IDAHO MINING ASSOCIATION

CYANIDATION FACILITIES IDAPA 58.01.13

Responsible, sustainable, Idaho minerals

MAY 3, 2019

WHY UPDATE THE CN RULES?

- The Idaho Mining Association and its members are committed to protecting Idaho's water quality and complying with existing water quality standards at cyanidation facilities.
- A design review and approval process that can adapt to regulatory and industry experience and current best practice technologies and designs is essential to build and operate safe CN facilities.
- The current IDEQ rule governing CN facilities is prescriptive in nature and takes a one-size-fits-all approach to all features of a cyanidation facility.

IDAHO MINING ASSOCIATION

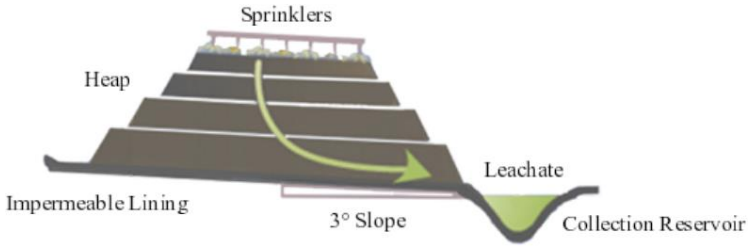
CURRENT RULES

- Unlike other industries that must design site-specific solutions to meet water quality goals, rules governing CN facilities are focused on a prescriptive design with minimum design standards that do not always align with current industry experience or best practice standards.
- IDEQ rules governing cyanidation facilities were adopted in 2006, however:
  - Technology and industry best practices for design, construction, operations and closure have advanced since IDEQ rules were developed.
  - The rules have not yet been tested as no applications have been submitted.
  - They provide limited adaptability to site specific conditions, new materials, or industry and regulator experience.
  - They do not differentiate between a tailings storage facility, heap leach facility, or pond and do not consider the type of material stored in the facility.

IDAHO MINING ASSOCIATION

IMPOUNDMENT TYPE

HEAP LEACH FACILITY



FACILITY USE:

- Active mineral extraction (Au/Ag typical) by spraying CN solution (±500ppm typical) on crushed ore (>1" diameter typical).

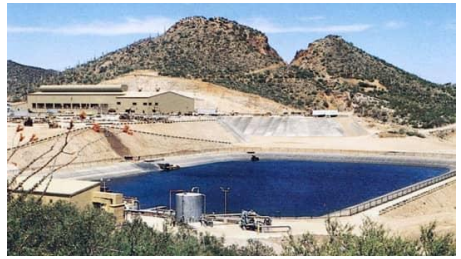
KEY DESIGN CONSIDERATIONS:

- High occurrence and magnitude of construction and operational liner damage due to equipment and type of material on liner system.
- Granular liner over-drain typically included to collect Au/Ag bearing CN solution resulting in minimal impediment to leakage through primary liner.
- Liner can be unloaded and repaired if necessary.

CLOSURE:

- Following operations a heap leach facility is typically rinsed with water to maximize mineral extraction and reduce CN concentrations, then reclaimed in place.

POND



FACILITY USE:

- Active mineral extraction by storing barren or pregnant CN or reagent solutions or stormwater from CN facility.

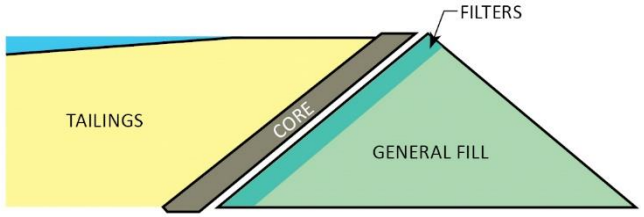
KEY DESIGN CONSIDERATIONS:

- Small liner defects can result in high leakage due to head conditions.
- Facility can be drained, inspected and repaired, if necessary.

CLOSURE:

- Ponds are typically decommissioned after operations by draining any remaining solution, removing liner, and breaching embankment or backfilling/recontouring.

TAILINGS STORAGE FACILITY



FACILITY USE:

- Permanent storage of finely ground rock (±50µm typical) following mineral extraction and CN neutralization (<25ppm CN typical but can be much less).

KEY DESIGN CONSIDERATIONS:

- Low occurrence and magnitude of construction and operational liner damage due to lack of equipment on liner and fine grained nature of tailings.
- Typically undesirable to place high permeability layer in liner system due to propensity to increase liner system leakage rates.
- Tailings adjacent to defect provides high impediment to leakage therefore continuous over-drain typically undesirable.
- Typically infeasible for liner to be unloaded and repaired.

CLOSURE:

- Remove surficial supernatant concurrent to primary tailings consolidation then cover and reclaim in place. Wetlands, pond or stream on final surface feasible.

REQUIREMENTS vs COMMON BEST PRACTICES

Current Requirements

Applies to all tailings storage facilities, heap leach facilities, and ponds:

- 80-mil HDPE primary liner *(or approved equivalent)*
- Granular drainage media layer for leak detection and recovery
- 80-mil HDPE secondary liner *(or approved equivalent)*
- Compacted clay subgrade

Current Common Best Practices

Since current requirements were adopted, industry best practices have changed. Current common best practices include:

- Design specifically for the type, use, and location of the facility
- Design specifically for the physical and chemical characteristics of the material being stored
- Design to prevent construction-related defects
- Design for operations and closure
- Design to keep process-related fluids and solids from migrating out of the facility and impacting surface or groundwater

To protect water quality for other types of mining operations, as well as other industries, Idaho rules typically rely upon applicants to propose site-specific performance-based designs that are reviewed/approved by IDEQ.

Idaho Mining Association

POTENTIAL PATHS FORWARD

Design process to focus on meeting, or exceeding, existing water quality standards could be accomplished by:

1. Updating rules to align with performance-based rules found elsewhere in Idaho Rules (e.g. Idaho Ground Water Rule and Idaho Solid Waste Rule) that require best practical methods and best available methods to protect water quality

   or

2. Providing alternate design application to meet performance goals

   a. *Department may allow review of an alternative design that applies best practical methods to meet Idaho's water quality standards*

   b. *Alternate designs would need to demonstrate compliance with water quality standards and require sign-off by an Idaho licensed professional engineer*

IDAHO MINING ASSOCIATION