3.16 Hazardous Materials and Solid Waste

The study area for direct and indirect impacts to hazardous materials and solid waste is defined as the existing Phoenix Project, the proposed POO expansion areas, and the main transportation routes to the mine, including I-80 from Elko to the Town of Battle Mountain, SH 305 from I-80 to the mine access road, and the access roads to the mine site and related facilities from SH 305. The CESA for hazardous materials and solid waste encompasses a modified Battle Mountain Mining District boundary (**Figure 3.1-1**).

3.16.1 Affected Environment

The study area for hazardous materials includes air, water, soil, and biological resources that potentially could be affected by an accidental release of hazardous materials during transportation and use in the proposed project and existing processes. The generation of TENORM also is a concern for air, water, soil, and biological resources. Description of the study area includes the current mining use of hazardous materials and solid waste generation. Also, the potential presence of uncontrolled hazardous materials or substances due to historical mining activities is part of the affected environment for hazardous materials and solid wastes.

3.16.1.1 Hazardous Materials

<u>Regulatory Definitions of Hazardous Materials</u>

"Hazardous materials," which are defined in various ways under a number of regulatory programs, can represent potential risks to both human health and the environment when not properly managed. The term "hazardous materials" includes materials that may be utilized, disposed, or generated in conjunction with the proposed project operations. Hazardous materials are defined and regulated under the following regulatory programs:

- Chemicals covered under Occupational Safety and Health Administration (OSHA) and MSHA Hazard Communication Standards (29 CFR 1910.1200 and 30 CFR 42).
- "Hazardous materials" as defined under USDOT regulations in 49 CFR, Parts 170-177.
- "Hazardous substances" as defined by CERCLA and listed in 40 CFR Table 302.4.
- "Hazardous wastes" as defined in Resource Conservation and Recovery Act (RCRA): Procedures in 40 CFR 262 are used to determine whether a waste is a hazardous waste. Hazardous wastes are regulated under Subtitle C of RCRA.
- Any "hazardous substances" and "extremely hazardous substances" as well as petroleum products such as gasoline, diesel, or propane, that are subject to reporting requirements if volumes on-hand exceed threshold planning quantities under Sections 311 and 312 of Superfund Amendments and Reauthorization Act (SARA).
- Petroleum products defined as "oil" in the Oil Pollution Act of 1990. The types of materials used in mining activities that would be subject to these requirements include diesel, lubrication fuels, and hydraulic oil.
- TENORM are regulated under the authority of the USEPA under a variety of programs including Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), CAA, Safe Drinking Water Act, and CWA (USEPA 2000). In addition, under an agreement between the State of Nevada and the U.S. Nuclear Regulatory Commission, TENORM is regulated by the Nevada Bureau of Health Protection Services. TENORM concentration has the potential to occur in copper processing.

In conjunction with the definitions noted above, the following lists provide information regarding management requirements associated with the transportation, storage, and use of particular hazardous chemicals, substances, or materials:

- The SARA Title III List of Lists or the Consolidated List of Chemicals Subject to Emergency Planning and Community Right-to-Know Act and Section 112(r) of the CAA.
- The USDOT listing of hazardous materials in 49 CFR 172.101.

Pursuant to regulations promulgated under CERCLA, as amended by SARA, release of a reportable quantity of a hazardous substance to the environment must be reported within 24 hours to the National Response Center (40 CFR Part 302). The NAC (445A.347) also requires immediate reporting of a release of a reportable quantity of a hazardous substance to the Nevada Division of Emergency Management. In addition, under the State of Nevada WPCP program, all releases of a reportable quantity must be reported as soon as possible, but not later than 24 hours after the event, to the NDEP Bureau of Corrective Actions. Nevada regulates the storage and handling of certain defined “highly hazardous substances” under NAC 459.952-459.9542.

Present Use of Hazardous Materials

The currently permitted mining and ore processing operations require the use of the following materials classified as hazardous. Typical hazardous materials used during mining include, but are not limited to, the following:

- Diesel fuel, gasoline, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Sodium cyanide, sodium hydroxide, acid, flocculants, lime, and antiscalants used in mineral extraction processes; and
- Ammonium nitrate and high explosives used for blasting in the open pits.

The types of chemicals, hazardous materials, and annual volumes used in the current mining and processing operations are listed in **Table 3.16-1**.

Table 3.16-1 Chemicals and Hazardous Materials Used in the Existing Phoenix Mine in 2010

Name	Annual Usage
Acetylene	84,840 cu ft
Ammonium nitrate (prill)	17,695,800 lbs
Antifreeze	44,832 gal
Antiscalant	360,428 lbs
Caustic	1,660,709 lbs
Collector 6221	65,000 lbs
Cyanide	5,594,891 lbs
Diesel	6,961,200 gal
Electronic detonator	62,862 ea
Emulsion	9,577,396 lbs
Flocculant	186,807 lbs

Table 3.16-1 Chemicals and Hazardous Materials Used in the Existing Phoenix Mine in 2010

Name	Annual Usage
Frother 501	119,418 lbs
Gasoline	144,720 gal
Heavy ANFO	20,449,995 lbs
Hydrochloric acid	844,408 lbs
Hydrogen peroxide	4,437,816 lbs
Lead Nitrate	167,571 lbs
Natural Gas BTU	29,665 lbs
Oxygen	311,472 cu ft
Potassium Amyl Xanthate (PAX)	364,366 lbs
Pentrite (as blasting cap/delays)	31,431 ea
Pentrite (as detonating cord)	3,143,095 ft
Pentrite (as explosive booster)	94,293 ea
Propane	6,954 lbs
Sulfuric acid	60,610,944 lbs

Source: Burt 2011.

3.16.1.2 Solid Waste

Regulatory Definition of Solid Waste

Solid waste consists of a broad range of materials that include garbage, refuse, wastewater treatment plant sludge, non-hazardous industrial waste, and other materials (solid, liquid, or contained gaseous substances) resulting from industrial, commercial, mining, agricultural, and community activities (USEPA 2006). Solid wastes are regulated under different subtitles of Resource Conservation and Recovery Act (RCRA) and include hazardous waste and non-hazardous waste. Non-hazardous wastes are regulated under RCRA Subtitle D. Disposal of solid waste is regulated under NAC 444.570-444.7499; disposal of hazardous waste is regulated under NAC 444.850-444.8746.

Certain types of materials, while they may contain potentially hazardous constituents, are specifically exempt from regulation as hazardous wastes. Used oil, for example, may contain toxic metals, but would not be considered a hazardous waste unless it meets certain criteria. TENORM produced from the extraction and processing of ores is specifically exempt from regulation as hazardous waste (USEPA 2000). Other wastes that might otherwise be classified as hazardous are managed as “universal wastes” and are exempt from hazardous waste regulation as long as those materials are handled in ways specifically defined by regulation. An example of a material that could be managed as a universal waste is lead-acid batteries. As long as lead-acid batteries are recycled appropriately, requirements for hazardous waste do not apply.

Existing Solid Waste Generation

The Phoenix Mine has an active waivered Class III waivered landfill located in Section 27, T31N, R43E (BLM 2002a). The landfill is used to dispose of empty containers, office waste, and other non-hazardous

solid wastes allowed under the landfill permit. Non-hazardous solid waste that is not disposed in the on-site landfill is taken to the Battle Mountain municipal landfill.

The Phoenix Mine facility currently is listed as a small quantity generator of hazardous waste, (USEPA 2008a). Hazardous waste generation is sporadic and recent shipments of hazardous waste have included two 55-gallon drums of painting waste, 10 broken lead-acid batteries, and 40 cylinders of polyurethane spray foam (Orr 2008).

3.16.1.3 Uncontrolled Hazardous Materials

Mining in the proposed project area began in the 1860s and there is the potential concern for uncontrolled releases of hazardous materials to have occurred in association with historic mining and milling activities. Federal and state incident databases were reviewed to determine the presence of sites in the study area that could pose potential concerns. USEPA databases that were reviewed include Superfund, RCRA Corrective Action, and Brownfields cleanup (USEPA 2008a,b). NDEP cleanup and leaking underground storage tank incident lists also were reviewed (NDEP 2008c,d). No spills requiring remediation were listed for the Phoenix Mine and no historic contamination concerns were documented in the databases that were reviewed.

3.16.1.4 Technologically Enhanced Naturally Occurring Radioactive Materials

TENORM has been associated with copper ore processing. Radionuclides such as uranium can be present in ore, but generally are widely dispersed and do not pose a concern (USEPA 2007). Processing of copper ores, however, can result in the concentration of radionuclides. Copper production processes that can create TENORM include, but are not limited to, leaching, solvent extraction, and milling. The USEPA's study of copper production facilities in Arizona indicated concentration of radioactive materials at widespread sites in the Arizona copper belt (USEPA 1999). In addition, TENORM has been found at the abandoned Yerington Copper Mine in Lyon County, Nevada, where copper processing took place over a nearly 50-year period (NDEP 2005).

In order to determine a background concentration of uranium, Newmont analyzed thousands of whole rock samples for uranium. A mean of 1.23 parts per million (ppm) was obtained from the sample population (Newmont 2007c). The analytical results did not differentiate between isotopes of uranium and are assumed to be total uranium values. The average total concentration translates into an average activity of 0.84 picoCuries per gram (pCi/g) (USEPA 1999). For comparison purposes, **Table 3.16-2** shows the average levels of uranium found in various earth materials. The levels of uranium indicate that the background levels from whole rock samples are low compared to the averages shown; however, the background analytical results are not necessarily indicative of the potential to concentrate the naturally occurring uranium into TENORM.

Table 3.16-2 Average Background Levels of Uranium in Selected Earth Materials

Material	Uranium – Total Range (pCi/g)
Granite	2.06 – 3.30
Shale	2.20
Dirty (clayey) sandstone	1.38 – 2.06
Carbonates (limestone and dolomite)	0.68 – 1.37
Soils	1.23
Crustal average	1.92

Source: USEPA 1999.

It should be noted that the ore deposits at the Yerington Copper Mine showed a predisposition for the production of TENORM as indicated by analyses published in 1954 that indicated the presence of uranium-containing radioactive minerals and Geiger surveys that showed counts as much as four times above background at the Yerington property (USEPA 2010a). A feasibility study indicated that as much as 50,000 pounds of yellowcake uranium could be extracted from the copper processing at Yerington. No radioactive mineral occurrences have been identified in the Phoenix Project area (Garside 1979, 1973; Garside and Davis 2006).

3.16.2 Environmental Consequences

The primary issues concerning hazardous materials include the: 1) potential for an accident during transport; and 2) potential impacts of accidental hazardous materials spills or releases.

The criterion for evaluating hazardous materials impacts is the risk of a potential spill and the associated impacts to sensitive receptors along transportation routes or exposure pathways.

To determine the potential for the formation of TENORM during the proposed copper leaching operations, bulk samples of run-of-mine copper-bearing rock were obtained from various sites at the Phoenix Mine for column leach testing. Based on the test results, uranium was detected in the bulk copper-bearing rock samples and in the column leach pregnant solutions and residues. The results are summarized in **Table 3.16-3**.

Table 3.16-3 Uranium Analysis Results for Copper-bearing Rock Leach Bulk Samples (pCi/g[1])

	Harmony Oxide	Pumpernickel Partial Leach	TAG Oxide	TAG Partial Leach	Harmony Partial Leach	Pumpernickel Oxide
Leach Bulk Samples	0.32	0.29	0.51	0.43	0.21	0.20
Leach Pregnant Solution[2]	0.18	1.72	4.49	3.39	1.93	1.24
Leach Residues	0.48	0.30	<0.1	<0.1	<0.1	<0.1

[1] Laboratory analyses originally reported in ppm and converted to pCi/g using the conversion 1 ppm = 0.69 pCi/g for uranium (USEPA 1999).

[2] Average of monthly composites.

Source: Newmont 2007c.

3.16.2.1 Proposed Action

Hazardous Materials

The proposed project would require the transport, handling, storage, use, and disposal of materials classified as hazardous under various regulatory frameworks. All hazardous materials would be shipped to and from the mine site in accordance with applicable USDOT hazardous materials regulations. All shipping containers and vehicles would be USDOT-approved for the specific materials. A brief description of the storage, use, and spill response for hazardous materials during operations under the Proposed Action is presented in Section 2.3.10.9, Spill Prevention and Emergency Response. The proposed rates of use and storage volumes of these substances are listed in **Table 2.3-5**.

Transportation. The BLM provided an analysis of the potential transportation risk for the Phoenix Project Final EIS (BLM 2002a). The materials of concern included diesel fuel and sodium cyanide, the major hazardous materials in terms of volume used at the mine site. The analysis indicated that there would be a very low risk for the release of these hazardous materials during transportation. For the transportation risk analysis for the proposed project, sulfuric acid would be the material of greatest concern because of the quantity, number of deliveries, and potential hazard. A risk analysis of the diluent also was conducted. The diluent is a kerosene-based material and second to sulfuric acid in terms of volume of use.

The chemical reagents most likely would be supplied from Elko, Nevada, and the transportation route would be on I-80 from Elko to SH 305, and then south on SH 305 to the mine access road. The Humboldt River would be the major surface water body along this route. The distance from Elko to the mine is approximately 93 miles. Based on the proposed annual consumption rates shown in **Table 2.3-5**, an approximate load delivery frequency for the materials can be determined. This analysis assumes a 23-year time period during which copper ore processing would occur.

In order to evaluate the potential impact of the transportation of hazardous materials to the mine site, the risk of a transportation accident resulting in a release of hazardous materials was estimated. Accident rates were derived from national statistics for truck accidents that involve hazardous materials as published by the Federal Motor Carrier Safety Administration (Battelle 2001). Considering sulfuric acid, the accident rate provided in **Table 3.16-4** is for a category of hazardous materials defined as corrosives. The accident rate is based on 1996 data (Battelle 2001) and includes accidents involving releases and non-releases of hazardous cargo. The accident rate for corrosive materials was 0.13 per million miles traveled. Using this rate, the potential number of transportation-related incidents for this material occurring over the life of the project is shown in **Table 3.16-4**. The potential number of releases shown in the table indicates that there would be a low probability of an accident involving the release of hazardous materials during the operational period of the proposed project. A similar analysis was performed for the diluent. Since it is kerosene-based, it belongs in the hazard class category of flammable and combustible liquids. As shown in **Table 3.16-4**, the probability of an accident and a release of the material over the lifetime of the project is very low. If only Phase I is completed, the probability of an accidental release of a hazardous material would be even lower.

Hazardous substances would be transported by commercial carriers or vendors in accordance with the requirements of Title 49 of the CFR. Carriers would be licensed and inspected as required by Nevada Department of Transportation and USDOT. Tanker trucks would be inspected and have a Certificate of Compliance issued by the Nevada Motor Vehicle Division. These permits, licenses, and certificates are the responsibility of the carrier. Title 49 of the CFR requires that all shipments of hazardous materials be properly identified and placarded. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

Storage and Use. Newmont has developed an Emergency Response Plan (Newmont 2010a) to respond to spills of hazardous materials at the mine site. This plan describes the required level of containment and safety measures associated with storage, handling, and spill clean-up of materials that may include diesel, cyanide, corrosives, and organic chemicals. Operations conducted in accordance with this plan would ensure that impacts from spills would be minimized and the spilled materials contained and removed. Newmont would have the necessary spill containment and cleanup equipment available on-site, and personnel would be able to respond quickly.

Table 3.16-4 Potential Number of Releases Caused by Transportation Accidents

Material	Annual Usage	Shipment Quantity	No. of Shipments[1]	Distance (miles)	Accident Rate per Million Miles[2]	Calculated Number of Accidents (distance) x (accident rate/1.0 million miles)	Probability of Release per Accident[3]	Calculated Number of Potential Releases
Sulfuric Acid	162,000 tons	20 tons	186,300	17,325,900	0.13	2.25	0.28	0.63
Diluent	225,000 gallons	10,000 gallons	518	48,128	0.50	0.024	0.36	0.01

[1] Shipments during 23 years of copper ore processing.

[2] The rate includes releases and non-releases (Battelle 2001). Release means a leak or spill, not a regulatory defined reportable quantity.

[3] Releases during accidents; does not include loading and unloading incidents (Battelle 2001).

In the event of a major or minor spill of hazardous materials occurring on-site, the Emergency Response Plan establishes procedures for preventing, controlling, and reporting environmental releases within or from the proposed project. The Emergency Response Plan provides the following information concerning the facility and emergency response procedures:

- Identification of responsible personnel and emergency response team;
- Resources on-site to deal with spills including process controls, secondary containment, and available equipment;
- Description of specific procedures for process materials for the neutralization, cleanup, and disposal of spilled material and impacted media;
- Spill reporting procedure;
- Identification of individuals to be contacted;
- A description of immediate containment measures; and
- Response in case of an earthquake.

The proposed copper processing facilities have been designed to minimize the potential for an upset that could result in a major spill and are described in Section 2.3.3, Copper Heap Leach Facilities.

Hazardous substances would be handled in accordance with applicable MSHA or OSHA regulations (Titles 30 and 29 of the CFR). The hazardous materials used for the proposed project would be handled as recommended on the manufacturer's Material Safety Data Sheet. Based on the facility's design features and the implementation of the Emergency Response Plan, the probability of a major release occurring at the mine site during the life of the proposed project is considered to be low.

Potential Effects of a Spill. The environmental effects of a release would depend on the material released, the quantity released, and the location of the release. The accident/release statistics presented in **Table 3.16-4** assume an accident involving a hazardous material transporter, but do not address volume or location. Potential spills could range in magnitude from a few gallons of material spilled during

transfer operations at the mine site to the loss of several thousand gallons into a riparian drainage as a result of a transportation accidental release.

A large-scale release of hazardous material would have implications for public health and safety. The location of the release would be the primary factor in determining its importance. A release in a populated area could have effects ranging from simple inconvenience during cleanup to potential loss of life if an explosion and fire were involved; however, as shown in the analysis above, the probability of a release anywhere along a transportation route is very small, the probability of a release within a populated area is smaller, and the probability of a release involving an injury or fatality is smaller still. USDOT statistics show that for the State of Nevada between 1993 and 2007, 0.01 injuries or deaths occurred for each hazardous materials highway incident (USDOT 2008). It is not anticipated that a release involving severe effects to human health or safety would occur during the life of the project.

The release of a hazardous material or waste into a sensitive area (e.g., stream, wetland, or populated area) is assumed to be very unlikely. Depending on the material, amount, and location of the release, an accident could affect soils, water, biological resources, and the public.

Response to a Spill. According to the Emergency Response Plan, any hazardous material spilled and affected media would be cleaned up and disposed according to the nature of the material (Newmont 2010a). Appropriate health and safety measures would be used to reduce the potential for personal exposure and lessen fire and explosion risk. Engineering controls (such as containment) would be used to prevent movement of materials beyond the immediate vicinity of the spill. If a reportable quantity is released beyond the facility and results in potential exposure of the public, the Local Emergency Planning Committee would be notified.

The Emergency Response Plan covers all hazardous materials including petroleum-based materials that would be stored and used at the mine site. A SPCC Plan was not developed for petroleum because Newmont has made the determination under 40 CFR 112 that potential discharges of oil would not impact jurisdictional or navigable waters of the U.S. (Newmont 2010a).

In the event of a hazardous materials release en-route to the mine site, the transportation company would be responsible for response and cleanup. Law enforcement and fire protection agencies also may be involved to initially secure the site for protect public safety. Hazardous materials transporters are required to maintain an Emergency Response Plan, which details the appropriate response, treatment, and cleanup for a material spilled onto land or into water. Specific procedures would be developed for fuels, acids, and other hazardous materials. For example, a spill of sulfuric acid may require neutralization, flushing the affected area with water, and removing contaminated soil. Cleanup would be followed by appropriate restoration of the disturbed area, which could include replacing removed soil, seeding the area to prevent erosion, and returning the land to its previous use.

Solid Waste

The proposed project would generate non-hazardous solid waste as described in Section 2.3.10.8, Waste Management. The crud solids and montmorillonite clay would be returned to the heap leach pads. In addition to the materials listed, empty material containers would be cleaned and disposed of in the on-site landfill or other permitted disposal site.

The lead sludge would be shipped back to the anode supplier for recycling. It is estimated that 15,000 pounds, or 60 drums, per year would be generated from the proposed project.

Technologically Enhanced Naturally Occurring Radioactive Materials

Based on the analytical results present in **Table 3.16-3**, there is a low potential for the concentration of TENORM as a result of the proposed copper leaching and extraction; however, if TENORM were to be concentrated, it has the potential to occur in leached materials, processing wastes, and process piping

and equipment. Newmont has indicated that monitoring for radionuclides in various process areas will occur during active operations (Newmont 2010a). The quarterly testing and monitoring for uranium, radium and gamma ray activity at various process areas will be implemented as described in Section 2.5.8, Applicant-committed Environmental Protection Measures, Hazardous Materials. In addition, Newmont has committed to gamma ray monitoring of E-ponds during closure operations. Monitoring will occur quarterly when workers are performing regular maintenance or monitoring of E-ponds. A one-time gamma meter measurement survey would occur at each E-pond upon closure. The monitoring would provide an indication if TENORM is being concentrated over time. No thresholds of radioactivity are currently proposed, and if radioactivity is shown to increase over time, the BLM would consult with appropriate regulatory agencies such as NDEP, USEPA, or MSHA to determine a course of action that would be protective of public health and environment as part of ongoing operations or actions to be implemented during reclamation.

3.16.2.2 Reona Copper Heap Leach Facility Elimination Alternative

The Reona Copper Heap Leach Facility Elimination Alternative would be the same as the Proposed Action, except that the proposed Reona Copper HLF and associated infrastructure (i.e., solution pipelines) would not be developed. The Reona HLF (Gold) would continue to operate under current permitted authorizations. All other direct and indirect impacts associated with the proposed project would be the same as described for the Proposed Action.

3.16.2.3 No Action Alternative

Under the No Action Alternative, the proposed Phoenix Copper Leach Project would not be developed and the associated effects would not occur. Potential impacts from hazardous materials and solid waste previously were discussed and analyzed in the Phoenix Project Final EIS (BLM 2002a). The current mining and mineral processing operations would continue, and the reagents and materials required for copper processing would not be brought on-site. Solid waste generation also would continue to be generated by the existing operations as described in the preceding discussion. In addition, the potential to concentrate natural uranium into TENORM would not be a concern.

3.16.3 Cumulative Impacts

The CESA for hazardous materials and solid waste is shown in **Figure 3.1-1**. Past and present actions and RFFAs are identified in **Table 2.8-1**; their locations are shown in **Figure 2.8-1**.

The Proposed Action incrementally would increase the amount of hazardous materials transported, stored, and consumed on-site. Solid waste that is generated also would increase. There would not be a noticeable increase in traffic along I-80; however, an expected 22 tankers per day of sulfuric acid delivery would be a sizable incremental increase in traffic along SH 305 during an expected 23 years of copper processing. Given the low probability of a hazardous material release and based on proper implementation of the Emergency Response Plan, the potential for cumulative impacts resulting from a release of hazardous materials would be low. No cumulative impacts are anticipated from the generation of solid waste.

3.16.4 Monitoring and Mitigation Measures

No significant impacts for hazardous materials, solid waste, or TENORM were identified; therefore, no additional monitoring and mitigation measures are recommended. Under this alternative, mining activities associated with the existing Phoenix Project would continue under the terms of current permits and approvals as authorized by the BLM and State of Nevada.

3.16.5 Residual Adverse Effects

Residual adverse effects have the potential to occur during the transportation of hazardous materials to the mine site and through spills that may occur during handling on-site. Although highly unlikely, residual

adverse effects from the release of hazardous materials would depend on the substance released, amount, location, and response. Prompt cleanup of spills and releases would minimize the potential for residual adverse effects from spills and releases.

If copper processing generates TENORM in amounts that pose a potential threat of exposure to people or wildlife, there may be long-term residual adverse effects. These effects would be lessened by identification of where TENORM would be concentrated in the process and how it would be mitigated in the proposed reclamation of mining facilities.