United States Department of the Interior
Bureau of Land Management

Battle Mountain District Office
Battle Mountain, Nevada

August 2010

Cortez Hills Expansion Project

NVN-067575

Draft Supplemental Environmental Impact Statement

DOI-BLM-NV-2010-0132-SEIS

Photo Courtesy of the Eureka Sentinel Museum

COOPERATING AGENCY:

Nevada Department of Wildlife

BLM Mission Statement

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times.

Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife, wilderness, air and scenic, scientific, and cultural values.

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Cover: Photo of historic Cortez townsite looking northeast toward the site of the proposed Cortez Hills Expansion Project. Printed with permission of Eureka Sentinel Museum, Eureka, Nevada.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
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AUG 10 2010

In Reply Refer To:
DOI-BLM-NV-2010-0132-SEIS
1790/3809 (NVB01000)
NVN-067575

Dear Reader:

Enclosed is the Cortez Hills Expansion Project Draft Supplemental Environmental Impact Statement (SEIS), prepared by the Bureau of Land Management (BLM), Battle Mountain District Office. Specifically, this Draft SEIS analyzes the air quality impacts of the transportation and processing of refractory ore at the existing Goldstrike Mine. This Draft SEIS also refines the analysis of the effectiveness of measures adopted to mitigate potential impacts to surface water resources from mine-related groundwater drawdown. An air quality analysis of particulate matter with an aerodynamic diameter of up to 2.5 microns or less ($PM_{2.5}$) also is included in this SEIS.

The public comment period begins August 20, 2010. Before including your address, phone number, e-mail address, or other potential identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public view, we cannot guarantee that we will be able to do so. Comments on the Cortez Hills Expansion Project Draft SEIS may be submitted by the following methods: Fax: (775) 635-4034; Email: CortezHills_DSEIS@blm.gov; Mail: Bureau of Land Management, 50 Bastian Road, Battle Mountain, NV 89020, ATTN: Christopher Worthington. Comments should be postmarked or otherwise delivered to the Battle Mountain District Office by close of business October 4, 2010, to ensure full consideration. Comments also may be submitted at public meetings to be held:

- September 14, 2010 (6 pm – 8 pm) Crescent Valley Town Center, Crescent Valley, NV
- September 15, 2010 (6 pm – 8 pm) BLM Battle Mountain District Office, Battle Mountain, NV

A Final SEIS will be prepared that will consider the comments received during the Draft SEIS public review and comment period. If you would like any additional information, please contact Christopher Worthington at (775) 635-4000.

Sincerely,

FOR

Gerald M. Smith
District Manager

DRAFT
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT
CORTEZ HILLS EXPANSION PROJECT

Lead Agency:	U.S. Department of the Interior Bureau of Land Management Battle Mountain District Office
Cooperating Agencies:	Nevada Department of Wildlife
Project Location:	Lander and Eureka counties, Nevada
Correspondence on this SEIS Should be Directed to:	Christopher Worthington, SEIS Project Manager Bureau of Land Management Battle Mountain District Office 50 Bastian Road Battle Mountain, NV 89820 (775) 635-4000

ABSTRACT

The Bureau of Land Management (BLM) Battle Mountain District Office authorized the Cortez Gold Mines (now Barrick Cortez Inc.) Cortez Hills Expansion Project in a Record of Decision and Plan of Operations Amendment Approval on November 12, 2008. The expansion project includes development of new facilities and expansion of existing open-pit gold mining and processing facilities at the Cortez Gold Mines Operations Area, located in north-central Nevada. When completed, the expansion will result in the surface disturbance of 6,412 acres of public land and 221 acres of private land owned by Barrick Cortez Inc.

The BLM elected to prepare this Supplemental Environmental Impact Statement (SEIS) after the U.S. Court of Appeals for the Ninth Circuit issued a decision on December 3, 2009, which found that plaintiffs South Fork Band Council of Western Shoshone of Nevada, Timbisha Shoshone Tribe, Great Basin Resource Watch, and Western Shoshone Defense Project were likely to succeed on the merits of their challenge with respect to two specific analyses in the Final EIS for this project. This SEIS analyzes the air quality impacts of the off-site transportation to and processing of Cortez refractory ore at the existing Goldstrike Mine. An air quality analysis of particulate matter with an aerodynamic diameter of up to 2.5 micrometers also is included in this SEIS. In addition, this SEIS refines the analysis of the effectiveness of measures adopted to mitigate potential impacts to surface water resources from mine dewatering.

Authorized Officer for SEIS:	Gerald M. Smith District Manager Battle Mountain District Office

List of Acronyms

$\mu g/m^3$	micrograms per cubic meter
AAQS	Ambient Air Quality Standards
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
AFY	acre-feet per year
amsl	above mean sea level
BAPC	Bureau of Air Pollution Control
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CGM	Cortez Gold Mines
CO	carbon monoxide
EIS	Environmental Impact Statement
gpm	gallons per minute
HAP	hazardous air pollutant
IMPROVE	Interagency Monitoring of Protected Visual Environments
km	kilometer
kv	kilovolt
lb/yr	pounds per year
m	meter
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NEPA	National Environmental Policy Act
NH_3	ammonia
NOA	Notice of Availability
NOI	Notice of Intent
NO_X	oxides of nitrogen
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PRIME	Plume Rise Model Enhancement
Project	Cortez Hills Expansion Project
REMSAD	Regional Modeling System for Aerosols and Deposition
ROD	Record of Decision
SEIS	Supplemental Environmental Impact Statement
SO_2	sulfur dioxide
tpy	tons per year
U.S.	United States
USEPA	U.S. Environmental Protection Agency
UTM	universal transverse mercator
VOC	volatile organic compound

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1.0 INTRODUCTION

The Battle Mountain District, Mount Lewis Field Office, of the Bureau of Land Management (BLM) has prepared this Supplemental Environmental Impact Statement (SEIS) for the Cortez Hills Expansion Project to refine the analysis of specific air quality effects and dewatering mitigation effectiveness in the Cortez Hills Expansion Project Final Environmental Impact Statement (EIS). The BLM prepared a Draft EIS for Cortez Gold Mines' (CGM's) proposed Cortez Hills Expansion Project in 2007 (BLM 2007) and Final EIS in 2008 (BLM 2008a). The BLM issued a Record of Decision (ROD) and Plan of Operations Amendment Approval on November 12, 2008 (BLM 2008b). Following issuance of the BLM's ROD, CGM proceeded with development of the approved Project.

The South Fork Band Council of Western Shoshone of Nevada, Timbisha Shoshone Tribe, Great Basin Resource Watch, and Western Shoshone Defense Project challenged the BLM's decision to approve the Cortez Hills Expansion Project in federal court and sought to enjoin mining operations during litigation. On December 3, 2009, on appeal from denial of the preliminary injunction motion, the United States (U.S.) Court of Appeals for the Ninth Circuit (Ninth Circuit) found that the plaintiffs were likely to succeed on the merits of their challenge with respect to two specific areas of environmental analysis in the EIS. The BLM subsequently elected to prepare an SEIS to refine these specific analyses.

On remand from the Ninth Circuit, on April 13, 2010, the U.S. District Court, District of Nevada (District Court), entered a limited injunction prohibiting the shipping of refractory ore from Cortez Hills and pumping of groundwater in excess of previously approved rates pending the completion of the SEIS and associated ROD.

Specifically, this SEIS analyzes the air quality impacts of the off-site transportation and processing of a total of 5 million tons of Cortez Hills refractory ore at the existing Goldstrike Mine, located approximately 70 miles north of the Cortez Hills Expansion Project. This SEIS also refines the analysis of the effectiveness of measures adopted to mitigate potential impacts to surface water resources (e.g., seeps and springs) from mine-related groundwater pumping. An air quality analysis of particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$) also is included in this SEIS.

1.1 Project Overview

Barrick Cortez Inc. (formerly known as Cortez Joint Venture or Cortez Gold Mines [CGM]), as manager of the Cortez Joint Venture, proposed to construct and operate the Cortez Hills Expansion Project, which included the development of new facilities and expansion of its existing open-pit gold mining and processing operations at the Cortez Gold Mines Operations Area. The Project is located approximately 24 miles south of Beowawe in Lander and Eureka counties, Nevada. In response to CGM's submittal in August 2005 of an Amendment to the Pipeline/South Pipeline Plan of Operations for the Cortez Hills Expansion Project and associated Modification to Reclamation Plan Permit Application to the BLM, the BLM prepared the Draft EIS (BLM 2007), Final EIS (BLM 2008a), and ROD (BLM 2008b) for the Cortez Hills Expansion Project.

1.2 Overview of Draft and Final Environmental Impact Statement and Record of Decision

The BLM initiated the scoping process for the EIS by publishing a Notice of Intent (NOI) to prepare an EIS in the *Federal Register* on December 2, 2005. Public scoping meetings for the EIS were held in Crescent Valley and Battle Mountain, Nevada, in December 2005. The comments received during the scoping process were considered in developing the EIS. In addition, as identified in Section 4.2 of the Final EIS (BLM 2008a), the BLM communicated with and received input from various federal, state, and local agencies and private organizations during the preparation of the Draft and Final EIS.

A 60-day comment period for the Draft EIS commenced on October 5, 2007, with the publication of the Draft EIS Notice of Availability (NOA) in the *Federal Register*. Public meetings were held for the Draft EIS in Crescent Valley and Battle Mountain, Nevada, in November 2007. The comments received during the Draft EIS public comment period were considered in preparing the Final EIS, which, in response to public comments and geotechnical concerns identified in the Draft EIS analysis, included a new alternative (Revised Cortez Hills Pit Design Alternative). A 30-day review period for the Final EIS commenced on October 3, 2008, with the publication of the Final EIS NOA in the *Federal Register.*

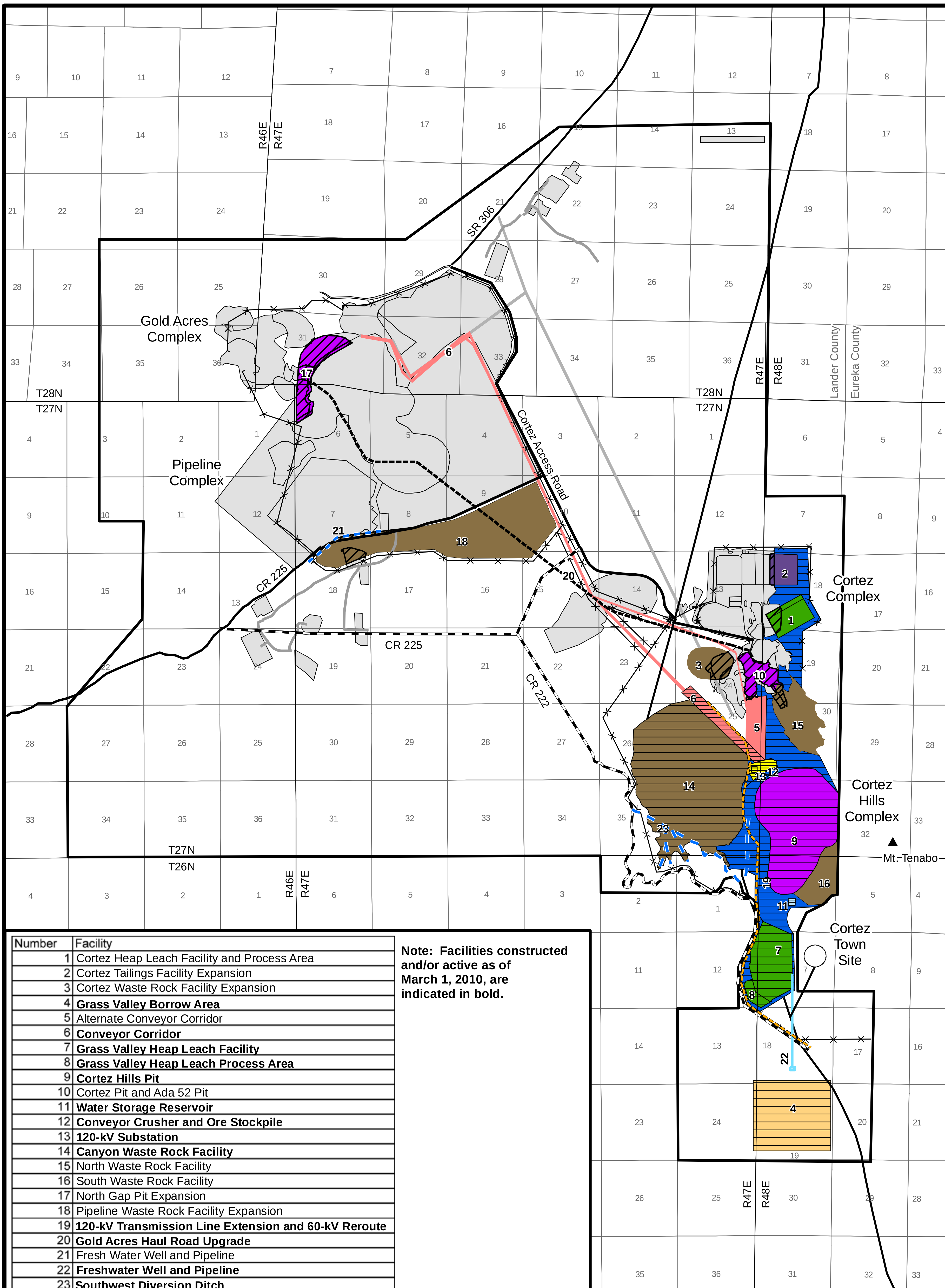
The BLM signed the ROD for the Cortez Hills Expansion Project on November 12, 2008 (BLM 2008b). In the ROD, the BLM selected the Proposed Action (inclusive of the committed environmental protection measures) with the Revised Cortez Hills Pit Design Alternative for the Cortez Hills Complex facilities, and the mitigation measures specified in Chapter 3.0 of the Final EIS as the BLM's Preferred Alternative. This is the approved Project (see **Figure 1-1**).

1.3 Status of Cortez Hills Expansion Project

Following BLM approval of the ROD and the Plan of Operations Amendment for the Cortez Hills Expansion Project on November 12, 2008, CGM commenced construction and subsequent operation of the Cortez Hills Expansion Project, as approved in the ROD (approved Project). This section of the SEIS summarizes the status of the approved Project as of March 1, 2010.

The project description, CGM-committed environmental protection measures, and the monitoring and mitigation measures developed by the BLM for the Cortez Hills Expansion Project have been described in the following documents:

- Cortez Hills Expansion Project, Amendment to the Pipeline/South Pipeline Plan of Operations, revised June 2008 (CGM and SRK Consulting [SRK] 2008);
- Cortez Hills Expansion Project Final Environmental Impact Statement (NV063-EIS06-011; BLM 2008a) (inclusive of the Revised Cortez Hills Pit Design Alternative); and
- Cortez Hills Expansion Project Record of Decision and Plan of Operations Amendment Approval (NVN-067575; BLM 2008b).



Number	Facility
1	Cortez Heap Leach Facility and Process Area
2	Cortez Tailings Facility Expansion
3	Cortez Waste Rock Facility Expansion
4	**Grass Valley Borrow Area**
5	Alternate Conveyor Corridor
6	**Conveyor Corridor**
7	**Grass Valley Heap Leach Facility**
8	**Grass Valley Heap Leach Process Area**
9	**Cortez Hills Pit**
10	Cortez Pit and Ada 52 Pit
11	**Water Storage Reservoir**
12	**Conveyor Crusher and Ore Stockpile**
13	**120-kV Substation**
14	**Canyon Waste Rock Facility**
15	North Waste Rock Facility
16	South Waste Rock Facility
17	North Gap Pit Expansion
18	Pipeline Waste Rock Facility Expansion
19	**120-kV Transmission Line Extension and 60-kV Reroute**
20	**Gold Acres Haul Road Upgrade**
21	Fresh Water Well and Pipeline
22	**Freshwater Well and Pipeline**
23	**Southwest Diversion Ditch**

Note: Facilities constructed and/or active as of March 1, 2010, are indicated in bold.

Cortez Hills Expansion Project

Figure 1-1

Currently Authorized Cortez Hills Expansion Project

03/04/2010

As described in Section 2.4 of the Final EIS (BLM 2008a), the approved Project entails operations at the Cortez Hills Complex, Pipeline Complex, Cortez Complex, and Gold Acres Complex (Figure 2-1 of the Final EIS). Figure 2-21 of the Final EIS shows the locations of the specific facilities associated with the Revised Cortez Hills Pit Design Alternative, and Table 2-15 of the Final EIS shows the acres of disturbance associated with the facilities (BLM 2008a).

As of March 1, 2010, construction efforts focused on activities at the Cortez Hills Complex. New activities authorized by BLM (2008b) at the other complexes have not commenced. **Figure 1-1** shows the status of the facilities as of March 1, 2010 (CGM 2010).

The construction phase of the Project began at the Cortez Hills Complex in November 2008 and was substantially completed in February 2010. As of March 1, 2010, approximately 70 percent of the ultimate footprint of the mine had been disturbed by construction and mining. The open pit currently is being worked at an elevation of approximately 5,720 feet above mean sea level (amsl) (i.e., approximately 400 feet deep) and measures approximately 1-mile-long by 0.75-mile-wide. As of March 1, 2010, approximately 80 million tons of waste rock had been placed in the Canyon Waste Rock Facility.

Table 1-1 summarizes the status of the Project facilities as of March 1, 2010.

Table 1-1
Cortez Hills Expansion Project Status, March 1, 2010

Cortez Hills Complex Facility	Status on March 1, 2010
Cortez Hills Open Pit	Mining at the 5,720-foot bench; pit approximately 1-mile-long and 0.75-mile-wide
Underground Operations	Facilities in F-Canyon complete except for the office facility and maintenance facility
Underground Mining	Mining at the 4,220-foot level
Dewatering System	Pumping at approximately 1,900 gallons per minute (gpm) with additional wells and drain holes installed as growth of the open pit and underground require
Grass Valley Heap Leach	Phase I leach pad (91 acres) complete with initial heap leach ore placed on pad; process ponds complete; process building substantially complete with commissioning in March 2010
Ore and Growth Media Stockpile Areas	Complete
Waste Rock Facilities	80 million tons of waste rock placed in the Canyon Waste Rock Facility; no waste rock placement in the North or South waste rock facilities
Ancillary Facilities	Complete
Primary Crusher and Conveyor	Complete
Water Supply Wells	Complete
Haul Roads	Complete
County Road Relocation	Complete
Relocation of 60-kilovolt (kV) Transmission line	Complete

Table 1-1 (Continued)

Cortez Hills Complex Facility	Status on March 1, 2010
Installation of 120-kV Transmission Line and Substation	Complete
Class III Waivered Landfill	Not started
Grass Valley Borrow Source	Complete
Fencing	Complete

Source: CGM 2010.

Mining operations, ore transport, mine dewatering, and equipment usage at the Project follow the plan described in Section 2.4.4 of the Final EIS (BLM 2008a). Consistent with the preliminary injunction entered by the District Court on April 13, 2010, CGM will not transport for off-site processing any refractory ore mined pursuant to the BLM's Cortez Hills Expansion Project ROD (BLM 2008b), nor will CGM pump groundwater under the authorization granted by the BLM's Cortez Hills Expansion Project ROD (BLM 2008b).

Systems for electrical power, water supply, mine support facilities, storm water controls, waste disposal, fencing, hazardous material management, safety, and fire protection have been or are being implemented as described in Sections 2.4.8 through 2.4.10 of the Final EIS (BLM 2008a).

The CGM-committed environmental protection measures described in Section 2.4.11 of the Final EIS (2008a) have been or are being implemented with scheduled follow-ups for recurring measures (e.g., quarterly groundwater monitoring). The BLM monitoring and mitigation measures described in Chapter 3.0 of the Final EIS (BLM 2008a) and in the ROD (BLM 2008b) also have been implemented.

1.4 Purpose and Need for the Action

The purpose and need are the same as the Purpose and Need for the Action identified in Section 1.1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

1.5 Authorized Officer

The Battle Mountain District Manager is the Authorized Officer for the SEIS. The Authorized Officer will evaluate the refined air quality and water resources analyses in the SEIS to assess whether the Cortez Hills Expansion Project ROD and Plan of Operations Amendment Approval of November 2008 (BLM 2008b) should be amended or modified.

1.6 Organization of the SEIS

This SEIS tiers from the Cortez Hills Expansion Project Final EIS (BLM 2008a); as such, the SEIS chapter and section numbers follow the organization of the Final EIS. (Note that table numbers begin with 1 within each section of this SEIS.) This SEIS only includes information that has been added or revised to address the specific water resources and air quality analyses identified above in Chapter 1.0. Chapter 2.0 of this

SEIS includes a comparison of impacts (Section 2.7) relative to the refined water resources and air quality analyses in this SEIS and identifies the BLM-preferred Alternative (Section 2.8). Chapter 3.0 presents the revised air quality and water resources analyses. Chapter 4.0 updates the public coordination activities associated with preparation of the SEIS. Chapter 6.0 identifies the reference documents used in preparation of the SEIS.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

As discussed in Section 1.6 of this SEIS, this document tiers from the Cortez Hills Expansion Project Final EIS; as such, the SEIS chapter and section numbers follow the organization of the Final EIS (BLM 2008a). This chapter includes information that supplements Sections 2.7 and 2.8 of the Final EIS.

This SEIS addresses the alternatives considered in Chapter 2.0 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), as applicable to the specific analyses in this SEIS. As discussed in Section 1.2 of this SEIS, the BLM selected the Proposed Action (inclusive of the committed environmental protection measures) with the Revised Cortez Hills Pit Design Alternative for the Cortez Hills Complex facilities, and the mitigation measures specified in Chapter 3.0 of the Final EIS as the BLM's Preferred Alternative in the ROD (BLM 2008b). This is the approved Project discussed in this SEIS (see **Figure 1-1**).

2.7 Comparative Analysis of Alternatives

Table 2-1 summarizes and compares the environmental impacts analyzed in this SEIS among the approved Project identified in the ROD (BLM 2008b) and the Proposed Action, other action alternatives, and No Action Alternative identified in the Final EIS (BLM 2008a). Descriptions of the impacts are presented in Chapter 3.0 of this SEIS.

2.8 BLM-preferred Alternative

In accordance with National Environmental Policy Act (NEPA), federal agencies are required by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1502.14) to identify their preferred alternative for a project in the Draft EIS if a preference has been identified, and in the Final EIS for the project. The preferred alternative is not a final agency decision; rather, it is an indication of the agency's preliminary preference.

The preferred alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering environmental, economic, technical, and other factors.

The BLM has determined that the preferred alternative for the Cortez Hills Expansion Project is the approved Project, which comprises the original Proposed Action with the Revised Cortez Hills Pit Design Alternative for the Cortez Hills Complex facilities, with the mitigation measures specified in Chapter 3.0 of the Final EIS (BLM 2008a). The BLM's selection is based on the refined analysis of water resources mitigation and air quality impacts in this SEIS in addition to the impact analysis in the Cortez Hills Expansion Project Final EIS (BLM 2008a). The BLM has considered the analysis of the effectiveness of the mitigation measures for potential impacts on seeps and springs from groundwater pumping and the potential air quality impacts of the off-site transportation and processing of refractory ore from the Cortez Hills Expansion Project. The BLM also has considered the results of air quality modeling of $PM_{2.5}$ emissions from the Cortez Hills Expansion Project.

Table 2-1
Impact Summary and Comparison of the Approved Project and Other Alternatives

Resource Area/Issue	Approved Project (ROD [BLM 2008b])	Proposed Action (Final EIS [BLM 2008a])	Grass Valley Heap Leach Alternative (Final EIS [BLM 2008a])	Crescent Valley Waste Rock Alternative (Final EIS [BLM 2008a])	Cortez Hills Complex Underground Mine Alternative (Final EIS [BLM 2008a])	Revised Cortez Hills Pit Design Alternative (Final EIS [BLM 2008a])	No Action Alternative (Final EIS [BLM 2008a])
Water Resources and Geochemistry							
Water Resources Monitoring and Mitigation Measures	Contingency mitigation measures include: 1) Installation of water supply pump in existing well 2) Installation of new production well 3) Piping water from new or existing source 4) Installation of guzzler 5) Enhanced development of existing seep to promote additional flow Impacts associated with mitigation implementation and effectiveness of mitigation are described in Section 3.2.4 of this SEIS, as applicable to all alternatives.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project, as applicable to Pipeline/South Pipeline Project facilities.
Air Resources							
$PM_{2.5}$ Impacts	$PM_{2.5}$ emissions, with either ore transport option, (i.e., conveyor or trucks) would not cause or contribute to a violation of the National Ambient Air Quality Standards (NAAQS) for $PM_{2.5}$.	Slightly higher emissions than approved Project, but would not cause or contribute to a violation of the NAAQS for $PM_{2.5}$.	Higher emissions than approved Project, and potentially would contribute to a violation of the NAAQS for $PM_{2.5}$.	Higher emissions than approved Project, and potentially would contribute to a violation of the NAAQS for $PM_{2.5}$.	Lower emissions than approved Project; would not cause or contribute to a violation of the NAAQS for $PM_{2.5}$.	Same as approved Project.	Lower emissions than approved Project; would not cause or contribute to a violation of the NAAQS for $PM_{2.5}$.
Transport of Refractory Ore to Goldstrike	Fugitive dust emissions would be unlikely to exceed the NAAQS for PM_{10} or $PM_{2.5}$.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Lower emissions than approved Project; would not cause or contribute to a violation of the NAAQS for PM_{10} or $PM_{2.5}$.
Processing of Refractory Ore at Goldstrike	No exceedance of the NAAQS would be anticipated for criteria pollutants (including $PM_{2.5}$), and emissions of hazardous air pollutants (HAPs), including mercury, would be anticipated to be below the major source limit of 25 tons per year (tpy).	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project.	Same as approved Project except emissions would be lower.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter includes information that supplements Sections 3.2.4, 3.2.5, and 3.10 of the Final EIS (BLM 2008a). The supplemental information and associated analyses presented in this chapter apply to the currently approved Project as well as the other action alternatives analyzed in the Final EIS (BLM 2008a), unless otherwise noted.

3.2.4 Monitoring and Mitigation Measures (Supplemental Information and Analysis)

Introduction

This information applies to the currently approved Project and the other action alternatives. This information supplements Section 3.2.4 of the Cortez Hills Expansion Project Final EIS (BLM 2008a) to refine the evaluation of the effectiveness of mine dewatering mitigation measures.

Mitigation Measures WR1a and WR1b presented in Section 3.2.4 (Monitoring and Mitigation Measures) of the Cortez Hills Expansion Project Final EIS (BLM 2008a) provide a framework for monitoring and mitigating potential impacts to perennial surface water resources from mine-related groundwater drawdown. In summary, Mitigation Measure WR1a requires monitoring and reporting of changes in groundwater levels and surface water flow and evaluation of the monitoring data to determine if observed changes in surface flow are attributable to mine-induced groundwater drawdown. Mitigation Measure WR1a also requires that the monitoring results be used to trigger the implementation of Mitigation Measure WR1b, which outlines a process to develop site-specific procedures to enhance or replace any affected perennial water resource. Mitigation Measure WR1b also requires subsequent monitoring and reporting to measure the effectiveness of the implemented measures and requires additional measures if the initial implementation of the mitigation measures is unsuccessful. As explained in the Final EIS (BLM 2008a), all of the measures outlined in Mitigation Measure WR1b are considered contingent as it is uncertain whether individual surface water resources would be impacted by mine-related groundwater drawdown and, therefore, whether mitigation would be required. Mitigation triggers based on monitoring were developed for each site, as described below.

The remainder of this section provides supplemental information and analysis to evaluate the effectiveness of Mitigation Measures WR1a and WR1b. The effectiveness evaluation is based on the following site-specific information:

- Summary of the available monitoring data for springs, seeps, and perennial streams located within the predicted mine-related groundwater drawdown area defined in the Final EIS;
- Identification of the current use of each water source;
- Identification of the monitoring thresholds to be used to trigger the implementation of site-specific mitigation;

- Identification of site-specific mitigation for each water source; and

- Evaluation of the effectiveness of the measures to mitigate potential impacts from groundwater pumping.

Surface water resources and associated wetland/riparian vegetation located within the model-simulated groundwater drawdown area under the various alternative pumping scenarios were listed in Table 3.2-12 in the Final EIS (BLM 2008a). The maximum predicted groundwater drawdown occurs under the cumulative pumping scenario, which includes the effects associated with historic dewatering activities initiated at the Pipeline Pit in 1996 and continuing through the present, and additional dewatering required for the Revised Cortez Hills Pit Design Alternative, which the BLM selected as the approved Project in the Cortez Hills Expansion Project ROD (BLM 2008b). As presented in Table 3.2-12 in the Final EIS, under the cumulative pumping scenario, there were 30 springs and seeps and 3 perennial streams identified within the model-simulated groundwater drawdown area.

Table 3.2-1 summarizes the general conditions, estimated riparian/wetland vegetation area (as stated in Table 3.2-12 in the Final EIS [BLM 2008a]), identified use, mitigation trigger, and mitigation plan for each of the water source areas identified within the predicted groundwater drawdown area. The table also describes the anticipated effectiveness of the site-specific plan to mitigate the potential impacts associated with the use of each of these surface water resources. This section, including **Table 3.2-1**, describes site-specific mitigation measures for potential water resources impacts attributable to mine-induced groundwater drawdown. The Final EIS (BLM 2008a) and the ROD (BLM 2008b) also included a site-specific mitigation measure to address potential long-term loss of riparian/wetland vegetation as a result of either mine-related disturbance (at site 27-47-35-42) or groundwater drawdown impacts (Table 3.2-12). The plan to mitigate the 0.7 acres of riparian/wetland vegetation from mine-related disturbance has been approved and is being implemented. Mitigation Measure V1 in Section 3.4.4 of the Final EIS (BLM 2008a) also specifies actions to be taken to "… develop new riparian/wetland areas" for impacts to the 3.5 acres of such vegetation that might be impacted by groundwater drawdown. As stated in the Final EIS (page 3.4-25), such measures would be implemented in conjunction with Mitigation Measure WR1b and would effectively mitigate any potential loss of riparian/wetland vegetation.

<u>**Water Resources and Associated Mitigation**</u>

Hydrology of Springs, Seeps, and Perennial Streams. The characteristics of each of the 33 identified water sources are summarized in **Table 3.2-1**. The water sources include: 1) perennial surface water features that may or may not be influenced by seasonal runoff; 2) seasonal water features characterized by measurable flow or a stagnant pond observed during portions of the year that typically become dry by late summer or fall; and 3) wet soil areas (i.e., seeps) that support hydrophilic vegetation and generally do not have any surface expression of water in most years.

Table 3.2-1
Water Resources Mitigation Summary

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
Cortez Hills	Cortez Spring	26-47-01-41	0.0 - 0.13	Also known as Shoshone Wells; consists of a buried pipe that daylights out of the hillside and directs water onto the ground. A trickle generally is persistent regardless of seasons (except for 7/15/03 when it was reported dry, and 12/14/09 when site was covered with snow).	0.000	Perennial water supply for livestock and wildlife.	Cessation of flow coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from existing well PD-07 at a sustained rate of approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock and wildlife.	Pipeline from existing well would be placed on existing road; no new disturbance.
	Northeast Toiyabe seeps	26-47-01-43	0.0 - 2.1	Site was reported dry for 16 of 31 quarterly measurements taken from 2002 to 2009. When not dry, it was reported as a damp or wet area (6 measurements), a trickle (3 measurements), or had measurable flow (3 quarters).	0.000[3]	Seasonal water supply for livestock and wildlife.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Install guzzler designed for large game.	Mitigation plan would be highly effective at maintaining a water supply for livestock and wildlife.	Approximately 0.7 acre of new disturbance for guzzler installation.
		26-47-12-21	0.0 - 20.0	Site was reported dry for 17 of 31 quarterly measurements from 2002 to 2009. When it was not dry, it was reported as a damp or wet area (6 measurements), or had measurable flow (7 measurements).	0.020[4]	Seasonal water supply for livestock and wildlife.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Install guzzler designed for large game.	Mitigation plan would be highly effective at maintaining a water supply for livestock and wildlife.	Approximately 0.7 acre of new disturbance for guzzler installation.
	Cortez Canyon seeps and springs	27-47-36-431	0.0[5]	Quarterly monitoring for 2002 to 2009 indicates that the site consistently is dry with no surface expression of water.[5]	0.000	None	NA	NA	NA	None
		27-47-36-433	0.0[5]	Quarterly monitoring for 2002 to 2009 indicates that the site was consistently dry with no surface expression of water.[5]	0.006[4]	None	NA	NA	NA	None

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
		26-47-01-212	0.0[5]	Quarterly monitoring for 2002 to 2009 indicates that the site consistently is dry with no surface expression of water.[5]	0.006[4]	None	NA	NA	NA	None
		26-47-01-214	0.0[5]	Quarterly monitoring for 2002 to 2009 indicates that the site consistently is dry with no surface expression of water.[5]	0.003[4]	None	NA	NA	NA	None
	Northeast Survey Area	27-48-30-44	0.0	Persistent seep with a stagnant boggy area reported from quarterly monitoring (2002 to 2009). Flow not measurable; was reported dry for 3 of the 31 measurements.	0.021	Water supply for wildlife and provides for habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from the existing groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for wildlife and habitat diversity.	Approximately 0.2 acre for water supply well and 0.01 acre for pipeline.
	Northeast Corner seeps and springs	27-48-30-421	0.0	Seep supporting willows. No surface water ponding or observable flow has been reported during quarterly monitoring (2002 to 2009), except for March 2006 when a wet area was observed.	0.028	Habitat for wildlife.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Enhancement consisting of installing a spring box to aid in collection and discharging to support willows and associated vegetation.	Mitigation plan would be highly effective at collecting existing flow and distributing it to the isolated willow area. This mitigation would not be effective at mitigating a complete drying out of the area caused by lowering the water table to below the depth required to sustain the willows.[4]	Less than 0.1 acre.
		27-48-30-412	0.0	Seep supporting willows. No surface water ponding or observable flow reported for 25 of 31 quarterly measurements (2002 to 2009). Wet area or trickle observed occasionally.	0.005	Habitat for wildlife.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Enhancement consisting of installing a spring box to aid in collection and discharging to support willows and associated vegetation.	Mitigation plan would be highly effective at collecting existing flow and distributing it to the isolated willow area. This mitigation would not be effective at mitigating a complete drying out of the area caused by lowering the water table to below the depth required to sustain the willows.[4]	Less than 0.1 acre.

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
		27-48-30-423	0.0	Seep supporting willows. No surface water ponding or observable flow has been reported during quarterly monitoring (2002-2009).	0.010	Habitat for wildlife.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Enhancement consisting of installing a spring box to aid in collection and discharging to support willows and associated vegetation.	Mitigation plan would be highly effective at collecting existing flow and distributing it to the isolated willow area. This mitigation would not be effective at mitigating a complete drying out of the area caused by lowering the water table to below the depth required to sustain the willows.[4]	Less than 0.1 acre.
Pipeline	Rocky Pass	27-46-28-224	0.0 - 86.89[6]	Perennial spring. Flows in the winter and spring are influenced by runoff.	1.180[7]	Water supply for livestock and wildlife and used for pasture irrigation.[7]	Reduction of flow to less than 3 gpm in summer and fall monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area, as determined from the existing groundwater monitoring wells.	Pipe water from new well at an initial rate of approximately 1.0 gpm. Increase flows as necessary up to 3 gpm to sustain habitat diversity based on quarterly vegetation monitoring.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre for water supply well and 0.02 acre for pipeline.
	Toiyabe Catchment	26-47-04-24	0.0 - 18.0	Quarterly monitoring indicates the spring typically flows in the winter and spring and is either flowing or dry by late summer to fall. Third quarter measurements indicate that spring was reported dry 7 of 14 years.	0.070	Seasonal water supply for livestock, wildlife, and habitat diversity.	Reduction of flow to less than 0.7 gpm for 2 consecutive years in summer and fall monitoring events coincident with a reduction in groundwater levels in this area, as determined from the existing groundwater monitoring wells.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre for water supply well and 0.02 acre for pipeline.
		27-47-27-43	0.0 - 0.0[8]	Quarterly monitoring from 1996 to 2009 indicates the site has been dry since August 1998.	0.000	None	None	None	Not applicable.	None

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
		27-47-33-42	Trickle - 3.3	Spring with a pipe that delivers water to a trough. Trough overflow flows for approximately 300 feet until it infiltrates into alluvium.	0.030	Perennial water source for livestock and wildlife.	Reduction of flow to less than 0.25 gpm for 2 consecutive years in summer and fall monitoring events coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock and wildlife.	Approximately 0.2 acre for water supply well and 0.02 acre for pipeline.
		27-48-16-31	1.6 - 15.0	Perennial spring that discharges into drainage and infiltrates in alluvium.	1.150	Perennial water source for livestock, wildlife, and habitat diversity.	Reduction of flow to less than 2.0 gpm observed in summer and fall quarterly monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area, as determined from the existing alluvial groundwater monitoring wells.	Pipe water from new well at approximately 1.0 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre for water supply well and 0.02 acre for pipeline.
		27-48-19-24	3.3 - 20.19[9]	Perennial spring that flows into a pond that discharges to a drainage.	0.040	Perennial water source for livestock, wildlife, and habitat diversity.	Reduction of flow to less than 5.0 gpm observed during summer and fall monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring wells.	Pipe water from new well at an initial rate of approximately 1.0 gpm. Increase flow up to 5 gpm, if necessary, to sustain wetland vegetation based on quarterly vegetation monitoring.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre for water supply well and 0.02 acre for pipeline.

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
	Shoshone Range	28-46-02-34	0.0 - 20.0	Site consists of two springs that saturate the area and flow into a drainage. Quarterly monitoring indicates site had measureable flow from May 1996 to August 2008. Site was reported dry in November 2008 and as a wet area with insufficient flow to measure in the first 3 quarters of 2009.	0.210	Water supply for livestock, wildlife, and habitat diversity.	Reduction of flow to less than 1.5 gpm during summer and fall monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring wells.	1. Install fencing around source with installation of a trough outside fenced area for livestock and wildlife. 2. If fencing does not restore flow to levels above mitigation trigger, supplemental water would be provided by piping water from a new well at approximately 0.5 gpm.	Fencing would protect the source from trampling by livestock and thereby may enhance flow and maintain water supply for livestock, wildlife, and habitat diversity. Piping water from a water supply well could be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Less than 0.05 acre of new disturbance for fencing. Approximately 0.2 acre for water supply well and <0.03 acre for pipeline.
		28-46-04-33	0.00 - 0.72	Site typically wet or with only a trickle. Site reported dry in some years during the third quarter (August) measurement.	0.460	Water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	1. Install fencing around source with installation of a trough outside fenced area for livestock and wildlife. 2. If fencing does not restore flow to levels above mitigation trigger, supplemental water would be provided by piping water from a new well at approximately 0.5 gpm.	Fencing would protect the source from trampling by livestock and thereby may enhance flow and maintain water supply for livestock, wildlife, and habitat diversity. Piping water from a water supply well could be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Less than 0.05 acre.
		28-46-05-42	0.0 - 6.97	Site characterized by seasonally saturated soil with occasional flows reported during wet years. Quarterly monitoring from 1996 to 2009 indicates the site was reported dry 29 of 55 quarters.	0.820	Habitat diversity; water supply for livestock and wildlife in wet years.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining habitat diversity and also would provide a perennial water supply for livestock and wildlife that currently does not exist.	Approximately 0.2 acre for water supply well and 0.01 acre for pipeline.

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
		28-46-15-32	0.0 - 2.0	Intermittent ponding with no measurable flow since 1998; quarterly monitoring results (1996 to 2009) report site was dry for 27 of the 54 measurements.	0.040[4]	Intermittent water supply for livestock and wildlife.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Install guzzler designed for large game.	Mitigation plan would maintain water supply for livestock and wildlife. Guzzler would not effectively mitigate loss of hydrophilic vegetation.[4]	Approximately 0.7 acre of new disturbance for guzzler installation.
	East Valley	28-48-28-14	0.0 - 5.0	At stock tank.	0.080	Water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Pipeline and water supply well would be on existing disturbance.
		28-48-28-342	0.0	Seep with water that ponds but does not flow into a drainage. Flow rate is not measurable.	0.090	Perennial water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Pipeline on existing road; no new disturbance.
		28-48-28-343	0.0	Seep with water that ponds but does not flow into a drainage. Flow rate is not measurable.	0.040	Perennial water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Pipeline and water supply well would be on existing disturbance.
		28-48-28-43	0.0	Seep with water that ponds but does not flow into a drainage. Flow rate is not measurable.	0.120	Perennial water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre of new disturbance for water supply well. Pipeline would be on existing disturbance.
		28-48-32-24	0.0 - 2.0	Observed flow (2.0 gpm) in November 1998; otherwise wet area (seep) with water that ponds but does not flow into a drainage.	0.060	Water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre of new disturbance for water supply well. Pipeline would be on existing disturbance.

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
		28-48-32-32	0.0	Seep with water that ponds but does not flow into a drainage. Flow rate is not measurable.	0.060	Perennial water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre of new disturbance for water supply well. Pipeline would be on existing disturbance.
		28-48-32-33	0.0 - 1.3	Seep with water that ponds but does not flow into a drainage; no measurable flow after August 1997.	0.080	Perennial water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Pipeline and water supply well would be on existing disturbance.
		28-48-32-34	0.0	Seep with water that ponds but does not flow into a drainage. Flow rate is not measurable.	<0.010	Water supply for livestock, wildlife, and habitat diversity.	Reduction of hydrophilic vegetation below established threshold coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring.	Pipe water from new well at approximately 0.5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Pipeline and water supply well would be on existing disturbance.
	Mill Creek	MIL-01	8.98 - 924.59	Perennial stream with flows that vary seasonally with surface runoff.	0.3[10]	Perennial water supply for livestock and wildlife and supports riparian corridor that provides habitat diversity.	Reduction of flow to less than 9 gpm during summer and fall monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring wells.	Pipe water from new well at approximately 9 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre for water supply well and 0.01 acre for pipeline.
	Indian Creek	IND-01U, IND-01D, and IC-1	12.4 - 14,479[11]	Perennial stream with flows that vary seasonally with surface runoff.	11.4[12]	Perennial water supply for livestock and wildlife and supports riparian corridor that provides habitat diversity.	Reduction of flow to less than 20 gpm during summer and fall monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area as determined from the groundwater monitoring wells.	Pipe water from new well at approximately 20 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre of new disturbance for water supply well. Pipeline would be on existing disturbance.

Table 3.2-1 (Continued)

Monitoring Program Area	Spring Group	ID	Flow Range (gpm)	Site Characteristics	Associated Riparian/ Wetland Vegetation (acres)[1]	Use	Mitigation Trigger	Contingency Mitigation Plan	Effectiveness of Site-specific Mitigation Plan	New Disturbance from Mitigation Implementation[2] (acres – approximate)
	Ferris Creek	FER-01	5.0 - 1,486	Perennial stream with flows that vary seasonally with surface runoff.	2.35[12]	Perennial water supply for livestock and wildlife and supports riparian corridor that provides habitat diversity.	Reduction of flow to less than 5 gpm during summer and fall monitoring events for 2 consecutive years coincident with a reduction in groundwater levels in this area, as determined from groundwater monitoring wells.	Pipe water from new well at approximately 5 gpm.	Mitigation plan would be highly effective at maintaining a water supply for livestock, wildlife, and habitat diversity.	Approximately 0.2 acre of new disturbance for water supply well. Pipeline would be placed on existing disturbance.

1 JBR 2007d as referenced in Final EIS (BLM 2008a).
2 Disturbance areas would be managed and reclaimed in accordance with BLM and State of Nevada requirements.
3 Site has hydrophilic vegetation but was not classified as a wetland or riparian area because of other factors such as the absence of hydric soils or hydrologic conditions.
4 Vegetation loss would be mitigated in accordance with Mitigation Measures V1 (Final EIS [BLM 2008a] p. 3.4-25). See text in Subsection 3.2.4 of this SEIS for additional discussion.
5 Excludes flow measurement of drill water runoff at the site June 2002.
6 Excludes flow measurements of high runoff recorded in May 2005.
7 The primary source of water for pasture irrigation is surface runoff during spring and early summer.
8 Excludes drip and trickle flows reported between May 1996 and May 1998.
9 Excludes a flow measurement taken during a rainstorm event in February 2000 and trickle flow reported when it was noted to contain ice and snow in November 2000.
10 Riparian corridor located downstream from mountain front.
11 Flow measured at monitoring station IC-1 1997 to 2010.
12 Riparian corridor located within the predicted 10-foot mine-related drawdown contour.

Source (unless otherwise noted): CGM and JBR Environmental Consultants, Inc. 2010.

There are three perennial stream reaches located within the model-simulated groundwater drawdown area: Mill Creek in the Cortez Mountains and Indian Creek and its tributary Ferris Creek in the Shoshone Mountains. All three stream reaches typically experience high flows associated with runoff in the spring to early summer period and low flows sustained by baseflow through the late summer and fall period.

Identified Use. The identified uses of the water resources include: 1) livestock and/or wildlife water source; 2) hydrophilic vegetation area or riparian corridor that provides habitat diversity; and/or 3) pasture irrigation. An individual spring or seep is considered a perennial water source if there is observable or measureable year-round flow (for springs or streams) or a stagnant pond or wet soil area (for seeps) in most years; or a seasonal water source if the surface water expression typically dries up for one or more quarters in most years. The identified use(s) of each surface water feature is listed in **Table 3.2-1**.

Mitigation Triggers. The mitigation trigger depends on the observable flow and site characteristics of each individual surface water feature. For perennial springs, the mitigation trigger would be based on a reduction of baseflow below an established flow threshold. The baseflow threshold was determined by reviewing the flow variations from the quarterly monitoring results over the period of record. Mitigation triggers based on reductions in baseflow would be determined using flow measurements from the low-flow period that typically occurs in summer and early fall (July to October) and the results of the groundwater monitoring. Site-specific mitigation triggers for each of the surface water features are listed in **Table 3.2-1**.

For springs and seeps that typically have intermittent flow or are characterized as wet soil areas that support vegetation with no measurable flow, the mitigation trigger would be based on a reduction in hydrophilic vegetation below an established threshold coincident with a reduction in groundwater levels in the area as determined by groundwater monitoring. Additional information regarding the site-specific mitigation triggers is provided in the Technical Memorandum – Contingency Mitigation Plans for Surface Waters, Cortez Hills Expansion Project, Lander and Eureka counties, Nevada (CGM and JBR 2010).

Contingency Mitigation Measures. Mitigation Measure WR-1b presented in the Final EIS (p. 3.2-111 [BLM 2008a]) included a bulleted list described as *"Methods for providing a new water source or improving an existing water source may include, but are not limited to:*

- *Installation of a water supply pump in an existing well (e.g,. monitoring well);*
- *Installation of a new water production well;*
- *Piping from a new or existing source;*
- *Installation of a guzzler;*
- *Enhanced development of an existing seep to promote additional flow; or*
- *Fencing or other protection measures for an existing seep to maintain flow."*

The proposed site-specific mitigation measures for the identified surface water resources within the mine-related groundwater drawdown area are summarized in **Table 3.2-1**. The site-specific mitigation plans would implement one or more of the six mitigation methods identified in Mitigation Measure WR-1b, as appropriate. Details regarding the proposed measures for specific sites are provided in the Technical Memorandum – Contingency Mitigation Plans for Surface Waters, Cortez Hills Expansion Project, Lander and Eureka counties, Nevada (CGM and JBR 2010). Final locations of specific facilities, including wells, pipelines, or guzzlers, would be determined prior to construction in compliance with appropriate NEPA and other environmental and cultural resources requirements, to be determined by the BLM.

This following discussion supplements the information regarding the six methods that was provided in Mitigation Measure WR-1b in the Final EIS (BLM 2008a).

1) Installation of a Water Supply Pump in an Existing Well. This mitigation measure consists of supplying water to the original surface water source area by pumping and piping water from an existing well. The amount of water conveyed to the affected spring would be based on the quantity of water required to sustain the identified use(s). As no new wells would need to be constructed, new surface impacts would be minimized. In addition, use of an existing well would minimize the time-frame required to implement the mitigation measure.

2) Installation of a New Production Well. This mitigation measure consists of constructing a new water well to replace water from one or more springs or seeps. Installing a new well would include drilling to obtain sufficient water, installing appropriate casing, installing a pump with a power supply (windmill or electric), installing a tank to supply consistent flow, and installing piping to the affected spring or seep area.

3) Piping Water from a New or Existing Source. This mitigation measure consists of piping water from a new or existing water source to a spring or seep that has experienced a reduction in flow. This mitigation would include identifying a nearby, upgradient source that discharges sufficient water, or creating a new source such as a small reservoir, and installing a piping system to convey water to the affected surface water source to maintain flow and sustain the identified use(s).

4) Installation of a Guzzler. This mitigation measure consists of installing a guzzler. Guzzlers are systems used to collect precipitation and runoff and store the water in a surface or buried container. The container then feeds an open trough for use by livestock and/or wildlife. Installation of a guzzler would be completed at seeps and springs where the primary use of the water is for wildlife consumption. Guzzlers are used throughout Nevada, Utah, and other arid areas of the west to supply water for wildlife, especially during the dry summer months. The size of the system can vary depending on the species targeted for the system. Larger guzzlers are needed for big game, while smaller systems can be used for small game and birds.

5) Enhanced Development of an Existing Seep to Promote Additional Flow. This mitigation measure consists of enhancing flow by developing the existing seep or spring. The development typically would include the installation of a spring box and piping to direct water to a specific discharge point. This mitigation likely would be used in circumstances where there has been a decrease in flow but not a complete loss of flow at the source. These types of spring and seep enhancements (or improvements) are not expected to be effective at mitigating seeps or springs that have experienced a complete loss of flow due to mine-induced groundwater drawdown.

6) Fencing or Other Protection Measures for an Existing Seep to Maintain Flow. This mitigation measure consists of fencing or other protection measures for existing seeps. Many seeps and springs are substantially impacted by livestock and wild horses. These effects can result in reduced flow as a result of overgrazing of vegetation, thus increasing surface evaporation and damage to the seep or spring source.

Mitigation Effectiveness. The following supplemental information describes the anticipated effectiveness of the methods identified in Mitigation Measure WR-1b. Site-specific evaluation of the effectiveness of the contingency mitigation plan for each of the identified surface water resources within the mine-related groundwater drawdown area is presented in **Table 3.2-1**. The site-specific measures include one or more methods described under the Contingency Mitigation Measures section above. Quarterly monitoring of the surface water resources required under Mitigation Measure WR-1a (Section 3.2.4 of the Final EIS [BLM 2008a]) would be used to document the effectiveness of the implemented measures. In addition, as stated in Mitigation Measure WR-1b (Section 3.2.4 of the Final EIS [BLM 2008a]), the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation is unsuccessful.

Use of an existing well (method #1 above) or construction of a new well (method #2 above) to supplement or replace baseflow affected by mine-induced groundwater drawdown are anticipated to be a highly effective methods to maintain the identified use(s) over the period of impact that may occur, including providing a water supply for livestock and/or wildlife and maintaining hydrophilic vegetation for habitat diversity. Well pumping is expected to provide a long-term sustainable source of water to supplement or replace the loss of baseflow. There is some potential for the flow to be disrupted at times due to mechanical problems (including freezing pipes) or maintenance of the system. However, with appropriate maintenance and system monitoring, potential disruptions in flow likely would be of short duration (i.e., several days to several weeks).

Piping water from a new or existing source (method #3 above) also is anticipated to be an effective method to provide flow to supplement or replace baseflow to springs or seeps affected by mine dewatering. A sufficient upgradient source could provide a long-term sustainable water supply to provide water for livestock and/or wildlife and maintain hydrophilic vegetation for habitat diversity. This measure is considered to be moderately effective since the upgradient water source created by collecting water in a surface reservoir or pond could be depleted during drought conditions. If the water resource and site conditions are favorable, this type of flow augmentation could be installed within a short timeframe after mitigation is triggered. This type of system would require long-term maintenance, and flow disruptions could occur due to freezing pipes.

Installation of a guzzler (method #4 above) would be an effective method to replace a source of water for livestock and/or wildlife. If the original spring or seep only provided a seasonal or intermittent source of water, the guzzler would provide an improved sustainable perennial source of water for livestock and/or wildlife use. However, installation of a guzzler without other spring enhancements would not be effective at providing water to sustain a diversity of habitat (such as hydrophilic vegetation) that a spring or seep may have originally supported. Guzzlers would require periodic maintenance for the life of the system.

Enhanced development of an existing spring or seep to promote additional flow (method #5 above) may or may not be effective at increasing the flow available at the surface. This mitigation likely would be used in circumstances where there has been a decrease in the flow but not a complete loss of flow at the source. For this situation, the spring enhancement measures likely would be moderately effective at increasing flow and partially or completely effective at mitigating reductions in flow associated with mine-induced drawdown. However, for seeps or springs that have experienced a complete loss of flow due to mine-induced groundwater drawdown, these enhancement measures are not expected to be effective at mitigating reduction in flows.

Eliminating grazing through installation of exclusionary fencing (method #6 above) to keep livestock and wild horses out but allow access for wildlife is an effective method of enhancing seep and spring flow along with hydrophilic vegetation if there has not been a complete loss of flow. However, if the flow of the spring or seep is completely lost due to a reduction in groundwater levels, then fencing alone is not expected to be an effective measure to mitigate impacts associated with mine-induced groundwater drawdown. If flow from a seep or spring is reduced but not completely lost, enhancement of the area through eliminating grazing likely would increase output of the spring.

Environmental Impacts Associated with Implementation of Mitigation Measures. The estimated acreage of new disturbance associated with the implementation of the site-specific mitigation plans is identified in **Table 3.2-1**. Any ground disturbance would be managed and reclaimed in accordance with BLM and State of Nevada requirements. Therefore, surface disturbance impacts associated with implementation of site-specific mitigation are expected to be reclaimed within 2 to 3 years after disturbance. Potential impacts that would result from implementation of the site-specific mitigation measures are discussed in the following paragraphs.

Well Development. If the East Valley springs are affected by mine-related groundwater drawdown, the contingency plan calls for installing one or more wells and associated piping to provide water to mitigate impacts to this group of springs. All other new wells would be located outside of, but in close proximity to, each individual mapped water resource area (i.e., no more than 200 feet from the water resource).

Ground disturbance impacts associated with piping water from an existing well would include new ground disturbance associated with installing a passive (windmill) or active (electric powered) pumping system, a storage tank for maintaining consistent flow, and surface or buried piping from the well to the desired location. The most likely power source for pumping from an existing or new well would be solar-power cells (CGM and JBR 2010). A new pipeline from an existing well would be placed in existing roadways; therefore, no new disturbance would be required for pipeline installation.

Ground disturbance activities associated with new well construction would include surface disturbance associated with the drill pad and sump, tank installation, and piping. A drill pad can range from several hundred square feet to several thousand square feet, depending on the size of the drill rig and ancillary facilities. Typical disturbance from the installation of a new production well would be approximately 0.2 acre. The pipelines would be placed in existing roadways to the extent practical. Pipelines installed along existing roadways are not expected to result in new ground disturbance; pipelines placed outside of existing roadways would result in new ground disturbance. For these locations, the distance between the proposed new wells and the spring and seep source areas would be less than 200 feet. Assuming a pipeline length of 200 feet and disturbance width of 6 feet, the total maximum new disturbance associated with pipeline installation would be approximately 0.03 acre. The estimated new disturbance associated with well construction and pipeline installation for each site is summarized in **Table 3.2-1**.

The estimated pumping rates that could be required to augment flows to sustain the identified uses are identified in **Table 3.2-1**. These pumping rates range from 0.5 to 3.0 gpm for springs, and 5 to 20 gpm for perennial streams. Because of the relatively low pumping rates, spatial distribution of the mitigation wells, and estimated hydraulic properties of the target aquifers (summarized in Table 3.2-3 of the Final EIS [BLM 2008a]), the pumping rates associated with this mitigation are unlikely to result in measurable drawdown that is outside the range of natural seasonal variations in groundwater levels. Therefore, additional groundwater drawdown effects associated with potential well development as outlined in the contingency mitigation measures are expected to be negligible.

If all of the contingency mitigation measures that require groundwater pumping to augment surface flows were triggered, the total maximum groundwater production would require approximately 78 acre-feet per year (AFY). CGM currently holds water rights that include 6,452 AFY for mining and milling, and 9,679 AFY for irrigation and stock watering within the Crescent Valley Hydrographic Basin (CGM and JBR 2010). It is anticipated that water rights for any new well production required for implementation of the mitigation plans would be addressed by transferring a portion of the existing water rights to the new points of diversion as required by the State Engineer. Other impacts to water rights associated with implementation of the site-specific measures are not anticipated.

Piping Water from a New or Existing Source. Disturbance associated with this measure would be limited to construction of a surface or buried pipeline from the source to the affected spring or seep. Assuming 0.5 mile of piping (a disturbance width of 6 feet along 2,640 feet of pipe), approximate disturbance associated with this mitigation measure would be 0.4 acre.

Installation of a Guzzler. Construction activities include vegetation removal at the collection apron and tank locations; excavation for the tank (assuming below ground installation); installation of the apron, tank, piping, and trough; and installation of an exclusionary fence to prevent horses and other livestock from damaging the guzzler apron. The actual design (size, location, etc.) is dependent on many variables including, but not limited to, annual precipitation, slope, and targeted wildlife (small game versus big game). Disturbance from a large game guzzler in this area would be up to 0.7 acre (assuming a disturbance area of approximately 150 feet by 200 feet).

Enhanced Development of an Existing Seep to Promote Additional Flow. The measures identified to enhance flow (i.e., installation of a spring box) at an existing spring would have minimal (less than 0.1 acre) of disturbance.

Fencing or Other Protection Measures for an Existing Seep to Maintain Flow. Installation of fencing around the water source would result in minimal (less than 0.05 acre) temporary disturbance for the duration of the mitigation.

3.2.5 Residual Adverse Impacts

Residual adverse impacts to baseline surface water uses are not anticipated with the successful implementation of Mitigation Measures WR-1a and 1b in accordance with the site-specific mitigation triggers and contingency mitigation measures described in Section 3.2.4 above. The potential for residual adverse impacts to occur would be further reduced by the provision in WR-1b (Section 3.2.4 of the Final EIS [BLM 2008a]) that indicates that the BLM has the ability to require the implementation of additional mitigation measures if the initial implementation was unsuccessful.

3.10 Air Quality

This information applies to the currently approved Project and other action alternatives, unless otherwise noted. This information supplements Section 3.10 of the Cortez Hills Expansion Project Final EIS (BLM 2008a) to refine the analysis of potential air quality impacts of transporting and processing Cortez Hills refractory ore at the Goldstrike Mine, located on private land approximately 70 miles north of the Cortez Hills Expansion Project. This SEIS also includes the results of $PM_{2.5}$ modeling for on-site activities associated with the approved Project and other action alternatives.

3.10.1 Affected Environment

The climate and existing air quality of the region and the Cortez Hills Expansion Project study area and cumulative effects study area are described in Section 3.10.1 of the Final EIS (BLM 2008a).

Relative to $PM_{2.5}$, the study area and cumulative effects study areas have been designated as in attainment or unclassified for all pollutants that have an Ambient Air Quality Standard (AAQS), including $PM_{2.5}$.

3.10.2 Environmental Consequences

<u>**Regulatory Framework and Associated Impacts**</u>

Ambient air quality and air pollutant emissions are regulated under both federal and State of Nevada laws and regulations, as discussed in detail in Section 3.10.2.1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The regulatory framework relative to the following discussion of potential air quality impacts is discussed below, including recent changes to the National Ambient Air Quality Standards (NAAQS) and associated regulations.

$PM_{2.5}$ Emissions. Prior to issuance in March 2010 of the U.S. Environmental Protection Agency (USEPA) guidance for modeling $PM_{2.5}$ (USEPA 2010a), emissions of $PM_{2.5}$ for mining sources were considered a fraction of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) emissions, and $PM_{2.5}$ impacts to local air quality were not modeled due to technological challenges related to modeling secondary formation of $PM_{2.5}$. Subsequent to publication of the Cortez Hills Expansion Project Final EIS (BLM 2008a), the USEPA guidance memorandum "Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS" was issued (USEPA 2010a). Taking into account this guidance, Enviroscientists, Inc. (Enviroscientists) (2010a) conducted dispersion modeling of $PM_{2.5}$ for the Cortez Hills Expansion Project; the BLM has reviewed the $PM_{2.5}$ model methodology and results.

Mercury Emissions. Mercury is not considered a criteria pollutant, and no NAAQS have been established under the Clean Air Act Amendments (CAA) for mercury. Mercury is included on the federal list of hazardous air pollutants (HAPs), which has been adopted by reference in the Nevada air quality regulations. Nevada air quality regulations (Nevada Administrative Code [NAC] 445B.349) prohibit the "discharge into the atmosphere from any stationary source of any hazardous air pollutant or toxic regulated air pollutant that threatens the health and safety of the general public, as determined by the director." The USEPA has proposed but has not finalized a National Emission Standard for HAPs or mercury emissions from gold ore processing facilities. HAPs are controlled through emissions limits at the source rather than ambient air concentrations. Mercury emissions associated with precious metals operations are regulated and controlled pursuant to the Nevada Mercury Control Program (NAC 445B.3611-3689).

$PM_{2.5}$ Model Selection and Options

According to the Guideline on Air Quality Models (as revised) (40 CFR 51, Appendix W), the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) is the preferred model for use in estimating ambient air pollutant concentrations resulting from emissions of sources such as those associated with the approved Project and with terrain similar to the terrain within and adjacent to the project area (USEPA 2003). The AERMOD model used by Enviroscientists (2010a) (version 09292) for modeling $PM_{2.5}$ emissions at the Cortez Hills Expansion Project included the Plume Rise Model Enhancement (PRIME) downwash algorithms that are used to calculate plume downwash from stack emissions caused by wind flowing over and around nearby buildings.

According to the USEPA's User Guide for AERMOD, the $PM_{2.5}$ standard is based on a 3-year average of the 98th percentile 24-hour average and a 3-year average of the annual mean at each ambient monitor (USEPA 2010a, 2004a). For purposes of modeling demonstrations of compliance with the NAAQS, the USEPA states that the eighth highest value is an unbiased surrogate for the 98th percentile 24-hour average concentration at a particular receptor over a 1-year period. For this analysis, the 24-hour design value was based on the highest of the eighth highest (H8H) concentrations at each receptor for the year of meteorological input data used in the model. The annual design value was based on the highest annual average across the receptor domain.

Emission Factors Used to Model $PM_{2.5}$ Emissions. Dispersion modeling programs require inputs of the calculated emissions for each air pollutant to be modeled. The emission factors used by Enviroscientists (2010a) for the Cortez Hills Expansion Project were based on AP-42 (USEPA 2009), Chapter 11, which contains the emission factors for metallic mineral processing operations. In those cases where a factor for $PM_{2.5}$ was provided in AP-42, it was used. Where a factor for $PM_{2.5}$ was not expressly stated, $PM_{2.5}$ emissions were estimated using engineering judgment based on specific facilities and activities associated with the project. Additional details on $PM_{2.5}$ emission factors used in the model are available in the *$PM_{2.5}$ Air Quality Impact Assessment Report* (Enviroscientists 2010a).

Receptors. Two classes of receptors were used in the modeling analysis. The first receptor class comprised individual receptors spaced at 30-meter (m) intervals along the model boundary of the project area. The second receptor class comprised three receptor grids: 1) a coarse Cartesian 1,000-m receptor grid extending approximately 5 kilometers (km) from the stationary source; 2) a 200-m Cartesian receptor grid extending at least 1,000 m from the stationary source; and 3) in areas with higher modeled impacts, a staggered second 200-m grid overlain on the initial 200-m grid, creating an approximate 140-m grid. The 140-m grid was applied near the Pipeline Mill, along County Road 222 near the Cortez Hills open pit, and near the South Pipeline waste disposal area.

Meteorological Data. One year of surface meteorological data collected in September 2003 through August 2004 in Boulder Valley, Air Quality Management Area 61, was used in the model. Boulder Valley is across the Humboldt River from Crescent Valley and is similar to Crescent Valley in vegetation, elevation, and size; therefore, the data are considered representative of the project area. The data previously were subject to review by the USEPA and Nevada Department of Environmental Protection – Bureau of Air Pollution Control (NDEP-BAPC) for a major source power plant application, and NDEP-BAPC previously approved the use of these data for modeling air quality impacts associated with the Pipeline Project (NDEP 2006).

Model Scenarios. Dispersion modeling of the Proposed Action identified in the Final EIS (BLM 2008a) and the approved Project identified in the ROD (BLM 2008b) was conducted for $PM_{2.5}$ for the two proposed operating scenarios for delivering ore from the Cortez Hills open pit to the Pipeline Mill (conveyor transport and trucking). Single model runs were conducted for the other action alternatives identified in the Final EIS (BLM 2008a), with the exception of the Cortez Hills Complex Underground Mine Alternative, which would result in 4,843 fewer acres of disturbance than the approved Project. Dispersion modeling was performed for $PM_{2.5}$, for the 24-hour and annual time periods.

Background Concentrations. The NDEP-BAPC indicated it did not have a recommendation for $PM_{2.5}$ background concentrations (NDEP 2009). The NDEP-BAPC's practice for particulate analyses is to use measured concentrations from the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring stations as the representative background concentration for rural Nevada sites. The Great Basin National Park IMPROVE site located in White Pine County, Nevada, was selected as the closest site for this analysis. The Cortez Hills Expansion Project and the GRBA1 monitoring station are located in similar topography and have similar climate. The two locations are situated in relatively similar terrain at similar elevation and each location receives approximately 9.5 inches of precipitation per year. Data measured at the Great Basin National Park monitoring station (GRBA1) for 2005 to 2007 were used to establish the $PM_{2.5}$ background concentrations; these data are summarized in **Table 3.10-1**. The 3-year average annual weighted mean based on the data set is 2.38 micrograms per cubic meter (μg/m^3). This value was used as the background $PM_{2.5}$ concentration for this analysis.

Table 3.10-1
GRBA1 $PM_{2.5}$ Measured Data Summary for Determination of a Background Concentration

Data Year	Number of Observations	Annual Average (μg/m^3)	Rolling 3-year Average, Annual Weighted Mean (μg/m^3)
2004	116	2.14	-
2005	121	2.30	-
2006	117	2.36	2.27
2007	104	2.51	2.38

Source: Enviroscientists 2010a.

Air Pollution Emission Sources and Emission Inventory. Air emission estimates for the approved Project and the action alternatives (BLM 2008a) were made based on the following factors:

- Maximum material throughput;
- USEPA-approved emission factors from AP-42;
- Existing air quality permits and past air quality permit applications for both the Pipeline Project and the Cortez Mill; and
- Facility descriptions (CGM and SRK 2008).

Air Quality Dispersion Modeling Analysis. The majority of the project area is located within the Crescent Valley Planning Area, which currently is unclassified or designated as attainment for $PM_{2.5}$. The southern portion of the project area extends into the Grass Valley Planning Area, which also currently is unclassified or designated as attainment for $PM_{2.5}$. The assessment of the potential $PM_{2.5}$ impacts for the approved Project and the action alternatives was conducted taking into account the March 2010 USEPA guidance memorandum “Modeling Procedures for Demonstrating Compliance with $PM_{2.5}$ NAAQS” (USEPA 2010a).

The dispersion model calculates ambient concentrations for each hour of the modeled time period, and appropriate hourly emission rates must be calculated for each modeled source for each modeled time period. The dispersion modeling assumed an operational and facility configuration that simulated a realistic maximum operational scenario. Assumptions made for the analysis of the approved Project and the action alternatives included:

- Cortez Hills open pit was in full production at 400,000 tons of material mined per day;
- Heap leach pads and waste rock facilities were assumed to be built to one half of their full heights; and
- Open pits were assumed to be at their full depth, resulting in maximum potential emissions from the haul trucks.

Specific information regarding the treatment of project facilities and activities in the air quality dispersion model and associated analyses are presented in the *$PM_{2.5}$ Air Quality Impact Assessment Report* (Enviroscientists 2010a).

Assessment of Off-site Transport and Processing Impacts. Specific information relative to the assessment of off-site transport and processing of refractory ore from the Cortez Hills Expansion Project is presented in the following technical memoranda:

- *Cortez Gold Mines – Emission Inventory to Quantify Truck Emissions* (Enviroscientists 2010b).
- *Technical Memorandum: Impact of $PM_{2.5}$ Emissions from Processing Ore from the Cortez Hills Expansion Project and Cortez Gold Mines Operations Area at the Barrick Goldstrike Mine* (Air Sciences Inc. 2010a).

- *Technical Memorandum: Impact of PM_{10}, SO_2, NO_X, CO and HAP Emissions from Processing Ore from the Cortez Hills Expansion Project and Cortez Gold Mines Operations Area at the Barrick Goldstrike Mine* (Air Sciences Inc. 2010b).

- *Technical Memorandum: Impact of Mercury Emissions from Processing Ore from the Cortez Hills Expansion Project and Cortez Gold Mines Operations Area at the Barrick Goldstrike Mine* (Air Sciences Inc. 2010c).

3.10.2.1 Approved Project

$PM_{2.5}$ Impacts from On-site Activities

The results of the dispersion modeling of $PM_{2.5}$ for the approved Project are presented in **Table 3.10-2**. The table shows the highest modeled results for $PM_{2.5}$ for 24-hour and annual averaging times, the location of the highest modeled receptor, the highest modeled result with and without background concentration, and the standards for $PM_{2.5}$ averaging time combinations. These results indicate that $PM_{2.5}$ emissions for the approved Project, with either ore transport option, would not cause or contribute to a violation of the NAAQS for $PM_{2.5}$.

Table 3.10-2
Highest Modeled $PM_{2.5}$ Air Pollutant Concentrations from the Approved Project

Averaging Time	Highest Modeled Receptor Location[1]		Dispersion Modeling Results (μg/m³)	Dispersion Modeling Results with Background (μg/m³)	NAAQS (μg/m³)
	UTM East (m)	UTM North (m)			
Truck Hauling Option					
24-hour	532,089	4,444,944	18.82	21.20	35
Annual	530,495	4,449,132	9.57	11.95	15
Overland Conveyor Option					
24-hour	532,139	4,444,943	18.55	20.93	35
Annual	530,488	4,444,919	9.15	11.53	15

[1] All coordinates in universal transverse Mercator (UTM) projection, North American Datum 1983.

Source: Enviroscientists 2010a.

In addition to direct $PM_{2.5}$ emissions, the USEPA has recognized that $PM_{2.5}$ also may include a “secondary” component that is formed as a result of complex atmospheric reactions involving precursor pollutant emissions. There are four potential pollutant precursors: sulfur dioxide (SO_2), nitrogen oxide (NO_X), volatile organic compounds (VOCs), and ammonia (NH_3). The USEPA presumes that emissions of SO_2 and NO_X will have some secondary contribution to $PM_{2.5}$ ambient concentrations and that emissions of VOCs and NH_3 will not contribute to $PM_{2.5}$ impacts based on its current level of understanding (73 Federal Register 28321-28350).

The USEPA recently has confirmed that while "air quality modeling of direct $PM_{2.5}$ emissions can be accomplished using a USEPA-approved model to predict ambient $PM_{2.5}$ impacts caused by new and modeled sources of $PM_{2.5}$ emissions," it "has not approved any models that can reliably predict the localized ambient $PM_{2.5}$ impacts of precursors (e.g., SO_2 and NO_X) emitted from individual stationary sources." Accordingly, USEPA instructs that an evaluation of $PM_{2.5}$ ambient impacts associated with a single source focus on direct $PM_{2.5}$ emissions (75 Federal Register 6827-6836).

In the absence of any approved air dispersion models for predicting ambient $PM_{2.5}$ impacts of precursors for this analysis, an estimate of $PM_{2.5}$ impacts associated with NO_X and SO_2 precursors was undertaken by Enviroscientists (2010a). The methodology was based on the conversion rates of NO_X and SO_2 that are estimated from the transformation rate expressions used in the CALPUFF air dispersion model. CALPUFF is a USEPA-approved model for predicting long-range air pollutant impacts (USEPA 2010b) and is not directly applicable to predicting the localized or near-field impacts associated with the Cortez Hills Expansion Project. It is important to note that the USEPA has not approved this, or any other, approach for predicting localized ambient $PM_{2.5}$ impacts of precursors. In fact, this approach may result in overestimation of secondary $PM_{2.5}$ impacts.

The analysis of secondary $PM_{2.5}$ impacts combined the AERMOD modeling output data and the empirical chemical transformation relationships from the CALPUFF modeling results. The total estimated secondary $PM_{2.5}$ impacts are 5.6 $\mu g/m^3$ for the 24-hour averaging period and 0.61 $\mu g/m^3$ for the annual averaging period. These estimates are based on the CALPUFF conversion rates and the predicted NO_X and SO_2 impacts at the receptor having the highest direct $PM_{2.5}$ emissions. Addition of these secondary $PM_{2.5}$ impact concentrations to the modeled and background $PM_{2.5}$ concentrations for the approved Project as shown in **Table 3.10-2** indicate that the $PM_{2.5}$ emissions for both transport options would comply with the $PM_{2.5}$ NAAQS.

Estimated Impacts Based on USEPA's $PM_{2.5}$ Screening-level Guidance. The USEPA guidance for $PM_{2.5}$ modeling provides information on modeling procedures to demonstrate compliance with $PM_{2.5}$ NAAQS by creating a conservative "screening level analysis" for evaluating compliance with the $PM_{2.5}$ NAAQS. The USEPA guidance explains that the rationale for the coarse screening-level analysis is based primarily on the assumption that a modeling analysis will be performed for only direct $PM_{2.5}$ emissions and will not include air quality impacts associated with $PM_{2.5}$ precursors (NO_X and SO_2), which may result in secondary $PM_{2.5}$ impacts. Certain assumptions were made in the screening-level analysis, presumably to offset the lack of an explicit calculation or modeling of secondary $PM_{2.5}$ emissions. The analysis discussed above accounts for and presents modeling results for both direct and secondary generation of $PM_{2.5}$; thus, it is more explicit and detailed than the screening-level analysis described in the USEPA guidance.

The screening-level analysis conforming to the USEPA guidance also was conducted by Enviroscientists (2010a). As discussed below, the screening-level analysis also concluded that the approved Project would not exceed the $PM_{2.5}$ NAAQS. The differences between the screening-level analysis and the explicit air quality modeling analysis are described below.

Annual $PM_{2.5}$ NAAQS Analysis. The screening-level analysis described in the USEPA guidance for evaluating compliance with the annual $PM_{2.5}$ NAAQS recommends that where modeling is based on 1 year of meteorological data, which is the case for the Cortez Hills Expansion Project $PM_{2.5}$ air dispersion modeling, that the "annual design value" accounting for the background concentration should be added to the highest modeled annual average concentration. The "annual design value" is determined from a 3-year average of the annual average $PM_{2.5}$ concentrations based on monitored data. The screening-level analysis was conducted using the annual background value of 2.38 µg/m^3.

24-hour $PM_{2.5}$ NAAQS Analysis. The screening-level analysis described in the USEPA guidance for compliance with the 24-hour $PM_{2.5}$ NAAQS recommends that where modeling is based on 1 year of meteorological data, the monitored 24-hour design value should be added to the maximum modeled 24-hour average concentration. In other words, the USEPA guidance recommends that the modeler select the highest modeled value or first high, rather than the eighth highest value that normally is selected for compliance modeling when AERMOD is used.

The USEPA guidance also suggests a different method to calculate a background concentration when it recommends that the modeled concentration be added to the monitored "design value." The 24-hour design value is defined as the 3-year average of the 98th percentile 24-hour average $PM_{2.5}$ concentration. This approach yields a higher background concentration than was used in the comprehensive air quality modeling analysis. The recommendation in the USEPA's guidance is not considered realistic for assessing impacts of the Cortez Hills Expansion Project because the conditions that would lead to the highest background concentrations (low wind, stagnant conditions) are different from those that are expected to yield the higher project emissions (high wind conditions). Nevertheless, a screening-level analysis was conducted using the higher background value of 6.79 µg/m^3 shown in **Table 3.10-3**.

Table 3.10-3
GRBA1 $PM_{2.5}$ Annual Measurement Data Summary for Determination of a 24-hour Design Value

Data Year	Number of Observations	98th Percentile (µg/m^3)	Rolling 3-Year Average, 98th Percentile (µg/m^3)
2004	116	5.92	--
2005	121	6.49	--
2006	117	6.61	6.34
2007	104	7.27	**6.79**

Source: Enviroscientist 2010a.

Impacts Based on USEPA's Screening-level Guidance. Following the recommendations in the USEPA guidance, the screening-level analysis results indicate that the approved Project would not be expected to cause or contribute to a violation of the 24-hour or annual averaging period $PM_{2.5}$ NAAQS. **Tables 3.10-4** and **3.10-5** show the screening-level results using the first high modeled $PM_{2.5}$ air pollutant concentrations for the 24-hour and annual averaging periods, respectively.

Table 3.10-4
First High Modeled $PM_{2.5}$ Air Pollutant Concentrations for the 24-hour Averaging Period

Action	First High Modeled Receptor Location[1]		Dispersion Modeling Results (µg/m^3)	Dispersion Modeling Results with Background (µg/m^3)	Ambient Standard (µg/m^3)
	UTM East (m)	UTM North (m)			
Approved Project- Truck Hauling Option	530,533	4,449,278	27.55	34.34	35
Approved Project- Conveyor Option	530,533	4,449,278	26.28	33.07	35

[1] All coordinates in UTM projection, North American Datum 1983.

Source: Enviroscientists 2010a.

Table 3.10-5
First High Modeled $PM_{2.5}$ Air Pollutant Concentrations for the Annual Averaging Period

Action	First High Modeled Receptor Location[1]		Dispersion Modeling Results (µg/m^3)	Dispersion Modeling Results with Background (µg/m^3)	Ambient Standard (µg/m^3)
	UTM East (m)	UTM North (m)			
Approved Project- Truck Hauling Option	530,495	4,449,132	9.57	11.95	15
Approved Project- Conveyor Option	530,488	4,444,919	9.15	11.53	15

[1] All coordinates in UTM projection, North American Datum 1983.

Source: Enviroscientists 2010a.

Ore Transport to and Processing at Goldstrike

As described in Section 2.4.6 of the Cortez Hills Expansion Project Final EIS (BLM 2008a), CGM estimates a continued annual projected shipping rate of refractory ore from the Cortez Gold Mines Operations Area (Cortez) to the Barrick Goldstrike Mine (Goldstrike) of approximately 400,000 tpy. The Goldstrike mill is located on private land approximately 70 miles north of the Cortez Hills Expansion Project. The refractory ore sent to Goldstrike for processing would be processed through either the existing roasters or the autoclaves.

Ore Transport to Goldstrike. Emissions of criteria pollutants regulated under NAAQS for the truck traffic associated with transporting refractory ore from Cortez to Goldstrike were evaluated on a round-trip basis. The total potential emissions as a result of tailpipe emissions and fugitive dust from paved and unpaved road surfaces were analyzed. The emissions along the truck route were evaluated in six separate sections to reflect the change in road surface and truck speed. The six road sections include the dirt road that exits the Cortez property, Cortez access road, State Route 306, Interstate 80, State Route 766, and the Goldstrike dirt road that enters the Goldstrike Mine property.

The haul trucks are expected to average 23 tons per load. In the analysis, the hauling of 400,000 tpy of material assumes an average of 94 trucks per day for 45 weeks per year. The hauling is assumed to occur over a 12-year period, with varying amounts of ore coming from the Cortez Complex and Pipeline Complex annually. The emissions inventory uses an annual percentage from each site based on a 10-year average.

Combustion emission factors for PM_{10}, $PM_{2.5}$, NO_X, carbon monoxide (CO), and SO_2, were derived from the USEPA Mobile 6 model (USEPA 2004b). The potential fugitive dust emissions, PM_{10} and $PM_{2.5}$, for paved and unpaved roads were calculated using USEPA AP-42 factors (Environscientists 2010b).

Fugitive dust emissions from hauling refractory ore from Cortez to Goldstrike are estimated to be approximately 18.5 tpy of PM_{10} and 3.9 tpy of $PM_{2.5}$. Emissions of other criteria pollutants are estimated to include 9.1 tpy of CO, 25 tpy of NO_X, and 0.44 tpy of SO_2 (Enviroscientists 2010b). Due to the travel distance involved, concentrations of fugitive dust from paved and unpaved roads and tail pipe emissions from haul trucks would be unlikely to cause a violation of NAAQS for $PM_{10,}$ $PM_{2.5}$, CO, NO_X, or SO_2.

Ore Processing at Goldstrike.

***$PM_{2.5}$*.** $PM_{2.5}$ emission inventories were developed by Air Sciences Inc. (2010a) for analyzing the impacts of the processing of Cortez refractory ore at Goldstrike using USEPA AP-42 emission factors and site-specific operational data. Similarly, $PM_{2.5}$ emission inventories were developed for the total ore (Cortez and Goldstrike) processed at Goldstrike in order to assess $PM_{2.5}$ emissions associated with processing Cortez refractory ore relative to total $PM_{2.5}$ emissions associated with Goldstrike operations.

The $PM_{2.5}$ emissions, including fugitive and process emissions, from processing Cortez refractory ore at Goldstrike for 2010 through 2021 are shown in **Table 3.10-6**. The projected process emissions were split into emissions from sources that process autoclave ore only (autoclave sources), sources that process roaster ore only (roaster sources), and downstream sources that process a combined ore stream (downstream combined sources). It is estimated that from 2010 to 2021 the $PM_{2.5}$ emissions from processing Cortez refractory ore at Goldstrike would range from 8.01 to 8.53 tpy.

Table 3.10-7 shows the projected $PM_{2.5}$ emissions from the total ore processed at Goldstrike relative to the projected $PM_{2.5}$ emissions from processing Cortez refractory ore at Goldstrike for 2010 through 2021. Based on this assessment, the projected total $PM_{2.5}$ emissions from Goldstrike would range from 108.61 to 155.25 tpy, with Cortez refractory ore contributing between 5.3 and 7.7 percent of the total $PM_{2.5}$ emissions. Therefore, the emissions associated with Cortez refractory ore processing at Goldstrike would be a relatively small portion of the total emissions and would not cause or contribute to a violation of $PM_{2.5}$ NAAQS.

Table 3.10-6
Estimated $PM_{2.5}$ Emissions from Processing Cortez Refractory Ore at Goldstrike for 2010 through 2021

Year	Cortez Refractory Ore Throughput (tpy)			Cortez Refractory Ore $PM_{2.5}$ Emissions (tpy)				
	Autoclave Sources	Roaster Sources	Downstream Combined Sources	Autoclave Sources	Roaster Sources	Downstream Combined Sources	Fugitive Sources	Total
2010	40,000	360,000	400,000	0.75	5.44	1.06	0.91	8.16
2011	140,000	260,000	400,000	2.64	3.93	1.06	0.91	8.53
2012	100,000	300,000	400,000	1.89	4.53	1.06	0.91	8.38
2013	100,000	300,000	400,000	1.89	4.53	1.06	0.91	8.38
2014	100,000	300,000	400,000	1.89	4.53	1.06	0.91	8.38
2015	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01
2016	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01
2017	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01
2018	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01
2019	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01
2020	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01
2021	0	400,000	400,000	0.00	6.04	1.06	0.91	8.01

Source: Air Sciences Inc. 2010a.

Table 3.10-7
Estimated $PM_{2.5}$ Emissions from Processing Refractory Ore at Goldstrike for 2010 through 2021

Year	Total Throughput (tpy)	Total $PM_{2.5}$ Emissions (tpy)	Cortez $PM_{2.5}$ Emissions (tpy)	Cortez Percent (percent)
2010	6,859,212	155.25	8.16	5.3
2011	6,727,067	152.26	8.53	5.6
2012	4,798,774	108.61	8.38	7.7
2013	4,981,560	112.75	8.38	7.4
2014	5,045,295	114.19	8.38	7.3
2015	5,123,179	115.96	8.01	6.9
2016	5,123,996	115.98	8.01	6.9
2017	5,098,703	115.40	8.01	6.9
2018	5,050,342	114.31	8.01	7.0
2019	5,047,101	114.23	8.01	7.0
2020	5,055,431	114.42	8.01	7.0
2021	5,013,669	113.48	8.01	7.1

Source: Air Sciences Inc. 2010a.

Criteria Pollutants. The Betze Pit Expansion Project Draft EIS (BLM 2008c) addressed the potential impacts from PM_{10}, SO_2, NO_X, and CO emissions from Goldstrike. These impacts are shown in **Table 3.10-8** along with the NAAQS. Based on the EIS analysis, the total impacts from Goldstrike would be below the NAAQS for all pollutants.

Table 3.10-8
Modeled Criteria Pollutant Concentrations from Goldstrike

Pollutant	Total Modeled Concentrations ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
24-hour PM_{10}	16.65	150
Annual PM_{10}	10.62	50
3-hour SO_2	13.03	1,300
24-hour SO_2	2.94	365
Annual SO_2	0.4	80
Annual NO_2	0.83	100
1-hour CO	216.49	40,000
8-hour CO	38.25	10,000

Source: Air Sciences Inc. 2010b.

The emission of criteria pollutants from the processing of Cortez ore at Goldstrike was estimated by Air Sciences Inc. (2010b) based on the amount of Cortez refractory ore that would be processed relative to the total ore processed at Goldstrike. For example, Goldstrike is projected to process a total of approximately 6,859,000 tons of ore in 2010. Cortez would send Goldstrike 400,000 tons of refractory ore annually, which would account for approximately 5.8 percent of the total ore processed at Goldstrike in 2010. Therefore, it is anticipated that the emissions attributable to Cortez refractory ore processing would be approximately 5.8 percent of the total emissions of criteria pollutants as shown in **Table 3.10-9**.

Table 3.10-9
Cortez Refractory Ore as a Percent of Total Goldstrike Throughput for 2010 through 2021

Year	Ore Throughput (tpy)		Cortez Refractory Ore as Percent of Total
	Total	Cortez	
2010	6,859,212	400,000	5.8
2011	6,727,067	400,000	5.9
2012	4,798,774	400,000	8.3
2013	4,981,560	400,000	8.0
2014	5,045,295	400,000	7.9
2015	5,123,179	400,000	7.8
2016	5,123,996	400,000	7.8
2017	5,098,703	400,000	7.8
2018	5,050,342	400,000	7.9
2019	5,047,101	400,000	7.9
2020	5,055,431	400,000	7.9
2021	5,013,669	400,000	8.0

Source: Air Sciences Inc. 2010b.

The percent attributable to Cortez refractory ore would vary annually based on the total amount of ore processed at Goldstrike. **Table 3.10-9** shows the estimated percent of the total ore processed at Goldstrike that would be attributed to processing Cortez ore for 2010 through 2021. Based on this evaluation, the processing of 400,000 tons of Cortez ore annually is anticipated to contribute between 5.8 and 8.3 percent of the total ore processed and a corresponding percent of the total emissions from Goldstrike shown in **Table 3.10-8**. Based on this analysis, emissions of criteria pollutants at Goldstrike due to Cortez refractory ore processing would not cause or contribute to a violation of NAAQS.

Hazardous Air Pollutant Emissions. The Betze Pit Expansion Project Draft EIS (BLM 2008c) provided the 2006 HAP emissions inventory for Goldstrike. The inventory showed a total of 7.96 tpy of HAP emissions from Goldstrike. Based on 400,000 tpy of Cortez refractory ore compared to the total tpy of ore processed at Goldstrike, it is estimated that the Cortez refractory ore would contribute between 5.8 and 8.3 percent of the total ore processed (**Table 3.10-9**) and a corresponding percent of the total HAP emissions (0.46 to 0.66 tpy) (Air Sciences Inc. 2010b).

This analysis provides a conservatively high estimate of HAP emissions from Cortez refractory ore, because it assumes that the total HAP emissions would remain constant each year. However, as shown in **Table 3.10-9**, the total ore processed at Goldstrike generally would be reduced from current levels, with a corresponding decline in total HAP emissions.

The Air Sciences Inc. (2010b) analysis also assumed that processing 1 ton of Cortez refractory ore would result in the same emissions as processing 1 ton of Goldstrike ore. This is a conservative approach because the 2006 HAP emissions inventory for Goldstrike reflects both the mining and processing of ore at the site, whereas the Cortez ore only would contribute to the processing-related HAP emissions at Goldstrike.

Based on this conservative anlaysis, HAP emissions at Goldstrike would not be anticipated to increase as a result of the processing of 400,000 tpy of Cortez refractory ore. Therefore, the combined HAP emissions at Goldstrike would remain well below the major source limit of 25 tpy.

Mercury Emissions*.* The projected mercury emissions from processing ore at Goldstrike was estimated by Air Sciences Inc. (2010c) based on Goldstrike's most recent mercury stack test results and the most recent hours of operational data. An estimate of mercury emissions associated with processing Cortez refractory ore at Goldstrike was made by Air Sciences Inc. (2010c) based on the amount of Cortez refractory ore and its mercury concentration relative to the total volume of ore processed at Goldstrike and its mercury concentration.

The Betze Pit Expansion Project Draft EIS (BLM 2008c) included an analysis of mercury deposition impacts associated with ore processing at Goldstrike based on an estimate of Goldstrike's mercury emissions. An allocation of mercury deposition impacts associated with processing Cortez refractory ore at Goldstrike was made by Air Sciences Inc. (2010c) based on the estimated mercury emissions associated with processing Cortez refractory ore at Goldstrike relative to the estimate of Goldstrike's mercury emissions used in the Betze EIS analysis of mercury deposition impacts.

Mercury Emissions Apportioned by Throughput. Based on the most recent stack test results representative of future operations at Goldstrike and the hours of operation data for 2009 (which provide a conservatively high estimate of future utilization) for operation of the Goldstrike roasters and autoclaves, the total annual mercury emissions for 2009 from ore processing at Goldstrike are projected to be 378 pounds per year (lb/yr). This estimate was based on the processing of a total of 6,859,000 tons of ore at Goldstrike in 2009. The mercury emissions from processing Cortez refractory ore at Goldstrike was estimated by Air Sciences Inc. (2010c) based on the amount of Cortez ore processed relative to the total ore processed at Goldstrike.

Goldstrike is projected to process a total of approximately 6,859,000 tons of ore in 2010, which is the current maximum projected annual production through the end of the mine life. In 2010, of the total ore processed, Goldstrike plans to process approximately 4,914,000 tons through the roasters and approximately 1,945,000 tons through the autoclaves. CGM plans to continue to send 400,000 tons of refractory ore to Goldstrike annually for processing through either the roasters or autoclaves, depending on the type of refractory ore. In 2010, 40,000 tons of the Cortez refractory ore is planned to be processed in the autoclaves and 360,000 tons is planned to be processed in the roasters at Goldstrike.

The 2010 annual mercury emissions associated with processing Goldstrike ore and Cortez refractory ore are apportioned by annual throughput. For example, 400,000 tons of Cortez refractory ore is 5.8 percent of the total (6,859,000 tons) ore processed at Goldstrike. The retorts are estimated to have a total of 12.6 lb/yr of mercury emissions, with 5.8 percent (0.7 lb/yr) attributed to the Cortez ore; 94.2 percent (11.9 lb/yr) are attributed to the Goldstrike ore.

Mercury Emissions Apportioned by Mercury Content. For each emission unit, the mercury emissions attributed to Cortez refractory ore were apportioned based on the average mercury content of the Cortez ore processed by the unit relative to the average mercury content of the Goldstrike ore processed by the unit. Assuming a linear increase in emissions with an increase in ore, mercury concentration provides a conservatively high estimate of mercury emissions. The estimated 2010 annual mercury emissions were apportioned by ore mercury concentration from processing Cortez refractory ore at Goldstrike.

Mercury Emissions Estimate for 2010 through 2021. Estimated mercury emissions from the processing of Cortez refractory ore at Goldstrike for years 2010 through 2021 are shown in **Table 3.10-10**. The emissions from Cortez refractory ore processing for 2011 through 2021 were calculated based on the emission estimation described above and adjusted to account for the differences in the quantity and the mercury concentration of the Cortez ore planned to be processed in the roasters and autoclaves in each of those years. **Table 3.10-10** also shows the projected percentage that the Cortez ore emissions would represent of the total mercury emissions.

Mercury Deposition. Relative contributions of mercury deposition from Nevada gold mining operations and other local, regional, and global sources to watersheds located in Nevada are based on USEPA computer simulation modeling using the Regional Modeling System for Aerosols and Deposition (REMSAD) model. The REMSAD results are used to quantify contributions of specific sources and source categories to mercury deposition within each of the lower 48 states (USEPA 2006).

The REMSAD model is designed to calculate the concentrations of both inert and chemically reactive pollutants by simulating the physical and chemical processes in the atmosphere that affect the pollutants. The model is designed to simulate the chemical transfer of mercury mass from one form (particulate, divalent gaseous, and elemental) to another. REMSAD simulates both wet and dry deposition of mercury.

Wet deposition occurs as a result of precipitation scavenging during rain or snow storms. Dry deposition is calculated for each mercury species based on land use characteristics and meteorological parameters. REMSAD also includes re-emission of previously deposited mercury originating from anthropogenic and natural sources into the atmosphere from land and water surfaces.

The USEPA REMSAD modeling domain encompassed the continental U.S. and portions of Canada and Mexico, with a 12-km horizontal grid resolution over the entire U.S. portion of the domain. The model utilized 2001 meteorological data files with a 36-km horizontal resolution. The AggreGATOR program was developed as a tool for overlaying the model output grid from the USEPA REMSAD modeling to any polygon of interest (e.g., a hydrologic boundary or state boundary). The AggreGATOR program allows the

Table 3.10-10
Estimated Mercury Emissions from Processing Cortez Refractory Ore at Goldstrike for 2010 through 2021

Year	Autoclave		Roaster		Total		Cortez Refractory Ore Mercury Emissions (lb/yr)	Percent of REMSAD
	Throughput (tpy)	Mercury Concentration[1] (ppm)	Throughput (tpy)	Mercury Concentration[1] (ppm)	Throughput (tpy)	Mercury Concentration[1] (ppm)		
2010	40,000	245.0	360,000[2]	35.0	400,000	56.0	76.2	13.0
2011	140,000	324.0	260,000[2]	57.4	400,000	150.7	135.0	23.0
2012	100,000	177.0	300,000	177.0	400,000	177.0	290.0	49.3
2013	100,000	80.0	300,000	80.0	400,000	80.0	131.1	22.3
2014	100,000	80.0	300,000	80.0	400,000	80.0	131.1	22.3
2015	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3
2016	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3
2017	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3
2018	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3
2019	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3
2020	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3
2021	0	N/A	400,000	80.0	400,000	80.0	160.6	27.3

[1] Mercury concentrations are an average of the Cortez Hills Complex and Pipeline Complex refractory ore mercury content, weighted by throughput.

[2] 340,000 of those tons in 2010 and 230,000 of those tons in 2011 would be shipped from CGM's Pipeline Pit as authorized by the 2005 Pipeline/South Pipeline Expansion Project ROD.

Source: Air Sciences 2010c.

results from the USEPA REMSAD modeling to be analyzed in a customized fashion to assess mercury deposition contributions from specific sources and categories of sources at specified areas (e.g., watersheds) within the model domain.

The AggreGATOR program incorporates the REMSAD 12-km grid cell output data and aggregates the data so that it can be viewed for an entire watershed or state. The watersheds defined by the AggreGATOR program for Nevada typically include 30 to 60 REMSAD grid cells. The AggreGATOR program allows the user to specify:

- The target area (watershed, group of watersheds, entire state, etc.);
- The source or group of sources for the denominator (usually all the sources including global background are selected); and
- The source or group of sources for the numerator.

The AggreGATOR program calculates the relative percentage of deposition from the source(s) selected for the numerator to the deposition from the source(s) selected for the denominator within the target area.

In the Betze Pit Expansion Project Draft EIS (BLM 2008c), the analysis of mercury deposition from Goldstrike was based on the 2007 version of the USEPA REMSAD modeling. The total mercury emissions modeled for Goldstrike in the 2007 REMSAD modeling was 588 lb/yr based on an estimate of Goldstrike's 2006 mercury emissions. Air Sciences Inc.'s (2010c) estimated mercury deposition associated with processing Cortez refractory ore at Goldstrike by assuming that those deposition impacts would be in direct proportion to the mercury emissions associated with processing Cortez ore at Goldstrike compared to the total emissions modeled.

As shown in **Table 3.10-10**, the highest projected mercury emissions from processing Cortez ore at Goldstrike are 290.0 lb/yr. This value was used to provide a maximum estimate of mercury deposition impacts associated with processing Cortez refractory ore at Goldstrike. Since 290.0 lb/yr represents 49.3 percent of the total Goldstrike mercury emissions used in the REMSAD modeling (588 lb/yr), it was estimated that the mercury deposition from processing Cortez ore at Goldstrike would account for approximately 49.3 percent of the total depositional impact attributed to the mercury emissions modeled for Goldstrike. The fraction of the maximum annual mercury emissions associated with the processing of Cortez refractory ore at Goldstrike would not contribute significantly to near-field mercury deposition. Mercury emissions estimated for processing of Cortez refractory ore would be less than 4 percent of the mercury emissions from northern Nevada gold mining sources.

3.10.2.2 Proposed Action (in Cortez Hills Expansion Project Final EIS [BLM 2008a])

The Proposed Action is described in Section 2.4 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Based on the modeling and analysis conducted by Enviroscientists (2010a) for this alternative, potential $PM_{2.5}$ emissions from on-site activities would be slightly higher than those described for the approved Project; however, the emissions would be unlikely to cause a violation of the $PM_{2.5}$ NAAQS.

Under this alternative, the annual maximum tpy of Cortez refractory ore shipped to Goldstrike for off-site processing would be the same as under the approved Project. Therefore, air emissions of criteria pollutants (including $PM_{2.5}$), mercury, and other HAPs would be similar to those described for the approved Project. As a result, no exceedence of the NAAQS would be anticipated, and HAPs emissions, including mercury, would be anticipated to be below the major source limit of 25 tpy.

3.10.2.3 Grass Valley Heap Leach Alternative

The Grass Valley Heap Leach Alternative is described in Section 2.5.1.1 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The location of the Grass Valley Heap Leach Facility south of the Cortez townsite under this alternative would result in different haulage distances and fence lines relative to the approved Project. Based on the modeling and analysis conducted by Enviroscientists (2010a) for the action alternatives, including the Grass Valley Heap Leach Alternative, potential $PM_{2.5}$ emissions for on-site activities would be higher than those described for the approved Project and potentially would cause a violation of the $PM_{2.5}$ NAAQS.

Under this alternative, the annual maximum tpy of Cortez refractory ore shipped to Goldstrike for off-site processing would be the same as under the approved Project. Therefore, air emissions of criteria pollutants (including $PM_{2.5}$), mercury, and other HAPs would be similar to those described for the approved Project. As a result, no exceedence of the NAAQS would be anticipated, and HAPs emissions, including mercury, would be anticipated to be below the major source limit of 25 tpy.

3.10.2.4 Crescent Valley Waste Rock Alternative

The Crescent Valley Waste Rock Alternative is described in Section 2.5.1.2 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The location of a waste rock facility in Crescent Valley, rather than in Cortez Canyon as per the approved Project, would result in different haulage distances, fence lines, and county road reconfiguration. Based on the modeling and analysis conducted by Enviroscientists (2010a) for the action alternatives, including the Crescent Valley Waste Rock Alternative, potential $PM_{2.5}$ emissions for on-site activities would be higher than those described for the approved Project and potentially would cause a violation of the $PM_{2.5}$ NAAQS.

Under this alternative, the annual maximum tpy of Cortez refractory ore shipped to Goldstrike for off-site processing would be the same as under the approved Project. Therefore, air emissions of criteria pollutants (including $PM_{2.5}$), mercury, and other HAPs would be similar to those described for the approved Project. As a result, no exceedence of the NAAQS would be anticipated, and HAPs emissions, including mercury, would be anticipated to be below the major source limit of 25 tpy.

3.10.2.5 Cortez Hills Complex Underground Mine Alternative

The Cortez Hills Complex Underground Mine Alternative is described in Section 2.5.1.3 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Under this alternative, surface facilities at the Cortez Hills Complex would not be developed, resulting in 4,843 fewer acres of surface disturbance than the approved Project, and only mill-grade ore would be mined. Although modeling was not conducted for this alternative, it is anticipated that potential $PM_{2.5}$ emissions from on-site activities would be lower than those described for the approved Project based on the reduced surface disturbance and associated elimination of surface facilities (e.g., Cortez Hills Pit, three waste rock facilities, and heap leach facilities). Therefore, mining under this alternative would be unlikely to cause a violation of the $PM_{2.5}$ NAAQS.

Under this alternative, the annual maximum tpy of Cortez refractory ore shipped to Goldstrike for off-site processing would be the same as under the approved Project. Therefore, air emissions of criteria pollutants (including $PM_{2.5}$), mercury, and other HAPs would be similar to those described for the approved Project. As a result, no exceedence of the NAAQS would be anticipated, and HAPs emissions, including mercury, would be anticipated to be below the major source limit of 25 tpy.

3.10.2.6 No Action Alternative

The No Action Alternative is described in Section 2.5.1.5 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). Under this alternative, previously approved operations at CGM's Pipeline/South Pipeline Project would continue; none of the operations proposed in the Cortez and Cortez Hills complexes would be conducted. Based on the modeling and analysis conducted by Enviroscientists (2010a) for the No Action Alternative, potential $PM_{2.5}$ emissions from on-site activities would be lower than those described for the approved Project and would be unlikely to cause a violation of the $PM_{2.5}$ NAAQS.

Under this alternative, the annual maximum tpy of refractory ore shipped to Goldstrike for off-site processing would be the same as under the approved Project. Therefore, air emissions of criteria pollutants (including $PM_{2.5}$), mercury, and other HAPs would be similar to those described for the approved Project. As a result, no exceedence of the NAAQS would be anticipated, and HAPs emissions, including mercury, would be anticipated to be below the major source limit of 25 tpy.

3.10.3 Cumulative Impacts

Cumulative air quality impacts for PM_{10} and mercury are described in Section 3.10.3 of the Cortez Hills Expansion Project Final EIS (BLM 2008a). The cumulative $PM_{2.5}$ impacts for the approved Project were evaluated based on model-predicted maximum 24-hour and annual concentrations of $PM_{2.5}$ that were added to background concentrations of 24-hour and annual monitored values.

The cumulative analysis for $PM_{2.5}$ utilized the conservative screening-level analysis described in the USEPA guidance for compliance with the 24-hour $PM_{2.5}$ NAAQS (USEPA 2010a). This guidance recommends that the monitored 24-hour design value be added to the maximum modeled 24-hour average concentration. The monitored design value is defined as the 3-year average of the 98th percentile 24-hour average $PM_{2.5}$ concentration. The cumulative analysis assumed that the monitored background design values account for other air quality sources in the region; the analysis used the 24-hour background value of 6.79 $\mu g/m^3$. Adding the maximum 24-hour modeled value to the background yields a conservative value of 34.34 $\mu g/m^3$, as shown in **Table 3.10-11**.

Table 3.10-11
Cumulative $PM_{2.5}$ Air Pollutant Concentrations with the Approved Project

Averaging Time	Highest Modeled Receptor Location[1]		Dispersion Modeling Results ($\mu g/m^3$)	Dispersion Modeling Results with Background ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
	UTM East (m)	UTM North (m)			
24-hour	530,533	4,449,278	27.55	34.34	35
Annual	530,495	4,449,132	9.57	11.95	15

[1] All coordinates in UTM projection, North American Datum 1983.

Source: Enviroscientists 2010a.

The screening-level analysis described in the USEPA guidance (USEPA 2010a) for compliance with the annual $PM_{2.5}$ NAAQS recommends that the monitored annual design value be added to the maximum modeled annual average concentration. The "annual design value" is determined from a 3-year average of the annual average $PM_{2.5}$ concentrations based on monitored data. The cumulative analysis assumes that the monitored background design values account for other air quality sources in the region; the analysis used the annual background value of 2.38 $\mu g/m^3$. Adding the maximum annual modeled value to the annual design value background yields a conservative cumulative $PM_{2.5}$ level of 11.95 $\mu g/m^3$ as shown in **Table 3.10-11**.

Cumulative $PM_{2.5}$ impacts under the No Action Alternative are anticipated to be lower than under the approved Project. Cumulative $PM_{2.5}$ impacts under the other action alternatives would be higher or lower (depending on the alternative) than under the approved Project. The Grass Valley Heap Leach Alternative and Crescent Valley Waste Rock Alternative would have higher $PM_{2.5}$ emissions than the approved Project; these alternatives potentially would result in cumulative impacts that contribute to a violation of the NAAQS for $PM_{2.5}$.

Off-site processing of Cortez refractory ore would vary each year but would contribute between 5.8 and 8.3 percent of the total annual $PM_{2.5}$ emissions from ore processing at Goldstrike. A conservative screening-level analysis of $PM_{2.5}$ impacts is made by assuming modeled impacts of PM_{10} are all $PM_{2.5}$ and adding background levels to compare the total to NAAQS. This conservative approach indicates that annual cumulative $PM_{2.5}$ impacts would be less than 13.0 $\mu g/m^3$, and 24-hour cumulative $PM_{2.5}$ impacts would be 23.44 $\mu g/m^3$. Therefore, no violation of the $PM_{2.5}$ NAAQS would be anticipated.

A conservative estimate of cumulative impacts due to processing Cortez refractory ore at Goldstrike is shown in the concentrations of the other modeled criteria pollutants in **Table 3.10-8**. The impact attributed to Cortez refractory ore processing at Goldstrike is a small percentage, less than 5 percent, of these total impacts.

The 2006 HAP emission inventory for Goldstrike, addressed in the Betze Pit Expansion Project EIS (BLM 2008c), shows a total of 7.96 tons per year of HAP emissions and represents cumulative impacts of processing refractory ore at Goldstrike. Cortez refractory ore would contribute between 5.8 and 8.3 percent of these total HAP emissions (0.46 to 0.66 tons per year) at Goldstrike. Mercury emissions from ore processing and the associated cumulative impacts were discussed in Section 3.10.3 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

All criteria pollutant levels are expected to meet NAAQS, resulting in very low cumulative impacts as a result of the approved Project. Mercury impacts and other HAP emissions are expected to be the same as discussed in the Cortez Hill Expansion Project Final EIS (BLM 2008b).

Off-site transport of refractory ore would increase $PM_{2.5}$ levels along the transport route; however, the level of emissions spread over these distances likely would not cause or contribute to a violation of NAAQS. Off-site transport of refractory ore also would cause a slight increase in $PM_{2.5}$ impacts in the vicinity of the Goldstrike ore processing facility but would not cause a violation of NAAQS.

3.10.4 Monitoring and Mitigation Measures

Monitoring and mitigation measures are discussed in Section 3.10.4 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

3.10.5 Residual Adverse Impacts

Residual adverse impacts are discussed in Section 3.10.5 of the Cortez Hills Expansion Project Final EIS (BLM 2008a).

4.0 PUBLIC COORDINATION

4.1 Public Participation and Scope of the SEIS

The public participation program for the Cortez Hills Expansion Project EIS includes an open forum for determining the scope of issues to be addressed in the assessment.

The BLM published a NOI to prepare a EIS in the Federal Register on July 16, 2010 (Federal Register Volume 75, Number 136).

As described in Chapter 1.0, the BLM elected to prepare this SEIS after the U.S. Court of Appeals for the Ninth Circuit issued a decision on December 3, 2009, which found that plaintiffs South Fork Band Council of Western Shoshone of Nevada, Timbisha Shoshone Tribe, Great Basin Resource Watch, and Western Shoshone Defense Project were likely to succeed on the merits of their challenge with respect to two specific analyses in the Final EIS for this project. The scope of this SEIS includes refined analyses of the potential air quality impacts of the off-site transportation to and processing of Cortez refractory ore at the existing Goldstrike Mine and the effectiveness of mitigation measures for potential impacts to surface water resources from mine-related groundwater drawdown. The results of modeling of $PM_{2.5}$ emissions from the Cortez Hills Expansion Project also are included in this SEIS.

4.2 Native American Consultation

Native American consultation for the original Cortez Hills Expansion Project EIS has been ongoing. The BLM sent a letter to Native American groups on August 4, 2010, advising them of the preparation of this SEIS. **Table 4-1** lists Native American groups contacted throughout the consultation process and the dates on which the BLM has exchanged dialogue from February 2009 through early July 2010. Additional details of ongoing consultation with area tribes, tribal groups, and their representatives are maintained in the BLM consultation records for this project; this information is considered confidential.

Table 4-1
Native American Contact List
(February 13, 2009 through July 7, 2010)

Name of Tribe or Other Group	Date of Contact
Yomba Shoshone Tribe	March 1, 2010 September 21, 2009 September 15, 2009 September 1, 2009 July 15, 2009 June 9 and 11, 2009 June 8, 2009 February 13, 2009

Table 4-1 (Continued)

Name of Tribe or Other Group	Date of Contact
Battle Mountain Band of the Te-Moak Tribe of Western Shoshone	March 1, 2010 September 23, 2009 September 3, 2009 September 2009 (Newsletter) August 2009 (Newsletter) July 30, 2009 July 15, 2009 June 9 and 11, 2009 April 27, 2009
Big Smoky Valley Shoshone	March 1, 2010 July 15, 2009 June 9 and 11, 2009
South Fork Band of the Te-Moak Tribe of Western Shoshone	September 22, 2009 September 8, 2009 July 15, 2009 June 9 and 11, 2009
Wells Band of the Te-Moak Tribe of Western Shoshone	July 15, 2009 June 9 and 11, 2009
Elko Band of the Te-Moak Tribe of Western Shoshone	September 9, 2009 July 15, 2009 June 9 and 11, 2009 March 16, 2009 March 11, 2009
Te-Moak Tribe of the Western Shoshone	July 7, 2010 September 9, 2009 June 24, 2010 August 19, 2009 August 5, 2009 July 15, 2009 June 9 and 11, 2009 June 8, 2009 May 12, 2009 April 27, 2009 April 23, 2009 April 21 and 22, 2009 April 20, 2009 April 15 and 16, 2009 April 14, 2009 April 13, 2009 April 6, 7, and 8, 2009 March 19, 2009 March 18, 2009 March 16, 2009 March 9, 2009
Duckwater Shoshone Tribe	March 1, 2010 September 23, 2009 September 2, 2009 July 15, 2009 June 9 and 11, 2009
Duck Valley Shoshone-Paiute Tribes of Idaho and Nevada	September 14, 2009 August 31, 2009 July 15, 2009 June 9 and 11, 2009 March 18, 2009

Table 4-1 (Continued)

Name of Tribe or Other Group	Date of Contact
Ely Shoshone Tribe	September 8, 2009 July 15, 2009 June 9 and 11, 2009
Timbisha Shoshone Tribe	July 15, 2009 June 9 and 11, 2009
Western Shoshone Defense Project	July 15, 2009 June 9 and 11, 2009 April 14, 2009 April 6, 2009
Western Shoshone Committee of Duck Valley	July 15, 2009 June 9 and 11, 2009 April 18, 2009 April 6, 7, and 8, 2009 March 25, 2009 March 20, 2009 March 19, 2009 March 18, 2009 March 9, 2009 March 4, 2009

Source: BLM 2010.

4.3 List of Contacts

While preparing the SEIS for the Cortez Hills Expansion Project, the BLM communicated with, and received input from, various federal and state agencies and tribal and private organizations. The following sections list these contacts.

4.3.1 Federal Agencies

U.S. Environmental Protection Agency

4.3.2 State Agencies

Nevada Department of Wildlife
Nevada Division of Environmental Protection

4.3.3 Tribal and Other Organizations

Recent contacts with these organizations are listed in **Table 4-1**.

4.4 List of Agencies, Organizations, and Persons to Whom Copies of this Statement are Sent

4.4.1 Federal Agencies

Bureau of Land Management, Carson City District
Bureau of Land Management, Elko District
Bureau of Land Management, Ely District
Bureau of Land Management, Las Vegas District
Bureau of Land Management, Pocatello District
Bureau of Land Management, Tonopah Field Office
Bureau of Land Management, Winnemucca District
U.S. Army Corp of Engineers, Reno, Nevada
U.S. Army Corps of Engineers, Sacramento, California
U.S. Department of Energy, Office of Environmental Compliance, Washington, DC
U.S. Department of the Interior, BLM, Office of Public Affairs, Washington, DC
U.S. Department of the Interior, OEPC, Washington, DC
U.S. Environmental Protection Agency, Washington, DC
U.S. Environmental Protection Agency, San Francisco, California
U.S. Fish and Wildlife Service, Reno, Nevada
U.S. Forest Service, Austin Ranger District
U.S. Forest Service, Tonopah Ranger District

4.4.2 State Agencies/Universities

Nevada State Clearinghouse/SPOC, Dept of Administration
Nevada Department of Agriculture
Nevada Department of Conservation and Natural Resources, Division of State Lands
Nevada Department of Minerals
Nevada Department of Transportation
Nevada Department of Wildlife, Elko, Nevada
Nevada Department of Wildlife, Las Vegas, Nevada
Nevada Department of Wildlife, Reno, Nevada
Nevada Division of Environmental Protection
Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
Nevada Division of Forestry
Nevada State Historic Preservation Office, Carson City, Nevada
University of Nevada – Gund Ranch, Beowawe, Nevada
University of Nevada – Reno, Reno, Nevada

4.4.3 Elected Officials

John Carpenter, Assemblyman
John Ensign, U.S. Senator
Pete Goicoechea, Assemblyman
Jim Gibbons, Governor

John Marvel, Assemblyman
Harry Reid, U.S. Senator
Dean A. Rhoads, State Senator
Dina Titus, U.S. Representative

4.4.4 County and Local Agencies

Crescent Valley Town Board
Eureka County Commissioners
Elko Chamber of Commerce
Elko County Commissioners
Esmeralda County Commission
Eureka County Natural Resources Department
Greater Austin Chamber of Commerce
Humboldt County Commissioners
Humboldt River Basin Water Authority
Lander County Commissioners, Battle Mountain
Lander County Public Land Use Advisory Commission
Lander Economic Development Authority

4.4.5 Tribal Organizations

Battle Mountain Band Te-Moak Tribe of the Western Shoshone
Bureau of Indian Affairs, Eastern Nevada Agency
Duckwater Shoshone Tribe
Elko Band Te-Moak Tribe of the Western Shoshone
Ely Shoshone Tribe
Shoshone-Paiute Tribes of Duck Valley
South Fork Band Te-Moak Tribe of the Western Shoshone
Te-Moak Tribe of the Western Shoshone
Timbisha Shoshone Tribe
Wells Band Te-Moak Tribe of the Western Shoshone
Western Shoshone Committee of Duck Valley
Yomba Shoshone Tribe

4.4.6 Newspapers and Libraries

Battle Mountain Bugle
Colorado State University Libraries
Elko Daily Free Press
Eureka Sentinel
Humboldt Sun

4.4.7 Organizations

Beatty Historical Museum Society
Commission for Preservation of Wild Horses
Committee for the High Desert
Earth Knowledge
EarthWorks
Eureka Sentinel Museum
Eureka Nuclear Waste Committee
Great Basin Resource Watch
MOSO RAC
Natural Resources Defense Council
Nevada Cattlemen's Association
Nevada Trappers Association
Railroad Symposium
Sierra Club, Toiyabe Chapter
The Fund for Animals
Western Mining Action Project
Western Shoshone Defense Project
Western Watersheds Project
WHOA
Wild Horse Preservation League
Wild Horse Wildness and Wildlife

4.4.8 Industry/Business

American Asphalt
AngloGold North America
Barrick Gold Corporation
Beatty Cattle Company LLC
Becker Realty
Broadbent & Associates, Inc.
C Ranches Inc.
Carter Cattle Company
Chiara Ranch
Coral Gold Resources
Cortez Gold Mines
Cortez Joint Venture DBA Dean Ranch
Crowell & Moring
Denver Mining Finance Co.
Doubek Hydrologic
ECM
EIP Associates
Florida Canyon Mine
Flying T Ranch

Geological & Environmental Consulting
Geothermal Associates
GIS Land Services
Glamis Gold Ltd.
Hecla Ventures Corporation
International Mining Services
JBR Environmental Consultants
Julian Tomera Ranches, Inc.
Kuipers and Associates
Lang Exploratory Drilling
Nevada Land and Resources Company
Nevada Mining Association
Newmont Exploration
Newmont Mining Corporation
Parsons, Behle & Latimer
Permits West Inc.
Plumb Line Mechanical
Railroad Symposium
Redi Services LLC
Resource Concepts Inc.
Romarco Minerals Inc.
Round Mountain Gold Corporation
Sage Engineering
Sansinena Ranch
Sierra Pacific Power Company
Summa Minerals
Summit Envirosolutions
Toiyabe Exploration Inc.
Truckee River Ranch
Twin Springs Ranch
Vogue Linen Supply
Weyerhaeuser Company

4.4.9 Individuals

Leon Abrams
Gary Adams
Donna Bailey
Marriah Banghart
Clay Baty
Mark Blair
Jack Broughton
Madaya and Shayne Burdine
Paul Burkett
Ann Carpenter
Joseph Carruthers
C. Joel Cashburn
Christopher Christie
Rex Cleary
Roy Clifford
Thomas Cope

Joe Dahl
Ronald Damele
Bruce Delaney
Brent Downey
Al Drayton
Vickie Drenon
Barbara and Ken Dugan
Dave Early
Eden
Fred Etchegaray
John Etchegaray
Leroy Etchegaray
John and Ginger Fareio
Julie Fishel
Mary Fischer
Malloy Foster
Aaron Foxworthy
Theresa Gaiato
Dawn Gann
Joe Giraudo
Donna Grill
Carl and Carole Hanks
Ritonda Harding
Cynthia Harris
Rich Harrison
Colleen Henderson
Tuesday Henderson
Jerry Hepworth
Felix and Merlene Ike
Kevin Jackson
Bud Johns
Tara Johnson
Walter Johnson
L.A. Jones
Bill and Peggy Kirkpatrick
Lee Koch
Bill Kohlmoos
David Knopp
Joseph Laravie
John Lemke
Frank Lewis
Ruby Lingelbach
John Livermore
J. Locke
Sara Locke
Robert Long
Pat Lore
Nancy Louden
Corey Lucero
Dave Mason
Rex Massey
Dorene McClure
Suzy McCoy
Robert McCracken
Norman McKitrick
Peter McKone
Richard Medley
Gale Mehrer
Diane Mihal
John Minoletti
Robert Moran
Ken Moss
Mike Musey
Bob McCusker
Gary McGill
Sheldon Morrison
Marion Murphy
Jason New
Henry Nye
Eric Oakes
Royal Orser
Adell and Norman Panning
Durk Pearson
Mark Pearson
Elaine Peterson
Earl Phillips
David Plummer
Kenneth Reim
Trish Rippie
Dan Richards
Joe Rodriquez
Bret Rosecrans
Brian Rowley
Paul Sadler
Sam Sandoval
Andy Rainwater Sandvile

Mike Sansinena
Fritz Sawyer
Thom Seal
Jay Scott
Robert Shaw
Sandy Shaw
Diane Shelley
Wanda Shuflin
Marjorie Sill
Mark Simpson
Carl Slagowski
Gordon Sobering
Randy Spevak
Kevin Stills
Jason Sutherland
Beth Swartz
Edward Syrjala
Bill Templeton
Keith Testerman
Vernon Thompson
Ken Toulsen
Wally Trapnell
Duane Tyree
Jose Vasquez
Ronie Waddell
Carol Wagner
Randy Walund
Fay Ward
Joan Whitney
Lois Whitney
Doug Wilson
Holly Wilson
Ed and Miriam Ylst

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