3.4 Geology and Minerals

3.4.1 Affected Environment

The study area for geology and minerals includes the project area, and transmission line analysis corridor (**Figure 3.4-1**). The cumulative effects study area (CESA) for geological and mineral resources is shown on **Figure 3.4-2** and is essentially the Carlin Trend north of Interstate 80 (I-80). The CESA extends from Newmont's Gold Quarry/South Operations Area Project in the south to the Midas Mine in the north to include mining and mineral exploration (exploration) activity in the Carlin Trend. Past, present, and reasonably foreseeable future actions (RFFAs) in the CESA are described in Section 3.2. **Figures 3.2-1** and **3.2-2** illustrate the mining and mineral exploration along the Carlin Trend. The CESA chosen provides an adequate area of analysis in which to compare the relative effects of the Proposed Action to overall mining activity in the Carlin Trend. Within the CESA, there are projects and activities not related to mining and include community development and wildfire management programs, as described in Section 3.2.

3.4.1.1 Physiography and Topography

The proposed project is located in the northern part of the Great Basin section of the Basin and Range Province (Fenneman and Johnson 1946). The Basin and Range is typified by northeast to southwest trending mountain ranges and intervening valleys, the Great Basin being characterized as generally having internal drainage. The project area is located in the northern portion of the Sheep Creek Range, which trends northeast-southwest. The Sheep Creek range is somewhat diffuse and is 25 miles wide and 50 miles long. The topography consists of rolling hills and cone-shaped rounded buttes. Little Antelope Creek drainage cuts through the project area in a generally north-south direction. In the Hollister area, the topography consists of rolling hills, drainages, rock ledges, and outcrops. It is somewhat rugged with elevations ranging from 5,400 to 7,000 feet above mean sea level.

3.4.1.2 Stratigraphy

The geologic units in the project area range from Paleozoic to Recent (**Figure 3.4-1**). The major rock units are shown in **Figure 3.4-3**. The oldest rocks that outcrop in the area are part of the Ordovician-age Vinini Formation, which is composed of quartzite, chert, and argillite (Wallace 2003a). The formation is characterized by repeating, coarsening-upwards sequences of orthoquartzites, muddy quartzites, sandy argillites, and bedded to laminated argillites. Minor calcareous siltstone and sandstone are present in some of the fine-grained facies of the Vinini Formation (Oelofse et al. 2009). The Vinini Formation sediments have undergone a very low grade metamorphism in the Hatter Expansion area. The Vinini Formation also has been altered by the heat of one or both of two Tertiary intrusive bodies. The alteration has changed the character of the Vinini Formation argillites to hornfels, a hard metamorphic rock that exhibits brittle deformation (Brown and Caldwell 2010a). The Vinini Formation was deposited in a subsiding marine basin, but the thickness of the formation is difficult to determine because the rocks have been deformed and folded and there are limited exposures of the entire stratigraphic section. Estimated thicknesses have ranged from 500 to 6,000 feet in various places in northern Nevada (Western Cordillera 2006). In the project area, the Vinini Formation may be up to approximately 5,000 feet thick (Rodeo Creek Gold Inc [RCG] 2011b), but there are limited outcrops in the northeastern portion of the Willow Creek Southeast Quadrangle (Oelofse et al. 2009; Wallace 2003a). The Vinini Formation is primarily in the subsurface in the study area and also is the host rock for the gold mineralization that is the objective of the proposed mine. The Roberts Mountain Thrust forms the base of the Vinini Formation and below the thrust are the Devonian Rodeo Creek and Roberts Mountain Formations (**Figure 3.4-4**). The Vinini Formation is characterized in the project area as having sheeted breccia zones that are indicative of Paleozoic deformation (Wallace 2003a).

Along the eastern reaches of the Mud Springs Road, there are exposures of a unit called the Slaven Chert, which is Devonian and is a ridge-former due to its resistance to erosion (Theodore et al. 2006). The Slaven Chert consists of alternating beds of chert and black shale, the layers being a few inches thick. The unit is often highly contorted and fossil evidence indicates it was deposited in a deepwater environment. In places the Slaven Chert is so deformed that it is described as a mélange, a descriptive term for a mappable unit that has been squeezed and contorted and which may contain fragments and blocks of rocks from other formations.

Another Paleozoic unit that outcrops in the project area is Strathearn Formation, a chert-pebble conglomerate that occurs in discontinuous outcrops east of the mine area and north of the Mud Springs Road and is estimated to be late Pennsylvanian to early Permian in age (Theodore et al. 2006). The Strathearn Formation (Late Pennsylvanian and Early Permian) consists of poorly exposed rocks 1.0 and 2.0 miles east of the project area (Theodore et al. 2006) (**Figure 3.4-1**). The lower part of the formation outcrops in the area and it is described as a poorly sorted chert-pebble conglomerate, with many of the pebbles and clasts derived from the Vinini Formation.

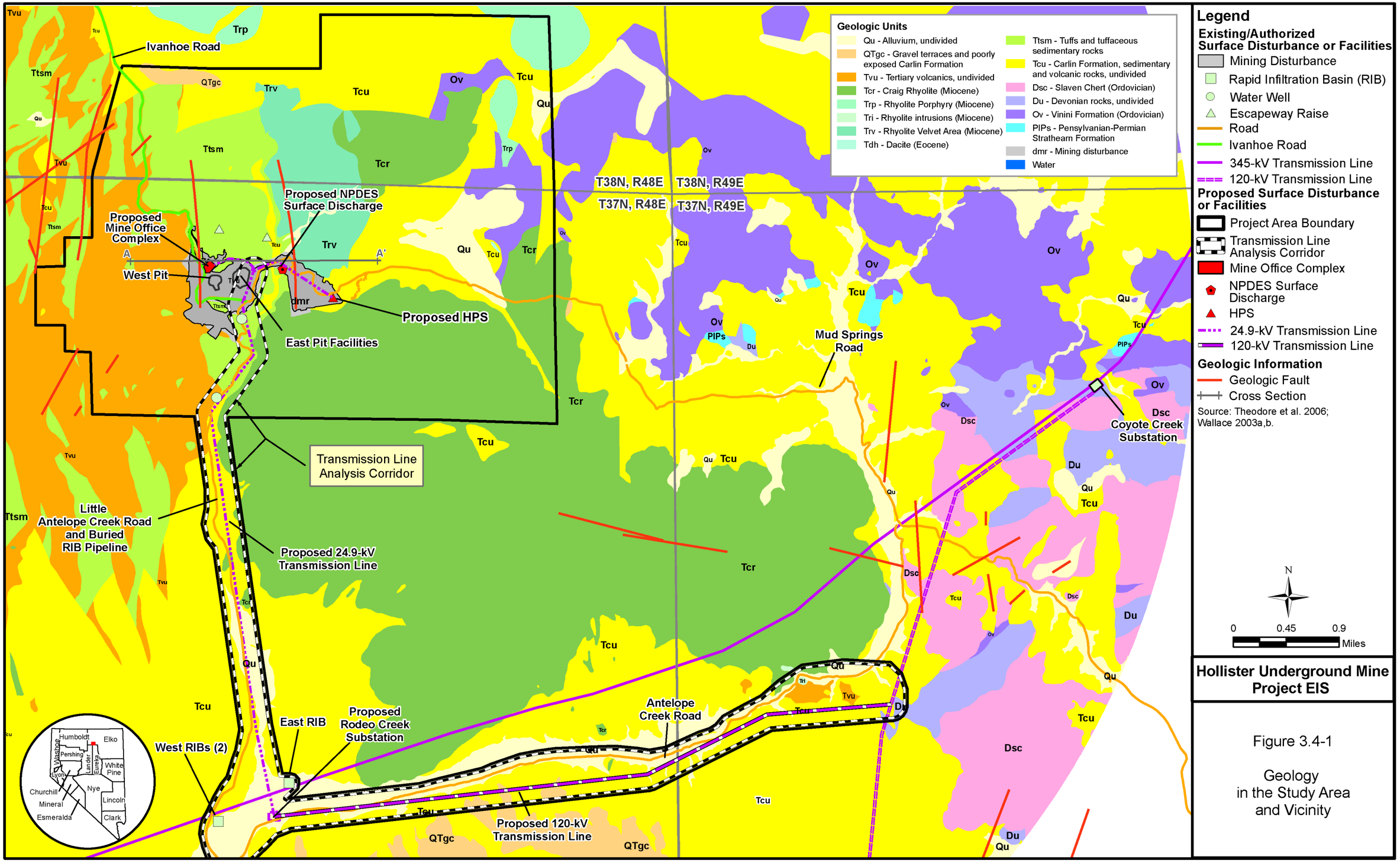
The majority of rocks primarily exposed in the project area are Tertiary igneous rocks. The oldest of the Tertiary igneous rocks are found in the Hatter Stock, an intrusive body of Eocene age composed of granodiorite-dacite (Wallace 2003a). The Hatter Stock is located about 3 miles east of the Hollister Site, but surface evidence is limited to float (isolated blocks of displaced rock). Geophysical data show a strong positive aeromagnetic anomaly in the location of the stock. Drilling data have further defined the limits of this igneous body.

At the base of the Tertiary volcanic rocks (volcanic rocks) and between the volcanic rock and the Vinini Formation is a tuff unit that has been altered to clay. The clay alteration zone is present near the base of the existing East and West pits and has been found in borings around the Hollister Site. This zone of clay alteration provides a low-permeability zone with respect to vertical groundwater flow (Brown and Caldwell 2011a).

Most of the igneous rocks in the vicinity of the Hollister Site are Miocene volcanic rocks consisting of tuffs, tuffaceous sedimentary rocks, andesite, and rhyolite. The Miocene rocks cover most of the surface of the study area and form a layer over the Vinini Formation that is approximately 600 to 700 feet thick (Oelofse et al. 2009). In the Hollister area, the Miocene rocks are much thinner, approximately 250 to 500 feet thick, and the top of the unconformity between the Vinini and Miocene rocks is exposed in the mine pit (RCG 2009a) (**Figure 3.4-4**).

In the Willow Creek Southeast Quadrangle, Wallace (2003a) has divided the tuffs and tuffaceous rocks on the basis of whether they occur north or south of Antelope Creek. The tuffaceous rocks on the south side of Antelope Creek appear to be directly correlative with the Carlin Formation to the east, but the apparent equivalents to the north of the creek are poorly exposed, so conclusive correlation is not possible. The Carlin Formation rocks consist of an upper member of sandstone and siltstone beds of reworked ash in part. There is a lower member composed of non-welded to partially welded ash-flow tuff. In addition, the lower member has tuffaceous rocks that were deposited in water or by wind.

North of Antelope Creek, the tuffaceous rock sequence has been divided into upper, middle, and lower units (Wallace 2003a,b). The rocks appear to represent continuous sedimentation and in part are very similar to the Carlin Formation on the south side of the creek, but poor exposures prevent definitive correlation. Increasing thickness of tuffaceous rocks to the west of the project area indicates a westerly, highland source that shed material in an easterly direction into lower lying areas. To the east of the Willow Creek Southeast Quadrangle, the Miocene tuffaceous rocks are mapped as Carlin Formation regardless of location (Theodore et al. 2006).



Hollister Underground Mine Project EIS

Figure 3.4-1

Geology in the Study Area and Vicinity

3/1/2012

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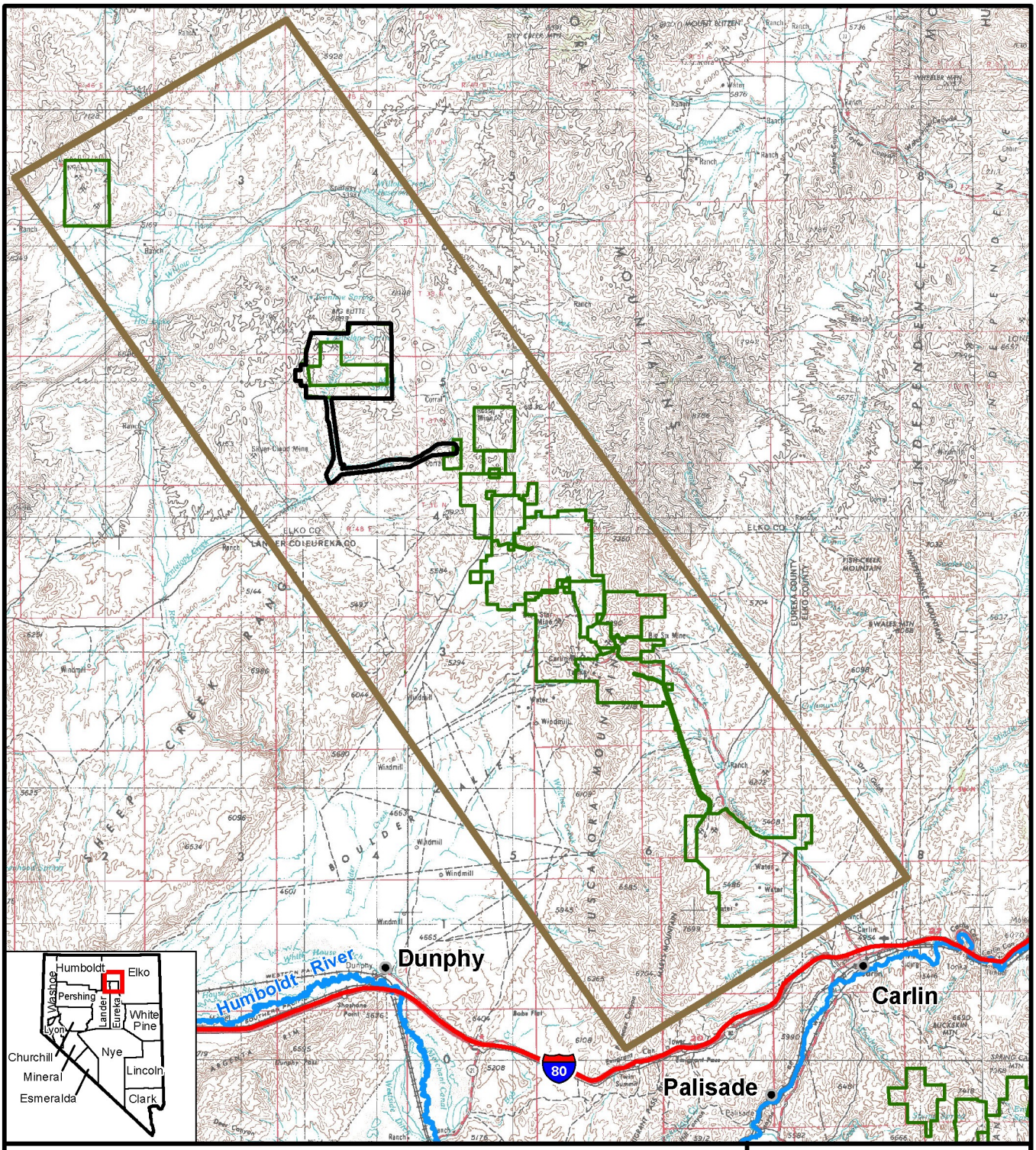


Legend

- Project Area Boundary
- Cumulative Effects Study Area
- Other Mine Plan Boundaries

N

0 2.5 5 7.5 10 Miles

Source: BLM 2009b.

Hollister Underground Mine Project EIS

Figure 3.4-2

Geology and Minerals Cumulative Effects Study Area

05/10/2011

Quaternary		Alluvium		
		Upper Gravels		
		Middle Gravels		
Tertiary	Pliocene	Lower Gravels		
	Miocene	Tuffaceous Rocks/Carlin Formation	Rhyolite and Andesite Flows	
	Eocene	Hatter Stock Dacite		
Penn-Permian		Strathearn Formation		Subthrust
Devonian		Slaven Chert		Rodeo Creek Unit
Silurian				Roberts Mountain Formation
Ordovician		Vinini Formation		Hanson Creek Formation

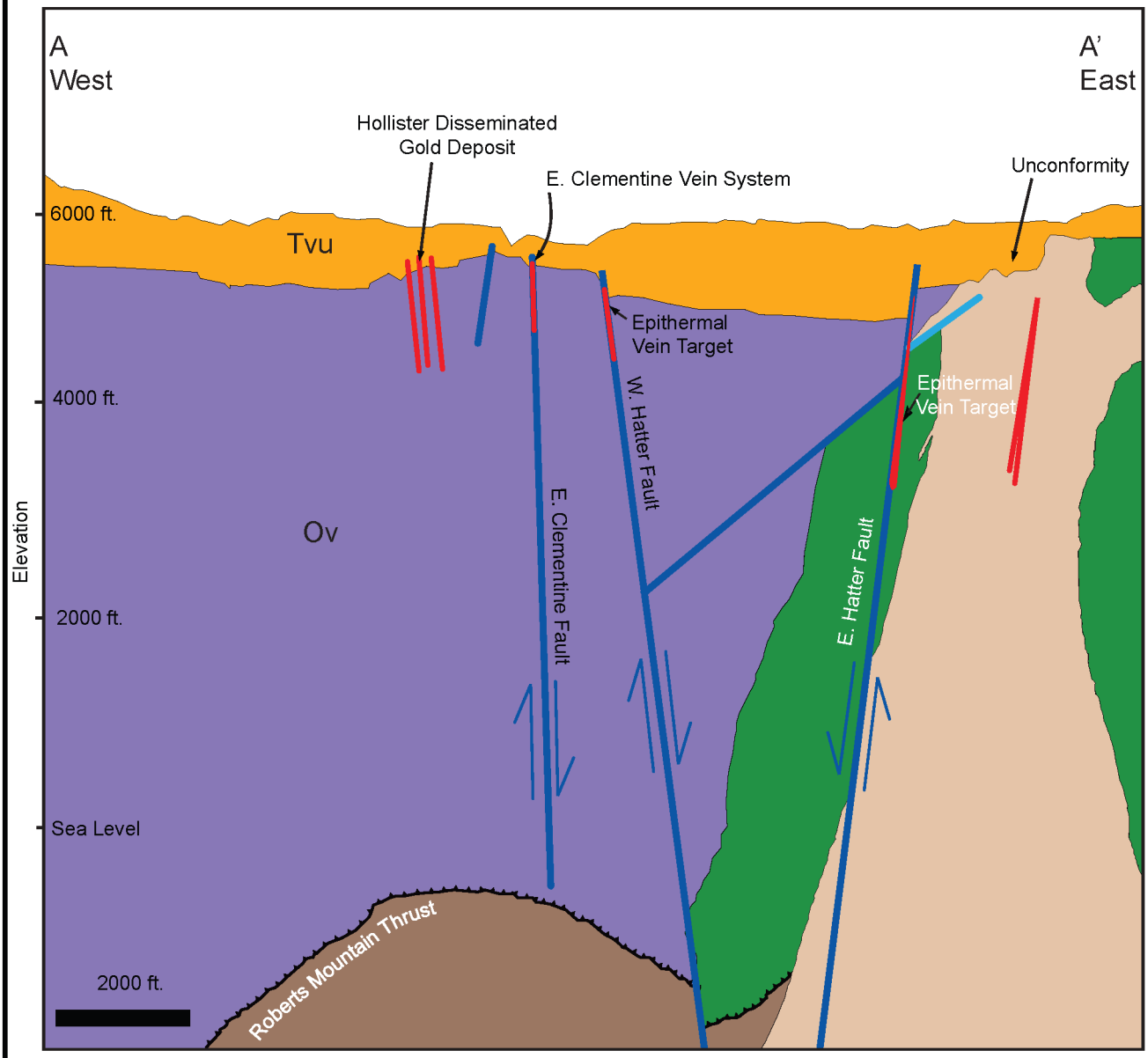
Unconformity

Hollister Underground Mine Project EIS

Figure 3.4-3

Generalized Stratigraphic Chart, Hollister Area

Source Oelofse et al. 2009; Theodore et al. 2006; Wallace 2003a.



Legend

- Ov - Vinini Formation (Ordovician)
- Hornfels Metamorphic Rocks
- Rodeo Creek Unit (Devonian)
- Hatter Stock (Eocene)
- Tvu - Tertiary Volcanic Rocks Undivided
- Veins

Note: The cross-section A-A' is shown on Figure 3.4-1.
Source: RCG 2011b.

Hollister Underground Mine Project EIS

Figure 3.4-4

Schematic Cross-section of the Hollister Area

03/19/12

The other volcanic rocks in the area consist of andesite and rhyolite deposited as lava flows. Just to the east and southeast of the mine site is a flow called the Craig Rhyolite, which extends for about 7 miles from the Hollister Site in a generally easterly direction (Theodore et al. 2006; Wallace 2003a). The rhyolite is 600 feet thick and contains flow units of variable thickness. North of the Hollister Site, rhyolite porphyry is present that forms distinct dome-like features, the best example of which is Big Butte. Another rhyolite flow, the rhyolite of the Velvet area, is a separate flow identified northeast of the Hollister Site and overlaps the Craig rhyolite. Andesite flows occur within and west of the mine area and reach a thickness of more than 300 feet (Wallace 2003a). The andesite is poorly exposed and is highly weathered in places.

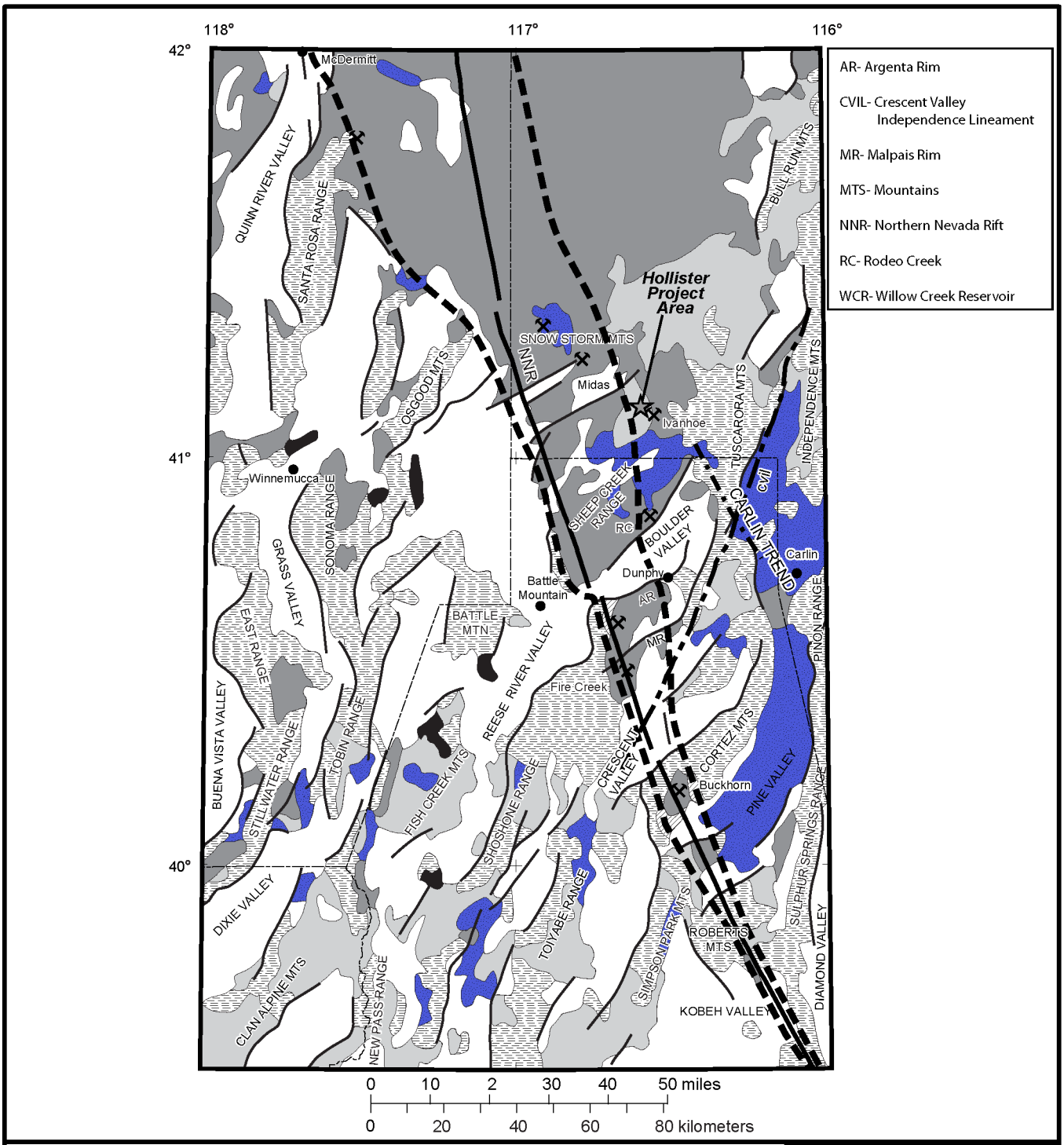
The youngest deposits in the area consist of probable Pliocene-Pleistocene gravels and Recent alluvium. The gravels have been subdivided by Wallace (2003a) into three units; lower, middle, and upper. The gravel units are generally composed of unconsolidated and poorly sorted fanglomerate deposits that occur on pediment surfaces south of Antelope Creek. Alluvium is generally found along the Antelope Creek and Little Antelope Creek drainages and is composed of unconsolidated and poorly sorted silt, sand, and gravel. Older alluvium deposits also are present in these drainages and occur as terraces 3 to 6 feet above the creeks.

3.4.1.3 Structure

The Carlin Trend, including the Hollister Site, is astride the suture zone at the Western edge of the Paleozoic North American continent. During the Early Paleozoic, this area lay near the continental shelf with shallow water shelf assemblage (predominantly) carbonates being deposited toward the continent, to the east, and continental margin, slope, and rise (predominantly) siliciclastics being deposited oceanward, to the west. Early Mississippian mountain building activity, termed the Antler Orogeny, thrust the deep water siliciclastics over the shallow water carbonates. During and subsequent to its emplacement, the allochthon (a geological formation not formed in the region where found and moved to its present location by tectonic forces) formed a highland which shed siliciclastics into the foredeep to the east. The allochthon was progressively eroded and by Late Mississippian it was covered by a shallow-water overlap assemblage. The Roberts Mountain Thrust is a thrust zone containing a series of thrust faults (McFarlane 1991) (**Figure 3.4-4**). The direction of movement was from west to east. In the project area, the Vinini Formation is on the upper plate and the thrust fault is the base of the formation. The thrust fault moved the older Ordovician Vinini Formation rocks over the younger Devonian Rodeo Creek Formation (Oelofse et al. 2009).

After the Antler Orogeny, there is little or no evidence of major tectonic events in the project area until the Miocene (Stewart 1980; Wallace 2003a). West of the Hollister Site, there are northwest and northeast striking normal faults that are consistent with crustal extension that began about 15 million years ago during the Miocene. Vertical displacement along the faults is less than 1,000 feet and fault blocks tend to tilt towards the east. The faulting and volcanism during the Miocene is related to a feature called the Northern Nevada Rift, a zone of faulting and volcanic activity that is 30 miles wide and 110 miles long and extends from Midas north of the project area to the north end of the Roberts Mountains (**Figure 3.4-5**) (Western Cordillera 2006). Although the project area is east of the defined rift area, the volcanic rocks and faulting are similar to areas inside the defined rift zone (John et al. 2000). The project area also is at the northern end of the Carlin Trend, a nearly 40-mile northwest-southeast trending group of mineral deposits generally characterized by gold deposits hosted in a variety of Paleozoic sedimentary rocks (Teal and Jackson 2002). The Carlin Trend, aside from the mineralization that is present, could be defined by structural features including high-angle northwest and northeast trending faults, anticlinal folds in the Paleozoic rocks, and collapsed breccia bodies.

The Sheep Creek Range is an uplifted block that tilts slightly to the east and was formed during Basin and Range faulting in the late Cenozoic (Wallace and John 1998). The faults bounding the range may have been reactivated Miocene faults.



Hollister Underground Mine Project EIS

Figure 3.4-5

Northern Nevada Rift Zone

02/29/12

3.4.1.4 Mineralization and Mining History Ivanhoe Mining District

The Hollister Site is located in the southern portion of the Ivanhoe Mining District (Wallace 2003a). Mineralization in the district occurs as mercury in shallow replacement silica zones or small sinter deposits, Tertiary volcanic-hosted disseminated gold deposits, and high-grade gold and silver vein deposits hosted by Vinini Formation characterize the mineralization in the district. **Figure 3.4-6** shows the older workings and prospects with respect to the Hollister area including both mercury and gold prospects and mines. The epithermal (shallow hydrothermal) gold-silver and mercury mineralization is thought to be associated with faulting and igneous activity related to the Northern Nevada Rift that was active during the Miocene (John et al. 2000). The Ivanhoe Mining District, containing the Hollister Site, also could be placed at the northern extent of the Carlin District (Teal and Jackson 2002). The mineralization at Hollister is younger than at other mines in the Carlin Trend, 14.5 to 15 million years ago for the Hollister Site as opposed to 27 to 28 million years ago for the Gold Quarry Mine. The mineralization at the Ivanhoe District was part of episodic south to north movement of mineralization along a general zone of weakness and volcanism. The Hollister Site is located between the Northern Nevada Rift zone and Carlin Trend.

Mercury Deposits

The mercury deposition occurred during silica replacement in tuff and tuffaceous units (Wallace 2003a). The ore bodies are opalite-type with cinnabar, the mercury-bearing mineral, disseminated in the opalite or fracture coatings (Bailey and Phoenix 1944). The ore bodies occurred as tabular “blanket” deposits, vein deposits, and irregular replacement bodies (LaPoint et al. 1991). Mercury was discovered in 1915 and was mined sporadically from 1916 to the 1970s. The largest producer was the Silver Cloud Mine, which reported 1,150 flasks of mercury over a period of about 40 years from ore grading an average of 5 pounds per ton (a flask contains 76.5 pounds of mercury). In addition to the Silver Cloud Mine, mercury was mined at the Velvet, Butte #1, Butte #2, and Mayflower Mines. Sections 3.2 (Past, Present, and Reasonably Foreseeable Future Actions) and 3.16 (Cultural Resources) have expanded discussions of the history of the Ivanhoe Mining District.

Tertiary Volcanic Rock Disseminated Gold Deposits

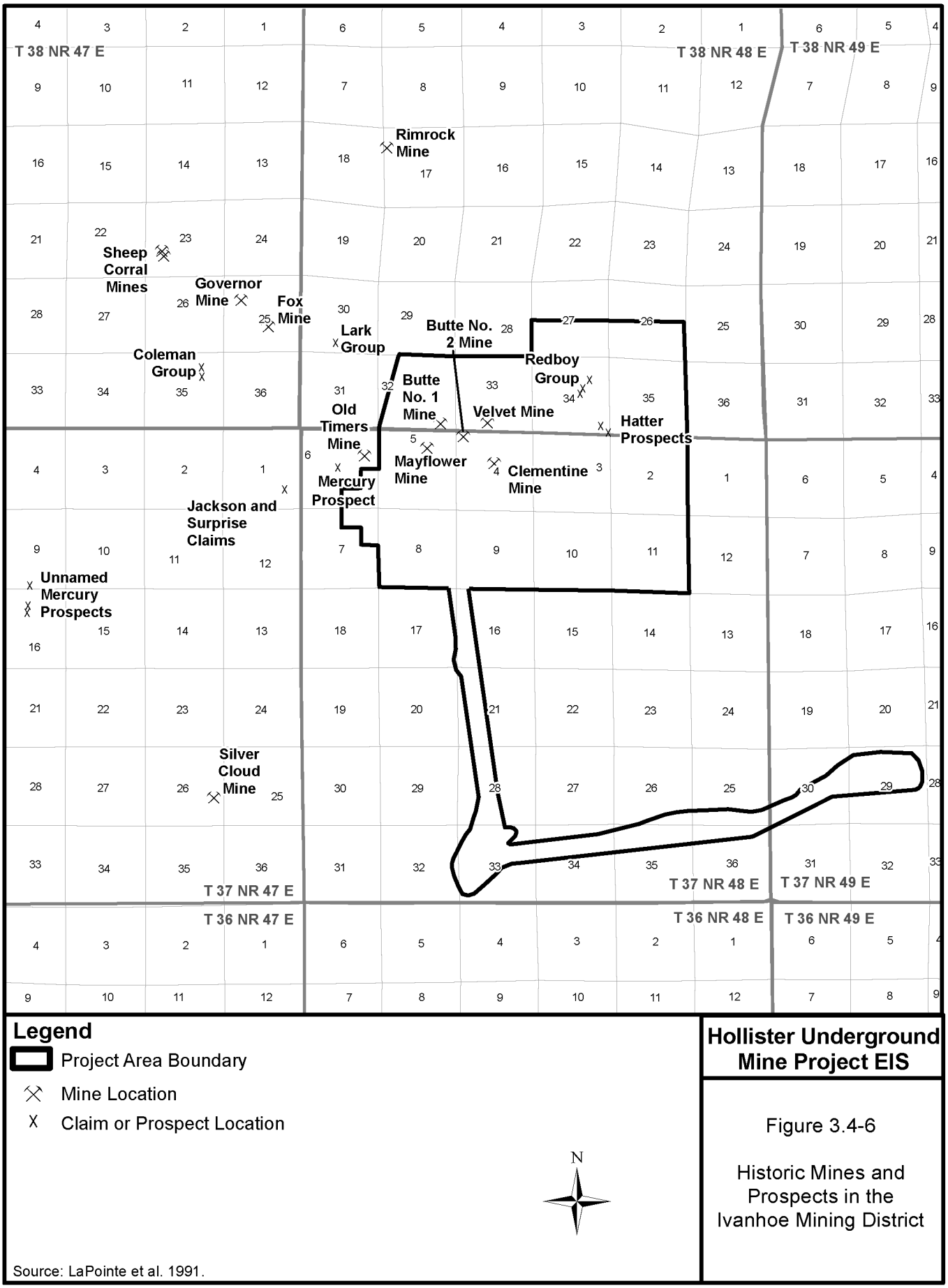
Beneath the mercury deposits are bulk mineable gold deposits that are hosted mainly by the volcanic rocks (Oelofse et al. 2009). The system is low-grade with disseminated gold occurring in tuffaceous deposits and andesite with the major ore mineral being electrum, with adularia, quartz, and chalcedony being gangue (non-ore) minerals. The Tertiary gold deposits at Hollister occur as four separate ore veins in a zone 6,500 feet long and 2,500 feet wide (LaPointe et al. 1991). The four ore bodies were the USX, Clementine, Velvet, and Butte #1. Exploration from the 1960s to the 1980s resulted in the opening of the Ivanhoe open-pit mine in 1990 (Oelofse et al. 2009). The reported production for 1990 and 1991 was 66,000 ounces of gold (Bonham and Hess 1995). Total production after residual heap leaching was concluded in 1996 was 115,696 ounces (Oelofse et al. 2009).

Ordovician Sedimentary Rock Gold Mineralization

Deeper exploration drilling in the 1990s indicated the presence of higher grade vein deposits hosted in the Vinini Formation (Oelofse et al. 2009). There are three vein systems oriented generally east-west and they appear to begin below the Tertiary-Ordovician contact 250 to 300 feet below the surface (**Figure 3.4-7**). The major vein systems are named the Clementine, Gwenivere, and South Gwenivere. The veins have banded textures created by alternating silica and clay minerals; silver alloy is present in particular bands. The gangue consists of quartz and clay.

Other Mineral Resources

The other important mineral resources in the area are barite deposits that were formed as sedimentary exhalative (SEDEX) deposits in a marine environment (Emsbo and Hofstra 2003). SEDEX deposits are formed from the injection of fluids and gases into sediments through volcanic vents in the seafloor.

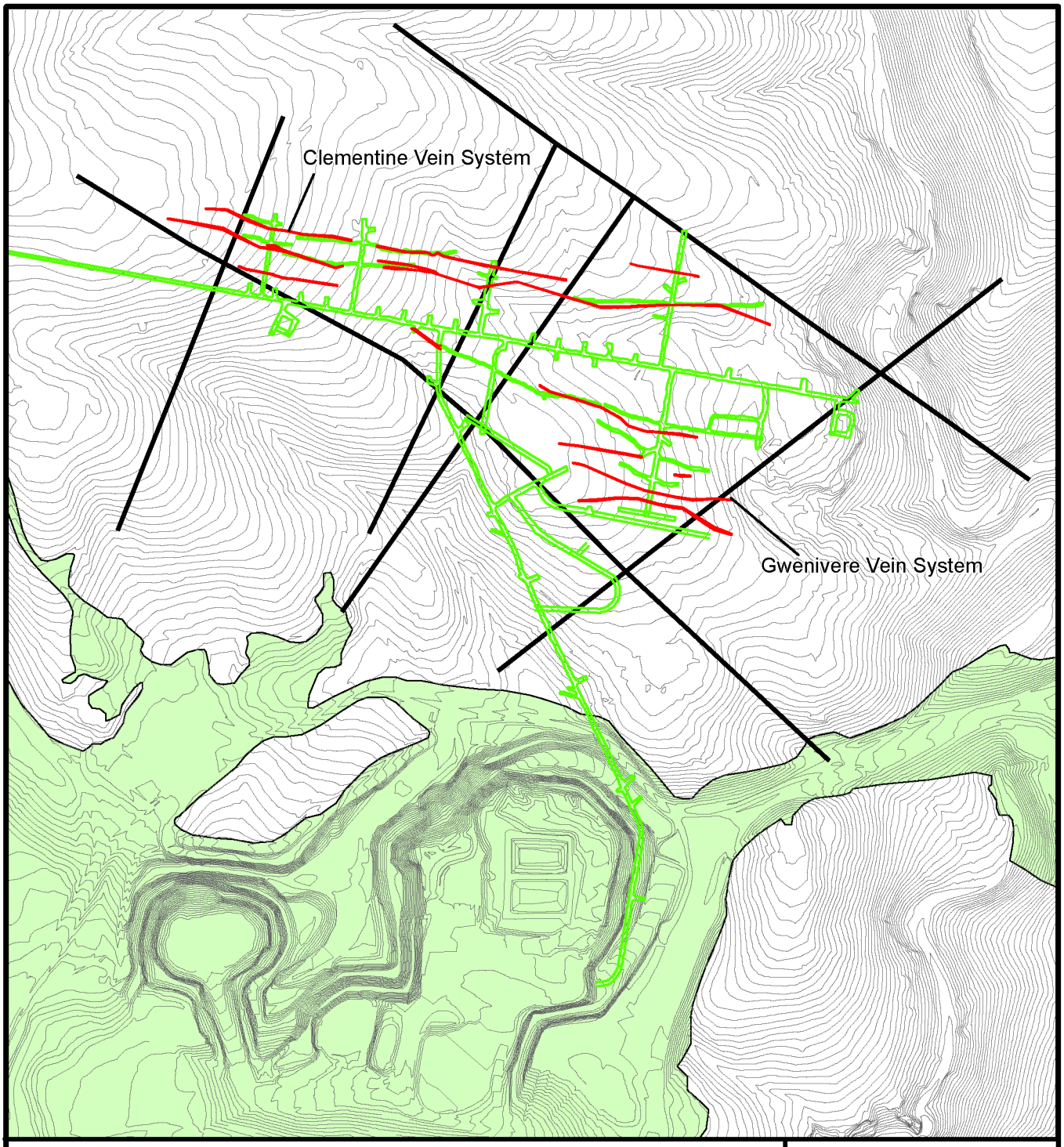


Source: LaPointe et al. 1991.

Hollister Underground Mine Project EIS

Figure 3.4-6

Historic Mines and Prospects in the Ivanhoe Mining District



Legend

- Veins
- High Angle Fault (Domains)
- Existing Underground Exploration Workings
- Existing/Reclaimed Mining Disturbance

N

0 400 800 Feet

Source: Brown and Caldwell 2010a.

Hollister Underground Mine Project EIS

Figure 3.4-7

Veins and Faults in the Project Area

1/16/2012

The Rossi Mine, located 8 miles east of the Hollister Site (Sections 14-16, 21-23, 26-28, 34-35, Township 37 North, Range 49 East) was the second largest producer of barite in Nevada in 2008 with an output of 186,138 tons (Davis 2009). Barite is primarily used as an additive for drilling fluids.

There is geothermal energy potential in northern Nevada, but there are no identified geothermal resources in the project area (Shevenell and Garside 2005).

Although the Vinini Formation can contain high levels of total organic carbon and may be a potential source rock for oil and gas (Western Cordillera 2006), no oil and gas wells have been drilled in the project area (Garside and Hess 2007).

Mineral material (gravel) sites are located near the entrance to the Town of Midas and Squaw Valley Ranch, approximately 18 miles west of the Hollister project boundary, along the Midas-Tuscarora Road. RCG has used a clay pit developed for the Hollister Development Block Project that is located along the Ivanhoe Road, approximately 3 miles south of the Midas-Tuscarora Road intersection.

3.4.1.5 Geological Hazards

Seismicity

Seismicity involves the potential hazards due to earthquakes and movement on active faults. There is little recorded seismicity in the project area. Within a 60-mile radius of the mine, earthquake activity from 1973 to the present has consisted of 47 earthquakes, of which the largest magnitude recorded was 4.6 (U.S. Geological Survey [USGS] 2010). There are Quaternary (the last 1.6 million years) faults in the project area, but no faults that are considered active (movement within the last 15,000 years) (DePolo 2008). The Quaternary faults include the Willow Creek Fault, the Southeastern Sheep Creek Range Fault, an unnamed fault zone south of Willow Creek Reservoir, and an unnamed fault near China Camp (**Figure 3.4-8**) (Adams et al. 1999; Adams and Sawyer 1999a,b; Anderson 2000). The nearest active faults are in the Shoshone Range Fault Zone that borders the northern flank of the Shoshone Range and extend into the Boulder Valley 15 miles south of the project area. Ground motion from a maximum credible earthquake event is predicted to be less than 10 percent of the acceleration of gravity, with a 10 percent probability of being exceeded in 50 years (Petersen et al. 2008).

Other Geological Hazards

The project is located in an area that has low incidence of landslides and a low landslide susceptibility (National Atlas 2009). No karst potential was identified in the area. The lack of near-surface carbonate or evaporite rocks that would be susceptible to solution and subsequent subsidence would preclude karst development.

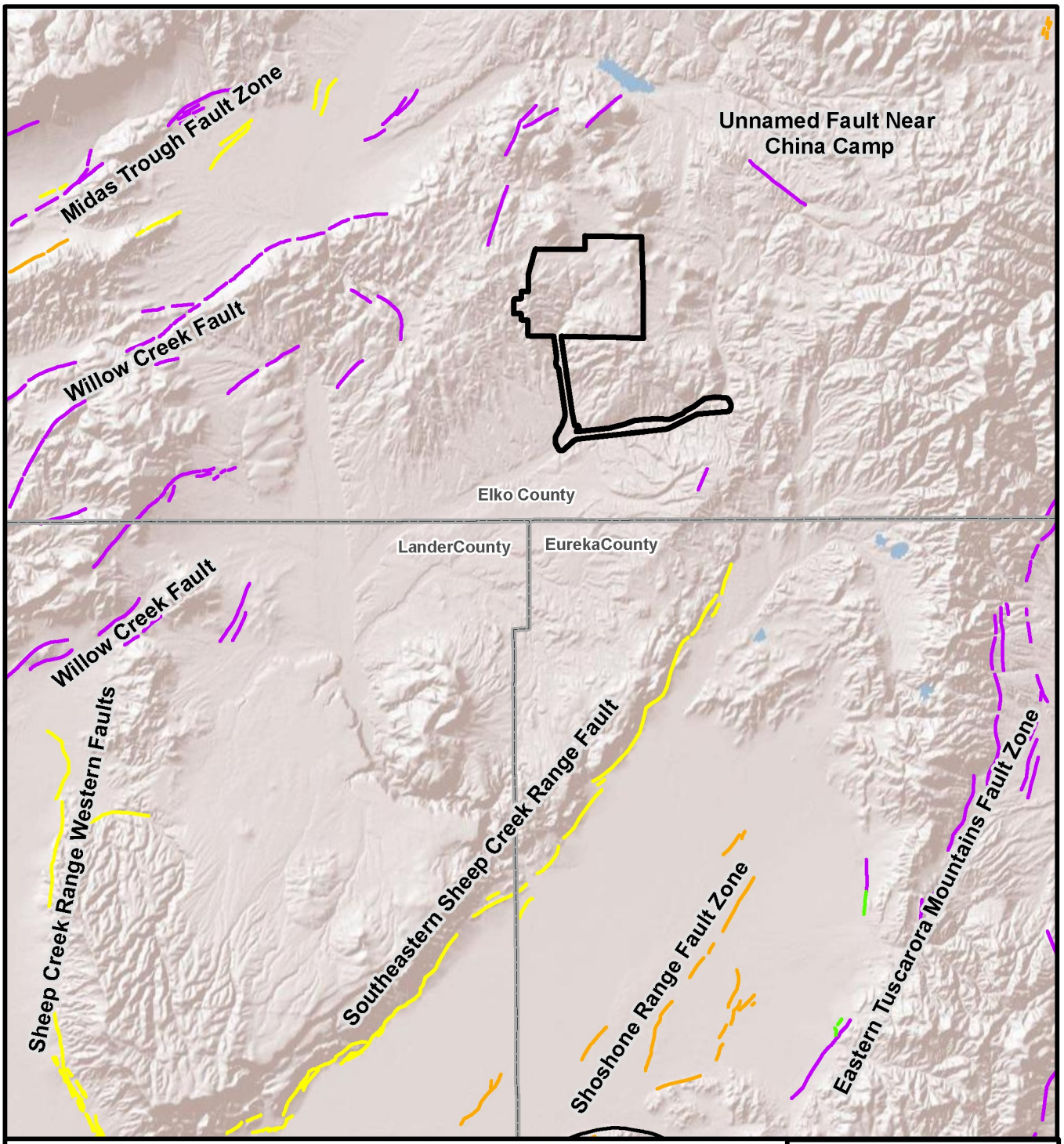
Waste Rock Storage Facility Stability

A stability analysis was not performed for the existing RCG waste rock storage facility (WRSF) in the East Pit because the WRSF is located in an open pit.

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action

Direct impacts of the Proposed Action on geologic and mineral resources would include the generation and disposal of about 2.6 to 3.7 million tons of waste rock and the extraction of 2.0 to 3.0 million tons of ore. The proposed project would have no impact to access or extraction of other mineral resources.



Legend

Project Area Boundary

Age of Faulting

- <15,000 Years Ago (Latest Pleistocene)
- <130,000 Years Ago (Latest Quaternary)
- <750,000 Years Ago (Mid-Quaternary)
- <1,600,000 Years Ago (Quaternary)

N

0 2.5 5 Miles

Source: DePolo 2008.

Hollister Underground Mine Project EIS

Figure 3.4-8

Quaternary Faults Sheep Creek Range Area

11/16/2010

The Proposed Action would create limited changes to topography mostly on pre-existing authorized mining-disturbed and reclaimed land. Because of pre-existing disturbance, the direct impacts to topography would be minimal, but permanent. The existing West Pit would be backfilled with waste rock below the rim, and through reclamation would result in a final topography closer to the original topography of the area prior to historical surface mining activities. Waste rock backfill in underground mine stopes would have no direct impact on surface topography, but would result in lessening the volume of the WRSFs and subsequent impacts to topography.

The Shoshone Range Fault Zone, 15 miles from the project area (**Figure 3.4-8**), contains potentially active faults (evidence of movement within the last 15,000 years) that could cause ground motion in the event of an earthquake. USGS ground motion hazard mapping indicates there is a low probability that ground motion presents a hazard at the site. There are no identified geologic conditions that would be exacerbated by project activities that would result in geologic hazards. The West Pit WRSF would be constructed to conform to regulatory standards to minimize potential for instability. A stability analysis would not need to be performed for the proposed West Pit WRSF because it is located inside an existing open pit, which would confine the WRSF.

3.4.2.2 Mud Springs Road Transmission Line Alternative

Impacts to geological and mineral resources for the Mud Springs Road Transmission Line Route Alternative would be the same as described for the Proposed Action.

3.4.2.3 Mud Springs Waste Rock Storage Facility Alternative

Impacts to geological and mineral resources for the Mud Springs WRSF Alternative would be the same as those described for the Proposed Action. A stability analysis would be performed for the Mud Springs WRSF if this is chosen as the Preferred Alternative.

3.4.2.4 Backfill Alternative

Impacts to geological and mineral resources for the Backfill Alternative would be the same as those described for the Proposed Action.

3.4.2.5 No Action Alternative

The No Action Alternative would have less impact on topography than the Proposed Action. A total of approximately 612,000 cubic yards of waste rock material would be generated and stored in the smaller existing WRSF compared with the Proposed Action that would construct the West Pit WRSF. Under this alternative, RCG would continue bulk sampling, test mining, and exploration as currently authorized.

3.4.3 Cumulative Impacts

The CESA for geology and minerals is shown in **Figure 3.4-2**. The past and present actions associated with mining and RFFAs in this area are identified in Section 3.2. Mining and exploration locations are shown in **Figure 3.2-2**. Other than mining and mineral exploration activities, past, present and future RFFAs would not affect geologic resources. Primary mineral production in these areas has included gold, silver, barite, and mercury (historically). Most of the mineral production has come from gold mining operations. Gravel has been mined for road construction. Surface mining activity affects geology and mineral resources by excavating, modifying, or covering natural topographic and geomorphic features and by removing mineral deposits.

Mining disturbance in the CESA includes exploration (i.e., drilling, trenching, sampling, and road construction), open-pit and underground mining, WRSFs, heap leach pads, ore milling and processing, and tailings disposal facilities. For the purposes of this evaluation, disturbed areas (or geologic disturbance) are open pits, underground mines, WRSFs, heap leach pads, and tailing impoundments

that permanently alter the natural topographic and geomorphic features in the area, even if reclaimed (**Figure 3.2-1**).

Based on available information, past, present, and reasonably foreseeable future mine, mineral exploration, and pipeline construction activities have resulted, or would result, in approximately 39,860 acres of disturbance within the geology and mineral resources CESA (Carlin Trend north of I-80) (**Table 3.2-1**). The Proposed Action would incrementally increase the permanent alteration of topography in the CESA by approximately 117 acres, in addition to the approximately 105 acres of previously authorized disturbance for a total of approximately 222 acres of disturbance. The proposed new disturbance in the CESA is 39,977 acres, less than 0.3 percent of the total projected disturbance caused by past, present, and foreseeable future activity within the CESA. In addition to cumulative impacts to topography, the proposed project potentially would remove approximately 1,000,000 ounces of gold (proven and probable reserves) (Muntean 2009). The Carlin Trend deposits have produced cumulatively 71.6 million ounces of gold by the end of 2008 and would produce up to 100 million ounces by 2018 (Price 2009).

Cumulative impacts to geological and mineral resources for the Mud Springs Road Transmission Line Alternative, Mud Springs WRSF Alternative, and Backfill Alternative, in combination with past, present, and RFFAs, would be the same as described for the Proposed Action.

3.4.4 Potential Monitoring and Mitigation Measures

No monitoring or mitigation measures are recommended because changes to geology and topography would be irreversible and permanent. The impacts to mineral resources would be an irretrievable commitment of resources.

3.4.5 Residual Impacts

Residual impacts would occur to the topography within small, localized areas within the project area due to permanent alteration of the landscape. The mined ore would be permanently removed from the area.