



Grassy Mountain Gold Project

Best Available, Practicable, and Necessary Technology

PRESENTERS:

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Introduction

Background and Purpose

Introduction: OAR 632-037-0118

(1) Chemical process mining including extraction, processing, and reclamation, must be undertaken in a manner that minimizes environmental damage through the use of the **best available, practicable, and necessary technology** to ensure compliance with environmental standards.

(a) The technical review team shall determine the **necessary** technologies if such technologies exist;

(b) The technical review team shall determine which, if any, of the necessary technologies is **available**;

(c) The technical review team shall determine which, if any, of the necessary and available technologies is **practicable**;

(d) The technical review team will **review, determine, and rank** the necessary, available and practicable technologies by their potential environmental benefits;

(e) The technical review team shall **recommend** to the Department, the technology that the technical review team has determined is **the best** available, necessary, and practicable technology to ensure compliance with environmental standards...

(3) The department will **require** the applicant **to use** the best available, practicable, and necessary technology to ensure compliance with the environmental standards...

(4) If the technical review team or the Department is **unable to identify** a necessary technology that is available and practicable, the Department **shall not issue** an operating permit.

Introduction: Definitions

- > **Available:** technology that is obtainable and has been demonstrated to meet environmental standards at an existing mine or a demonstration project of similar size and scale, or is reasonably expected to meet or exceed environmental standards at the proposed mine. OAR 632-037-0010(2)
- > **Practicable:** costs are not significantly disproportionate to the potential environmental benefits; a technology is not practicable if the cost is so high it renders a mining operation infeasible. OAR 632-037-0010(24)
- > **Necessary:** technology that is required to ensure compliance with environmental standards. OAR 632-037-0010(19)



Introduction: Types of Technologies for Consideration

- > **Mine construction methods** – design of underground structure; materials and equipment to be used; reuse of materials on site; waste disposal options
- > **Extraction of ore and backfilling** – minimizing waste rock; maximizing use of waste rock as aggregate and/or in backfilling; alternative waste storage options
- > **Transportation of materials** – minimizing distance between related mine sites, containment during transport
- > **Milling operations** – different technologies for crushing of rock and separation of gold, cyanide leaching, gold refining, cyanide destruction, and management of chemicals used in gold processing
- > **Tailings disposal** – tailings sampling methods; locations for the TSF; options for liners, drainage, and leak detection; groundwater sampling and protection options; long term pollution prevention controls



Introduction: Types of Technologies for Consideration

- > **Operational monitoring and pollution control methods** – various sampling methods for soil, air, water and waste; dust control options; different scrubber and air purification systems
- > **Mine closure methods** – TSF dry closure, wet closure, wetland establishment closure, and water saturation closure options
- > **Wildlife and habitat protection** – barriers and fencing options; wildlife and bird deterrent methods, mitigation strategies
- > **Reclamation and long term monitoring** – monitoring types, equipment, and schedule options



Proposed Approach

Proposed Approach



Hypothetical Example

Identify: A focus for research

(1) Chemical process mining...must be undertaken in a manner that minimizes environmental damage through the use of the best available, practicable, and necessary technology to ensure compliance with environmental standards”.

What is the potential environmental damage?

- Release from the Tailings Storage Facility (TSF)

What processes contribute to the potential environmental damage?

- Liner degradation overtime
- Failure of warning systems

What are the environmental standards?

- OAR Chapter 690, Division 20 – Dam Safety, administered by the Water Resources Department.
- OAR Chapter 340, Division 43 – Chemical Mining, administered by the Department of Environmental Quality

Research

- (a) The TRT shall determine the **necessary** technologies if such technologies exist;
- (b) The TRT shall determine which, if any, of the necessary technologies is **available**;
- (c) The TRT shall determine which, if any, of the necessary and available technologies is **practicable**;

Technology that Minimizes Liner Degradation Overtime

Criteria	Technology A	Technology B	Technology C	Technology D
Necessary	✓	✓	✓	✓
Available	✓	✓	X	✓
Practicable	✓	X	✓	✓

Technology that Minimizes Risk of Warning System Failure

Criteria	Technology E	Technology F	Technology G	Technology H
Necessary	X	✓	✓	✓
Available	X	✓	✓	✓
Practicable	✓	X	✓	✓

Rank

(d) The technical review team will **review, determine, and rank** the necessary, available and practicable technologies **by their potential environmental benefits**;

Criteria	Technology A	Technology D
Minimizes risk of liner degradation overtime	Lower benefit	Higher benefit
Meets environmental standards in OAR Chapter 690, Division 20	Yes	Yes
Meets environmental standards in OAR Chapter 340, Division 43	Yes	Yes

Criteria	Technology G	Technology H
Minimizes risk of warning system failure	Higher benefit	Lower benefit
Meets environmental standards in OAR Chapter 690, Division 20	Yes	Yes
Meets environmental standards in OAR Chapter 340, Division 43	Yes	Yes

Rate and Recommend

(e) The technical review team shall **recommend** to the Department, the technology that the technical review team has determined is the **best** available, necessary, and practicable technology to ensure compliance with environmental standards.

Liner degradation overtime: **best** available, necessary, and practicable technology to ensure compliance with environmental standards

✓ **Technology D**

Failure of warning systems: **best** available, necessary, and practicable technology to ensure compliance with environmental standards

✓ **Technology G**

Q/A
