

STATE OF WYOMING AML PROJECT 9B-2 CARISSA GOLD MINE EVALUATION EXECUTIVE SUMMARY

INTRODUCTION

In August 2003, PHC Reclamation, Inc. (PHC-REC), together with its subconsultants TriHydro Corporation and Forsgren Associates, performed an inventory and assessment of the physical and environmental hazards associated with the Carissa Gold Mine property. The property contains approximately 216.46 acres and is located approximately 30 miles south of Lander, Wyoming in Fremont County, Wyoming.

The purpose of the Carissa Gold Mine Evaluation is to provide the Wyoming Department of Environmental Quality, Abandoned Mine Land Division (AML) with a report complete with detailed discussions including the investigative and inventory methods used, findings, methods of hazard mitigation, recommendations, and estimated costs to restore the Carissa Gold Mine property to acceptable levels of public safety. The AML will report the findings to the Governor of the State of Wyoming, the Joint Minerals, Business and Economic Development Interim Committee and the Wyoming Parks and Cultural Resources Commission. The report will be utilized to make the determination whether or not the property should be purchased by the State of Wyoming to be preserved as a historical site.

This summary will provide an overview of the work performed and briefly describe the project scope of work, the major work tasks completed, the recommended design concepts and the Engineer's cost estimates to mitigate hazards. The complete Report of Investigation (ROI), "CARISSA GOLD MINE EVALUATION" provides detailed information of all work performed, procedures used, findings, and recommendations and cost estimates.

HISTORICAL BACKGROUND

The foothills of the Wind River Mountains in central Wyoming are dotted with what remains of the gold rush that hit the area in 1867. Several ghost towns and deserted mines echo the triumph and failures of the masses of 19th century prospectors that populated the area.

At the center of the gold rush were the boomtown of South Pass City, and the nearby Carissa Gold Mine. Discovery of the Carissa Lode in June 1867 resulted in the South Pass gold rush, Wyoming's largest 19th Century mining boom. The area surrounding the Carissa Lode was originally named the Sweetwater Mining District. The Carissa Gold Mine was considered the flagship property of the Sweetwater Mining District throughout the mining booms. It had the largest extent of workings, mined the greatest tonnage, had the largest mill, and was the biggest producer of gold of all the mines in the district. Total gold production is estimated to be between 50,000 to 180,000 ounces.

Nestled in a small valley below the Carissa Gold Mine is South Pass City. As one walks along the main street, it is not hard to imagine the town in its heyday. For the rough and rowdy citizens of the old west, the jail on the south end of town was an absolute necessity. High on a hill east of town was a small one-room schoolhouse, and of course no town in the old west would have been complete without a "Boot Hill." The South Pass City cemetery is located on a rise just west of town.

This frontier community played an important role in Wyoming politics. In the first territorial legislative, William Bright, a saloonkeeper, mine owner, and a representative from South Pass City wrote and introduced a woman's suffrage bill. Wyoming became the first state or territory to allow women the right to vote and hold office when the Governor signed the bill in December of 1869.

In February of 1870, Esther Morris became the town's Justice of the Peace; this made her the nation's first female judge. Her appointment was the subject of controversy in South Pass City, but nevertheless she was successful.

Though South Pass City had a short existence, during its life the Carissa Gold Mine produced millions of dollars in gold and made a handful of people very wealthy. All that remains of the Sweetwater mining district is a few ghost towns and the Carissa Gold Mine. The Carissa Gold Mine and South Pass City area is the perfect place to get an authentic taste of the old west.

In 1966, the Wyoming's 75th Anniversary Commission purchased South Pass City, as a birthday present for the citizens of the state, thus ensuring that the town's storied history would not end up like so many others of its kind. Now a historic site, South Pass City has enjoyed 35 years of unprecedented popularity as a result of the combined efforts of several state agencies. The last 35 years have seen South Pass City become one of the most accurately restored and authentically exhibited historic sites in the West. Seventeen of the site's 23 original structures have been restored and exhibited, with many of the site's 30,000 artifacts exhibited in their original buildings. (Source: State of Wyoming State Parks and Cultural Resources Web Page).

PROJECT SCOPE

An inventory and assessment of the Carissa Gold Mine property was conducted that included a detailed review of existing environmental investigation and historical documents pertaining to the environmental impact that the Carissa Gold Mine and Mill has had in the past. Also, an overview of surface owners and lessees; mineral owners, mineral lessees and claimants; determination of drilling permittees and site eligibility was made. In addition, geomorphology and localized hydrology, mining, structural and environmental engineering, geology, soils and vegetation, and limited on-site GPS surveying and mapping of the features were conducted.

• Ownership and Eligibility

A review of land patents was conducted using available files listed within the United States Bureau of Land Management's (BLM) General Land Office Records. In general, the date of the title transfer of public land to private ownership can indicate the general time period of the mine operation. Typically, public land is patented after 10 years of continuous occupation and development by a private entity. There are 17 individual patented lode-mining claims of interest associated with the Carissa Gold Mine property. Seven (7) mineral surveys were conducted in determining the various patent boundaries. Research revealed that no active, inactive or terminated mine permits exist or are listed for the lands included within this project. This information indicates that all large-scale mining activities within the project area ceased operation prior to 1973 making them eligible for reclamation under Title IV of the Surface Mining Control and Reclamation Act of 1977.

• Review of Existing Environmental Investigation Documents

PHC-REC and AML carried out a thorough review of all existing environmental information available for the Carissa Gold Mine property in an effort to more completely assess the site and to streamline the field investigation phase of the project. Information was obtained from the Carissa Mining Company, AML, Wyoming Game and Fish Department, Wyoming DEQ/Water Quality Division (WQD), Wyoming DEQ/Land Quality Division, Wyoming DEQ/Solid and Hazardous Waste Division, Wyoming Department of State Parks & Cultural Resources (State Parks), and the BLM.

This review indicated that existing environmental data for the Carissa Gold Mine property are fairly extensive in nature, have been collected over an extended period of time, and offer several observations and conclusions to the environmental condition on this property.

Soil, tailings, and sediment sampling have shown that the historic Carissa Mill tailings contain several heavy metals and compounds as a result of not only the milling process, but also the geochemical composition of the ore processed. Arsenic has repeatedly been found to be the primary constituent of concern in the soils and tailings. The Carissa Tailings Disposal Project (AML Project 9B) was carried out to minimize human health and environmental hazards from this finely ground tailings material.

Sediment in the Willow Creek riparian area, adjacent to the Carissa Gold Mine property has been shown to contain elevated levels of total mercury. Mercury has not been shown to be a constituent of concern in the groundwater on the Carissa Gold Mine property.

Information from the WQD indicates that none of the waters within the Carissa Gold Mine property are listed as Impaired or Threatened to become Impaired. There are no data that indicate that the Carissa Gold Mine property is causing impairment to Willow Creek or any other surface water in the area.

The groundwater in the immediate vicinity of the Carissa Mill tailings disposal area does have total arsenic concentrations that exceed the human health drinking water standard. The drinking water well at South Pass City State Historical Site has not shown any metals contamination.

Cyanide has been observed in the groundwater-monitoring program but has been at concentrations well below the human health drinking water standard.

The mitigation of hazards at the Carissa Gold Mine property to acceptable levels of public safety can be accomplished without adverse impact to the environment and will not effect any of the areas of environmental concern described above. There will be environmental improvement as a result of eliminating toxic materials that could become airborne or transported into surface waters by major storm events. The proposed mitigation of high concentrations of heavy metals found in the mill processing waste material, mine ore waste and tanks can be done cost effectively resulting in safe access for the public.

- **Inventory of Eligible Features On The Carissa Gold Mine Property**

Surface investigations were conducted in the field of each feature within the project site to locate, identify the type and the extent of hazards to public safety. Each feature was investigated by key members of the project team related to their areas of expertise.

All features were inventoried, investigated, evaluated, photographed digitally, and video taped. Surveying and mapping was done for identification and relocation of each mine feature. Each feature was documented on Site Inventory Data Forms and assigned a site name specific to the area investigated. Sampling of mine waste dumps and tailings and of waste material in the mill, including wood structures, floors and tanks, was conducted. Samples of these materials were collected and assayed to identify locations, types and concentrations of hazardous materials.

Subsurface investigation was conducted by a thorough review and analysis of available subsurface drilling data, mapping information, existing underground mine maps, and old mine reports to identify known and potential hazards.

- **Hazards to Public Safety**

Fourteen (14) distinct areas of disturbance were investigated, the hazards and existing conditions for each area were identified and inventoried, and preliminary costs to remediate all hazards to an acceptable level of public safety were developed. All identified hazards and potential hazards to public safety are described in the ROI. The hazards were grouped into three (3) categories:

- 1. Hazardous mine workings. This group includes shafts, inclines, adits and tunnels, underground stopes and drifts, subsidence areas; surface pits and open pit mine highwalls.*
- 2. Unstable structures, buildings, and equipment. This group includes the Carissa Mill, miscellaneous outbuildings, equipment, and surface and underground storage tanks.*
- 3. Hazardous materials. This group includes outside mine waste dumps and processing waste material inside the mill. Samples of these materials were collected and assayed to identify locations, types and concentrations of hazardous materials.*

HAZARD MITIGATION and VISITOR SAFETY RECOMMENDATIONS

During the field investigations, PHC-REC noted on the Site Inventory Data Forms the presence or indication of "historic debris and/or structures," if observed, at a particular inventoried area. A meeting was held with AML and State Parks personnel in South Pass City on August 20, 2003 for the purpose of discussing possible mitigation methods of the hazards to acceptable levels of public safety at the Carissa Gold Mine property. Issues involving cultural resources, threatened/endangered species, wetlands, and migratory birds of high federal interest that have a direct bearing on final reclamation designs were reviewed. In an effort to provide the Governor and state legislature with as accurate a cost estimate as possible, AML and PHC-REC needed an understanding of the State Parks' management philosophy and post-purchase vision for the property. Additionally, this meeting also presented State Parks with information on potential work at the site that would not be included in the mitigation plan because of non-eligibility. The results of that meeting, as well as several subsequent meetings, are discussed in detail in the ROI.

Final mitigation plans will be influenced by several factors including the State Parks' Master Plan, threatened and endangered species surveys (T&E), and cultural resource surveys. In addition, they will be influenced by the availability of financial grants through the AML and the U.S. Department of the Interior, Office of Surface Mining Reclamation and Enforcement (OSM).

Meetings and conversations between the State of Wyoming and the engineer and concurrence will all impacted parties will be a prerequisite to initiating any final design work. State Parks' considerations must be incorporated into the 95 percent designs to eliminate or minimize disturbance to potentially historic features. Based upon their Master Plan and concerns, areas designated as historically significant will not be reclaimed. In addition, special provisions to utilize the Carissa Mill as an interpretive site will be incorporated into the specifications to ensure compliance with the State Parks' Master Plan.

The mitigation plan recommended in the ROI addresses methods to obtain acceptable levels of public safety, stability, effect of the mitigation plan on the environment, and cost. Engineering design criteria will include risk assessment, environmental and structural engineering analysis, surface water impacts, material strength and stability, and site access.

The findings of the Carissa Gold Mine Evaluation, as detailed in the ROI, have resulted in the following conclusions:

- All hazards inventoried can be mitigated to acceptable levels of public safety while preserving the unique historic value of the site,*
- Costs of mitigation are consistent with AML's costs for reclamation of similar sites,*
- No "fatal flaw" hazards are expected to be encountered during the reclamation, and*
- Building stabilization and closure of mine openings should proceed as soon as possible.*

The investigation considered the cost of three (3) mitigation scenarios based on the level of public access to the Carissa Mill Building. The Carissa Mill Building contains significant historic gold ore processing artifacts and high levels of hazardous materials. The scenarios and associated costs include:

- Mitigation of all hazards to public safety located on the Carissa Gold Mine property with no direct access to the Mill building - \$543,000.00;*
- Mitigation of all hazards to public safety located on the Carissa Gold Mine property with minimal access to the Mill building (sealed Plexiglas entryway) - \$ 700,000.00*
- Extensive Mill Building access – not recommended for consideration at this time due to the cost of remediating all of the hazardous features and conditions inside of the building.*

Cost estimates include closure of all hazardous mine openings, stabilization and repair of all buildings to prevent further deterioration of historically significant features and to eliminate the potential for collapse, and removal and off-site disposal of hazardous materials. Cost estimates do not include costs of design, administration, or construction management; these will add approximately twenty five percent (25%) to the cost.