



Grassy Mountain Gold

Environmental Evaluation & Socioeconomics Analysis



Statement of Qualifications



EXPLORATION AND PLANNING

- Regulatory support and strategy
- Baseline technical studies
- Compliance auditing and monitoring
- Environmental permitting
- National Instrument 43-101, studies
- Due Diligence Reviews
- Community and public outreach involvement
- Indigenous Relations
- Environmental permitting



PROJECT DEVELOPMENT

- Regulatory support and strategy
- Baseline studies
- Environmental assessments (EIA, ESIA, EA, EIS, EIR)
- Risk and mitigation planning
- Water management
- Tailings and waste management
- Human health risk assessments
- Closure planning
- Community and public outreach/involvement
- Indigenous Relations
- Environmental permitting



Statement of Qualifications



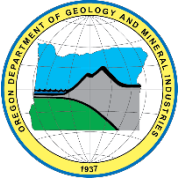
OPERATIONS

- Compliance auditing and monitoring
- Environmental effects monitoring (EEM)
- Mine closure planning and reclamation
- Closure and decommissioning planning
- Cost estimating
- Water management
- Tailings and waste management
- Environmental permitting



CLOSURE

- Closure and decommissioning planning
- Cost estimating
- Reclamation design, implementation, and management
- Closure compliance approvals
- Cover design and landform engineering
- Ecosystem and stream restoration
- Compliance and construction monitoring
- Contract administration
- Remediation
- Water management
- Tailings and waste management
- Environmental permitting



Meet the Team

Cameron Curtis - Project Manager / Environmental Scientist

- 10 years experience
- Managed interdisciplinary teams of analysts for projects throughout the PNW
- Focus on environmental permitting and compliance under NEPA and state regulations in WA, OR and CA.

George Fennemore – Senior Environmental Manager

- 29 years experience
- Conducted mine permitting and environmental management at multiple operating mine sites in Nevada
- Designed mine project components, data collection and environmental analyses
- Completed permit applications, modifications, appeals, protests, and litigation.

Alison Uno – Senior Environmental Scientist

- 16 years experience
- Conducted and managed environmental analyses of gold mines in the US
- Expertise in biological resources analyses
- Created NEPA documentation for large multi-volume environmental impact statements (EISs), permit applications, and supporting documents.



Meet the Team

Walt Martin – Senior Geologist

- 40 years experience
- Worked in mining, minerals exploration, civil engineering, and hydrology industries
- Certified Professional Geologist with American Institute of Professional Geologists (CPG)

Kevin O’Barr – Health, Safety, Security, and Environment Senior Advisor

- 45 years experience
- Specialized focus on health and safety in mining, MSHA training, construction and safety auditing, risk assessments.

Guadalupe Fattore – Water Treatment Specialist

- 18 years experience
- Specialized focus on water treatment and geochemistry in the mining industry
- Expertise in mine water management and treatment, geochemical modeling, ARD prediction/suppression, sustainable operations and closures for coal and hard rock mines

Ryan Cooper – Principal, Environmental Scientist

- 21 years experience
- Created permit applications and permit strategies for rural developments.
- Analyzed effects to socioeconomic and environmental justice from project proposals.



Meet the Team

Yong Ma – Senior Acoustic Engineer

- 31 years experience
- Conducted noise impact assessments in USA, Canada, and other countries
- Expertise in acoustic assessments for projects related to commercial, residential, and industrial facilities

Eric Clark – Senior Air Quality Engineer

- 19 years experience
- Created air quality permit applications
- Expertise in PSD applicability and BACT analyses, emissions inventories, NSPS applicability reviews, Title V applications, and air quality emissions modeling

Gilbert Browning – Senior Archaeologist

- 16 years experience
- Cultural resources compliance actions per local, state, and federal regulations
- Expertise in Section 106 of the National Historic Preservation Act (NHPA), and Native American Graves Protection and Repatriation Act (NAGPRA)



Environmental Evaluation (EE)

Purpose

- Required per the Oregon state Consolidated Permit Application process.
- Describes the proposed Project in detail.
- Informs agencies, tribes, local governments, and the public about the impacts of a proposal.
- Identifies measures to avoid, minimize, and mitigate impacts.
- Also required: Socioeconomic Impact Analysis.



Environmental Evaluation (EE)

Contents

- Chapter 1: Introduction, Regulatory Framework
- Chapter 2: Project Description and Alternatives
- Chapter 3: Impact Analysis:
Geology, Soils, Water, Vegetation, Wetlands, Wildlife, Listed Species, Invasive Plants, Cultural Resources, Rangeland Management, Land Use, Air Quality & GHG, Noise, Aesthetics, Recreation.
- Chapter 4: Cumulative Impacts
- Chapter 5: Mitigation
- Chapter 6: References cited



Environmental Evaluation (EE)

Appendices

More in-depth analysis of important features of proposal:

- Appendix A: Best Available, Practicable, and Necessary Technology
- Appendix B. Analysis of Credible Accidents
- Appendix C. Cyanide Chemistry
- Appendix D. Acid Rock Drainage Assessment and Analysis



Socioeconomics Analysis

Contents

- Section 1: Introduction, Scope, and Approach.
- Section 2: Demographic, Economic, and Environmental Justice Baseline Data
 - Demographic Data: Population, Race and Ethnicity, Housing, Public Safety, Community Services
 - Economic Data: Income and Poverty, Public Finances
 - EJ: Identify Minority Communities based on race, ethnicity & income, tribal communities, traditionally underrepresented communities
- Section 3: Impact Analysis
- Section 4: References Used



Project Activities

- **Site Preparation and Construction of Surface Facilities**
- Underground Mining
- Temporary Waste Rock Storage Facility
- Run-of-mine Ore Stockpile
- Ore Processing
- Cyanide Detoxification
- Tailings Disposal and Storage
- Tailings Storage Facility Reclaim Pond
- Water Management and Supply
- Process Materials and Waste
- Electrical Power
- **Access and Haul Roads**
- Communications, Security, and Fencing
- Equipment and Schedule
- Workforce
- Closure and Reclamation
- Financial Assurances and the Reclamation Bond





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Alternatives

1. Proposed Project: Consolidated Permit Application
 2. No Action Alternative: No mine development
 3. Alternative A: Use of thiosulfate
- Thiosulfate Alternative has its own set of effects and would decrease gold recovery by approx. 30%
 - Other Alternatives considered (e.g., open pit, heap leach).
 - Other alternatives eliminated from detailed analysis based on initial feasibility & environmental effects.
 - Additional alternative Project components evaluated in Appendix A: Best Available, Practicable and Necessary Technology.



Gold Mining - Key Issues

- **Ground Disturbance**
- Acid Generation
- Groundwater Drawdown
- Groundwater Quality

Surface disturbance footprints for underground mining are typically tens of acres compared to hundreds to thousands of acres for open pit mining.

Project uses underground mining to minimize surface disturbance area.



Underground Mine



Open Pit Mine



Gold Mining - Key Issues

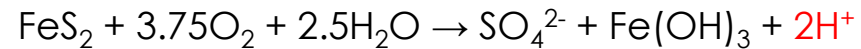
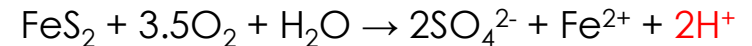
- Ground Disturbance
- **Acid Generation**
- Groundwater Drawdown
- Groundwater Quality

Exposure of sulfide minerals to atmospheric oxygen and water can generate acidity.

Controls include limiting the oxidation reaction and neutralizing the acid generated.

Project uses cement in underground supports and cemented rock fill to neutralize the oxidation reaction.

Project uses lined facilities to store mined and processed material to prevent drainage into the environment.





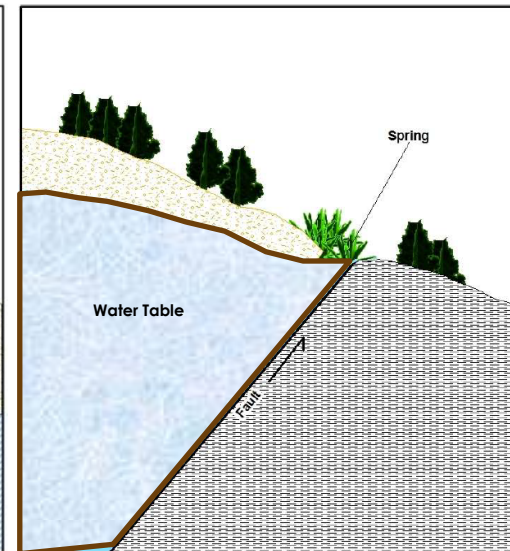
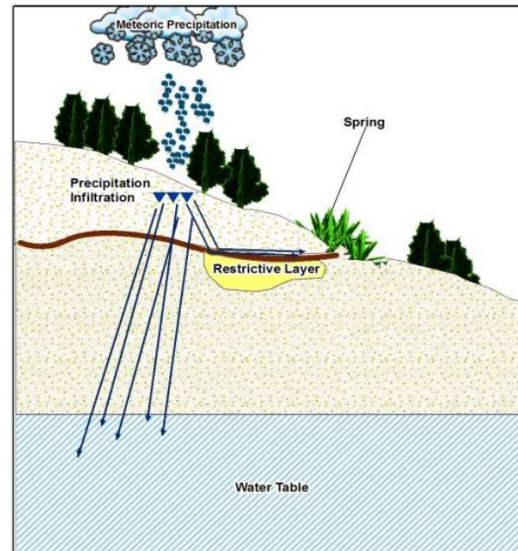
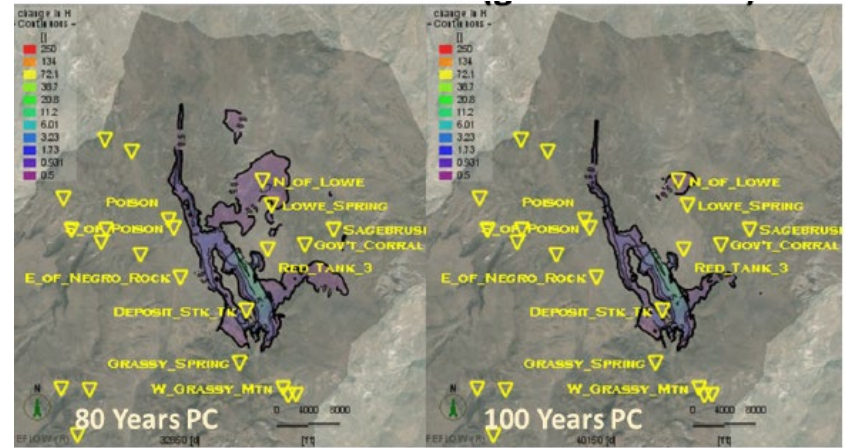
Gold Mining - Key Issues

- Ground Disturbance
- Acid Generation
- **Groundwater Drawdown**
- Groundwater Quality

Mining requires dewatering to draw down the water table in the vicinity of the mine.

Groundwater drawdown can affect other groundwater users, surface seeps and springs

Project includes seep and spring monitoring with mitigation if impacts are detected.





Gold Mining - Key Issues

- Ground Disturbance
- Acid Generation
- Groundwater Drawdown
- **Groundwater Quality**

Exposed rock and mined materials can leach metals/analytes when in contact with groundwater or rainfall.

Leachate may be acidic or pH neutral and may contain metals/analytes (e.g., arsenic).

Project uses lined facilities to prevent leachate contact with the environment.

Potential increase in arsenic concentrations post-closure when groundwater levels return.

Current groundwater concentrations exceed water quality standards.





Ore Processing - Key Issues

- **Cyanide Use and Management**
- Tailings Storage Facility
- Air Emissions

Gold extraction uses cyanide leaching to remove gold from ore.

Thiosulfate option would have analytes also requiring liners, pH management.

Diligent cyanide management is required to protect human health and wildlife.

Project uses cyanide destruction and physical barriers to limit wildlife exposure to cyanide in process solutions.

Project seeks International Cyanide Management Code certification.





Ore Processing - Key Issues

- Cyanide Use and Management
- **Tailings Storage Facility**
- Air Emissions

After ore is processed using cyanide, the resulting tailings must be managed to inhibit contact with the environment.

Project uses an engineered, lined Tailings Storage Facility (TSF), with drainage to divert water back into the gold extraction process.

Cyanide concentrations in TSF are managed and monitored to prevent harm to wildlife.

Project includes fencing, bird balls, and other measures to restrict wildlife access to TSF.

Project includes post-closure TSF synthetic liner cover and revegetation and reclaimed.

Thiosulfate option requires water treatment plant.





Ore Processing - Key Issues

- Cyanide Use and Management
- Tailings Storage Facility
- **Air Emissions**

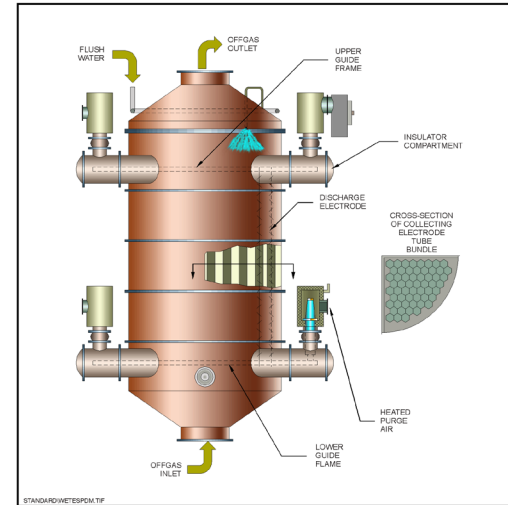
Ore processing generates dust and volatilizes chemicals in the ore.

Process facilities equipped with air quality controls to manage dust and capture gaseous emissions.

Thiosulfate option requires additional air quality controls to control hydrogen sulfide emissions.

Project includes dust and Hazardous Air Pollutant (HAP) emission controls per air permitting requirements.

Project uses dust control measures (water spraying) in disturbed areas (e.g., quarry, roads).





Reclamation - Key Issues

- Physical Stabilization
- Geochemical Stabilization
- Post-mining Land Uses

Closure and reclamation actions stabilize mine facilities physically and geochemically using liners and revegetation.

Reclamation allows the land to be used again post-closure.

Project uses facility removal, regrading, covers/liners, soil placement and revegetation of disturbance areas.

Project manages long-term draindown of process water from the TSF via evaporation using a lined process pond converted to an evaporation cell.

Project reclamation goal to establish a self-sustaining ecosystem similar to pre-mining conditions to support livestock rangeland, wildlife habitat, and dispersed recreation.





Nearby Mining Operations

Large Active Underground Gold and Silver Mines

- Turquoise Ridge Mine (NV)
- Goldstrike Mine Complex (NV)
- Leeville Mine (NV)
- Lucky Friday Mine (ID)
- Fire Creek Mine (NV)
- Cortez Hills Underground Mine (NV)
- Goldrush Mine (NV)
- Jerritt Canyon Mine (NV)

Mills with Tailings Storage Facilities

- Twin Creeks Autoclave (NV)
- Goldstrike Autoclave (NV)
- Goldstrike Roaster (NV)
- Gold Quarry Roaster (NV)
- Pipeline Oxide Mill (NV)
- Jerritt Canyon Roaster (NV)



Environmental Evaluation

Impacts to be Addressed in Permits

Water Resources:

- No streams, rivers, or wetlands within the site boundary.
- 0.29 acres of wetlands in area proposed for road widening.
- Changes in surface drainage patterns from creation of TSF and stormwater drainages.
- Drawdown of water for consumption may affect localized seeps and springs.
- Potential for acid generation and leaching of metals so all excavated materials and cyanide to be contained in lined facilities or mixed with cement and used in underground mine.
- Potential increase in arsenic in groundwater post-closure – transport inhibited by low permeability rock.



Environmental Evaluation

Impacts to be Addressed in Permits

Wildlife, Habitats & Vegetation:

- Approx. 739 acres of land with wildlife habitats removed from use.
- Effects to ODFW Habitat Categories 2 through 6, mule deer habitat, and low-density greater sage grouse habitat requiring mitigation.
- Mine and Process Area fenced to exclude wildlife.
- Anthropogenic disturbance, noise, and night lighting effects.
- Exposure of wildlife to low levels of cyanide in TSF.
- Potential vehicle-wildlife collisions on Access Road.
- State-listed plant, Mulford's milkvetch, occurs in two areas along the Access Road Area.
- Reclamation to return land to rangeland/wildlife habitats.
- Some native plant communities take many years to recover (big sagebrush).



Environmental Evaluation

Impacts to be Addressed in Permits and Consultation

Cultural Resources:

- Cultural sites identified as eligible or unevaluated for listing on the National Register of Historic Places (NRHP) under Criterion D are present.
- Consultation is ongoing to avoid or mitigate effects to historic properties.
- Consultation is ongoing between the BLM and affected Tribal Nations.



Environmental Evaluation

Impacts to be Addressed in Permits

Other resources would have minor effects, including:

- Removal of minerals
- Movement of soils
- Changes to native and non-native plant habitats
- Potential spread of invasive species
- Pastures removed from grazing and dispersed recreation use
- Localized traffic disruptions during road upgrades
- Air emissions equivalent to 1 year of energy use by 722 homes
- Negligible localized increases in noise
- Site screened from many views due to topography



Socioeconomics Analysis

Expected Effects

- Approx. 198 jobs created – direct (mine workers) plus expected indirect and induced (local jobs)
- Small increase in local population (48-127 people) so no adverse effects anticipated to community facilities and services
- No anticipated adverse effects to water supplies, waste management, electrical power, transportation
- Revenues: \$3M Local/County; \$3M State; \$3M Federal.
- Malheur County: lower average salaries and income than state and national averages



Socioeconomics Analysis

Environmental Justice Analysis

- EJ Communities identified based on income, race/ethnicity, and presence of Tribal Communities and Traditionally Underrepresented Communities
- EJ Communities present in and around nearby cities of Vale, Ontario, and Nyssa
- Also Tribal and Traditionally Underrepresented Communities present in and around Vale and Ontario
- EJ analysis found minor positive effects to EJ communities from job opportunities and revenues spent on local services



The Environmental Evaluation and
Socioeconomics Analysis was
produced by Stantec

