2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter describes the proposed project as described by CGM in the draft Amendment to the Pipeline/South Pipeline Plan of Operations for the Cortez Hills Project and Modification to Reclamation Plan Permit Application (CGM and SRK Consulting [SRK] ***2008***) and supporting plans (Proposed Action); other alternatives, including the No Action Alternative, that are analyzed in this EIS; and other potential alternatives that were considered but eliminated from detailed analysis. A description of the past, present, and reasonably foreseeable future actions considered in the cumulative impact assessment is included in Section 2.6. A comparative analysis of the project alternatives is presented in Section 2.7. The BLM's preferred alternative is identified in Section 2.8.

2.2 Project Background

Mining in the Cortez Mining District began with the discovery of silver ore in 1862 along the quartzite outcroppings at the western base of Mount Tenabo, also known as the "White Cliffs." Underground silver mining was conducted in the area until the 1930s. Modern production of gold in the area started in the 1950s at the Gold Acres Mine, in 1968 at the Cortez Mine, and has continued with the development of additional mines and processing facilities. In the 1980s and 1990s and in 2005, CGM prepared Plans of Operation to expand its existing facilities at the Cortez, Horse Canyon, and Gold Acres areas and develop an underground exploration program at Cortez. The most recent of the previous mine expansions in these areas was analyzed in an EIS and subsequently approved by the BLM (BLM 1993c); the underground exploration program was analyzed in an Environmental Assessment (EA) and approved in 2006 (BLM 2006a). In the mid-1990s through 2004, CGM prepared Plans of Operation to develop and subsequently expand facilities at Pipeline. The most recent three EIS analyses for the Pipeline Complex (BLM, 1996a, 2000a, 2004e) subsequently were approved by the BLM (1996d, 2000b, and 2005a, respectively).

From 1969 to 1973 and in the mid-1980s, the Cortez Mill processed oxidized ore from the Cortez Pit. Between 1973 and 1976, the Cortez Mill processed oxidized ore from the Gold Acres open pits, while concurrent heap leaching of lower grade ores was conducted at both the Cortez and Gold Acres facilities. The processing of refractory sulfide/carbon ores was initiated in 1990 at the Cortez Mill, following installation of a circulating fluid bed (CFB) roaster; the roaster was in operation until 1996. The Cortez Mill facility also was the site of heap leaching for lower grade ore stockpiles from earlier mining and milled material obtained from mining at Horse Canyon. Following cessation of operations at Horse Canyon in 1993, the mill was supplied by renewed mining and processing of low-grade stockpiles from both the Cortez and Gold Acres facilities. In October 1999, the Cortez Mill and associated components were placed into temporary closure and maintenance.

The Pipeline deposit was discovered in March 1991 as a result of deep condemnation drilling in an area proposed as a site for a new Gold Acres heap leach pad. The effects of the resulting Pipeline Project were analyzed in the Pipeline Project Final EIS (BLM 1996a) and subsequently approved (BLM 1996d). Ongoing exploration drilling along the same trend resulted in the discovery of additional ore reserves to the south of

the Pipeline deposit. The expansion of existing operations to facilitate mining of the identified South Pipeline deposit was analyzed in an EIS (BLM 2000a), and approval was granted in the ROD (BLM 2000b). A second proposed expansion, known as the Pipeline/South Pipeline Pit Expansion Project, was analyzed in a Supplemental EIS (SEIS) (BLM 2004e) and subsequently approved (BLM 2005a). During this period, two subsequent expansions of the Pipeline dewatering/infiltration facilities also were approved by the BLM. The initial expansion was approved by Administrative Determination in 1999, and the second expansion was analyzed in an EA (BLM 1999a) and subsequently approved in a Decision Record (BLM 1999b). An EA and Decision Record (BLM 2001c) also were completed to allow excavation of gravel material from borrow pits located approximately 4 miles southeast of the Pipeline Complex for use in mining-related construction projects.

The Pediment deposit (in the proposed Cortez Hills Complex) was discovered in 1999 during exploration drilling along geologic trends. Further exploration drilling between 1999 and 2004 for delineation of the identified ore body resulted in the discovery of an adjacent ore body, known as the Cortez Hills deposit. CGM currently proposes to expand their existing operations to facilitate development of the Pediment and Cortez Hills deposits. The proposed expansion, known as the Cortez Hills Expansion Project, would use existing and proposed mine and processing facilities at the Pipeline and Cortez sites and existing facilities at the Gold Acres site.

A summary of the past and existing plans of operations and environmental analyses for the Cortez Gold Mines Operations Area is presented in Appendix A. The existing plans of operations for CGM's current operations also are summarized below.

- N64-81-001P Cortez Mine/Cortez Canyon (3/30/81)
- N64-81-001P Amendment #1 Cortez Mine/Cortez Canyon (5/10/84)
- N64-81-001P Amendment #2 Cortez Mine/Cortez Canyon (1/23/89)
- N64-81-001P Amendment #3 Cortez Mine/F-Canyon Project (4/27/89)
- N64-87-010P Amendment #10 Cortez and Gold Acres Area (1/90)
- N64-93-001P Pipeline Project (10/5/92)
- N64-96-001P South Pipeline Project (9/16/96)
- N64-93-001P Amendment #98-1A Pipeline Project (Pipeline Infiltration Project) (10/22/98)
- NVN-067575 (01-1A) Pipeline / South Pipeline Pit Expansion Project (1/16/01)
- NVN-067575 (01-2A) Pipeline Gravel Pit Expansion (12/18/01)
- NVN-067261 Cortez ***Mine*** Underground Exploration Project (2/16/06)
- **NVN-66621 Horse Canyon/Cortez Unified Exploration Project (4/5/05)**
- **NVN-67261 Pipeline/South Pipeline/Gold Acres Exploration Project (2/11/93)**

2.3 Existing Facilities

Existing CGM mining and processing facilities are located in three main areas in the Cortez Gold Mines Operations Area: Cortez, Pipeline, and Gold Acres, referred to here as the Cortez Complex, Pipeline Complex, and Gold Acres Complex, respectively (**Figure 2-1**). The Cortez Mine is located on the western flank of Mount Tenabo in the Cortez Mountains on the southeast side of Crescent Valley, approximately

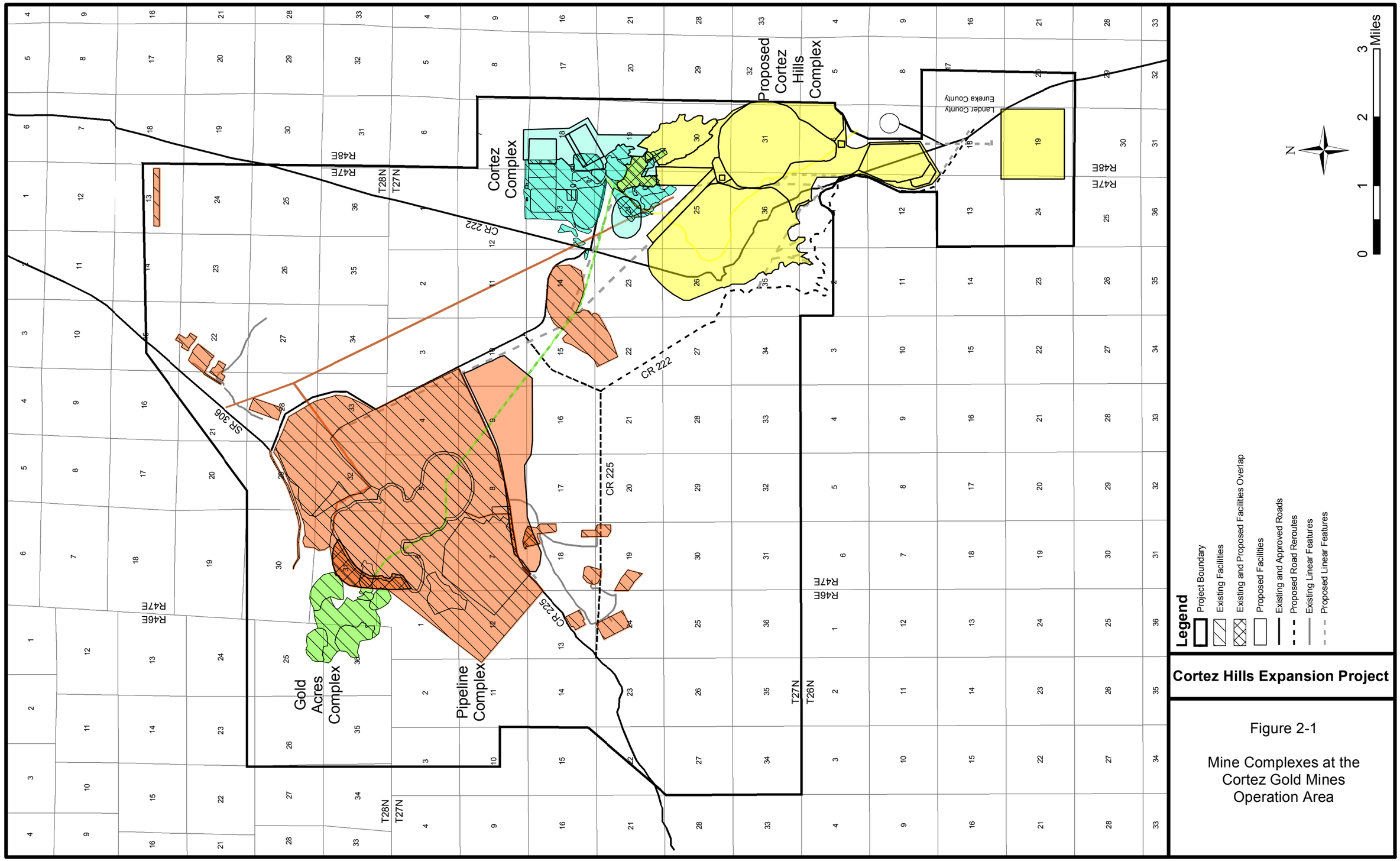


Figure 2-1

Mine Complexes at the Cortez Gold Mines Operation Area

06/14/2007

7 miles southeast of the Pipeline Complex. The existing Gold Acres Complex is located directly west of the Pipeline Complex. As the majority of the existing facilities would be expanded for, or used in support of, the Proposed Action, the descriptions of the facilities have been incorporated into Section 2.4.1, Proposed Action, to aid the reader in understanding the complete proposed project. Existing primary facilities associated with each of these complexes are shown in **Figure 2-2** and summarized below.

Cortez Complex:

- Three open pits (F-Canyon, Cortez, and Ada 52)
- Several waste rock facilities
- An inactive heap leach facility
- Cortez Mill inclusive of crushing and grinding facilities, a CFB roaster, a carbon-in-leach (CIL) circuit, and chemical reagent storage area
- Underground exploration program with associated dewatering system, 120-kilovolt (kV) transmission line, cross-valley water pipeline, ore stockpiles, partial pit backfill (F-Canyon Pit), and surface support facilities
- A tailings facility
- Class III waivered landfill
- Gravel pits
- Ancillary support facilities (e.g., offices, assay lab, maintenance, water supply, stormwater diversion, haul roads)

Pipeline Complex:

- An open pit with an in-pit/perimeter groundwater dewatering system (Pipeline)
- Groundwater infiltration sites
- Waste rock facilities (Gap and Pipeline)
- Pit backfill area
- A heap leach facility and an integrated heap leach/tailings facility with associated ponds
- Pipeline Mill inclusive of crushing and grinding facilities, CIL/carbon-in-column (CIC) circuits, chemical reagent storage area, and recovery/refining circuit
- Ancillary support facilities (e.g., assay lab, offices, shop/warehouse, maintenance, sanitary leach field, fuel storage and fill stations, water supply wells)

Gold Acres Complex:

- An open pit (Gold Acres)
- Waste rock facilities (mostly reclaimed)
- Ore stockpiles
- A heap leach pad
- Transfer point for loading trucks for off site shipment of refractory ore for third-party processing
- Class III waivered landfill
- Bioremediation site associated with the Pipeline mining activities

- A 90-day temporary hazardous waste storage facility (e.g., used oil, etc.)
- Geology and shop facilities
- Blasting materials storage area

2.4 Proposed Action

2.4.1 Project Overview

CGM submitted an Amendment to the Pipeline/South Pipeline Plan of Operations to the BLM on August 29, 2005, for the proposed Cortez Hills Expansion Project; revised plans were submitted in June and November 2006. The following key documents provide supplemental information to CGM's Plan of Operations amendment:

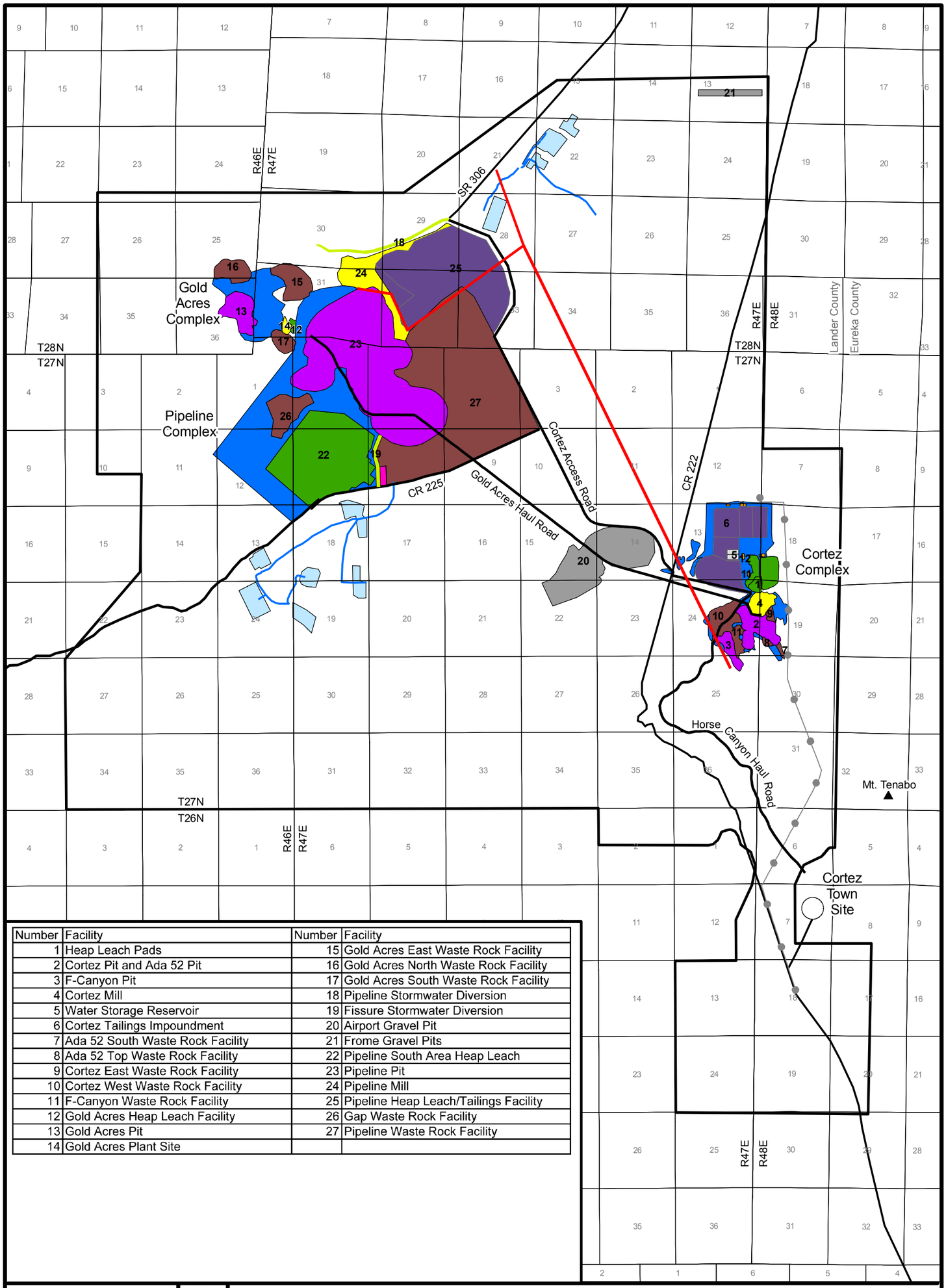
- Cortez Hills Expansion Project Baseline Characterization Report (Geomega 2006e)
- Groundwater Flow Modeling Report for the Cortez Hills Expansion Project (Geomega 2007f)
- Cortez Hills Expansion Project Pit Lake Chemistry Assessment (Geomega 2007a)
- Cortez Hills Expansion Project Waste Rock Assessment (Geomega 2007c)
- Screening-Level Ecological Risk Assessment for the Cortez Hills/Pediment Pit Lake (Geomega 2007b)
- Air Quality Impact Assessment Report (Enviroscientists 2006)

The Proposed Action would include the development of new facilities at the new Cortez Hills Complex (**Figure 2-1**), and, to minimize additional surface disturbance and environmental impacts, the utilization of some of CGM's existing facilities at the Cortez, Pipeline, and Gold Acres complexes, some of which would be expanded. Existing facilities that would be utilized for the Proposed Action, and existing disturbance within the proposed project boundary, are shown in **Figure 2-2** and **Table 2-1**. The proposed layout of the Cortez Hills Expansion Project facilities is shown in **Figure 2-3**.

The proposed project would result in a total of approximately 6,792 acres of new surface disturbance within the 58,058-acre project boundary (**Table 2-1**). The project would involve the construction, or modification of the following primary components.

Cortez Hills Complex:

- New open pit (Cortez Hills Pit) for development of Cortez Hills and Pediment ore zones
- Development of underground operations
- Underground mining
- New groundwater dewatering system to include in-pit, perimeter, and underground facilities
- New Grass Valley Heap Leach Facility with associated solution ponds, new CIC facility, and reagent storage area
- New ore, subgrade ore, and growth media stockpiles
- Three new waste rock facilities (Canyon, North, and South)
- New ancillary facilities (maintenance shop; safety, security, and administrative facilities; 90-day temporary waste storage area; and fuel and lubricant storage facilities)



Number	Facility	Number	Facility
1	Heap Leach Pads	15	Gold Acres East Waste Rock Facility
2	Cortez Pit and Ada 52 Pit	16	Gold Acres North Waste Rock Facility
3	F-Canyon Pit	17	Gold Acres South Waste Rock Facility
4	Cortez Mill	18	Pipeline Stormwater Diversion
5	Water Storage Reservoir	19	Fissure Stormwater Diversion
6	Cortez Tailings Impoundment	20	Airport Gravel Pit
7	Ada 52 South Waste Rock Facility	21	Frome Gravel Pits
8	Ada 52 Top Waste Rock Facility	22	Pipeline South Area Heap Leach
9	Cortez East Waste Rock Facility	23	Pipeline Pit
10	Cortez West Waste Rock Facility	24	Pipeline Mill
11	F-Canyon Waste Rock Facility	25	Pipeline Heap Leach/Tailings Facility
12	Gold Acres Heap Leach Facility	26	Gap Waste Rock Facility
13	Gold Acres Pit	27	Pipeline Waste Rock Facility
14	Gold Acres Plant Site		

Legend

- Project Boundary
- Ancillary Areas
- Gravel Pits
- Infiltration Basins
- Heap Leach Facilities
- Open Pits
- Mill Sites
- Solution Ponds
- Growth Media Stockpile
- Tailings Facilities
- Waste Rock Facilities
- Water Storage Reservoir
- Roads
- Stormwater Diversion
- Water Pipeline
- 60-kV Transmission Line
- 120-kV Transmission Line and Water Pipeline Corridor

N

0 0.5 1 2 3 Miles

Cortez Hills Expansion Project

Figure 2-2
Existing Facilities

06/22/2007

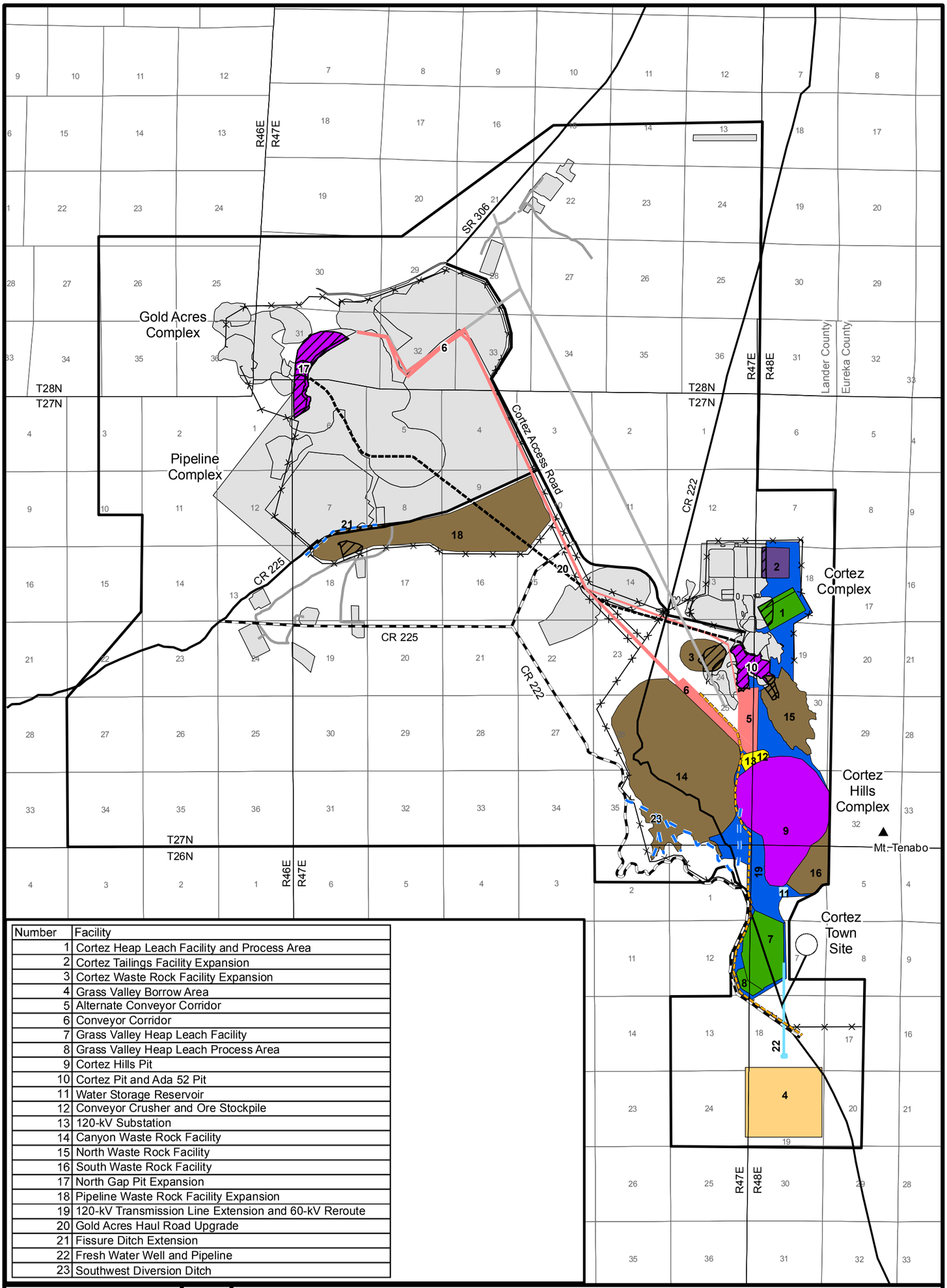
Table 2-1
Currently Authorized and Proposed Surface Disturbance
(Proposed Action)

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Proposed Action: Total Acreage for Proposed Facility	Proposed Action: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Proposed Action: New Proposed Facility Disturbance (acres)
Open Pits[3]					
Cortez Hills Complex	Cortez Hills Pit	--	923	0	923
Cortez Complex	Cortez Pit	132[4]	110	110	0
	F-Canyon Pit	44	--	--	--
Pipeline Complex	North Gap Pit Expansion	--	190	190	0
	Pipeline Pit	1,353	--	--	--
Gold Acres Complex	Gold Acres Pit	111	--	--	--
	Subtotal	**1,640**	**1,223**	**300**	**923**
Underground Operations		**5**	**0[5]**	**0**	**0**
Waste Rock Facilities					
Cortez Hills Complex	Canyon Waste Rock Facility	--	1,690	0	1,690
	North Waste Rock Facility	--	303	22[6]	281
	South Waste Rock Facility	--	175	0	175
Cortez Complex	Cortez Waste Rock Facility	--	137	56	81
	Cortez Out-of-pit Waste Rock Facilities	138[7]	--	--	--
	F-Canyon Pit Backfill	0[5]	0[5]	0	0
	Underground Stope Backfill	0[8]	0[8]	0	0
Pipeline Complex	Gap Waste Rock Facility	125	0[9]	0	0
	North Gap Pit Backfill	--	0[5]	0	0
	Pipeline Pit Backfill	0[5]	0[5, 9]	0	0
	Pipeline Waste Rock Facility	1,746	968	50	918
Gold Acres Complex	Gold Acres Waste Rock Facilities	227	--	--	--
	Subtotal	**2,236**	**3,273**	**128**	**3,145**
Processing Facilities					
Cortez Hills Complex	Grass Valley Heap Leach Pad and Process Facility	--	328	0	328
	Crusher/stockpile	--	33	0	33
	Cross-valley Conveyor Corridors	--	441	119	322
Cortez Complex	Cortez Heap Leach Pad and Processing Facility	102	120	27	93
	Cortez Mill	53	0[9]	0	0
	Cortez Tailings Facility	369	94	14	80
	Solution Ponds	6	0	0	0
Pipeline Complex	Pipeline Heap Leach/Tailings	932	0[9]	0	0
	Pipeline South Area Heap Leach	758	0[9]	0	0
	Pipeline Mill	220	0[10]	0	0
Gold Acres Complex	Gold Acres Plant Site	12	--	--	--
	Gold Acres Heap Leach Facility	41[11]	--	--	--
	Subtotal	**2,493**	**1,016**	**160**	**856**

Table 2-1 (Continued)

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Proposed Action: Total Acreage for Proposed Facility	Proposed Action: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Proposed Action: New Proposed Facility Disturbance (acres)
Ancillary Support Facilities					
Cortez Hills Complex	Administration Facilities	--	0[12]	0	0
	Class III Landfill	--	5	0	5
	Cortez Hills Ancillary Facilities	--	583	0	583
	Grass Valley Borrow Area	--	605	0	605
	Fresh Water Reservoir	--	6	0	6
	Grass Valley Water Wells/Powerline/ Access Road	--	3	0	3
	120-kV Transmission Line Extension and Substation	--	4	0	4
	60-kV Transmission Line Reroute	--	0[13]	0	0[13]
Cortez Complex	Airport Gravel Pit	487	0[9]	0	0
	Cortez Ancillary Facilities	312	275	0	275
	Cortez Remediation Wells	23	--	--	--
	Horse Canyon Haul Road	45	0[12]	0	0
	Water Storage Reservoirs	13	0[9]	0	0
	120-kV Transmission Line/Cross-valley Water Pipeline Corridor	10	0[9]	0	0
Pipeline Complex	County Road Construction/Cortez Access Road	85	--	--	--
	County Road Relocations	--	76[14]	0	76[14]
	Diversion Channel	21	--	--	--
	Fissure Ditch	0[5]	0[5]	0	0
	Frome Gravel Pit	45	0[9]	0	0
	Gold Acres Haul Road	54	11	0	11
	Growth Media Stockpiles	18	0[5]	0	0
	Mine Water Infiltration Basins/Pipelines/ Ditches	578	0[9]	0	0
	Pipeline Ancillary Facilities	1,021	0[9]	0	0
Gold Acres Complex	Gold Acres Ancillary Facilities	262	0[9]	0	0
	Subtotal	**2,974**	**1,568**	**0**	**1,568**
On-going Exploration		**91**	**300**	**0**	**300**
Total Disturbance Area		**9,439**	**7,380**	**588**	**6,792**

1 Reflects the existing approved disturbance acreage.
2 Reflects a continuation or change in use for previously authorized disturbance.
3 Inclusive of 200-foot-wide pit adjustment zones.
4 Reflects the currently combined footprints for the Cortez and Ada 52 pits. Twenty-two acres of the previously authorized disturbance for the Cortez Pit was never developed.
5 Disturbance is accounted for in other existing and/or proposed disturbance footprints.
6 Acreage previously authorized, but never developed, as part of the Cortez Pit.
7 Reflects the four existing waste rock facilities at the Cortez Complex that would not be used under the Proposed Action.
8 Backfill would be placed in mined-out portions of the underground workings; no additional disturbance.
9 Existing facility would be used to support the Proposed Action; however, there is no proposed change to the currently permitted disturbance footprint, height, capacity, or throughput, as applicable.
10 The proposed mill expansion would be within the existing disturbance area.
11 Closure and relocation of this facility previously was analyzed and authorized by the BLM (2004e, 2005a) to facilitate expansion of the Pipeline Pit for the Pipeline/South Pipeline Project. The acreage above reflects the remaining disturbance outside of the currently authorized Pipeline Pit. Approximately 23 acres of the remaining disturbance would overlap with the proposed North Gap Pit expansion.
12 Disturbance is accounted for in the ancillary facilities acreage.
13 The majority of the proposed disturbance is accounted for in other proposed disturbance footprints. The remainder of the related disturbance would be minimal.
14 Acreage based on an assumed 50-foot-wide construction right-of-way (ROW).



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	Fissure Ditch Extension
22	Fresh Water Well and Pipeline
23	Southwest Diversion Ditch

Legend

- Project Boundary
- Ancillary Areas
- Borrow Area
- Conveyor Corridor
- Water Storage Reservoir
- Heap Leach Facilities
- Pits
- Process
- Tailings Facilities
- Waste Rock Facilities
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- CR Reroutes
- Ditch
- Water Pipeline
- Fence
- Gold Acres Haul Road Upgrade
- Transmission Line Reroute

N

0 1 2 3 Miles

Cortez Hills Expansion Project

Figure 2-3

Proposed Action

03/04/2008

- New primary crusher, conveyor offload stockpiles, and approximately 12-mile-long conveyor system
- Two new water supply wells and associated power distribution line, water pipeline, and water reservoir or head tank
- Construction and upgrade of haul roads
- Relocation of portions of an existing county road and 60-kV transmission line segment in the project boundary
- Installation of new 120-kV transmission line segment and substation
- Construction of new Class III waivered landfill
- Development of new borrow source in Grass Valley
- Modification of existing HC/CUEP boundary to remove overlap with the proposed project boundary

Cortez Complex:

- Deepening of existing Cortez Mine open pit
- Expansion of existing Cortez Waste Rock Facility
- Expansion of existing F-Canyon backfill
- New Cortez Heap Leach Facility with associated solution ponds, CIC facility, and reagent storage area
- Expansion of existing tailings facility
- Expansion of diesel fuel storage facilities
- Ancillary facilities for underground support (backfill crushing, additional ore stockpiles, shotcrete plant, conveyor onload area, and haul road)

Pipeline Complex:

- Expansion of existing Pipeline open pit (North Gap Pit expansion)
- Expansion of existing Pipeline Waste Rock Facility
- New North Gap backfill
- Relocation of existing county road around waste rock facility expansion area
- Expansion of existing Pipeline Mill to facilitate an increase in throughput from currently permitted 13,500 tons per day (tpd) to an average of 15,000 tpd
- Modification of existing Pipeline/South Pipeline/Gold Acres exploration plan boundary to remove overlap with proposed project boundary

Where possible, existing CGM facilities would be used for the proposed project to minimize additional disturbance. The following primary existing facilities, for which no modifications are proposed, would be utilized for the Proposed Action (**Figure 2-2**):

Cortez Complex:

- Cross-valley water pipelines to the existing Pipeline infiltration basins and process facilities
- 120-kV transmission line (to underground portals)
- Underground portals and surface support facilities in the F-Canyon Pit
- Grinding and carbon-in-pulp (CIP) circuits at the Cortez Mill (which would be reactivated)

- Class III waivered landfill (which would be reactivated)
- Administrative offices and ancillary buildings

Pipeline Complex:

- Pipeline Heap Leach/Tailings Facility (with currently permitted expansion)
- Pipeline South Area Heap Leach Facility
- Assay lab, administrative offices, and shop
- Groundwater infiltration sites

Gold Acres Complex:

- 90-day temporary hazardous materials storage facility (e.g., oil, etc.)
- Class III waivered landfill
- Hydrocarbon bio-remediation facilities
- Blasting materials storage area

2.4.2 Land Ownership and Mining Claims

The project boundary for the proposed Cortez Hills Expansion Project is composed of approximately 57,058 acres, of which 53,790 acres are public lands administered by the BLM and 3,268 acres are owned by CGM (**Figure 1-2**). The majority (97 percent) of the approximately 6,792 acres of proposed new disturbance would occur on public lands administered by the BLM Battle Mountain Field Office. The remainder of the proposed new disturbance (3 percent) would occur on private land owned by CGM.

2.4.3 Schedule and Work Force

Pending authorization of required permits and approvals, construction and operation of the Cortez Hills Expansion Project is anticipated to be initiated ***in*** 2008. The life of the mine would include approximately 10 years of active mining. Concurrent reclamation would be conducted during this period as areas become available. Up to an additional 3 years would be required for ongoing ore processing, site closure, and final reclamation.

CGM currently employs approximately 500 workers at the existing Pipeline/South Pipeline Project. For the existing Cortez Underground Exploration Project, CGM currently employs 5 CGM workers and a contractor work force of 50 to 60 workers. The current CGM work force would fulfill a portion of the work force requirements for the proposed Cortez Hills Expansion Project. It is anticipated that a contractor work force of approximately 300 workers for 18 months would be required for construction of facilities, to initiate mining, and for other site preparation activities during the construction period. Approximately 200 employees would be required in addition to CGM's existing work force for open-pit mining and processing operations and concurrent reclamation, and a maximum of approximately 150 employees would be required for underground mining. Approximately 155 workers would be required for the final 3 years of ongoing ore processing, closure, and reclamation. Existing employees currently live in the communities of Crescent Valley, Beowawe, Battle Mountain, Carlin, Elko, and Spring Creek. It is anticipated that the majority of the

additional work force would be hired from the local communities to the extent possible. It is anticipated that the proposed project would provide employment opportunities through 2018, concurrently with the existing Pipeline/South Pipeline Project. The average annual operations work force payroll is estimated to be approximately $45.9 million.

2.4.4 Expansion of Mining Operations

Under the Proposed Action, one new open pit (Cortez Hills) would be developed to mine the identified Cortez Hills and Pediment deposits. In addition, the existing Cortez Pit would be deepened, and the North Gap Pit expansion would facilitate the mining of additional reserves associated with the existing Pipeline Pit (**Figure 2-3**). Acreages for these facilities are presented in **Table 2-1**. Pit designs have been developed based on the configurations of the ore bodies as defined during exploration drilling, CGM's experience in similar rock types, the results of geotechnical testing and hydrological studies, and surface mining industry and Mine Safety and Health Administration (MSHA) standards. Geologic structural mapping and open pit wall and groundwater level monitoring would be conducted during mining to optimize pit designs and ensure pit stability during operations. CGM has announced a total reserve of approximately 8 million ounces of gold in the proposed Cortez Hills Pit, Cortez and North Gap pit expansion areas, and Cortez Hills underground area. The waste-to-ore ratio (based on current economic factors) and ore and waste rock tonnages for the proposed open pit, pit expansion areas, and underground are summarized in **Table 2-2**.

Table 2-2
Stripping Ratios and Ore and Waste Rock Tonnages

Source of Ore and Waste	Average Strip Ratio	Heap Leach Ore	Mill-grade Ore	Refractory Ore	Total Ore	Waste Rock
		(million tons)				
Cortez Hills Pit	12.6:1	77	35	3	115	1,450
Cortez Pit Expansion	3:1	5	10	0	15	45
North Gap Pit Expansion	2.7:1	30	0	0	30	80
Underground Operations	0.2:1	0	8	2	10	2
TOTAL	**N/A**	**112**	**53**	**5**	**170**	**1,577**

During operations, mining in the existing Pipeline Complex (including the North Gap Pit expansion area) proposed Cortez Hills Pit, Cortez Pit (proposed to be deepened), or Cortez Hills underground workings would be scheduled based on market prices for gold, reagents, labor, and other supplies required for mining; equipment and experienced labor supply; ore grades; and other factors affecting the mining operations. Operations may occur simultaneous in all areas or only in some of the areas from time to time during project life. Some of the mining equipment used for these operations would be shared. A projected list of mobile equipment that would be used for the Proposed Action is identified in **Table 2-3**. Contractors may be used to mine the Cortez Pit, the upper benches of waste rock in the Cortez Hills Pit, and, depending on economics, potentially may supplement the mining activity in the Pipeline Pit complex (including the North Gap Pit expansion area). As a result, it is anticipated that in addition to the equipment identified in

Table 2-3, one to two Caterpillar 992 loaders (or equivalent), four to six 100-ton haul trucks, three dozers, and two rotary drills also could be operating on site for approximately 5 years.

Table 2-3
Mobile Equipment List for the Proposed Action

Type of Equipment	Number of Existing Units to be Shared[1]	Number of New Units to be Added to Fleet
Open-pit Mining		
Electric wire rope shovels	2	2 to 3
Hydraulic shovel	1	1
Haul trucks (85- to 400-ton)[2]	20 to 30[2]	16 to 23[2]
Rotary drills	4 to 10	7 to 10
Track bulldozers	4 to 12	4 to 6
Wheeled bulldozers	2 to 5	5 to 7
Graders	2 to 5	2 to 3
Water trucks	2 to 4	3 to 4
Bobcat loader	1 to 3	1 to 3
Light plants	10 to 14	10 to 14
Blasting trucks	1	4 to 5
Tractor with two 10,000-gallon tanker-trailers	1	1
Trackhoe	0	1
Underground Mining		
Load-haul-dump machines	0	3 to 5
Haul trucks (40- to 60-ton)	0	10 to 14
Development and production drills	0	4 to 8
Rockbolters	0	2 to 3
Scissor decks	0	2 to 3
Forklifts	0	2 to 3
Flatbed carriers	0	2 to 3
Underground service trucks	0	2 to 4
Shotcrete trucks	0	3 to 5
Explosives trucks	0	2 to 3
Road grader	0	1
Personnel carriers	0	6 to 10

[1] Existing equipment that would be shared between currently permitted operations and the Proposed Action.
[2] Haul trucks to be used for mining purposes and for transport of mill-grade ore to existing mill facilities or stockpile areas.

2.4.4.1 Open Pits

The removal of ore and waste rock from the proposed pit and pit expansion areas would be accomplished using the same conventional open-pit mining methods currently used at the existing Pipeline operation, including drilling, blasting, loading, and hauling. Mining would be conducted 24 hours per day, 7 days per week. Proposed open-pit mining activities by mine complex are presented below.

Cortez Hills Complex

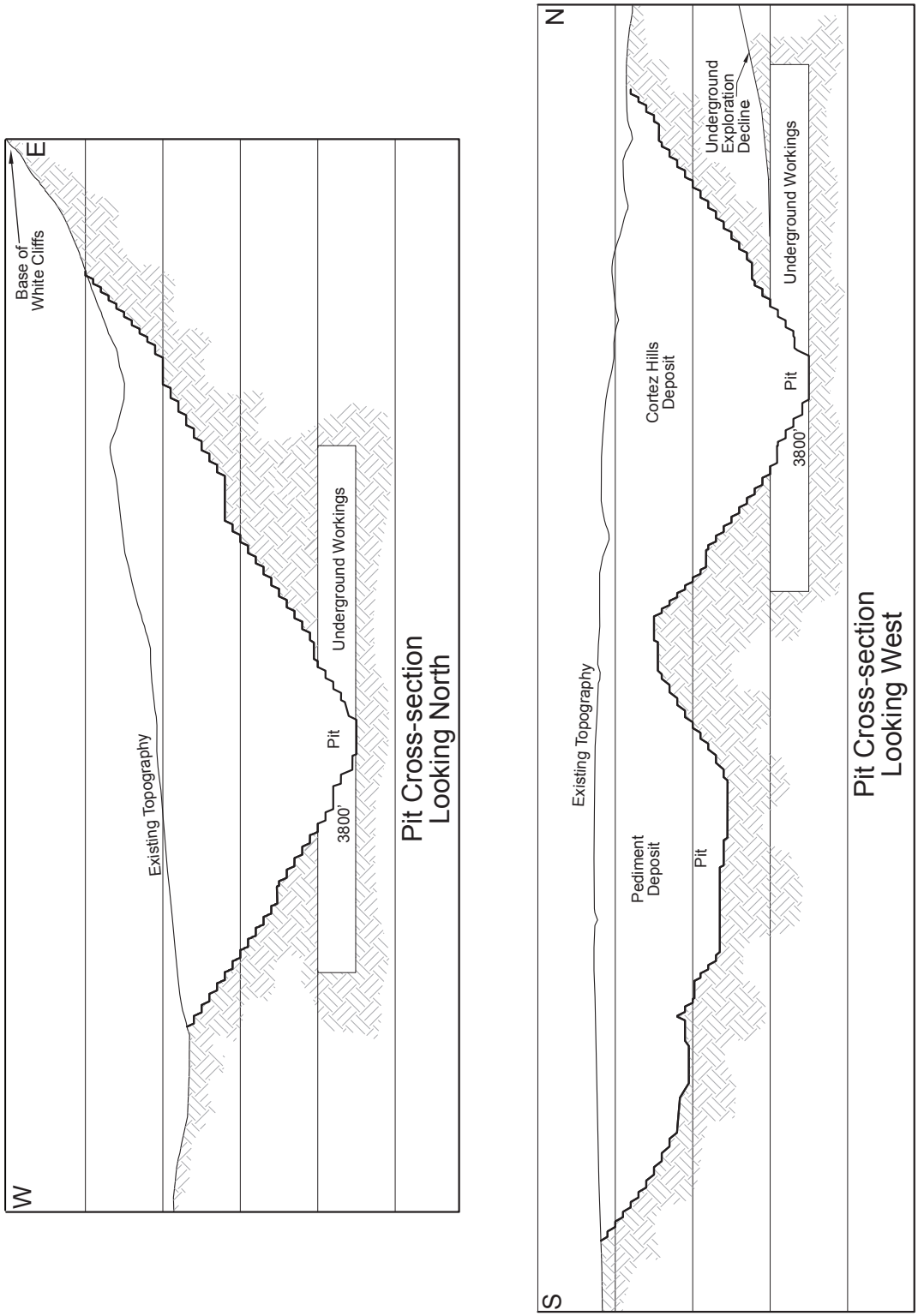
Proposed open-pit mining at the Cortez Hills Complex would include development of the Cortez Hills Pit to facilitate mining of the identified ore deposits (**Figure 2-3**). A shared highwall would separate the larger and deeper Cortez Hills deposit from the Pediment deposit. The pit would be approximately 8,900 feet in length and approximately 6,400 feet in width. In addition, a 200-foot-wide pit adjustment zone around portions of the pit rim would provide operational flexibility for minor pit modifications due to safety or engineering considerations during operations. The deeper portion of the pit would have an overall depth up to approximately 2,200 feet, with a maximum bottom elevation of 3,800 feet above mean sea level (amsl). The overall depth of the shallower portion would be up to 1,000 feet, with a maximum bottom elevation of 5,000 feet amsl. **Figure 2-4** shows the general pit cross-section. The pit generally would be mined with 25-foot benches in ore zones and 50- to 100-foot benches in waste rock zones. Based on geologic and hydrologic studies in the proposed pit area, the overall pit slope angles would range from approximately 1 horizontal (H): 1 vertical (V) to 2H:1V; however, in areas of reduced dewatering efficiency and/or poor rock quality, the pit slope angles could decrease to approximately 2.2H:1V. For example, the eastern highwall of the open pit was designed at a shallower slope angle due to its geologic structural complexity and associated safety concerns, with consideration to avoid direct disturbance to the quartzite outcroppings that form the White Cliffs. As mining progresses, geologic and geotechnical monitoring would continue, as needed, to assist in optimizing the final pit design. The average daily mining rate at the Cortez Hills Pit would be approximately 300,000 to 500,000 tpd.

Cortez Complex

Three open pits (Cortez, Ada 52, and F-Canyon) currently exist at the Cortez Complex. Under the Proposed Action, the existing Cortez Pit would be deepened by up to 100 feet within the currently permitted footprint (**Figure 2-3**). A 200-foot-wide pit adjustment zone around the pit rim would provide for operational flexibility. The pit adjustment zone would be within the currently approved ancillary disturbance area. The deepened pit would have an overall depth of approximately 400 feet, with a bottom elevation of approximately 4,600 feet amsl. Bench heights of 50 feet would be used, and the overall pit slope angles would range from 2H:1V to 2.5H:1V. At the Cortez Pit, mining would be conducted at a rate up to 40,000 tpd.

Pipeline Complex

Proposed open-pit mining at the Pipeline Complex would include the development of the North Gap Pit expansion, which would involve a layback of the western wall of the currently permitted Pipeline Pit (**Figure 2-3**). The open pit rim would be at an elevation of approximately 5,100 feet amsl. The pit expansion area would be approximately 6,950 feet in length and approximately 1,550 feet in width. The North Gap Pit



Cortez Hills
Expansion Project

Figure 2-4
Cortez Hills Pit
General Cross-sections

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expansion area would have an overall depth of approximately 700 feet, with a bottom elevation of approximately 4,400 feet amsl. Bench heights of 50 feet would be used, and the overall pit slope angles would range from 2H:1V to 2.5H:1V. As with the existing Pipeline Pit, a 200-foot-wide pit adjustment zone would extend around the rim of the pit expansion area, within which the pit could be laid back if necessary for safety or engineering considerations. Mining in the North Gap Pit expansion area would be sequenced with existing Pipeline operations. As a result, mining would proceed at the currently approved average rate of 350,000 tpd. The expansion would not increase the time or pumping volume required for dewatering of the Pipeline Pit complex.

2.4.4.2 Underground Mining

Existing Underground Exploration

The currently approved underground exploration activities and facilities are described in detail in the Cortez Mine Underground Exploration Project EA (BLM 2006a). The current***ly authorized*** underground exploration program, which would continue through 2011, includes:

- Twin declines each between 5,000 to 8,000 feet in length from a portal in the existing F-Canyon open pit, with underground cross-cuts and drift tunnels;
- Exploration and test mining (to determine the appropriate stoping method for the rock conditions encountered) for up to 5 years;
- Potential ventilation raises/escape passes;
- A 120-kV transmission line from the main Pipeline feed line to the portal site (**Figure 2-2**);
- Surface and underground explosives storage areas;
- Surface support facilities (e.g., septic system, fuel/lubricant storage, laydown yard, water storage tanks);
- Aboveground batch plant, storage silos, and aggregate stockpile area;
- Ore stockpiles either adjacent to the portal or on existing waste rock facilities;
- Partial backfill of the existing F-Canyon open pit with up to 650,000 tons of waste rock; and
- A 5,000 gallons per minute (gpm) capacity water management system including surface dewatering wells, underground collection and pumping systems, pipelines, and two cross-valley pipelines to provide for water disposal through existing infiltration basins or consumption at the existing Pipeline Mill, depending on water quality.

Proposed Underground Mining

Under the Proposed Action, underground mining operations would be initiated no sooner than mid-year 2008. Access for underground development and mining would be through the existing twin declines in the F-Canyon Pit (the southernmost of the existing Cortez pits) (**Figure 2-3**) initially developed for the current exploration program and through new decline(s) in the proposed Cortez Hills Pit. Underground mining would be conducted to approximately the 3,800-foot elevation and would have an underground horizontal extent of 1,000 feet wide by 5,000 feet long.

Supporting surface facilities for underground operations would be located in the Cortez Mill area and the F-Canyon and Cortez Hills pits. Facilities would include infrastructure for operations, engineering, cement

silo(s); surface laydown area(s); a parking lot; air compressors; surface explosive storage; a staging area; and temporary stockpiles for ore, waste, and backfill aggregate, with possible shotcrete plants.

Declines and drifts would be approximately 16.5 feet in height by 18 feet in width to accommodate mining equipment, piping, ventilation ducting, and possibly an underground conveyor. In general, declines and drifts would be developed using underground drilling and blasting techniques to fracture the rock, load-haul-dump (LHD) machines to excavate the rock, and underground haul trucks to haul the material to waste rock facilities or ore stockpiles, as appropriate. Alternately, a conveyor may be used to transport ore to the surface. Any waste rock not disposed of underground would be disposed of in the existing F-Canyon Pit waste rock backfill. The proposed portal sites in the Cortez Hills Pit would have rock bolts, mesh, and shotcrete installed around the portal to maintain the integrity of the highwall.

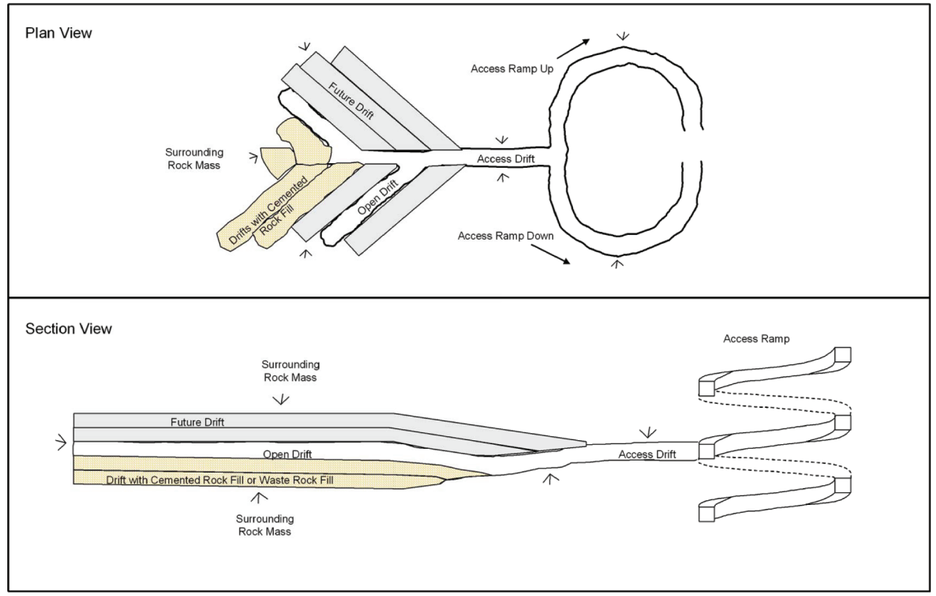
Ground support of underground workings would consist of rock bolts, mesh, shotcrete, cemented rock fill, or other appropriate ground control methods typical of Nevada underground operations. Ground support would be installed by mechanical means including, but not limited to, mechanical rock bolters and robotic shotcrete machines. Ground conditions are expected to change as mining progresses; the ground control plan would be revised accordingly.

Once the declines are sufficiently deep, miscellaneous excavations would be established to support mining and ongoing exploration. These excavations would include underground drill stations, vent raises, access drifts, stopes, load centers, pump stations, sumps, explosive storage areas, fuel storage areas, refuge stations, connector drifts, muck bays, laydown areas, and material storage areas. Excavations also would be developed to house facilities for underground equipment maintenance, fueling, warehousing, and backfill and shotcrete plants.

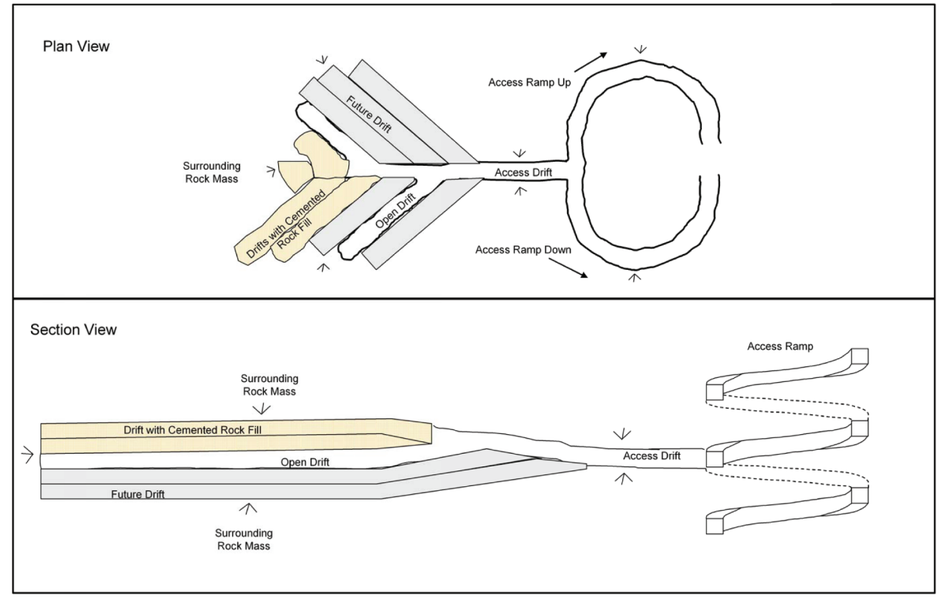
Raises for ventilation, power, and secondary escape routes would connect the underground workings with the surface. Raises would be constructed from surface or underground using a drill rig or a raise-boring machine. The drill rig would drill and blast a slot raise while the raise-boring rig would enlarge a small-diameter pilot hole to a large borehole from the bottom up using a reamer bit. In both methods, the rock, drill cuttings, and drill fluids produced from the development of the raise would be removed via the decline.

The mining method would be determined by the character (e.g., strength, fracture density, etc.) of the host and waste rock. Preliminary investigations of mining methods, including stope dimensions, have been initiated under existing authorizations and would be refined as more data are compiled and engineering studies completed. Test mining would be done to ensure worker safety would not be compromised. A brief discussion of mining methods that may be employed is presented below.

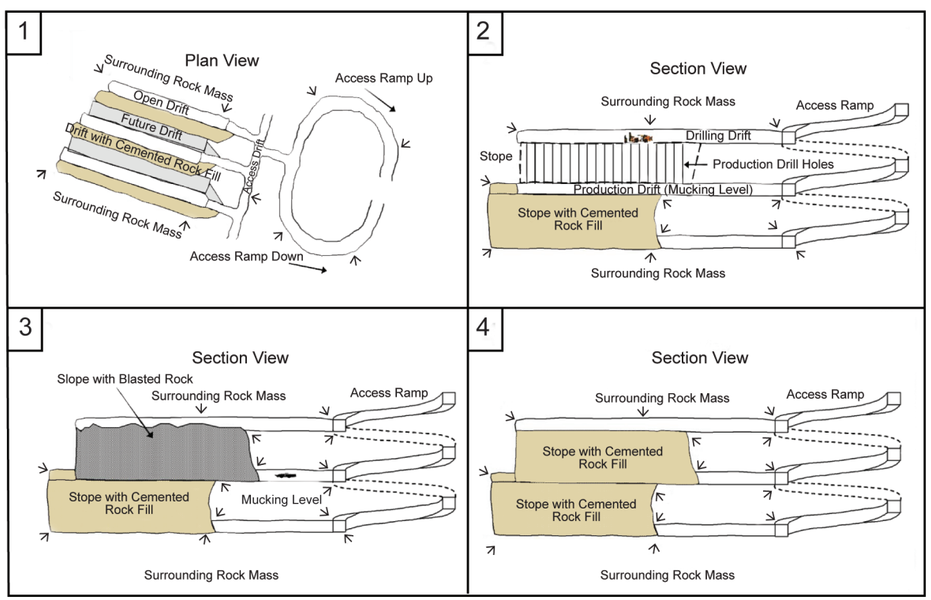
Overhand Drift and Fill. Overhand drift and fill is a mining method in which parallel drifts would be driven in ore on a given level and replaced with cemented backfill or waste rock. Subsequent levels would be developed above the first level (**Figure 2-5**). Completed cuts would have cemented backfill placed in the drift access using a LHD with a jamming plate instead of a bucket. Cemented backfill, once sufficiently cured, would serve as support for the walls of adjacent drifts. When a drift is driven between backfill on both



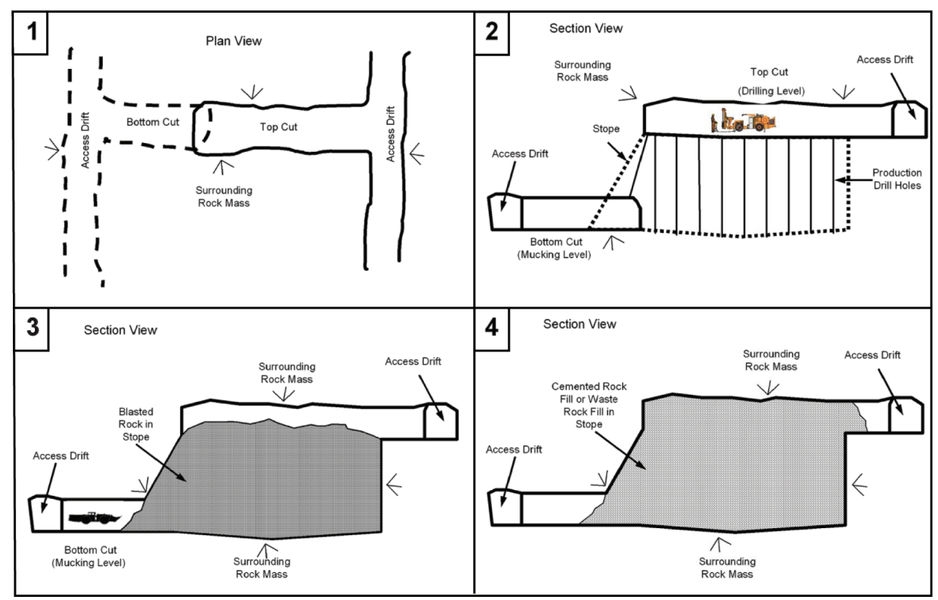
Conceptual Diagram of Overhand Drift and Fill
Underground Mining Method



Conceptual Diagram of Underhand Drift and Fill
Underground Mining Method



Conceptual Diagram of Longhole Open Stoping
Underground Mining Method



Conceptual Diagram of Blind Bench Stoping
Underground MIning Method

Cortez Hills Expansion Project

Figure 2-5

Underground Mining Methods

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sides, waste rock would be placed so worker safety would not be compromised. Cemented backfill and waste rock also would serve as a working platform from which additional levels of ore may be taken above these first (bottom) drifts, once access to the next level has been established. The dimensions for overhand drift and fill cuts would range from 10 to 20 feet in height and width.

Primary access to drift and fill areas would be provided by a centrally located ramp, which also would provide as an intake airway during operations. Ramps would be driven at grades up to 15 percent, with dimensions of 15 feet in height by 20 feet in width.

Mining horizons, known as subdrifts, would be located on given vertical intervals off of the primary access, with the subdrifts outside the footwall of the orebody. Subdrifts would be driven at a slight upgrade from the ramp access drift to the extremities of the orebody. The dimensions for subdrifts would range from 10 to 20 feet in height and width. Additional excavations would include electrical cutouts, sumps, exploration drill cutouts, and access drifts to ventilation raises and service rises.

Underhand Drift and Fill. Underhand drift and fill mining would use similar criteria as described above for overhand drift and fill, except the production sequence for mining the cuts would be top down instead of bottom up. Drifts would range in size from 10 to 20 feet in height and width (**Figure 2-5**). All backfill would be composed of cemented rock backfill of suitable strength to provide for mining in the next level underneath the fill in accordance with accepted industry safety practices.

Longhole or Blasthole Stoping. Longhole stoping is an overhand, vertical stoping method utilizing longhole drilling and blasting techniques carried out from sublevels to break the ore (**Figure 2-5**). The ore would be mucked by a remote controlled LHD to ensure worker safety, as the resultant cavity or “stope” would be unsupported. Primary and secondary access would be as described above for overhand drift and fill. Stope access drifts would be driven from the secondary access towards the orebody along the strike of the orebody. The access drifts would be driven on a slight upgrade to allow for drainage. Upper and lower stope access drifts (also referred to as top and bottom cuts) would be driven simultaneously. If viewed from above, these drifts would appear on top of one another; however, they actually would be separated by ore that ultimately would be stoped out. The upper access drift would act as the drill drift and the lower access drift as an extraction drift. Drilling would begin at the end of the top cut and would retreat back to the drift access, blasting the ore between the two drifts. The bottom cut would serve as the extraction drift from which a LHD would remove the blasted rock and load haul trucks. Dimensions of upper and lower stope access drifts may be up to 20 feet in height by 20 feet in width. Stope dimensions may be up to 80 feet in width, 100 feet in height, and 200 feet in length.

Stopes would be designed beginning with a primary stope generally at a central location, with additional primary, secondary, and tertiary stopes on either side. Stopes would be excavated in leapfrog fashion, with tertiary stopes being left until the adjacent stopes have been mined and backfilled. Tertiary stopes (i.e., stopes with cemented backfill on both sides) would be filled with waste rock generated from underground mine development.

Blind Bench Stoping. Blind bench stoping is a variation on longhole stoping; it differs in that the top and bottom cuts would be driven from opposing directions and, if viewed from above, would not overlap except

for a small portion at the end of each drive where a slot raise would be developed (**Figure 2-5**). All other aspects of blind bench stoping would be as described above for longhole stoping.

2.4.4.3 Surface Water Diversions

Stormwater diversion ditches would be constructed, where needed, to divert runoff away from the open pits. The diversion for the Cortez Hills Pit would be constructed inside the pit adjustment zone east of the pit wall or on the pit's uppermost bench. The ditch would be approximately 10 feet wide and 4 feet deep and would accommodate runoff from a 25-year/24-hour storm event. Portions of the ditch may be lined with 60-mil high density polyethylene (HDPE) liner to prevent infiltration. Flow would be routed to existing drainages. There are no proposed stormwater diversions for the Cortez Pit because upgradient drainages already have been occluded by historic waste rock facilities and open pits. The proposed North Gap Pit expansion would be developed within the existing Pipeline diversion ditch system.

2.4.4.4 Access and Haul Roads

Access to the site from Interstate 80 (I-80) is provided via Nevada State Route (SR) 306 to existing operations. The route currently is, and would continue to be, used by suppliers, site personnel, and contractors on a daily basis. Lander County Road (CR) 225 would provide access from the existing Pipeline Complex to the Cortez and Cortez Hills complexes. Under the Proposed Action, typical daily traffic would include fuel transport (2 trips), reagent transport (1 trip), employee buses (4 trips), and company and contractor pickups (approximately 240 trips).

Under the Proposed Action, portions of two Lander County roads (CR 225 and CR 222) would be rerouted to facilitate development of proposed project facilities (**Figure 2-3**). To facilitate development of the Canyon Waste Rock Facility, an approximately 8-mile segment of CR 222 that currently traverses the bottom of Cortez Canyon would be rerouted to the canyon to the southwest of the current alignment (**Figure 2-3**). Prior to expansion of the Pipeline Waste Rock Facility, an approximately 5-mile segment of CR 225 would be relocated to the south of the current alignment. The rerouted road segments would be constructed with a 24-foot running surface, 2 percent outslopes, grades not exceeding 8 percent, and appropriate erosion control measures in accordance with Lander County standards. Permits as required by Lander County would be obtained prior to initiation of road construction. Public access would be maintained during construction.

A small network of service vehicle access roads would be developed to monitor pit wall slopes and provide access to the heap leach facilities, dewatering wells, and other areas of the project. Access roads would be 24 feet in width and graveled, as needed, to provide for all weather travel. Gravel would be obtained from the existing gravel pit located west of the Cortez Complex or the gravel pit located northeast of the Pipeline Complex (**Figure 2-2**). Drainage culverts, silt fencing, straw bales, and diversion berms would be installed, as needed, to control runoff and provide erosion control along access roads.

Haul roads would be constructed to provide for transport of ore and waste rock from the pits to the heap leach facilities, crushers, or waste rock facilities, as applicable. Existing haul roads also would be used, some of which may be upgraded. In general, haul roads would be 110 feet wide to safely accommodate

400-ton haul trucks and meet MSHA requirements. The roads would be constructed with safety berms on the outer edges, would be designed to a 10 percent grade, would be rocked, as needed, to provide for all weather travel, and drainage would be established between the road edge and safety berm. The majority of the haul road construction and upgrade would occur internal to the Cortez Hills Complex or the Pipeline Complex. The existing Gold Acres haul road, which runs between the Cortez Mill and Pipeline Complex, would be upgraded by widening the road from 90 to 110 feet and improving the road base. In addition, approximately 4 miles of the existing Horse Canyon haul road would be rerouted to accommodate development of the Cortez Hills Pit and Canyon Waste Rock Facility. The reroute would be internal to the Cortez Hills Complex, with a portion of the haul road rerouted around the proposed pit and the remainder rerouted through the proposed waste rock facility to provide for access and waste rock haulage for facility development. Stormwater controls and BMPs would be used and maintained.

2.4.4.5 Drilling and Blasting

Drilling and blasting techniques implemented for open-pit mining for the Proposed Action would be the same as currently used at the existing Pipeline Pit. Drilling would be accomplished with the use of diesel-powered and/or electric blast hole drill rigs. Blast holes would be loaded with an ammonium nitrate/fuel oil mixture, or blasting slurry in wet areas, which subsequently would be detonated. Unconsolidated gravels and growth media that do not require the use of drilling and blasting techniques prior to removal would be ripped with a dozer, as needed. Blasting only would be performed during daylight hours and under strict safety procedures as required by MSHA.

Drilling and blasting techniques for underground mining would be the same as currently implemented for the existing underground exploration program. Drilling would be accomplished with the use of an underground jumbo drill, which would drill holes up to 14 feet deep. The holes would be loaded with an ammonium nitrate/fuel oil mixture or an emulsion blend and subsequently detonated. Blasting would be performed under safety procedures required by MSHA.

2.4.4.6 Loading and Hauling

For open-pit operations, hydraulic or electric shovels or hydraulic front-end loaders would be used to load rock into 85- to 400-ton haul trucks. Waste rock would be trucked from the pits to their adjacent waste rock disposal facilities. Waste rock from the North Gap Pit expansion area alternately may be trucked to the currently permitted Pipeline Pit backfill area. Mined ore would be transported over existing and proposed haul roads to mill or heap leach facilities or appropriate stockpiles, depending on ore type. The majority of the mill-grade ore from the Cortez Hills Pit would be delivered to the proposed new crusher located north of the Cortez Hills Pit and subsequently conveyed by overland conveyor or hauled to the Pipeline Mill. The remainder of the mill-grade ore from the Cortez Hills Pit and the mill-grade ore from the Cortez Pit would be trucked to the existing Cortez Mill for processing. Ore from the North Gap Pit expansion area would be transported over existing roads to existing Pipeline heap leach or mill facilities or placed on existing stockpiles. All refractory ore would be trucked to stockpiles and subsequently trucked off site under an ore sales agreement for processing. In the past, refractory ore was sold for off site processing at the Jerritt Canyon Mine. Currently, refractory ore is sold for off site processing to the Barrick Goldstrike facility.

Possible future refractory ore sales would be to one of these facilities or another processing facility in northern Nevada.

For underground operations, LHD machines would be used to load rock into underground haul trucks. Waste rock would be transported to the existing F-Canyon Pit backfill area or, if suitable, used as backfill material for the underground workings. Material used as backfill temporarily may be stored in the underground workings. Ore would be trucked to ore stockpiles in the F-Canyon and Cortez Hills pits. Alternately, the ore may be transported to a central underground area and transferred to a conveyor system that would carry the ore to the surface stockpiles. Surface haulage equipment subsequently would transport the ore to the appropriate processing facility.

2.4.4.7 Cross-valley Ore Transport

Under the Proposed Action, the majority of the mill-grade ore mined from the Cortez Hills and Cortez pits would be transported to the existing Pipeline Mill for processing.

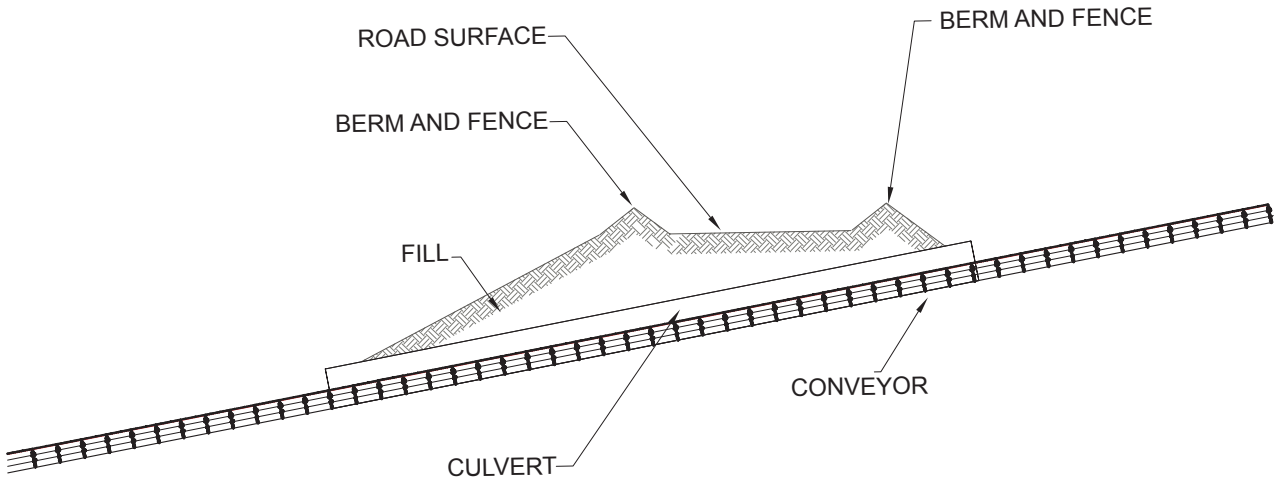
Crusher and Ore Stockpile

Prior to transfer of mill-grade ore from the Cortez Hills Pit to the Pipeline Mill, the ore would be fed to a new primary gyratory crusher that would be constructed, along with a new stockpile, north of the Cortez Hills Pit (**Figure 2-3**). Crushed ore subsequently would be conveyed via the proposed overland conveyor system, or alternately hauled, to the existing coarse ore stockpile at the Pipeline Mill facility. Dust collection devices and water suppression would be used to control fugitive dust at the conveyor's transfer points. Existing air permits would be modified prior to construction of the new crusher.

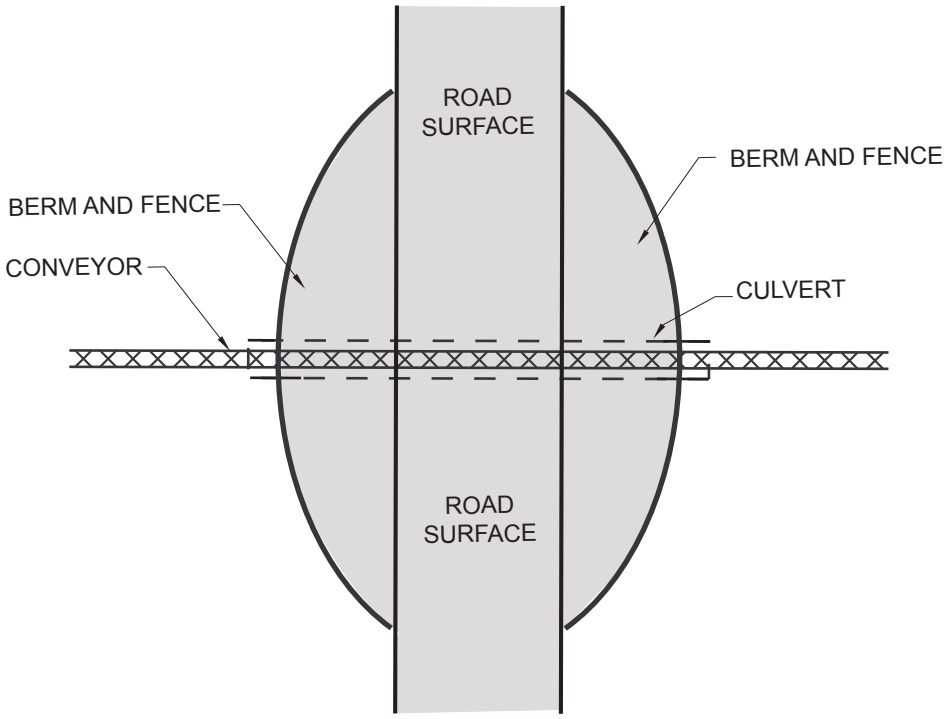
Cross-valley Conveyor

Under the Proposed Action, a new approximately 12-mile-long conveyor system, with an average height of 4 feet above ground surface, could be constructed between the proposed Cortez Hills crusher/stockpile facility and the existing Pipeline Mill coarse ore stockpile (**Figure 2-3**). To provide for final design adjustments in areas of steeper terrain, two potential routes for the southeastern end of the conveyor have been identified between the Cortez Hills Complex and the valley floor, both of which are analyzed in this EIS. The final route selection and final alignment of the conveyor corridor within the selected route would be determined during final detailed design. The conveyor right-of-way corridor, inclusive of the associated maintenance road, would be 100 feet in width. The crushed ore would be conveyed to a discharge station located on a previously authorized disturbance area at the Pipeline Complex.

To prevent public **and** livestock access, BLM-approved fencing would be installed along both sides of the conveyor corridor. Public crossing of the conveyor corridor would be provided by traffic overpasses (**Figure 2-6**). The overpasses would include appropriately sized safety berms and barriers, and the ends would be fenced to restrict access.



CROSS-SECTION



PLAN-VIEW

Cortez Hills
Expansion Project

Figure 2-6
Typical Conveyor Bridge
Cross-section and Plan-view

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To facilitate the passage of wildlife across the conveyor corridor, five wildlife overpasses or ramps would be installed. One wildlife ramp would be constructed over the conveyor corridor on the eastern slope of the Cortez range to provide for mule deer migration. The other four wildlife ramps would be constructed over the conveyor corridor to facilitate antelope movement in Crescent Valley. All three wildlife ramps would be sized and field located in coordination with the BLM and NDOW. As with the traffic overpasses, the ramps would include appropriately sized safety berms and barriers, and the ends would be fenced.

As the predominate wind direction in the project vicinity is from the south (Enviroscientists 2006), the conveyor would be partially covered on the south side to reduce the generation of fugitive dust. In addition, ore moisture would be maintained over 4 percent. A water line also would be installed parallel to the conveyor for dust control, if needed. To provide for maintenance access, the north side of the conveyor would remain open, and an access road would be installed along the length of the conveyor. A power distribution line also would be installed parallel to the conveyor. Lighting and appropriate signage would be installed where needed.

Cross-valley Truck Transport

To provide for operational flexibility, cross-valley truck transport of ore is being analyzed as an option. Under this option, mill-grade ore from the Cortez Hills and Cortez pits could be hauled across the valley floor to the Pipeline Mill via the existing haul road between the two sites, which would be upgraded under the Proposed Action as discussed in Section 2.4.4.4, Access and Haul Roads. Ore would be hauled in large capacity haul trucks. Approximately 15 to 30 round trips per day (12 miles each way) would be required during production.

2.4.4.8 Dewatering and Water Management

Additional dewatering would be necessary to facilitate mining of the Cortez Hills Pit and for the Cortez Hills underground operations. Dewatering is not anticipated for the proposed expansion of the Cortez Pit. No additional dewatering beyond that currently authorized for the Pipeline Pit (annualized average rate up to 34,500 gpm [BLM 2004e]) would be required for development of the North Gap Pit expansion area.

Water from the proposed dewatering operations would be consumed by the project's process and dust suppression requirements or infiltrated at the existing infiltration basins. The produced water is expected to be of adequate quality for use in mining, heap leaching, milling, and non-potable service needs (Geomega 2006e). Projected dewatering rates for the proposed project, consumption rates for mining and processing, and projected water disposal rates over the life of the mine are presented in **Table 2-4**.

Prior to initiation of the project, the state permits for the existing operation would be modified to facilitate the infiltration of excess dewatering water from the proposed Cortez Hills Expansion Project. All pit dewatering wells would be installed, maintained, and decommissioned in accordance with Nevada Division of Water Resources (NDWR) requirements, unless mined through during mine operations.

Dewatering Operations

Open Pit Dewatering. The pit dewatering operations under the Proposed Action, as summarized below, would be similar to those currently implemented for the existing Pipeline dewatering operations.

Table 2-4
Dewatering and Disposal Rates for the Proposed Action
(gpm – annualized)

Year of Operation	Dewatering Rate[1]	Mine/Milling Consumption	Disposal Rates	
			Infiltration Rate	Rate to Dean Ranch for Irrigation
1	0	1,000	0	0[2]
2	1,300	1,000	300	0[2]
3	700	1,000[3]	0	0[2]
4	1,200	1,000	200	0[2]
5	2,200	1,000	2,200	0[2]
6	2,700	1,000	1,700	0[2]
7	4,200	1,000	3,200	0[2]
8	3,700	1,000	2,700	0[2]
9	6,700	1,000	5,700[4]	5,700[4]
10	8,400	1,000	7,400[4]	7,400[4]

[1] Includes dewatering for the Cortez Hills Pit and underground operations.
[2] Water from the Pipeline dewatering system would continue to be piped to the Dean Ranch as currently authorized (annualized average of up to 6,000 gpm. No water from the proposed Cortez Hills dewatering would be conveyed to the ranch during this time.
[3] Make up water would be obtained from the proposed water supply well in Grass Valley, as discussed in Section 2.4.8.2, Water Supply.
[4] During the irrigation season (April through October) water from the Cortez Hills dewatering system would be piped to the Dean Ranch for irrigation. During the non-growing season, water would be conveyed to the infiltration ponds.

Source: CGM 2006c; Geomega 2007f.

Dewatering of the Cortez Hills Pit would be accomplished through the use of perimeter wells located peripheral to the pit area, in-pit wells, horizontal and vertical drains installed for passive dewatering of pit walls, and water collection sumps installed in the bottom of the pit. Booster pump stations would be located internal to the pit and on the pit perimeter to transfer dewatering water to the proposed fresh water reservoir or storm water event pond located at the proposed Grass Valley Heap Leach Facility. Water subsequently would be conveyed to use areas (e.g., heap leach facilities, mill facilities, water truck standpipes for dust suppression). If needed, additional dewatering water storage would be provided by the existing water storage reservoir at the Cortez Mill area.

The proposed fresh water reservoir would be located immediately south of the Cortez Hills Pit (**Figure 2-3**). It would be approximately 500 feet in length and width, with a storage capacity of approximately 49 acre-feet. The reservoir would have a single 60-mil geosynthetic liner. An 8-foot-high chain link fence would be installed around the reservoir to exclude wildlife. A minimum of 2 feet of freeboard would be maintained during operations to accommodate precipitation from a 100-year/24-hour storm event. Prior to

construction, CGM would obtain a Dam Permit from the NDWR; an Industrial Artificial Pond permit would not be required as the reservoir would not contain process fluids.

Underground Operations. Under the Proposed Action, underground operations would mine down to the 3,800-foot elevation. Advancement of the underground workings below the 4,600-foot elevation would require dewatering activities. Underground dewatering operations would include surface wells and associated booster pumps in addition to valved drain holes that would flow to pipelines and collection sumps where booster pumps would be used to move the water from the underground workings to the surface. The use of water from the underground dewatering program would parallel those described above for open-pit dewatering operations.

Water Management

Dewatering water in excess of the project's consumption rate would be discharged in accordance with NDEP Water Pollution Control Permit criteria. At the time of installation and quarterly thereafter, groundwater produced from dewatering wells, drainholes, and other dewatering water production locations (e.g., contact water in the underground workings) would be sampled, analyzed, and managed based on the analytical results and NDEP permit requirements. As dewatering water may not be suitable for discharge due to its analyte concentrations, dewatering water that exceeds permit limitations would be consumptively used to the extent possible and would not be discharged without water treatment to bring it into compliance. Excess dewatering water that does not meet applicable standards would be conveyed to the Pipeline Mill for use as process water or discharged to the existing lined water storage reservoir facility prior to use as process water or evaporation. Waters that meet the applicable Nevada water quality standards would be infiltrated through alluvial deposits to the groundwater in the Crescent Valley hydrologic basin, using the previously authorized infiltration basins located peripheral to the Pipeline Complex or conveyed to the CGM-owned Dean Ranch for irrigation purposes (see **Table 2-4**).

Two existing dedicated water pipelines that segregate excess dewatering water by water quality for cross-valley conveyance previously were authorized for the Cortez Underground Exploration Project. These pipelines would be used for cross-valley conveyance of excess dewatering water produced by the proposed project's dewatering operations.

Existing Infiltration Basins. The currently permitted infiltration basins located peripheral to the Pipeline Complex would be used for disposal of excess dewatering water under the Proposed Action. No new infiltration basins are proposed. The 9 existing infiltration sites, which have been fenced, each include up to 15 separate infiltration basins. The infiltration basins are described in the South Pipeline Final EIS (BLM 2000a). In summary, the infiltration basins range in size up to 1,000 feet in length by 200 feet in width and were excavated to a depth of approximately 15 to 20 feet. A portion of the excavated material was used to construct embankments around the basins, thereby increasing their storage capacity. To increase the infiltration capacity of some of the basins, a series of rock-filled trenches (French drains) were installed. In addition, holes were drilled within some basins to further facilitate vertical infiltration.

The flow rates of discharged dewatering water to the infiltration basins currently is, and would continue to be, controlled through the selective use of pumps and a manifold/valve distribution system. The volume of

water delivered to individual infiltration basins within each site also would continue to be regulated through distribution pipes and valves or flumes and headgates.

Infiltration basins currently are, and would continue to be, operated in series such that one basin would receive the dewatering water, fill, and then flow into an adjacent basin. Conversely, individual infiltration basins or groups of basins could be drained by infiltration and dried to provide for maintenance access. Maintenance would consist of ripping or scarifying the bottom of a basin to enhance infiltration and/or removal of finer sediments. Removed sediment currently is, and would continue to be, placed on the existing soil stockpiles adjacent to the infiltration basins.

The livestock watering troughs previously installed to deter livestock from attempting to access water in the infiltration basins would continue to be operated on a rotational basis in coordination with the BLM and grazing permittees. Water for the troughs would continue to be provided by taps on the dewatering water pipeline. For the protection of bird species, the troughs were designed with avian exit ramps.

Ongoing Irrigation Use at the Dean Ranch. The CGM-owned Dean Ranch, located adjacent to the northeast corner of the proposed project boundary (**Figure 2-2**), currently has groundwater rights that total 18,800 gpm on an annualized basis. A portion of this water (6,000 gpm [annualized]) currently is supplied by CGM's dewatering water discharge program through an aboveground pipeline. Dewatering water diverted from the existing Pipeline dewatering program to the ranch currently is used for sprinkler and flood irrigation. Under the Proposed Action, excess dewatering water from the proposed Cortez Hills Expansion Project that meets applicable Nevada State water quality standards also would be conveyed to the Dean Ranch for seasonal (April through October) use for irrigation (see **Table 2-4**). If needed, the water delivery system to the Dean Ranch would be modified to accommodate additional groundwater disposal while maximizing the agricultural operation.

Existing Dewatering/Discharge Monitoring Program. Hydrologic monitoring and reporting currently is conducted in accordance with existing permit requirements to measure the effects of the dewatering and discharge program on groundwater quantity and quality both locally in the Pipeline Complex area and in the southern Crescent Valley region. The monitoring requirements are described in the Integrated Monitoring Plan (Water Management Consultants, Inc. [WMC] 1995a) and summarized in the South Pipeline Project Final EIS (BLM 2000a). In general, the monitoring program provides: 1) data on dewatering flow rates and transient groundwater levels, which are used to optimize and manage the existing pit dewatering operations; 2) data for tracking potential mine-related groundwater quality changes in the area; and 3) a trigger mechanism for mitigation of any identified mine-related impacts on water supply wells and seeps and springs in the area of potential effect. Under the Proposed Action, the existing monitoring program would be expanded in accordance with applicable federal and state permit requirements to measure the effects of the proposed Cortez Hills Expansion Project pit dewatering and discharge program on groundwater quantity and quality.

In response to earth fissuring that occurred in November 2002 to the east of the existing Pipeline South Area Heap Leach Facility, CGM has implemented management, monitoring, and mitigation measures to address possible future fissuring in the Pipeline Complex area. These measures are described in the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). These protective measures, which

would continue as part of the Cortez Hills Expansion Project, include integration of the following components:

- Stormwater diversion ditch to intercept and route surface water runoff away from the fissure area;
- Dewatering pipeline instrumentation and pressure monitoring;
- Intercept trench east of the existing Pipeline South Area Heap Leach Facility and west of the main fissure complex;
- Backfilling of existing open fissure gullies;
- Protective berming and grading to exclude water from the fissure field;
- Alluvial waste rock dikes to provide containment and channelization in the event of a dewatering line break; and
- Monitoring of subsidence rates and horizontal strain.

Under the Proposed Action, the existing lined ditch previously installed between the Pipeline Waste Rock Facility and mill to route runoff away from the fissure area would be extended around the proposed Pipeline Waste Rock Facility expansion area (**Figure 2-3**).

2.4.5 Waste Rock Facilities

Under the Proposed Action, three new waste rock facilities (Canyon, North, and South) and one new pit backfill area (North Gap Pit backfill) would be constructed. Also, two existing waste rock facilities (Cortez and Pipeline) and one existing pit backfill area (F-Canyon Pit backfill) would be expanded (**Figure 2-3**). The existing Pipeline Pit backfill area and Gap Waste Rock Facility, as currently permitted, would be used to accommodate a portion of the waste rock generated under the Proposed Action. In addition, a portion of the waste rock from the underground operations would be backfilled into mined-out portions of the underground workings as mining proceeds. Disturbance acreages associated with the waste rock facilities are presented in **Table 2-2**.

The waste rock facilities would be engineered, constructed, and reclaimed in the same manner as the currently permitted Pipeline Waste Rock Facility to ensure long-term stability, provide for effective reclamation, and reduce the overall visual impact. Mined waste rock would be hauled to the proposed facilities and placed by end dumping from the top of the active dump faces, resulting in working faces at the angle of repose (approximately 1.3H:1V). The waste rock facilities would be constructed in 50- to 200-foot lifts. In addition, the margins of the waste rock areas would be constructed such that variable topography would result during final grading, thereby providing a more natural post-mining landscape.

As required by NDEP, quarterly samples of distinct waste rock units currently are collected from the Pipeline Pit and subjected to meteoric water mobility and acid base accounting tests. Based on the results, any localized areas of acid generating waste rock are placed internal to the waste rock disposal facility and encapsulated or blended with acid neutralizing waste rock prior to placement. These procedures, as well as specific waste rock handling procedures for the in-pit facilities, also would be implemented for the Cortez Hills Expansion Project in accordance with the existing Integrated Monitoring Plan (WMC 1995a).

To control erosion and for long-term stability of the waste rock facilities, appropriate stormwater controls (e.g., stormwater diversion ditches) would be constructed and the waste rock piles appropriately graded to control stormwater runoff and runon. Engineered stormwater diversions constructed upgradient of the facilities, as needed, would be designed to accommodate flow from a 24-hour/100-year storm event and would route the flow to the drainages downgradient of the facilities. In addition, the waste rock facilities would be visually monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective and operating properly. Non-point source runoff from the waste rock facilities would flow directly to existing drainages.

Cortez Hills Complex

Proposed Canyon Waste Rock Facility. The Canyon Waste Rock Facility (**Figure 2-3**) would accommodate up to 1,200 million tons of waste rock from the proposed Cortez Hills Pit. To minimize surface disturbance, haul distances, and visual effects, the facility would be located in Cortez Canyon and would be constructed using valley-fill techniques. The maximum height of waste rock above existing topography would be approximately 1,400 feet, and the maximum crest elevation of the facility would be approximately 6,280 feet amsl. A cross-section and profile of the proposed facility is presented in **Figure 2-7**.

A stormwater diversion channel (ditch) would be constructed along the southwest side of this facility to control stormwater runon. A portion of the ditch would be located upgradient of the facility, and the remainder would be incorporated into the upper waste rock fill area. Three small diversions also would be constructed to direct stormwater from upgradient drainages south of the facility to the main diversion channel (**Figure 2-3**). The portions of the ditches that cross the waste rock facility would be lined (covered with a synthetic liner overlying a compacted soil layer) to prevent infiltration. The synthetic liner would be held in place and protected by a layer of gravel. Intercepted flow would be routed to Copper Canyon downgradient of the facility.

Proposed North Waste Rock Facility. The North Waste Rock Facility (**Figure 2-3**) would accommodate up to 185 million tons of waste rock from the proposed Cortez Hills Pit. The maximum height of waste rock above existing topography would be approximately 850 feet, and the maximum crest elevation of the facility would be approximately 5,850 feet amsl.

Proposed South Waste Rock Facility. The South Waste Rock Facility (**Figure 2-3**) would accommodate up to 65 million tons of waste rock from the proposed Cortez Hills Pit. The maximum depth of waste rock above existing topography would be approximately 500 feet. The maximum crest elevation would be approximately 6,500 feet amsl.

Cortez Complex

Proposed Cortez Waste Rock Facility Expansion. Under the Proposed Action, the existing Cortez Waste Rock Facility would be expanded (**Figure 2-3**) to accommodate approximately an additional 50 million tons of waste rock from the Cortez Pit. The height of the facility would increase by approximately 250 feet resulting in a total height of 300 feet and a maximum crest elevation of approximately 5,100 feet amsl.

Proposed F-Canyon Pit Backfill Expansion. The F-Canyon Pit is the southern most of the three existing pits at the Cortez site (**Figure 2-8**). The placement of up to 650,000 tons of waste rock in this pit (which is above the water table) was authorized under the Cortez Mine Underground Exploration Project EA (BLM 2006a). Under the Proposed Action, up to 2 million additional tons of waste rock from the proposed underground mining operation would be placed as backfill in the F-Canyon Pit to an elevation of approximately 5,200 feet amsl.

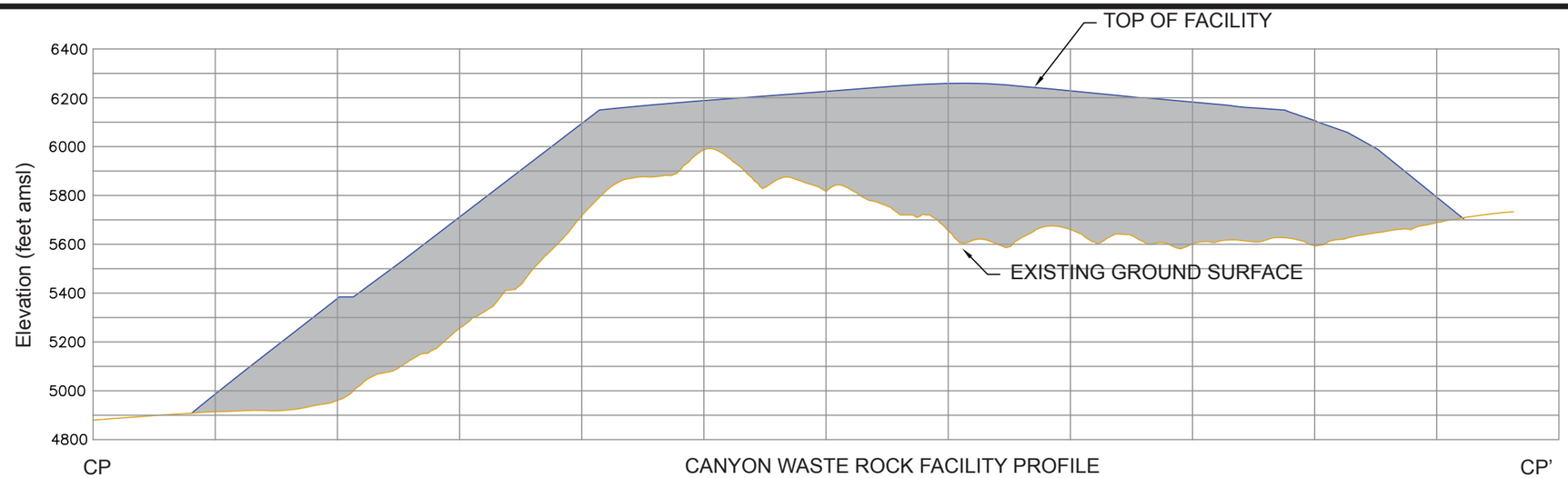
Proposed Underground Backfill. After underground stopes and drifts have been mined out, a portion of the workings would be backfilled with cemented backfill or waste rock to provide stability for adjacent drifts and provide a platform from which additional levels of ore could be mined as discussed in Section 2.4.4.2, Underground Mining. The cement plant, located external to the portal for the approved exploration program, may be moved underground during operation.

Pipeline Complex

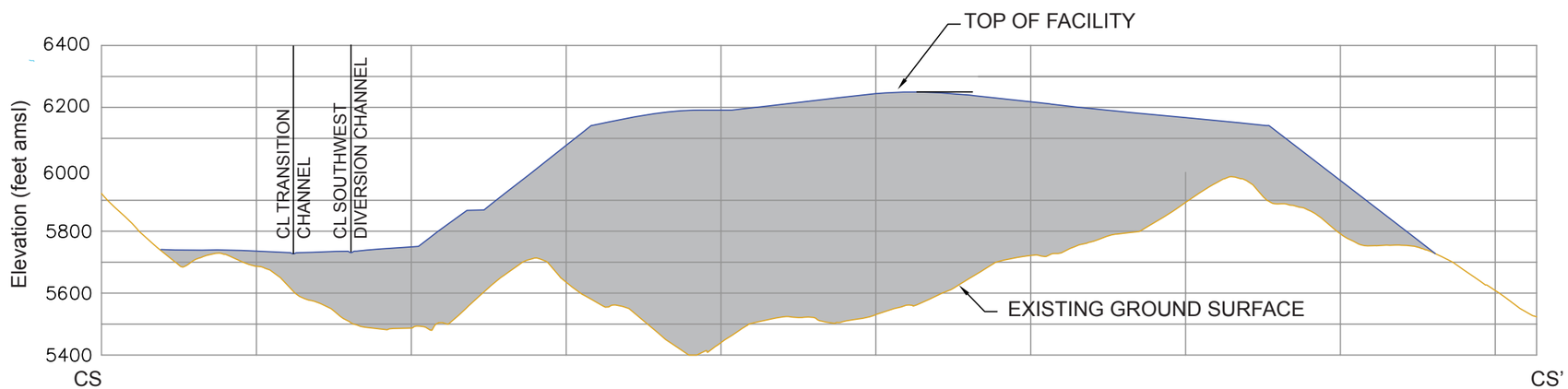
Proposed Pipeline Waste Rock Facility Expansion. Under the Proposed Action, the area of the existing Pipeline Waste Rock Facility would be expanded (**Table 2-1** and **Figure 2-3**). The expansion area would accommodate approximately 418 million tons of waste rock. The expanded facility would receive waste rock from the currently permitted Pipeline Pit and the proposed North Gap Pit expansion area. The facility also would be used to accommodate the stockpiling of growth media that would be mined from the currently approved Pipeline Pit. The growth media would be placed in stockpiles on completed portions of the waste rock facility. The maximum height of waste rock above existing topography in the facility expansion area would be approximately 300 feet, and the maximum crest elevation would be approximately 5,100 feet amsl. There would be no change in the currently permitted height (300 feet) of the existing portion of the facility. Prior to placement of waste rock over the closed infiltration site in the western portion of the expansion area (**Figure 2-3**), the infiltration basins would be backfilled.

Existing Gap Waste Rock Facility. Under the Proposed Action, a portion of the waste rock from the North Gap Pit expansion area may be placed in the currently authorized Gap Waste Rock Facility (**Figure 2-3**), depending on mine sequencing. This facility, as currently authorized, would have a maximum height above existing topography of 250 feet, a maximum crest elevation of approximately 5,350 feet amsl, and the capacity to accommodate up to 44 million tons of waste rock. No expansion of this facility would be required to accommodate waste rock placement under the Proposed Action.

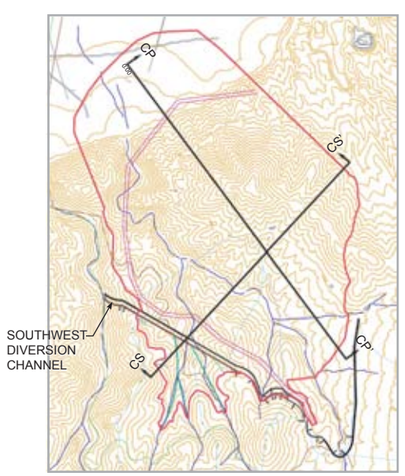
Existing Pipeline Pit Backfill. Under the Proposed Action, a portion of the oxide waste rock from the North Gap Pit expansion area would be placed in the existing Pipeline Pit backfill area (**Figure 2-9**). As currently authorized, the majority of the backfill area would be developed to approximately the 5,100-foot elevation, with the southern portion completed to approximately the 5,350-foot elevation (approximately 250 feet above the pre-pit ground surface) (**Figure 2-9**). No expansion of the pit backfill area (currently authorized for placement of up to 300 million tons of waste rock) would be required to accommodate waste rock placement under the Proposed Action.



CANYON WASTE ROCK FACILITY PROFILE



CANYON WASTE ROCK FACILITY PROFILE CROSS-SECTION



Cortez Hills Expansion Project

Figure 2-7

Canyon Waste Rock Facility Cross-section and Profile

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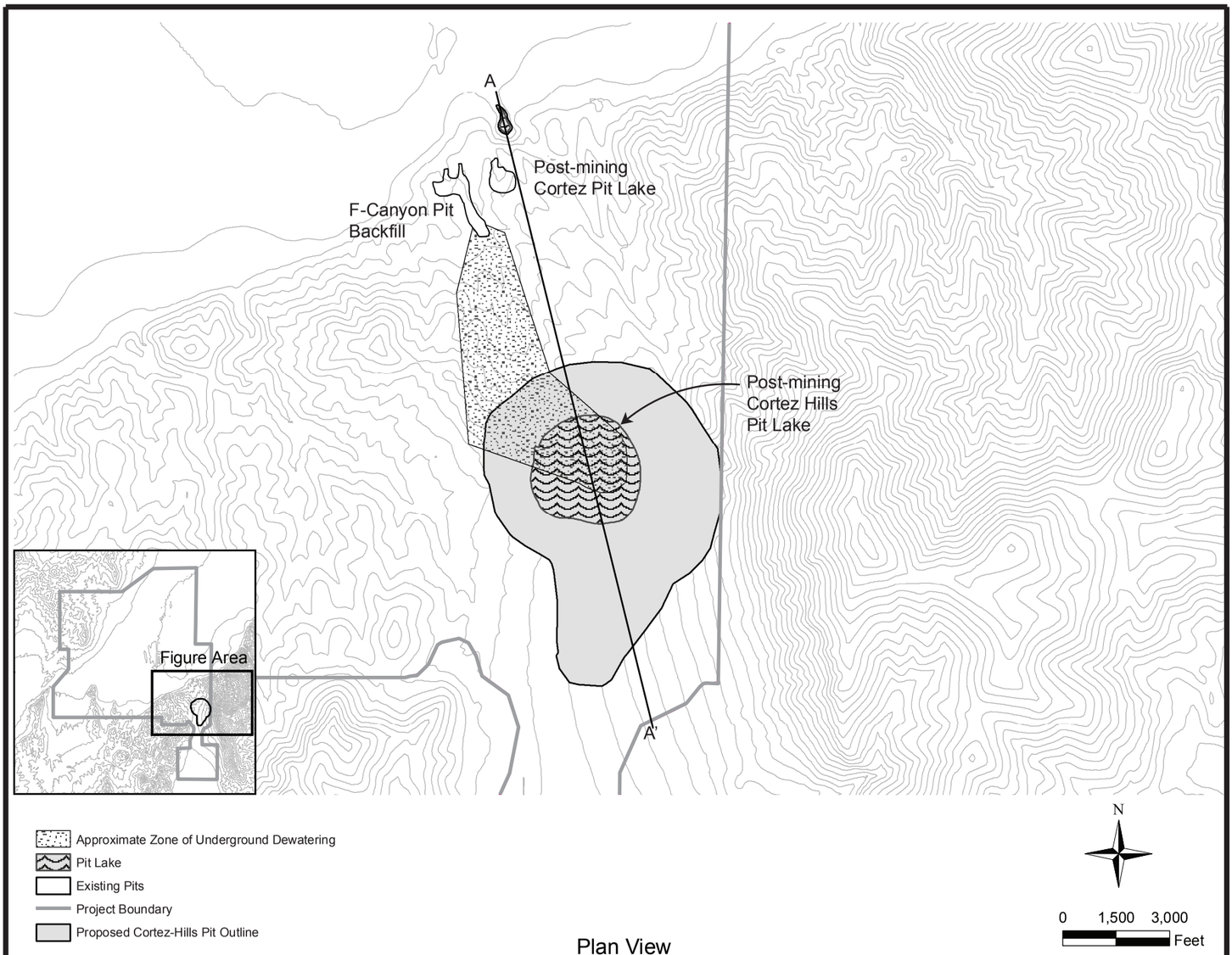
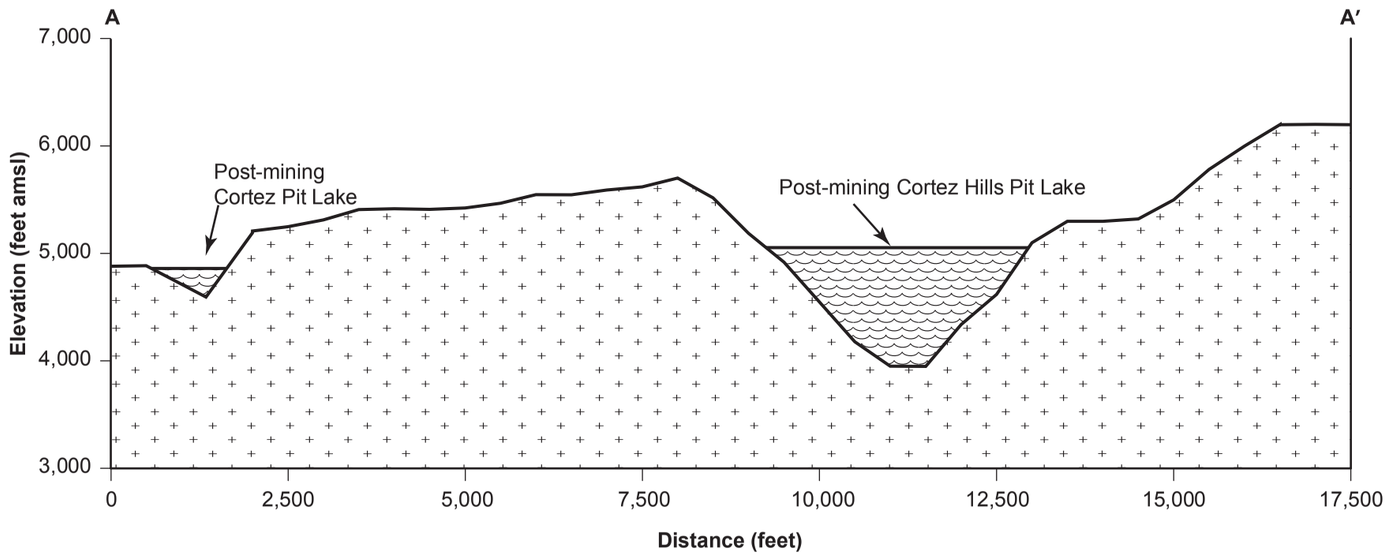


Plan View



Cross-section

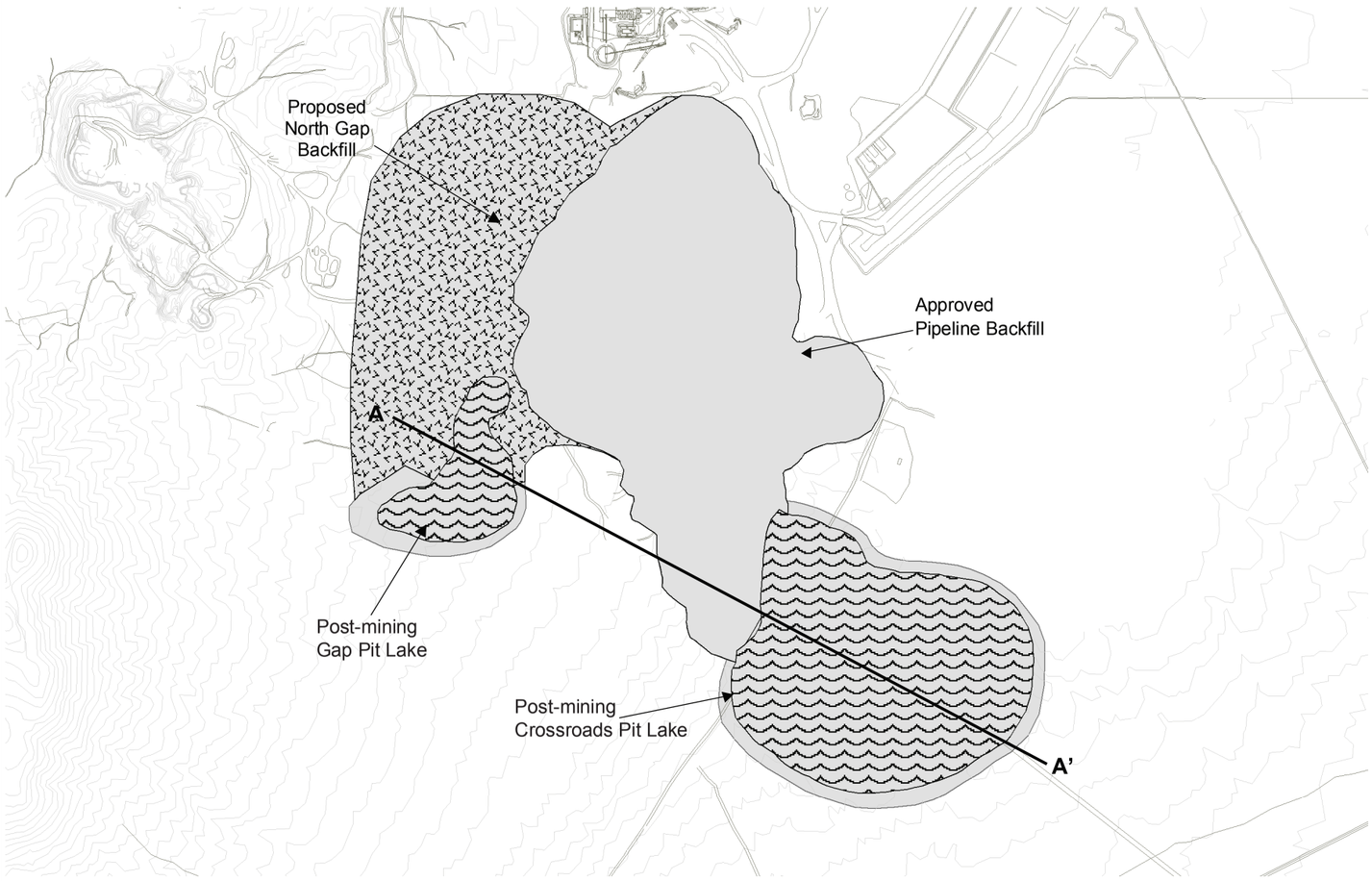
Legend

Source: Geomega 2007g.

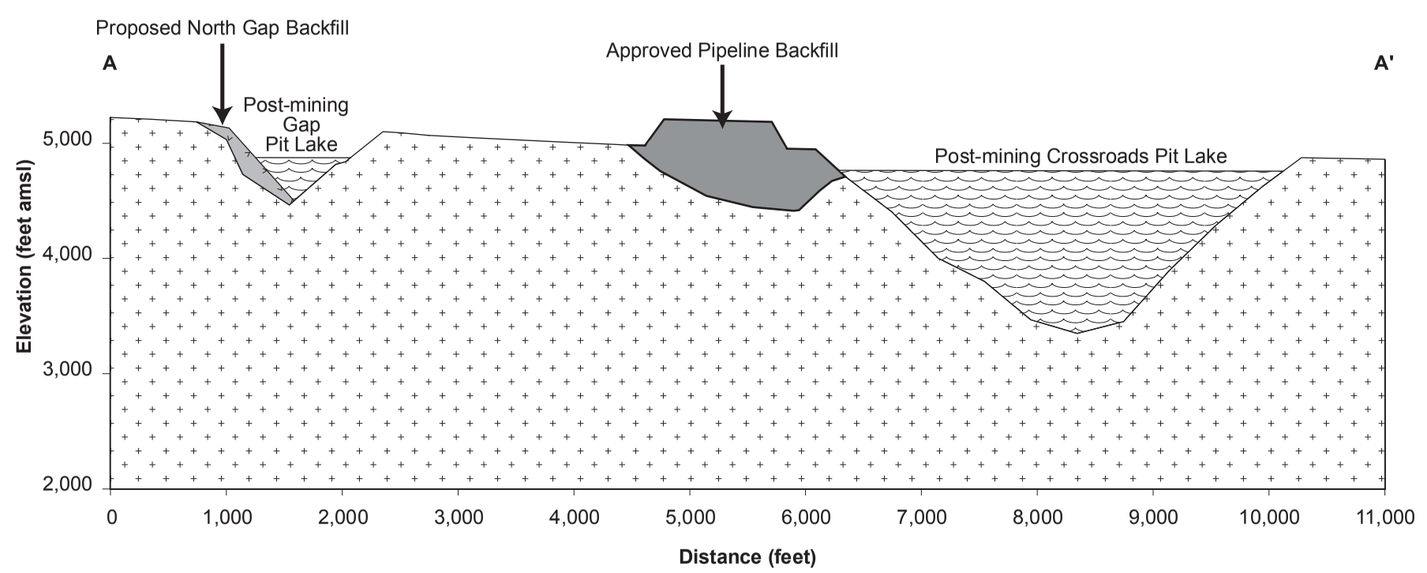
Cortez Hills Expansion Project

Figure 2-8

Pit Backfill Area and
Post-mining Pit Lakes-
Cortez and
Cortez Hills Complexes



Plan View



Cross-section

Cortez Hills Expansion Project

Figure 2-9

Pit Backfill Areas and
Post-mining Pit Lakes -
Pipeline Complex

Source: Geomega 2006d.

Note: The post-mining pit lakes as shown would develop within currently approved portions of the Pipeline Pit.

Proposed North Gap Pit Backfill. Under the Proposed Action, a portion of the waste rock from the currently approved Pipeline Pit would be placed as backfill in the proposed North Gap Pit expansion area (**Figure 2-9**). The backfill area would be developed to approximately the 5,000-foot elevation and would accommodate up to 44 million tons of waste rock.

2.4.6 Ore Processing

Ore mined under the Proposed Action would consist of low-grade heap leach ore, lesser amounts of high-grade millable ore, and minor amounts of refractory ore. Ore processing would be managed according to grade and metallurgy. Uncrushed leachable ore would be placed directly on one of the heap leach pads using trucks from the mine. Mill grade ore primarily would be processed at the existing Pipeline Mill, which may be expanded depending on timing and ore mining production rates. Some of the mill grade ore would be processed at the existing Cortez Mill CIL circuit. Refractory ore would be placed in the existing stockpile located at the Pipeline Waste Rock Facility or in new stockpiles in the F-Canyon pit, near the proposed crusher/conveyor, and on selected portions of the waste rock facilities. As currently done under existing operations, refractory ore subsequently would be shipped by ***40***-ton truck***s*** primarily via SR 306 and I-80 to a ***permitted*** off site processing facility (***i.e***., Barrick Goldstrike facility) under ore sales agreements. Based on off site ore sales from 2003 to 2005, the annual projected shipping rate is approximately 400,000 tons per year (tpy). ***No increase in shipping rate is proposed; therefore, shipping would be conducted under current authorizations.***

2.4.6.1 Proposed Heap Leach Facilities

A total of approximately 112 million tons of leachable ore (**Table 2-3**) would be mined under the Proposed Action, a portion of which would be processed at the existing Pipeline heap leach facilities. These facilities are described in the South Pipeline Project Final EIS (BLM 2000a) and Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). A summary of the currently permitted facilities is presented in this section. To facilitate the processing of the remainder of the leachable ore, two new heap leach facilities (Grass Valley and Cortez) would be constructed (**Figure 2-3**). Disturbance acreages associated with the heap leach facilities is presented in **Table 2-1**. Operation of the facilities would be in accordance with NDEP permit criteria and the BLM Cyanide Management Plan.

The proposed new heap leach facilities each would consist of engineered leach pads connected to a collection sump, via lined solution ditches, and two containment ponds located downgradient of the leach pad facilities. Each of the proposed facilities would have a dedicated CIC adsorption facility and reagent addition tanks, as described in Section 2.4.6.2, Proposed Processing Facilities Expansion. An 8-foot-tall chain link fence would be installed around each facility to provide for wildlife exclusion and regulated access. **Figure 2-10** presents a conceptual layout for the proposed facilities. A general cross-section of the facilities is presented in **Figure 2-11**.

Heap Leach Design and Construction

Prior to construction of the new and expanded heap leach pads, the areas would be cleared of brush and the sites would be graded and prepared for liner placement. Leach pad site leveling and grading would be performed to control solution flows and establish a stable downhill toe area for the ore heap. In addition, the subgrade would be modified to provide internal cell divider berms to separate flows for concurrent leach cycles during operation. Height and placement of the berms would be determined by piping requirements, cell size, pumping rates, and ore placement schedules.

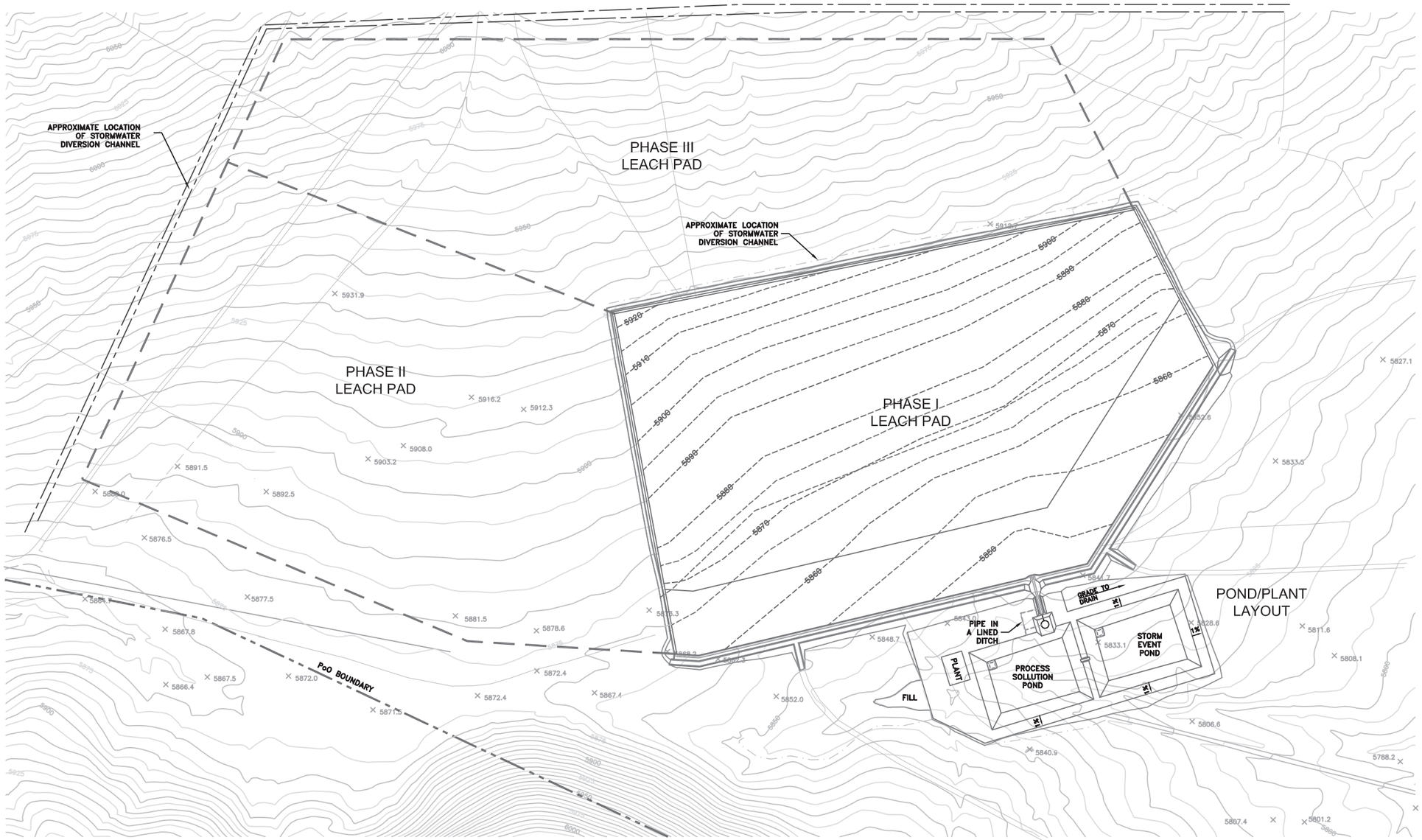
The heap leach facilities would be designed as closed circuit, zero discharge facilities with the capacity to contain all process fluids and meteoric waters generated by a 100-year/24-hour storm event as required by Nevada Administrative Code (NAC) 445A.433. In addition, the systems would be designed to continue to provide for containment of a 24-hour draindown resulting from power losses or unscheduled shutdown. The facilities would be surrounded by lined containment berms to prevent surface water runon from entering the facilities and to provide for containment of process solutions. Stormwater diversion channels designed to contain flow from a 100-year/24-hour storm event also would be constructed around the facilities, where needed.

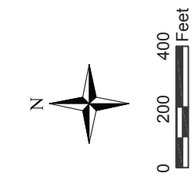
The leach pads would be constructed in compliance with NAC 445A.434 and 445A.438, and would utilize a composite-lined system with leak detection as discussed in the Plan of Operations (CGM and SRK ***2008***). Eighty-mil HDPE geomembrane would be used for the primary liner. The liner would be placed on a 12-inch-thick soil subliner compacted to provide an in-place permeability of 1×10^{-6} centimeters per second or less. A drainage layer consisting of a network of 4- to 10-inch drainage pipe covered by 18 to 24 inches of crushed rock or screened gravel would be placed on top of the primary liner to provide for collection of pregnant (gold-bearing) solution and reduce the hydraulic head on the liner.

Leach-grade run-of-mine ore would be placed in lifts on the pads using mine haulage trucks. Lime (for pH control during leaching) would be added to the ore in the haul trucks prior to placement of ore on the pad. The rock would be placed in lifts approximately 10 to 30 feet high, and the top of each lift would be leveled. The overall side slopes of the facilities would be no steeper than 2.5H:1V, and the maximum height of the heaps would be 300 feet.

Once a lift is completed, a network of sprinkler pipes would be placed on top of the ore pile, and a dilute solution of sodium cyanide would be sprayed on the ore. Scarifying areas on the heaps would be done on an as needed basis to prevent ponding or pooling of process solution. After percolating through the heap, the leach solution would be collected in pipes under the heaps and routed to the pregnant solution ponds.

Cortez Hills Complex. Under the Proposed Action, the Grass Valley Heap Leach Facility would be constructed at the Cortez Hills Complex. The proposed facility has been designed to accommodate 65 million tons of leach-grade ore. The height of the facility would be a maximum of 300 feet above natural ground surface.





Cortez Hills Expansion Project

Figure 2-10

General Heap Leach Facility Layout

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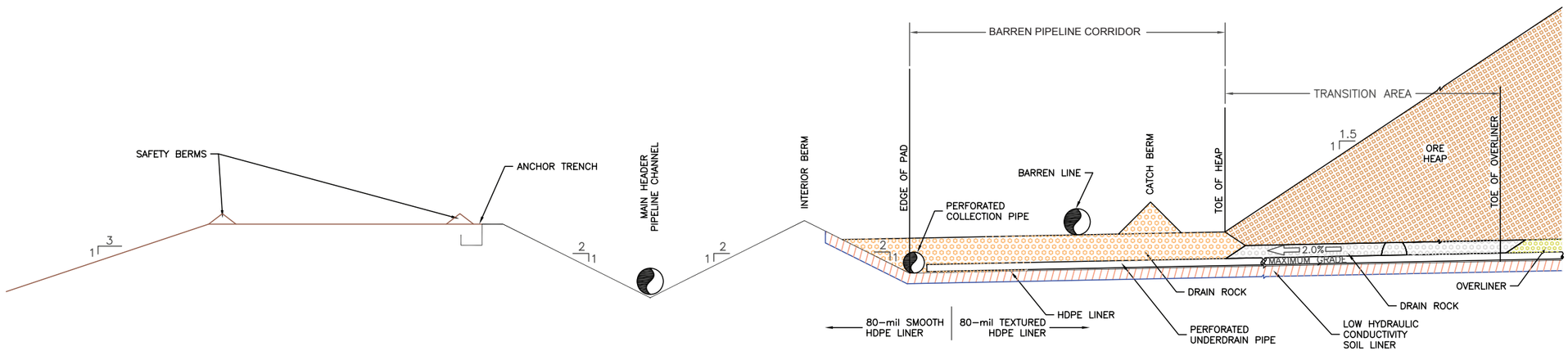


TYPICAL DOWN GRADIENT PERIMETER BERM
WITH COLLECTION PIPELINE CHANNEL N.T.S

NOTE: Typical cross-section is representative of the proposed Grass Valley and Cortez heap leach facilities.

Cortez Hills Expansion Project

Figure 2-11

Typical Heap Leach Facility Cross-section

05/29/07

Cortez Complex. Under the Proposed Action, heap leach-grade ore from the Cortez Pit would be trucked to the proposed Cortez Heap Leach Facility or trucked to one of the existing heap leach facilities at the Pipeline Complex. The Cortez Heap Leach Facility may be developed in the area of the existing heap leach pads near the Cortez Mill, if sufficient ore is defined. The proposed facility has been designed to accommodate approximately 10 million tons of ore. The height of the facility would be a maximum of 300 feet above natural ground surface.

To provide for operational flexibility, cross-valley truck transport of heap leach-grade ore is being analyzed as an option. Under this option, heap leach-grade ore from the Cortez Pit could be trucked across the valley floor to one of the existing heap leach facilities at the Pipeline Complex via the existing haul road between the two sites, which would be upgraded under the Proposed Action as discussed in Section 2.4.4.4, Access and Haul Roads. Ore would be hauled in large capacity haul trucks. Approximately 50 round trips per day (12 miles each way) would be required during production from the Cortez Pit. No expansion of the existing Pipeline South Area Heap Leach Facility or Pipeline Heap Leach/Tailings Facility is proposed under this option.

Pipeline Complex. Under the Proposed Action, a portion of the leach-grade ore from the North Gap Pit expansion area would be processed at the existing South Area Heap Leach Facility and/or the heap leach portion of the existing Heap Leach/Tailings Facility. However, no change in the currently permitted footprints, heights, capacities, or solution collection systems would be required.

Solution Collection System

Cortez Hills Complex. To facilitate leaching of ore at the Grass Valley Heap Leach Facility, leach solution would be pumped from the newly constructed CIC process building to the heap leach facility. The process building would contain a low head pumping system for areas up to 150 feet in height and a high head pumping system for areas over 150 feet in height. Each system would be able to pump 7,500 gpm to the heaps for a total application rate of up to 15,000 gpm.

Following percolation of the leach solution through the heap, pregnant (gold-bearing) solution would be collected at the base of each cell of the heap leach pad, with solution routed through flumes. Solution subsequently would be routed to a perforated pipe within a buried, lined ditch (**Figure 2-9**) that would gravity feed to the low point of the pad where solution would flow into an HDPE pipe connected to a pregnant solution sump. The sump would consist of a 60,000-gallon steel tank on a concrete slab. Gold-bearing solution would be pumped at a rate of up to 12,600 gpm from the pregnant solution sump to the new CIC facility located adjacent to the leach pad, where the gold would be extracted from solution through adsorption onto activated carbon. The barren solution subsequently would be pumped from the process building to the top of the heap to reinitiate the leaching process. Additional sodium cyanide, sodium hydroxide, and water would be added to the barren solution, as necessary, to maintain the cyanide concentration, solution pH, and volume.

Both a process solution pond and stormwater event pond would be constructed adjacent to the pregnant solution sump and CIC process building to provide for emergency solution containment (**Figure 2-10**). The process solution pond would be designed to contain, in addition to the normal operating solution volume,

draindown resulting from a 24-hour power loss, and a 100-year/24-hour storm event on the pond while maintaining 2 feet of freeboard. The stormwater event pond would be designed to contain runoff from the heap leach facility resulting from a 100-year/24-hour storm event while maintaining 2 feet of freeboard.

The ponds would be constructed in compliance with NAC 445A.435 and would be double-lined with 80-mil HDPE primary and secondary liners separated by a layer of geonet to collect any seepage from the primary liner. The seepage collection layer would drain to a 4-inch polyvinylchloride collection pipe that would report to a sump where flows would be monitored. Any collected seepage would be pumped back into the heap leach system. In addition, an engineered leak detection system would be installed under the new ponds. The solution ponds would be covered with netting, pond covers, floating “bird balls,” or other means to exclude avian and terrestrial wildlife.

Under normal operating conditions, neither pond would contain solution. If upset conditions should be encountered, solution from the pregnant solution sump and/or process building would report to the process solution pond, which would be designed to overflow to the stormwater event pond. The ponds for the Grass Valley facility would have storage capacities of 18.5 and 18.0 million gallons, respectively. Any solution reporting to these ponds would be pumped back into the system for reuse in the leaching process.

Cortez Complex. The solution collection system for the proposed Cortez Heap Leach Facility would be the same as the solution collection system described above for the proposed Grass Valley Heap Leach Facility, with the following exception. Based on the size of the proposed facility and the design criteria, the process solution and stormwater event ponds would have storage capacities of 4.0 and 3.3 million gallons, respectively.

Pipeline Complex. No changes to the solution collection systems for the currently permitted South Area Heap Leach Facility or Heap Leach/Tailings Facility are proposed.

2.4.6.2 Proposed Processing Facilities Expansions

Under the Proposed Action, the existing Pipeline Mill (which would be modified) and the existing Cortez Mill would be used for processing of mill-grade ore from the proposed open-pit and underground mining operations. Two new CIC circuits and associated reagent tanks also would be constructed adjacent to Grass Valley and Cortez heap leach facilities (**Figure 2-3**).

Cortez Hills Complex

Under the Proposed Action, mill-grade ore from the Cortez Hills Pit would be crushed and conveyed to the existing Pipeline Mill for processing as described in Section 2.4.4.7, Cross-valley Ore Transport.

Proposed Grass Valley Carbon-in-Column Circuit. Under the Proposed Action, the proposed Grass Valley CIC process building would be constructed adjacent to the Grass Valley Heap Leach Facility. The process building would house three parallel trains of five CIC tanks, each with a solution capacity of 4,200 gpm. In addition, two cyanide tanks, one anti-scalent tank, and one Cherokee Chemical tank (for mercury control) would be installed. This zero discharge circuit would be constructed on a cement pad

engineered to contain 110 percent of the volume of the largest tank, in accordance with NDEP requirements. Overflow containment would be provided by the process solution and stormwater event ponds (see Section 2.4.6.1, Proposed Heap Leach Facilities).

To facilitate the extraction of gold from the pregnant solution, the solution would be pumped from the pregnant solution sump to the proposed CIC facility. As the pregnant solution passes through the CIC tanks, the gold would be adsorbed by the activated carbon granules in the tanks. The barren solution at the end of the CIC circuit would be pumped back to the heap for reuse in the leaching process. Loaded (gold-bearing) carbon from the CIC facility would be transported by a specially designed and dedicated truck in specially designed transport units to the existing Pipeline recovery/refining circuit for gold stripping and carbon reactivation. The barren carbon subsequently would be transported back to the Grass Valley CIC facility and placed back into the CIC circuit.

Cortez Complex

Existing Cortez Mill Facilities. The existing Cortez Mill facilities have been in temporary closure and under care and maintenance since October 1999. Under the Proposed Action, the existing crushing, grinding, and CIL circuits at the Cortez Mill would be reactivated for use in processing part of the mill-grade ore mined under the proposed operations. A general description of these facilities is presented below. The mill currently has a permitted throughput of 2,000 tpd. No increase in throughput is proposed for this facility under the Cortez Hills Expansion Project. Modifications to existing permits, as required, would be obtained from NDEP prior to reactivation of the Cortez Mill.

Existing Crushing and Grinding Facilities. Mill-grade ore would be fed to a jaw crusher and subsequently conveyed to a coarse-ore stockpile. Crushed ore would be reclaimed from the stockpile and fed, via conveyor, to a semi-autogenous grinding (SAG) mill for primary grinding. Dust collection devices and water sprays would be used to control fugitive dust at transfer points. Ore, water, and steel grinding balls would be tumbled in the SAG mill to reduce the ore to sand sized particles. Oversized material from the SAG mill would be discharged and reduced in size by a cone crusher, then recycled back through the SAG mill. The fine fraction from the SAG mill would be transferred to a ball mill where the ore would be ground to a finer grain. The ground ore, which would be mixed with water and a weak cyanide solution to form a slurry during grinding, would be fed to the CIL circuit.

Existing Cortez Mill Carbon-in-Leach Circuit. The slurried ore from the grinding circuit would be piped to a thickener tank, where the ground ore would be allowed to settle and the excess water decanted. The ore subsequently would be pumped through a series of eight CIL tanks, where the dissolved gold in the weak cyanide solution would be adsorbed onto activated carbon (charcoal) granules. Loaded carbon from the CIL circuit would be transported via a specially designed and dedicated truck to the Pipeline Mill recovery and refining circuit, where the gold would be recovered and the carbon reactivated for reuse in the Cortez Mill CIL circuit.

Proposed Cortez Carbon-in-Column Circuit. The CIC facility for the proposed Cortez Heap Leach Facility would be the same as described above for the proposed Grass Valley CIC facility.

Pipeline Complex

Existing Pipeline Mill Facilities. Existing Pipeline Mill facilities would be used to process the majority of the mill-grade ore mined under the Proposed Action. Facilities that would be used include the crushing and grinding facilities, CIL/CIC circuits, and recovery/refining circuits. These facilities are described in the South Pipeline Project Final EIS (BLM 2000a) and Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). A summary of the currently permitted facilities is presented below. To accommodate the processing of additional ore, the existing mill may be expanded to increase the throughput capacity from the currently permitted 13,500 to 15,000 tpd, if needed.

Existing Crushing and Grinding Facilities. Current crushing and grinding operations at the Pipeline Mill parallel those described above for the Cortez Mill.

Existing Carbon-in-Leach and Carbon-in-Column Circuits. Current CIL operations at the Pipeline Mill parallel those described above for the Cortez Mill. In addition to a CIL circuit, the Pipeline Mill also has a CIC circuit for recovery of dissolved gold from the process decant water. The decanted water from the mill thickener tank is run through a series of six CIC tanks where the gold in solution is adsorbed onto activated carbon. The barren solution subsequently is recirculated through the grinding circuit. The existing CIC circuit also would continue to be used for processing of pregnant solution from the existing heap leach facilities.

Existing Recovery and Refining Circuit. Loaded carbon from the CIL and CIC circuits is screened from the slurry and solution, respectively, and transferred to the carbon stripping circuit. During stripping, a dilute caustic and cyanide solution is circulated through the carbon at elevated pressure and temperature, resulting in the gold being desorbed from the carbon into solution. The carbon subsequently is dried and reactivated in a kiln, then reused in the CIL and CIC circuits. The pregnant strip solutions are cooled and passed through the electrowinning circuit, causing the gold to precipitate onto steel wool. The barren strip solution subsequently is recycled back to the stripping vessel. The steel wool containing the gold is mixed with fluxes and melted into doré buttons. The buttons are combined in a second melting and poured into bars, which are shipped off site to a buyer.

Proposed Pipeline Mill Facilities Expansion. The proposed expansion of the existing Pipeline Mill, if required, would include the construction of a second ball mill, a grind thickener tank, a countercurrent decantation thickener tank, and other ancillary facilities (e.g., stormwater containment, power distribution facilities). Facilities would be constructed within the currently permitted existing disturbance area. The mill would continue to be operated as a zero discharge facility. New facilities would be constructed using concrete containment structures to provide for containment of any spills. Sumps within the containment area would collect any spilled solution which would be pumped back into the processing circuit. Modifications to existing permits, as required, would be obtained from NDEP prior to construction of the proposed additional mill components.

2.4.6.3 Tailings Facilities

Mill tailings resulting from processing of the mill-grade ore mined under the Proposed Action would be disposed of in either the expanded Cortez Tailings Facility or the existing Pipeline Heap Leach/Tailings Facility (**Figure 2-3**).

Cortez Hills Complex

No tailings facilities are proposed at the Cortez Hills Complex.

Cortez Complex

Under the Proposed Action, the existing tailings facility would be expanded to accommodate tailings from the Cortez Mill (**Figure 2-3**). The facility expansion area would have an ultimate crest elevation of 4,950 feet amsl and would accommodate a total of approximately 15 million tons of tailings. The facility would have a composite liner system consisting of a 12-inch-thick secondary liner of compacted soil and a 60-mil HDPE geomembrane primary liner. The soil liner would be composed of near-surface clayey native soils and silty clay tailings from Tailings Area 5 (one of the existing tailings impoundments at Cortez) compacted to a maximum permeability specification of 1×10^{-6}. To improve embankment stability, a textured HDPE liner would be used under the embankment, with a smooth HDPE liner used within the impoundment basin. A minimum 18-inch-thick underdrain blanket would be placed on the liner with an integral solution collection piping network consisting of corrugated polyethylene pipe to convey drainage to an underdrain collection pond. Leak detection systems would be installed for the impoundment, solution collection channel, and underdrain pond. Any collected seepage would be contained and returned to the system.

During operations, tailings would be deposited near the embankment, resulting in consolidated beaches near the embankment sloping to a central decant pool. Solution from the decant pool would be piped to the existing Cortez water storage reservoirs for use as process makeup water. The facility would be operated as a zero discharge facility.

All necessary construction permits and modifications to operating permits would be obtained from the NDEP BMRR, NDWR, and NDOW prior to initiation of facility construction.

Non-lethal weak acid dissociable (WAD) cyanide levels would be maintained at the Cortez tailings facility through the use of a dilution system for the protection of wildlife species. As backup, the existing cyanide detoxification system (i.e., in-line addition of ferrous sulfate to the tailings solution) at the Cortez Mill would be used, if needed, to lower cyanide levels in the tailings discharged to the tailings facility.

Pipeline Complex

The existing Pipeline Heap Leach/Tailings Facility is described in the South Pipeline Project Final EIS (BLM 2000a) and Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). A summary of the facility is presented below.

The existing Pipeline Heap Leach/Tailings Facility is a single integrated system which includes an embankment; a composite liner consisting of a 24-inch-thick secondary liner of compacted soil having a permeability specification of 1 x 10^{-6} and an 80-mil-thick HDPE geomembrane primary liner over a 40-mil-thick geomembrane secondary liner, and a drain blanket. A geofabric drainage layer between the pond liners allows for drainage of any solution which may leak through the primary liner. Any drainage collected from the pond liner systems is collected in the double lined barren/reclaim pond from where it is pumped back to the facility.

The facility has been designed and previously permitted to accommodate future 25-foot lifts to an ultimate maximum height of 350 feet. To accommodate future tailings once the existing facility has reached capacity, a 434-acre tailings expansion area was analyzed and approved under the South Pipeline NEPA analysis (BLM 2000a). This previous approval provides for expansion of the facility into the adjacent heap leach area that is underlain by the integrated heap leach/tailings liner system. Prior to construction of the expansion, the facility's NDEP Water Pollution Control Permit would be modified accordingly. No additional expansion of the Pipeline tailings facility, beyond that currently approved, is proposed under the Cortez Hills Expansion Project.

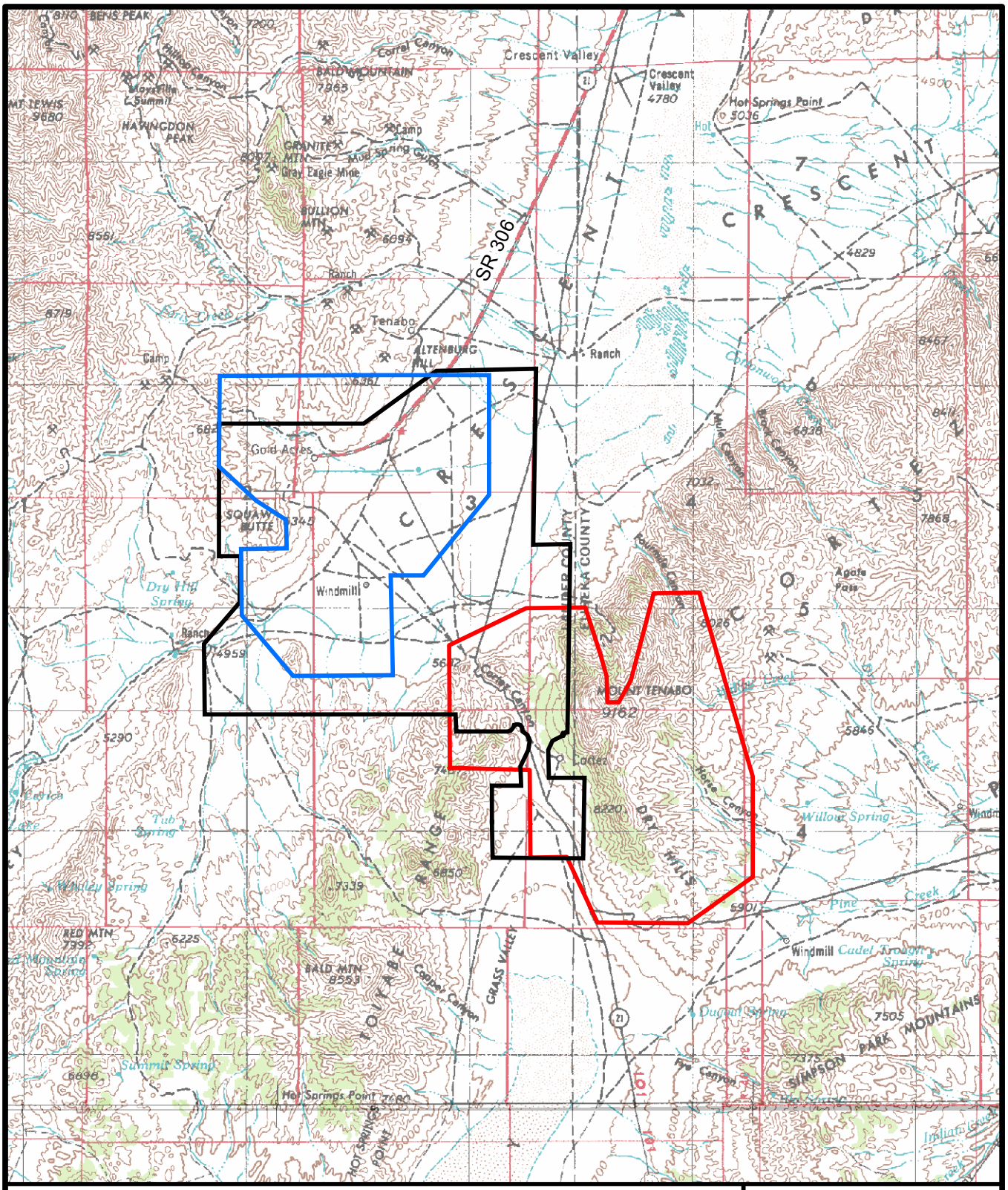
Operation and management practices as currently implemented for the tailings facility would continue under the Proposed Action. Tailings resulting from the processing of ore currently are, and would continue to be, deposited around the tailings facility through a series of valved spigots operated to optimize tailings deposition and consolidation. As tailings are discharged, the tailings and solution separate. The water pool subsequently is, and would continue to be, pumped back to the mill for reuse. The deposited tailings are further dewatered and solidified for reclamation as remaining solution passes through the drain blanket installed on top of the primary liner. The solution flows from the drain blanket to the lined perimeter collection ditches which report to the lined solution collection ponds. The facility would continue to be operated as a zero discharge facility.

Concentrations of WAD cyanide in the tailings impoundment currently are, and would continue to be, maintained at non-lethal levels for the protection of wildlife species. The existing cyanide detoxification system at the Pipeline facility would be used, if needed, to lower cyanide levels.

2.4.7 Exploration

Ongoing exploration activities would be conducted within and adjacent to the proposed project boundary per existing approvals to identify and delineate any additional ore reserves. Drilling also would be conducted to confirm the grade of ore deposits or confirm that an area contains no economically recoverable gold (condemnation drilling). These activities would consist of surface geologic or geophysical surveys, access road grading or construction, and exploration or condemnation hole drilling programs (surface and underground). Proposed exploration-related disturbance associated within the Cortez Hills Expansion Project is identified in **Table 2-1.**

CGM proposes to modify the boundaries of the currently authorized HC/CUEP and Pipeline/South Pipeline/Gold Acres Exploration Project to eliminate overlap with the areas of currently active and proposed mining in the proposed Cortez Hills Expansion Project boundary (**Figure 2-12**). In general, the portion of



Legend

- Project Boundary
- HC/CUEP
- Pipeline/South Pipeline/Gold Acres Exploration Boundary

Note: The Lander/Eureka County line was adjusted subsequent to the date of this USGS map base.

N

0 1 2 4 Miles

Cortez Hills Expansion Project

Figure 2-12
Proposed Project Boundary and Boundaries for Existing Exploration Plans

06/14/2007

HC/CUEP plan area west of the Lander/Eureka County line would be included in the Cortez Hills Expansion Project boundary, while the remainder of the existing exploration plan area east of the county line would remain within the HC/CUEP boundary. As a result, approximately 80 acres of existing exploration-related disturbance would become part of the proposed Cortez Hills Expansion Project plan area, and the remaining 39 acres of existing exploration-related disturbance would remain within the modified HC/CUEP plan area. The current authorization for up to 250 acres of exploration-related disturbance within the HC/CUEP plan area would be retained for the modified HC/CUEP area, with ongoing exploration conducted in accordance with existing permit requirements.

Similarly, the portion of the Pipeline/South Pipeline/Gold Acres Exploration Project plan area that overlaps with the proposed project boundary would be included in the Cortez Hills Expansion Project boundary (**Figure 2-12**). As of 2007, no exploration had been conducted under the Pipeline/South Pipeline/Gold Acres Exploration Project. The modified exploration plan area would retain the current authorization for up to 50 acres of exploration-related disturbance. The exploration project would continue to be conducted in accordance with existing permit requirements.

2.4.8 Infrastructure

2.4.8.1 Electrical Power

Sierra Pacific Power Company currently supplies electrical power to the existing Pipeline and Cortez complexes via a 60-kV transmission line, which also runs southward from the Cortez Mill into the proposed Cortez Hills Complex area and on through Grass Valley. Under existing permits for the underground exploration program, the portion of the transmission line between the Pipeline and Cortez complexes is being replaced with a 120-kV transmission line.

Under the Proposed Action, the currently authorized 120-kV line would be extended from the Cortez Mill to the north side of the Cortez Hills Pit, where it would connect to a new 120-kV substation. Also, approximately 3 miles of the existing 60-kV transmission line would be rerouted around the proposed Cortez Hills Pit and tie into the existing 60-kV transmission line alignment in the southern portion of the proposed project boundary as shown in **Figure 2-3**. Alternately, a 120-kV transmission line may be used for this 3-mile reroute. In addition, power requirements for the proposed project would require the installation of a new electric distribution network internal to the facilities at the Cortez Hills and Cortez complexes and parallel to the proposed conveyor. Primary uses of electricity would include the dewatering well pumps, electric shovels, primary crusher, conveyor, heap leach solution pumps, and the maintenance shop and safety/security buildings. An approximately 1-mile-long, power distribution line would be installed in the southern end of the project boundary to provide power for the proposed water supply wells.

No modifications to the existing electrical supply or distribution system at the Pipeline Complex would be required to support the Proposed Action. Power supply to the proposed conveyor system may, in part, come from this existing electrical supply network.

2.4.8.2 Water Supply

Water used for dust suppression and processing would be obtained from the mine dewatering program, to the extent possible. To facilitate the distribution of dewatering water to the mine use areas at the Cortez and Cortez Hills complexes, a water supply system consisting of overland piping would be constructed adjacent to existing and proposed roads to convey water between the proposed fresh water reservoir and stormwater event ponds and the use areas (i.e., heap leach pads, Cortez Mill facilities, and locally for dust control). At times when the dewatering water volume would be insufficient to provide for operational needs at the Cortez Hills facilities, water would be obtained from two new water supply wells that would be developed on CGM-owned land in Grass Valley. Under the Proposed Action, the annualized average daily water consumption for open pit and underground mining-related activities is estimated at 1,000 gpm (1,613 acre feet per year).

Consumptive water use for the existing and proposed expansion facilities at the Pipeline Complex would continue to be met by the current and ongoing Pipeline dewatering program or existing water supply wells in Crescent Valley. Mining-related activities at the Pipeline Complex currently consume up to approximately 4,000 gpm. No increase in the consumptive water use at Pipeline is anticipated as a result of activities under the Proposed Action.

Potable water currently is, and would continue to be, provided by bottled water or the existing or proposed water supply wells in accordance with applicable Nevada Bureau of Health Protection Services standards.

2.4.8.3 Ancillary Support Facilities

Existing ancillary support facilities located at the Pipeline, Gold Acres, and Cortez complexes would be used, as applicable, to support the proposed project. These facilities include administrative offices, safety/change house with a first aid station, assay lab, bioremediation site (single-lined facility for managed degradation of hydrocarbon-contaminated soils), shop/warehouse, Class III landfills, heavy equipment and light vehicle fuel stations, diesel and gas storage facilities, and explosives storage. Additional support facilities would be constructed near the proposed Cortez Hills Pit. These facilities would include a maintenance shop; safety, security, and administrative facilities; and fuel and lubricant storage and distribution facilities.

2.4.8.4 Stormwater Control

The area upgradient of the proposed facilities contains numerous ephemeral drainages that flow only during times of intense precipitation or snowmelt. Based on anticipated stormwater runoff calculations, engineered stormwater diversions would be designed and constructed to divert away from the open pit, heap leach pads, waste rock facilities, and other facilities, as required. BMPs (e.g., riprap and staked certified weed-free straw bales) would be implemented to reduce erosion and sediment transport. Locations and design criteria for facility-specific diversions are discussed in previous sections, as applicable.

Revegetation of disturbed areas would reduce the potential for wind and water erosion. Following construction, cut and fill embankments and growth media stockpiles would be seeded as soon as practical

and safe. Concurrent reclamation would be conducted to the extent possible to accelerate revegetation of disturbed areas.

2.4.8.5 Sanitary and Solid Waste Disposal

All sanitary waste generated at the Pipeline and Cortez complexes would continue to be disposed of in the existing on site, State of Nevada-approved, engineered leach fields. All sanitary wastes at the Cortez Hills Complex would be disposed of in the proposed sanitary leach field. Approval for the system would be obtained from the State of Nevada prior to installation. The system would be installed in accordance with all applicable state regulations.

All non-toxic, non-hazardous solid waste materials generated at the Pipeline facilities currently are, and would continue to be, disposed of in the currently approved Gold Acres Class III landfill. Non-toxic, non-hazardous waste generated at the Cortez and Cortez Hills facilities would be disposed of in a new Class III landfill, which would be located on private land in Grass Valley, or in the existing Cortez Class III landfill, which would be reactivated. Approval for the new landfill would be obtained from the State of Nevada, prior to construction. Disposal of non-toxic, non-hazardous solid wastes would be conducted in accordance with all applicable federal, state, and county laws and regulations, as outlined in CGM's Solid and Hazardous Waste Plan (JBR Environmental Consultants, Inc. [JBR] 2006b).

2.4.8.6 Fencing and Site Security

For security and safety purposes, CGM would fence the proposed project facilities with a four-strand (three strands barbwire and a smooth bottom strand) range fence. All solution ponds and other areas of cyanide use, as well as the water storage reservoir, would be fenced with an 8-foot-high chain link fence for the exclusion of wildlife. In addition, mining areas undergoing concurrent reclamation would be fenced, as necessary, to facilitate revegetation. Existing and newly constructed fences would be maintained by CGM throughout the life of the project.

Security in the project boundary would be the responsibility of CGM. A roving security patrol currently provides, and would continue to provide, controlled access during the life of the project. The security system would include direct security measures, supported by employees involved in the day-to-day operation. In addition, a new building would be constructed to house monitoring equipment for areas of concern and safety.

2.4.9 Hazardous Materials Management

Procedures for reagent transportation, storage, waste management, and spill prevention and emergency response programs currently are in place and implemented for the existing operations as described in the South Pipeline Project Final EIS (BLM 2000a) and Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). A summary of the regulatory requirements on which these procedures and programs are based are described below. CGM's existing procedures and programs would be updated, as needed, to incorporate the proposed Cortez Hills Expansion Project.

Under the Proposed Action, there would be no change in the current reagent consumption rate at the existing Pipeline Mill to facilitate the processing of a portion of the mill-grade ore mined under the Cortez Hills Expansion Project. As a result, on site reagent storage and usage at the existing facilities would continue to be covered under existing permits. To support the proposed additional processing facilities at the Cortez and Cortez Hills complexes, two new chemical storage areas would be constructed, one located adjacent to the proposed Grass Valley Heap Leach Facility and one located adjacent to the existing Cortez maintenance shop. In addition, new fuel and lubricant storage facilities would be required at the Cortez Hills Complex, and an additional light diesel tank would be installed near the Cortez Mill. The types and quantities of materials that would be stored at these new storage facilities are presented in **Table 2-5**.

2.4.9.1 Reagent Transportation and Storage

Transportation and handling of chemicals currently is, and would continue to be, conducted by licensed carriers and properly trained workers in accordance with applicable regulations. Explosives would be delivered to the site by licensed haulers and stored on site at the currently approved explosives magazine at Gold Acres and at the Underground Exploration Project facility in the F-Canyon Pit in compliance with applicable Department of Homeland Security; Bureau of Alcohol, Tobacco, and Firearms; and MSHA regulations. Federal (I-80), state (SR 306), and county (Lander CR 225) roads and highways currently are, and would continue to be, used for the transport of explosive hazardous materials to the site. All shippers would be licensed by the Nevada Department of Transportation and other applicable agencies.

All liquid reagents would be trucked to the site and stored in specially designed, proposed storage tanks that would be located within concrete secondary containment structures designed to contain 110 percent of the capacity of the largest tank within the containment area. Solid reagents would be trucked to the site and stored in bins or silos. All reagents would be stored in a manner that would inhibit any inter-mixing and subsequent reaction. Reagent storage and cleanup procedures as outlined in the existing Hazardous Materials Spill and Emergency Response Plan (CGM 2006a) (as discussed in Section 2.4.10.2, Spill Prevention and Emergency Response) currently are, and would continue to be, implemented, with revisions made to the plans, as needed, to incorporate the proposed project.

Fuel (i.e., gasoline and diesel fuel), antifreeze, petroleum oils, and solvents would be trucked to the site in tanker trucks and transferred to proposed aboveground storage tanks. The tanks would be located within concrete secondary containment structures designed to contain 110 percent of the capacity of the largest tank within the containment area.

Explosives materials that would be transported to the site would include blasting agents (composed primarily of ammonium nitrate and fuel oil [transported separately]) and initiation devices. Blasting agents currently are, and would continue to be, stored in appropriate storage bins separate from the explosive magazine. Blasting initiation devices currently are, and would continue to be, stored in magazines that conform with federal and state regulations. Explosives materials for the proposed project would be stored in the existing Gold Acres storage area (for open pit operations) and underground storage areas (for the underground operation, or at a magazine that would be located near the Cortez Hills Pit).

Table 2-5
Hazardous Materials Summary for the Proposed Action[1]

Material[2]	Use	Annual Usage	Amount Stored (typical)	Storage Method	Waste Management/ Disposal	Use Location	Primary Hazard Designation	Amount Per Load
Sodium cyanide	Process	2,500,000 lbs	26,400 gal	Tank	Spent	Process facility	Highly toxic	15 tons
Lime	Process	10,700,000 lbs	200 tons	Silo	Spent	Process facility	Corrosive	40 tons
Cherokee Chemical[3]	Process	2,000 gal	4,000 gal	Tank	Spent	Process facility	Irritant	4,000 gal
Gasoline	Mine	96,000 gal	12,000 gal	Tank	Spent	Truck shop	Flammable	10,000 gal
Diesel fuel	Mine	6,800,000 gal	80,000 gal	Tank	Spent	Truck shop	Flammable	10,000 gal
Petroleum oils	Mine	43,500 gal	2,500 gal	Tank	Recycled	Truck shop	Flammable	Various
Antifreeze	Mine	6,200 gal	2,000 gal	Tank	Recycled	Truck shop	Toxic	Various

[1] Reflects additional reagent storage/usage beyond that currently authorized for the existing operations that would be required for the Proposed Action.
[2] The following hazardous materials and substances may be transported, stored, and used at the Cortez Hills Expansion Project in appreciable quantities, but less than the Threshold Planning Quantity designated by Superfund Amendments and Authorization Act (SARA) Title II for emergency planning: acetone, ammonium hydroxide, calcium hypochlorite, ethyl alcohol, freon, isopropyl alcohol, litharge (lead oxide), nitric acid, petroleum solvents, sodium hypochlorite, soda ash, and sulfuric acid. Sodium hypochlorite, hydrogen peroxide, and sulfuric acid would be used as neutralizers and kept on-site for emergency purposes. Small quantities of hazardous materials not included in this list may be used as laboratory reagents, paints, office products, and maintenance products.
[3] Proprietary Mercury control additive developed by the University of Nevada Reno (Chemical UNR-811).

2.4.9.2 Spill Prevention and Emergency Response

There are several regulatory frameworks relative to spill prevention and releases of hazardous substances and petroleum. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) creates a framework for planning and response to hazardous substance releases. The part of CERCLA that governs emergency planning is the Emergency Planning and Community Right-to-Know Act (EPCRA), which was part of the SARA. The basis of emergency planning begins with requirements set forth in the Occupational Health and Safety Administration (OSHA) and MSHA Hazard Communication Standard. Under EPCRA, facilities that are required by the Standard to have material safety data sheets (MSDS) on hand for hazardous chemicals also are subject to certain reporting and planning requirements, dependent on threshold amounts of those chemicals or threshold planning quantities (TPQs). The TPQ for EPCRA hazardous chemicals is 10,000 pounds. The TPQs for materials designated as extremely hazardous substances (EHS) is 500 pounds or less, depending on the hazard posed by the particular EHS. Under the reporting requirements set forth in Sections 311 and 312 of SARA Title III, the Proposed Action would be subject to certain reporting and emergency planning requirements, because the amounts of certain hazardous chemicals on site would exceed 10,000 pounds. Some of those materials include lime, diesel fuel, and gasoline. Also present on site is one EHS present in amounts greater than the TPQ (sodium cyanide, TPQ 100 pounds).

Reporting and emergency planning under EPCRA include the following:

- The facility must notify state and local emergency planning committees that the facility is subject to emergency planning requirements.

- The facility must submit to state and local emergency planning committees and local fire departments copies of MSDS or a list of those materials defined as hazardous under the OSHA Hazard Communication Standard that are present in excess of 10,000 pounds or in amounts greater than the TPQ for EHS.

- The facility must submit an annual inventory of such materials stating the maximum amounts of those materials at any given time throughout the calendar year, an estimate of average daily amounts of those materials, and the location of those materials at the facility.

- The annual inventories must be submitted by March 1 for materials at the facility.

- All reporting, notification, and other plans supplied to the local, state, or federal authorities under EPCRA are available to the public.

CGM previously provided information relative to hazardous materials on hand at the existing operations at the Pipeline Complex to the State Fire Marshall. No changes are proposed for the types of materials or quantities of materials that would be used at the Pipeline Complex as a result of the proposed Cortez Hills Expansion Project; the quantities of materials that would be transported to and used at proposed operations at the Cortez and Cortez Hills complexes are presented in **Table 2-5**. The types of materials required to support the proposed project would be the same as those currently used at the existing Pipeline Complex.

CGM would continue to provide annual inventories to the appropriate agencies including the State Fire Marshall's office.

CERCLA also established reportable quantities for releases of hazardous substances. If a hazardous substance is released in an amount greater than its reportable quantity, then a facility is required to report the release to the National Response Center and to state and local authorities. Examples of reportable quantities for certain chemicals that may be used under the Proposed Action include sodium cyanide (10 pounds) and sodium hydroxide (1,000 pounds).

The U.S. Department of Transportation (USDOT) has developed a list of materials that are classified as hazardous for transportation purposes (49 CFR 172.101) and prescribes packaging and labeling requirements for each designated hazardous material. The USDOT hazardous materials list includes the hazardous substances regulated under CERCLA, as well as other types of chemicals. The hazardous substances to be used in mining activities under the Proposed Action would be transported to the site in accordance with USDOT and applicable Nevada Department of Transportation (NDOT) regulations.

CGM previously developed a Hazardous Materials Spill and Emergency Response Plan (CGM 2006a) for its existing facilities. Prior to initiation of the proposed project, the existing plan would be amended, as necessary, to encompass the proposed facilities. The plan would be maintained and implemented, as needed, throughout the life of the project. This plan describes the system that would be used for the prevention, response, containment, and safe cleanup of any spills or discharges of substances that potentially may degrade the environment. The procedures outlined in this plan apply to potential leaks and spills that would remain within the mine boundary or flow off site.

Petroleum products are excluded from regulation as hazardous substances under CERCLA. Standards for the storage and spill prevention of petroleum products are established by regulations issued under the Clean Water Act. These regulations are contained in 40 CFR Part 112. In compliance with Part 112, CGM's existing Hazardous Materials Spill and Emergency Response Plan (CGM 2006a) describes the systems and procedures to prevent and contain spills of petroleum fuels, lubrication oil, coolant, and used oil. The plan also identifies the spill discovery, notification, and the general cleanup procedures. The plan would be updated, as necessary, for the Proposed Action.

All chemicals would be stored and handled in accordance with manufacturer's recommendations and state regulations. The MSDS for all the chemicals used on the project site would be kept at locations that are accessible to the working personnel in accordance with the OSHA and MSHA Hazard Communication Standard.

2.4.9.3 Waste Management

As shown in **Table 2-5**, the majority of the hazardous materials used on site would be spent or consumed during operations. Materials that are not spent or consumed (e.g., petroleum oils, antifreeze, etc.) would be recycled, to the extent possible, or disposed off site in an approved depository in accordance with CGM's Solid and Hazardous Waste Management Plan (JBR 2006b) and all applicable federal and state regulations.

2.4.10 Safety and Fire Protection

CGM's existing fire protection plan, which is in place for all of their operations, would be implemented for the proposed project. A copy of the plan previously was provided to the State Fire Marshall. The procedures as outlined in the fire protection plan are in accordance with MSHA and applicable state and county fire code regulations. Adequate fire protection equipment as needed to implement the plan would be maintained on site during operation. A fire water reserve would be maintained in the facility water supply tanks.

2.4.11 Applicant-committed Environmental Protection Measures

During construction and operation of the Cortez Hills Expansion Project, CGM would implement applicant-committed environmental protection measures to mitigate potential impacts to air, land, water, wildlife, cultural resources, and human resources and to prevent undue or unnecessary degradation of the environment as part of the proposed project's standard operating procedures. Pre-development planning, pollution prevention measures, and pollution control measures and equipment would be used to reduce potential project-generated environmental impacts.

Proposed environmental protection measures applicable to the Proposed Action have been adopted from the Amendment to the Pipeline/South Pipeline Plan of Operations for the Cortez Hills Expansion Project (CGM and SRK ***2008***), Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e), and South Pipeline Project Final EIS (BLM 2000a). These measures are identified below.

2.4.11.1 Geology

- The Cortez Hills Pit design included evaluation and consideration of the potential for both kinematic failures and mass failures under static and seismic conditions and the consequences of such failures. That analysis was incorporated into the design of the east pit wall to avoid impacts to the White Cliffs ***and to avoid the property of*** **cultural and** ***religious importance*** **(PCRI)** ***boundary to the east of the pit***.

- Geotechnical monitoring, consisting of geologic structure mapping, groundwater monitoring, and slope stability analyses, would be conducted during active mining to assist in optimizing the final pit designs. Slope movement monitoring also would be initiated to evaluate the safety of the open pit high walls. In addition, operational procedures for controlling blasting and bench scaling would facilitate mining with stable pit walls.

- In response to earth fissuring that occurred in November 2002 to the east of the existing Pipeline South Area Heap Leach Facility, CGM has implemented management, monitoring, and mitigation measures to address possible future fissuring in the Pipeline Complex area. These measures are described in the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e). These protective measures, which would continue as part of the Cortez Hills Expansion Project, include integration of the following components:

  - Storm water diversion ditch to intercept and route surface water runoff away from the fissure area;
  - Dewatering pipeline instrumentation and pressure monitoring;

- Intercept trench east of the existing Pipeline/South Pipeline Heap Leach Facility and west of the main fissure complex;
- Backfilling of existing open fissure gullies;
- Protective berming and grading to exclude water from the fissure field;
- Alluvial waste rock dikes to provide containment and channelization in the event of a dewatering line break; and
- Monitoring of subsidence rates and horizontal strain.

2.4.11.2 Water Resources

- To minimize impacts to water resources, the proposed new and expanded heap leach facilities would be designed and operated as zero discharge facilities, with a composite liner system in accordance with NDEP criteria. Expanded mill and tailings facilities also would be designed and operated as zero discharge facilities.

- Selective placement of waste rock, as needed, and routine monitoring of the waste rock disposal facilities during operations would be implemented to reduce the potential for acid rock drainage that does not meet applicable Nevada water quality standards.

- To limit erosion and reduce sediment transport from project disturbance areas, erosion control measures as outlined in the project's Storm Water Pollution Prevention Plan (SWPPP) and Reclamation Plan would be installed, as needed, and maintained. To further reduce erosion potential, stormwater diversions would be installed around project facilities, as needed, to divert stormwater runoff around disturbance areas. Facilities would be monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective and operating properly. In addition, implementation of concurrent reclamation would further reduce erosion potential.

- A groundwater monitoring plan would be prepared and submitted to the BLM and NDEP for approval prior to project construction and operation ***and incorporated into CGM's Integrated Monitoring Plan***. Groundwater monitoring would be conducted to ensure compliance with permit criteria and to provide for early identification of potential impacts. If any monitoring wells go dry due to dewatering activities, the monitoring program would be re-evaluated in coordination with the NDEP.

- All mineral exploration and development drill holes, monitoring and observation wells, and production dewatering wells would be properly abandoned following completion of their functions to prevent contamination of groundwater resources.

- CGM's Integrated Monitoring Plan (WMC 1995a) would be reviewed and updated annually to include additional surface water and groundwater resources monitoring locations in the project vicinity.

2.4.11.3 Soils, Vegetation, and Invasive and Non-native Species

- To minimize impacts to soils and provide for re-establishment of vegetation, suitable growth media would be salvaged and stockpiled during the development of the mine open pits and during construction of the waste rock facilities and heap leach pads for subsequent use in reclamation. Alternately, the growth media may be transported to, and redistributed on, mine-related surface disturbance areas undergoing concurrent reclamation (e.g., waste rock disposal facilities).

- CGM would avoid the use of the native silty Relley-Broyles soil association in reclaiming the Pipeline Waste Rock Facility expansion area due to its high erodibility.

- BMPs would be used to limit erosion from project facilities and disturbance areas during and following construction and operations. These practices may include, but would not be limited to, installation of storm water diversions to route water around disturbance areas and project facilities and the placement of erosion control devices (e.g., silt fences, staked weed-free straw bales, riprap, etc.). To ensure long-term erosion control, all sediment and erosion control measures would be inspected periodically, and repairs would be performed, as needed.

- Revegetation of disturbance areas would be conducted as soon as practical to reduce the potential for wind and water erosion, minimize impacts to soils and vegetation, help prevent the spread of invasive and non-native species in disturbance areas, and facilitate post-mining land uses. Following construction activities, areas such as cut and fill embankments and growth media stockpiles would be seeded. Concurrent reclamation would be conducted to the extent practical to accelerate revegetation of disturbance areas. Areas undergoing concurrent reclamation would be fenced, as necessary, to minimize livestock and wildlife access until vegetation has been re-established. All sediment and erosion control measures and revegetated areas would be inspected periodically to ensure long-term erosion control and successful reclamation.

- Piñon-juniper would be cleared in advance of mine construction/development in a manner that would allow utilization of the resource to the extent possible. Funding for the value of the removed firewood would be provided as a contribution to an off site BLM or NDOW revegetation project.

- To minimize the introduction and spread of noxious weeds in project-related disturbance areas, CGM's Noxious Weed Control Plan (SRK 2005) would be implemented. The plan outlines procedures for the prevention, monitoring, and treatment of noxious weed infestations. The results of the monitoring program would provide the basis for updating the plan, if needed.

- Certified weed-free seed mixes would be used for reclamation.

- Implementation of the project's fire control plan would minimize potential fire-related impacts to vegetation.

2.4.11.4 Wildlife, Special Status Species, and Livestock Protection

- Implementation of the proposed Reclamation Plan would minimize habitat impacts for wildlife species. Implementation of the plan also would minimize impacts to range resources through the re-establishment of forage.

- Eight-foot-high chain link fencing ***(i.e., NDOW-approved exclusion fencing per the Industrial Artificial Pond Permit)*** would be installed around the heap leach facilities, and netting, pond covers, or floating "bird balls," as appropriate, would be installed over ditches and ponds that would contain leach solutions, to minimize potential impacts to avian and terrestrial wildlife species. In addition, the heaps would be scarified to minimize ponding and pooling of process solutions.

- To prevent livestock access, BLM-approved fencing would be installed along both sides of the conveyor corridor. To facilitate the passage of wildlife across the cross-valley conveyor corridor, five wildlife overpasses or ramps would be installed. One wildlife ramp would be constructed over the conveyor corridor on the ***western*** slope of the Cortez range to provide for mule deer migration. The other four wildlife ramps would be constructed over the conveyor corridor to facilitate antelope movement in Crescent Valley. All wildlife ramps would be sized and field located in coordination with the BLM and NDOW prior to construction. The ramps would include appropriately sized safety berms and barriers and ends would be fenced.

  CGM would coordinate with BLM and NDOW to develop a protocol to evaluate big game use of conveyor overpasses or ramps (e.g., track surveys, movement observations, etc.). If it is determined by these agencies that the overpasses or ramps are not used by big game, CGM would coordinate with BLM and NDOW to develop additional measures to encourage migration movement, or develop off site habitat enhancement/water development projects within the immediate vicinity of the study area to offset potential habitat losses associated with the proposed conveyor corridor.

- To minimize potential impacts to wildlife species, WAD cyanide concentrations in the tailings impoundments would be maintained at non-lethal levels. As added protection, the existing cyanide detoxification system (which uses in-line addition of ferrous sulfate to the tailings solution) would be used if it should become necessary to lower the cyanide levels in the tailings discharge to the tailings facility.

- CGM would work with the BLM and local permittees to develop livestock fencing that would preserve grazing to the extent possible while providing protection for both reclaimed mine facilities and livestock. Fencing between the Pipeline and Cortez complexes may be constructed to exclude cattle from the mine area during select times of the year. While the conveyor corridor would be fenced along its route, the wildlife overpasses would remain open, and, therefore, the conveyor corridor would not serve in the capacity of livestock fencing without additional components.

- Livestock watering troughs previously installed to deter livestock from attempting to access water in the infiltration basins would continue to be operated on a rotational basis in coordination with the BLM and grazing permittees.

- To aid livestock movement around the water distribution pipelines from the Grass Valley water well, CGM would consult with the BLM and grazing permittees on appropriate locations for installation of earthen ramps over the pipelines.

- The rerouted transmission line segment would be designed and constructed in accordance with applicable regulations to minimize raptor electrocution and collision potential. To minimize the collision potential for foraging raptors, standard safe designs as outlined in Mitigating Bird Collisions with Power Lines (Avian Power Line Interaction Committee [APLIC] 1994) would be incorporated, as applicable. To minimize electrocution of raptor species attempting to perch on the lines in areas of identified avian concern, standard safe designs as outline in Suggested Practices for Raptor Protection on Power Lines (APLIC 1996; APLIC and USFWS 2005) would be incorporated, as applicable.

- In the event that initiation of the proposed project should occur during the raptor nesting season (March 1 through July 31), a raptor survey would be conducted, and appropriate mitigation measures, such as buffer zones around occupied nests, would be developed and implemented, as needed.

- To protect nesting birds, removal of migratory bird habitat on currently undisturbed lands in the proposed disturbance areas would be avoided to the extent possible between March 1 and July 31. Should removal of habitat be required during this period, CGM would coordinate with the BLM and NDOW to conduct breeding bird surveys and implement appropriate mitigation, such as buffer zones around occupied nests, as needed.

2.4.11.5 Cultural Resources

- Proposed facilities in the Cortez Hills Complex, including the Cortez Hills Pit, have been located and designed to avoid Mount Tenabo and the White Cliffs.

- Proposed facilities in the Cortez and Cortez Hills complexes have been located and designed to avoid the historic Cortez townsite and Shoshone Wells.

- If previously undocumented cultural resource sites are discovered during construction of the mine facilities, construction would be halted in the area of the discovery, and the BLM Authorized Officer would be contacted to evaluate the find. If the site is eligible to the National Register of Historic Places (NRHP), impacts would be mitigated through avoidance or an appropriate data recovery program developed pursuant to the Programmatic Agreement (PA) (effective October 20, 2005) among the BLM, Nevada SHPO, and CGM.

- CGM would train employees and contractors in their responsibilities to protect cultural resources and enforce CGM's policy against off-road cross-country travel and the removal of artifacts.

- CGM would provide for continued access to the historic Cortez townsite and erect a marker designed in coordination with the BLM at the townsite to provide historical information for visitors.

- Mitigation of adverse effects to eligible archaeological and historic sites is addressed in the Historic Properties Treatment Plan ***(HPTP)***, which has been prepared by a BLM-approved archaeological contractor. ***T***he ***HPTP*** **has been approved by the BLM, is under review by the Nevada SHPO, and would be finalized following the ROD to incorporate any changes required by the Agency Preferred Alternative and SHPO comments. The HPTP** would be implemented prior to surface disturbance affecting any property listed in the plan.

2.4.11.6 Air Quality

- Fugitive dust controls, including water application on haul roads and other disturbed areas, chemical dust suppressant application (e.g., magnesium chloride), where appropriate, and application of other BMPs as approved by the NDEP Bureau of Air Pollution Control, currently are, and would continue to be, implemented.

- Temporary disturbance areas (e.g., growth media stockpiles, cut and fill embankments, etc.) would be seeded with an interim seed mix and concurrent reclamation would be implemented on completed portions of the waste rock facilities, thereby minimizing fugitive dust emissions.

- To reduce the generation of fugitive dust from the overland conveyor, the conveyor would be partially covered on the south side, which is the predominate wind direction in the project vicinity. If needed, a water line and water sprays also would be installed on the conveyor to further reduce fugitive dust generation.

- To control combustion emissions, all manufacturer installed pollution control equipment would be operated and maintained in good working order.

- As part of the Nevada Mercury Control Program, CGM currently uses, and would continue to use, a chemical stabilizing agent in the processing circuit to inhibit the adsorption of mercury on the activated carbon and remove it from the system before it can be emitted into the atmosphere. In addition, a baghouse on the existing refinery furnace and wet scrubber on the existing carbon kiln are currently used, and would continue to be used, to control mercury emissions from these sources. As part of the ongoing program, CGM plans to install carbon beds on the refinery furnace baghouse exhaust, the carbon kiln wet scrubber exhaust, and the electrowinning cells exhaust in ***2008*** to further control mercury emissions. Additionally in ***2008***, CGM plans to initiate installation of a mercury retort to replace the existing gold drying ovens. The retort exhaust also would be routed through a carbon bed.

2.4.11.7 Land Use and Access and Socioeconomics

- Post-mining safety barriers (e.g., berms, fencing, or other appropriate barriers) would be installed peripherally to the ultimate perimeters of the pits after mining has been completed.

- Public access would be maintained during construction of the proposed reroute segments on CR 225 and CR 222.

- Development of post-mining land use plans that may include future utilization of mine infrastructure for long-term economic benefits for the region.

2.4.11.8 Recreation

- CGM would provide for continued access to the historic Cortez townsite and erect a marker at the townsite to provide historical information for visitors.

2.4.11.9 Visual Resources *and Noise*

- During operations, the margins of the waste rock facilities would be constructed to provide for variable topography during final regrading, thereby providing a more natural post-mining landscape.

- Following the completion of mining, structures and buildings would be dismantled and removed from the site.

- Concurrent reclamation would be implemented to the extent possible.

- ***Prior to initiation of mining, CGM would conduct an inventory of the condition of the headstones in the Cortez cemetery. During the life of the project, the headstones periodically would be monitored to identify any damage so that preventative measures or repairs could be quickly and appropriately accomplished.***

2.4.11.10 Hazardous Materials

- Prior to initiation of the project, the existing Hazardous Materials Spill and Emergency Response Plan (CGM 2006a) would be amended, as necessary, to include the Cortez Hills Expansion Project. Implementation of the prevention, containment, and cleanup procedures in this plan would minimize the potential for related impacts to soils, vegetation, wildlife, and water resources.

- Prior to initiation of the project, the existing Solid and Hazardous Waste Management Plan (JBR 2006b) would be amended, as necessary, to include the Cortez Hills Expansion Project. Implementation of the management procedures for the handling of solid and hazardous waste generated at the site, reagent storage, transportation, and handling requirements would minimize the potential for related impacts to soils, vegetation, wildlife, and water resources.

- A training program would be implemented to inform employees of their responsibilities in proper waste disposal procedures.

2.4.11.11 General Measures

- The existing perimeter fence would be extended to encompass proposed project facilities for security and safety purposes. BLM-approved four-strand range fencing (three stands barbwire and a smooth

bottom strand) would be used. Leach pads, ponds, process areas, and the water storage reservoir would be fenced with 5- or 8-foot chain link fencing for wildlife exclusion.

- To the extent practical, CGM would protect all survey monuments, witness corners, reference monuments, bearing trees, and line trees against unnecessary or undue destruction or damage. Public land survey system monuments would be protected and preserved in accordance with Nevada BLM Instructional Memorandum (IM) No. NV-2007-003. If destroyed, CGM immediately would report the matter to the Authorized Officer.

2.4.11.12 Sustainability Activities

CGM currently incorporates, and would continue to incorporate, sustainability activities into day-to-day operations to minimize impacts to the human environment. The sustainability activities are discussed in the Pipeline/South Pipeline Pit Expansion Final SEIS (BLM 2004e). In summary, the activities include creating a positive work environment for employees; working proactively with federal, state, and county agencies and stakeholders; incorporating environmentally sound practices into operations; addressing legacy issues associated with older mining operations in the project boundary; working with other mining companies and affected communities on an overall plan to minimize post-closure impacts to communities, including identification of post-mining land uses of the mine site that may provide long-term economic stability to the local area; maintaining an active donations and scholarship program; and encouraging employees to be active in their local communities.

2.4.12 Reclamation

Reclamation of the currently permitted facilities would continue to be conducted in accordance with the previously approved Pipeline Reclamation Plan as amended in the 2004 Plan Amendment for the South Pipeline Expansion Project. This plan provided the basis for development of the draft reclamation plan for the proposed Cortez Hills Expansion Project, as presented in the Amendment to the Pipeline/South Pipeline Plan of Operations for the Cortez Hills Expansion Project and Modification to Reclamation Permit Application (CGM and SRK ***2008***). Prior to initiation of the project, the reclamation plan would be revised, if needed, and submitted to the BLM and NDEP for final approval. The intent of the project's reclamation program is to restore the site to a beneficial post-mining land use, prevent undue or unnecessary degradation of the environment, and reclaim disturbed areas such that they would be visually and functionally compatible with the surrounding topography.

The areas of proposed disturbance include the following components: mine pits, aboveground support for underground workings, waste rock facilities, heap leach facilities, stockpiles, linear facilities (e.g., conveyor and haul roads), and ancillary facilities (see **Table 2-1**). With the exception of pit highwalls, ramps, and floors, all of the surface disturbance associated with these mine components would be reclaimed.

The final grading plan for the project is designed in part to minimize the visual impacts of unnatural lines and landforms. Slopes would be regraded to blend with surrounding topography, to the extent possible, and facilitate revegetation. Where feasible, large constructed topographic features (e.g., waste rock facilities and heap leach pads) may have rounded crests and variable slope angles to more closely resemble natural

landforms. The pits would remain as large depressions partially filled with water. The conceptual post-mining reclamation topography is shown in **Figure 2-13**.

Revegetation of disturbance areas would be conducted as soon as practical to reduce the potential for wind and water erosion. Following construction activities, areas such as cut and fill embankments and growth media stockpiles would be seeded. Concurrent reclamation would be conducted to the extent practical to accelerate revegetation of disturbance areas. All sediment and erosion control measures and revegetated areas would be inspected periodically to ensure long-term erosion control and successful reclamation.

2.4.12.1 Proposed Reclamation Schedule

Concurrent waste rock facility reclamation would occur during the life of the mine when practical and safe and would include recontouring and revegetating the completed sections of the waste rock facilities incrementally during operations. Upon completion of mining, final waste rock facility reclamation would be completed pursuant to the final closure plan and schedule that would be submitted to the BLM and NDEP for approval.

Heap leach pad reclamation activities would commence once draindown has been completed. The time required to drain the heaps is estimated at approximately 2 years; however, it may vary depending on operational conditions, and excessive precipitation could increase heap leach draindown times.

A detailed closure plan for each process facility component would be prepared at least 2 years prior to the anticipated closure date (NAC 445A.447). The closure plan would conform with the Water Pollution Control regulations in effect at the time of closure.

2.4.12.2 Post-mining Land Use and Reclamation Goals

Principal land uses in the project vicinity include mineral exploration and development, livestock grazing, wildlife habitat, and dispersed recreation. Following closure and final reclamation, the site would support the multiple land uses of livestock grazing, wildlife habitat, and recreation. Land uses that may be conducted concurrent with operations and following site closure may include irrigated pasture and crop (e.g., alfalfa) production on private land parcels within the project vicinity. The identified post-closure land uses would be in conformance with the BLM Battle Mountain RMP and Lander County zoning ordinances.

The goals of the reclamation program are as follows:

- Provide a stable post-mining landform that would support defined land uses
- Minimize erosion and protect water resources through control of stormwater runoff and stabilization of mine facilities
- Establish post-reclamation surface soil conditions conducive to the regeneration of a stable plant community through stripping, stockpiling, and reapplication of growth media

- Revegetate disturbed areas with a diversity of plant species in order to establish productive long-term plant communities compatible with post-mining land uses

- Maintain public safety by stabilizing or limiting access to landforms that could constitute a public hazard

2.4.12.3 Growth Media Stockpiling and Use

Suitable growth media would be salvaged during development of the open pits, construction of the waste rock facilities, and construction of the heap leach pads for subsequent use in reclamation. Suitable alluvial material from the open pits also would be salvaged as growth media. Growth media would be placed in stockpiles within the proposed disturbance area (i.e., ancillary disturbance area or completed portions of the waste rock facilities) and would be located such that mining operations would not disturb them. To minimize wind and water erosion, the stockpiles would be recontoured to slopes of 2.5H:1V and seeded with an interim seed mix (**Table 2-6**). Diversion channels and/or berms would be constructed around the stockpiles, as needed, to prevent erosion from overland runoff. BMPs (e.g., silt fences or staked weed-free straw bales) also would be used, as necessary, to control sediment transport. Alternately, the growth media may be transported to, and redistributed on, mine-related surface disturbance areas undergoing concurrent reclamation (e.g., waste rock disposal facilities). In addition, where waste rock facilities would be developed on slopes, available soil may be salvaged by dozer pushing the soil downhill prior to waste rock placement. The salvaged soil would be used to construct berm stockpiles at the toe of the waste rock facility, thereby preventing waste rock from scattering downhill during placement. Following final regrading of the waste rock, the growth media berm would be hauled up onto the reshaped waste rock facility for placement spreading.

Table 2-6
Interim Reclamation Seed Mix

Common Name	Scientific Name	Application Rate[1] (pounds pure-live-seed per acre)
Alfalfa	*Medicago sativa*	1.0
Crested wheatgrass	*Agropyron crisatum*	1.0
Total Application Rate		2.0

[1] Application rate is for broadcast seeding.

Based on reclamation experience at the existing facilities, the proposed growth media replacement depth for the mine facilities (with the exception of the open pits) would be a minimum of 6 to 12 inches. Based on a 6- to 12-inch application rate, approximately 4.7 million cubic yards of growth media would be required to reclaim the facilities. It is projected that approximately 9.7 million cubic yards of growth media (inclusive of suitable alluvial material from the open pits) would be available for salvage. This proposed growth media replacement depth would be reviewed in coordination with the BLM and NDEP for specification in the final closure plan for the Cortez Hills Expansion Project.

Following placement of growth media, BMPs for erosion control (e.g., silt fences or staked weed-free straw bales) would be installed and maintained to minimize erosion from the facilities until vegetation has been

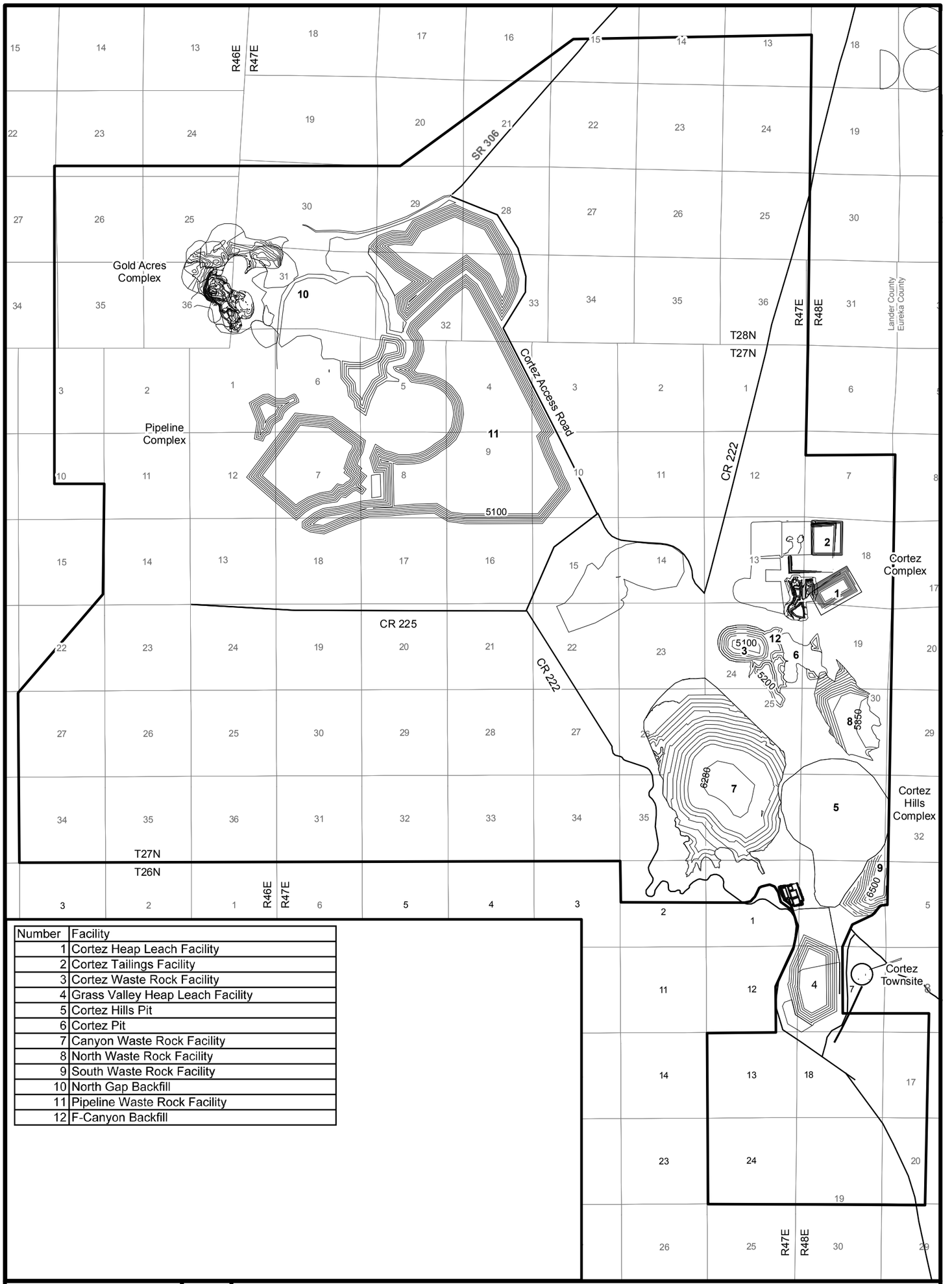


Figure 2-13
Proposed Action
Post-mining Reclamation
Topography

Cortez Hills Expansion Project

Legend

Project Boundary

N

0 0.5 1 2 3 Miles

Note: Contours at 100-foot intervals.

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re-established. To further reduce erosion of growth media from the slopes of the mine facilities, benches would be constructed every 50 to 100 vertical feet.

2.4.12.4 Seed Mixes

Prior to seeding, disturbance areas would be recontoured, surfaces would be ripped or scarified (where conditions warrant), and growth media would be redistributed. Following the placement of growth media, the final surface would be contour scarified to promote water retention, reduce erosion, and prepare the final seedbed. Seedbed preparation and seeding would be conducted in the fall to take advantage of winter and spring moisture.

Seeding would be conducted with either a rangeland drill or a broadcast seeder and harrow, depending on site accessibility. The seed mixes presented in **Tables 2-7** and **2-8** were developed by the BLM and are based on the species' effectiveness in providing erosion protection, the ability to grow within the constraints of the low annual precipitation experienced in the region, the species' suitability for site aspect, and the site elevation and soil type.

In addition to seeding the waste rock facilities, CGM would evaluate the planting of piñon pine seedlings in suitable areas as part of the reclamation program. Piñon pines are the dominate tree species in the Cortez Hills Complex area. The planting of seedlings could help ***accelerate*** re-establishment ***of the species*** in mine-related disturbance areas.

Table 2-7
Reclamation Seed Mix for Elevations below 5,500 feet amsl

Common Name	Scientific Name	Application Rate[1] (pounds pure-live-seed per acre)
Shrub Species (use four of the following shrubs at the rates identified)		
Four-winged saltbush	*Atriplex canescens*	4.0
Shadscale	*Atriplex confertifolia*	4.0
Winterfat	*Ceratoides lanata*	4.0
Forage kochia	*Kochia prostrate*	0.5
Nevada Mormon tea	*Ephedra nevadensis*	10.0
Spiny hopsage	*Grayia spinosa*	2.0
Douglas rabbitbrush	*Chrysothamnus viscidiflorus*	0.5
Forb Species (use two of the following forbs at the rates identified)		
Scarlet globemallow	*Sphaeralcea coccinea*	0.50
Palmer penstemon	*Penstemon palmeri*	0.25
Lewis flax	*Linum lewisii*	0.75
Grass Species (use four of the following grasses at the rates identified)		
Crested wheatgrass	*Agropyron cristatum*	1.0
Indian ricegrass	*Oryzopsis hymenoides*	1.0
Great Basin wildrye	*Elymus cinereus*	1.0
Bottlebrush squirreltail	*Sitanion hystrix*	1.0
Inland saltgrass	*Distichlis spicata stricta*	0.5
Alkali sacaton	*Sporobolus airoides*	0.1
Russian wildrye	*Elymus junceus*	1.0
Total Average Application Rate[1]		**18.1**

[1] Drill seeding rates are provided. Rates would be doubled for broadcast seeding, if used.

Note: If seed mix and application rates need to be modified as a result of limited species availability, poor seed quality, and/or the results of concurrent reclamation and revegetation test plots, the modifications would be undertaken with the concurrence of the BLM.

Table 2-8
Reclamation Seed Mix for Elevations between 5,500 and 7,500 feet amsl

Common Name	Scientific Name	Application Rate[1] (pounds pure-live-seed per acre)
Shrub Species (use four of the following shrubs at the rates identified)		
Wyoming big sagebrush	*Artemesia tridentata wyomingensis*	0.1
Four-winged saltbush	*Atriplex canescens*	2.0
Forage kochia	*Kochia prostrate*	0.25
Nevada Mormon tea	*Ephedra nevadensis*	4.0
Spiny hopsage	*Grayia spinosa*	1.0
Forb Species (use three of the following forbs at the rates identified)		
Scarlet globemallow	*Sphaeralcea coccinea*	0.5
Palmer penstemon	*Penstemon palmeri*	0.5
Lewis flax	*Linum lewisii*	1.0
Sweetvetch	*Hedysarum boreale*	2.0
Grass Species (use four of the following grasses at the rates identified)		
Crested wheatgrass	*Agropyron cristatum*	2.0
Indian ricegrass	*Oryzopsis hymenoides*	2.0
Great Basin wildrye	*Elymus cinereus*	2.0
Bottlebrush squirreltail	*Sitanion hystrix*	2.0
Total Average Application Rate[1]		**19.35**

[1] Drill seeding rates are provided. Rates would be doubled for broadcast seeding, if used.

Note: If seed mix and application rates need to be modified as a result of limited species availability, poor seed quality, and/or the results of concurrent reclamation and revegetation test plots, the modifications would be undertaken with the concurrence of the BLM.

2.4.12.5 Noxious Weed Management

CGM previously developed a Noxious Weed Management Program for the Pipeline Project, which has continued to be implemented at the existing operations in the project boundary. The plan, as updated (SRK 2005), would be implemented as a property-wide program for the existing and proposed operations. The plan contains a risk assessment, management strategies, provisions for annual monitoring of mine facilities, and treatment evaluation and includes provisions for treatment. The results from annual monitoring would provide the basis for updating the plan and developing annual treatment programs. Weed control practices would be implemented in coordination with the BLM and Lander County Conservation District to limit the spread of noxious weeds in the project-related disturbance areas and to ensure successful reclamation.

2.4.12.6 Facility Reclamation

Reclamation of the Open Pits

The objective of mine pit reclamation is to create safe and stable topographic features. Following the completion of mining, in-pit benches, highwalls, and haul roads would be left in place. Post-mining safety barriers (e.g., berms, fencing, or other appropriate barriers) would be installed peripherally to the crest of each pit (based on predicted wall stability at the time of closure) to control access by people, livestock, and most wildlife. Pit ramps would be barricaded to prevent entrance. Stormwater runoff would be diverted around each pit by stormwater diversions. The bottom elevations of the pits would be below the water table

(as indicated below). As a result, after dewatering activities cease, pit lakes would form in the bottom of most of the pits.

- Cortez Hills Pit: Following the completion of mining, the bottom elevation in the pit (approximately 3,800) would be below the groundwater table elevation (approximately 4,790 feet amsl). As a result, following the completion of mining and associated dewatering, groundwater would enter the pit, resulting in the formation of a pit lake.

- Cortez Pit Expansion: Following the completion of mining, the bottom elevation of the pit (approximately 4,600 feet amsl) would be below the groundwater table elevation (approximately 4,790 feet amsl). As a result, following the completion of dewatering operations at the Cortez Hills Pit (which also would provide for dewatering of the Cortez Pit), a pit lake would form in the bottom of the Cortez Pit.

- North Gap Pit Expansion: The bottom elevation of the pit (approximately 4,400 feet amsl) would be below the groundwater table elevation (approximately 4,770 feet amsl). However, under the Proposed Action, the North Gap Pit expansion area would be backfilled with waste rock from the currently authorized Pipeline Pit, precluding development of a post-mining pit lake.

Closure of Underground Operations

Surface disturbance associated with underground mining activities would be recontoured to approximate original contour and revegetated. Closure of underground mine facilities would parallel the procedures described in the closure plan prepared by Golder (2006) for the existing Cortez Underground Exploration Project. Underground facilities would be closed in phases starting at the lowest points of the underground mine working up to the surface. The closure procedures are summarized below.

In general, removal and cleanup of water management equipment would consist of: 1) grouting of dewatering drillholes, 2) construction of water-tight dams (i.e., concrete core bulkheads with compacted waste rock backfill and pressure grouting) in select portions of the declines to re-establish pre-mining hydrologic conditions, 3) backfilling or grouting of sumps, 4) removal and salvage or disposal in an approved off site waste disposal facility of underground and surface piping, pumps, and pumping equipment, and 5) abandonment of surface dewatering wells in accordance with applicable rules and regulations. Piping that cannot be salvaged for reuse would be dismantled as required for backfill placement and left underground.

Fans, motors, pumps, compressors, power supply and distribution equipment, ventilation curtains and ducts, and other equipment would be removed and salvaged for use at another CGM facility or disposed of off site in an approved waste disposal facility. Alternately, non-reactive equipment (e.g., HDPE pipe) may be left underground.

All remaining fuels, lubricants, and explosives would be removed from the underground workings and disposed of as described below under Disposition of Buildings and Ancillary Facilities. In addition, any contaminated areas would be cleaned using approved methods (e.g., detoxification, bioremediation, steam cleaning).

To prevent access to underground workings, an earthen plug a minimum of 30 feet in length would be placed in each of the declines. Shotcrete, approximately 4 inches thick, subsequently would be sprayed over the fill and adjacent area to connect the fill to the native rock wall and provide a continuous barrier. All other surface openings would be backfilled and leveled to blend with the surrounding topography, concrete capped, or closed with cemented backfill.

Reclamation of Waste Rock Facilities

The reclamation goals for the waste rock facilities include stabilizing slopes, ensuring mass stability, rounding edges to minimize visual impacts, revegetating surfaces, and erosion control. Reclamation of the waste rock facilities would be conducted concurrently with operations, to the extent possible. As areas of the facilities reach their ultimate height and become permanently inactive, the slopes would be regraded. The final overall slopes of the reclaimed waste rock facilities would be approximately 2.5H:1V. Approximately 15-foot-wide benches would remain on facility slopes at intervals of approximately 50 to 200 vertical feet to minimize surface water runoff velocities and associated erosion. Growth media subsequently would be placed on the prepared surfaces to a minimum depth of approximately 6 inches, and the areas reseeded. To minimize erosion until vegetation has re-established, silt fences, sediment traps, or other appropriate BMPs would be installed.

The reclamation procedures for the proposed North Gap and expanded F-Canyon pit backfill areas would be the same as currently authorized for existing backfill areas. Backfilled waste rock that would be above the projected groundwater table (all of the F-Canyon backfill and a portion of the North Gap backfill) would be reclaimed in a manner similar to out-of-pit waste rock disposal areas, as described above. Waste rock in the North Gap backfill facility that would be located in proximity to the ultimate pit lake surface would consist of selected rock that would not be easily eroded by wave action.

Reclamation of the Heap Leach Facilities

Based on the results of the geochemical evaluation of Gold Acres heap leach material conducted by SRK (2004) to identify closure options for heap leach facilities at the Cortez Gold Mines Operations Area, and the recent reclamation of CGM's Gold Acres Heap Leach Facility, rinsing of the heaps is not proposed. An alternate closure approach is proposed under the Water Pollution Control regulations (NAC 445A.430). A Final Plan for Permanent Closure detailing proposed closure technology (e.g., evapotranspiration [ET] cells), management requirements for any long-term effluent discharge, and closure would be developed 2 years prior to project closure pursuant to the requirements of the NDEP (NAC 445A.430 through 445A.447 at the time of closure). The closure plan also would include an ecological risk assessment (ERA) evaluating potential sodium (and other constituent) accumulation in the soils of the ET cells. A general description of heap closure and reclamation is presented below.

Following the completion of leaching, the heaps would be allowed to drain. Draindown solution would be used at other active process facilities or would be evaporated via evaporation or ET cells. It is anticipated that under normal weather conditions, approximately 2 years would be required for draindown.

Following draindown, the surface solution circulation piping would be removed from the heaps, and the perimeter ditches would be filled with clean growth media and/or barren rock. The heap piles then would be regraded to their final configuration with overall slopes of 2.5H:1V and rounded bench edges. This design would mitigate aesthetic impacts, ensure stability, promote runoff, and reduce infiltration. The recontoured heap piles would be covered with a minimum of 12 inches of growth media and revegetated. To minimize erosion until vegetation has re-established, silt fences, sediment traps, or other appropriate BMPs would be installed. In addition, the stormwater diversion structures constructed upgradient of the heaps prior to operation would be retained to minimize erosion over the long term.

Based on earlier closure projects conducted at the Cortez Gold Mines Operations Area, cyanide concentrations from process facility draindown solutions have ranged from non-detectable (less than the method of detection limit of 0.01 mg/L) to 0.15 mg/L (CGM 2007e). It is anticipated that long-term solution management would incorporate a vegetated soil cover to limit infiltration into the heaps and the use of one or more evaporation or ET cells to provide for on site containment and evaporation of solution (zero-discharge facility). ET cells would remain in place in perpetuity. Should the zero-discharge design utilizing evaporation or ET cells prove infeasible at the time of closure, other water management options would be developed in coordination with the BLM and NDEP. These options may include, but would not be limited to:

- Cover redesign to reduce seepage from meteoric infiltration;
- Enhanced evaporation via mechanical methods (e.g., snowmakers, misters, etc.);
- Leach field installation; or
- Water treatment (e.g., precipitation and settling using lime, sulfide, ferrous solution, and/or flocculants; filtration; ion exchange; reverse osmosis; air stripping; biological precipitation; or passive wetlands).

Water that does not meet applicable water quality standards also may be managed by diversion to other lined process components (e.g., mill, heap leach, tailings, or the water storage reservoir during operations only).

Reclamation of Solution Ponds and Carbon-in-Column Circuit

Following heap draindown, the remaining water in each of the solution ponds would be allowed to evaporate. Solids also would be present in some quantity in most of the ponds at the time of closure. Representative samples of the solids would be obtained and analyzed to determine their chemical characteristics. Depending on the results of the characterization testing, the solids would be left in the ponds and buried in place, removed for gold recovery, removed and placed on the heaps, or placed in either the existing or proposed tailings impoundment. The ponds subsequently would be reclaimed or converted into post-closure ET cells.

Where ponds would be reclaimed, the pond liners either would be removed and disposed of in a permitted landfill, or removed from the sides of the ponds and folded into the pond bottoms. The ponds subsequently would be backfilled and graded to prevent accumulation of water and to blend with the surrounding topography. A minimum of 6 inches of growth media would be redistributed prior to seeding.

Where ponds would be converted into ET cells, the liners would be inspected and repaired, as necessary; a 2-foot overliner layer, or other suitable protective layer, would be placed over the liner; and the ponds would be partially or completely backfilled, with any required fluid conveyance/distribution piping installed. The surface subsequently would be graded to prevent accumulation of water and to blend with the surrounding topography. Approximately 6 inches of growth media would be redistributed prior to seeding.

The CIC and reagent tanks would be removed from the mine site and either reused at other CGM sites or appropriately disposed of off site. The related disturbance subsequently would be ripped to relieve compaction, recontoured, as needed, covered with growth media, and reseeded.

Reclamation of Stormwater Event Ponds and Fresh Water Reservoir

All equipment and surface piping associated with the stormwater event ponds or fresh water reservoir would be removed. The pond liners would be folded into the pond bottom. The ponds subsequently would be backfilled and regraded to prevent ponding of water. Growth media would be redistributed prior to seeding.

Reclamation of Tailings Expansion Areas

In addition to the reclamation goals identified in Section 2.3.13.2, Post-mining Land Use and Reclamation Goals, the final configuration of the proposed tailings expansion area would be designed to maximize runoff and minimize infiltration of direct precipitation and ensure long-term containment of the tailings.

As described above, a Final Plan for Permanent Closure would be developed 2 years prior to project closure pursuant to the requirements of the NDEP (NAC 445A.446 and 445A.447). The plan would include tailings closure specifications, including draindown management, which would be similar to that described above for the heap leach facilities. A general description of tailings reclamation is presented below.

Following the regrading of slopes to 2.5H:1V or shallower and shaping of the tailings surface to allow drainage of runoff, sufficient growth media to ensure a long-term cover depth of at least 12 inches would be placed on the prepared surfaces and subsequently reseeded. An average of 12 inches of growth media also would be placed on the embankments prior to seeding. Conveyance structures (e.g., armored spillways) would be designed and constructed to provide for long-term stability.

All associated surface piping, structures, and equipment would be removed and any related surface disturbance recontoured and reseeded. All buried piping would be cut, plugged, and buried in place after rinsing to closure specifications.

Reclamation of Road Features

Once haul, access, and exploration roads are no longer necessary, they would be recontoured to approximate original contours, to the extent possible, culverts removed or plugged, and the area revegetated. Where a road is located on fill, the side slopes would be rounded and regraded to a 2.5H:1V slope. Road surfaces at grade would be ripped to relieve compaction, covered with soil from the safety berms, and revegetated. Dikes and ditches that no longer would be required also would be regraded and

revegetated. Some access roads would be maintained following the completion of mining to provide access to monitoring sites.

As determined by BLM, any roads on public lands determined to be suitable for public access or which continue to provide public access consistent with pre-mining conditions would not be reclaimed (e.g., portions of the Horse Canyon haul road).

Disposition of Buildings and Ancillary Facilities

During final mine closure, buildings and structures (including the conveyor) would be dismantled, and materials would be salvaged or disposed of in the existing or proposed landfill or another permitted landfill off site. Concrete foundations and slabs would be broken up and buried in place under approximately 2 feet of material to prevent ponding and provide for revegetation. After demolition and salvage operations have been completed, the associated disturbance areas would be covered with growth media and revegetated.

Any remaining reagents and explosives would be transported to other CGM mines for use or disposed of at a licensed off site facility. Any above-surface pipelines would be removed and properly disposed of off site. Buried pipelines would be capped and left in place. Unneeded utility poles would be cut off at ground level and disposed of at an approved off site location or in the existing or proposed on site Class III waivered landfills.

Drill Hole and Water Well Abandonment

All mineral exploration and development drill holes and monitoring, production, and dewatering wells subject to NDWR regulations would be abandoned in accordance with applicable rules and regulations (NAC 534.425 through 534.428). Boreholes would be sealed to prevent cross contamination between aquifers, and the required shallow seal would be placed to prevent contamination by surface access.

Monitoring wells around the heap leach facilities would be maintained until CGM is released from post-mining groundwater monitoring requirements by the NDEP. These wells then would be plugged and abandoned according to the requirements of the Nevada State Engineer.

2.4.12.7 Reclamation of Historic Disturbances

CGM has in place a program to evaluate the management of disturbance associated with historic non-CGM mining adjacent to operating mines. Based on this evaluation, some of the historic disturbances adjacent to operations have been secured for safety reasons, protected for habitat purposes (i.e., constructing bat gates in tunnels), and/or reclaimed. As the proposed project would be in the area of non-impounded historic tailings associated with the historic silver mining in the Cortez Mining District, CGM would evaluate the feasibility of reclaiming the historic tailings concurrently with the proposed mining operation. Prior to securing or reclaiming these existing disturbances, CGM would coordinate with, and obtain approval from, the BLM and other jurisdictional agencies, as applicable.

2.4.12.8 Post-reclamation Monitoring and Maintenance

Following mine closure, CGM would conduct maintenance, site inspections, and any other necessary monitoring for the period of reclamation responsibility. Post-mining groundwater quality would be monitored according to the requirements established by NDEP, with the goal of demonstrating non-degradation to waters of the state. Monitoring of revegetation success would be conducted annually for a minimum of 3 years or until the revegetation standards have been met, as determined by the jurisdictional agencies. In addition, noxious weed monitoring and control would be implemented for a period of 5 years.

2.5 Alternatives to the Proposed Action

The BLM NEPA Handbook (H-1790-1) stipulates that "Before impacts can be analyzed in detail, reasonable alternatives to the proposed action – including the no-action alternative which reflects continuation of current management practices and/or denial of the action – must be defined." The Handbook also indicates that "Each alternative, except for the no-action alternative, should represent an alternative means of satisfying the identified purpose and need and of resolving issues. The rationale for considering but not selecting for further analysis certain suggested alternatives must be documented, especially those suggested by the public or other agencies (40 CFR 1502.14[a])."

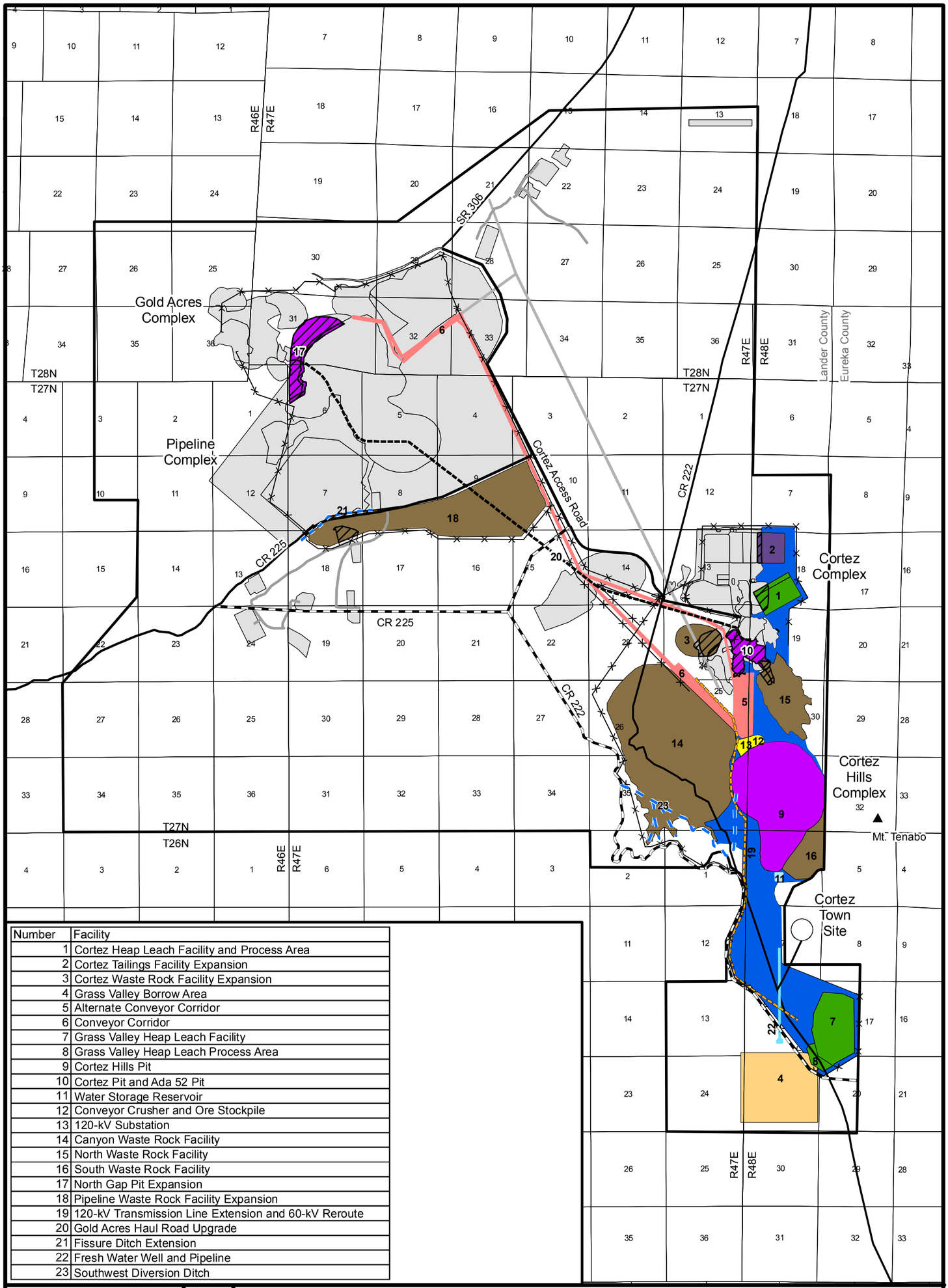
The issues and concerns identified during the scoping process focused primarily on potential impacts to water quantity and quality, wildlife, cultural resources and resources important to Native Americans, and reclamation scenarios associated with the Proposed Action. Therefore, the BLM focused on these issues and suggested alternatives in considering the alternatives to be evaluated in the EIS. However, other issues also have been considered in identifying alternatives. The following alternatives are discussed in detail in this EIS.

2.5.1 Alternatives Considered in Detail (Including No Action)

Mine operations are composed of a number of facility components. There can be alternative means and locations to implement these components in most settings. These alternative means are limited, however, by the location of the mineral deposit, land and mineral ownership, and existing physical constraints, both natural and man-made. For the proposed Cortez Hills Expansion Project, varying the location of most of the proposed facilities is constrained by the existing mining and processing facilities and the topographic features of the project vicinity.

2.5.1.1 Grass Valley Heap Leach Alternative

The BLM has examined the option of moving the proposed Grass Valley heap leach pad and associated solution ponds and CIC facility to an alternate site approximately 1.5 miles south-southeast of the proposed location (see **Figure 2-14**) to reduce visual impacts from the historic Cortez townsite, Cortez cemetery, and the Shoshone Wells springs. The facility would be approximately the same size (381 acres and 300 feet in height above ground surface) and have approximately the same capacity (65 million tons) as the heap leach facility under the Proposed Action. Overall, this alternative would result in 1,168 acres of additional surface disturbance than would occur under the Proposed Action (see **Table 2-9**). The haul road to the alternate



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	Fissure Ditch Extension
22	Fresh Water Well and Pipeline
23	Southwest Diversion Ditch

Legend

- Project Boundary
- Ancillary Areas
- Borrow Areas
- Conveyor Corridor
- Water Storage Reservoir
- Heap Leach Facilities
- Pits
- Process Facilities
- Tailings Facilities
- Waste Rock Facilities
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- CR Reroute
- Ditch
- Water Pipeline
- Fence
- Gold Acres Haul Road Upgrade
- Transmission Line Reroute

N

0 1 2 3 Miles

Cortez Hills Expansion Project

Figure 2-14
Grass Valley
Heap Leach Alternative

03/04/2008

Table 2-9
Currently Authorized and Proposed Surface Disturbance
Grass Valley Heap Leach Alternative

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Grass Valley Heap Leach Alternative: Total Acreage for Proposed Facility	Grass Valley Heap Leach Alternative: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Grass Valley Heap Leach Alternative: New Proposed Facility Disturbance (acres)
Open Pits[3]					
Cortez Hills Complex	Cortez Hills Pit	--	923	0	923
Cortez Complex	Cortez Pit	132[4]	110	110	0
	F-Canyon Pit	44	--	--	--
Pipeline Complex	North Gap Pit Expansion	--	190	190	0
	Pipeline Pit	1,353	--	--	--
Gold Acres Complex	Gold Acres Pit	111	--	--	--
	Subtotal	**1,640**	**1,223**	**300**	**923**
Underground Operations		**5**	**0[5]**	**0**	**0**
Waste Rock Facilities					
Cortez Hills Complex	Canyon Waste Rock Facility	--	1,690	0	1,690
	North Waste Rock Facility	--	303	22[6]	281
	South Waste Rock Facility	--	175	0	175
Cortez Complex	Cortez Waste Rock Facility	--	137	56	81
	Cortez Out-of-pit Waste Rock Facilities	138[7]	--	--	--
	F-Canyon Pit Backfill	0[5]	0[5]	0	0
	Underground Stope Backfill	0[8]	0[8]	0	0
Pipeline Complex	Gap Waste Rock Facility	125	0[9]	0	0
	North Gap Pit Backfill	--	0[5]	0	0
	Pipeline Pit Backfill	0[5]	0[5, 9]	0	0
	Pipeline Waste Rock Facility	1,746	968	50	918
Gold Acres Complex	Gold Acres Waste Rock Facilities	227	--	--	--
	Subtotal	**2,236**	**3,273**	**128**	**3,145**
Processing Facilities					
Cortez Hills Complex	Grass Valley Heap Leach Pad and Process Facility	--	328	0	328
	Crusher/stockpile	--	33	0	33
	Cross-valley Conveyor Corridors	--	441	119	322
Cortez Complex	Cortez Heap Leach Pad and Processing Facility	102	120	27	93
	Cortez Mill	53	0[9]	0	0
	Cortez Tailings Facility	369	94	14	80
	Solution Ponds	6	0	0	0
Pipeline Complex	Pipeline Heap Leach/Tailings	932	0[9]	0	0
	Pipeline South Area Heap Leach	758	0[9]	0	0
	Pipeline Mill	220	0[10]	0	0
Gold Acres Complex	Gold Acres Plant Site	12	--	--	--
	Gold Acres Heap Leach Facility	41[11]	--	--	--
	Subtotal	**2,493**	**1,016**	**160**	**856**

Table 2-9 (Continued)

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Grass Valley Heap Leach Alternative: Total Acreage for Proposed Facility	Grass Valley Heap Leach Alternative: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Grass Valley Heap Leach Alternative: New Proposed Facility Disturbance (acres)
Ancillary Support Facilities					
Cortez Hills Complex	Administration Facilities	--	0[12]	0	0
	Class III Landfill	--	5	0	5
	Cortez Hills Ancillary Facilities	--	1,374	0	1,374
	Grass Valley Borrow Area	--	595	0	595
	Fresh Water Reservoir	--	6	0	6
	Grass Valley Water Wells/Powerline/ Access Road	--	3	0	3
	120-kV Transmission Line Extension and Substation	--	4	0	4
	60-kV Transmission Line Reroute	--	0[13]	0	0[13]
Cortez Complex	Airport Gravel Pit	487	0[9]	0	0
	Cortez Ancillary Facilities	312	275	0	275
	Cortez Remediation Wells	23	--	--	--
	Horse Canyon Haul Road	45	0[12]	0	0
	Water Storage Reservoirs	13	0[9]	0	0
	120-kV Transmission Line/ Cross-valley Water Pipeline Corridor	10	0[9]	0	0
Pipeline Complex	County Road Construction/Cortez Access Road	85	--	--	--
	County Road Relocations	--	82[14]	0	82[14]
	Diversion Channel	21	--	--	--
	Fissure Ditch	0[5]	0[5]	0	0
	Frome Gravel Pit	45	0[9]	0	0
	Gold Acres Haul Road	54	11	0	11
	Growth Media Stockpiles	18	0[5]	0	0
	Mine Water Infiltration Basins/Pipelines/Ditches	578	0[9]	0	0
	Pipeline Ancillary Facilities	1,021	0[9]	0	0
Gold Acres Complex	Gold Acres Ancillary Facilities	262	0[9]	0	0
	Subtotal	**2,974**	**2,355**	**0**	**2,355**
On-going Exploration		**91**	**300**	**0**	**300**
Total Disturbance Area		**9,439**	**8,167**	**588**	**7,579**

1` Reflects the existing approved disturbance acreage.
2 Reflects a continuation or change in use for previously authorized disturbance.
3 Inclusive of 200-foot-wide pit adjustment zones.
4 Reflects the currently combined footprints for the Cortez and Ada 52 pits. Twenty-two acres of the previously authorized disturbance for the Cortez Pit was never developed.
5 Disturbance is accounted for in other existing and/or proposed disturbance footprints.
6 Acreage previously authorized, but never developed, as part of the Cortez Pit.
7 Reflects the four existing waste rock facilities at the Cortez Complex that would not be used under this alternative.
8 Backfill would be placed in mined-out portions of the underground workings; no additional disturbance.
9 Existing facility would be used to support the **Alternative**; however, there is no proposed change to the currently permitted disturbance footprint, height, capacity, or throughput, as applicable.
10 The proposed mill expansion would be within the existing disturbance area.
11 Closure and relocation of this facility previously was analyzed and authorized by the BLM (2004e, 2005a) to facilitate expansion of the Pipeline Pit for the Pipeline/South Pipeline Project. The acreage above reflects the remaining disturbance outside of the currently authorized Pipeline Pit. Approximately 23 acres of the remaining disturbance would overlap with the proposed North Gap Pit expansion.
12 Disturbance is accounted for in the ancillary facilities acreage.
13 The majority of the proposed disturbance is accounted for in other proposed disturbance footprints. The remainder of the related disturbance would be minimal.
14 Acreage based on an assumed 50-foot-wide construction ROW.

Note: Shaded entries in table reflect differences from Proposed Action.

facility location would be approximately 1.5 miles longer one way than under the Proposed Action. The haul distance to this location over the life of the project would total 543,750 miles***, resulting in 13,660 additional operating hours, with a fuel consumption rate of 40 to 50 gallons per hour. An*** additional haul truck would be required**.**

The depth to groundwater at this location is approximately 117 feet below ground surface. As per the Proposed Action, the Grass Valley Heap Leach Facility location would require a realignment of CR 222. In addition, access to the historic Cortez townsite and Cortez cemetery would require visitors to cross an active mine haul road.

Reclamation procedures that would be implemented under this alternative would parallel those described in Section 2.4.12, Reclamation. The post-mining reclamation topography for the Cortez and Cortez Hills complexes under this alternative is shown in **Figure 2-15**.

2.5.1.2 Crescent Valley Waste Rock Alternative

In response to scoping comments regarding potential water quality impacts associated with placement of the proposed Canyon Waste Rock Facility, the BLM has examined an alternative location for a waste rock facility in Crescent Valley. Under this alternative, the Crescent Valley Waste Rock Facility would be constructed on the valley floor between the existing Cortez and Pipeline complexes; the proposed Canyon Waste Rock Facility would not be constructed (see **Figure 2-16**). The Crescent Valley Waste Rock Facility would have a design capacity of 1,200 million tons, result in approximately 1,751 acres of new surface disturbance, and have a maximum height of 500 feet above the valley floor. The depth to groundwater at this alternative waste rock facility location is approximately 25 to 50 feet below ground surface.

The development of the Crescent Valley Waste Rock Facility would eliminate the need to relocate CR 222 within Cortez Canyon; however, an approximately 7-mile-long segment of CR 222 would need to be rerouted in Crescent Valley (**Figure 2-16**). As per the Proposed Action, realignment of CR 225 would be required; however, the approximately 4-mile-long alignment would be constructed farther north and would run between the Crescent Valley Waste Rock Facility and the proposed Pipeline Waste Rock Facility expansion area (**Figure 2-16**). All other proposed facilities would be the same as described under the Proposed Action. Overall, this alternative would result in 38 acres of additional surface disturbance than would occur under the Proposed Action (see **Table 2-10**).

Under this alternative, the existing and proposed alignments of the linear cross-valley facilities (i.e., existing 120-kV transmission line/water pipeline corridor and proposed conveyor corridor and corridor for the Gold Acres haul road upgrade) during construction and operations would be the same as under the Proposed Action. During operations, the Crescent Valley Waste Rock Facility would be constructed with a minimum 600-foot setback from the linear cross-valley facility corridors. A similar separation would exist between the Crescent Valley Waste Rock Facility and the proposed Cortez Waste Rock Facility expansion area during operations to allow for side slope recontouring during reclamation. During final reclamation, the linear facilities would be removed or relocated, and the Crescent Valley Waste Rock Facility subsequently would be recontoured.

Table 2-10
Currently Authorized and Proposed Surface Disturbance
Crescent Valley Waste Rock Alternative

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Crescent Valley Waste Rock Alternative: Total Acreage for Proposed Facility	Crescent Valley Waste Rock Alternative: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Crescent Valley Waste Rock Alternative: New Proposed Facility Disturbance (acres)
Open Pits[3]					
Cortez Hills Complex	Cortez Hills Pit	--	923	0	923
Cortez Complex	Cortez Pit	132[4]	110	110	0
	F-Canyon Pit	44	--	--	--
Pipeline Complex	North Gap Pit Expansion	--	190	190	0
	Pipeline Pit	1,353	--	--	--
Gold Acres Complex	Gold Acres Pit	111	--	--	--
	Subtotal	**1,640**	**1,223**	**300**	**923**
Underground Operations		**5**	**0[5]**	**0**	**0**
Waste Rock Facilities					
Cortez Hills Complex	Crescent Valley Waste Rock Facility	--	1,997	246	1,751
	North Waste Rock Facility	--	303	22[6]	281
	South Waste Rock Facility	--	175	0	175
Cortez Complex	Cortez Waste Rock Facility	--	137	56	81
	Cortez Out-of-pit Waste Rock Facilities	138[7]	--	--	--
	F-Canyon Pit Backfill	0[5]	0[5]	0	0
	Underground Stope Backfill	0[8]	0[8]	0	0
Pipeline Complex	Gap Waste Rock Facility	125	0[9]	0	0
	North Gap Pit Backfill	--	0[5]	0	0
	Pipeline Pit Backfill	0[5]	0[5, 9]	0	0
	Pipeline Waste Rock Facility	1,746	968	50	918
Gold Acres Complex	Gold Acres Waste Rock Facilities	227	--	--	--
	Subtotal	**2,236**	**3,580**	**374**	**3,206**
Processing Facilities					
Cortez Hills Complex	Grass Valley Heap Leach Pad and Process Facility	--	328	0	328
	Crusher/stockpile	--	33	0	33
	Cross-valley Conveyor Corridors	--	441	119	322
Cortez Complex	Cortez Heap Leach Pad and Processing Facility	102	120	27	93
	Cortez Mill	53	0[9]	0	0
	Cortez Tailings Facility	369	94	14	80
	Solution Ponds	6	0	0	0
Pipeline Complex	Pipeline Heap Leach/Tailings	932	0[9]	0	0
	Pipeline South Area Heap Leach	758	0[9]	0	0
	Pipeline Mill	220	0[10]	0	0
Gold Acres Complex	Gold Acres Plant Site	12	--	--	--
	Gold Acres Heap Leach Facility	41[11]	--	--	--
	Subtotal	**2,493**	**1,016**	**160**	**856**
Ancillary Support Facilities					
Cortez Hills Complex	Administration Facilities	--	0[12]	0	0
	Class III Landfill	--	5	0	5
	Cortez Hills Ancillary Facilities	--	583	0	583
	Grass Valley Borrow Area	--	605	0	605
	Fresh Water Reservoir	--	6	0	6
	Grass Valley Water Wells/Powerline/ Access Road	--	3	0	3
	120-kV Transmission Line Extension and Substation	--	4	0	4
	60-kV Transmission Line Reroute	--	0[13]	0	0[13]

Table 2-10 (Continued)

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Crescent Valley Waste Rock Alternative		
			Total Acreage for Proposed Facility	Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	New Proposed Facility Disturbance (acres)
Cortez Complex	Airport Gravel Pit	487	0[9]	0	0
	Cortez Ancillary Facilities	312	275	0	275
	Cortez Remediation Wells	23	--	--	--
	Horse Canyon Haul Road	45	0[12]	0	0
	Water Storage Reservoirs	13	0[9]	0	0
	120-kV Transmission Line/ Cross-valley Water Pipeline Corridor	10	0[9]	0	0
Pipeline Complex	County Road Construction/Cortez Access Road	85	--	--	--
	County Road Relocations	--	53[14]	0	53[14]
	Diversion Channel	21	--	--	--
	Fissure Ditch	0[5]	0[5]	0	0
	Frome Gravel Pit	45	0[9]	0	0
	Gold Acres Haul Road	54	11	0	11
	Growth Media Stockpiles	18	0[5]	0	0
	Mine Water Infiltration Basins/ Pipelines/Ditches	578	0[9]	0	0
	Pipeline Ancillary Facilities	1,021	0[9]	0	0
	Storm Water Diversions	21	0[5]	0	0
Gold Acres Complex	Gold Acres Ancillary Facilities	262	0[9]	0	0
Subtotal		**2,974**	**1,545**	**0**	**1,545**
On-going Exploration		**91**	**300**	**0**	**300**
Total Disturbance Area		**9,439**	**7,664**	**834**	**6,830**

1 Reflects the existing approved disturbance acreage.
2 Reflects a continuation or change in use for previously authorized disturbance.
3 Inclusive of 200-foot-wide pit adjustment zones.
4 Reflects the currently combined footprints for the Cortez and Ada 52 pits. Twenty-two acres of the previously authorized disturbance for the Cortez Pit was never developed.
5 Disturbance is accounted for in other existing and/or proposed disturbance footprints.
6 Acreage previously authorized, but never developed, as part of the Cortez Pit.
7 Reflects the four existing waste rock facilities at the Cortez Complex that would not be used under this alternative.
8 Backfill would be placed in mined-out portions of the underground workings; no additional disturbance.
9 Existing facility would be used to support the Alternative; however, there is no proposed change to the currently permitted disturbance footprint, height, capacity, or throughput, as applicable.
10 The proposed mill expansion would be within the existing disturbance area.
11 Closure and relocation of this facility previously was analyzed and authorized by the BLM (2004e, 2005a) to facilitate expansion of the Pipeline Pit for the Pipeline/South Pipeline Project. The acreage above reflects the remaining disturbance outside of the currently authorized Pipeline Pit. Approximately 23 acres of the remaining disturbance would overlap with the proposed North Gap Pit expansion.
12 Disturbance is accounted for in the ancillary facilities acreage.
13 The majority of the proposed disturbance is accounted for in other proposed disturbance footprints. The remainder of the related disturbance would be minimal.
14 Acreage based on an assumed 50-foot-wide construction ROW.

Note: Shaded entries in table reflect differences from Proposed Action.

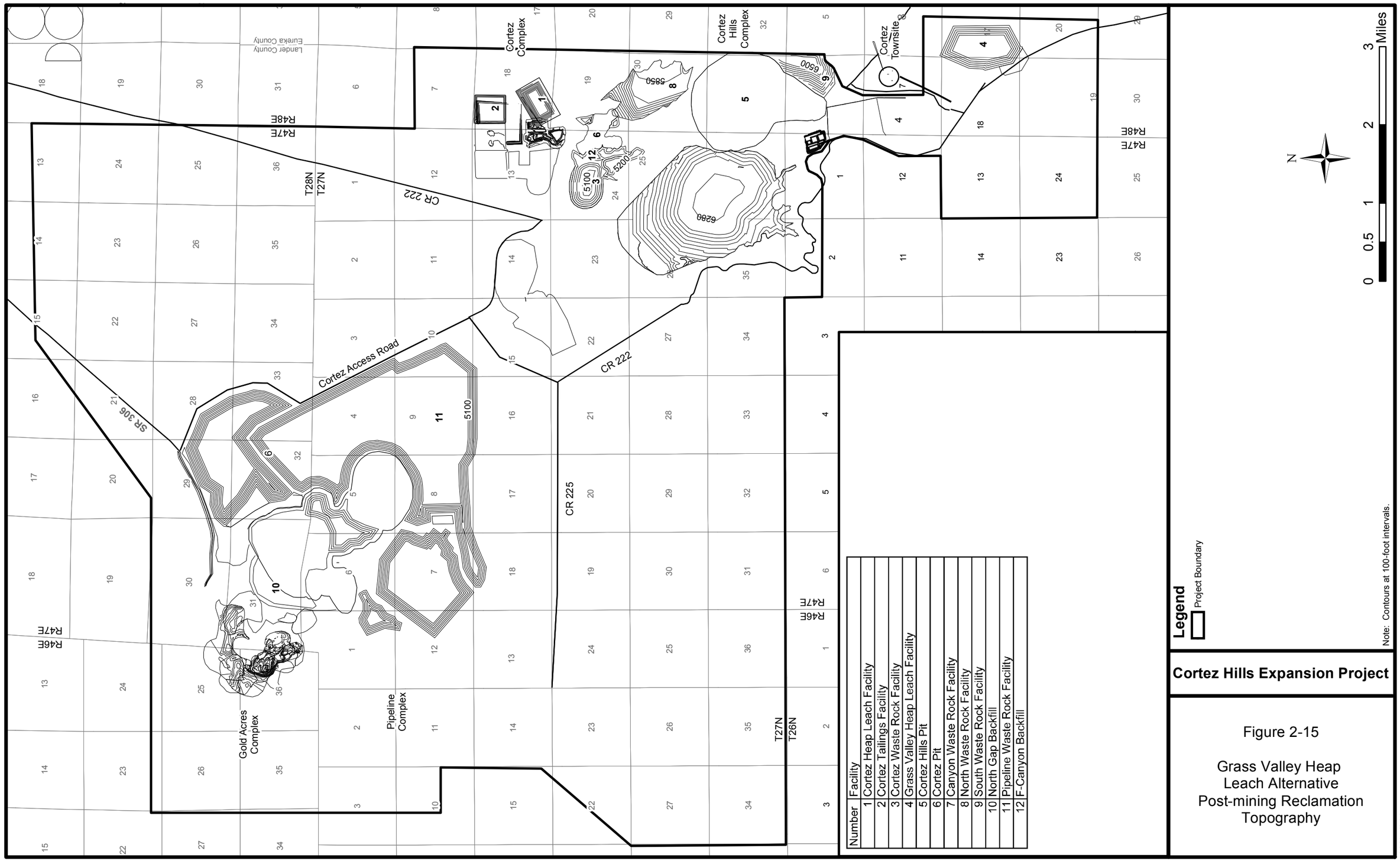
The mine life and mining rate for the project were determined by the need to deliver up to 15,000 tpd of mill-grade ore to the existing Pipeline Mill, in order to maintain efficient operation of that processing facility. Therefore, the mining rate would need to be sufficient to produce enough mill-grade ore to supply the mill on a daily basis. An integral component of the mining rate is the haul time required for removal and transport of waste rock from the open pit to the waste rock facilities. Based on an approximate additional 10-mile round-trip haulage distance under this alternative from the Cortez Hills Pit to the Crescent Valley Waste Rock Facility, the additional round-trip travel time would be approximately 0.6 hour. Over the life of the mine, an estimated additional 1.13 million hours would be required to transport the waste rock (up to 1,200 million tons) to the Crescent Valley Waste Rock Facility, an approximately 115 percent increase as compared to transport to the Canyon Waste Rock Facility under the Proposed Action. Maintaining a 10-year mine life, a required daily delivery of up to 15,000 tons of mill-grade ore to the Pipeline Mill, and the additional haul time required to transport waste rock to the Crescent Valley Waste Rock Facility, 31 additional large-capacity haul trucks would be required under this alternative. Correspondingly, costs associated with fuel, tires, maintenance, parts and labor, operator wages, and overhead would increase. The reclamation costs also would be higher, proportional to the increased disturbance area.

Approximately 150 additional employees (drivers and maintenance personnel) would be required under this alternative. The annual payroll would be approximately $55 million. Operation of 31 additional haul trucks would result in the consumption of an additional 12 million gallons of diesel fuel, 80,000 gallons of petroleum oils, and 11,000 gallons of antifreeze per year. Based on increased fuel usage, the daily fuel transport traffic to the mine would increase from an average of 2 trips per day under the Proposed Action to an average of 4 trips per day under this alternative.

Under this alternative, approximately 305,000 additional cubic yards of growth media would be required for reclamation purposes, resulting in a total growth media requirement of approximately 5.0 million cubic yards. Reclamation procedures would parallel those described in Section 2.4.12, Reclamation. The post-mining reclamation topography for this alternative is shown in **Figure 2-17**.

2.5.1.3 Cortez Hills Complex Underground Mine Alternative

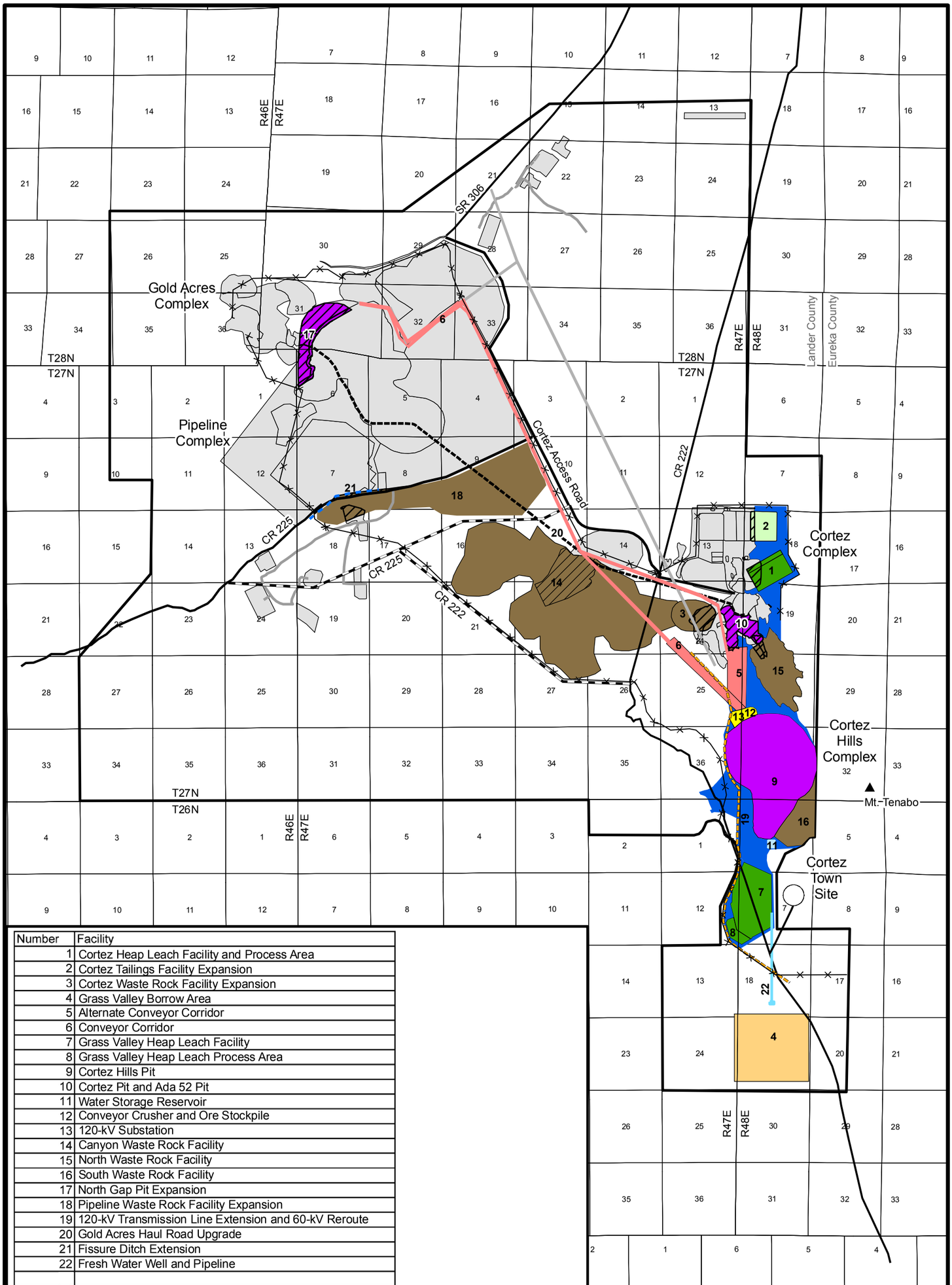
The BLM has evaluated an alternative of developing the Cortez Hills deposit only through the use of underground mining techniques. Under this alternative, the proposed Cortez Hills Pit; North, South, and Canyon waste rock facilities; cross-valley conveyor and crusher; and Grass Valley borrow area would not be developed. In addition, the cost of underground mining would make extraction of heap leach-grade ore uneconomic, and therefore, the proposed Grass Valley Heap Leach Facility would not be developed. This alternative also would eliminate the need to reroute CR 222 within Cortez Canyon and eliminate the need to reroute the existing 60-kV transmission line through the Cortez Hills Complex area. Mine development under this alternative would require the construction of two additional underground portals. All other proposed facilities at the Pipeline and Cortez complexes would be the same as described under the Proposed Action (see **Figure 2-18**), and currently approved facilities for the Cortez Underground Exploration Project (e.g., portals, surface facilities, and F-Canyon backfill area) would be used. Overall, this alternative would result in 4,621 fewer acres of surface disturbance than mine development under the Proposed Action (see **Table 2-11**).



Number	Facility
1	Cortez Heap Leach Facility
2	Cortez Tailings Facility
3	Cortez Waste Rock Facility
4	Grass Valley Heap Leach Facility
5	Cortez Hills Pit
6	Cortez Pit
7	Canyon Waste Rock Facility
8	North Waste Rock Facility
9	South Waste Rock Facility
10	North Gap Backfill
11	Pipeline Waste Rock Facility
12	F-Canyon Backfill

Figure 2-15

Grass Valley Heap Leach Alternative Post-mining Reclamation Topography



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	Fissure Ditch Extension
22	Fresh Water Well and Pipeline

Legend

- Project Boundary
- Ancillary Areas
- Borrow Areas
- Conveyor Corridor
- Water Storage Reservoir
- Heap Leach Facilities
- Pits
- Process Facilities
- Tailings Facilities
- Waste Rock Facilities
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- CR Reroute
- Diversion Ditch
- Water Pipeline
- Fence
- Gold Acres Haul Road Upgrade
- Transmission Line Reroute

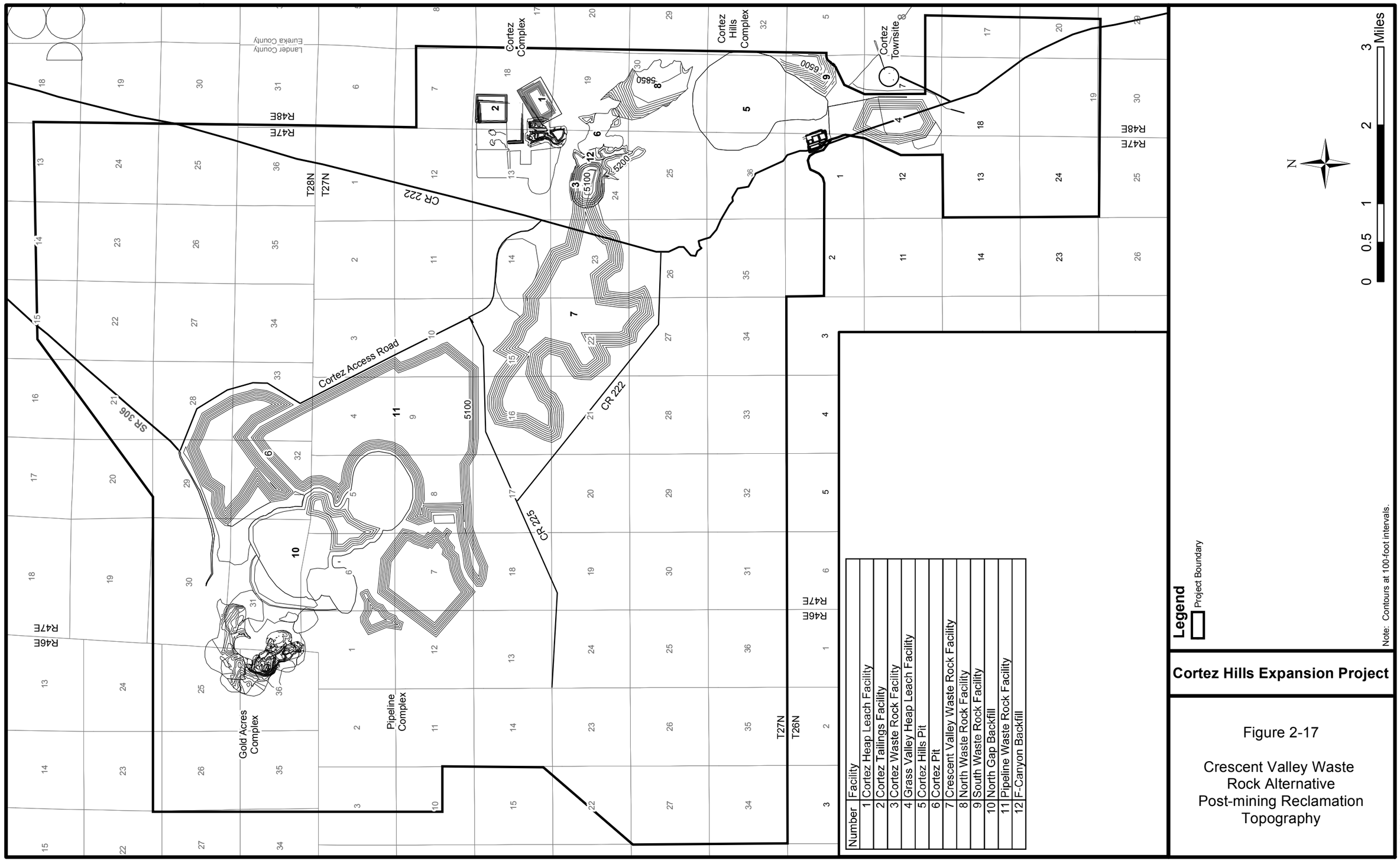
N

0 1 2 3 Miles

Cortez Hills Expansion Project

Figure 2-16
Crescent Valley Waste Rock Alternative

06/20/2007



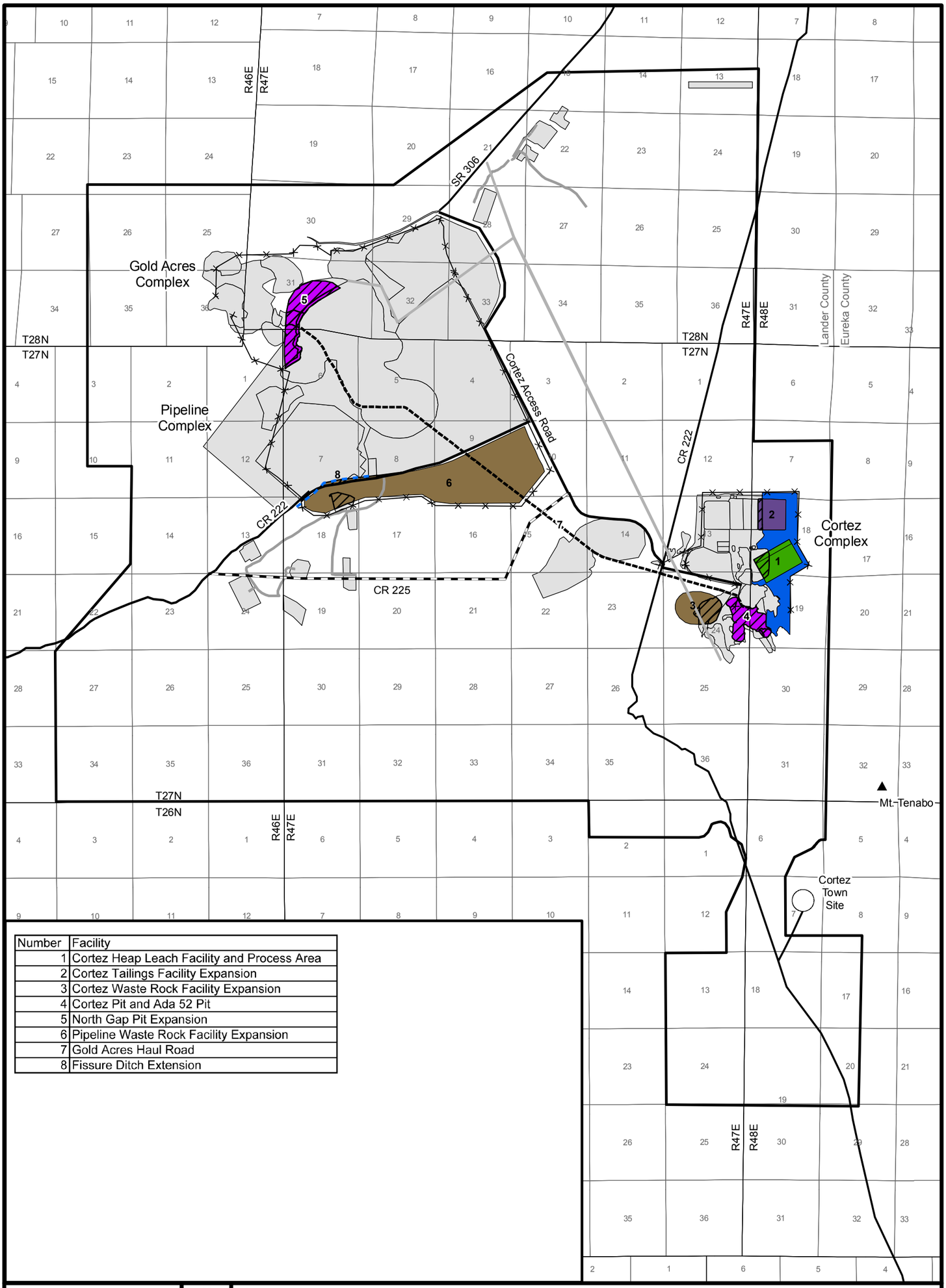
Number	Facility
1	Cortez Heap Leach Facility
2	Cortez Tailings Facility
3	Cortez Waste Rock Facility
4	Grass Valley Heap Leach Facility
5	Cortez Hills Pit
6	Cortez Pit
7	Crescent Valley Waste Rock Facility
8	North Waste Rock Facility
9	South Waste Rock Facility
10	North Gap Backfill
11	Pipeline Waste Rock Facility
12	F-Canyon Backfill

Cortez Hills Expansion Project

Figure 2-17

Crescent Valley Waste Rock Alternative Post-mining Reclamation Topography

05/31/2007



Number	Facility
1	Cortez Heap Leach Facility and Process Area
2	Cortez Tailings Facility Expansion
3	Cortez Waste Rock Facility Expansion
4	Cortez Pit and Ada 52 Pit
5	North Gap Pit Expansion
6	Pipeline Waste Rock Facility Expansion
7	Gold Acres Haul Road
8	Fissure Ditch Extension

Legend

- Project Boundary
- Ancillary Areas
- Heap Leach Facilities
- Pits
- Tailings Facility
- Waste Rock Facilities
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- CR Reroute
- Fissure Ditch Extension
- Fence
- Gold Acres Haul Road Upgrade
- Water Lines

N

0 1 2 3 Miles

Cortez Hills Expansion Project

Figure 2-18
Cortez Hills Complex
Underground Mine
Alternative

05/29/2007

Table 2-11
Currently Authorized and Proposed Surface Disturbance
Cortez Hills Complex Underground Mine Alternative

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Cortez Hills Complex Underground Mine Alternative: Total Acreage for Proposed Facility	Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	New Proposed Facility Disturbance (acres)
Open Pits[3]					
Cortez Hills Complex	Cortez Hills Pit	--	--	--	--
Cortez Complex	Cortez Pit	132[4]	110	110	0
	F-Canyon Pit	44	--	--	--
Pipeline Complex	North Gap Pit Expansion	--	190	190	0
	Pipeline Pit	1,353	--	--	--
Gold Acres Complex	Gold Acres Pit	111	--	--	--
	Subtotal	**1,640**	**300**	**300**	**0**
Underground Operations		**5**	**0[5]**	**0**	**0**
Waste Rock Facilities					
Cortez Hills Complex	Canyon Waste Rock Facility	--	--	--	--
	North Waste Rock Facility	--	--	--	--
	South Waste Rock Facility	--	--	--	--
Cortez Complex	Cortez Waste Rock Facility	--	137	56	81
	Cortez Out-of-pit Waste Rock Facilities	138[6]	--	--	--
	F-Canyon Pit Backfill	0[5]	0[5]	0	0
	Underground Stope Backfill	0[7]	0[7]	0	0
Pipeline Complex	Gap Waste Rock Facility	125	0[8]	0	0
	North Gap Pit Backfill	--	0[5]	0	0
	Pipeline Pit Backfill	0[5]	0[5,8]	0	0
	Pipeline Waste Rock Facility	1,746	968	50	918
Gold Acres Complex	Gold Acres Waste Rock Facilities	227	--	--	--
	Subtotal	**2,236**	**1,105**	**106**	**999**
Processing Facilities					
Cortez Hills Complex	Grass Valley Heap Leach Pad and Process Facility	--	--	--	--
	Crusher/stockpile	--	--	--	--
	Cross-valley Conveyor Corridors	--	--	--	--
Cortez Complex	Cortez Heap Leach Pad and Processing Facility	102	120	27	93
	Cortez Mill	53	0[8]	0	0
	Cortez Tailings Facility	369	94	14	80
	Solution Ponds	6	0	0	0
Pipeline Complex	Pipeline Heap Leach/Tailings	932	0[8]	0	0
	Pipeline South Area Heap Leach	758	0[8]	0	0
	Pipeline Mill	220	0[8]	0	0
Gold Acres Complex	Gold Acres Plant Site	12	--	--	--
	Gold Acres Heap Leach Facility	41[9]	--	--	--
	Subtotal	**2,439**	**214**	**41**	**173**
Ancillary Support Facilities					
Cortez Hills Complex	Administration Facilities	--	--	--	--
	Class III Landfill	--	--	--	--
	Cortez Hills Ancillary Facilities	--	--	--	--
	Grass Valley Borrow Area	--	--	--	--
	Fresh Water Reservoir	--	--	--	--
	Grass Valley Water Wells/Powerline/Access Road	--	--	--	--
	120-kV Transmission Line Extension and Substation	--	--	--	--
	60-kV Transmission Line Reroute	--	--	--	--

Table 2-11 (Continued)

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Cortez Hills Complex Underground Mine Alternative		
			Total Acreage for Proposed Facility	Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	New Proposed Facility Disturbance (acres)
Cortez Complex	Airport Gravel Pit	487	0[8]	0	0
	Cortez Ancillary Facilities	312	275	0	275
	Cortez Remediation Wells	23	--	--	--
	Horse Canyon Haul Road	45	0[8]	0	0
	Water Storage Reservoirs	13	0[8]	0	0
	120-kV Transmission Line/ Cross-valley Water Pipeline Corridor	10	0[8]	0	0
Pipeline Complex	County Road Construction/Cortez Access Road	85	--	--	--
	County Road Relocations	--	32[10]	0	32[10]
	Diversion Channel	21	--	--	--
	Fissure Ditch	0[5]	0[5]	0	0
	Frome Gravel Pit	45	0[8]	0	0
	Gold Acres Haul Road	54	11	0	11
	Growth Media Stockpiles	18	0[5]	0	0
	Mine Water Infiltration Basins/Pipelines/Ditches	578	0[8]	0	0
	Pipeline Ancillary Facilities	1,021	0[8]	0	0
Gold Acres Complex	Gold Acres Ancillary Facilities	262	0[8]	0	0
Subtotal		**2,974**	**318**	**0**	**318**
On-going Exploration		**91**	**300**	**0**	**300**
Total Disturbance Area		**9,439**	**2,237**	**447**	**1,790**

1 Reflects the existing approved disturbance acreage.
2 Reflects a continuation or change in use for previously authorized disturbance.
3 Inclusive of 200-foot-wide pit adjustment zones.
4 Reflects the currently combined footprints for the Cortez and Ada 52 pits. Twenty-two acres of the previously authorized disturbance for the Cortez Pit was never developed.
5 Disturbance is accounted for in other existing and/or proposed disturbance footprints.
6 Reflects the four existing waste rock facilities at the Cortez Complex that would not be used under this alternative.
7 Backfill would be placed in mined-out portions of the underground workings; no additional disturbance.
8 Existing facility would be used to support the Alternative; however, there is no proposed change to the currently permitted disturbance footprint, height, capacity, or throughput, as applicable.
9 Closure and relocation of this facility previously was analyzed and approved by the BLM (2004e, 2005a) to facilitate expansion of the Pipeline Pit for the Pipeline/South Pipeline Project. The acreage above reflects the remaining disturbance outside of the currently authorized Pipeline Pit. Approximately 23 acres of the remaining disturbance would overlap with the proposed North Gap Pit expansion.
10 Acreage is based on an assumed 50-foot-wide construction ROW.

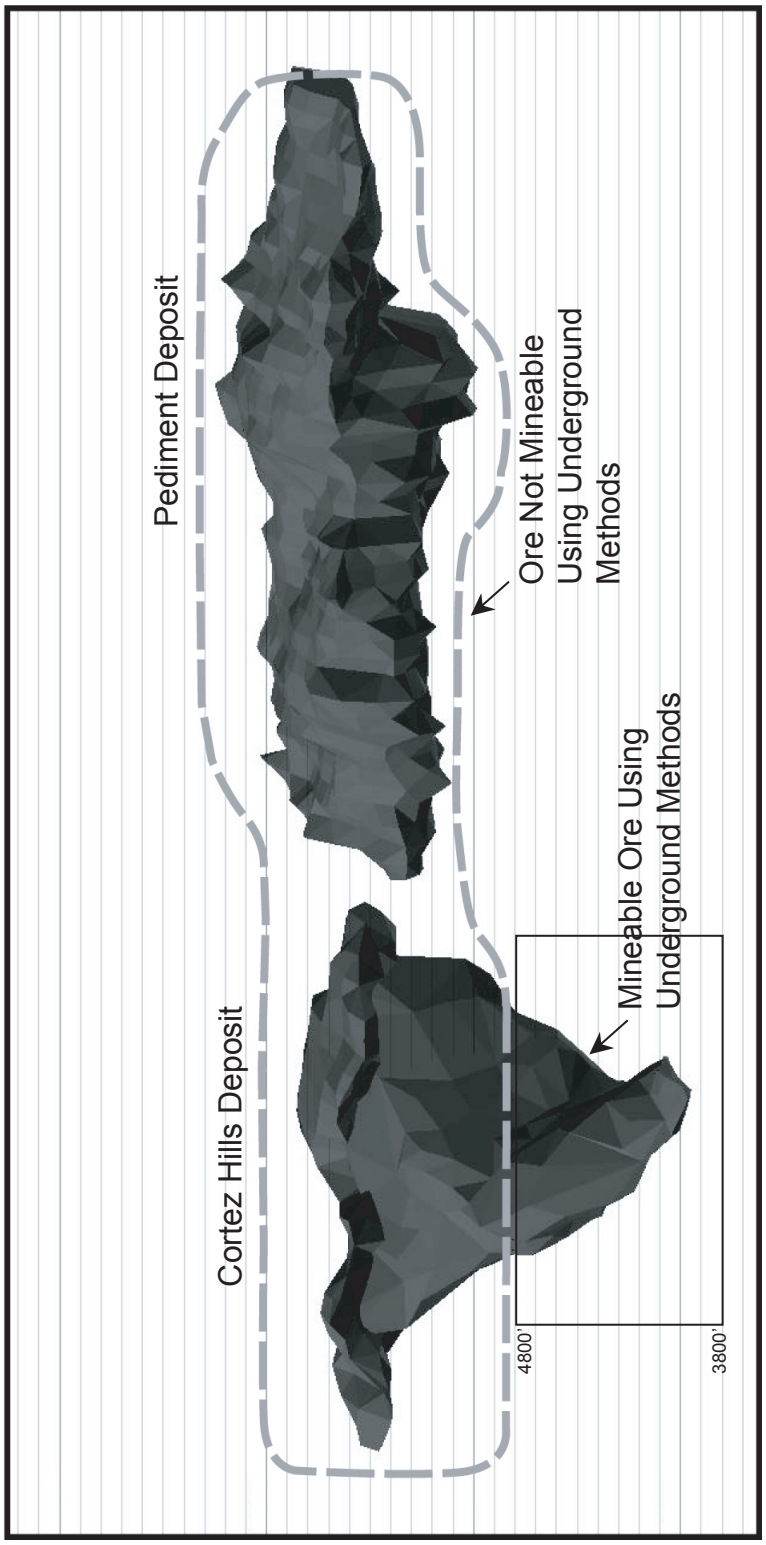
Note: Shaded entries in table reflect differences from Proposed Action.

Under this alternative, the proposed expansion of open-pit mining operations and associated facilities, and development of underground mining operations, would be initiated no sooner than mid-year 2008. Over the projected 16-year underground mine life, it is estimated that 6.0 million tons of mill-grade ore, 1.4 million tons of refractory ore, and 2.6 million tons of waste rock would be extracted by underground mining methods. Ore and waste rock tonnages that would be mined from the Cortez Pit and North Gap Pit expansion area under this alternative would be the same as under the Proposed Action (see **Table 2-2**). Approximately 3 million total ounces of gold would be produced. Gold production under this alternative would be substantially reduced because the Pediment deposit and the upper levels of the Cortez Hills deposit are in host rock that is geotechnically unsuitable for underground mining (**Figure 2-19**). As a result, the Pediment deposit would not be mined, and only approximately 55 percent of the Cortez Hills deposit would be mined, resulting in only approximately 37 percent of the resource being mined through underground mining compared to the Proposed Action.

It is assumed that CGM's current work force, as described in Section 2.4.3, Schedule and Work Force, would fulfill a portion of the work force requirements under the Cortez Hills Complex Underground Mine Alternative. It is anticipated that a contractor work force of approximately 100 workers for 6 months would be required for construction of facilities, to initiate mining, and for other site preparation activities during the construction period. No additional employees would be required beyond CGM's existing work force for open-pit mining and processing operations and concurrent reclamation. A maximum of approximately 120 employees would be required for underground mining. Approximately 120 workers would be required for the final 3 years of ongoing ore processing, closure, and reclamation. It is anticipated that the majority of the additional work force would be hired from the local communities to the extent possible. It also is anticipated that this alternative would provide employment opportunities through 2014 for open-pit and heap leach operations, concurrent with the existing Pipeline/South Pipeline Project, and through 2024 for underground operations. The total average annual operations work force payroll under this alternative would be approximately $36 million through 2014, which would decrease to approximately $8 million thereafter.

As discussed in Section 2.4.4, Expansion of Mining Operations, some of the mining equipment for surface operations would be shared between the existing and proposed surface operations. The types of open-pit and underground mining equipment used under this alternative would be the same as under the Proposed Action. The number of existing units and new units that would be added to the fleet under this alternative are identified in **Table 2-12**.

Access to underground operations would be through the existing twin exploration declines in the F-Canyon Pit and through two additional declines that would be developed immediately adjacent to the existing declines. Development of the new portals would be the same as described in Section 2.4.4.2, Underground Mining. The various underground mining methods that may be used under this alternative, depending on the character of the host rock and results of preliminary investigations and engineering studies being conducted in association with the currently approved underground exploration program, would be the same as described in Section 2.4.4.2. Elevations of underground workings would vary from 4,800 to 3,800 feet amsl, depending on geotechnical ground conditions encountered.



Cortez Hills
Expansion Project

Figure 2-19
Mineable Ore Under the
Cortez Hills Complex
Underground
Mine Alternative

05/30/07

Table 2-12
Mobile Equipment List for the Cortez Hills Complex Underground Mine Alternative

Type of Equipment	Number of Existing Units to be Shared[1]	Number of New Units to be Added to Fleet
Open-pit Mining		
Electric wire rope shovels	2	0
Hydraulic shovel	1	0
Haul trucks (85- to 400-ton)	20 to 30[2]	0
Rotary drills	4 to 10	0
Track bulldozers	4 to 12	0
Rubber tired bulldozers	2 to 5	0
Graders	2 to 5	0
Water trucks	2 to 4	0
Bobcat loader	1 to 3	0
Light plants	10 to 14	0
Blasting trucks	1	0
Tractor with two 10,000-gallon tanker-trailers	1	0
Trackhoe	0	0
Underground Mining		
Load-haul-dump machines	0	3 to 5
Haul trucks (40-ton)	0	10 to 14
Development and production drills	0	4 to 8
Rockbolters	0	2 to 3
Scissor decks	0	2 to 3
Forklifts	0	2 to 3
Flatbed carriers	0	2 to 3
Underground service trucks	0	2 to 4
Shotcrete trucks	0	3 to 5
Explosives trucks	0	2 to 3
Road grader	0	1
Personnel carriers	0	6 to 10

[1] Identified existing equipment that would be shared between currently permitted operations and proposed open-pit operations under this alternative.
[2] Haul trucks to be used for mining purposes and for transport of mill-grade ore to existing mill facilities.

At lower elevations, the underground workings would be below the pre-mining water table and would require dewatering. Dewatering and water disposal operations would be the same as described for the underground component of the Proposed Action (see Section 2.4.4.8, Dewatering and Water Disposal). Projected dewatering rates, consumption rates for mining and processing, and projected water disposal rates for this alternative over the life of the mine are presented in **Table 2-13**. Under this alternative, no expansion of the currently permitted dewatering operation at Pipeline would be required to accommodate development of the North Gap Pit expansion. Dewatering operations would not be required for the Cortez Pit, as drawdown associated with the underground dewatering program would be sufficient to dewater this pit to facilitate mining.

Table 2-13
Dewatering and Disposal Rates for the Cortez Hills Complex Underground Mine Alternative (gpm – annualized)

Year of Operation	Dewatering Rate[1]	Mine/Milling Consumption[2]	Disposal Rates	
			Infiltration Rate	Rate to Dean Ranch for Irrigation
1	3,200	1,200	2,000	0[3]
2	1,300	1,200	100	0[3]
3	1,100	1,000	100	0[3]
4	2,100	1,200	900	0[3]
5	3,500	1,200	2,300	0[3]
6	3,500	1,200	2,300	0[3]
7	4,700	2,000	1,500	1,200[4]
8	6,400	4,000	1,500	900[4]
9	6,700	4,000	1,500	1,200[4]
10	7,000	4,000	1,500	1,500[4]
11	7,300	4,000	1,500	1,800[4]
12	8,200	4,000	1,500	2,700[4]
13	8,300	4,000	1,500	2,800[4]
14	8,500	4,000	1,500	3,000[4]
15	8,700	4,000	1,500	3,200[4]
16	8,900	4,000	1,500	3,400[4]

[1] Reflects dewatering for underground operations.
[2] If the quantity of dewatering water that does not meet discharge requirements should exceed the mine consumption rate, the water would be conveyed to the existing water storage reservoir and subsequently evaporated.
[3] Water from the Pipeline dewatering system would continue to be piped to the Dean Ranch as currently authorized. No water from the proposed underground dewatering system would be conveyed to the ranch during this time.
[4] During the irrigation season (April through October) water from the underground dewatering system would be piped to the Dean Ranch for irrigation. During the non-growing season, water would be conveyed to the infiltration ponds. Existing operations currently are permitted for conveyance of dewatering water to the Dean Ranch up to 6,000 gpm on an annual average basis. No increase in this currently authorized rate is proposed.

Source: CGM 2007a; Geomega 2007d.

Waste rock would be cemented and used as backfill in underground workings in accordance with the selected mining method, as described for the reduced underground component under the Proposed Action (see Section 2.4.4.2, Underground Mining). Under this alternative, expansion of the currently permitted F-Canyon backfill area to accommodate excess waste rock from underground operations would be the same as described for the Proposed Action in Section 2.4.5, Waste Rock Facilities.

The production rate from the underground workings would be approximately 1,500 tpd. Mill-grade ore from the underground operation would be trucked either across the valley to the existing Pipeline Mill via the existing Gold Acres haul road (which would be upgrade as described in Section 2.4.4.4, Access and Haul Roads) or to the existing Cortez Mill for processing. Under this alternative, the cross-valley conveyor and associated crusher would not be constructed, and the Pipeline Mill would not be expanded. Ore would be hauled in 400-ton haul trucks. Approximately 5 to 10 round trips per day (12 miles each way) would be

required through approximately 2010 to transport mill-grade ore to the Pipeline Mill. During concurrent mining with existing and proposed operations at the Pipeline Pit and proposed additional mining at the Cortez Pit, mill-grade ore from the pits and underground operations would be processed at the Pipeline Mill either during limited operating periods or at a reduced rate. Following the completion of open-pit operations at Pipeline and processing of the associated ore, the underground production rate would be insufficient to support continued operation of the Pipeline Mill. As a result, mill-grade ore from the underground operation and mining in the Cortez Pit would be processed at the Cortez Mill, which would be restarted in approximately 2010. Refractory ore would be trucked to stockpiles and subsequently trucked off site under an ore sales agreement for processing, as is currently done under existing operations.

No expansion of the Pipeline Heap Leach/Tailings Facility is proposed under this alternative beyond that currently permitted. The proposed expansion of the Cortez Tailings Facility would be the same as described for the Proposed Action (see Section 2.4.6.3, Tailings Facilities).

Under this alternative, water supply and consumption would be the same as described for the Proposed Action in Section 2.4.8.2, Water Supply, with the following exceptions. Mine dewatering would be conducted for the projected 16 years of operation. The dewatering, mine water consumption, and water disposal rates under this alternative are shown in **Table 2-13**. Water for consumptive uses would be provided by dewatering activities or existing water supply wells in Crescent Valley and near the Cortez Mill. No new water supply wells would be developed under this alternative.

Procedures for reagent transportation, storage, waste management, and spill prevention and emergency response programs under this alternative would be the same as described for the Proposed Action in Section 2.4.9, Hazardous Materials Management, with the following exceptions. The Grass Valley Heap Leach Facility, associated chemical storage area, and fuel and lubricant storage facilities at the Cortez Hills Complex, as described under the Proposed Action, would not be constructed under this alternative. As a result, the quantities of materials above the currently permitted usage levels that would be transported to and stored at the site would be less than required under the Proposed Action (see **Table 2-14**).

Under this alternative, typical daily traffic to the mine site for reagent and fuels transport and employee commuting would be the same as for existing operations. Following the completion of open-pit mining in 2014, the typical daily traffic for underground operations would include fuel transport (1 trip), reagent transport (1 trip), employee buses (3 trips), and company and contractor pickups (approximately 80 trips).

Under this alternative, approximately 303,500 total cubic yards of growth media would be required for reclamation purposes. Reclamation procedures would parallel those described in Section 2.4.12, Reclamation. The post-mining reclamation topography for the Cortez Complex under this alternative is shown in **Figure 2-20**.

2.5.1.4 Revised Cortez Hills Pit Design Alternative

Based on the results of the analysis of the Proposed Action for the Draft EIS, Mitigation Measure GM2 was developed and incorporated into Section 3.1.4, Monitoring and Mitigation Measures, of the

Table 2-14
Hazardous Materials Summary for the Cortez Hills Complex Underground Mine Alternative

Material[1]	Use	Annual Usage	Amount Stored (typical)	Storage Method	Waste Management/ Disposal	Use Location	Primary Hazard Designation	Amount Per Load
Sodium cyanide	Process	750 tons	26,400 gal	Tank	Spent	Process facility	Highly toxic	15 tons
Lime	Process	3,600 tons	200 tons	Silo	Spent	Process facility	Corrosive	40 tons
Hydrochloric acid	Laboratory	165 tons	10,000 gal	Tank	Spent	Process facility	Corrosive	15 tons
Sodium hydroxide	Process	70 tons	15,000 gal	Tank	Spent	Process facility	Corrosive	15 tons
Flocculant[2]	Process	170 tons	33 tons	Tank	Spent	Process facility	Irritant	20 tons
Anti-scalent	Process	30 tons	3,000 gal	Tank	Spent	Process facility	Irritant	4,000 gal
Ferrous sulfate	Process	150 tons	45 tons	Bin/Tank	Spent	Process facility	Irritant	20 tons
Cherokee Chemical[3]	Process	1,300 gal	4,000 gal	Tank	Spent	Process facility	Irritant	4,000 gal
Ammonium nitrate	Mine	2,500 tons	150 tons	Bin	Spent	Mine	Explosive	40 tons
Gasoline	Mine	240,000 gal	12,000 gal	Tank	Spent	Truck shop	Flammable	10,000 gal
Diesel fuel	Mine	2,000,000 gal	80,000 gal	Tank	Spent	Truck shop	Flammable	10,000 gal
Petroleum oils	Mine	11,000 gal	2,500 gal	Tank	Recycled	Truck shop	Flammable	Various
Antifreeze	Mine	1,500 gal	2,000 gal	Tank	Recycled	Truck shop	Toxic	Various
Fluxes	Lab/Refinery	3 tons	1.5 tons	Various	Spent	Laboratory	Toxic	Various

[1] The following hazardous materials and substances may be transported, stored, and used at the Cortez Hills Expansion Project in appreciable quantities, but less than the Threshold Planning Quantity designated by SARA Title II for emergency planning: acetone, ammonium hydroxide, calcium hypochlorite, ethyl alcohol, freon, isopropyl alcohol, litharge (lead oxide), nitric acid, petroleum solvents, sodium hypochlorite, soda ash, and sulfuric acid. Sodium hypochlorite, hydrogen peroxide, and sulfuric acid would be used as neutralizers and kept on-site for emergency purposes. Small quantities of hazardous materials not included in this list may be used as laboratory reagents, paints, office products, and maintenance products.
[2] Flocculants would include Thatcher Polymer T-Floc, A-830, Nalco Nuclear 9708, and DULV Flocculant D8D. Flocculant only would be used in the mill thickener circuits.
[3] Proprietary mercury control additive developed by the University of Nevada Reno (Chemical UNR-811).

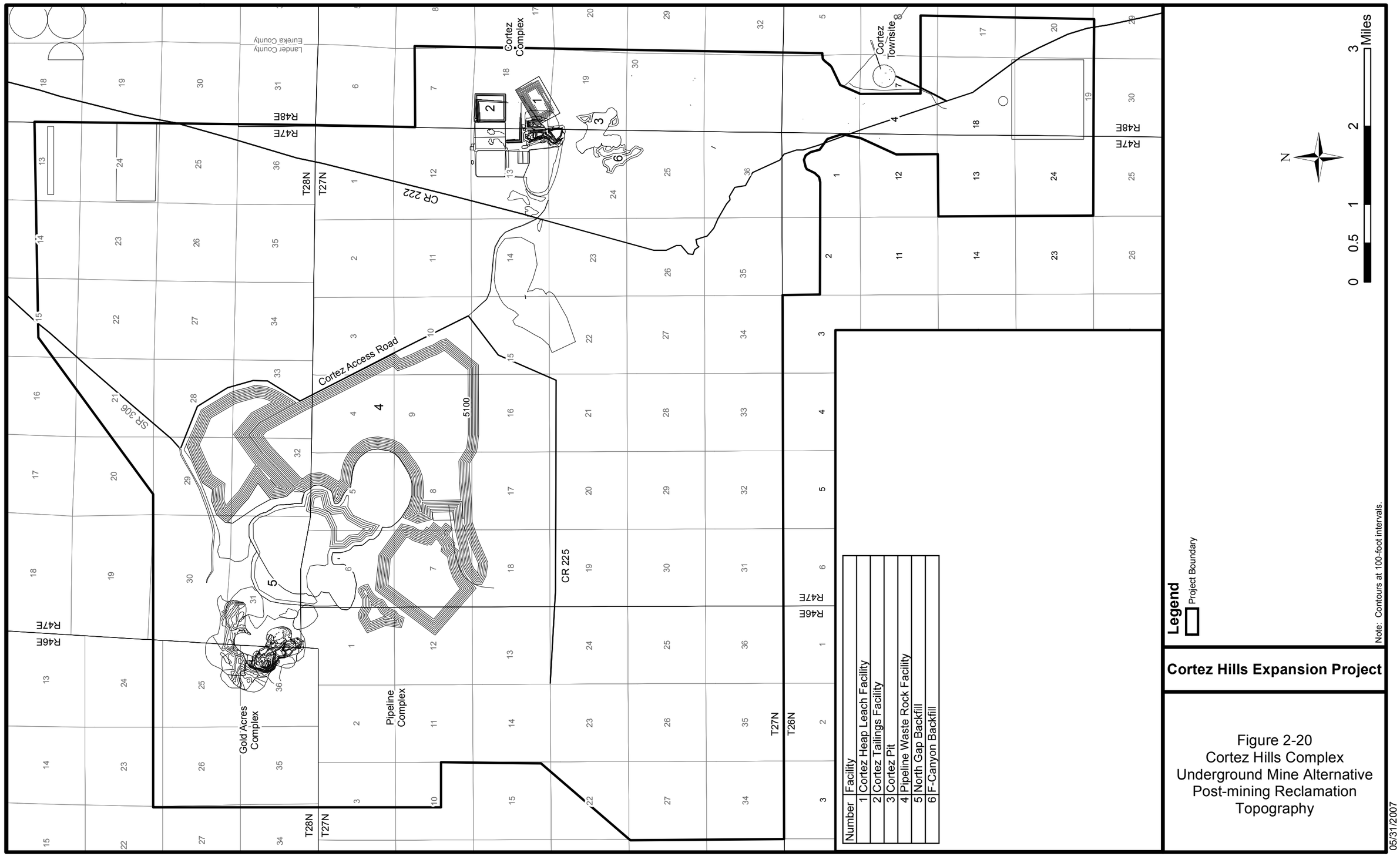


Figure 2-20
Cortez Hills Complex
Underground Mine Alternative
Post-mining Reclamation
Topography

Draft EIS to address potential long-term stability issues identified for the east wall of the proposed Cortez Hills Pit, including potential impacts to the PCRI located to the east of the pit. To implement this mitigation measure and in response to issues identified in comments on the Draft EIS, CGM initiated review of geotechnical data and evaluation of potential pit design changes that would conform to the specifications in Mitigation Measure GM2 while still meeting the purpose and need of the project. The resulting revised Cortez Hills Pit design includes a flatter east pit wall and associated reduction in the size of the open pit, expansion of the underground mining component, and an associated reduction in the size of the Canyon, North, and South waste rock facilities (see Figure 2-21 and Table 2-15). The BLM has evaluated CGM's revised Cortez Hills Pit design as an alternative to the Proposed Action in the Final EIS.

Under the Revised Cortez Hills Pit Design Alternative, the life of the mine would be the same as described for the Proposed Action in Section 2.4.3, Schedule and Work Force. However, due to the expanded underground component of this alternative, underground operations would be conducted concurrently with open-pit operations throughout the approximately 10 years of active mining. Underground closure subsequently would be conducted during the additional 3 years required for ongoing ore processing, site closure, and final reclamation.

CGM's current open-pit and underground work force, as described in Section 2.4.3, Schedule and Work Force, would fulfill a portion of the work force requirements under the Revised Cortez Hills Pit Design Alternative. The contractor work force required during the initial 18 months of the operation, as well as the underground operations work force, would be the same as described for the Proposed Action. Approximately 135 employees would be required in addition to the existing work force for surface operations, approximately 65 fewer new employees than under the Proposed Action. During the final 3 years of ongoing ore processing, closure, and reclamation, the surface work force would be the same as under the Proposed Action, with the addition of approximately 35 underground workers required for concurrent underground closure. The total average annual operations work force payroll under this alternative would be approximately $42 million.

Under this alternative, the Cortez Hills Pit would result in approximately 835 acres of surface disturbance, and the deepest bottom elevation of the pit would be 4,600 feet amsl. The overall pit slope angles would range from approximately 2H:1V to 1H:1V, with the shallower pit slopes occurring along the eastern highwall. Figure 2-22 shows the general pit cross-section under this alternative. The average daily mining rate at the Cortez Hills Pit would be approximately 300,000 to 450,000 tpd. CGM would continue to collect geotechnical data during operations for use in optimizing the final eastern pit crest and highwall design to ensure conformance with the specifications in Mitigation Measure GM2.

Under the Revised Cortez Hills Pit Design Alternative, underground mining would be conducted from approximately the 4,600-foot elevation to approximately the 3,800-foot elevation and would have an approximate underground horizontal extent of 3,000 feet wide by 4,500 feet long. As described under the Proposed Action, access for underground development and mining would be through the existing twin declines in the F-Canyon Pit. The general location of underground mining

Table 2-15
Currently Authorized and Proposed Surface Disturbance
Revised Cortez Hills Pit Design Alternative

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Proposed Action: Total Acreage for Proposed Facility	Proposed Action: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Proposed Action: New Proposed Facility Disturbance (acres)
Open Pits[3]					
Cortez Hills Complex	Cortez Hills Pit	--	835	0	835
Cortez Complex	Cortez Pit	132[4]	110	110	0
	F-Canyon Pit	44	--	--	--
Pipeline Complex	North Gap Pit Expansion	--	190	190	0
	Pipeline Pit	1,353	--	--	--
Gold Acres Complex	Gold Acres Pit	111	--	--	--
	Subtotal	1,640	1,135	300	835
Underground Operations		5	0[5]	0	0
Waste Rock Facilities					
Cortez Hills Complex	Canyon Waste Rock Facility	--	1,504	0	1,504
	North Waste Rock Facility	--	262	20[6]	242
	South Waste Rock Facility	--	170	0	170
Cortez Complex	Cortez Waste Rock Facility	--	137	56	81
	Cortez Out-of-pit Waste Rock Facilities	138[7]	--	--	--
	F-Canyon Pit Backfill	0[5]	0[5]	0	0
	Underground Stope Backfill	0[8]	0[8]	0	0
Pipeline Complex	Gap Waste Rock Facility	125	0[9]	0	0
	North Gap Pit Backfill	--	0[5]	0	0
	Pipeline Pit Backfill	0[5]	0[5, 9]	0	0
	Pipeline Waste Rock Facility	1,746	968	50	918
Gold Acres Complex	Gold Acres Waste Rock Facilities	227	--	--	--
	Subtotal	2,236	3,041	126	2,915
Processing Facilities					
Cortez Hills Complex	Grass Valley Heap Leach Pad and Process Facility	--	328	0	328
	Crusher/stockpile	--	33	0	33
	Cross-valley Conveyor Corridors	--	441	119	322
Cortez Complex	Cortez Heap Leach Pad and Processing Facility	102	120	27	93
	Cortez Mill	53	0[9]	0	0
	Cortez Tailings Facility	369	94	14	80
	Solution Ponds	6	0	0	0
Pipeline Complex	Pipeline Heap Leach/Tailings	932	0[9]	0	0
	Pipeline South Area Heap Leach	758	0[9]	0	0
	Pipeline Mill	220	0[10]	0	0
Gold Acres Complex	Gold Acres Plant Site	12	--	--	--
	Gold Acres Heap Leach Facility	41[11]	--	--	--
	Subtotal	2,493	1,016	160	856

Table 2-15 (Continued)

Complex	Facility	No Action Alternative Approved Disturbance[1] (acres)	Proposed Action: Total Acreage for Proposed Facility	Proposed Action: Proposed Facility Overlap with Previously Approved Disturbance[2] (acres)	Proposed Action: New Proposed Facility Disturbance (acres)
Ancillary Support Facilities					
Cortez Hills Complex	Administration Facilities	--	0[12]	0	0
	Class III Landfill	--	5	0	5
	Cortez Hills Ancillary Facilities	--	750	0	750
	Grass Valley Borrow Area	--	605	0	605
	Fresh Water Reservoir	--	6	0	6
	Grass Valley Water Wells/Powerline/ Access Road	--	3	0	3
	120-kV Transmission Line Extension and Substation	--	4	0	4
	60-kV Transmission Line Reroute	--	0[13]	0	0[13]
Cortez Complex	Airport Gravel Pit	487	0[9]	0	0
	Cortez Ancillary Facilities	312	267	0	267
	Cortez Remediation Wells	23	--	--	--
	Horse Canyon Haul Road	45	0[12]	0	0
	Water Storage Reservoirs	13	0[9]	0	0
	120-kV Transmission Line/Cross-valley Water Pipeline Corridor	10	0[9]	0	0
Pipeline Complex	County Road Construction/Cortez Access Road	85	--	--	--
	County Road Relocations	--	76[14]	0	76[14]
	Diversion Channel	21	--	--	--
	Fissure Ditch	0[5]	0[5]	0	0
	Frome Gravel Pit	45	0[9]	0	0
	Gold Acres Haul Road	54	11	0	11
	Growth Media Stockpiles	18	0[5]	0	0
	Mine Water Infiltration Basins/Pipelines/ Ditches	578	0[9]	0	0
	Pipeline Ancillary Facilities	1,021	0[9]	0	0
Gold Acres Complex	Gold Acres Ancillary Facilities	262	0[9]	0	0
	Subtotal	2,974	1,727	0	1,727
On-going Exploration		91	300	0	300
Total Disturbance Area		9,439	7,219	586	6,633

[1] Reflects the existing approved disturbance acreage.
[2] Reflects a continuation or change in use for previously authorized disturbance.
[3] Inclusive of 200-foot-wide pit adjustment zones.
[4] Reflects the currently combined footprints for the Cortez and Ada 52 pits. Twenty-two acres of the previously authorized disturbance for the Cortez Pit was never developed.
[5] Disturbance is accounted for in other existing and/or proposed disturbance footprints.
[6] Acreage previously authorized, but never developed, as part of the Cortez Pit.
[7] Reflects the four existing waste rock facilities at the Cortez Complex that would not be used under this alternative.
[8] Backfill would be placed in mined-out portions of the underground workings; no additional disturbance.
[9] Existing facility would be used to support this alternative; however, there is no proposed change to the currently permitted disturbance footprint, height, capacity, or throughput, as applicable.
[10] The proposed mill expansion would be within the existing disturbance area.
[11] Closure and relocation of this facility previously was analyzed and authorized by the BLM (2004e, 2005a) to facilitate expansion of the Pipeline Pit for the Pipeline/South Pipeline Project. The acreage above reflects the remaining disturbance outside of the currently authorized Pipeline Pit. Approximately 23 acres of the remaining disturbance would overlap with the proposed North Gap Pit expansion.
[12] Disturbance is accounted for in the ancillary facilities acreage.
[13] The majority of the proposed disturbance is accounted for in other proposed disturbance footprints. The remainder of the related disturbance would be minimal.
[14] Acreage based on an assumed 50-foot-wide construction ROW.

Note: Shaded entries in table reflect differences from the Proposed Action.

in relation to the Cortez Hills Pit under this alternative is shown in Figure 2-22. The various underground mining methods that may be employed under this alternative would be the same as described in Section 2.4.4.2, Underground Mining.

The mobile equipment requirements under this alternative would be the same as identified for the Proposed Action in Table 2-3, with the following exceptions. Under this alternative, 15 to 21 haul trucks (85- to 400-ton), no more than 2 electric wire rope shovels, and 2 to 4 water trucks would be required.

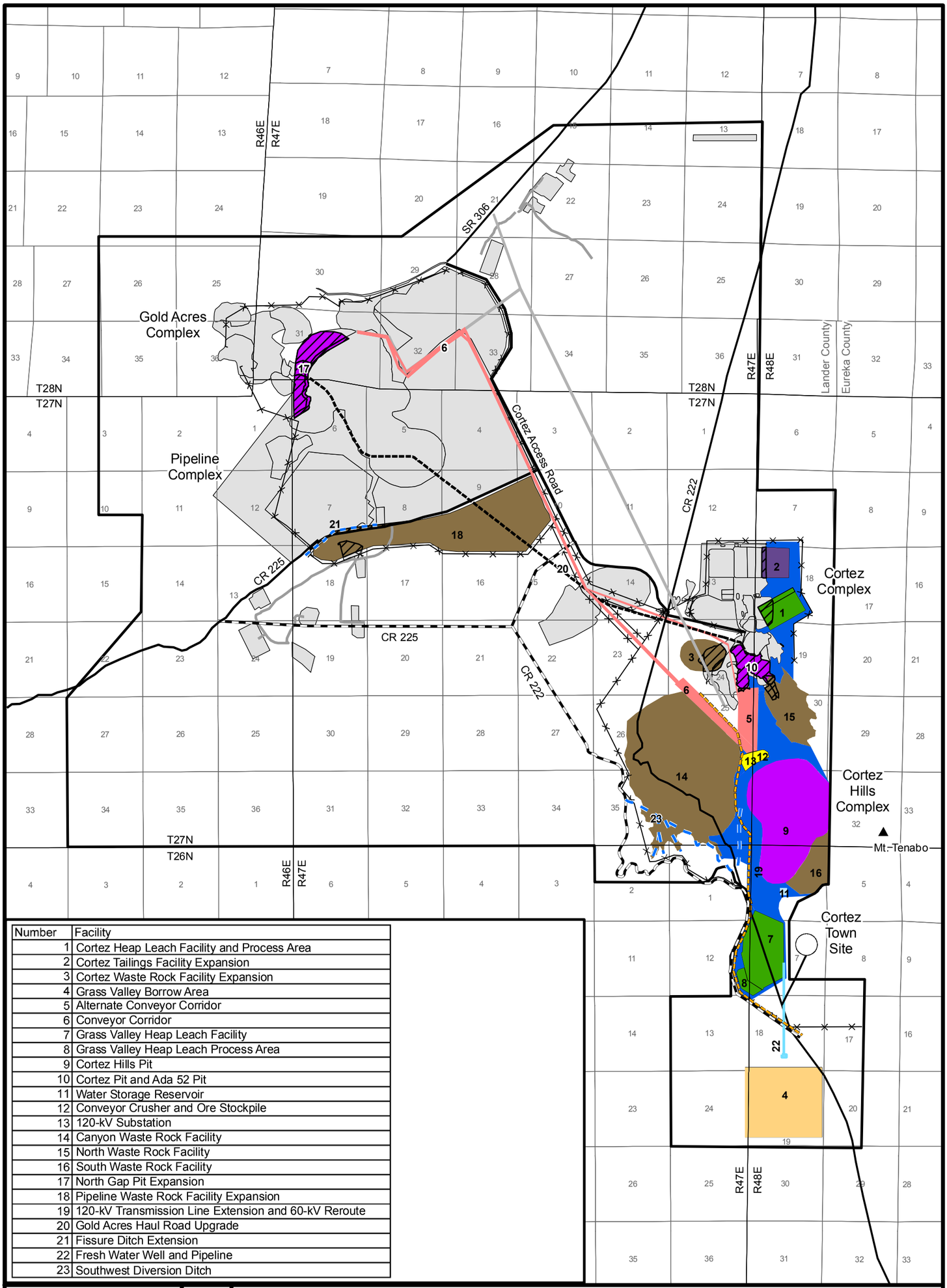
Dewatering and water disposal operations required to facilitate open-pit and underground mining at the Cortez Hills Complex would be the same as described under the Proposed Action (see Section 2.4.4.8, Dewatering and Water Disposal). Projected dewatering rates, consumption rates for mining and processing, and projected water disposal rates under this alternative over the life of the mine also would be the same as under the Proposed Action (see Table 2-4). Dewatering operations would not be required for the Cortez Pit expansion, as drawdown associated with dewatering at the Cortez Hills Complex would be sufficient to dewater the Cortez Pit to facilitate mining.

Total gold production from the proposed Cortez Hills Pit, Cortez and North Gap pit expansion areas, and Cortez Hills underground area would be approximately 8 million ounces, similar to the Proposed Action. However, at the Cortez Hills Complex, a larger portion of the gold reserves would be recovered by underground mining methods. The waste-to-ore ratio and ore and waste rock tonnages under this alternative are summarized in Table 2-16. Based on these tonnages, approximately 10 million fewer tons of heap leach ore and approximately 6 million fewer tons of mill-grade ore would be mined. In addition, approximately 475 million fewer tons of waste rock would be mined from the Cortez Hills Pit.

Table 2-16
Stripping Ratios and Ore and Waste Rock Tonnages for the Revised Cortez Hills Pit Design Alternative

Source of Ore and Waste	Average Strip Ratio	Heap Leach Ore	Mill-grade Ore	Refractory Ore	Total Ore	Waste Rock
		(million tons)				
Cortez Hills Pit	10.2:1	67	28	1	96	975
Cortez Pit Expansion	3:1	5	10	0	15	45
North Gap Pit Expansion	2.7:1	30	0	0	30	80
Underground Operations	0.2:1	0	9	4	13	2
TOTAL	N/A	102	47	5	154	1,102

Source: CGM 2008a, CGM and SRK 2008.



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	Fissure Ditch Extension
22	Fresh Water Well and Pipeline
23	Southwest Diversion Ditch

Legend

- Project Boundary
- Ancillary Areas
- Borrow Area
- Conveyor Corridor
- Water Storage Reservoir
- Heap Leach Facilities
- Pits
- Process
- Tailings Facilities
- Waste Rock Facilities
- Existing Facilities
- Overlap of Existing and Proposed Facilities
- CR Reroutes
- Stormwater Diversion
- Water Pipeline
- Fence
- Gold Acres Haul Road Upgrade
- Transmission Line Reroute

N

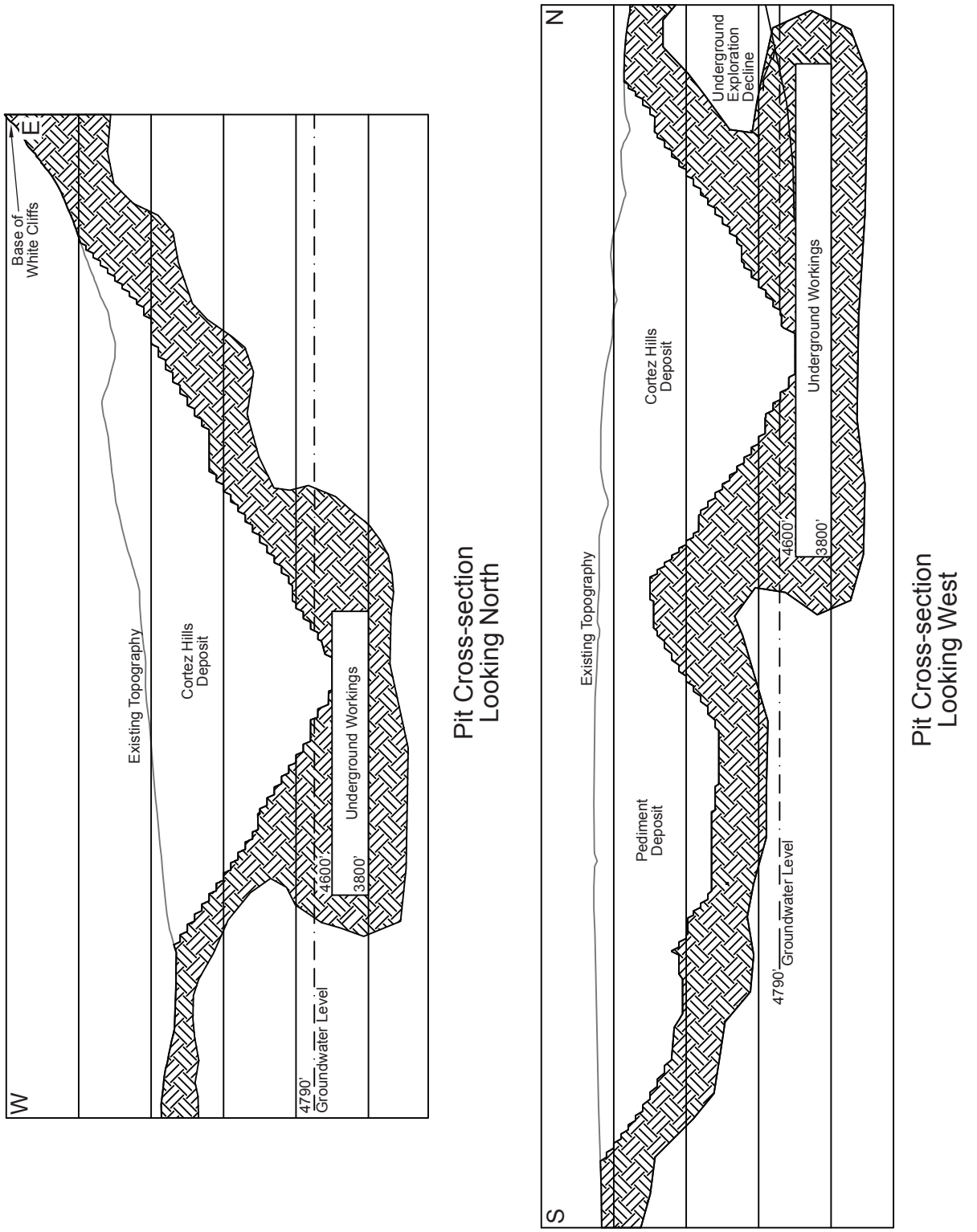
0 1 2 3 Miles

Cortez Hills Expansion Project

Figure 2-21

Revised Cortez Hills Pit Design Alternative

04/29/2008



Cortez Hills
Expansion Project

Figure 2-22
Revised Cortez Hills Pit
Design Alternative
General Cross-section

Source: SRK 2008.

07/29/08

Under this alternative, the Canyon Waste Rock Facility would have a design capacity of 800 million tons and would result in approximately 1,504 acres of disturbance. The maximum height of waste rock above existing topography would be approximately 1,400 feet, and the maximum crest elevation of the facility would be approximately 6,290 feet amsl. The South Waste Rock Facility would have a design capacity of 65 million tons and would disturb approximately 170 acres. The maximum height of waste rock above existing topography would be approximately 500 feet, and the maximum crest elevation would be approximately 6,500 feet amsl. The North Waste Rock Facility would have a design capacity of 165 million tons and would result in approximately 242 acres of new disturbance. The maximum height of waste rock above existing topography would be approximately 850 feet, and the maximum crest elevation would be approximately 5,850 feet amsl. The F-Canyon Pit Backfill Expansion would be the same as described under the Proposed Action in Section 2.4.5, Waste Rock Facilities.

The disturbance areas of Cortez Hills and Cortez ancillary facilities would be approximately 750 acres and 267 acres, respectively. Overall, this alternative would result in 159 fewer acres of surface disturbance than would occur under the Proposed Action (see Table 2-15).

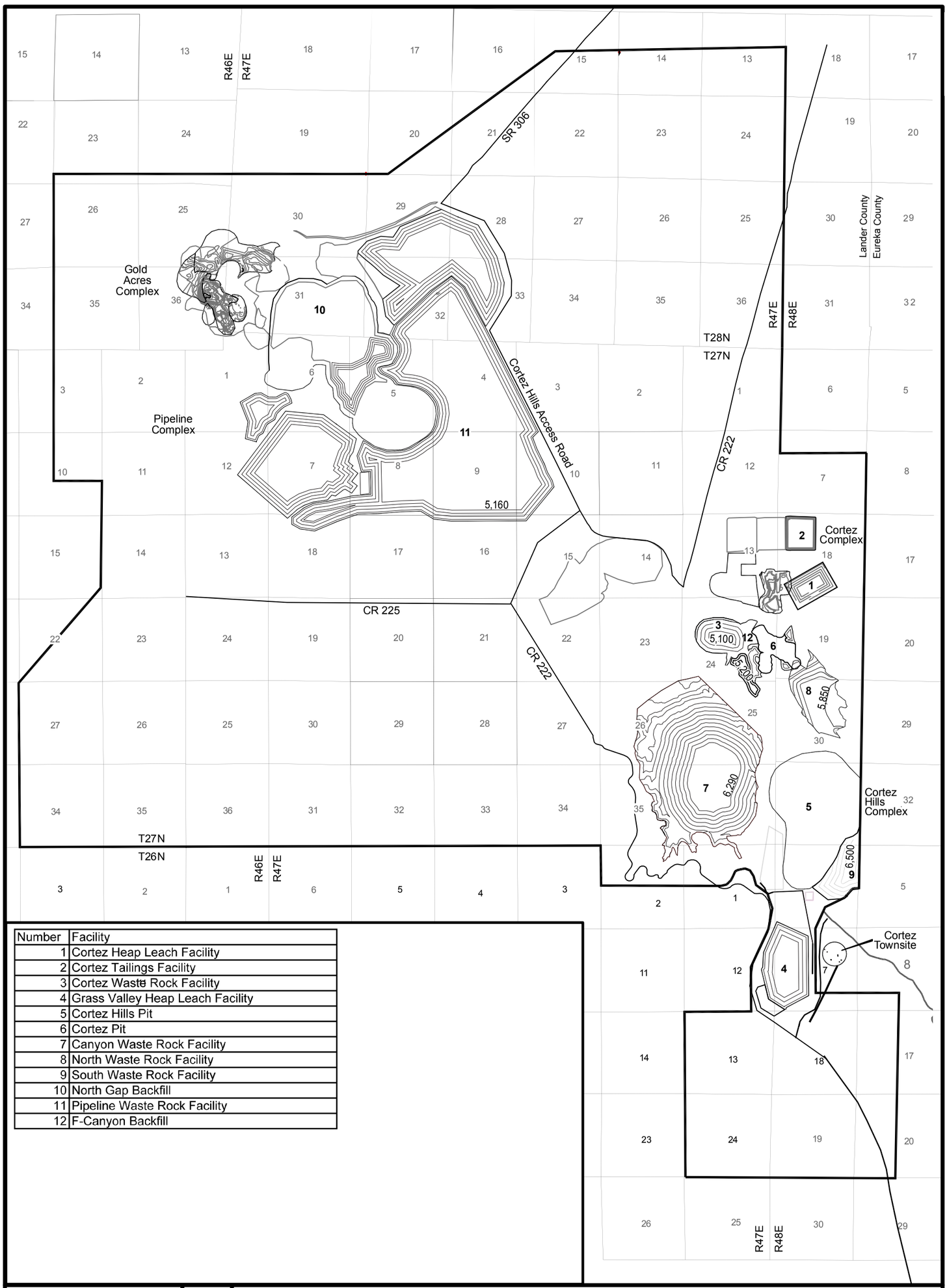
Procedures for reagent transport, storage, waste management, and spill prevention and emergency response would be the same as described under the Proposed Action in Section 2.4.9, Hazardous Material Management, with the following exception. Process reagent transport and consumption would be slightly less than under the Proposed Action as a result of the reduction in the tonnage of ore to be processed under this alternative.

Under the Revised Cortez Hills Pit Design Alternative, approximately 3.7 million cubic yards of growth media would be required for reclamation purposes. Reclamation procedures would parallel those described in Section 2.4.12, Reclamation. The post-mining reclamation topography for this alternative is shown in Figure 2-23.

Following the completion of mining, the bottom elevation in the Cortez Hills Pit (approximately 4,600 feet amsl), although shallower than under the Proposed Action (approximately 3,800 feet amsl), would be below the groundwater table elevation (approximately 4,790 feet amsl). As a result, following the completion of mining and associated dewatering, groundwater would enter the pit, resulting in the formation of a pit lake (Figure 2-24).

2.5.1.5 No Action Alternative

Under the No Action Alternative, the proposed facilities that would comprise the Cortez Hills Expansion Project would not be developed. Under this alternative, mining and processing operations associated with the existing Pipeline/South Pipeline Project and activities associated with the currently approved Cortez Underground Exploration Project would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada.



Number	Facility
1	Cortez Heap Leach Facility
2	Cortez Tailings Facility
3	Cortez Waste Rock Facility
4	Grass Valley Heap Leach Facility
5	Cortez Hills Pit
6	Cortez Pit
7	Canyon Waste Rock Facility
8	North Waste Rock Facility
9	South Waste Rock Facility
10	North Gap Backfill
11	Pipeline Waste Rock Facility
12	F-Canyon Backfill

Legend

Project Boundary

N

0 0.5 1 2 3 Miles

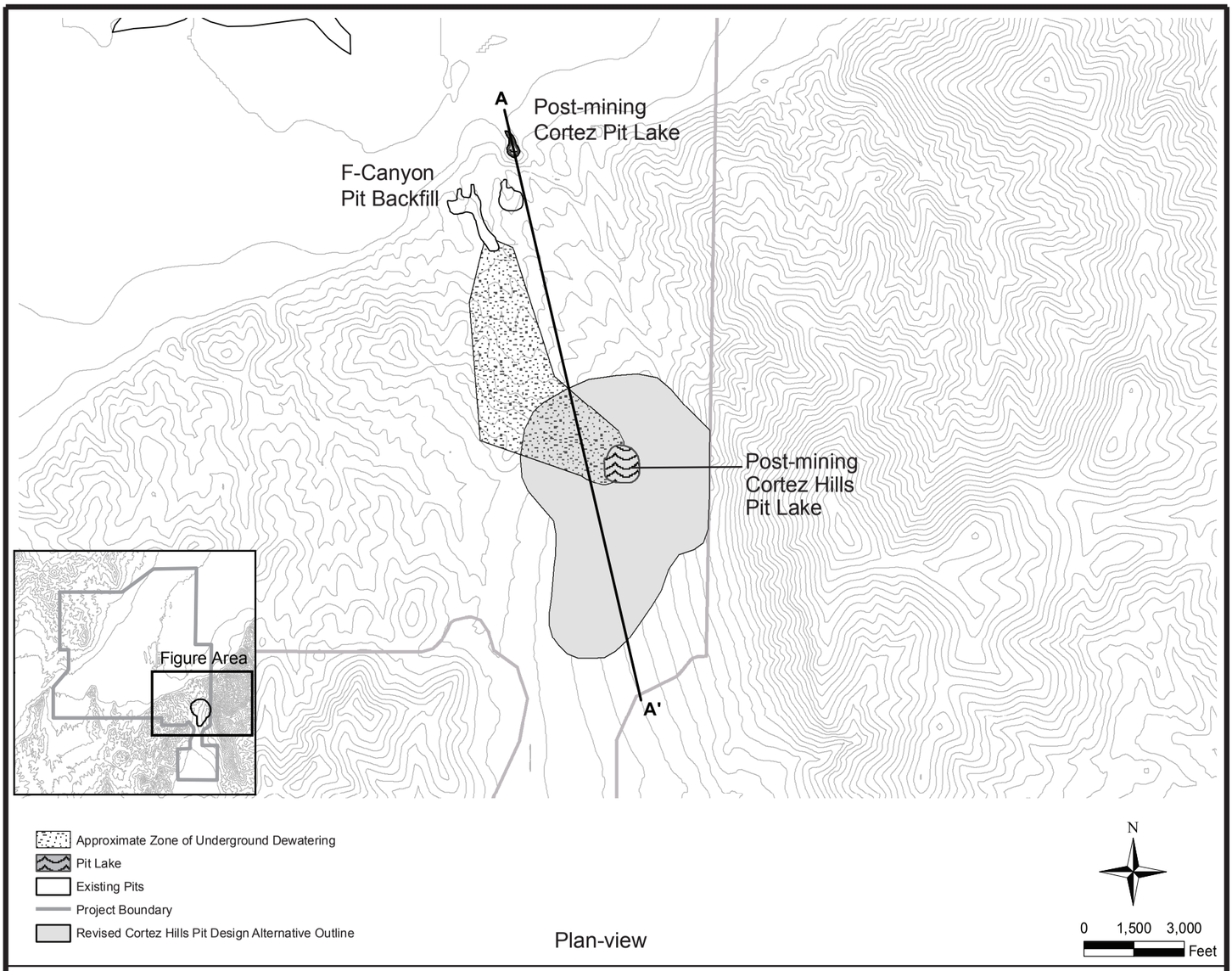
Note: Contours at 100-foot intervals.

Cortez Hills Expansion Project

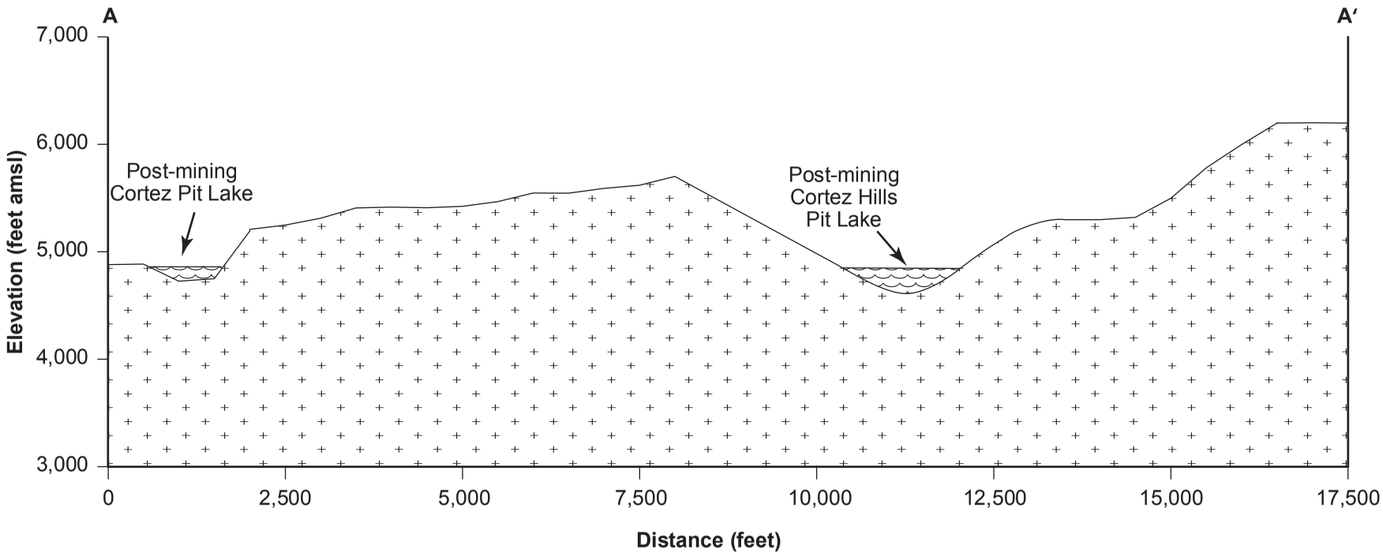
Figure 2-23

Revised Cortez Hills Pit
Design Alternative
Post-mining
Reclamation Topography

04/29/08



Plan-view



Cross-section

Legend

Source: Geomega 2008a.

Cortez Hills Expansion Project

Figure 2-24

Pit Backfill Area and
Post-mining Pit Lakes -
Cortez Complex and
Revised Cortez Hills Complex

02/27/2008

Existing major facilities at the Pipeline Complex that would continue to operate under the No Action Alternative would include the Pipeline Pit and associated dewatering and infiltration system, in-pit and out-of-pit waste rock facilities, heap leach facilities, and Pipeline Mill and tailings facility. Existing major facilities that would continue to operate at the Cortez Complex in association with the underground exploration program would include the underground workings and dewatering system and the F-Canyon waste rock backfill facility (**Figure 2-1**). The Cortez Mill and tailings facility also may be operated. These facilities are described in the South Pipeline Project Final EIS (BLM 2000a), Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e), and Cortez Underground Exploration Project EA (BLM 2006a) and are summarized below. Currently approved surface disturbance in the Cortez Gold Mines Operations Area totals 9,439 acres (see **Table 2-1**).

Current Schedule and Work Force

Approximately 470 workers currently are employed by CGM for open-pit mining, heap leaching, processing, and reclamation activities at the existing Pipeline/South Pipeline Project, with operations anticipated to continue through 2014. For the existing Cortez Underground Exploration Project, CGM would continue to employ 5 CGM workers and a contractor underground work force of 50 to 60 workers for up to 5 years (through 2011). Ongoing ore processing, decommissioning, and final reclamation would continue for approximately another 3 years (through 2017) with a work force of approximately 125 to 200 individuals. The average annual operations work force payroll for the remainder of the Pipeline/South Pipeline Project would be approximately $28 million.

Existing Pit

The rim of the Pipeline Pit is at an elevation of approximately 5,060 feet amsl. At the completion of mining, the pit bottom would be approximately 3,400 feet amsl. Under the No Action Alternative, typical mining techniques as described in Section 2.4.4, Expansion of Mining Operations, would continue to be implemented for ongoing mining.

Mine dewatering and water disposal operations as currently authorized would continue through the completion of mining (2013). The general dewatering and water disposal procedures currently implemented are similar to those described in Section 2.4.4.8, Dewatering and Water Disposal. Under this alternative, the approved maximum annualized average dewatering rate is 34,500 gpm. Dewatering water would continue to supply the mine water consumption needs (up to approximately 4,000 gpm). Existing infiltration basins (totaling 578 acres of approved disturbance) located in Crescent Valley would continue to be used for disposal of excess dewatering water, and an annualized average of up to 6,000 gpm of excess dewatering water would continue to be piped via an approved ROW to the Dean Ranch for seasonal irrigation purposes.

The open pit at Gold Acres currently is inactive; however, ongoing exploration is continuing around the pit. Expansion of the existing open pit was analyzed in the Cortez Gold Mine Expansion Project Final EIS (BLM 1993c) and subsequently authorized. Any additional mining at the Gold Acres site would be conducted in accordance with the existing permit criteria.

Existing Waste Rock Facilities

Under the No Action Alternative, waste rock would continue to be placed in one of the following permitted waste rock facilities: 1) Pipeline Waste Rock Facility (permitted at 1,746 acres of disturbance and a maximum height of 300 feet above ground surface), 2) Gap Waste Rock Facility (permitted at 125 acres of disturbance and a maximum height of 300 feet above ground surface), and/or 3) Pipeline Pit backfill (permitted maximum height of southern portion is 250 feet above original pre-pit ground surface). Up to 300 million tons of waste rock material would be placed in the open pit. The total combined permitted capacity of the Pipeline and Gap waste rock facilities is 700 million tons. The existing waste rock facilities at Gold Acres have been reclaimed; no additional waste rock would be placed in these facilities under the No Action Alternative.

Waste rock handling procedures as currently authorized and implemented are outlined in the Integrated Monitoring Plan. These procedures are summarized in Section 2.4.5, Waste Rock Facilities.

Existing Processing Facilities

Under the No Action Alternative, heap leach-grade ore would continue to be processed at the Pipeline South Area Heap Leach Facility and the heap leach portion of the Pipeline Heap Leach/Tailings Facility. The South Area Heap Leach Facility has a permitted disturbance area of 758 acres, a permitted maximum height of 300 feet above ground surface, and a total capacity of 110 million tons. The Heap Leach/Tailings Facility has a total permitted disturbance of 932 acres and a permitted maximum height of 350 feet above ground surface. A total of up to 20 million tons of heap leach-grade ore and 75 million tons of tailings would be processed and stored at this facility. The existing leach pads and solution collection systems are similar to those described in Section 2.4.6.1, Proposed Heap Leach Facilities. Pregnant solution would continue to be processed at the CIC circuit located at the Pipeline Mill, a summary of which is presented in Section 2.4.6.2, Proposed Processing Facilities Expansion.

Mill-grade ore would continue to be processed at the Pipeline Mill at a rate of up to 13,500 tpd. Resulting tailings would continue to be deposited in the associated tailings portion of the Heap Leach/Tailings Facility. Under current authorizations, the existing Cortez Mill (permitted throughput of 2,000 tpd) also could be used for processing of mill-grade ore, with tailings deposited in the existing Cortez Tailings Facility. The existing Pipeline and Cortez mill facilities are summarized in Section 2.3.6.2, Proposed Processing Facilities Expansion. A summary of the tailings liner and seepage collection systems is presented in Section 2.4.6.3, Tailings Facilities. Currently authorized lifts for the Pipeline Heap Leach/Tailings Facility slated for construction through 2012 also are discussed in Section 2.4.6.3.

Refractory ore would continue to be shipped off site to a third-party operator for processing. Currently, there are approximately two shipments of refractory ore per day authorized for transport. Shipments are transported via the main access route to the mine site (SR 306).

Current Water Supply

Consumptive water use for mining and processing (up to 4,000 gpm) would continue to be supplied by the mine dewatering wells. Potable water would continue to be provided via bottled water or an approved water supply well, as currently authorized.

Current Electric Power Supply and Utilities

Under the No Action Alternative, electric power for operations would continue to be provided by Sierra Pacific Power Company via the existing 120-kV transmission line and substation. Mine site communication would continue to be proved by three existing towers (50, 60, and 100 feet in height). An existing fiber optic line, microwave facilities located between the Pipeline and Cortez complexes, and a cellular site near the Pipeline Mill would continue to provide telephone service to the site.

The existing 60-kV transmission line to the Cortez Mill site would be upgraded to a 120-kV line as currently authorized under the Cortez Mine Underground Exploration Project EA (BLM 2006a).

Other Facilities

The currently permitted ancillary facilities (e.g., drainage diversions, road corridors, gravel pits) and support facilities (e.g., administrative offices, assay lab, shop/warehouse, fuel storage facilities, explosives storage) would continue to be used under this alternative.

Sanitary and Solid Waste

Under this alternative, all sanitary wastes would continue to be disposed of in the existing approved leach fields. The existing Gold Acres Class III waivered landfill would continue to be used for disposal of all non-toxic, non-hazardous solid waste materials in accordance with all applicable federal, state, and county laws and regulations.

Security and Fencing

The existing security system would continue to be implemented under the No Action Alternative. Existing fences would be maintained to prevent access by wildlife and livestock and to provide for public safety.

Hazardous Materials and Solid Waste

Procedures for reagent transportation and storage, waste management, and the spill prevention and emergency response programs are summarized in Section 2.4.9, Hazardous Materials Management. There would be no increase in the currently permitted storage volumes or consumption rates of reagents or fuels under this alternative.

Environmental Protection Measures

The applicant-committed environmental protection measures for the No Action Alternative are identified in the Pipeline/South Pipeline Expansion Project Final EIS (BLM 2004e). Monitoring and mitigation measures for the project are identified in the associated ROD (BLM 2005a). These measures would continue to be implemented throughout the life of the existing project.

Site Closure and Reclamation

Under the No Action Alternative, the existing facilities would be closed and reclaimed in accordance with the currently approved reclamation plan, current permits, and applicable federal and state closure and reclamation requirements. Final closure and reclamation of the project site are discussed in the earlier EISs (BLM 2004e, 2000a, 1996a, 1993c) and EA (BLM 2006a) and generally would follow the procedures described in Section 2.4.12, Reclamation. The post-mining reclamation topography for the No Action Alternative is presented in **Figure 2-*25***.

Ongoing Exploration

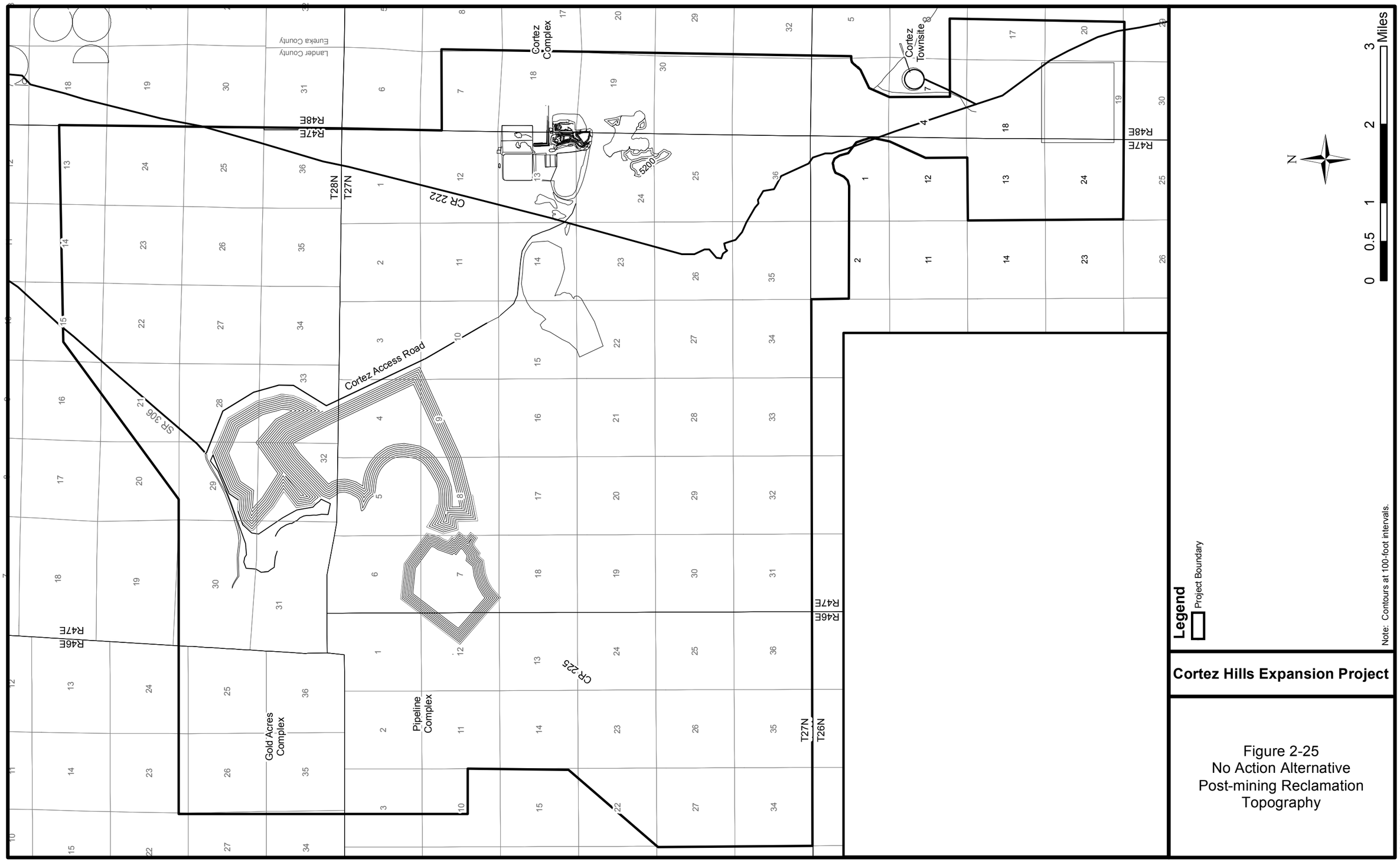
Exploration would continue in the vicinity of the Pipeline, Gold Acres, and Cortez complexes and in the Horse Canyon area under current authorizations, inclusive of the underground exploration originating at the existing Cortez Mine. Based on the authorization for the existing Pipeline/South Pipeline/Gold Acres Exploration Program, the total permitted disturbance for exploration in the Pipeline/Gold Acres areas is 50 acres. Based on the HC/CUEP, the permitted disturbance for exploration in the Cortez and Horse Canyon areas is 250 acres. The underground exploration program is being conducted within existing disturbance areas.

Under current authorization, underground exploration at the Cortez Mine, which would be conducted down to the 4,100-foot elevation, would continue for up to 5 years (through 2011). Associated dewatering operations would be conducted during this period, with an average dewatering rate of 4,100 gpm and a maximum of 5,000 gpm. Dewatering water would be piped to the Pipeline Mill for use as mill water or piped to the infiltration basins for disposal. The Cortez water storage reservoir would provide back-up storage for dewatering water.

Up to 650,000 tons of waste rock from the underground exploration program would be placed in the F-Canyon Pit backfill area. The remainder of the waste rock would be placed as backfill in the mined out portions of the underground workings as exploration proceeds. Ore would be hauled to the Pipeline Mill for test processing or shipped off site for test processing at another facility.

2.5.2 Alternatives Considered but Eliminated from Detailed Analysis

This section of the EIS describes the alternatives previously considered but subsequently eliminated from detailed analysis by the BLM and the rationale for their elimination. The alternatives were considered relative to their means of addressing the identified purpose and need, their technological and economic feasibility, as well as their potential to address environmental issues and reduce potential impacts.


Cortez Complex
Cortez Townsite
Lander County
Eureka County
R47E
R48E
T28N
T27N
CR 222
5200
Cortez Access Road
SR 306
R46E
CR 225
Gold Acres Complex
Pipeline Complex
T27N
T26N
N
0 0.5 1 2 3 Miles
Legend
Project Boundary
Note: Contours at 100-foot intervals.
Cortez Hills Expansion Project
Figure 2-25
No Action Alternative
Post-mining Reclamation
Topography
02/16/2008

2.5.2.1 Mining Alternatives

Sequential Schedule Alternative

Under this alternative, the Pipeline Pit would be mined through the year 2014. Mining activities associated with the proposed Cortez Hills Expansion Project subsequently would be initiated in 2014 and continue through approximately 2024. Under this alternative, there would be a delay in the accrual of state and local government revenues for approximately 6 years, until approximately the third quarter of 2015.

This alternative would reduce the level of human activity in the overall project boundary at any given time. However, it would increase the duration of mining and processing activities and the associated impacts (e.g., mine traffic, mine noise, air emissions, dewatering) by approximately 6 years. This alternative would result in a reduction in the peak dewatering rate from approximately 8,000 to 5,000 gpm; however, it would extend the time period for dewatering operations by an additional 6 years. Approximately 12,614 million gallons of additional groundwater would need to be pumped, and an additional 64,843 megawatt hours of power would be required for the additional groundwater pumping.

Under this alternative, a portion of the waste rock from the proposed Cortez Hills Pit and expanded Cortez Pit hypothetically could be backfilled into the Pipeline Pit, which currently is being partially backfilled under the existing permitted operation. Following completion of the currently permitted backfill operation, the remaining capacity in the existing pit complex could accommodate approximately 230 million tons of additional waste rock. However, the estimated incremental cost to haul waste rock across the valley from the Cortez Hills and Cortez pits would be approximately $331 million, which would preclude this waste rock disposal scenario. In addition, based on the lab-scale leachate analysis of the waste rock (Geomega 2006c), if the waste rock were backfilled into the existing Pipeline Pit, the saturated in-pit waste rock would result in groundwater concentrations of arsenic, iron, mercury, and manganese that would have the potential to exceed the applicable Nevada water quality standards (Geomega 2006b). As a result, placement of waste rock from the Cortez Pit as backfill in the Pipeline Pit would have the potential to degrade waters of the State of Nevada.

Although there would be less surface disturbance through 2014 under this alternative, surface disturbance would increase starting in 2014, with closure of the currently permitted Pipeline facilities that would be needed to support the Proposed Action (e.g., open pit, waste rock expansion area, South Area Heap Leach, heap leach/tailings facility, mill, and infiltration basins) delayed until 2024. The alternative would result in an approximately 6-year increase in the duration of surface disturbance over the Proposed Action scenario.

The final years of mining in the existing Pipeline Pit would not produce a sufficient quantity of mill-grade ore to maintain operations at the Pipeline Mill. In addition, under this alternative, initiation of mining at the Cortez Hills Pit would require up to 2 years of waste rock removal prior to production of mill-grade ore. Therefore, a 6-year furlough of approximately 220 existing jobs would occur due to the temporary closure of the existing Pipeline Mill (attributable to a discontinuous supply of mill-grade ore), and the 200 new jobs associated with the Proposed Action would not be required.

This alternative has been eliminated from detailed consideration primarily for the following reasons:

- Socioeconomic impacts associated with the need to furlough approximately 220 workers due to the temporary closure (6 years) of Pipeline Mill.
- Socioeconomic fluctuations to the local community infrastructure, including the initial decrease then subsequent increase in infrastructure needs including housing, schools, medical facilities, etc.
- Delay in revenues to the state and local economies.
- The Pipeline Pit only would accommodate a portion of the waste rock from the Cortez Hills and Cortez pits. As a result, construction of a large waste rock facility still would be required.
- ***Extension of dewatering for an additional 6 years and an increase in the quantity of groundwater pumped for dewatering (approximately 12,614 million additional gallons).***

Cortez Hills Portion Pit Backfill Alternative

Under this alternative, the Cortez Hills portion of the Cortez Hills Pit would be mined first and subsequently backfilled with approximately 208 million tons of waste rock from the Pediment portion of the pit. The Cortez Hills portion of the pit would be backfilled to levels consistent with adjacent topography along the perimeter of the pit, to the extent possible; this elevation is estimated to be approximately 5,000 feet amsl. Trucks would haul waste rock within the pit from the Pediment portion of the pit to the mined out Cortez Hills portion. This backfill would eliminate the formation of a pit lake in this portion of the pit; however, the groundwater quality would differ from the Proposed Action due to groundwater flow through the waste rock. As discussed for the Sequential Schedule Alternative, based on the lab-scale leachate analysis, placement of this waste rock as backfill would have the potential to degrade waters of the State of Nevada.

This alternative would reduce the surface disturbance associated with the proposed Canyon Waste Rock Facility by approximately 200 acres. There would be no change in the mining rate associated with this alternative.

Mining of the Pediment portion of the pit would be delayed approximately 2 years, as mining would need to be concluded in the Cortez Hills portion before overburden removal could begin to access the Pediment deposit. This alternative would have an adverse economic impact on Cortez' revenue due to a 2-year delay in cash flow from the mining of the Pediment portion of the pit.

The currently approved underground exploration program at the Cortez Hills site would continue during operation of the proposed project. Placement of waste rock in the Cortez Hills portion of the pit under this alternative would limit the ability to site surface facilities associated with underground mining (e.g., portals, stockpiles, etc.) internal to the Cortez Hills Pit, if the need is identified during the exploration program.

This alternative has been eliminated from detailed consideration primarily for the following reasons:

- ***In-pit placement of waste rock would have the potential to negatively impact downgradient groundwater quality resulting in increased concentrations of arsenic, iron, mercury, and manganese (Geomega 2006c).***

- Potential effects on the future development of additional mineral reserves (if identified).

- Pit backfill would not eliminate the need for construction of a large waste rock facility.

Pediment Portion Pit Backfill Alternative

Under this alternative, the Pediment portion of the Cortez Hills Pit would be mined first and subsequently backfilled with approximately 104 million tons of waste rock from the Cortez Hills portion of the pit. Trucks would haul waste rock within the pit from the Cortez Hills portion of the pit to the mined out Pediment portion. The Pediment portion of the pit would be backfilled to levels consistent with adjacent topography along the perimeter of the pit, to the extent possible; this portion of the pit would be backfilled to approximately 5,500 feet amsl. No pit lake is expected to form in this portion of the pit under this alternative. However, even if the Pediment portion of the pit were backfilled, a pit lake would form in the Cortez Hills portion of the pit as the water table returns to a steady-state condition. This alternative would reduce the surface disturbance associated with the proposed Canyon Waste Rock Facility by approximately 100 acres.

The ore in the Pediment portion of the pit primarily would be processed at the heap leach facilities, and the ore in the Cortez Hills portion of the pit primarily would be processed at the mill facilities. Therefore, the supply of ore to the existing Pipeline Mill would be reduced due to the sequential, rather than concurrent, mining of the Pediment and Cortez Hills portions of the pit, resulting in a 4-year furlough of approximately 220 jobs. There would be no change in the mining rate associated with this alternative.

This alternative was eliminated from further consideration primarily for the following reasons:

- The multi-year (4-year) furlough of the Pipeline Mill operations, affecting approximately 220 jobs, due to the delay in the mining of mill-grade ore from the Cortez Hills portion of the pit.

- There still would be some surface disturbance associated with the Canyon Waste Rock Facility.

- The reduction in project economics associated with the sequential development of the Pediment and Cortez Hills portions of the Cortez Hills Pit; this economic impact is estimated to be a revenue deferral due to a 4-year delay in the start of production from the Cortez Hills portion of the pit.

Partial/Complete Backfill of Existing Pits

Cortez Pit Backfill Alternative. Under this alternative, mining of the proposed deepening of the Cortez Pit would be conducted prior to mining in the Cortez Hills Pit. The Cortez Pit then would be backfilled to an elevation of approximately 5,300 feet amsl with waste rock from the Cortez Hills Pit. The Cortez Pit would

have the capacity to accommodate approximately 60 million tons of waste rock, resulting in a reduction in the size of the proposed Canyon Waste Rock Facility. In addition, this alternative would eliminate the development of a post-mining pit lake in the Cortez Pit; however, the groundwater quality would differ from the Proposed Action due to groundwater flow through the waste rock backfill. As discussed for the Sequential Schedule Alternative, lab-scale leachate analysis indicates that placement of this waste rock as backfill would have the potential to degrade waters of the State of Nevada.

This alternative would result in additional operating costs of approximately $5.9 million relative to the costs of the Proposed Action. These additional costs would be associated with an additional round-trip haul distance of approximately 1 mile. The additional total miles traveled during the life of the project to haul 60 million tons of waste rock would be approximately 220,000 miles.

This alternative was eliminated from further consideration primarily for the following reasons:

- ***In-pit placement of waste rock would have the potential to negatively impact downgradient groundwater quality resulting in increased concentrations of arsenic, iron, mercury, and manganese (Geomega 2006c).***

- ***S***urface disturbance associated with the Canyon Waste Rock Facility ***would not be substantially reduced***.

Pipeline Pit Backfill Alternative

Waste rock from the existing Pipeline Pit and the proposed North Gap Pit expansion would complete the currently authorized backfill capacity of the Pipeline Pit. Waste rock from the existing Pipeline Pit also would be placed as backfill in the proposed North Gap Pit expansion area, once mined and would complete the backfill capacity of the pit expansion area. Based on concurrent mining at the Pipeline, Cortez, and Cortez Hills complexes, there would be no additional capacity in the Pipeline Pit or North Gap Pit Expansion area to accommodate waste rock from the proposed mining of the Cortez and Cortez Hills pits. Although there would be potential backfill capacity if mining was conducted sequentially, sequential mining was considered but eliminated from further consideration as discussed above under the Sequential Mining Alternative.

This alternative was eliminated from further consideration primarily for the following reason:

- Backfill capacity would not be available at the Pipeline Complex (i.e., existing Pipeline Pit and proposed North Gap Pit expansion) to accommodate waste rock from the Cortez and Cortez Hills pits under a concurrent mining scenario. (Rationale for elimination from consideration of sequential mining is discussed above under the Sequential Mining Alternative.)

2.5.2.2 Waste Rock Facility Alternatives

Three Smaller Waste Rock Facilities

As an alternative to the Canyon Waste Rock Facility, three smaller waste rock facilities would be developed. One facility would be located on the valley floor in Crescent Valley, north of the proposed facility; one facility would be located at the site of the proposed North Waste Rock Facility; and one facility would be located in Grass Valley, south of the proposed leach pad and water well locations (the Grass Valley Waste Rock Facility). The characteristics of these three facilities are presented in **Table 2-*17***. The other waste rock facilities identified for the proposed project (Cortez and Pipeline waste rock facility expansions) would be the same as described for the Proposed Action.

Table 2-*17*
Characteristics of Three Smaller Waste Rock Facilities Alternative

Waste Rock Facility	Capacity (million tons)	Area (acres)	Height (feet)	Approximate Depth to Groundwater (feet below ground surface)	Distance from Pit to Center of Facility (miles each way)
Crescent Valley	633	1,068	500	25	5
North	185	303[1]	640[1]	500[1]	0.5[1]
Grass Valley	375	1,068	500	80	4

[1] Same as the Proposed Action.

Development of the three smaller waste rock facilities would eliminate the need to reroute CR 222 in Cortez Canyon. However, under this alternative, CR 222 within Grass Valley would require relocation, and public access to the Cortez townsite and cemetery via the county road would require crossing of an active haul road.

Use of three smaller waste rock facilities would require construction of haul roads from the pit to the individual facilities. Based on the facility's capacities and the distance from the pit to the individual facilities (see **Table 2-*17***), the estimated total haul distance would be approximately 10 miles round trip. This alternative would result in an additional 13.5 million miles of waste rock haulage over the life of the project. The total round-trip travel time would be approximate 0.45 hour (27 minutes). Over the life of the mine, an estimated additional 904,000 hours would be required to move the waste rock (up to 900 million tons) to these three smaller waste rock facilities, an approximately 95 percent increase compared to haulage to the Canyon Waste Rock Facility under the Proposed Action. As discussed in Section 2.5.1.2, Crescent Valley Waste Rock Alternative, the mining rate would need to be sufficient to supply up to 15,000 tpd of mill-grade ore to the existing Pipeline Mill on a daily basis in order to maintain efficient operation of that processing facility. Maintaining a 10-year mine life, a required daily delivery of up to 15,000 tons of mill-grade ore to the Pipeline Mill, and the additional haul time required to transport waste rock to the three smaller waste rock facilities, 25 additional large-capacity haul trucks would be required under this alternative. Correspondingly, costs associated with fuel, tires, maintenance, parts and labor, operator wages, and overhead would increase.

This alternative was eliminated from further consideration primarily for the following reasons:

- A total of approximately 891 acres of additional surface disturbance.
- Increase in visual impacts due to the size, location, and height (500 feet) of the Crescent Valley and Grass Valley facilities (500 feet) above the valley floor (versus valley in-fill as per the Proposed Action).
- Public access to the Cortez townsite and cemetery via the county road would require crossing of an active haul road, where a large capacity haul truck would cross the county road an average of every 90 seconds, 24 hours a day.
- Increased fugitive dust and combustion emissions.
- Additional project costs associated with the increased waste rock haulage distance.

2.5.2.3 Infrastructure Alternatives

Conveyance of Water from Pipeline Operations to Cortez Hills Expansion Project

Under this alternative, dewatering water from the currently approved Pipeline dewatering operations that would not be consumed by the existing operations would be conveyed by pipeline across the valley to supply the water consumption needs of the proposed Cortez Hills Expansion Project. Consumptive use of excess dewatering water from the existing Pipeline facility for the proposed project would reduce the volume of dewatering water currently disposed of in the existing infiltration basins in Crescent Valley by up to approximately 1,200 gpm during periods when dewatering production is not consumed in the heap leach facilities (during summer months of the first 2 years of mining). This alternative would eliminate the need for development of new water supply well(s) in either Crescent Valley or Grass Valley.

It is anticipated that the proposed Pipeline and Cortez Hills dewatering operations may not have a sufficiently large instantaneous yield to meet process and dust suppression demands during the summer months of the operation. In addition, following the cessation of dewatering operations, there would be an ongoing water supply demand for dust suppression purposes during the closure and reclamation period. The proposed wells would be required to meet the demand during these periods.

While eliminating the need for new water supply wells, this alternative would involve up to approximately 26 additional acres of surface disturbance associated with construction of a cross-valley pipeline, which could be collocated with the proposed cross-valley conveyor. This compares to approximately 3 acres of disturbance for the proposed water supply wells, pipelines, electrical distribution lines, and access roads. A cross-valley pipeline would be used infrequently, because water from the Pipeline dewatering operations only would be used when the water supplied from the Cortez Hills dewatering operations would be insufficient to meet operational needs.

Construction and operation of a cross-valley pipeline would result in additional operating and capital costs **associated with** an additional 4,890 megawatt hours of power consumption per year over the 10-year life of the project for operation of the water pipeline pumps.

For the reasons identified above, this alternative was eliminated from further consideration.

2.6 Past, Present, and Reasonably Foreseeable Future Actions

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (RFFAs) regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time" (40 CFR 1508.7). BLM Instruction Memo NV-90-435 specifies that impacts first must be identified for the Proposed Action before cumulative impacts with interrelated actions can occur.

Interrelated projects and actions are defined for this EIS as those past and present actions and RFFAs that could interact with the Proposed Action in a manner that would result in cumulative impacts, resulting primarily from mining, commercial activities, and public uses. The past and present actions and RFFAs previously identified in the Pipeline/South Pipeline Pit Expansion Project Final SEIS (BLM 2004e) have been updated for this analysis. These projects and actions are identified in **Table 2-*18***.

The geographic area for cumulative effects is determined by the type of resource potentially affected. **Figure 2-*26*** shows the distribution of the primary surface-disturbing actions throughout the cumulative effects study areas. Information on these actions is presented below. The area of concern for cumulative effects varies by resource, with impacts for certain resources being restricted to the actual area of disturbance. Other resources, such as livestock and wildlife, may range over a wide area, and cumulative impacts could involve more than surface disturbance. Resource-specific cumulative effects study areas were developed for each resource, as appropriate, and are discussed in Chapter 3.0, Affected Environment and Environmental Consequences.

2.6.1 Past and Present Actions

The past and present projects and actions considered in the cumulative effects analysis are described below. Their associated acreages are presented in **Table 2-*18***. Included in this category are the historic and ongoing projects and actions in the general vicinity of the proposed project.

2.6.1.1 Mining-related Disturbance

The mining of vein-type deposits in the project vicinity prior to 1950 generally resulted in ***many*** small areas of disturbance. Larger scale gold and silver mining operations were initiated in the 1980s and 1990s. Other minerals (e.g., barite, sulfur) also have been mined in the area. Brief descriptions of the other past and present mines considered in the cumulative effects analysis are presented below.

Table 2-*18*
Surface Disturbance Associated with Past and Present Actions and RFFAs

Action	Past and Present Approved Disturbance		RFFA Projected Disturbance (acres)	Total Approved/ Projected Disturbance (acres)	Operating Dates
	Total Approved Disturbance (acres)	Remaining Disturbance (acres)			
Mining Projects					
Black Rock Canyon Mine	117		0	117	
Buckhorn Mine	820	9	0	820	1980 – 1991
Clipper Mine	400	21	0	400	
CGM Cortez Mine	1,662[1]		0	1,662	1969 – 1987
CGM Cortez Hills Refractory Ore Processing and Underground Operations - Increased Depth	0[2]		0[3]	0	
CGM Gold Acres	881	389	50[4]	931	1950 – present
CGM Hilltop Mine	92	71	0	92	
CGM Horse Canyon	698	418	0	698	1983 – 1987
CGM Pipeline/South Pipeline Project	7,616		0[5]	7,616	1996 – present
CGM Robertson Mine	285		0	285	
CGM Satellite Mine Southeast of Cortez Hills (1)	0		1,500	1,500	
CGM Satellite Mine North- Northwest of Pipeline/South Pipeline (2)	0		1,500	1,500	
Cortez Silver Mining District[6]	92		0	92	
Elder Creek Mine	143	In final closure	0	143	
Fox Mine	4		0	4	
Greystone Mine	242		0	242	1953 – 1990
Grey Eagle Project	5		0	5	
Hot Springs Sulfur Mine	5		0	5	
May Mine	1	1		1	
Mill Canyon[6]	18		0	18	
Mud Spring Gulch	10		0	10	
South Silicified Project	31	0	0	31	1986 – 1987
Utah Mine and Camp	6		0	6	
Subtotal	**13,128**	**--**[7]	**3,050**	**16,178**	
Exploration					
Notices BLM-Battle Mountain Field Office: 118 expired, 8 pending, and 30 authorized[8]	265		0	265	
Plans (7) BLM-Battle Mountain Field Office[8]	306		0	306	
Notices (10) BLM-Ely Field Office[8]	50		0	50	
CGM Cortez Underground Exploration Project	5		0	5	
CGM HC/CUEP/HC/CUEP Amendment #1	250		0	250	
CGM West Pine Valley	150		0	150	
CGM West Side	0		200	200	
CGM Area	0		600	600	
CGM Hilltop Mine	50	16	0	50	
CGM Pipeline/South Pipeline/Gold Acres Exploration Project	50		0	50	
CGM Robertson Project	12	0	0	12	
Coral Resources Robertson Mine	22	7		22	
Dean Mine	67	17	0	67	
Fire Creek Exploration Project	50		0	50	
Mud Springs	0		10	10	
Santa Fe Mill Canyon	250		0	250	
South Roberts	0		3	3	
Toiyabe Mine	20		0	20	
Uhalde Lease	100	Final closure and bond release completed.	0	100	
Subtotal	**1,597**	**--**[7]	**813**	**2,410**	

Table 2-*18* (Continued)

Action	Past and Present Approved Disturbance		RFFA Projected Disturbance (acres)	Total Approved/ Projected Disturbance (acres)	Operating Dates
	Total Approved Disturbance (acres)	Remaining Disturbance (acres)			
Utilities/Community					
State Route 306 (100 feet wide)	327		0	327	
Gravel Roads in Crescent Valley (50 feet wide)	1,370		0	1,370	
Dirt Roads in Crescent Valley (30 feet wide)	644		64	708	
Powerlines in Crescent Valley (60 feet wide)	364		0	364	
Towns of Crescent Valley and Beowawe[9]	900		0	900	
Subtotal	**3,605**	**--[7]**	**64**	**3,669**	
Other Development and Actions					
BLM Fuels Reduction Projects[10]	5,641		0	5,641	
Wildfires[11]	90,099			90,099	
Recreation[12]	0		0	0	
Livestock[13]	10		4,313	4,323	
Wildlife	0		0	0	
Agriculture Development[14]	9,750		0	9,750	
CGM Additional Irrigation Pivots at Dean Ranch	0		640	640	
Crescent Valley Water Supply	2		0	2	
Subtotal	**105,502**	**--[7]**	**4,953**	**110,455**	
Total	**123,832**	**--[7]**	**8,880**	**132,912**	

[1] The 62 acres previously approved for exploration in the Cortez Mine area are included below under exploration Notices and Plans; hence, to avoid double counting, the 62 acres have been subtracted from the 1,722 acres previously identified for mining operations. The acreage also includes disturbance associated with the Horse Canyon haul road from Horse Canyon to Cortez.

[2] Acreage associated with the proposed Cortez Hills Expansion Project is accounted for under the Proposed Action. It is not repeated here to eliminate double counting.

[3] Assuming approval of the Cortez Hills Expansion Project, RFFAs at the project site could include the potential addition of a refractory ore process and increased depth of the proposed underground operations. No additional surface disturbance would be associated with these activities, if developed, as they would occur within areas of existing or currently proposed disturbance.

[4] RFFAs could include pit expansion and development of underground operations.

[5] RFFAs could include development of underground operations and the potential addition of a bio-leaching process. No additional surface disturbance would be associated with these activities, if developed, as they would occur within areas of existing or currently proposed disturbance.

[6] ***Historic mining- and exploration-related disturbance first began in 1862, prior to the promulgation of surface land management laws and regulations governing mining activities on public lands (e.g., FLPMA and 40 CFR 3809). Since there were no laws or regulatory programs in place at that time, there were no regulatory or administrative approvals granted. Therefore, the identified disturbance acreage does not include* all *historic mining-related disturbance in the area.***

[7] Insufficient data set to accurately determine.

[8] Plans and notices outside of the general Crescent Valley area have not been quantified.

[9] Surface disturbance associated with the towns of Crescent Valley and Beowawe is assumed to be 640 and 160 acres, respectively, with approximately 100 acres of private developed land peripheral to the towns.

[10] Inclusive of acreage associated with the Crescent Valley Wildland Urban Interface Fire Defense System, Tonkin Hazardous Fuels Reduction Project, and Red Hills Hazardous Fuels Reduction Project. Of the total acreage, planned prescribed burns would affect up to 2,537 acres of piñon-juniper woodland, and 800 acres of piñon-juniper woodland would be thinned.

[11] Reflects acreage of vegetation affected by wildland fires from 1998 through 2006 within the vegetation cumulative effects study area. The acreage is inclusive of approximately 22,918 acres of fire-affected piñon-juniper woodland.

[12] Surface disturbance associated with recreation activities has occurred; however, the acreages have not been quantified.

[13] Surface disturbance associated with existing and proposed livestock water use is assumed to be 0.5 acre per water right. The surface disturbance associated with the livestock RFFAs is based on projected seeding activities (change in vegetation and habitat), 0.5 acre per water development activity, and 43 acres for fencing and cattle guards. Livestock-related activities outside of the Carico Lake allotment have not been quantified.

[14] Surface disturbance associated with agricultural development is based on the acreage under irrigation and assumes that a change in vegetation and habitat equates to surface disturbance. Acreage values were based on a February 15, 1998, special hydrographic abstract for Hydrographic Basin No. 054 from the NDWR. These values are based on permitted or authorized use of water and may not reflect actual use in a given year.

Source: BLM 2003d, 2005b,c,d,e, 2006a,c; Inland Gold and Silver Corp. 1989.

CGM Projects

Gold mining at the Cortez Mine was initiated in 1969 and has continued to the present. Other activities include the Horse Canyon mining operation and the haul road from Horse Canyon to the Cortez Mine site. Current disturbances are associated with open-pits, waste rock facilities, roads, leach pad, and a mill and tailings facility. The facilities at the Cortez Mine site are identified in Section 2.3, Existing Facilities. As discussed in the South Pipeline Project Final EIS (BLM 2000a), CGM currently is conducting groundwater remediation at the Cortez Mine under a NDEP-directed plan to remove solutes associated with historic cyanide process solution seepage from a localized area of shallow groundwater.

Gold Acres was one of the first large-scale gold mining operations that used leaching to recover gold from low-grade ore. The facilities associated with this site are identified in Section 2.3, Existing Facilities.

The Hilltop Mine, an underground gold mining operation, is located approximately 11 miles north-northwest of the proposed project boundary. Ongoing exploration would continue under existing permits for the mine.

Mining of the Pipeline deposit was initiated in 1996. Since that time, several expansions of the project have been approved, the most recent being the 2005 authorization for the Pipeline/South Pipeline Pit Expansion Project. The facilities at this mine site are identified in Section 2.3, Existing Facilities. In addition to surface disturbing activities, groundwater currently is pumped from the mine pit for dewatering purposes. The current dewatering/water disposal program is described in Section 2.5.1.2, No Action Alternative.

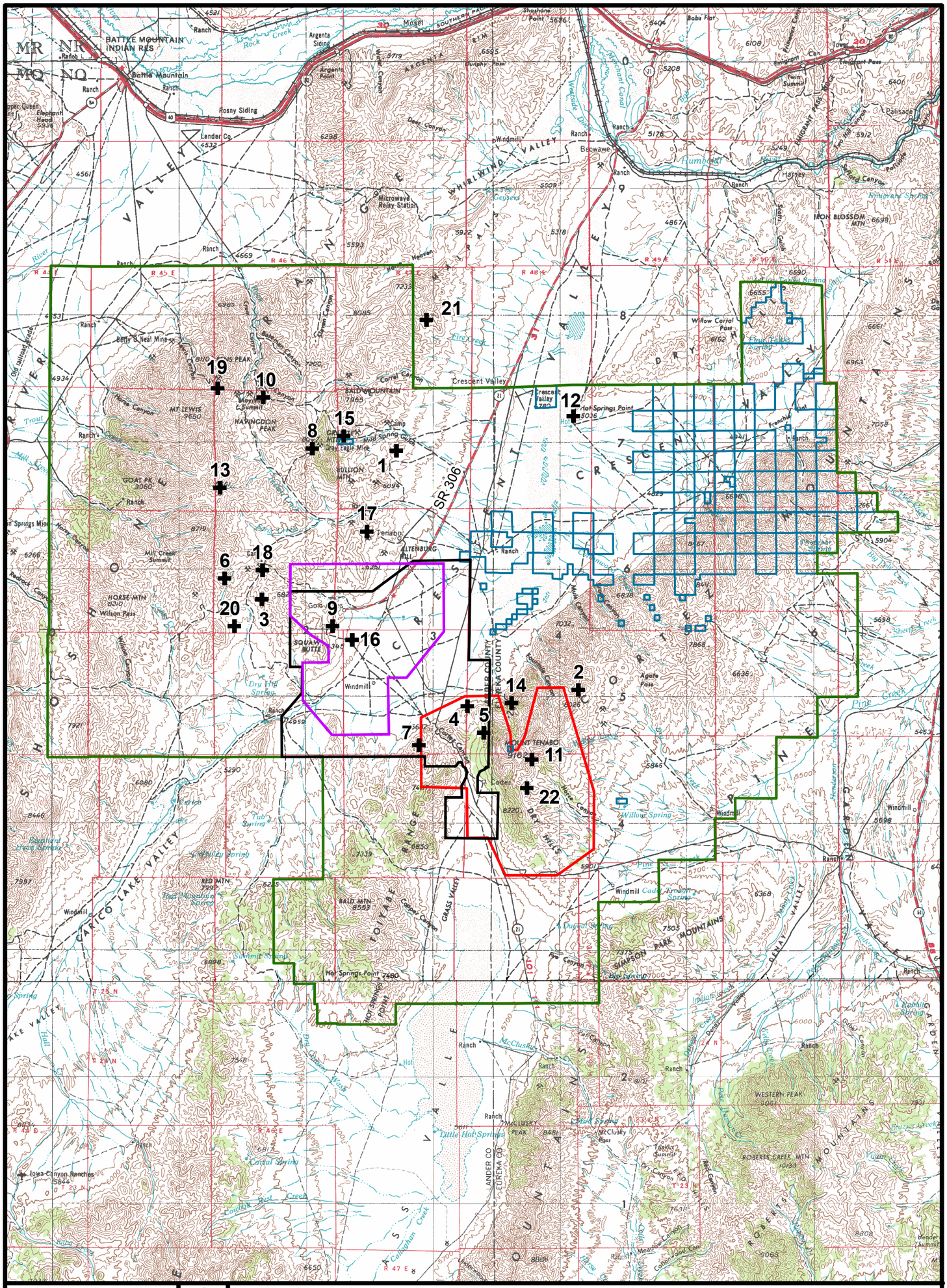
The Robertson Mine, originally operated and reclaimed by Coral Resources, Inc., consists in part of a small modern-era open-pit gold mine located approximately 3 miles north of the proposed project boundary. Other portions of the Robertson Project include Triplet Gulch, Gold Quartz, and exploration in the Tenabo area. The adjacent Triplet Gulch exploration site (29 acres in size) has been reclaimed. The historic Gold Quartz operations included a small historic townsite (6 acres total). The more recent mining activity has resulted in approximately 150 acres of disturbance. CGM conducted plan-level exploration activities at the Robertson Mine that have since been reclaimed. Exploration activities currently are being conducted at the site by Coral Resources, Inc.

Both historic and recent (within the last 10 years) surface disturbance (42 and 50 acres, respectively) has occurred as a result of mining-related activity in the Cortez Silver Mining District, located in the Cortez/Cortez Hills area. The more recent disturbance has included activities associated with seismic lines and the development of roads and additional tailings capacity.

Non-CGM Projects

Nevada Rae Gold initiated mining operations at the Black Rock Canyon Mine in 2005. This small mine is located approximately 6 miles north of the project boundary adjacent to the Uhalde Placer Mine.

The Buckhorn Mine is located on the eastern slope of the Cortez Mountains approximately 7.5 miles northeast of the project boundary. It first operated as an underground mine in 1910, and the current operator



Source: BLM 2000a; CGM 2006b; U.S. Geological Survey (USGS) 2006.
Note: The Lander/Eureka County line was adjusted subsequent to the date of this USGS map base.

Figure 2-26
Past and Present Actions and RFFAs

03/12/2008

(Teck Cominco American) has operated the mine since 1985. The operation included 10 individual open pits, 13 waste rock facilities, and 4 heap leach pads. The site is in post closure.

The M.I.L.L.C. (formerly M.I. Drilling) Clipper Mine was a barite operation located in the Shoshone Range approximately 3 miles west of the project boundary. Final reclamation has been completed and the reclamation bond has been released.

The Elder Creek Mine is a small gold mine located in the Shoshone Range approximately 2 miles west of the project boundary. Originally permitted in the 1980s, it operated from 1989 until the company went bankrupt in 1998. The BLM currently is working on closure of the heap leach pads. A Finding of No Significant Impact (FONSI) recently was issued by the BLM (in June 2006) for permanent closure of the site. An EA for Closure and a Decision Record were issued by the BLM in June 2006. The closure project is a joint effort by the BLM, USACE, and NDEP. A contract for reclamation of the mine was awarded in July 2006. Earthwork and construction of an ET cell and an evaporation cell were completed in October 2006.

The Fox Mine is an active turquoise mine located in the extreme northern portion of the Toiyabe Range. The site is within the project boundary approximately 0.5 mile west of the proposed Canyon Waste Rock Facility.

The Grey Eagle Project is a small historic and recent underground gold mine with an associated leach operation. The site is located in the Shoshone Range approximately 7 miles north of the project boundary.

M.I.L.L.C. operates the Greystone Mine located in the Shoshone Range approximately 21 miles northwest of the project boundary. This open pit barite mine has been in production since the early 1950s.

The historic open-pit Hot Springs Sulfur Mine is located near Hot Springs Point east of the Town of Crescent Valley. The site, which is currently inactive, consists of roads, pits, waste dumps, and trenches.

Lee Louden operates the May Turquoise Mine. The Plan of Operations for this small mine was approved June 21, 2005. It is located approximately 16 miles northwest of the project boundary.

Mining-related disturbance at the Mill Canyon site on the east flank of Mount Tenabo primarily occurred prior to 1950, with 1 acre of disturbance resulting from Notice-level mineral exploration in 1988. The site is located approximately 1 mile east of the project boundary. Groundwater contamination has been identified in association with this historic gold mining operation.

Mud Spring Gulch is located in the Bullion Mountain-Mud Spring Gulch area approximately 8 miles north of the project boundary. The historic gold mining operation encompasses seven small historic adits and associated small open pits.

The South Silicified Project is located approximately 2.6 miles south of Crescent Valley. The operation consisted of a small open pit, two small waste rock facilities, and a haul road. The project is currently idle and reclaimed.

The Utah Mine and Camp site is located approximately 2 miles northwest of the project boundary. No recent mining activity has occurred at this historic gold mine, which is almost completely revegetated.

2.6.1.2 Exploration-related Disturbance

Exploration activities include access road and drill pad construction and drilling. Small-scale exploration operations have resulted in isolated areas of land disturbance scattered throughout the cumulative effects study area (**Table 2-*18***). Larger scale exploration operations have included Santa Fe's Mill Canyon and CGM's HC/CUEP, Pipeline/South Pipeline/Gold Acres Exploration Project, and West Pine Valley.

The majority of CGM's exploration has occurred in the Shoshone Range. In 2006, CGM initiated the Cortez Underground Exploration Project in the Cortez Mine area. Based on the results of this ongoing exploration project, which has included the development of two portals at the existing Cortez Mine to further define deep mineralization, an underground mining component is included in the proposed Cortez Hills Expansion Project. Groundwater encountered during underground exploration has been piped to the existing Pipeline facilities for use in processing. Extracted waste rock has been placed in the existing F-Canyon Pit.

2.6.1.3 Utilities and Community Actions

Present utility and community actions resulting in surface disturbance in the cumulative effects study area include state, county, and public roads; powerlines; and development associated with the communities of Crescent Valley and Beowawe. In Crescent Valley, where the majority of the primary project-related activities would occur, there are approximately 27 miles of paved roads (including SR 306), approximately 26 miles of gravel roads, and approximately 177 miles of dirt roads. Also, there are approximately 50 miles of transmission lines and numerous lower voltage distribution lines, which have not been inventoried. Although there is a designated ROW associated with transmission lines and distribution lines, the associated surface disturbance typically is minimal (e.g., restricted to the pole locations and maintenance access, as needed). However, for purposes of this analysis, complete ROW disturbance has been assumed for the transmission lines to provide a conservative estimate of cumulative impacts. In addition, surface disturbance associated residences, commercial development, and the supporting infrastructure exist in the towns of Crescent Valley and Beowawe. Disturbances associated with these activities are presented in **Table 2-*18***.

2.6.1.4 Other Development and Actions

Other development activities and actions considered in the cumulative effects analysis include recreation, fuel reduction programs, grazing, wildlife management activities, water supply actions, and agriculture. Dispersed recreation (e.g., hunting, hiking, camping, and bird watching) occurs throughout the project region. Although there are no designated off-highway vehicle (OHV) areas in the project region, OHV use also occurs in the area. Surface disturbance has occurred as a result of recreational activities; however, the acreage for this disturbance could not be quantified for this analysis. Vegetation affected by wildfires from 1998 through 2006 has been quantified for this analysis.

Since 2003, the BLM has implemented three fuels reduction programs in the cumulative effects study area. Management activities associated with these programs have included prescribed burns and thinning of piñon-juniper woodlands.

Existing livestock water use includes 20 water rights at a projected total usage rate of 538 acre-feet per year. For analysis purposes, surface disturbance associated with livestock water use is assumed to be approximately 0.5 acre per water right.

BLM wildlife management objectives in the Carico Lake allotment (within which the majority of the primary project-related activities would occur) are specifically defined in the Shoshone-Eureka Range Program Summary (RPS) (BLM 1988b). These include short-term goals to improve big game habitat conditions and an overall objective to manage rangeland habitats to maintain or enhance sage grouse breeding habitat (leks and nesting areas). In addition, NDOW has constructed a few big game guzzlers for antelope in the general project vicinity (Lamp 2006). Related disturbance associated with these activities could not be quantified for this analysis.

Water for the town of Crescent Valley currently is supplied by one main well and one backup well. The water is stored in two tanks with capacities of 150,000 and 200,000 gallons. Surface disturbance associated with the actions is assumed to be minimal (see **Table 2-*18***).

Currently, there are 7,950 acres under irrigation in the project vicinity. As discussed in Section 2.5.1.4, No Action Alternative, up to 6,000 gpm of dewatering water from the existing Pipeline operations are conveyed via a gravity-feed ditch/canal system to areas in Crescent Valley (Dean Ranch) for seasonal agricultural irrigation. Disturbance associated with the water conveyance system is approximately 375 acres.

2.6.2 Reasonably Foreseeable Future Actions

In order to qualify as a RFFA for the cumulative effects analysis, a project or action must impact the same resources as the Proposed Action, must occur within the life of the Proposed Action (including reclamation), and must have a reasonable likelihood of going forward. The RFFAs identified for this cumulative effects analysis are discussed below; their associated disturbance acreages are presented in **Table 2-*18***.

2.6.2.1 Mining-related Actions

Cortez Hills Complex

Depending on the results of ongoing underground exploration, which would continue to be conducted during operation of the proposed Cortez Hills Expansion Project, if approved, the underground component of the currently proposed project could be expanded in the future. The potential expansion could include mining to a lower elevation, increased dewatering requirements, and potentially the construction of an underground conveyor with connection to the currently proposed cross-valley conveyor. Expansion of underground operations would extend the life of the mine beyond 2017.

Cortez Complex

Depending on the results of ongoing research, CGM may construct a facility at the Cortez Mine site for the on site processing of refractory ores using an alternative heap leach process (e.g., alternative leach solutions). It is anticipated that a facility of up to 100 acres would be constructed within permitted disturbance (e.g., waste rock facility or completed portions of the heap leach pad) and likely would consist of a large on-off pad system where ore would be crushed, loaded by conveyor or trucked onto a pad system, leached, and subsequently off loaded by loader and truck. The process may use ammonium thiosulfate, bioleach, or other technologically cost-effective techniques for extracting gold from refractory ore.
If sufficient quantities of refractory ore are mined from currently permitted and proposed mine pits, the existing Cortez CIL mill dry grinding circuit may be enlarged and/or modified, the CFB roaster upgraded or remodeled or reactivated, or autoclaves may be added to provide for on site processing of refractory ore. These activities would occur in areas of currently permitted disturbance.

Pipeline Complex

It is anticipated that future activities at the existing Pipeline/South Pipeline Project may include additional management of dewatering water, pit expansion, and development of underground operations. For the management of dewatering water, additional infiltration facilities and associated water conveyance corridors and access roads could be required in the future. It is anticipated that approximately 600 acres of additional disturbance would be associated with the facilities' construction. The additional sites would be located to work in conjunction with the existing basins.

Additional management of dewatering water from the existing Pipeline Pit may be necessary during certain years of the planned dewatering schedule. Additional management activities would include the need to consumptively use an additional 2,000 gpm (3,220 acre-feet per year) through irrigation or other activities. This would result in a combined total of up to 12,000 gpm (19,320 acre-feet per year) of water being consumptively used during certain years of the project for mining needs and seasonal irrigation at the Dean Ranch. Potential increased use of dewatering water at the Dean Ranch would be subject to substitution of existing water rights assigned to the ranch and approval by the State Water Engineer.

Mining operations are foreseeable to the east of the existing Pipeline Pit to access the Deep South mineral deposit. These operations would include a 1,400-acre expansion of the Pipeline open pit and a continuation of the mine dewatering program. Waste rock stripping requirements would be high to develop this deposit; mined waste rock material would be placed in both an expansion of the Pipeline Waste Rock Facility or placed as backfill into mined out portions of the pit complex. It is anticipated that the Deep South mineral deposit could produce ore suitable for conventional CIL or heap leach operations. Ore could be processed at the Pipeline Mill, Cortez Mill, or Pipeline heap leach areas. An increase in the Pipeline Heap Leach/Tailings Facility would be required.

Underground mining techniques may be used to mine deep, high-grade feeder zones that may be located in the vicinity of the existing Pipeline Pit. Mined ore would be processed using currently permitted facilities. Waste rock production would be minimal. It is anticipated that the surface disturbance associated with these activities would occur in previously approved disturbance areas.

Gold Acres Complex

A known reserve of refractory ore currently exists in the Gold Acres Pit. It is anticipated that this reserve would be mined in the future, if sufficient refractory ore is mined from the Pipeline, Cortez, and Cortez Hills pits to warrant enlargement and/or modification of the existing Cortez Mill. Future mining at Gold Acres could include both expansion of the existing pit and development of underground operations with portals constructed internal to the pit. Depending on the economics at the time of actual mining, it is anticipated that 1 to 2 years of refractory ore feed could be mined at Gold Acres. Depending on the timing of future mining at Gold Acres in relation to operations at Pipeline, a dewatering program may need to be developed at Gold Acres to facilitate future mining.

Satellite Mines

A satellite mine consists of one or more open pits and associated waste rock facilities; however, the operation relies on currently approved processing facilities at an existing mine site to which it is peripherally located. It is assumed that during the life of the proposed Cortez Hills Expansion Project, two satellite mines may be developed (one north-northwest of Pipeline and one southeast of Cortez Hills). It is anticipated that the potential satellite mine located approximately 1.5 miles north-northwest of the Pipeline Mill would consist of one open pit, haul roads, and two waste rock facilities. Waste rock facilities would be constructed and reclaimed to blend with the existing topography to the extent possible. Mill-grade and heap-grade ore would be hauled to the existing Pipeline Mill or existing South Area Heap Leach Facility, as applicable, for processing. Ore transport would be via roads designed and constructed to accommodate the existing Pipeline mining fleet. Alternately, new heap leach pads and a processing facility could be constructed near the mine area to reduce hauling costs. Existing ancillary facilities (e.g., explosives magazine, truck shops, offices, etc.) at the potential mine site would be used to support the operation. The currently projected life of this satellite mine is 6 years. It is anticipated that if proposed and approved, the project would be mined concurrently with and following the proposed Cortez Hills Expansion Project.

It is anticipated that the potential satellite mine located approximately 2 miles southeast of the proposed Cortez Hills Expansion Project would consist of an underground and/or open-pit mine operation with associated waste rock, processing, and ancillary facilities. Waste rock facilities would be designed, constructed, and reclaimed to blend with the existing topography to the extent possible. Rather than construct additional processing facilities, mill-grade ore could be hauled to the existing Pipeline Mill for processing. The currently projected life of this satellite mine is 6 years. It is anticipated that if it is proposed and approved, the project would be mined following the proposed Cortez Hills Expansion Project.

2.6.2.2 Exploration-related Actions

Exploration activity would continue within the project region. Reasonably foreseeable exploration-related disturbance within ***the*** CGM ***a***rea includes the following:

- Up to an additional 150 acres could be disturbed in the Cortez Range over the next 10 years, primarily in the Horse Canyon, Cortez trend, and Buckhorn areas;

- Up to 100 acres of disturbance could occur in the Toiyabe Range over the next 10 years;
- Up to 200 acres of disturbance could occur in the Shoshone Range over the next 10 years; and
- Approximately 150 acres of disturbance could occur in the valley areas adjacent to the mountain ranges.

Near the southern end of Crescent Valley, CGM has one additional potential exploration project (West Side Exploration Project). The West Side Exploration Project potentially would be located in the Shoshone Range to the northwest of the project boundary.

Small isolated exploration projects also are anticipated in the project vicinity (**Table 2-*18***).

2.6.2.3 Utilities and Community Actions

It is anticipated that additional dirt roads would be created as a result of recreational use of public lands in the project vicinity. For purposes of this analysis, it is assumed that dirt roads in the cumulative effects study area would increase by 10 percent.

No proposals for new transmission lines have been identified in the general project region. It is reasonable to assume that additional distribution lines would be constructed; however, they cannot be quantified at this time.

2.6.2.4 Other Development and Actions

Recreational use in the project vicinity is expected to continue to be limited, with dispersed recreation activities being the predominate use. No recreational improvements have been identified for the reasonably foreseeable future; however, the BLM and NDOW have expressed an interest in using the Pipeline post-mining pit lakes as a recreational area. This could involve stocking the lakes with fish and building boat ramps, parking lots, picnic areas, and sanitary facilities. Construction of such a facility would occur outside the timeframe of the proposed project and, therefore, would not meet the definition of a RFFA for this cumulative effects analysis.

As outlined in the Shoshone-Eureka RPS, the long-term goal is to increase licensed grazing use to 30,892 animal unit months (AUMs), a 13.7 percent increase over existing grazing levels. Assuming 70 percent of the goal is reached during the life of the proposed project, the licensed grazing use would increase by 2,605 AUMs. These numbers may change, depending on the final goals for the Carico Lake Allotment, which currently is under evaluation. In addition, the goals in the RPS provide for additional range improvements, including seeding activities, which would result in surface disturbance or changes in species composition, respectively (**Table 2-*18***).

Additional agricultural development reasonably expected to occur in the project vicinity in the foreseeable future includes the installation of four additional irrigation pivots at the Dean Ranch. For purposes of this

analysis, surface disturbance associated with agriculture development is based on the acreage under irrigation and assumes that a change in vegetation and habitat equates to surface disturbance (**Table 2-*18***). Water for the irrigation pivots likely would be provided by dewatering water from the existing Pipeline/South Pipeline Project and Proposed Action (if approved); however, there would be no associated change in the overall water rights allocation for the Dean Ranch.

BLM currently is evaluating the potential introduction of bighorn sheep in the northern half of the Cortez Mountains. The earliest release, if approved, would occur in 2008. Information relative to the number of release animals is not available at this time. There are no plans at this time to construct any associated big game water developments.

2.7 Comparative Analysis of Alternatives

Table 2-*19* summarizes and compares the environmental impacts between the Proposed Action, other action alternatives, and the No Action Alternative. Detailed descriptions of impacts are presented in Chapter 3.0, Affected Environment and Environmental Consequences. The summarized impacts assume the implementation of applicant-committed environmental protection measures but the absence of potential mitigation measures. Implementation of the potential monitoring and mitigation measures identified in Chapter 3.0 potentially would further reduce impacts.

2.8 BLM-preferred Alternative

In accordance with NEPA, federal agencies are required by the CEQ (40 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 prepared for the project. The preferred alternative is not a final agency decision; rather, it is an indication of the agency's preliminary preference.

The BLM has selected a preferred alternative based on the analysis in this EIS. This preferred alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering economic, environmental, technical, and other factors. The BLM has determined that the preferred alternative is the Proposed Action as outlined in Chapter 2.0 with mitigation measures specified in Chapter 3.0 of this EIS.

The BLM has selected the Proposed Action with the Revised Cortez Hills Pit Design Alternative for the Cortez Hills Complex facilities and the mitigation measures specified in Chapter 3.0, as the preferred alternative. BLM's selection of the preferred alternative primarily was based on the impacts associated with social and economic values and recovery of a substantial portion of the identified mineral resource within the Pediment and Cortez Hills deposits. The Proposed Action would have greater beneficial social and economic impacts (see Section 3.13, Social and Economic Values) relative to employment, expenditures, and tax revenues, primarily in comparison to the No Action and Cortez Hills Complex Underground Mine alternatives. ***The incorporation of the Revised Cortez Hills Pit Design Alternative would address potential long-term stability issues associated with the east wall of the Cortez Hills Pit, including potential impacts to the PCRI located to the east of the pit*.** Under the No Action Alternative, the identified mineral resources would not be developed, resulting in the loss of approximately 8 million ounces of recoverable gold. Due to geotechnical and safety conditions under the Cortez Hills

Complex Underground Mine Alternative, none of the Pediment deposit would be mined and only approximately 37 percent of the Cortez Hills deposit would be mined. As a result, recovered gold reserves would be approximately 3 million ounces, compared to 8 million ounces that would be recovered under the Proposed Action (see Section 3.1, Geology and Minerals). Identified impacts under the Grass Valley Heap Leach and Crescent Valley Waste Rock alternatives generally would be similar to the Proposed Action. Both of these alternatives would result in additional impacts associated with increased ore or waste rock haulage; however, neither would provide greater environmental benefits than the Proposed Action.

Table 2-*19*
Impact Summary and Comparison of the Proposed Action and Other Alternatives

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Geology and Minerals						
Mineral extraction and material generation and disposal	CGM would extract approximately 8 million ounces of gold and generate and dispose of approximately 1,577 million tons of waste rock, 53 million tons of tailings material, and 112 million tons of spent heap leach material. Approximately 5 million tons of refractory ore also would be generated.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	CGM would extract approximately 3 million ounces of gold and generate and dispose of approximately 127.6 million tons of waste rock. 16 million tons of tailings material, and 35 million tons of spent heap leach material. Approximately 1.4 million tons of refractory ore also would be generated.	***CGM would extract approximately 8 million ounces of gold and would generate and dispose of approximately 1,102 tons of waste rock, 47 million tons of tailings material, and 102 million tons of spent heap leach material. Approximately 5 million tons of refractory ore also would be generated.***	CGM would continue to produce gold and silver from the existing permitted operations for the Pipeline/South Pipeline Project. Approximately 8 million ounces of gold associated with the Cortez Hills Expansion Project would remain in place. The associated waste rock, tailings, and spent heap leach material would not be generated.
Geotechnical and seismic stability of waste rock and heap leach facilities	Facilities would be stable with appropriate design, construction, and closure.	Impacts would be the same as the Proposed Action	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action	***Impacts would be the same as the Proposed Action.***	No new waste rock, heap leach, or tailings facilities would be developed.
Pit slope and underground mine stability	There is a potential for pit slope failures in the east wall of the Cortez Hills Pit during the post-mining period. Post-closure collapse in the underground workings is not expected to affect surface features.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts associated with the proposed Cortez Hills Pit would not occur, as the pit would not be developed. Post-mining failure of the underground workings would not affect surface conditions.	***No large-scale pit slope failures in the east wall of the Cortez Hills Pit would be anticipated during operations or during the post-closure period. Underground mine stability impacts would be similar to the Proposed Action.***	There is some potential for localized pit slope failure in existing pits during the post-mining period. The Cortez Hills Pit would not be developed.
Blasting-induced ground vibration effects on White Cliffs	***No damage to the White Cliffs is anticipated.***	***Impacts would be the same as the Proposed Action.***	***Impacts would be the same as the Proposed Action.***	***Impacts would be the same as the Proposed Action.***	***Impacts would be the same as the Proposed Action.***	***The Cortez Hills Pit would not be developed, and related blasting would not occur.***
Dewatering-induced subsidence and earth fissure hazards	Subsidence or risk of earth fissure development associated with currently permitted activities is not anticipated to increase in severity; these hazards may continue for a longer period of time due to extended dewatering for the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Subsidence and risk of earth fissure development would continue as predicted for existing operations.
Future availability of mineral resources	No impacts have been identified.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Identified mineral resource associated with the proposed project would remain in place.
Alteration of topographic or geomorphic features	Open pits and reclaimed waste rock facilities, leach pads, and tailings impoundment would result in the permanent alteration of topographic or geomorphic features on approximately 4,570 acres.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action.	The permanent alteration of geomorphic and topographic features would occur on approximately 1,172 acres.	***Impacts would be similar to the Proposed Action.***	Additional alteration of geomorphic and topographic features would be avoided as proposed facilities would not be developed.
Water Resources and Geochemistry						
Dewatering and drawdown	There would be an increase in drawdown over currently permitted activities on the east side of Crescent Valley in the region surrounding the Cortez Hills Pit, and east of the Cortez Hills Pit beneath the Cortez Mountains.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Groundwater would continue to be pumped for dewatering of facilities. Drawdown would continue to increase in Crescent Valley and beneath the eastern slope of the Shoshone Range and in the region surrounding the Cortez Hills Underground Exploration Project.
Drawdown effects on perennial streams and springs	Flow could be reduced in Mill Creek and in 22 inventoried springs within the predicted 10-foot groundwater drawdown contour. A total of 15 springs occur in areas where long-term (greater than 100 years) groundwater drawdown is predicted.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action. Flow could be reduced in Mill Creek and in 25 inventoried springs within the predicted drawdown area. A total of 13 springs occur in areas where groundwater levels are not predicted to recover.	***A total of 14 springs occur in areas where long-term groundwater drawdown is predicted. Impacts would be similar to the Proposed Action.***	Flow could be reduced in Indian, Ferris, and Mill creeks and in 20 inventoried springs associated with drawdown for existing operations. A total of 2 springs occur in areas where groundwater levels are not predicted to recover.
Drawdown effects on water rights	Drawdown could affect 11 identified water rights; 5 are groundwater rights, and 6 are surface water rights (excluding CGM-owned or controlled water rights).	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action.	***Impacts would be similar to the Proposed Action. Drawdown could affect 9 identified water rights; 5 are groundwater rights, and 4 are surface water rights (excluding CGM-owned or controlled water rights).***	Drawdown could affect 6 water rights; 5 are groundwater rights, and 1 is a surface water right (excluding CMG-owned or controlled water rights).
Pit lake development	Pit lakes would develop in the Cortez Hills and Cortez pits; other pit lake development in the Pipeline Pit complex would be essentially the same as currently permitted. ***The Cortez Hills Pit lake is predicted to have groundwater outflow; the Cortez Pit lake is predicted to behave as a sink (i.e., no throughflow to the groundwater system).***	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action, except the Cortez Hills Pit would not be developed.	***Impacts would be similar to the Proposed Action. Both the Cortez Hills and Cortez pit lakes are predicted to behave as sinks (i.e., no throughflow to the groundwater system).***	Two pit lakes (North Gap and Crossroads) would develop in the Pipeline Pit complex as part of existing approved operations.
Pit lake water quality	There would be no impacts associated with pit lake water quality.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	***The Cortez Hills Pit lake is predicted to have overall higher constituent concentrations due to evapoconcentration; arsenic is the only constituent predicted to exceed Nevada water quality standards.***	Impacts would be the same as the Proposed Action.
Water quality impacts associated with waste rock and other process facilities	There would be no impacts to groundwater or surface water quality.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Impacts would be the same as the Proposed Action.

Table 2-*19* (Continued)

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Flooding, erosion, and sedimentation	Pipeline Waste Rock Facility and County Road 225 reroute would be located within the 100-year floodplain and may cause flooding outside of the delineated floodplain resulting in increased soil erosion. Stormwater diversion along the Cortez Hills east pit wall could accelerate erosion and sedimentation in downstream drainages.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action. The waste rock facility would be located within the 100-year floodplain causing increased impacts to the floodplain and associated potential flooding and erosion.	Impacts would be similar to the Proposed Action. There would be no impacts associated with stormwater diversion along the Cortez Hills east wall, as the pit would not be developed.	***Impacts would be the same as the Proposed Action.***	No impacts would occur to the 100-year floodplain.
Soils and Reclamation	Approximately 6,792 acres of soils would be disturbed. Suitable topsoil and growth media would be salvaged and stockpiled during ground-disturbing activities for reclamation purposes. There would be long-term reductions in soil productivity in areas being reclaimed; areas within the Cortez Hills Pit and county road reroutes (approximately 999 acres) that would not be reclaimed would have permanent loss of productivity. Soil loss from erosion on disturbed areas would range from approximately 4 tons per acre per year on steeper slopes to approximately 0.05 ton per acre per year on flatter areas.	Impacts would be similar to the Proposed Action, except approximately 7,579 acres of soils would be disturbed under this alternative.	Impacts would be similar to the Proposed Action, except approximately 6,830 acres of soils would be disturbed under this alternative.	Approximately 1,790 acres of soils would be disturbed under this alternative, as surface facilities at the Cortez Hills Complex would not be developed. There would be a permanent loss of approximately 32 acres of soils associated with county road reroutes.	***Impacts would be similar to the Proposed Action, except approximately 6,633 acres of soils would be disturbed under this alternative. The permanent loss of soil productivity associated with the Cortez Hills Pit and county road reroutes would be approximately 911 acres.***	Additional impacts to soils would be avoided as the proposed ground disturbance would not occur.
Vegetation						
General vegetation impacts	Mine development and operation would disturb or remove approximately 6,792 acres of vegetation, the majority of which (approximately 5,793 acres) subsequently would be reclaimed. Areas within the Cortez Hills Pit and county road reroutes (approximately 999 acres) that would not be reclaimed would have a permanent loss of vegetation. A total of 1,612 acres of piñon-juniper vegetation would be impacted, of which 809 acres permanently would be lost.	Impacts would be similar to the Proposed Action except, approximately 7,579 acres of vegetation would be disturbed; 6,580 acres would be reclaimed. A total of 1,608 acres of piñon-juniper vegetation would be impacted, of which 809 acres permanently would be lost.	Impacts would be similar to the Proposed Action except, approximately 6,830 acres of vegetation would be disturbed; 5,854 acres would be reclaimed. A total of 1,369 acres of piñon-juniper vegetation would be impacted, of which 809 acres permanently would be lost.	Approximately 1,790 acres of vegetation would be disturbed; approximately 1,758 acres would be reclaimed. There would be a permanent loss of vegetation on 33 acres in association with the county road reroutes. No piñon-juniper vegetation would be impacted by this alternative.	***Impacts would be similar to the Proposed Action except approximately 6,633 acres of vegetation would be disturbed; 5,722 acres would be reclaimed.*** ***A total of 1,646 acres of piñon-juniper vegetation would be impacted, of which 786 acres permanently would be lost.***	There would be no additional impacts to vegetation as no new disturbance would occur. No piñon-juniper vegetation would be impacted by this alternative.
Wetland/Riparian Vegetation	Approximately 0.7 acre of wetland/riparian vegetation would be removed or disturbed, and groundwater drawdown could affect wetland/riparian vegetation associated with 22 seeps and springs (approximately 3.5 acres) and one potential perennial stream reach.	Impacts to wetland/riparian habitat would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action. Approximately 0.4 acre of wetland/riparian vegetation would be removed or disturbed.	No wetland/riparian habitat would be directly affected by this alternative. Groundwater drawdown could affect wetland/riparian vegetation associated with 25 seeps and springs (approximately 2.6 acres) and one potential perennial stream reach.	***Impacts would be similar to the Proposed Action.***	There would be no additional impacts to wetland/riparian vegetation as no new disturbance or additional dewatering beyond that currently authorized would occur.
Special Status Species	No known special status plant species would be impacted.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	***Impacts would be the same as the Proposed Action.***	No additional impact to special status plant species or their habitat would occur.
Wildlife and Fisheries Resources						
Wildlife habitat	Approximately 6,792 acres of terrestrial habitat (native vegetation) would be disturbed, of which approximately 999 acres of terrestrial habitat associated with the Cortez Hills Pit and county road reroutes would not be reclaimed. Surface disturbance would result in a temporary incremental increase in habitat fragmentation and displacement until vegetation has been re-established.	Impacts would parallel the impacts of the Proposed Action, except that 7,579 acres of terrestrial habitat would be directly disturbed, of which 1,005 acres would not be reclaimed.	Impacts would parallel the impacts of the Proposed Action, except that 6,830 acres of terrestrial habitat would be directly disturbed, of which 976 acres would not be reclaimed.	Approximately 1,790 acres of terrestrial habitat would be disturbed. There would be a permanent loss of 32 acres of terrestrial habitat associated with county road reroutes.	***Impacts would parallel the impacts of the Proposed Action, except that 6,633 acres of terrestrial habitat would be directly disturbed, of which 911 acres would not be reclaimed.***	No additional wildlife habitat would be disturbed.
Fisheries habitat	No project-related disturbance would occur within perennial stream habitat. Mine-related groundwater drawdown could affect potential perennial stream habitat in Mill Canyon. No fish were collected in this stream in recent surveys.	Impacts associated with project-related disturbance and mine-related groundwater drawdown would be similar to the Proposed Action.	Impacts associated with project-related disturbance and mine-related groundwater drawdown would be similar to the Proposed Action.	Impacts associated with project-related disturbance would be similar to the Proposed Action. The potential impacts to fisheries associated with mine-related groundwater drawdown would be similar to the Proposed Action except impacts would continue for a longer period of time based on the extended dewatering period.	***Impacts associated with project-related disturbance and mine-related drawdown would be similar to the Proposed Action.***	No additional fisheries habitat would be disturbed. Potential impacts to fisheries habitat associated existing approved water management operations would continue.
Impacts to invertebrates	Fourmile Canyon, which is the only drainage in the study area with documented occurrence of springsnails, would not be affected by the proposed project. Mill Canyon, a potential perennial stream that could be affected by mine-related groundwater drawdown, is not known to contain springs and seeps. Springsnails were not present in any of the seeps or springs that could be affected by mine-related groundwater drawdown in the vicinity of the Cortez Hills Complex.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action, except impacts would continue for a longer period of time based on the extended dewatering period.	***Impacts would be the same as the Proposed Action.***	No additional impacts to invertebrates would occur.
Mule deer	Approximately ***3,868*** acres of mule deer range would be disturbed, of which approximately ***946*** acres would not be reclaimed. No important mule deer movement corridors or seasonal habitats would be directly impacted. ***Based on the low deer population in the area,*** impacts to mule deer are anticipated to be low.	Impacts would be ***similar to*** the Proposed Action.	Impacts would be ***similar to*** the Proposed Action***, except slightly fewer acres of mule deer range would be disturbed***.	No mule deer range would be affected.	***Impacts would be similar to the Proposed Action, except there would be a slight decrease in disturbance within mule deer range. Approximately 911 acres would not be reclaimed.***	No additional mule deer range would be disturbed.

Table 2-*19* (Continued)

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Pronghorn	Approximately 4,110 acres of pronghorn range would be disturbed, of which approximately 21 acres would not be reclaimed. No important pronghorn seasonal ranges would be directly impacted. Impacts to pronghorn populations are anticipated to be low.	Impacts would be the same as the Proposed Action.	Approximately 4,387 acres of pronghorn range would be disturbed, of which approximately 999 acres associated with the Cortez Hills Pit and county roads would not be reclaimed.	Approximately 1,456 acres of pronghorn range would be disturbed; approximately 32 acres associated with county road reroutes would not be reclaimed.	***Impacts would be similar to the Proposed Action, except approximately 3,924 acres of pronghorn range would be disturbed.***	No additional pronghorn range would be disturbed.
Impacts to breeding birds	Direct impacts to bird species would include the temporary loss of approximately 5,793 acres, and the permanent loss of approximately 999 acres, of potentially suitable breeding, roosting, and foraging habitat. Potential direct impacts (i.e., loss of nests, eggs, or young) to breeding birds would be minimized by vegetation clearing outside of the breeding season, to the extent possible, and the implementation of breeding bird surveys and appropriate mitigation, as needed, in coordination with BLM and NDOW.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action, except approximately 1,790 acres of habitat would be disturbed of which 32 acres associated with county road reroutes would not be reclaimed.	***Impacts would be similar to the Proposed Action.***	No additional impacts to habitat; ongoing operations and reclamation would continue to affect habitat in existing disturbance areas. No additional impacts to nesting birds, including raptor and passerine species, would occur.
Pit lake formation	Based on the results of groundwater modeling and the screening-level ecological risk assessment, pit lake water would be within Nevada stock water standards and would not pose unacceptable risks to wildlife or fish species.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	***Some constituents in the Cortez Hills Pit lake water would be higher than under the Proposed Action; however, concentrations still would be less than Nevada stock water standards and would pose no unacceptable risk to wildlife or fish species.***	No additional pit lakes would be formed. Potential impacts associated with the approved Gap and Crossroads pit lakes, which would form in the Pipeline Pit, and the Cortez Pit, would continue under the No Action Alternative.
Potential for hazardous materials spill	The potential for impacts to wildlife would be highest if a spill enters aquatic habitat; however, the probability of a spill into aquatic habitat along the transportation corridor would be low.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action.	The probability of a release associated with transport of fuels and reagents and potential for associated impacts to wildlife species would be less than under the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Hazardous materials used for ongoing processing would continue to be transported to the existing operations.
Noise and human presence	Increased noise, traffic, and human presence associated with mine development and operation is expected to result in negligible to low impacts to wildlife. There would be an increased potential for wildlife/vehicle collisions if haul trucks are used to haul ore across the valley to the Pipeline Complex for processing in place of a conveyor or the Cortez Heap Leach Facility.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	There would be less impact to terrestrial wildlife as there would be fewer above-ground facilities.	***Impacts would be the same as the Proposed Action.***	These impacts would remain the same as current levels until ongoing operations and reclamation have been completed, at which time these impacts would end.
Water Quantity and Quality	Approximately 0.7 acre of riparian/wetland habitat would be affected by project disturbance. Twenty-two seeps and springs with approximately 3.5 acres of wetland/riparian habitat and one potential perennial stream segment could be affected by dewatering activities. Based on CGM's committed environmental protection measures, potential impacts to wildlife from cyanide ingestion would be low.	Impacts would be the same as the Proposed Action.	Impacts would similar to the Proposed Action. Approximately 0.4 acre of riparian/wetland habitat would be affected by project disturbance.	No wetland/riparian habitat would be directly affected by disturbance. Twenty-five seeps and springs with approximately 2.6 acres of wetland/riparian habitat and one potential perennial stream segment could be affected by dewatering activities. The potential impacts to wildlife associated with mine-related groundwater drawdown would be similar to the Proposed Action except the impacts would continue for a longer period of time based on the extended dewatering period.	***Impacts would be similar to the Proposed Action.***	Potential impacts to wildlife habitat associated with existing approved water management operations would continue. There would be no potential impacts to wildlife from cyanide ingestion associated with the proposed new operations.
Special Status Species	See impacts for individual species.	Potential impacts to special status wildlife species would parallel the impacts of the Proposed Action. Potential impacts to springsnails or potentially suitable habitat would be the same as the Proposed Action.	Potential impacts to special status wildlife species would parallel the impacts of the Proposed Action. Potential impacts to springsnails or potentially suitable habitat would be the same as the Proposed Action.	Approximately 5,002 fewer acres of terrestrial habitat would be disturbed, resulting in substantially less disturbance to habitat for special status terrestrial species. Potential impacts to springsnails or potentially suitable habitat would be similar to the Proposed Action except that the impacts associated with mine-induced groundwater drawdown would continue for a longer period of time.	***Potential impacts to special status wildlife species would parallel the impacts of the Proposed Action.*** ***Potential impacts to springsnails or potentially suitable habitat would be the same as the Proposed Action.***	No additional impacts to special status terrestrial wildlife species or their habitat would occur. No additional impacts to springsnails or potentially suitable habitat would occur.
Impacts to bats	Direct impacts would include the long-term disturbance of 5,218 acres of foraging habitat and the permanent loss of 939 acres of foraging habitat. The proposed reroute of CR 222 could affect an existing adit with recorded bat habitation; disturbance of this adit and the associated loss of maternity roosts, nursery colonies, or hibernacula would be considered a significant impact.	See above.	See above.	See above.	***See above.***	See above.
Impacts to pygmy rabbit	The long-term loss of approximately 7 acres and the permanent loss of approximately 5 acres of potentially suitable sagebrush habitat would be considered a low-to-moderate impact, depending on the habitat quality (which has not been determined). The potential loss of individual rabbits during construction would not result in population-level effects.	See above.	See above.	See above.	***See above.***	See above.

Table 2-*19* (Continued)

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Impacts to sensitive bird species	Northern goshawk – no direct or indirect impacts to the northern goshawk would occur. Bald eagle, golden eagle, and ferruginous hawk - potential impacts to these species would be low. Swainson's hawk – no direct impacts to nesting Swainson's hawks are anticipated; indirect impacts would result from mine-related noise and human presence. Prairie falcon – potential impacts to prairie falcon would be considered low. Greater sage-grouse – no impacts to breeding greater sage-grouse would be anticipated; impacts to brooding activity would be low. Direct impacts associated with project-related habitat reduction would be considered negligible based on the availability of suitable wintering habitat in the project vicinity. Mountain quail – direct impacts associated with project-related habitat reduction would be considered negligible based on the availability of suitable wintering habitat in the project vicinity. Short-eared owl and long-eared owl – direct impacts associated with project-related habitat reduction would be considered negligible for the short-eared owl and low for the long-eared owl, based on the availability of suitable habitat in the project vicinity. Indirect impacts would result from mine-related noise and human presence. Burrowing owl – direct impacts would include the short-term reduction (pending successful reclamation) of potential grassland and shrubland breeding and foraging habitat. Indirect impacts would result from mine-related noise and human presence. Potential impacts to this species would be considered low. Pinyon jay – direct impacts associated with project-related piñon-juniper habitat reduction would be considered low. Indirect impacts would result from mine-related noise and human presence. Loggerhead shrike, vesper sparrow, and juniper titmouse – direct impacts associated with project-related habitat reduction and indirect impacts from mine-related noise and human presence would be considered negligible.	See above.	See above.	See above.	***See above.***	See above.
Range Resources	***Perimeter fences around proposed facilities would result in a*** total of ***142*** AUMs temporarily lost from public land in the Carico Lake Allotment ***and*** 36 AUMs temporarily lost from public land in the South Buckhorn Allotment. ***Following successful reclamation and removal of perimeter fences, 159 AUMs would be recovered.*** A total of 19 AUMs associated with the Cortez Hills Pit and county road reroutes would be permanently lost in the Carico Lake Allotment. Impacts may occur to three water-related range improvements in the Carico Lake Allotment that fall within the predicted mine-related 10-foot groundwater drawdown area.	***Perimeter fences around proposed facilities would result in a*** total of ***153*** AUMs temporarily lost in the Carico Lake Allotment and 36 AUMs in the South Buckhorn Allotment. A total of 19 AUMs would be permanently lost. Impacts to range improvements would be the same as the Proposed Action.	***Perimeter fences around proposed facilities would result in a*** total of ***169*** AUMs temporarily lost in the Carico Lake Allotment and 20 AUMs in the South Buckhorn Allotment. A total of 19 AUMs would be permanently lost. Impacts to range improvements would be the same as the Proposed Action.	***Perimeter fences around proposed facilities would result in a*** total of 33 AUMs temporarily lost in the Carico Lake Allotment. ***No permanent loss of AUMs would occur.*** Impacts to range improvements would be the same as the Proposed Action.	***Temporary impacts would be similar to the Proposed Action. Following successful reclamation and the removal of perimeter fences, a total of 17 AUMs would be permanently lost.*** ***Impacts to range improvements would be the same as the Proposed Action.***	No additional AUMs would be lost. No additional impacts would occur to range improvements.
Paleontological Resources	No impacts to significant paleontological resources are expected.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Potential impacts to paleontological resources would be avoided as the proposed ground disturbance would not occur.
Cultural Resources	A total of 96 NRHP-eligible properties would be directly impacted. Impacts to NRHP-eligible properties would be mitigated in accordance with the treatment plan and Programmatic Agreement (PA).	A total of 94 NRHP-eligible properties would be directly impacted. Impacts to NRHP-eligible properties would be mitigated in accordance with the treatment plan and PA.	A total of 80 NRHP-eligible properties would be directly impacted. Impacts to NRHP-eligible properties would be mitigated in accordance with the treatment plan and PA.	One NRHP-eligible property would be directly impacted. Impacts to NRHP-eligible properties would be mitigated in accordance with the treatment plan and PA.	***Impacts would be the same as the Proposed Action.***	No NRHP-properties would be impacted.

Table 2-*19* (Continued)

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Native American Traditional Values						
Visual impacts	The Proposed Action would modify the visual character of the lower third of ***the western slope of*** Mount Tenabo and the adjacent canyon and valley lands; it would not modify the upper two-thirds of ***Mount Tenabo***, including the White Cliffs. Views from the top of Mount Tenabo, a location of importance to Native Americans, would be affected.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Visual impacts associated with the proposed Cortez Hills facilities would be reduced.	***Impacts would be the same as the Proposed Action.***	Visual effects associated with the Proposed Action would not occur.
Impacts to pine nut harvesting	There would be a permanent loss of 817 acres of piñon-juniper woodland associated with the Cortez Hills Pit. Long-term impacts to future harvestable pine nuts, and the associated cultural experience, that would be affected by the Proposed Action are unknown.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	No impacts to piñon-juniper woodland would occur.	***Impacts would be the same as the Proposed Action.***	No impacts to piñon-juniper woodland would occur.
Access impacts	Access to the western slope of Mount Tenabo would be limited; access to the eastern slope would not be affected. Access to known culturally significant sites (e.g., Shoshone Wells) would remain open. Access to the Horse Canyon property of cultural and religious importance (PCRI) would not be affected.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	There would be less effect on access under this alternative.	***Impacts would be the same as the Proposed Action.***	There would be no impacts to access.
Impacts to burials	Identified potential burial locations would be ***managed*** in accordance with ***NAGPRA,*** the NHPA***,*** and PA.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	***Impacts would be the same as the Proposed Action.***	There would be no impacts to possible burial locations.
Impacts to cultural sites	Impacts to NRHP-eligible properties would be mitigated in accordance with the treatment plan and PA. However, some Western Shoshone perceive some forms of mitigation, in particular data recovery, as being destructive.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	Impacts would be similar to the Proposed Action; fewer sites eligible for the NRHP would be affected and require mitigation.	***Impacts would be the same as the Proposed Action.***	There would be no impacts to NRHP-eligible properties.
Impacts to spiritual and religious uses of the ***study*** area	Impacts to visitors to Mount Tenabo for these uses are anticipated; however, as ***Western Shoshone consultants have not disclosed*** the number of people who visit Mount Tenabo for these uses ***and the frequency and specific locations of their visits are*** unknown, the level of this impact cannot be quantified.	Impacts would be the same as the Proposed Action.	Impacts would be the same as the Proposed Action.	There would be less effect on the spiritual and religious ***use*** of Mount Tenabo.	***Impacts would be the same as the Proposed Action.***	There would be no additional impacts to the spiritual and religious ***use*** of Mount Tenabo.
Air Quality	Modeling results indicate that maximum concentrations of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}), oxides of nitrogen (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), and ozone (O_3) would not exceed applicable Nevada or National Ambient Air Quality Standards (NAAQS). There would be no impacts to PSD Class I areas. The combined hazardous air pollutant (HAP) emissions would be less than the major source limit of 25 tons per year ***and no individual HAP emission would exceed 10 tons per year***; therefore, the Proposed Action would not constitute a major HAP source.	Air quality impacts would be the same as the Proposed Action except for two potential exceedances of ambient air quality standards: at the fence line at two different locations for CO, and adjacent to CR 222 just south of the proposed Cortez Hills Pit for NO_2.	Air quality impacts would be the same as the Proposed Action except for two potential exceedances of ambient air quality standards: at the fence line at two different locations for CO, and adjacent to CR 222 just south of the proposed Cortez Hills Pit for NO_2.	Air quality impacts would be the same as the Proposed Action. The modeled concentrations indicate the project emissions would comprise a small fraction of the applicable ambient air quality standards.	***Impacts would be the same as the Proposed Action.***	Impacts to air quality would be limited to ongoing approved mining, mineral processing, and reclamation activities. The modeled concentrations indicate project emissions would comprise a small fraction of the applicable ambient air quality standards.
Land Use and Access	Approximately 6,792 acres of public and private lands would be converted to mining activities; approximately 999 acres associated with the Cortez Hills Pit and county road reroutes would not be reclaimed. The Proposed Action would comply with adopted governmental plans and policies. The existing 60-kV power line through the eastern portion of the project boundary would require realignment. There would be a potential for conflicts of mine (haul truck) traffic with private vehicles if the cross-valley conveyor or the Cortez Heap Leach Facility were not constructed. No significant impacts are anticipated from rerouting County Roads (CRs) 222 and 225; there would be minor increases in travel times along these roads.	Approximately 7,579 acres of public and private lands would be converted to mining activities. The haul road to the Grass Valley Heap Leach Alternative would cross the public access road to the historic Cortez townsite and Cortez cemetery, increasing the potential for conflicts of mine (haul truck) traffic with private vehicles. Other impacts would be similar to the Proposed Action.	Approximately 6,830 acres of public and private lands would be converted to mining activities. The distance of the proposed realignment of CR 225 would decrease slightly and CR 222 would increase slightly compared to the Proposed Action; these changes are not considered significant.	Approximately 1,790 acres of public and private lands would be converted to mining activities. CR 222 would not require realignment under this alternative. Other impacts would be similar to the Proposed Action.	***Approximately 6,633 acres of public and private lands would be converted to mining activities.*** ***Other impacts would be the same as the Proposed Action.***	There would be no change from current uses on the project site.

Table 2-*19* (Continued)

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Recreation and Wilderness	Approximately 6,792 acres of public and private lands would be removed from public access for recreation for the life of the project; extensive public land in the immediate area would accommodate dispersed recreational uses. Approximately 999 acres of public land associated with the Cortez Hills Pit and county road reroutes would not be reclaimed. The proximity of the proposed Grass Valley Heap Leach Facility to the historic Cortez townsite could affect recreational visits to the townsite; CGM would ensure continued access to the townsite. No Wilderness Study Areas (WSAs) or developed recreational facilities would be adversely affected.	Impacts would be the same as the Proposed Action except approximately 7,579 acres of public and private lands would be temporarily removed from dispersed recreational use. Access to the historic Cortez townsite would require crossing the mine haul road.	Impacts would be similar to the Proposed Action except approximately 6,830 acres of public and private lands would be temporarily removed from dispersed recreational use. This alternative would leave most of Cortez Canyon (a scenic location) undisturbed.	Approximately 1,790 acres of public and private lands would be temporarily removed from dispersed recreational use. This alternative would result in less disturbance to Cortez Canyon and the lower slopes of Mount Tenabo; these are two of the more scenic areas used for recreation. Recreational visits to the historic Cortez townsite would be unaffected.	***Approximately 6,633 acres of public and private lands would be temporarily removed from dispersed recreational use.*** ***Other impacts would be similar to the Proposed Action.***	Existing mine-related impacts to recreation associated with the existing operations would continue through mine closure. No additional impacts would occur to recreational use of the area.
Social and Economic Values	The direct work force increase during construction would be approximately 450 workers, including underground operations. Direct employment associated with operations would be approximately 350 workers. Population growth generated by the Proposed Action would be just over 1 percent for the entire study area, but could reach nearly 9 percent for Crescent Valley/Beowawe. During construction, capital expenditures would generate over $13 million in sales and use tax revenue for the state and local counties. Operations would generate an estimated $10 million per year in sales taxes. There also would be an increase in net proceeds taxes on mine production and property taxes associated with the Proposed Action. Elko elementary schools may have capacity issues, depending on residence locations chosen by mine workers and their families and the ages of their children. Housing and other public services should have adequate capacity.	The social and economic impacts would be similar to the Proposed Action. This alternative would require an additional $3.7 million in operating costs and an additional $3.5 million in capital costs. These additional expenditures would increase tax payments to state and local governments by a small amount.	The social and economic impacts would be similar to the Proposed Action. This alternative would require an additional $305 million in operating costs plus an additional $109 million in capital costs. Reclamation costs would increase by $5 million. An additional 150 workers would be required, and wages and salaries would increase by an estimated $13 million per year. The increased revenues would benefit the local economy; however, there would be a reduction in net proceeds tax revenues due to increased operating costs. The associated population increase would put additional pressure on Elko schools and other public services and facilities.	The social and economic impacts would be similar to, but less than, impacts from the Proposed Action. This alternative would result in decreased employment and expenditures compared to the Proposed Action, with an associated decrease in the revenues accruing to state and local governments. There would be less impact to local public services and facilities and the local housing market.	***The social and economic impacts would be similar to, but the revenues generated would be slightly less than, impacts from the Proposed Action.***	Economic opportunities associated with the Proposed Action would be foregone. Impacts on public infrastructure and services would not occur. Increased revenues would not accrue to state and local governments.
Environmental Justice	Potential impacts would not be expected to disproportionately affect any particular population.	Impacts would be the same as described for the Proposed Action.	Impacts would be the same as described for the Proposed Action.	Impacts relative to potential effects to a particular population would be the same as described for the Proposed Action.	***Impacts would be the same as described for the Proposed Action.***	Impacts relative to potential effects to a particular population would be the same as described for the Proposed Action.
Visual Resources	From key observation point (KOP) #1, visual contrasts allowable for Visual Resource Management (VRM) Class III lands within the mine site would be exceeded in Cortez Canyon during active mining. Proposed reclamation and revegetation would reduce the long-term visual effects and achieve VRM objectives in both Class III and Class IV areas from KOP #1. VRM class objectives would be met from KOP #2. Achievement of VRM Class III objectives may be marginal from KOP #3 during mining; the objectives would be met following reclamation. From Shoshone Wells, due to the proximity of project facilities to this site, it is unlikely the Proposed Action would meet VRM Class III objectives, even following reclamation. From the top of Mount Tenabo, the Proposed Action would meet VRM Class IV objectives; it would conflict with VRM Class III objectives in relevant areas. Following reclamation, all areas except the Cortez Hills Pit would comply with VRM objectives.	The alternative heap leach facility would be closer to KOP#3; however, this location is not a static viewing point; therefore, visual impacts would be similar to the Proposed Action.	Visual impacts from KOPs # 1 and #3 would be similar to the Proposed Action. The alternative waste rock location would be much closer to KOP #2 and much more prominent. Visual impacts to Shoshone Wells would be reduced as the valley location for the waste rock facility would not be visible from this site. Views from the top of Mount Tenabo would be similar to the Proposed Action.	Visual contrasts would be reduced under this alternative from all KOPs and other sensitive sites. Reclamation would reduce contrasts over time.	***Impacts would be similar to the Proposed Action; minor differences likely would not be noticed by most observers.***	Project-related disturbance and construction would not occur; therefore, management guidelines for VRM Class III lands would not be exceeded.
Noise	Noise from operations would be barely perceptible at the nearest sensitive receptors and would remain below 50 dBA_q, the standard for community noise levels. Peak noise levels from blasting in the pit would not exceed thresholds for impulse noises.	Noise impacts would be similar to the Proposed Action.	There would be increased noise due to more equipment operation on the valley floor. Noise impacts would be minor.	Reduced amount of aboveground activity would reduce noise emissions relative to the Proposed Action.	***Impacts would be the same as the Proposed Action.***	Mine-related noise and blasting beyond that currently authorized would not occur; the existing noise environment would remain essentially unchanged from existing conditions.

Table 2-*19* (Continued)

Resource Areas	Proposed Action	Grass Valley Heap Leach Alternative	Crescent Valley Waste Rock Alternative	Cortez Hills Complex Underground Mine Alternative	*Revised Cortez Hills Pit Design Alternative*	No Action Alternative
Hazardous Materials and Solid Waste						
Transportation	There would be a low probability of an accident involving the release of hazardous materials during the life of the project. The number of potential transportation-related fuel releases that potentially would occur over the life of the project is projected at approximately 0.010.	Impacts would be similar to the Proposed Action. There would be a very small increase in the potential for a transportation-related release of fuel due to the additional haulage distance to the heap leach pad.	Impacts would be similar to the Proposed Action. There would be an increased potential (2.5 times) for a transportation-related release of fuel due to the increased amount of fuel required for the additional haulage distance to the waste rock facility.	There would be less transport of fuels and reagents than under the Proposed Action; therefore, the probability of a release would be lower.	***Impacts would be the same as the Proposed Action.***	No additional hazardous materials would be transported to the site. Transportation of hazardous materials associated with the existing operations would continue.
Storage and use	Operations would be conducted in accordance with the Hazardous Materials Spill and Emergency Response Plan, which would ensure that impacts from potential spills would be minimized and the spilled materials contained and removed.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action.	Impacts would be similar to the Proposed Action.	***Impacts would be the same as the Proposed Action.***	No additional hazardous materials would be stored or used on site. Storage and use associated with the existing operations would continue.