3.25 Energy Requirements, Climate Change, and West Nile Virus

3.25.1 Energy Requirements

Greenhouse gas (GHG) emissions associated with the proposed project would be associated primarily with the consumption of energy for mining and ore processing over the 20-year project life. Operations that would contribute to GHG emissions would include:

- Fuel consumption (vehicles and machinery); and
- Electricity consumption (machinery and water removal).

The 2008 national annual emissions of GHGs were approximately 8 billion tons United States Environmental Protection Agency (USEPA) 2008, reported in carbon dioxide (CO_2) equivalents (CO_{2e}). In Nevada, the total CO_2 emissions from all combustion sources (diesel, gasoline, coal, propane, etc.) are approximately 62 million tons (56.3 million metric tons) (Nevada Division of Environmental Protection [NDEP] 2008b). A total of 78 percent of Nevada statewide emissions of CO_2 are from electrical power generation and transportation (NDEP 2008b). Approximately 3.5 percent of Nevada CO_2 emissions, which is 2.2 million tons or 2.0 million metric tons of CO_2 per year, is from mining activities in the Carlin Trend (NDEP 2008b).

Under the Proposed Action, it is estimated that the proposed project would emit approximately 30,768 tpy (27,912 metric tons per year) of CO_{2e} GHGs, which is approximately 1.4 percent of the estimated annual CO_2 emissions from mining in the Carlin Trend. The estimated fuel and electrical power consumption for the Proposed Action and No Action Alternative are provided in **Table 3.25-1**. All alternatives, except the No Action Alternative, are anticipated to have similar GHG emissions as the Proposed Action.

The Proposed Action would reduce the direct emissions of CO_2 at the Hollister Site relative to the No Action Alternative. This reduction is due to the reduction in emissions from the generators, which under the Proposed Action would be used for backup emergency power. However, the Proposed Action indirect GHG emissions (which are the GHG emissions from electricity generation) would increase relative to the No Action when the site switches to on-line power. When accounting for both direct and indirect GHG emissions, the Proposed Action GHG emissions would increase, respectively, relative to the No Action Alternative.

3.25.2 Climate Change

GHGs consist of compounds in the earth's atmosphere that absorb outgoing long-wave radiation emitted from the earth's surface, resulting in a warming of the atmosphere. Naturally occurring GHGs include CO_2, methane (CH_4), nitrous oxide, and ozone. Although many of these gases occur naturally in the atmosphere, man-made sources have substantially increased the emissions of GHGs over the past several decades. Of the man-made GHGs, the greatest contribution currently comes from CO_2 emissions.

Table 3.25-1 Estimated Fuel and Electrical Power Consumption

Case	Diesel Consumption (gallons)	Diesel Consumption (m^3)	Propane Consumption (gallons)	Propane Consumption (m^3)	Power Consumption (kW-hour/year)	Direct GHG (tons/yr)	Indirect GHG (tons CO_{2e}/yr)[1,2]	Total GHG (tons CO_{2e}/yr)
						CO_2		
Proposed Action[3] (Stationary Sources)[4]	135,135	511.5	0	0	25,000,000	1,342	17,238	18,580
Proposed Action[3] (mobile sources)[5]	687,804	2,610.8	0	0	0	12,188	0	12,188
Proposed Action Total	822,939	3,122.3	0	0	25,000,000	13,530	17,238	30,768
No Action Alternative (stationary sources)	744,851	2,819.6	0	0	0	8,268	0	8,268
No Action Alternative (mobile sources)	295,878	1,120.0	0	0	0	1,327	0	1,327
No Action Alternative Total	1,040,729	3,939.6	0	0	0	9,595	0	9,595

[1] USEPA 2011. Greenhouse Gas Equivalences Calculator accessed May 24, 2011. http://www.epa.gov/cleanenergy/enrgy-resources/calculator.html.

[2] NVEnergy would provide electric power to the Hollister Site via the proposed electric power transmission line (transmission line).

[3] Fuel and power consumption and GHG emissions for the Mud Springs Road Transmission Line, Mud Springs Waste Rock Storage Facility, and Backfill alternatives would be similar to the Proposed Action.

[4] Calculations assume 500 hours per year for operation of the generators as backup emergency power.

[5] Calculations assume all ore is transported to the Esmeralda Mill.

Source: Rodeo Creek Gold Inc 2010f.

Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks (i.e., vegetation) cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused carbon dioxide equivalent[1] (CO_2 [e]) concentrations to increase dramatically, and are a possible contributor to overall global climatic changes (Intergovernmental Panel on Climate Change [IPCC] 2007).

Global mean surface temperatures have increased an average of nearly 1.8 degrees Fahrenheit (°F) (1.0 degree Celsius [°C]) from 1890 to 2006, with variation dependent on where measurements are reported (Goddard Institute for Space Studies 2007). Northern latitudes (above 24°N) have exhibited temperature increases of nearly 2.1°F (1.2°C) since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions. However, increasing concentrations of GHGs is likely to accelerate the rate of climate change.

At present, there is no regulatory program which requires reductions in GHG emissions. However, in response to a Supreme Court decision interpreting the Clean Air Act, on July 30, 2008, USEPA published an advance notice of proposed rulemaking addressing regulatory mechanisms for regulating GHG emissions for purposes of addressing climate change.

As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documented trends (USEPA 2008). It should be noted however, that while many in the scientific community assert that increases in global mean surface temperature are undoubtedly caused by increases in global GHG concentrations, others continue to debate this theory for varying reasons, including uncertainty in the empirical evidence and theoretical models (Waugh 2011).

A recent study provides further evidence that the earth is getting warmer. The Berkeley Earth Surface Temperature study (Berkeley 2011) found reliable evidence of a rise in the average world land temperature of approximately 1.8°F (1°C) since the mid-1950s (Science Daily 2011). Analyzing temperature data from 15 sources, in some cases going as far back as 1800, the Berkeley Earth Surface Temperature study directly addressed scientific concerns raised by climate change skeptics, including the urban heat island effect, poor station quality, and the risk of data selection bias.

Specifically, the Berkeley Earth Surface Temperature study concluded that (Berkeley 2011; Science Daily 2011):

- The urban heat island effect is locally large and real, but does not contribute significantly to the average land temperature rise. That's because the urban regions of Earth amount to less than 1 percent of the land area.
- About one-third of temperature sites around the world reported global cooling over the past 70 years (including much of the U.S. and northern Europe). But two-thirds of the sites show warming. Individual temperature histories reported from a single location are frequently noisy

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[1] Carbon dioxide equivalents represent the quantity of CO_2 that would be required to produce the same global warming potential (GWP) as any given GHG. Typically, this value is presented over a 100 year period where a given quantity (i.e., 1 pound) of CO_2 has a GWP of 1 and the same quantity of CH_4 has a GWP of 21. Therefore, given the same quantities, CH_4 has an impact 21 times greater than CO_2.

Source: American Petroleum Institute 2009.

and/or unreliable, and it is always necessary to compare and combine many records to understand the true pattern of global warming.

- The large number of sites reporting cooling might help explain some of the skepticism of global warming. In fact, it is very hard to measure weather consistently over decades and centuries, and the presence of sites reporting cooling is a symptom of the noise and local variations that can creep in. A good determination of the rise in global land temperatures cannot be done with just a few stations: it takes hundreds -- or better, thousands -- of stations to detect and measure the average warming. Only when many nearby thermometers reproduce the same patterns can we know that the measurements were reliably made.
- Stations ranked as "poor" in a survey by Anthony Watts and his team of the most important temperature recording stations in the U.S., (known as the USHCN -- the U.S. Historical Climatology Network), showed the same pattern of global warming as stations ranked as OK. Absolute temperatures of poor stations may be higher and less accurate, but the overall global warming trend is the same, and the Berkeley Earth Surface Temperature analysis concluded that there is not any undue bias from including poor stations in the survey.

Another recent study titled The Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation concluded that climate change would likely lead to global increases in extreme weather, along with heightened risks to livelihoods, human health, and infrastructure, both today and in the future (IPCC 2011). It also describes the costs -- in terms of lives lost and economic damages -- that have already occurred, plus those that would likely result from this phenomenon, and the societal implications of a warmer world, in which yesterday's extreme conditions become the new norm (IPCC 2011).

Climate change analyses are comprised of several factors including, but not limited to, GHGs, land use management practices, and the albedo effect (the fraction of solar radiation reflected by a surface or object). While emissions from mining activities may contribute to the effects of climate change to some extent, it is currently not possible to associate any particular actions with the creation of any specific climate–related environmental effects. The tools necessary to quantify climatic impacts presently are unavailable. As a consequence, impact assessments of specific effects of man-made activities cannot be determined. Therefore, climate change analysis for the purpose of this document is limited to accounting and disclosing of GHG emissions that may contribute to climate change.

3.25.2.1 Proposed Action

The proposed project would emit approximately 30,768 tpy (27,912 metric tons per year) of CO_{2e} that would incrementally add to the GHGs in the region from other sources including power plants, mining activities, industrial operations, vehicle traffic, wildfires and other activities as identified in Section 3.2, Past, Present, and Reasonably Foreseeable Future Actions. The proposed project represents 1.4 percent of the GHG emissions from all sources in the region, approximately 0.05 percent of the emissions in Nevada, and a tiny fraction of the emissions on a global basis. As a result, the proposed project would be expected to have a negligible effect on climate.

Historically, the climate in the project area (the Great Basin Desert) has been highly variable due to its location in respect to atmospheric circulation patterns and the surrounding complex topography. However, it is highly probable that temperatures in North America would rise over the next 100 years with temperatures in the western U.S. increasing between 4.5°F (2.5°C) and 10.8°F (6°C) relative to pre-1900 levels (Christiansen et al. 2007). These increased temperatures would have numerous impacts, including diminished water resources related to longer periods of drought, snowpack dissipation due to warmer temperatures (snow would occur later in the year and melt sooner) (Bureau of Reclamation 2011), and a direct effect on ozone, which has been shown to have increased ground level concentrations due to increasing temperature (USEPA 1998b).

3.25.2.2 Mud Springs Road Transmission Line, Mud Springs Waste Rock Storage Facility, and the Backfill Alternatives

The Mud Springs Road Transmission Line, Mud Springs Waste Rock Storage Facility, and the Backfill alternatives would have similar GHG emissions as the Proposed Action, and as a result, would have a negligible effect on climate.

3.25.2.3 No Action Alternative

Under the No Action Alternative, the proposed project would not be developed, and the existing exploration and bulk sampling activities at the Hollister Site would continue to operate under current authorizations and at current GHG emission levels.

3.25.3 West Nile Virus

The potential for the Proposed Action and alternatives to increase the likelihood of West Nile Virus (WNV) was evaluated, including the effects of climate change. WNV is an arbovirus typically spread by the mosquito species *Culex pipiens* and can infect numerous species including humans, birds, horses and other mammals. Typically, WNV is transmitted to humans from the bite of a mosquito that became infected by feeding on infected birds. **Table 3.25-2** shows the number of human WNV cases in Elko County, and the entire State of Nevada, over the past three years. In the past 3 years, there were a total of 27 human cases of WNV reported in Nevada with zero reported cases in Elko County (Nevada State Health Division [NSHD] 2011) and a total of 2,399 for the entire U.S. over the same timeframe (Center for Disease Control [CDC] 2011).

Table 3.25-2 Human West Nile Cases in Elko County Nevada, 2009 to 2011

	2009	2010	2011	Past 3 Years
Elko County	0	0	0	0
State of Nevada	12	2	13	27

Sources: CDC 2011; NSHD 2011.

Any human residing or working in areas where WNV activity have been identified are potentially at risk of contracting the virus. The virus itself can present in several forms ranging from West Nile Fever (a mild disease causing flu-like symptoms), West Nile Encephalitis (inflammation of the brain), West Nile Meningitis (inflammation of the membrane around the brain and spinal cord), or West Nile Meningoencephalitis (inflammation of the brain and the surrounding membrane). However, many individuals who become infected with WNV would experience no symptoms. Of those that become infected, 1 in 5 would develop mild flu-like symptoms and only 1 in 150 would contract more serious symptoms. Individuals infected with the more serious illnesses as a result of WNV typically see a fatality rate ranging from 3 to 15 percent with the highest number of fatalities in the elderly.

The mosquito can potentially breed in any environment with stagnant, shallow, or slow moving water.

3.25.3.1 Proposed Action

The Proposed Action utilizes the same water collection and disposal facilities as the No Action Alternative and includes the existing North Surge, South Recycle, and storm water ponds; storm water diversion ditches; and the Rapid Infiltration Basins (RIBs). The storm water pond and diversion ditches only contain water on a temporary basis after storm water runoff or snowmelt events. The RIBs are designed to infiltrate excess mine water into the alluvium and do not hold standing water on a permanent

basis. As a result, the storm water pond, diversion ditches, and RIBs do not support mosquito breeding habitat. The North Surge and South Recycle ponds contain water and potentially could support mosquito breeding habitat; however, the risk of contracting WNV at the Hollister Site and in Elko County is very low (**Table 3.25-2**).

The Proposed Action would not be creating any additional ponds that potentially could increase the likelihood of humans contracting WNV over the No Action Alternative. The proposed NPDES discharge of excess mine water into Little Antelope Creek potentially could result in minor, additional marginal pooled habitats that could be suitable for mosquito breeding habitat compared with the No Action Alternative. Most of the discharged water would be flowing down Little Antelope Creek due to stream gradient and would result in poor breeding habitat for mosquitoes. Eventually the discharged water would evaporate or infiltrate into the alluvium. Discharge of excess mine water into Little Antelope Creek is not expected to result in an increase in the incidences of WNV over the No Action Alternative given the low rate of water discharge (up to 1,100 gallons per minute maximum), arid climate, poor mosquito breeding habitat along the creek, and low potential of contracting WNV in Elko County (**Table 3.25-2**).

The existing West Pit sometimes has standing water at the bottom of the pit due to the proximity of the perched aquifer to the base of the pit. The West Pit would be backfilled with waste rock under the Proposed Action. As a result, this potential mosquito breeding habitat would no longer be available under the Proposed Action.

3.25.3.2 Mud Springs Road Transmission Line, Mud Springs Waste Rock Disposal Facility, and Backfill Alternatives

These alternatives would have the same very low risk of spreading WNV as the Proposed Action.

3.25.3.3 No Action Alternative

As demonstrated by **Table 3.25-2**, there have been no reported human WNV cases in the immediate project area in the prior 3 years. This is primarily due to the environment not being hospitable for *Culex pipiens* due to the arid climate and lack of suitable habitats. Standing water at the Hollister Site is very infrequent, thus limiting the breeding habitat for *Culex pipiens*. Any wet areas of potential habitat at the site would typically dry out within a few days. The risk of workers and visitors to the Hollister Site contracting WNV is very low.

3.25.3.4 West Nile Virus and Climate Change

As mentioned previously, temperatures in the western U.S. are predicted to increase between 4.5°F (2.5°C) and 10.8°F (6°C) over the next 100 years relative to pre-1900 levels (Christiansen et al. 2007). Potential impacts associated with increasing temperatures include diminished water resources related to longer periods of drought that could result in less mosquito habitat and resulting reduced risk of contracting WNV.