
Mimbres figwort	<i>Scrophularia macrantha</i>	SC	SC	SS	S	X		X	X	Steep, rocky, usually north-facing igneous cliffs and talus slopes, occasionally in canyon bottoms; piñon-juniper woodland and lower montane coniferous forest; 6,500-8,200 ft (1,982 - 2,500 m).	Low - no documentation, low/ poor habitat quality,	May affect, not likely to adversely affect	37 acres of pinyon-juniper woodland will be removed from the project site
Thurber's campion	<i>Silene thurberi</i>	SC	SC					X	X	In protected locations on rocky areas and slopes; in arroyos and mountains; elevation range not documented, but perhaps 1,520 - 5,000 ft (463 - 1,524 m).	No - outside elevation range	No effect	Species is not within the elevation range, protected locations do not occur within the Project site
Wright's campion	<i>Silene wrightii</i>	SC	SC	SS				X	X	Cliffs and rocky outcrops in Rocky Mountain montane and subalpine conifer forests; about 6,800-8,000 ft (2,073 - 2,439 m).	No - lack of habitat in Project site	No effect	No habitat is present in the Project site
Porsild's starwort	<i>Stellaria porsilii</i>	SC	SC		S	X		X	X	In shade and partially open understory of mixed conifer and aspen forests, and occasionally scattered on roadsides with steep, loamy and rocky embankments; 7,900-8,200 ft (2,408 - 2,500 m).	No - outside elevation range	No effect	Species is not within the elevation range of the Project site
						<p>Note 1: BLM sensitive; former federal C2                      Note 2: BLM sensitive; former federal C2; NM threatened                      Note 3: BLM sensitive; former federal C2; NM rare (List 3)                      Note 4: BLM sensitive; former federal C2; NM rare and sensitive (List 2)                      Note 5: BLM sensitive; NM considered but not listed (List 4)</p>				<p><sup>a</sup> Guide for potential for occurrence                      No: no habitat is present or the species is not within the elevation range of the Project site                      Low: no documentation, low/ poor habitat quality, and/ or foraging habitat only                      Moderate: no documentation but suitable habitat within range                      High: species have been documented to occur</p>			

Source: NMGFD 2008 and NMRPTC 2009

Note: Species highlighted in blue were not analyzed in the 1997 FEIS.  
 Species highlighted in green were not addressed in any of the prior biological assessments (1997 FEIS, 2008 MSGP, and/or 2009 Final EA).

**Appendix B. Special Status Species with Potential to Occur in Grant County, New Mexico**

Species		Legal Protection Status as of December 23 & 29, 2009				Source of Listed Species Evaluations and Reviews Conducted for the Project Site				Preferred Habitat	Potential for Occurrence in Project Site <sup>3</sup>	Potential Impacts or Effects on the Species or its Critical Habitat	Rationale for Effects Determination
Common Name	Scientific Name	ESA	New Mexico	BLM	USFS Region 3	Final EIS Little Rock Mine Project Sept 1997	Biological Evaluation in Support of Endangered Species Act Certification MSGP 2008	Little Rock Mine Stockpile Reclamation Project Final EA Sept 2009	December 23 & 29, 2009 Species List (BISON-M, nmrareplants. unm.edu, USFWS County Species List)				

Special status plant and wildlife species are subject to regulations under the authority of federal and state agencies. Federal special status species include threatened and endangered species protected pursuant to the Endangered Species Act (ESA) of 1973, Section 4, as amended. Species designations prior to 1973 were originally appointed by the predecessor of the ESA, the Endangered Species Preservation Act of 1966. Additional FWS designations include Proposed, Candidate, Species of Concern, and Delisted Monitoring. The BLM has designated some species as Sensitive. Definitions for the Federal designations follow:

E - Endangered species are those species in danger of extinction throughout all or a significant portion of their range.

T - Threatened species are those species likely to become endangered in the foreseeable future.

C - Candidate species are those species for which FWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher priority listing activities. Candidate species are not protected under the ESA.

SC - Species of Concern receive no legal protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species. Species of Concern is an informal term that refers to those species that the FWS believes may be in need of concentrated conservation actions. Conservation actions, such as monitoring, vary depending on the health of the populations and degree and type of threats.

E, NEP - Experimental, Nonessential Population designations imply the experimental population is not essential for the continued existence of the species.

S - BLM Sensitive are those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.

SS - BLM State Listed Species are species listed by a State in a category implying but not limited to potential endangerment or extinction. Listing is either by legislation or regulation.

Note: Species highlighted in blue were not analyzed in the 1997 FEIS.  
 Species highlighted in green were not addressed in any of the prior biological assessments (1997 FEIS, 2008 MSGP, and/or 2009 Final EA).

## **Appendix C – Chiricahua Leopard Frog Survey Report**

**Appendix C**  
**LITTLE ROCK MINE**  
**CHIRICAHUA LEOPARD FROG**  
**SURVEY REPORT**

Prepared for:

Freeport McMoRan, Inc.

Prepared by:

Tierra Environmental Consultants

July 2010

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- Appendix C-1 – VES Survey Method
- Appendix C-2 – Completed Field Data Forms and Water Quality Analyses
- Appendix C-3 –Water Quality Data Summary
- Appendix C-4 – Site Photographs and Descriptions

## 1 INTRODUCTION

Freeport McMoRan, Inc. (FMI) proposes to develop an open-pit copper mine and haul road that has been previously permitted/approved on private, USDA Forest Service and Bureau of Land Management (BLM) lands located within the Burro Mountains in southwestern New Mexico. The proposed Little Rock Mine lies within the known range of the Chiricahua leopard frog (CLF) which is listed as a threatened species by the United States Fish and Wildlife Service (USFWS) and as a state sensitive species in New Mexico. In order to evaluate potential effects of the mine on this species, FMI authorized Tierra Environmental Consultants (Tierra EC), to conduct a field survey to identify potentially suitable habitat for the CLF within and in the vicinity (approximately a 5-mile radius)<sup>1</sup> of the proposed mine site. The 5-mile radius represents the Area of Potential Effect (APE) more than encompassing areas where surface and groundwater resources may be influenced by development of the open pit. The influence of the project on water resources is evaluated separately (see Hydrology Memorandum). This report includes a description of CLF natural history; survey methods; identification of the survey area; description of the survey protocol; description of the survey areas; survey results; general wildlife observations; and conclusion.

## 2 CHIRICAHUA LEOPARD FROG NATURAL HISTORY

CLF is a member of the *Pantherana* clade (*Rana pipiens* complex). The Center for North American Herpetology (2008) adopted a change in genus from *Rana* to *Lithobates* as recommended in Frost et al. (2006), in which *Rana* was partitioned worldwide and in North America into two genera. This change has not been recognized by the Integrated Taxonomic Information System (2009), which continues to place all of these frogs in the genus *Rana*.

This species is a medium to large, stocky frog with adult snout to vent lengths between 2.0 and 5.4 inches (5.0 and 13.5 cm; AGFD 2006). The basic color of this frog is green to brown, with a green head and face. The upper lip stripe is faint or absent in front of the eye. The eyes are relatively high on the head and are upturned (Brennan and Holycross 2006). The CLF is distinguished from other leopard frogs by rougher skin with more tubercles and by smaller and more numerous dorsal spots. In addition, it has cream-colored tubercles (spots) on a dark background on the rear of the thigh and dorsolateral folds that are interrupted and deflected medially (AGFD 2006). This frog is listed as threatened under the Endangered Species Act (ESA).

The CLF is one of the most aquatic of the ranid frogs, requiring permanent or nearly permanent water sources. This frog may be found in streams, rivers, backwaters, ponds, stock tanks, that are free from introduced fish, crayfish, and bullfrogs. The primary habitat for this species is oak and pine woodlands and it is known to range into chaparral, grassland, and desert habitats (AGFD 2006). CLF adapts to man-made aquatic systems, including earthen stock tanks, irrigation systems, wells, abandoned swimming pools, ornamental backyard ponds, and mine adits located within or near its primary habitat (AGFD 2006). Earthen cattle tanks also provide habitat for leopard frogs (Sredl 1997).

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<sup>1</sup> A current/updated hydrogeologic flow model for the Little Rock Mine indicates that a five mile radius around the mine permit boundary generously encompasses a projected cone of depression due to groundwater withdrawal and drawdown, and considers potential effects on springs and seeps (refer to the Hydrology Memorandum dated June 2010). Correspondingly, Tierra EC established an Area of Potential Effect (APE) at a five-mile radius around the mine permit boundary. The APE also considers dispersal distances for CLF.

Although a highly aquatic species, this frog has the ability to disperse throughout its range to establish new populations and avoid desiccation and predation. According to the USFWS, the estimated dispersal distance for CLF are (1) one mile overland, (2) three miles along intermittent<sup>2</sup> drainages, and (3) five miles along permanent water courses, or some combination of the above.

Geographically, the CLF range extends from central Arizona and southwestern New Mexico south into the Sierra Madre Occidental of Mexico into western Jalisco. The population of CLF located within the western and southwestern mountains in New Mexico extends west along the Mogollon Rim into central Arizona. The elevation range for this frog is reported from 3,050 to 8,890 feet (AGFD 2006, Stebbins 2003, Sredl 1997 and BISON-M 2010).

The CLF has experienced declines in populations in recent decades, particularly in New Mexico. Potential native predators on adults or tadpoles include native fishes, garter snakes, great blue heron, coyote, gray fox, raccoon, coati, black bear, and mountain lion. Non-native predators, including bullfrog, crayfish, and sport fish are also significant threats. Another recognized threat is the loss of aquatic habitat from human actions, including drying, damming, diverting, siltation, and heavy grazing (AGFD 2006). Perhaps the most serious threat to the CLF is chytridiomycosis, an infection caused by chytrid fungus, first documented in this species in 1992. Many amphibian species are affected by this fungus (AGFD 2006).

### **3 METHODS**

#### **3.1 IDENTIFICATION OF POTENTIAL CLF SURVEY AREAS**

Tierra EC focused survey efforts within areas that have the potential to support surface water in the APE and surrounding areas within approximately 5-miles of the lake that would form in the bottom of the proposed open pit. Prior to the field reconnaissance, Tierra EC biologists reviewed USGS topographic maps, aerial photographs, and available CLF survey data for the Burro Mountains that had been collected on the project area and vicinity by the USFS and others. Known lentic and lotic surface water features (i.e., springs, seeps, stock tanks and wells) with the potential to support perennial water and emergent wetland vegetation were identified for focused survey to determine if CLF and/or suitable habitat is present and to collect data on water quality, temperature, vegetation, and other habitat features that might support populations of CLF or facilitate dispersal of the species within the APE. Figure 1 depicts the location of the APE and the potential CLF survey areas.

#### **3.2 SURVEY PROTOCOL**

Visual surveys for CLF and potential suitable habitat within the APE were conducted from April 26 to April 28, 2010, and were completed in general conformance with visual field protocols recommended by the USFWS for this species. Due to the rough terrain and remoteness of most of the survey sites, surveys were conducted during daylight hours for safety reasons. Focused surveys by USFWS permitted personnel would be recommended if frog activity or suitable habitat was noted at any of the sites.

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<sup>2</sup> A stream which carries water a considerable portion of the time, but which ceases to flow occasionally or seasonally because bed seepage and evapotranspiration exceed the available water supply.

The surveys were conducted on foot by two teams of two biologists. At each survey site supporting surface water, a Visual Encounter Survey (VES) Form was completed to document survey findings in accordance with the USFWS recommended survey protocol. The VES method is intended to generate presence/absence data and generate inferences about species abundance. A copy of the VES survey protocol is provided in Appendix C-1.

Surveys of lentic systems included thoroughly scanning the perimeter with binoculars and listening for frog calling prior to approaching the surface water feature. A pedestrian reconnaissance of the perimeter was then conducted visually to assess the presence of frogs and to listen for audible plops as frogs retreated below the water surface. Potential refugia, such as vegetation, rocks, downed trees and branches and undercut banks were also carefully examined for frogs. Anthropogenic features such as well casings and covers, man-made spring boxes, water pump structures, and any other human made habitat features located near any of the potential habitat sites were also visually evaluated for the presence of frogs or frog signs.

Lotic systems were evaluated by walking along the edge of the stream while scanning the bank, surrounding vegetation, and water with binoculars and listening for audible plops. Potential refugia, such as vegetation, rocks, downed trees and branches, and undercut banks were also visually examined for frogs. While conducting the surveys, observations of potential predators were recorded, including other amphibians, aquatic insects, wading birds, snakes, and exotic predators or competitors, such as non-native fish, bullfrogs, and crayfish. Water samples were collected where possible by immersing a plastic water bottle below the water surface near the edge of the surface water source. Samples were analyzed in the field for temperature, pH, and conductivity, and sent to a laboratory for additional analyses. Field data was collected on the standard VES form. To prevent cross contamination and prevent spread of chytrid fungus, field personnel did not wade into the surface water features, and field equipment was rinsed with a bleach solution in accordance with the survey protocol.

## 4 RESULTS

### 4.1 ECOLOGICAL CHARACTERIZATION

The survey area is located within the Big Burro Mountains on the west and the Little Burro Mountains on the east, which are separated by the Mangas Valley. Elevations range from 5,250 feet above mean sea level (amsl; 1,600 meters) on the valley floor to above 6,490 feet amsl (1,977 meters) in the Big Burro Mountains. Most of the APE is located on the western side of the Continental Divide.

#### 4.1.1 Vegetation

Three primary biotic communities are located within the APE: Maderean Evergreen Woodland, Semidesert Grassland, and Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980). Vegetation within the Maderean Evergreen Woodland is dominated by coniferous and evergreen tree species, such as Mexican piñon (*Pinus cembroides*), a variety of oak species (*Quercus spp.*), and one-seed juniper (*Juniperus monosperma*). Shrub species include mountain mahogany (*Cercocarpus montanus*), sumac (*Rhus spp.*), and Wright's silktassel (*Garrya wrightii*). Species found within the Semidesert Grasslands include sagebrush (*Artemisia spp.*), rabbitbrush (*Ericameria nauseosa*), burroweed (*Isocoma tenuisecta*), catclaw (*Acacia greggii*), and a variety of grasses and herbaceous species. Rocky Mountain (Petran) Montane Coniferous Forest is found at higher elevations with the APE. This vegetation community is dominated by ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus*

*gambelii*), and alligator bark juniper (*Juniperus deppeana*), and common shrubs include sumac (*Rhus spp.*) and Arizona rose (*Rosa arizonica*).

#### 4.1.2 Hydrologic Conditions

The Continental Divide influences the surface and groundwater hydrologic conditions within the APE. Most of the APE is west of the divide, facilitating drainage to towards the Mangas Creek and ultimately the Gila River. Several tributaries of Mangas Creek, including Deadman Canyon, Whitewater Canyon, and California Gulch, are located with the APE. These tributaries and most of the surface water features within the APE are ephemeral. However, several springs and seeps provide a source of surface water for many months of the year. Groundwater is similarly influenced by the divide and there is both a regional aquifer, an alluvial aquifer at lower elevation in the Mangas Valley, and perched aquifers at higher elevations (Dames & Moore 1995).

## 4.2 CLF SURVEY

Twenty-eight surface water features were identified for focused surveys within or near the APE by reviewing USGS maps and other sources of information. Of these, twenty-two sites were visited during the field survey. These features included springs, stock tanks, wildlife water troughs, ephemeral drainages, and the Gila River. Eighteen of the sites that were visited are located within the APE. Six of the sites were not visited because they either could not be located in the field, or they were located on private land, and access was not available. Four sites that were visited were located outside of the APE, including two springs (Gold Gulch and Grapevine Spring), an ephemeral drainage (Green Canyon Wash), and the Gila River above the confluence with Mangas Creek. Appendix C-4 provides the name of the feature, UTM coordinates, site description, and site photos of the surface water features.

Many of the sites that were visited are man-made features that included metal and concrete troughs and spring boxes and stock tanks constructed within ephemeral drainages. No CLF adults, tadpoles or egg masses were observed at any of the sites and no emergent or wetland vegetation, which would provide suitable habitat for CLF, was found at any of the sites within the APE. Two sites, McCain Spring and Fleming Pond, had habitat features indicative of CLF habitat; perennial water and emergent vegetation. However, past survey results for McCain Spring have not documented CLF occupancy, and historic water quality and flow monitoring data indicate several years of drought at this site. Fleming pond is a man-made pond fed by groundwater. Survey results documented that the pond is used by cattle and contained CLF predators including wading birds and dragonflies.

Known predators of CLF, such as bullfrogs, fish, water birds, and dragonflies were noted at several sites north and south of the project area. Three adult bullfrogs, non-native warm water fish, and dragonflies were observed in the Barry Ford Stock Tank, and at least 20 adult bullfrogs were observed in a backwater slough on the Gila River near the southeast abutment on the Highway 180 Bridge. Wading birds and dragonflies were noted at Fleming Pond. Fleming Pond supports a pool of water at least most of the year; however, it supports marginal or sparse vegetation that is unsuitable as adequate cover for frogs. In addition, a high density of predator species was observed.

VES forms that were completed for most of the sites within the APE are provided in Appendix C-2 and results of water quality analysis are presented in Appendix C-3. Photographs, UTM coordinate location data and a description of each site is provided in Appendix C-4.

## 5 REFERENCES

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## **Appendix C-1 – VES Survey Method**

Locality Data										
<b>*SITE:</b>					<b>*SITE AT:</b>					
For use by central data repository only:			<b>*UTM ZONE:</b> 11 12 13		<b>*UTM EASTING:</b>		<b>*UTM NORTHING:</b>		NAD83 NAD27	
<b>NEW SITE:</b> Y N		<b>NUM:</b>								
<b>*QUAD:</b>				<b>*MIN:</b> 7.5 15		<b>*YEAR:</b>		<b>*ST-CNTY:</b>		
<b>*ELEV:</b>	m ft	<b>*H<sub>2</sub>O CLASS:</b> Lentic Lotic		<b>*H<sub>2</sub>O TYPE:</b>		Canal	Plant outflow	Riverine	Wetland	
						Stock tank	Lake	Reservoir	Small metal/concrete tanks or drinkers	
<b>DIRECTIONS:</b>										
Visit Conditions										
<b>DATE:</b>			<b>*START:</b>		<b>*STOP:</b>		<b>*SEARCH TIME:</b> min		<b>*OBSERVERS:</b>	
<b>*EFFORT:</b> meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	<b>*VOUCHERS:</b> Specimen Photos: Habitat Photos: Specimen(s): Y N Specimen #s: _____				
<b>*SEARCH METHODS:</b> Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other						<b>DRY:</b> Y N	<b>RELEASE:</b> Y N			
<b>T<sub>Air</sub>:</b>	°C °F	<b>T<sub>Water</sub>:</b>	°C °F	<b>EC:</b> µS	<b>pH:</b>	<b>RH:</b> %	<b>*H<sub>2</sub>O CLARITY:</b> Extremely clear Moderately clear Extremely turbid			
<b>*WIND:</b> ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph						<b>*CLOUD COVER:</b> 0-20% 21-40% 41-60% 61-80% 81-100%				
<b>*PRECIPITATION:</b>		None		Intermittent rain		Steady light rain		Steady heavy rain		Snow/Sleet
<b>*LENTIC LENGTH:</b> m		<b>*LENTIC WIDTH:</b> m		<b>*LOTIC WIDTH:</b> 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m						
<b>*RIPARIAN WIDTH:</b>			0-2 m	3-5 m	6-10 m	<b>*SUBSTRATE:</b> Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial (mark 1-3)				
<b>VEGETATION:</b>	%	<b>PROMINENT SPECIES:</b>				<b>*PREDATORS:</b> (include scat and tracks)				
Floating						Leeches Boatmen/Backswimmers Dragonflies				
Submerged						Belostomatids Beetles Warm water fish				
Emergent						Cold water fish Tiger salamanders Bullfrogs				
Perimeter						Mud turtles Gartersnakes Wading birds				
Canopy						Hawks, black & zone-tailed Mammals Crayfish				
<b>OTHER ORGANISMS:</b>					<b>OTHER ORG. NOTES:</b>					
<b>SITE / SURVEY NOTES:</b> Continued on another sheet? Y N										
Riparian Herpetofauna Observations										
<b>*SPECIES:</b>	<b>CERTAINTY:</b>		<b>LIFE STAGE</b>				<b>#</b>	<b>COMMENTS:</b>		
	Uncertain Certain		Egg	Larvae	Juvenile	Adult				
	Uncertain Certain		Egg	Larvae	Juvenile	Adult				
	Uncertain Certain		Egg	Larvae	Juvenile	Adult				

## **Appendix C-2 – Completed Field Data Forms and Sample Results**

Locality Data										
*SITE: <i>mirberry tank</i>					*SITE AT:					
For use by central data repository only:										
NEW SITE: Y N		NUM:		*UTM ZONE: 11 12 13		*UTM EASTING:		*UTM NORTHING:		NAD83 NAD27
*QUAD:				*MIN: 7.5 15		*YEAR:		*ST-CNTY:		
*ELEV: m ft	*H <sub>2</sub> O CLASS: Lentic Lotic		*H <sub>2</sub> O TYPE: Canal Plant outflow Riverine Wetland <u>Stock tank</u> Lake Reservoir Small metal/concrete tanks or drinkers							
DIRECTIONS:										

Visit Conditions											
DATE:			*START:		*STOP:		*SEARCH TIME: min		*OBSERVERS: <i>JH/SB</i>		
*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks		*VOUCHERS: Specimen Photos: Habitat Photos:		Specimen(s): Y N Specimen #s:		
*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other								*DRY: Y N		*RELEASE: Y N	
T <sub>Air</sub> : °C °F	T <sub>Water</sub> : °C °F	EC: µs	pH:	RH: %	*H <sub>2</sub> O CLARITY: Extremely clear Moderately clear Extremely turbid						
*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph					*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%						
*PRECIPITATION: None Intermittent rain Steady light rain Steady heavy rain Snow/Sleet											
*LENTIC LENGTH: m		*LENTIC WIDTH: m		*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m							
*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m			*SUBSTRATE: (mark 1-3) Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial								

VEGETATION:		PROMINENT SPECIES:			*PREDATORS: (include scat and tracks)		
Floating	%				Leeches Boatmen/Backswimmers Dragonflies		
Submerged					Belostomatids Beetles Warm water fish		
Emergent					Cold water fish Tiger salamanders Bullfrogs		
Perimeter		<i>blue grama</i>			Mud turtles Gartersnakes Wading birds		
Canopy		<i>duripar pinyon pine live oak</i>			Hawks, black & zone-tailed Mammals Crayfish		

OTHER ORGANISMS:				OTHER ORG. NOTES:			
SITE / SURVEY NOTES: <i>No standing water, mud, cattle trampled, heavily disturbed</i> Continued on another sheet? Y N							

Riparian Herpetofauna Observations							
*SPECIES:	CERTAINTY:		LIFE STAGE			#	COMMENTS:
	Uncertain	Certain	Egg	Larvae	Juvenile	Adult	
	Uncertain	Certain	Egg	Larvae	Juvenile	Adult	
	Uncertain	Certain	Egg	Larvae	Juvenile	Adult	

Locality Data				
*SITE: <u>Mangas Pond</u>		*SITE AT:		
For use by central data repository only:				
NEW SITE: Y N	NUM:	*UTM ZONE: 11 <u>12</u> 13	*UTM EASTING: <u>0744453</u>	*UTM NORTHING: <u>3620756</u>
				<u>NAD83</u> NAD27
*QUAD:		*MIN: 7.5 15	*YEAR:	*ST-CNTY:
*ELEV: m ft	*H <sub>2</sub> O CLASS: Lentic Lotic	*H <sub>2</sub> O TYPE: Canal Plant outflow Riverine Wetland <u>Stock tank</u> Lake Reservoir		Small metal/concrete tanks or drinkers
DIRECTIONS:				

Visit Conditions									
DATE:		*START:	*STOP:	*SEARCH TIME: <u>10</u> min	*OBSERVERS: <u>JH/SB</u>				
*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS: Specimen Photos: Habitat Photos:			
						Specimen(s): Y N Specimen #s:			
*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other							DRY: Y N	RELEASE: Y N	
T <sub>Air</sub> : °C °F	T <sub>Water</sub> : °C °F	EC: <u>616</u> µS	pH: <u>9.31</u>	RH: %	*H <sub>2</sub> O CLARITY: Extremely clear Moderately clear Extremely turbid				
*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph					*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%				
*PRECIPITATION: None Intermittent rain Steady light rain Steady heavy rain Snow/Sleet									
*LENTIC LENGTH: <u>175 ft</u>	*LENTIC WIDTH: <u>150 m</u>	*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m							
*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m			*SUBSTRATE: <u>Mud/Silt</u> Sand Gravel Cobble Boulder Bedrock Artificial (mark 1-3)						

VEGETATION:	%	PROMINENT SPECIES:	*PREDATORS: (include scat and tracks)
Floating	<u>5</u>	<u>algae</u>	Leeches Boatmen/Backswimmers <u>Dragonflies</u>
Submerged			Belostomatids Beetles Warm water fish
Emergent	<u>15</u>	<u>rush</u>	Cold water fish Tiger salamanders Bullfrogs
Perimeter		<u>cholla globemallow desert spoon</u>	Mud turtles Gartersnakes <u>Wading birds</u>
Canopy	<u>1</u>	<u>mesquite / cholla / globemallow</u>	Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: <u>mallards, sandpiper</u>	OTHER ORG. NOTES:
SITE / SURVEY NOTES: Continued on another sheet? Y N <u>estimated depth 2 ft</u> <u>closed well pumps to pond</u> <u>little to no cover / edges trampled</u>	

Riparian Herpetofauna Observations				
*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **MANGUS POND**  
SVL Sample ID: **W0D0600-04 (Water)**

Sampled: 26-Apr-10 15:07  
Received: 29-Apr-10  
Sampled By:

**Sample Report Page 1 of 1**

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:10	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:11	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:11	
EPA 200.7	Calcium	83.4	mg/L	0.040	0.012		W018277	DT	05/03/10 15:09	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:11	
EPA 200.7	Cobalt	0.0071	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:11	
EPA 200.7	Copper	0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:11	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 15:10	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:11	
EPA 200.7	Magnesium	14.6	mg/L	0.061	0.018		W018277	DT	05/03/10 15:09	
EPA 200.7	Manganese	0.0139	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:10	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:11	
EPA 200.7	Potassium	8.89	mg/L	0.50	0.09		W018277	DT	05/03/10 15:09	
EPA 200.7	Sodium	35.6	mg/L	0.50	0.02		W018277	DT	05/03/10 15:09	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:11	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	19.4	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:11	
SM 2320B/2310B	Carbonate	30.6	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:11	
SM 2320B/2310B	Total Alkalinity	50.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:11	
SM 2540 C	Total Diss. Solids	510	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	5.30	mg/L	2.00	0.44		N/A		05/03/10 12:37	
SM 5310B	Dissolved Organic Carbon	15.1	mg/L	1.00	0.22		W019024	SAM	05/03/10 12:37	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	32.3	mg/L	2.02	0.384	10	W018292	EML	05/03/10 08:13	D2
EPA 300.0	Fluoride	0.696	mg/L	0.101	0.009		W018292	EML	05/01/10 00:58	
EPA 300.0	Sulfate as SO4	265	mg/L	3.03	0.76	10	W018292	EML	05/03/10 08:13	D2

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 7.14 meq/L    Anion Sum: 7.46 meq/L    C/A Balance: -2.20 %    Calculated TDS: 470    TDS/cTDS: 1.08

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director

Locality Data

\*SITE: @F Spring \*SITE AT:

For use by central data repository only:

NEW SITE: Y N NUM: \*UTM ZONE: 11 12 13 \*UTM EASTING: 0737643 \*UTM NORTHING: 3621863 (NAD83) NAD27

\*QUAD: \*MIN: 7.5 15 \*YEAR: \*ST-CNTY:

\*ELEV: m ~~5523~~ 5523 (ft) \*H<sub>2</sub>O CLASS: Lentic Lotic \*H<sub>2</sub>O TYPE: Canal Plant outflow (Riverine) Wetland Stock tank Lake Reservoir Small metal/concrete tanks or drinkers

DIRECTIONS:

Visit Conditions

DATE: 4-26-10 \*START: \*STOP: \*SEARCH TIME: 10 min \*OBSERVERS: Jill/Sarah

\*EFFORT: Total Perimeter Partial Perimeter Left Bank Right Bank Both Banks \*VOUCHERS: Specimen Photos: Habitat Photos: meters Specimen(s): Y N Specimen #s:

\*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other DRY: Y N RELEASE: Y N

T<sub>Air</sub>: °C °F T<sub>Water</sub>: °C °F EC: 932 µS pH: 7.67 RH: % \*H<sub>2</sub>O CLARITY: Extremely clear Moderately clear Extremely turbid

\*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph \*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%

\*PRECIPITATION: None Intermittent rain Steady light rain Steady heavy rain Snow/Sleet

\*LENTIC LENGTH: m \*LENTIC WIDTH: m \*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m

\*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m \*SUBSTRATE: (mark 1-3) Mud/Silt (Sand) Gravel Cobble Boulder Bedrock Artificial

VEGETATION: % PROMINENT SPECIES: \*PREDATORS: (include scat and tracks)

Floating 80 algae Leeches Boatmen/Backswimmers Dragonflies

Submerged Emergent 1 small sedge spikerush Belostomatids Beetles Warm water fish

Perimeter 70 seepwillow/juniper/oak/bermuda Mud turtles Gartersnakes Wading birds

Canopy 10 seepwillow grass Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: deer, cattle, mourning dove OTHER ORG. NOTES: not suitable habitat

SITE / SURVEY NOTES: 1" depth

Continued on another sheet? Y N

Riparian Herpetofauna Observations

*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **CF SPRING**  
SVL Sample ID: **W0D0600-09 (Water)**

Sampled: 27-Apr-10 12:03  
Received: 29-Apr-10  
Sampled By:

**Sample Report Page 1 of 1**

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:48	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:49	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:49	
EPA 200.7	Calcium	98.6	mg/L	0.040	0.012		W018277	DT	05/03/10 15:47	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:49	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:49	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:49	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 15:48	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:49	
EPA 200.7	Magnesium	43.2	mg/L	0.061	0.018		W018277	DT	05/03/10 15:47	
EPA 200.7	Manganese	0.0056	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:48	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:49	
EPA 200.7	Potassium	3.08	mg/L	0.50	0.09		W018277	DT	05/03/10 15:47	
EPA 200.7	Sodium	56.0	mg/L	0.50	0.02		W018277	DT	05/03/10 15:47	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:49	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	318	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:51	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:51	
SM 2320B/2310B	Total Alkalinity	318	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:51	
SM 2540 C	Total Diss. Solids	631	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	30.8	mg/L	2.00	0.44		N/A		05/03/10 14:18	
SM 5310B	Dissolved Organic Carbon	5.38	mg/L	1.00	0.22		W019024	SAM	05/03/10 14:18	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	59.1	mg/L	1.01	0.192	5	W018292	EML	05/03/10 09:14	D2
EPA 300.0	Fluoride	1.13	mg/L	0.505	0.046	5	W018292	EML	05/03/10 09:14	D1
EPA 300.0	Sulfate as SO4	161	mg/L	1.52	0.38	5	W018292	EML	05/03/10 09:14	D2

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 11.0 meq/L    Anion Sum: 11.4 meq/L    C/A Balance: -1.96 %    Calculated TDS: 613    TDS/cTDS: 1.03

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director

60

Locality Data

\*SITE: Siphon Spring \*SITE AT:

For use by central data repository only:

NEW SITE: Y N NUM: \*UTM ZONE: 11 12 13 \*UTM EASTING: 737646 \*UTM NORTHING: 3616615 NAD83  
NAD27

\*QUAD: \*MIN: 7.5 15 \*YEAR: \*ST-CNTY:

\*ELEV: m ft \*H<sub>2</sub>O CLASS: Lentic Lotic \*H<sub>2</sub>O TYPE: Canal Plant outflow Riverine Wetland Stock tank Lake Reservoir Small metal/concrete tanks or drinkers  
Spring

DIRECTIONS:

Visit Conditions

DATE: \*START: \*STOP: \*SEARCH TIME: 10 min \*OBSERVERS: Jill/Sarah

\*EFFORT: Total Perimeter Partial Perimeter Left Bank Right Bank Both Banks \*VOUCHERS: Specimen Photos: Habitat Photos:  
meters Specimen(s): Y N Specimen #s:

\*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other DRY: Y N RELEASE: Y N

T<sub>Air</sub>: °C °F T<sub>Water</sub>: °C °F EC: 306.9 µS pH: 8.6 RH: % \*H<sub>2</sub>O CLARITY: Extremely clear Moderately clear Extremely turbid

\*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph \*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%

\*PRECIPITATION: None Intermittent rain Steady light rain Steady heavy rain Snow/Sleet

\*LENTIC LENGTH: m \*LENTIC WIDTH: m \*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m

\*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m \*SUBSTRATE: Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial  
11-20 m 21-50 m >50 m (mark 1-3)

VEGETATION: % PROMINENT SPECIES: \*PREDATORS: (include scat and tracks)

Floating 5 algae Leeches Boatmen/Backswimmers Dragonflies

Submerged

Emergent

Perimeter 30 blue grama Belostomatids Beetles Warm water fish

Canopy 10 sidedats grama, desert spoon Cold water fish Tiger salamanders Bullfrogs

pine/oak/juniper/sample trees Mud turtles Gartersnakes Wading birds

Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: woodpecker, mourning dove, cattle, squirrel OTHER ORG. NOTES: seep willow

SITE / SURVEY NOTES: NO suitable habitat very little flow, little to no cover

Continued on another sheet? Y N

Riparian Herpetofauna Observations

*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		

downstream a small seep w/ spikerush / cottonwood / seep willow

**Little Rock Mine**  
**Field Data Sheet Update**  
*4/29/2010*

**Siphon Spring:**

Canopy pine/oak/juniper/seepwillow

Other organisms:

Acorn woodpecker, mourning dove, cattle, apache squirrel



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **SIPHON SPRING**  
SVL Sample ID: **W0D0600-11 (Water)**

Sampled: 28-Apr-10 10:39  
Received: 29-Apr-10  
Sampled By:

**Sample Report Page 1 of 1**

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:58	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 16:00	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 16:00	
EPA 200.7	<b>Calcium</b>	34.7	mg/L	0.040	0.012		W018277	DT	05/03/10 15:58	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 16:00	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 16:00	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 16:00	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 15:58	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 16:00	
EPA 200.7	<b>Magnesium</b>	11.0	mg/L	0.061	0.018		W018277	DT	05/03/10 15:58	
EPA 200.7	<b>Manganese</b>	0.0110	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:58	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 16:00	
EPA 200.7	Potassium	< 0.50	mg/L	0.50	0.09		W018277	DT	05/03/10 15:58	
EPA 200.7	<b>Sodium</b>	18.8	mg/L	0.50	0.02		W018277	DT	05/03/10 15:58	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 16:00	

**Classical Chemistry Parameters**

SM 2320B/2310B	<b>Bicarbonate</b>	139	mg/L	1.0	0.3		W018286	DKS	04/30/10 15:05	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 15:05	
SM 2320B/2310B	<b>Total Alkalinity</b>	139	mg/L	1.0	0.3		W018286	DKS	04/30/10 15:05	
SM 2540 C	<b>Total Diss. Solids</b>	256	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	<b>Dissolved Inorganic Carbon</b>	9.23	mg/L	2.00	0.44		N/A		05/03/10 14:55	
SM 5310B	<b>Dissolved Organic Carbon</b>	5.34	mg/L	1.00	0.22		W019024	SAM	05/03/10 14:55	

**Anions by Ion Chromatography**

EPA 300.0	<b>Chloride</b>	10.1	mg/L	1.01	0.192	5	W018292	EML	05/03/10 11:10	D2
EPA 300.0	<b>Fluoride</b>	0.602	mg/L	0.101	0.009		W018292	EML	05/03/10 10:35	
EPA 300.0	<b>Sulfate as SO4</b>	53.3	mg/L	1.52	0.38	5	W018292	EML	05/03/10 11:10	D2

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 3.46 meq/L    Anion Sum: 4.20 meq/L    C/A Balance: -9.70 %    Calculated TDS: 212    TDS/cTDS: 1.21

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director

362400  
739000



**Willow Creek** Locality Data

\*SITE: ~~Headwater~~ \*SITE AT: Near Siphon Spring / Willow Creek

For use by central data repository only:

NEW SITE:	NUM:	*UTM ZONE:	*UTM EASTING:	*UTM NORTHING:	NAD83
Y N		11 12 13	0739148	3616919	NAD27

\*QUAD: \*MIN: 7.5 15 \*YEAR: \*ST-CNTY:

\*ELEV: m ft \*H<sub>2</sub>O CLASS: Lentic Lotic \*H<sub>2</sub>O TYPE: Canal Plant outflow Riverine Wetland Stock tank Lake Reservoir Small metal/concrete tanks or drinkers

DIRECTIONS:

Visit Conditions

DATE: \*START: \*STOP: \*SEARCH TIME: \*OBSERVERS:

min JH/SB

*EFFORT:	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS:	Specimen Photos:	Habitat Photos:
meters						Specimen(s):	Y N	Specimen #s:

\*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other DRY: RELEASE:

Y N Y N

T <sub>Air</sub> :	°C	T <sub>Water</sub> :	°C	EC:	pH:	RH:	*H <sub>2</sub> O CLARITY:	Extremely clear	Moderately clear	Extremely turbid
	°F		°F	µs		%				

\*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph \*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%

\*PRECIPITATION: None Intermittent rain Steady light rain Steady heavy rain Snow/Sleet

*LENTIC LENGTH:	*LENTIC WIDTH:	*LOTIC WIDTH:						
m	m	0-2 m	3-5 m	6-10 m	11-20 m	21-50 m	51-100 m	>100 m

\*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m \*SUBSTRATE: Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial

(mark 1-3)

VEGETATION:	%	PROMINENT SPECIES:	*PREDATORS: (include scat and tracks)
Floating			Leeches Boatmen/Backswimmers Dragonflies
Submerged			Belostomatids Beetles Warm water fish
Emergent			Cold water fish Tiger salamanders Bullfrogs
Perimeter			Mud turtles Gartersnakes Wading birds
Canopy			Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: OTHER ORG. NOTES:

SITE / SURVEY NOTES: *Between Siphon Spring / whitewater tank*  
 Continued on another sheet? Y N *water in willow creek, small volume, no veg.*

Riparian Herpetofauna Observations

*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		



**Locality Data**

*Canyon*

\*SITE: *Deadman Box seep* \*SITE AT: *(TWS 7) water sampling*

For use by central data repository only:

NEW SITE: Y N	NUM:	*UTM ZONE: 11 12 13	*UTM EASTING: 743500000	*UTM NORTHING: 361200000	NAD83 NAD27
------------------	------	------------------------	----------------------------	-----------------------------	----------------

\*QUAD: \*MIN: 7.5 15 \*YEAR: \*ST-CNTY:

\*ELEV: m ft \*H<sub>2</sub>O CLASS: Lentic Lotic \*H<sub>2</sub>O TYPE: Canal Plant outflow Riverine Wetland Stock tank Lake Reservoir Small metal/concrete tanks or drinkers

DIRECTIONS:

**Visit Conditions**

DATE: *4-26-10* \*START: \*STOP: \*SEARCH TIME: *10* min \*OBSERVERS: *Sarah / Jill*

*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS: Specimen Photos: Habitat Photos:
						Specimen(s): Y N Specimen #s:

\*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other

*WIND: <1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph		*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%				
*PRECIPITATION: <u>None</u> Intermittent rain Steady light rain Steady heavy rain Snow/Sleet						

*AIR: °C °F	*WATER: °C °F	*EC: µs	*PH:	*RH: %	*H <sub>2</sub> O CLARITY: Extremely clear Moderately clear Extremely turbid
	<i>13.1</i>	<i>412</i>	<i>7.59</i>		

*LENTIC LENGTH: m	*LENTIC WIDTH: m	*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m

\*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m \*SUBSTRATE: (mark 1-3) Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial

VEGETATION: %	PROMINENT SPECIES:	*PREDATORS: (include scat and tracks)
Floating		Leeches Boatmen/Backswimmers Dragonflies
Submerged		Belostomatids Beetles Warm water fish
Emergent		Cold water fish Tiger salamanders Bullfrogs
Perimeter	<i>sample grass</i>	Mud turtles Gartersnakes Wading birds
Canopy	<i>Juniper, Pinyon, gambel's oak</i>	Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: *None* OTHER ORG. NOTES: *No aquatic life*

SITE / SURVEY NOTES: *9" deep water approx 2' x 12' box*  
 Continued on another sheet? Y N *No suitable habitat*

**Riparian Herpetofauna Observations**

*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **TWS-7**

SVL Sample ID: **W0D0600-03 (Water)**

Sample Report Page 1 of 1

Sampled: 26-Apr-10 13:35  
Received: 29-Apr-10  
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:04	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:05	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:05	
EPA 200.7	Calcium	84.9	mg/L	0.040	0.012		W018277	DT	05/03/10 15:04	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:05	
EPA 200.7	Cobalt	0.0062	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:05	
EPA 200.7	Copper	0.027	mg/L	0.010	0.006		W018277	DT	05/03/10 15:05	
EPA 200.7	Iron	0.087	mg/L	0.061	0.018		W018277	DT	05/03/10 15:04	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:05	
EPA 200.7	Magnesium	11.6	mg/L	0.061	0.018		W018277	DT	05/03/10 15:04	
EPA 200.7	Manganese	0.0289	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:04	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:05	
EPA 200.7	Potassium	33.1	mg/L	0.50	0.09		W018277	DT	05/03/10 15:04	
EPA 200.7	Sodium	15.5	mg/L	0.50	0.02		W018277	DT	05/03/10 15:04	
EPA 200.7	Zinc	0.0172	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:05	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	310	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:03	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:03	
SM 2320B/2310B	Total Alkalinity	310	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:03	
SM 2540 C	Total Diss. Solids	472	mg/L	20	9		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	50.3	mg/L	2.00	0.44		N/A		05/03/10 12:25	
SM 5310B	Dissolved Organic Carbon	67.9	mg/L	1.00	0.22		W019024	SAM	05/03/10 12:25	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	8.89	mg/L	0.202	0.038		W018292	EML	05/01/10 00:47	
EPA 300.0	Fluoride	0.610	mg/L	0.101	0.009		W018292	EML	05/01/10 00:47	
EPA 300.0	Sulfate as SO4	5.14	mg/L	0.30	0.08		W018292	EML	05/01/10 00:47	

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 6.72 meq/L      Anion Sum: 6.58 meq/L      C/A Balance: 1.02 %      Calculated TDS: 346      TDS/cTDS: 1.37

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director



Locality Data					
*SITE: Sugarloaf Mtn Spring			*SITE AT:		
For use by central data repository only:		*UTM ZONE:	*UTM EASTING:	*UTM NORTHING:	NAD83
NEW SITE:	NUM:	11 12 13	742000000	361500000	NAD27
Y	N				
*QUAD:		*MIN: 7.5 15	*YEAR:	*ST-CNTY:	
*ELEV:	m	*H <sub>2</sub> O CLASS:	*H <sub>2</sub> O TYPE: Canal Plant outflow Riverine Wetland Stock tank Lake Reservoir Small metal/concrete tanks or drinkers		
	ft	Lentic Lotic	Spring		
DIRECTIONS:					

Visit Conditions											
DATE:		*START:	*STOP:	*SEARCH TIME:	*OBSERVERS:						
				min	JH/SB						
*EFFORT:	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS: Specimen Photos: Habitat Photos:					
meters						Specimen(s): Y N Specimen #s:					
*SEARCH METHODS:		Dipnet	Seine	Trap	Hand exploration	Snorkel	Boat	Call playback	Other	DRY: Y N	RELEASE: Y N
T <sub>Air</sub> :	°C	T <sub>Water</sub> :	°C	EC:	pH:	RH:	*H <sub>2</sub> O CLARITY: Extremely clear Moderately clear Extremely turbid				
	°F	21.9	°F	353	µs	7.47					
*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph						*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%					
*PRECIPITATION:		None		Intermittent rain		Steady light rain		Steady heavy rain		Snow/Sleet	
*LENTIC LENGTH:	m	*LENTIC WIDTH:	m	*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m							
*RIPARIAN WIDTH:	0-2 m 11-20 m	3-5 m 21-50 m	6-10 m >50 m	*SUBSTRATE: Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial (mark 1-3)							

VEGETATION:	%	PROMINENT SPECIES:	*PREDATORS:
Floating		algae	Leeches Boatmen/Backswimmers Dragonflies
Submerged			Belostomatids Beetles Warm water fish
Emergent			Cold water fish Tiger salamanders Bullfrogs
Perimeter		see back	Mud turtles Gartersnakes Wading birds
Canopy		willow / pinion pine / juniper / oak	Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: None	OTHER ORG. NOTES: NO suitable habitat
SITE / SURVEY NOTES: seep/spring / 1" deep potholes / wetted mud little surface water - from recent rain	
Continued on another sheet? Y N	

Riparian Herpetofauna Observations						
*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:		
	Uncertain Certain	Egg Larvae Juvenile Adult				
	Uncertain Certain	Egg Larvae Juvenile Adult				
	Uncertain Certain	Egg Larvae Juvenile Adult				

**Little Rock Mine**  
**Field Data Sheet Update**  
4/29/2010

**Sugarloaf Mountain Spring**

Site/Survey notes (page 2):

Rock outcrop

Hedgehog cacti (*Echinocereus* sp.)

Prickly pear cacti (*Opuntia* sp.)

Staghorn cholla (*Opuntia* sp.)

Blue grama grass (*Bouteloua gracilis*)

Crevice spiny lizard colony (*Sceloporus poinsetti*)

Page 2. Sugarloaf Mountain Spring

collared lizard colony - photo reviewed in office: spiny  
lizards, not collared lizards

rock outcrop

hedgehog - Echinocereus

prickly pear

staghorn cholla

bluegrama



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **SUGARLOAF SPRING**

SVL Sample ID: **W0D0600-02 (Water)**

Sample Report Page 1 of 1

Sampled: 26-Apr-10 12:28  
Received: 29-Apr-10  
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 14:58	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:00	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:00	
EPA 200.7	Calcium	48.3	mg/L	0.040	0.012		W018277	DT	05/03/10 14:58	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:00	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:00	
EPA 200.7	Copper	0.015	mg/L	0.010	0.006		W018277	DT	05/03/10 14:59	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 14:58	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:00	
EPA 200.7	Magnesium	8.15	mg/L	0.061	0.018		W018277	DT	05/03/10 14:58	
EPA 200.7	Manganese	0.0179	mg/L	0.0040	0.0019		W018277	DT	05/03/10 14:58	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:00	
EPA 200.7	Potassium	1.55	mg/L	0.50	0.09		W018277	DT	05/03/10 14:58	
EPA 200.7	Sodium	21.1	mg/L	0.50	0.02		W018277	DT	05/03/10 14:58	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:00	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	113	mg/L	1.0	0.3		W018286	DKS	04/30/10 13:58	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 13:58	
SM 2320B/2310B	Total Alkalinity	113	mg/L	1.0	0.3		W018286	DKS	04/30/10 13:58	
SM 2540 C	Total Diss. Solids	310	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	16.7	mg/L	2.00	0.44		N/A		05/03/10 12:11	
SM 5310B	Dissolved Organic Carbon	17.4	mg/L	1.00	0.22		W019024	SAM	05/03/10 12:11	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	9.69	mg/L	0.202	0.038		W018292	EML	05/01/10 00:35	
EPA 300.0	Fluoride	0.540	mg/L	0.101	0.009		W018292	EML	05/01/10 00:35	
EPA 300.0	Sulfate as SO4	74.5	mg/L	1.52	0.38	5	W018292	EML	05/03/10 08:02	D2

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 4.04 meq/L    Anion Sum: 4.11 meq/L    C/A Balance: -0.84 %    Calculated TDS: 232    TDS/cTDS: 1.34

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director

Locality Data						
*SITE: McCain Spring			*SITE AT:			
For use by central data repository only:						
NEW SITE: Y <input checked="" type="radio"/> N		NUM:	*UTM ZONE: 11 <input checked="" type="radio"/> 12 13	*UTM EASTING: 744458	*UTM NORTHING: 3616853	<input checked="" type="radio"/> NAD83 <input type="radio"/> NAD27
*QUAD:			*MIN: 7.5 15	*YEAR:	*ST-CNTY:	
*ELEV: m ft	*H <sub>2</sub> O CLASS: Lentic Lotic		*H <sub>2</sub> O TYPE: Canal Plant outflow Riverine <input checked="" type="radio"/> Wetland <input checked="" type="radio"/> Stock tank <input checked="" type="radio"/> Spring Lake Reservoir			Small metal/concrete tanks or drinkers
DIRECTIONS:						

Visit Conditions						
DATE: 4/26/10		*START:	*STOP:	*SEARCH TIME: 10 min	*OBSERVERS: Sarah/Jill	
*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS: Specimen Photos: Habitat Photos: Specimen(s): Y N Specimen #s:
*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other						
*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph						
*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%						
*PRECIPITATION: <input checked="" type="radio"/> None Intermittent rain Steady light rain Steady heavy rain Snow/Sleet						
*LENTIC LENGTH: 50 ft m	*LENTIC WIDTH: 50 ft m	*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m				

*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m	*SUBSTRATE: (mark 1-3) <input checked="" type="radio"/> Mud/Silt Sand Gravel Cobble Boulder Bedrock Artificial	
VEGETATION: %	PROMINENT SPECIES:	*PREDATORS: (include scat and tracks)
Floating	algae	Leeches Boatmen/Backswimmers Dragonflies
Submerged		Belostomatids Beetles Warm water fish
Emergent	spikerush, scirpus am.	Cold water fish Tiger salamanders Bullfrogs
Perimeter	cocklebur, tomatillo, blue/white oak	Mud turtles Gartersnakes Wading birds
Canopy	juniper	Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS:	OTHER ORG. NOTES: intermittent / 2 ft deep max
SITE / SURVEY NOTES: intermittent / dry most of the year 3 photos	
Continued on another sheet? Y N	

Riparian Herpetofauna Observations					
*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:	
	Uncertain Certain	Egg Larvae Juvenile Adult			
	Uncertain Certain	Egg Larvae Juvenile Adult			
	Uncertain Certain	Egg Larvae Juvenile Adult			

**Little Rock Mine  
Field Data Sheet Update**

4/29/2010

**McCain Spring**

Emergent – spikerush, bulrush

Perimeter – cocklebur, silverleaf nightshad, blue/sideoats grama

Site/survey notes (page 2):

Blue grama (*Bouteloua gracilis*)

Sideoats grama (*B. curtipendula*)

Cottontail (*Sylvilagus auduboni*)

Prickly pear (*Opuntia* sp.)

Cholla (*Opuntia* sp.)

Silverleaf nightshade (*Solanum elaeagnifolium*)

Juniper (*Juniperus monosperma*)

Pinyon pine (*Pinus edulis*)

Common raven (*Corvus corax*)

White-tailed deer (*Odocoileus virginianus*)

Spikerush (*Eleocharis acicularis*)

Bulrush (*Scirpus* sp.)

Indian paintbrush (*Castilleja* sp.)

blue grama  
sidecoats grama  
rabbit (cottontail)  
prickly pear/cholla  
tomatillo  
juniper  
Pinyon pine

stike rush (Equisetum)  
scirpus in pond

spring is 10 ft depth

common raven

mistletoe

white-tailed deer

a. turbinella  
~~scr~~ scrubs  
live  
oak

Locality Data										
*SITE: <u>Deadman Canyon</u>					*SITE AT: <u>GSF 01775</u>					
For use by central data repository only:										
NEW SITE: Y N		NUM:		*UTM ZONE: 11 12 13		*UTM EASTING: 74400000		*UTM NORTHING: 361450000		NAD83 NAD27
*QUAD:				*MIN: 7.5 15		*YEAR:		*ST-CNTY:		
*ELEV: m ft	*H <sub>2</sub> O CLASS: Lentic Lotic		*H <sub>2</sub> O TYPE: Canal Plant outflow <u>Riverine</u> Wetland			Stock tank	Lake	Reservoir	Small metal/concrete tanks or drinkers	
DIRECTIONS:										

Visit Conditions									
DATE: <u>4/26/10</u>			*START:		*STOP:		*SEARCH TIME: <u>10 min</u>		*OBSERVERS: <u>JH/SB</u>
*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS: Specimen Photos: Habitat Photos:			
						Specimen(s): Y N Specimen #s:			
*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other							DRY: Y N	RELEASE: Y N	
T <sub>Air</sub> : °C °F	T <sub>Water</sub> : °C °F	EC: µS	pH: ( )	RH: %	*H <sub>2</sub> O CLARITY: <u>Extremely clear</u> Moderately clear Extremely turbid				
*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph					*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%				
*PRECIPITATION: <u>None</u> Intermittent rain Steady light rain Steady heavy rain Snow/Sleet									

*LENTIC LENGTH: <u>greek</u> m		*LENTIC WIDTH: <u>6ft</u> m		*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m					
*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m				*SUBSTRATE: (mark 1-3) <u>Mud/Silt</u> <u>Sand</u> Gravel Cobble Boulder Bedrock Artificial					
VEGETATION: %		PROMINENT SPECIES:				*PREDATORS: (include scat and tracks)			
Floating <u>70</u>		<u>algae</u>				Leeches Boatmen/Backswimmers Dragonflies			
Submerged		-				Belostomatids Beetles Warm water fish			
Emergent		-				Cold water fish Tiger salamanders Bullfrogs			
Perimeter		<u>rabbit brush</u>				Mud turtles Gartersnakes Wading birds			
Canopy		<u>cottonwood; juniper</u>				Hawks, black & zone-tailed Mammals Crayfish			

OTHER ORGANISMS:					OTHER ORG. NOTES: <u>insect larvae</u>				
SITE / SURVEY NOTES: Continued on another sheet? Y N <u>3" deep / intermittent water</u> <u>too sandy</u> <u>No suitable habitat</u>									

Riparian Herpetofauna Observations										
*SPECIES:	CERTAINTY:		LIFE STAGE				#	COMMENTS:		
	Uncertain	Certain	Egg	Larvae	Juvenile	Adult				
	Uncertain	Certain	Egg	Larvae	Juvenile	Adult				
	Uncertain	Certain	Egg	Larvae	Juvenile	Adult				

**Little Rock Mine**  
**Field Data Sheet Update**  
4/29/2010

**Deadman Canyon**

Site/Survey notes (page 2):

Common mullein (*Verbascum thapsus*)

Turkey vulture (*Cathartes aura*)

White-tailed deer (*Odocoileus virginianus*)

Pinyon pine (*Pinus edulis*)

Rubber rabbitbrush (*Chrysothamnus nauseosus*)

Blue grama grass (*Bouteloua gracilis*)

mullein/miner's lettuce

turkey vulture

deer

pinyon pine

rubber rabbit brush

blue grama



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

(208) 784-1258

Fax (208) 783-0891

Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **DEADMAN SPRING**  
SVL Sample ID: **W0D0600-01 (Water)**

Sampled: 26-Apr-10 11:17  
Received: 29-Apr-10  
Sampled By:

Sample Report Page 1 of 1

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 14:42	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 14:43	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 14:43	
EPA 200.7	Calcium	39.2	mg/L	0.040	0.012		W018277	DT	05/03/10 14:42	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 14:43	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 14:43	
EPA 200.7	Copper	0.019	mg/L	0.010	0.006		W018277	DT	05/03/10 14:43	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 14:42	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 14:43	
EPA 200.7	Magnesium	7.76	mg/L	0.061	0.018		W018277	DT	05/03/10 14:42	
EPA 200.7	Manganese	0.0367	mg/L	0.0040	0.0019		W018277	DT	05/03/10 14:42	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 14:43	
EPA 200.7	Potassium	1.41	mg/L	0.50	0.09		W018277	DT	05/03/10 14:42	
EPA 200.7	Sodium	17.9	mg/L	0.50	0.02		W018277	DT	05/03/10 14:42	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 14:43	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	114	mg/L	1.0	0.3		W018286	DKS	04/30/10 13:53	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 13:53	
SM 2320B/2310B	Total Alkalinity	114	mg/L	1.0	0.3		W018286	DKS	04/30/10 13:53	
SM 2540 C	Total Diss. Solids	232	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	18.9	mg/L	2.00	0.44		N/A		05/03/10 11:47	
SM 5310B	Dissolved Organic Carbon	11.6	mg/L	1.00	0.22		W019024	SAM	05/03/10 11:47	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	9.78	mg/L	0.202	0.038		W018292	EML	05/01/10 00:23	
EPA 300.0	Fluoride	0.262	mg/L	0.101	0.009		W018292	EML	05/01/10 00:23	
EPA 300.0	Sulfate as SO4	44.0	mg/L	0.30	0.08		W018292	EML	05/01/10 00:23	

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 3.41 meq/L    Anion Sum: 3.48 meq/L    C/A Balance: -1.00 %    Calculated TDS: 189    TDS/cTDS: 1.23

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director

Locality Data

\*SITE: Fleming pond \*SITE AT:

For use by central data repository only:

NEW SITE: Y N	NUM:	*UTM ZONE: 11 <u>12</u> 13	*UTM EASTING: 738771	*UTM NORTHING: 3625900	NAD83 NAD27
*QUAD:		*MIN: 7.5 15	*YEAR:	*ST-CNTY:	
*ELEV: m ft	*H <sub>2</sub> O CLASS: Lentic Lotic	*H <sub>2</sub> O TYPE: Canal Plant outflow Riverine Wetland	Stock tank	<u>Lake</u> Reservoir	Small metal/concrete tanks or drinkers

*pond*

DIRECTIONS:

Visit Conditions

DATE: 4-26-10 \*START: \*STOP: \*SEARCH TIME: 15 min \*OBSERVERS: Sarah/Jill

*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks	*VOUCHERS:	Specimen Photos:	Habitat Photos:
						Specimen(s): Y N	Specimen #s:	

\*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback Other

*WIND: ≤1 mph 1-3 mph <u>4-7 mph</u> 8-12 mph 13-18 mph 19-24 mph >24 mph		*CLOUD COVER: <u>0-20%</u> 21-40% 41-60% 61-80% 81-100%
*PRECIPITATION: <u>None</u> Intermittent rain Steady light rain Steady heavy rain Snow/Sleet		
*LENTIC LENGTH: m	*LENTIC WIDTH: m	*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m
*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m >50 m	*SUBSTRATE: <u>Mud/Silt</u> Sand Gravel Cobble Boulder Bedrock Artificial (mark 1-3)	

VEGETATION:	%	PROMINENT SPECIES:	*PREDATORS: (include scat and tracks)
Floating	<u>50</u>	<u>algae</u>	Leeches Boatmen/Backswimmers <u>Dragonflies</u>
Submerged			Belostomatids Beetles Warm water fish
Emergent	<u>30</u>	<u>spikemush rushes and cattail, bulrush</u>	Cold water fish Tiger salamanders <u>Bullfrogs</u>
Perimeter	<u>80</u>	<u>yucca, tomatillo, cocklebur, mustard, grasses (sample)</u>	Mud turtles Gartersnakes <u>Wading birds</u>
Canopy			Hawks, black & zone-tailed Mammals Crayfish

OTHER ORGANISMS: red-wing blackbird, great blue heron, american coot, coot OTHER ORG. NOTES: aquatic snail, artificially-constructed, migratory bird pond

SITE / SURVEY NOTES: pond fed by groundwater as mitigation 200x300 ft, 2-3 ft max suitable habitat

Continued on another sheet? Y N

Riparian Herpetofauna Observations

*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		
	Uncertain Certain	Egg Larvae Juvenile Adult		

Not suitable habitat - emergent vegetation has developed, however not suitable for cover (see Biology Section of memorandum).

**Little Rock Mine  
Field Data Sheet Update**

4/29/2010

**Fleming Pond**

Emergent – spikerush, cattail, bulrush

Perimeter – yucca, silverleaf nightshade, cocklebur, mustard, yellow foxtail

Other organisms:

Red-wing blackbird

Great blue heron

American coot

Cattle

Site survey/notes:

Southwestern prickly poppy (*Argemone pleiocantha*)

Yellow foxtail (*Setaria plumila*)

Argemone pleiocantha (Z.)  
white flower  
unknown grass  
swallows



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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **FLEMING POND**  
SVL Sample ID: **W0D0600-07 (Water)**

Sampled: 27-Apr-10 10:26  
Received: 29-Apr-10  
Sampled By:

**Sample Report Page 1 of 1**

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:37	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:38	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:38	
EPA 200.7	Calcium	20.4	mg/L	0.040	0.012		W018277	DT	05/03/10 15:36	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:38	
EPA 200.7	Cobalt	0.0072	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:38	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:38	
EPA 200.7	Iron	0.112	mg/L	0.061	0.018		W018277	DT	05/03/10 15:37	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:38	
EPA 200.7	Magnesium	14.4	mg/L	0.061	0.018		W018277	DT	05/03/10 15:36	
EPA 200.7	Manganese	0.0211	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:37	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:38	
EPA 200.7	Potassium	3.97	mg/L	0.50	0.09		W018277	DT	05/03/10 15:36	
EPA 200.7	Sodium	27.4	mg/L	0.50	0.02		W018277	DT	05/03/10 15:36	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:38	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	84.8	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:25	
SM 2320B/2310B	Carbonate	7.2	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:25	
SM 2320B/2310B	Total Alkalinity	92.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:25	
SM 2540 C	Total Diss. Solids	223	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	10.5	mg/L	2.00	0.44		N/A		05/03/10 13:55	
SM 5310B	Dissolved Organic Carbon	12.8	mg/L	1.00	0.22		W019024	SAM	05/03/10 13:55	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	26.4	mg/L	1.01	0.192	5	W018292	EML	05/03/10 09:49	D2
EPA 300.0	Fluoride	0.437	mg/L	0.101	0.009		W018292	EML	05/03/10 08:51	
EPA 300.0	Sulfate as SO4	47.3	mg/L	0.30	0.08		W018292	EML	05/03/10 08:51	

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 3.50 meq/L    Anion Sum: 3.59 meq/L    C/A Balance: -1.23 %    Calculated TDS: 196    TDS/cTDS: 1.14

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director









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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **DEADMAN 1**  
SVL Sample ID: **W0D0600-06 (Water)**

Sampled: 26-Apr-10 12:00  
Received: 29-Apr-10  
Sampled By:

**Sample Report Page 1 of 1**

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	<b>Aluminum</b>	0.484	mg/L	0.081	0.019		W018277	DT	05/03/10 15:21	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:22	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:22	
EPA 200.7	<b>Calcium</b>	12.2	mg/L	0.040	0.012		W018277	DT	05/03/10 15:20	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:22	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:22	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:22	
EPA 200.7	<b>Iron</b>	0.271	mg/L	0.061	0.018		W018277	DT	05/03/10 15:21	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:22	
EPA 200.7	<b>Magnesium</b>	3.22	mg/L	0.061	0.018		W018277	DT	05/03/10 15:21	
EPA 200.7	<b>Manganese</b>	0.0471	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:21	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:22	
EPA 200.7	<b>Potassium</b>	1.36	mg/L	0.50	0.09		W018277	DT	05/03/10 15:20	
EPA 200.7	<b>Sodium</b>	10.0	mg/L	0.50	0.02		W018277	DT	05/03/10 15:20	
EPA 200.7	<b>Zinc</b>	0.0340	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:22	

**Classical Chemistry Parameters**

SM 2320B/2310B	<b>Bicarbonate</b>	33.3	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:21	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:21	
SM 2320B/2310B	<b>Total Alkalinity</b>	33.3	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:21	
SM 2540 C	<b>Total Diss. Solids</b>	202	mg/L	20	9		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	<b>Dissolved Inorganic Carbon</b>	4.31	mg/L	2.00	0.44		N/A		05/03/10 13:42	
SM 5310B	<b>Dissolved Organic Carbon</b>	11.9	mg/L	1.00	0.22		W019024	SAM	05/03/10 13:42	

**Anions by Ion Chromatography**

EPA 300.0	<b>Chloride</b>	7.46	mg/L	0.202	0.038		W018292	EML	05/03/10 08:37	
EPA 300.0	<b>Sulfate as SO4</b>	21.8	mg/L	0.30	0.08		W018292	EML	05/03/10 08:37	

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 1.41 meq/L      Anion Sum: 1.33 meq/L      C/A Balance: 2.94 %      Calculated TDS: 76      TDS/cTDS: 2.66

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director





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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **MUD SPRING**  
SVL Sample ID: **W0D0600-05 (Water)**

Sampled: 26-Apr-10 12:00  
Received: 29-Apr-10  
Sampled By:

**Sample Report Page 1 of 1**

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:15	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:17	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:17	
EPA 200.7	<b>Calcium</b>	43.7	mg/L	0.040	0.012		W018277	DT	05/03/10 15:15	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:17	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:17	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:16	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 15:15	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:17	
EPA 200.7	<b>Magnesium</b>	9.74	mg/L	0.061	0.018		W018277	DT	05/03/10 15:15	
EPA 200.7	<b>Manganese</b>	0.0431	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:15	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:17	
EPA 200.7	<b>Potassium</b>	1.51	mg/L	0.50	0.09		W018277	DT	05/03/10 15:15	
EPA 200.7	<b>Sodium</b>	16.6	mg/L	0.50	0.02		W018277	DT	05/03/10 15:15	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:17	

**Classical Chemistry Parameters**

SM 2320B/2310B	<b>Bicarbonate</b>	178	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:15	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:15	
SM 2320B/2310B	<b>Total Alkalinity</b>	178	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:15	
SM 2540 C	<b>Total Diss. Solids</b>	190	mg/L	20	9		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	<b>Dissolved Inorganic Carbon</b>	22.7	mg/L	2.00	0.44		N/A		05/03/10 12:48	
SM 5310B	<b>Dissolved Organic Carbon</b>	1.74	mg/L	1.00	0.22		W019024	SAM	05/03/10 12:48	

**Anions by Ion Chromatography**

EPA 300.0	<b>Chloride</b>	7.40	mg/L	0.202	0.038		W018292	EML	05/03/10 08:25	
EPA 300.0	<b>Fluoride</b>	0.804	mg/L	0.101	0.009		W018292	EML	05/03/10 08:25	
EPA 300.0	<b>Sulfate as SO4</b>	7.05	mg/L	0.30	0.08		W018292	EML	05/03/10 08:25	

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 3.75 meq/L    Anion Sum: 3.95 meq/L    C/A Balance: -2.68 %    Calculated TDS: 194    TDS/cTDS: 0.98

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director





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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **FR828 CATTLE WATER BOX**

SVL Sample ID: **W0D0600-08 (Water)**

Sample Report Page 1 of 1

Sampled: 27-Apr-10 10:30  
Received: 29-Apr-10  
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	< 0.081	mg/L	0.081	0.019		W018277	DT	05/03/10 15:42	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:43	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:43	
EPA 200.7	Calcium	74.3	mg/L	0.040	0.012		W018277	DT	05/03/10 15:42	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:43	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:43	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:43	
EPA 200.7	Iron	< 0.061	mg/L	0.061	0.018		W018277	DT	05/03/10 15:42	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:43	
EPA 200.7	Magnesium	21.9	mg/L	0.061	0.018		W018277	DT	05/03/10 15:42	
EPA 200.7	Manganese	0.188	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:42	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:43	
EPA 200.7	Potassium	1.67	mg/L	0.50	0.09		W018277	DT	05/03/10 15:42	
EPA 200.7	Sodium	25.2	mg/L	0.50	0.02		W018277	DT	05/03/10 15:42	
EPA 200.7	Zinc	0.0242	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:43	

**Classical Chemistry Parameters**

SM 2320B/2310B	Bicarbonate	246	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:34	
SM 2320B/2310B	Carbonate	< 1.0	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:34	
SM 2320B/2310B	Total Alkalinity	246	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:34	
SM 2540 C	Total Diss. Solids	384	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	Dissolved Inorganic Carbon	13.5	mg/L	2.00	0.44		N/A		05/03/10 14:06	
SM 5310B	Dissolved Organic Carbon	2.65	mg/L	1.00	0.22		W019024	SAM	05/03/10 14:06	

**Anions by Ion Chromatography**

EPA 300.0	Chloride	21.4	mg/L	1.01	0.192	5	W018292	EML	05/03/10 10:00	D2
EPA 300.0	Fluoride	2.11	mg/L	0.101	0.009		W018292	EML	05/03/10 09:02	
EPA 300.0	Sulfate as SO4	60.0	mg/L	1.52	0.38	5	W018292	EML	05/03/10 10:00	D2

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 6.66 meq/L      Anion Sum: 6.88 meq/L      C/A Balance: -1.62 %      Calculated TDS: 354      TDS/cTDS: 1.08

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director

Locality Data				
*SITE: Stock Tank		*SITE AT: Section 1, Township 20S, Range 15W		
For use by central data repository only:		*UTM ZONE: 11 (12) 13	*UTM EASTING: 74013	*UTM NORTHING: 31087
NEW SITE: Y N	NUM:			NAD83 NAD27
*QUAD:		*MIN: 7.5 15	*YEAR:	*ST-CNTY:
*ELEV: m ft	*H <sub>2</sub> O CLASS: Lentic Lotic	*H <sub>2</sub> O TYPE: Canal Plant outflow Riverine Wetland <u>Stock tank</u> Lake Reservoir Small metal/concrete tanks or drinkers		
DIRECTIONS: Stock tank located on private property on east side of Hwy 90				

Visit Conditions					
DATE: 4-27-2010		*START:	*STOP:	*SEARCH TIME: min	*OBSERVERS: R. Bowers D. Dwyer
*EFFORT: meters	Total Perimeter	Partial Perimeter	Left Bank	Right Bank	Both Banks
*VOUCHERS: Specimen Photos: Habitat Photos: Specimen(s): Y N Specimen #s:					
*SEARCH METHODS: Dipnet Seine Trap Hand exploration Snorkel Boat Call playback <u>Visual</u> Other					
*WIND: ≤1 mph 1-3 mph 4-7 mph 8-12 mph 13-18 mph 19-24 mph >24 mph					
*CLOUD COVER: 0-20% 21-40% 41-60% 61-80% 81-100%					
*PRECIPITATION: <u>None</u> Intermittent rain Steady light rain Steady heavy rain Snow/Sleet					
*LENTIC LENGTH: 75 ft	*LENTIC WIDTH: 100 ft	*LOTIC WIDTH: 0-2 m 3-5 m 6-10 m 11-20 m 21-50 m 51-100 m >100 m			
*RIPARIAN WIDTH: 0-2 m 3-5 m 6-10 m >10 m					
*SUBSTRATE: Mud/Silt <u>Sand</u> Gravel Cobble Boulder Bedrock Artificial					

VEGETATION: %	PROMINENT SPECIES:		*PREDATORS: (include scat and tracks)	
Floating 20	Algae		Leeches Boatmen/Backswimmers <u>Dragonflies</u>	
Submerged 20	Algae		Belostomatids Beetles Warm water fish	
Emergent			Cold water fish Tiger salamanders <u>Bullfrogs</u>	
Perimeter			Mud turtles Gartersnakes Wading birds	
Canopy			Hawks, black & zone-tailed Mammals Crayfish	

OTHER ORGANISMS: Goldfish	OTHER ORG. NOTES:
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SITE / SURVEY NOTES: visual identified bullfrogs and fish.

Continued on another sheet? Y N

Riparian Herpetofauna Observations					
*SPECIES:	CERTAINTY:	LIFE STAGE	#	COMMENTS:	
	Uncertain <u>Certain</u>	Egg Larvae Juvenile <u>Adult</u>		LANDOWNER INDICATED POND OCCUPIED BY BULLFROGS AND NON-NATIVE FISHES.	
	Uncertain Certain	Egg Larvae Juvenile Adult			
	Uncertain Certain	Egg Larvae Juvenile Adult			



One Government Gulch - PO Box 929

Kellogg ID 83837-0929

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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

Client Sample ID: **BARRY FORD TANK**

SVL Sample ID: **W0D0600-10 (Water)**

Sample Report Page 1 of 1

Sampled: 27-Apr-10 15:12  
Received: 29-Apr-10  
Sampled By:

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	<b>Aluminum</b>	0.409	mg/L	0.081	0.019		W018277	DT	05/03/10 15:53	
EPA 200.7	Arsenic	< 0.025	mg/L	0.025	0.006		W018277	DT	05/03/10 15:54	
EPA 200.7	Cadmium	< 0.0020	mg/L	0.0020	0.0005		W018277	DT	05/03/10 15:54	
EPA 200.7	<b>Calcium</b>	37.1	mg/L	0.040	0.012		W018277	DT	05/03/10 15:53	
EPA 200.7	Chromium	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:54	
EPA 200.7	Cobalt	< 0.0061	mg/L	0.0061	0.0008		W018277	DT	05/03/10 15:54	
EPA 200.7	Copper	< 0.010	mg/L	0.010	0.006		W018277	DT	05/03/10 15:54	
EPA 200.7	<b>Iron</b>	0.430	mg/L	0.061	0.018		W018277	DT	05/03/10 15:53	
EPA 200.7	Lead	< 0.0076	mg/L	0.0076	0.0022		W018277	DT	05/03/10 15:54	
EPA 200.7	<b>Magnesium</b>	8.77	mg/L	0.061	0.018		W018277	DT	05/03/10 15:53	
EPA 200.7	<b>Manganese</b>	0.0475	mg/L	0.0040	0.0019		W018277	DT	05/03/10 15:53	
EPA 200.7	Nickel	< 0.010	mg/L	0.010	0.002		W018277	DT	05/03/10 15:54	
EPA 200.7	<b>Potassium</b>	1.27	mg/L	0.50	0.09		W018277	DT	05/03/10 15:53	
EPA 200.7	<b>Sodium</b>	22.9	mg/L	0.50	0.02		W018277	DT	05/03/10 15:53	
EPA 200.7	Zinc	< 0.0101	mg/L	0.0101	0.0026		W018277	DT	05/03/10 15:54	

**Classical Chemistry Parameters**

SM 2320B/2310B	<b>Bicarbonate</b>	119	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:59	
SM 2320B/2310B	<b>Carbonate</b>	22.2	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:59	
SM 2320B/2310B	<b>Total Alkalinity</b>	141	mg/L	1.0	0.3		W018286	DKS	04/30/10 14:59	
SM 2540 C	<b>Total Diss. Solids</b>	262	mg/L	10	4		W018273	JMS	04/30/10 10:42	

**Dissolved Classical Chemistry Parameters**

Calculation	<b>Dissolved Inorganic Carbon</b>	12.4	mg/L	2.00	0.44		N/A		05/03/10 14:30	
SM 5310B	<b>Dissolved Organic Carbon</b>	21.9	mg/L	1.00	0.22		W019024	SAM	05/03/10 14:30	

**Anions by Ion Chromatography**

EPA 300.0	<b>Chloride</b>	14.4	mg/L	1.01	0.192	5	W018292	EML	05/03/10 10:59	D2
EPA 300.0	<b>Fluoride</b>	1.13	mg/L	0.101	0.009		W018292	EML	05/03/10 10:24	
EPA 300.0	<b>Sulfate as SO4</b>	20.1	mg/L	0.30	0.08		W018292	EML	05/03/10 10:24	

**Cation/Anion Balance and TDS Ratios**

Cation Sum: 3.66 meq/L    Anion Sum: 3.70 meq/L    C/A Balance: -0.50 %    Calculated TDS: 190    TDS/cTDS: 1.38

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

**Kirby Gray**  
Technical Director







Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
DEADMAN SPRING	W0D0600-01	Water	26-Apr-10 11:17	29-Apr-2010
SUGARLOAF SPRING	W0D0600-02	Water	26-Apr-10 12:28	29-Apr-2010
TWS-7	W0D0600-03	Water	26-Apr-10 13:35	29-Apr-2010
MANGUS POND	W0D0600-04	Water	26-Apr-10 15:07	29-Apr-2010
MUD SPRING	W0D0600-05	Water	26-Apr-10 12:00	29-Apr-2010
DEADMAN 1	W0D0600-06	Water	26-Apr-10 12:00	29-Apr-2010
FLEMING POND	W0D0600-07	Water	27-Apr-10 10:26	29-Apr-2010
FR828 CATTLE WATER BOX	W0D0600-08	Water	27-Apr-10 10:30	29-Apr-2010
CF SPRING	W0D0600-09	Water	27-Apr-10 12:03	29-Apr-2010
BARRY FORD TANK	W0D0600-10	Water	27-Apr-10 15:12	29-Apr-2010
SIPHON SPRING	W0D0600-11	Water	28-Apr-10 10:39	29-Apr-2010

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.

Sample preparation is defined by the client as per their Data Quality Objectives.

This report supercedes any previous reports for this Work Order. The complete report includes pages for each sample, a full QC report, and a notes section.

The results presented in this report relate only to the samples, and meet all requirements of the NELAC Standards unless otherwise noted.

(Q6) SVL received the following containers outside of published EPA guidelines for preservation temperatures (0-6°C).

The guidelines do not pertain to nitric-preserved metals.

**Default Cooler (Received Temperature: 6.7°C)**

Labnumber	Container	Client ID	Labnumber	Container	Client ID
W0D0600-01 A	Raw HDPE	DEADMAN SPRING	W0D0600-01 B	Sulfuric Amber VOA	DEADMAN SPRING
W0D0600-01 C	Sulfuric Amber VOA	DEADMAN SPRING	W0D0600-01 D	Filtered Sulfuric VOA	DEADMAN SPRING
W0D0600-01 E	Filtered Sulfuric VOA	DEADMAN SPRING	W0D0600-01 F	Filtered nitric HDPE	DEADMAN SPRING
W0D0600-02 A	Raw HDPE	SUGARLOAF SPRING	W0D0600-02 B	Sulfuric Amber VOA	SUGARLOAF SPRING
W0D0600-02 C	Sulfuric Amber VOA	SUGARLOAF SPRING	W0D0600-02 D	Filtered Sulfuric VOA	SUGARLOAF SPRING
W0D0600-02 E	Filtered Sulfuric VOA	SUGARLOAF SPRING	W0D0600-02 F	Filtered nitric HDPE	SUGARLOAF SPRING
W0D0600-03 A	Raw HDPE	TWS-7	W0D0600-03 B	Sulfuric Amber VOA	TWS-7
W0D0600-03 C	Sulfuric Amber VOA	TWS-7	W0D0600-03 D	Filtered Sulfuric VOA	TWS-7
W0D0600-03 E	Filtered Sulfuric VOA	TWS-7	W0D0600-03 F	Filtered nitric HDPE	TWS-7
W0D0600-04 A	Raw HDPE	MANGUS POND	W0D0600-04 B	Sulfuric Amber VOA	MANGUS POND
W0D0600-04 C	Sulfuric Amber VOA	MANGUS POND	W0D0600-04 D	Filtered Sulfuric VOA	MANGUS POND
W0D0600-04 E	Filtered Sulfuric VOA	MANGUS POND	W0D0600-04 F	Filtered nitric HDPE	MANGUS POND
W0D0600-05 A	Raw HDPE	MUD SPRING	W0D0600-05 D	Filtered Sulfuric VOA	MUD SPRING
W0D0600-05 E	Filtered Sulfuric VOA	MUD SPRING	W0D0600-05 F	Filtered nitric HDPE	MUD SPRING
W0D0600-06 A	Raw HDPE	DEADMAN 1	W0D0600-06 D	Filtered Sulfuric VOA	DEADMAN 1
W0D0600-06 E	Filtered Sulfuric VOA	DEADMAN 1	W0D0600-06 F	Filtered nitric HDPE	DEADMAN 1
W0D0600-07 A	Raw HDPE	FLEMING POND	W0D0600-07 B	Sulfuric Amber VOA	FLEMING POND
W0D0600-07 C	Sulfuric Amber VOA	FLEMING POND	W0D0600-07 D	Filtered Sulfuric VOA	FLEMING POND
W0D0600-07 E	Filtered Sulfuric VOA	FLEMING POND	W0D0600-07 F	Filtered nitric HDPE	FLEMING POND
W0D0600-08 A	Raw HDPE	FR828 CATTLE WATER BOX	W0D0600-08 B	Sulfuric Amber VOA	FR828 CATTLE WATER BOX
W0D0600-08 C	Sulfuric Amber VOA	FR828 CATTLE WATER BOX	W0D0600-08 D	Filtered Sulfuric VOA	FR828 CATTLE WATER BOX
W0D0600-08 E	Filtered Sulfuric VOA	FR828 CATTLE WATER BOX	W0D0600-08 F	Filtered nitric HDPE	FR828 CATTLE WATER BOX
W0D0600-09 A	Raw HDPE	CF SPRING	W0D0600-09 B	Sulfuric Amber VOA	CF SPRING
W0D0600-09 C	Sulfuric Amber VOA	CF SPRING	W0D0600-09 D	Filtered Sulfuric VOA	CF SPRING
W0D0600-09 E	Filtered Sulfuric VOA	CF SPRING	W0D0600-09 F	Filtered nitric HDPE	CF SPRING
W0D0600-10 A	Raw HDPE	BARRY FORD TANK	W0D0600-10 B	Sulfuric Amber VOA	BARRY FORD TANK
W0D0600-10 C	Sulfuric Amber VOA	BARRY FORD TANK	W0D0600-10 D	Filtered Sulfuric VOA	BARRY FORD TANK
W0D0600-10 E	Filtered Sulfuric VOA	BARRY FORD TANK	W0D0600-10 F	Filtered nitric HDPE	BARRY FORD TANK
W0D0600-11 A	Raw HDPE	SIPHON SPRING	W0D0600-11 B	Sulfuric Amber VOA	SIPHON SPRING



One Government Gulch - PO Box 929

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Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

**Default Cooler (Received Temperature: 6.7°C) (Continued)**

<u>Labnumber</u>	<u>Container</u>	<u>Client ID</u>	<u>Labnumber</u>	<u>Container</u>	<u>Client ID</u>
W0D0600-11 C	Sulfuric Amber VOA	SIPHON SPRING	W0D0600-11 D	Filtered Sulfuric VOA	SIPHON SPRING
W0D0600-11 E	Filtered Sulfuric VOA	SIPHON SPRING	W0D0600-11 F	Filtered nitric HDPE	SIPHON SPRING



Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

**Quality Control - BLANK Data**

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
<b>Metals (Dissolved)</b>								
EPA 200.7	Aluminum	mg/L	<0.081	0.019	0.081	W018277	03-May-10	
EPA 200.7	Arsenic	mg/L	<0.025	0.006	0.025	W018277	03-May-10	
EPA 200.7	Cadmium	mg/L	<0.0020	0.0005	0.0020	W018277	03-May-10	
EPA 200.7	Calcium	mg/L	<0.040	0.012	0.040	W018277	03-May-10	
EPA 200.7	Chromium	mg/L	<0.0061	0.0008	0.0061	W018277	03-May-10	
EPA 200.7	Cobalt	mg/L	<0.0061	0.0008	0.0061	W018277	03-May-10	
EPA 200.7	Copper	mg/L	<0.010	0.006	0.010	W018277	03-May-10	
EPA 200.7	Iron	mg/L	<0.061	0.018	0.061	W018277	03-May-10	
EPA 200.7	Lead	mg/L	<0.0076	0.0022	0.0076	W018277	03-May-10	
EPA 200.7	Magnesium	mg/L	<0.061	0.018	0.061	W018277	03-May-10	
EPA 200.7	Manganese	mg/L	<0.0040	0.0019	0.0040	W018277	03-May-10	
EPA 200.7	Nickel	mg/L	<0.010	0.002	0.010	W018277	03-May-10	
EPA 200.7	Potassium	mg/L	<0.50	0.09	0.50	W018277	03-May-10	
EPA 200.7	Sodium	mg/L	<0.50	0.02	0.50	W018277	03-May-10	
EPA 200.7	Zinc	mg/L	<0.0101	0.0026	0.0101	W018277	03-May-10	

**Dissolved Classical Chemistry Parameters**

SM 5310B	Dissolved Organic Carbon	mg/L	<1.00	0.22	1.00	W019024	03-May-10	
SM 5310B	Dissolved Organic Carbon	mg/L	<1.00	0.22	1.00	W019024	03-May-10	

**Anions by Ion Chromatography**

EPA 300.0	Fluoride	mg/L	<0.100	0.009	0.100	W018292	30-Apr-10	
EPA 300.0	Chloride	mg/L	<0.200	0.038	0.200	W018292	30-Apr-10	
EPA 300.0	Sulfate as SO4	mg/L	<0.30	0.08	0.30	W018292	30-Apr-10	

**Quality Control - LABORATORY CONTROL SAMPLE Data**

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
<b>Metals (Dissolved)</b>									
EPA 200.7	Aluminum	mg/L	0.982	1.00	98.2	85 - 115	W018277	03-May-10	
EPA 200.7	Arsenic	mg/L	0.990	1.00	99.0	85 - 115	W018277	03-May-10	
EPA 200.7	Cadmium	mg/L	0.987	1.00	98.7	85 - 115	W018277	03-May-10	
EPA 200.7	Calcium	mg/L	19.1	20.0	95.3	85 - 115	W018277	03-May-10	
EPA 200.7	Chromium	mg/L	0.995	1.00	99.5	85 - 115	W018277	03-May-10	
EPA 200.7	Cobalt	mg/L	0.970	1.00	97.0	85 - 115	W018277	03-May-10	
EPA 200.7	Copper	mg/L	0.986	1.00	98.6	85 - 115	W018277	03-May-10	
EPA 200.7	Iron	mg/L	9.74	10.0	97.4	85 - 115	W018277	03-May-10	
EPA 200.7	Lead	mg/L	0.976	1.00	97.6	85 - 115	W018277	03-May-10	
EPA 200.7	Magnesium	mg/L	19.7	20.0	98.5	85 - 115	W018277	03-May-10	
EPA 200.7	Manganese	mg/L	0.980	1.00	98.0	85 - 115	W018277	03-May-10	
EPA 200.7	Nickel	mg/L	0.939	1.00	93.9	85 - 115	W018277	03-May-10	
EPA 200.7	Potassium	mg/L	18.9	20.0	94.7	85 - 115	W018277	03-May-10	
EPA 200.7	Sodium	mg/L	18.3	19.0	96.4	85 - 115	W018277	03-May-10	
EPA 200.7	Zinc	mg/L	0.985	1.00	98.5	85 - 115	W018277	03-May-10	

**Dissolved Classical Chemistry Parameters**

SM 5310B	Dissolved Organic Carbon	mg/L	61.9	66.7	92.8	80 - 120	W019024	03-May-10	
SM 5310B	Dissolved Organic Carbon	mg/L	65.0	66.7	97.4	80 - 120	W019024	03-May-10	



Freeport McMoRan - Tyrone Mine  
 PO Box 7  
 Hurley, NM 88043

**Project Name: Tyrone Routine**  
 Work Order: **W0D0600**  
 Reported: 05-May-10 16:42

**Quality Control - LABORATORY CONTROL SAMPLE Data (Continued)**

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
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**Anions by Ion Chromatography**

EPA 300.0	Fluoride	mg/L	1.89	2.00	94.4	90 - 110	W018292	30-Apr-10	
EPA 300.0	Chloride	mg/L	2.88	3.00	96.1	90 - 110	W018292	30-Apr-10	
EPA 300.0	Sulfate as SO4	mg/L	10.1	10.0	101	90 - 110	W018292	30-Apr-10	

**Quality Control - DUPLICATE Data**

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch ID	Analyzed	Notes
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**Metals (Dissolved)**

EPA 200.7	Aluminum	mg/L	<0.081	<0.081	UDL	20	W018277	03-May-10	
EPA 200.7	Arsenic	mg/L	<0.025	<0.025	UDL	20	W018277	03-May-10	
EPA 200.7	Cadmium	mg/L	<0.0020	<0.0020	UDL	20	W018277	03-May-10	
EPA 200.7	Calcium	mg/L	39.1	39.2	0.3	20	W018277	03-May-10	
EPA 200.7	Chromium	mg/L	<0.0061	<0.0061	UDL	20	W018277	03-May-10	
EPA 200.7	Cobalt	mg/L	<0.0061	<0.0061	<RL	20	W018277	03-May-10	
EPA 200.7	Copper	mg/L	0.019	0.019	0.9	20	W018277	03-May-10	
EPA 200.7	Iron	mg/L	<0.061	<0.061	UDL	20	W018277	03-May-10	
EPA 200.7	Lead	mg/L	<0.0076	<0.0076	UDL	20	W018277	03-May-10	
EPA 200.7	Magnesium	mg/L	7.72	7.76	0.5	20	W018277	03-May-10	
EPA 200.7	Manganese	mg/L	0.0366	0.0367	0.3	20	W018277	03-May-10	
EPA 200.7	Nickel	mg/L	<0.010	<0.010	<RL	20	W018277	03-May-10	
EPA 200.7	Potassium	mg/L	1.39	1.41	1.0	20	W018277	03-May-10	
EPA 200.7	Sodium	mg/L	17.8	17.9	0.4	20	W018277	03-May-10	
EPA 200.7	Zinc	mg/L	<0.0101	<0.0101	<RL	20	W018277	03-May-10	

**Classical Chemistry Parameters**

SM 2320B/2310B	Total Alkalinity	mg/L	117	114	1.9	20	W018286	30-Apr-10	
SM 2320B/2310B	Total Alkalinity	mg/L	316	318	0.8	20	W018286	30-Apr-10	
SM 2320B/2310B	Bicarbonate	mg/L	117	114	1.9	20	W018286	30-Apr-10	
SM 2320B/2310B	Bicarbonate	mg/L	316	318	0.8	20	W018286	30-Apr-10	
SM 2320B/2310B	Carbonate	mg/L	<1.0	<1.0	UDL	20	W018286	30-Apr-10	
SM 2320B/2310B	Carbonate	mg/L	<1.0	<1.0	UDL	20	W018286	30-Apr-10	
SM 2540 C	Total Diss. Solids	mg/L	311	314	1.0	20	W018273	30-Apr-10	
SM 2540 C	Total Diss. Solids	mg/L	473	472	0.2	20	W018273	30-Apr-10	
SM 2540 C	Total Diss. Solids	mg/L	54	59	8.9	20	W019114	04-May-10	
SM 2540 C	Total Diss. Solids	mg/L	58	70	18.8	20	W019114	04-May-10	

**Dissolved Classical Chemistry Parameters**

SM 5310B	Dissolved Organic Carbon	mg/L	21.7	21.9	1.2	20	W019024	03-May-10	
SM 5310B	Dissolved Organic Carbon	mg/L	9.11	11.6	24.1	20	W019024	03-May-10	R2

**Anions by Ion Chromatography**

EPA 300.0	Fluoride	mg/L	<0.101	<0.101	<RL	20	W018292	01-May-10	
EPA 300.0	Chloride	mg/L	4.05	4.05	0.0	20	W018292	01-May-10	
EPA 300.0	Sulfate as SO4	mg/L	40.1	40.1	0.0	20	W018292	01-May-10	



Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

**Quality Control - MATRIX SPIKE Data**

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
<b>Metals (Dissolved)</b>										
EPA 200.7	Aluminum	mg/L	1.02	<0.085	1.00	102	70 - 130	W018277	03-May-10	
EPA 200.7	Aluminum	mg/L	1.05	<0.085	1.00	101	70 - 130	W018277	03-May-10	
EPA 200.7	Arsenic	mg/L	1.04	<0.026	1.00	104	70 - 130	W018277	03-May-10	
EPA 200.7	Arsenic	mg/L	1.05	<0.026	1.00	105	70 - 130	W018277	03-May-10	
EPA 200.7	Cadmium	mg/L	1.00	<0.0021	1.00	100	70 - 130	W018277	03-May-10	
EPA 200.7	Cadmium	mg/L	1.01	<0.0021	1.00	101	70 - 130	W018277	03-May-10	
EPA 200.7	Calcium	mg/L	58.5	39.2	20.0	96.4	70 - 130	W018277	03-May-10	
EPA 200.7	Calcium	mg/L	54.4	34.7	20.0	98.4	70 - 130	W018277	03-May-10	
EPA 200.7	Chromium	mg/L	1.02	<0.0064	1.00	102	70 - 130	W018277	03-May-10	
EPA 200.7	Chromium	mg/L	1.02	<0.0064	1.00	102	70 - 130	W018277	03-May-10	
EPA 200.7	Cobalt	mg/L	0.990	<0.0064	1.00	98.8	70 - 130	W018277	03-May-10	
EPA 200.7	Cobalt	mg/L	0.998	<0.0064	1.00	99.3	70 - 130	W018277	03-May-10	
EPA 200.7	Copper	mg/L	1.02	0.019	1.00	100	70 - 130	W018277	03-May-10	
EPA 200.7	Copper	mg/L	0.996	<0.011	1.00	99.6	70 - 130	W018277	03-May-10	
EPA 200.7	Iron	mg/L	10.1	<0.064	10.0	101	70 - 130	W018277	03-May-10	
EPA 200.7	Iron	mg/L	10.2	<0.064	10.0	102	70 - 130	W018277	03-May-10	
EPA 200.7	Lead	mg/L	0.989	<0.0080	1.00	98.9	70 - 130	W018277	03-May-10	
EPA 200.7	Lead	mg/L	0.998	<0.0080	1.00	99.8	70 - 130	W018277	03-May-10	
EPA 200.7	Magnesium	mg/L	28.1	7.76	20.0	101	70 - 130	W018277	03-May-10	
EPA 200.7	Magnesium	mg/L	31.5	11.0	20.0	102	70 - 130	W018277	03-May-10	
EPA 200.7	Manganese	mg/L	1.05	0.0367	1.00	102	70 - 130	W018277	03-May-10	
EPA 200.7	Manganese	mg/L	1.04	0.0110	1.00	103	70 - 130	W018277	03-May-10	
EPA 200.7	Nickel	mg/L	0.968	<0.011	1.00	96.5	70 - 130	W018277	03-May-10	
EPA 200.7	Nickel	mg/L	0.977	<0.011	1.00	97.5	70 - 130	W018277	03-May-10	
EPA 200.7	Potassium	mg/L	21.3	1.41	20.0	99.3	70 - 130	W018277	03-May-10	
EPA 200.7	Potassium	mg/L	20.3	<0.53	20.0	99.1	70 - 130	W018277	03-May-10	
EPA 200.7	Sodium	mg/L	36.7	17.9	19.0	98.8	70 - 130	W018277	03-May-10	
EPA 200.7	Sodium	mg/L	37.5	18.8	19.0	98.3	70 - 130	W018277	03-May-10	
EPA 200.7	Zinc	mg/L	1.01	<0.0106	1.00	100	70 - 130	W018277	03-May-10	
EPA 200.7	Zinc	mg/L	1.01	<0.0106	1.00	101	70 - 130	W018277	03-May-10	
<b>Dissolved Classical Chemistry Parameters</b>										
SM 5310B	Dissolved Organic Carbon	mg/L	48.6	1.74	50.0	93.6	75 - 125	W019024	03-May-10	
SM 5310B	Dissolved Organic Carbon	mg/L	52.3	5.34	50.0	93.8	75 - 125	W019024	03-May-10	
<b>Anions by Ion Chromatography</b>										
EPA 300.0	Fluoride	mg/L	2.10	<0.101	2.00	101	80 - 120	W018292	01-May-10	
EPA 300.0	Fluoride	mg/L	2.78	0.602	2.00	109	80 - 120	W018292	03-May-10	
EPA 300.0	Chloride	mg/L	7.26	4.05	3.00	107	80 - 120	W018292	01-May-10	
EPA 300.0	Chloride	mg/L	13.0	10.1	3.00	98.5	80 - 120	W018292	03-May-10	D2
EPA 300.0	Sulfate as SO4	mg/L	50.2	40.1	10.0	102	80 - 120	W018292	01-May-10	
EPA 300.0	Sulfate as SO4	mg/L	62.6	53.3	10.0	92.3	80 - 120	W018292	03-May-10	D2



Freeport McMoRan - Tyrone Mine  
PO Box 7  
Hurley, NM 88043

**Project Name: Tyrone Routine**  
Work Order: **W0D0600**  
Reported: 05-May-10 16:42

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### Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
R2	RPD exceeded the laboratory acceptance limit.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
R > 4S	% recovery not applicable, sample concentration more than four times greater than spike level
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

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## **Appendix C-3 –Water Quality Data Summary**

## Little Rock Mine

### Appendix C-3. Water Quality Sample Results - Springs and Seeps

Analyte (dissolved unless noted)	Concentration, mg/L										
	BARRY FORD TANK	CF SPRING	DEADMAN 1	DEADMAN SPRING	FLEMING POND	FR828 CATTLE WATER BOX	MANGAS POND	MUD SPRING	SIPHON SPRING	SUGARLOAF SPRING	TWS-7
Alkalinity (CO <sub>3</sub> )	22.2	-1	-1	-1	7.2	-1	30.6	-1	-1	-1	-1
Alkalinity (HCO <sub>3</sub> )	119	318	33.3	114	84.8	246	19.4	178	139	113	310
Alkalinity, total	141	318	33.3	114	92	246	50	178	139	113	310
Aluminum	0.409	-0.081	0.484	-0.081	-0.081	-0.081	-0.081	-0.081	-0.081	-0.081	-0.081
Arsenic	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025	-0.025
Cadmium	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Calcium	37.1	98.6	12.2	39.2	20.4	74.3	83.4	43.7	34.7	48.3	84.9
Chloride, total	14.4	59.1	7.46	9.78	26.4	21.4	32.3	7.4	10.1	9.69	8.89
Chromium	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061	-0.0061
Cobalt	-0.0061	-0.0061	-0.0061	-0.0061	0.0072	-0.0061	0.0071	-0.0061	-0.0061	-0.0061	0.0062
Copper	-0.01	-0.01	-0.01	0.019	-0.01	-0.01	0.01	-0.01	-0.01	0.015	0.027
DIC, total	12.4	30.8	4.31	18.9	10.5	13.5	5.3	22.7	9.23	16.7	50.3
DOC	21.9	5.38	11.9	11.6	12.8	2.65	15.1	1.74	5.34	17.4	67.9
Fluoride, total	1.13	1.13		0.262	0.437	2.11	0.696	0.804	0.602	0.54	0.61
Iron	0.43	-0.061	0.271	-0.061	0.112	-0.061	-0.061	-0.061	-0.061	-0.061	0.087
Lead	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076	-0.0076
Magnesium	8.77	43.2	3.22	7.76	14.4	21.9	14.6	9.74	11	8.15	11.6
Manganese	0.0475	0.0056	0.0471	0.0367	0.0211	0.188	0.0139	0.0431	0.011	0.0179	0.0289
Nickel	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Potassium	1.27	3.08	1.36	1.41	3.97	1.67	8.89	1.51	-0.5	1.55	33.1
Sodium	22.9	56	10	17.9	27.4	25.2	35.6	16.6	18.8	21.1	15.5
Sulfate, SO <sub>4</sub> , total	20.1	161	21.8	44	47.3	60	265	7.05	53.3	74.5	5.14
TDS, total	262	631	202	232	223	384	510	190	256	310	472
Zinc	-0.0101	-0.0101	0.034	-0.0101	-0.0101	0.0242	-0.0101	-0.0101	-0.0101	-0.0101	0.0172
Hardness (CaCO <sub>3</sub> )	129	424	44	130	110	276	268	149	132	154	260

Negative values indicate result was less than reporting limit; absolute value of negative numbers reflects the reporting limit.

Hardness was calculated by the following equation:  $\text{Hardness (mg/L as CaCO}_3) = (\text{Ca}^{2+} \text{ mg/L}) \times (100 \text{ g/mol CaCO}_3) / (\text{atomic weight Ca}^{2+}) + (\text{Mg}^{2+} \text{ mg/L}) \times (100 \text{ g/mol CaCO}_3) / (\text{atomic weight Mg}^{2+}) + (\text{Fe}^{2+} \text{ mg/L}) \times (100 \text{ g/mol CaCO}_3) / (\text{atomic weight Fe}^{2+}) + (\text{Mn}^{2+} \text{ mg/L}) \times (100 \text{ g/mol CaCO}_3) / (\text{atomic weight Mn}^{2+})$

Samples were collected during the reconnaissance level survey for Chiricahua leopard frog between April 26 and 28, 2010.

	Atomic weight (g/mol)
Calcium	40.08
Iron	55.85
Magnesium	54.94
Manganese	24.31

## **Appendix C-4 – Site Photographs and Descriptions**

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Sugarloaf Spring	742000 /3615000	<p>Seep/ spring located in between large rock outcrops to the east of Sugarloaf Mountain. Located at an elevation of approximately 6,620 feet above mean sea level (amsl). Water in bottom of the drainage is less than 2 inches deep. Emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae. The surrounding habitat consists of Great Basin Conifer Woodland (Brown and Lowe 1980).</p>	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Deadman Canyon	744000 / 3614500	<p>Water ponding located near a four-way intersection of FMI utilized dirt roads. Contains water in the bottom of drainage, less than 3 inches deep. Emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae. Located at an elevation of approximately 6,000 feet amsl. The surrounding habitat consists of Madrean Evergreen Woodland (Brown and Lowe 1980).</p>	
McCain Spring	744458 / 3616853	<p>Ponded area approximately 2 feet deep, about 50 feet in length and 50 feet in width; located at an elevation of approximately 5,840 feet amsl. The pond contains some emergent vegetation of spikerush and bulrush that do not provide suitable cover. No submergent vegetation with the exception of filamentous algae. Bottom of the pond is lined with a layer of leaf litter. No aquatic species observed. Historical water data shows periods of elevated copper levels, low pH, and extended dry periods. Area has been surveyed for CLF by Dr. Jennings in the past. No historical populations of CLF known to occur. The surrounding habitat consists of Madrean Evergreen Woodland (Brown and Lowe 1980).</p>	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
McCain Spring (continued)			
Whitewater Tank		Site not located. Not accessible; remote site.	No photo.
Camp Creek Tank	740000/ 3614000	<p>This potential stock tank is an excavated area approximately 10 feet deep and 30 feet wide; located at an elevation of approximately 6,178 feet amsl. This tank was dry during the observation, and the bottom was covered with a thick layer of dry leaf litter. There was no evidence that it has held water for any length of time and no evidence of aquatic or wetland vegetation was found around this tank. The surrounding habitat consists of Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980).</p>	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Camp Creek Tank (continued)			
Willow Creek	739148 / 3616919	<p>Mostly dry creek located at an elevation of approximately 5,820 feet amsl. Contained small water flows in the bottom of drainage, less than 5-inches deep. Soils contained a sandy and rocky substrate that did not support emergent or submergent vegetation. The surrounding habitat consists of Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980).</p>	 <p>*Date stamp inaccurate, picture taken 4/26-28/10.</p>

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Deadman Box Seep	743500 / 3612000	<p>Man made box seep constructed from rock and cement, containing water approximately 9 inches deep. No emergent or submergent vegetation present. Located at an elevation of approximately 6,300 feet amsl. The surrounding habitat consists of Great Basin Conifer Woodland (Brown and Lowe 1980).</p>	
Deadman 1 Creek	742237 / 3612037	<p>This location is a small ephemeral drainage approximately 1-2 ft wide located where Old Tyrone Road crosses the Deadman Canyon drainage. The elevation is approximately 6,572 ft. At the time of the site visit, approximately 2-5 inches of surface water was present in the bottom of the drainage; no deep pools were noted several hundred feet upstream or downstream from the road crossing and no emergent wetland vegetation was observed. The surrounding habitat consists of Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980).</p>	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Deadman 1 (continued)			
Siphon Spring		Site not located.	No photo.
Mangas Pond	744453 / 3620756	Man-made pond, estimated depth of 2 feet. Emergent vegetation present but not suitable for cover; no submergent vegetation with the exception of filamentous algae; heavily disturbed by cattle. Located at an elevation of approximately 5,620 feet amsl. Predator species such as waterbirds were observed. The surrounding habitat consists of Madrean Evergreen Woodland (Brown and Lowe 1980).	No photo.

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Siphon Spring (Adjacent)	737646 / 3616615	<p>Mostly dry wash with a small water flow in bottom of drainage, less than 5 inches deep. Area has been disturbed by cattle. Soils contained a sandy and rocky substrate, no emergent or submergent vegetation present, with the exception of filamentous algae. Located at an elevation of approximately 6,060 feet amsl. The surrounding vegetation is comprised of Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980).</p>	 <p>*Date stamps inaccurate; all pictures taken 4/26-28/10.</p>
Siphon Spring (Adjacent) (continued)			

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Drainage North of Mud Spring	740692 / 3610675	Shallow trickle of water in bottom of drainage 1-2 feet wide drainage; less than 5 inches deep; no deep pools observed; filamentous algae observed, but no emergent vegetation present. Metal wildlife water trough located in bottom of drainage; no aquatic or wetland vegetation. Located at an elevation of approximately 6,877 feet amsl. The surrounding vegetation is comprised of Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980).	
003 Spring		Private Land - no access	No photo.
Mud Spring	740612 / 3609855	Mud Spring is located within the Gila NF on the north side of Ferguson Mountain just west of the Continental Divide at an elevation of approximately 6,577 feet amsl. This spring consists of a 3-foot diameter pool protected by a rock retaining structure on the upgradient side. A small pool of cloudy water was noted at the time of the field visit. Water from this spring is fed via an underground pipe to an elevated metal spring-box that is located on a concrete pad approximately 20-feet downgradient from the spring. There is no wetland vegetation around this spring. The surrounding vegetation is comprised of Rocky Mountain (Petran) Montane Coniferous Forest (Brown and Lowe 1980).	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Mud Spring (continued)			
Wildlife Water Trough	742272 / 3605520	<p>This 3 x 10 foot metal water trough on a concrete pad is located adjacent to Forest Road 828 about 3 miles east of Highway 90. The trough is fed by groundwater pumped from a nearby well. No wetland or aquatic vegetation is located at this site. Surrounding vegetation is primarily oak/pine forest.</p>	
004 Spring		Private Land - no access	No photo.
Granite Well		Site not located.	No photo.

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Redrock Tank	739500 / 3624000	Site not accessible due to fenced land – From afar, observed a small metal tank/ structure.	No photo.
Willow Creek (2)		Site not located.	
CF Spring	737643 / 3621863	Wash approximately 10 feet across in width with water flow in the bottom of drainage; depth is less than 4 inches deep. Sparse emergent vegetation present but not suitable for cover, no submergent vegetation with the exception of filamentous algae. Located at an elevation of approximately 5,523 feet amsl. The surrounding habitat consists of Madrean Evergreen Woodland (Brown and Lowe 1980).	 <p>*Date stamp inaccurate, camera was reset.</p>
Mulberry Tank	735000 / 3614000	Stock tank with no standing water, only mud; heavily disturbed by cattle. No emergent or submergent vegetation and no evidence indicating that the tank has held water for any length of time. Located at an elevation of approximately 6,276 feet amsl. The surrounding habitat consists of an ecotonal mix of Madrean Evergreen Woodland and Great Basin Conifer Woodland (Brown and Lowe 1980).	No photo.

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Fleming Pond	738771 / 3625900	<p>Small man-made pond created to mitigate for Migratory Bird Treaty Act impacts from nearby mining operations. The surface water pool is approximately 200 by 300 feet and 2-3 feet deep. The pond is maintained artificially by pumping groundwater from a shallow aquifer. Emergent hydrophytic vegetation has developed around the edge of the pond, but the vegetation is sparse and there are no cut banks, logs, or other habitat elements that would provide refugia for CLF. No fish or amphibians were observed, however known CLF predators such as aquatic birds and insects (dragonflies) were observed around the pond. Located at an elevation of approximately 5,120 feet amsl. The surrounding habitat consists of an ecotonal mix of Madrean Evergreen Woodland and Semidesert Grassland (Brown and Lowe 1980).</p>	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Gold Gulch Spring	737284 / 3604204	<p>This spring consists of an 18 inch diameter metal pipe approximately 15 feet deep located on the upper terrace of an ephemeral drainage. The pipe is open at the top which allowed visual confirmation that no water is present. The surrounding habitat consists of Madrean Evergreen Woodland (Brown and Lowe 1980).</p>	
Grapevine Spring	7439040 / 3604911	<p>This feature consists of a concrete spring box located at an elevation of approximately 6,577 feet amsl. There was approximately 5 inches of stagnant water in the trough; probably water from snow or precipitation falling directly into the tank as the spring does not appear to be flowing. No aquatic or wetland vegetation is present, and several forms of aquatic insects were observed in the trough. The surrounding habitat consists of an ecotonal mix of Madrean Evergreen Woodland and Great Basin Conifer Woodland (Brown and Lowe 1980).</p>	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Green Canyon Wash	725864 / 3644525	This point is located where Bill Evans Road crosses Green Canyon Wash just west of Highway 180 approximately 18 miles northeast of the APE. This ephemeral wash, which is approximately 200 feet wide discharges into the Gila River approximately 1/4-mile from this point.	
Barry Ford Farm Stock Tank	749632 / 3609412	This stock tank is located at an elevation of 5,970; east of State Route 90 on private property more than 5-miles from the proposed mine open pit. The tank consists of an oval shaped excavation surrounded by an earthen berm. Groundwater is pumped into the tank to maintain drinking water for livestock. Warm water fish species and male and female adult bull frogs were visually identified in the pond. The landowner also indicated that goldfish were released into the pond. Vegetation observed at the pond includes a small seep willow patch (as seen in the photo foreground) and non-native grasses. The surrounding habitat consists of an ecotonal mix of Madrean Evergreen Woodland and Semidesert Grassland (Brown and Lowe 1980).	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Barry Ford Farm Stock Tank (continued)			
Oak Grove Residential Area		Residential area; mostly closed wells.	No photo.
Mangas Creek / Deadman Canyon/ Whitewater Confluence	742464 / 3617126	Constructed diversion channel that discharges flow from project area drainages including Whitewater Canyon, Deadman Canyon, and California Gulch at the confluence with Mangas Creek.	

Site Name	UTM Coordinates (Easting / Northing)	Site Description	Photo
Mangas Creek / Deadman Canyon/ Whitewater Confluence (continued)			
Gila River at Highway 180 Bridge	723656 / 3647807	<p>This point on the Gila River is located approximately 20 miles from the proposed Little Rock Mine site where Highway 180 crosses the river. Vegetation noted at this point includes deciduous riparian species including cottonwood and willow as well as salt cedar and a variety of herbaceous aquatic plants. Numerous bullfrogs were noted along the banks of backwater areas. Elevation at this site is approximately 4,467 feet amsl.</p>	