Net Environmental Benefit Considerations and Adaptive Management at a Submarine Mine Tailings Deposit in Prince William Sound, Alaska

Beatson Mine Remediation and Restoration Site

Jessi Massingale and Evan Malczyk, Floyd|Snider

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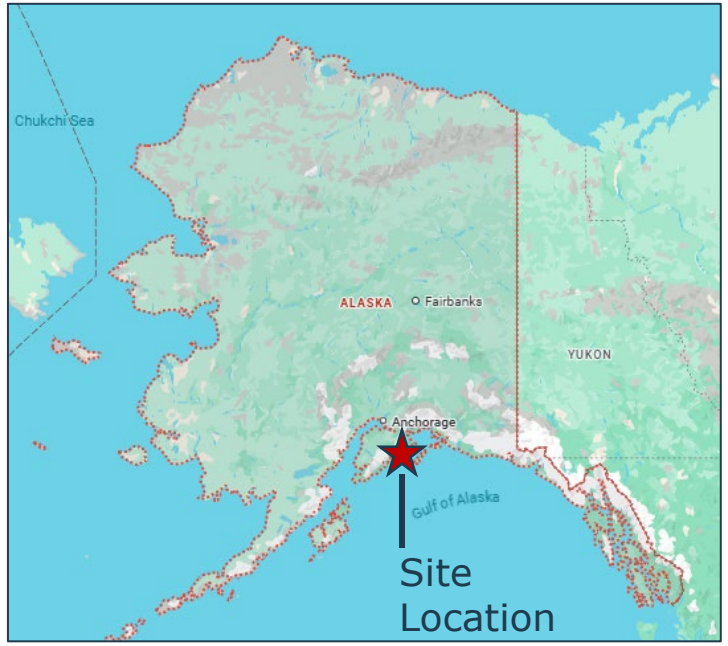
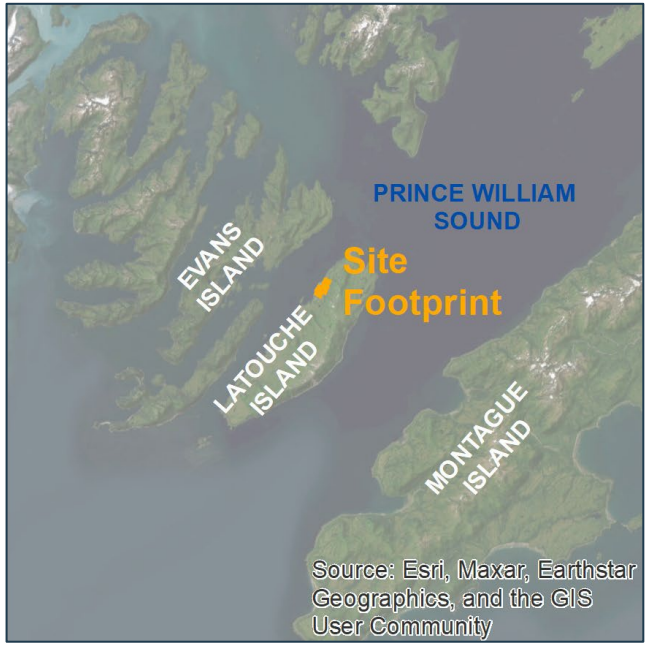
Site Location

- Northwest side of Latouche Island, Prince William Sound, Southeast Alaska
- Remote, access only by boat or small seaplane
- Latouche Island and surrounding land and waters of the Chugach region are the traditional and ancestral homelands of the Sugpiat people—including Chenega and Chugach Alaska Native Tribes
- Across Latouche passage—Alaska Native Village of Chenega
- The upland part of the Site has approximately 20 structures used primarily for seasonal recreation and temporary residences





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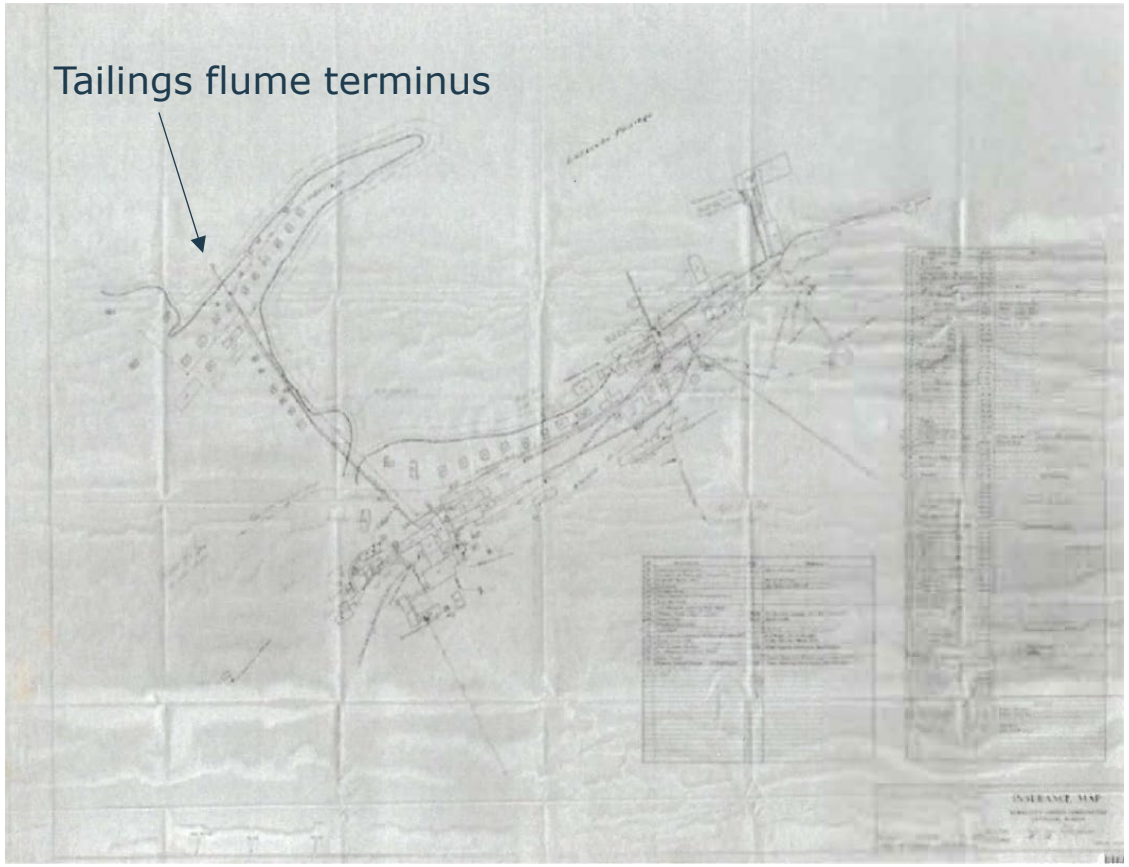
Historical Mine Operations

- Three abandoned underground copper mines that operated 1904-1930

Historical Mine Operations and Tailings Discharge

- Historical flume: human-made elevated wooden trough reached from the uplands across the beach and disposed of mine tailings down slope into Latouche Passage (1915–1930)
- Submarine tailings deposit consists of approximately 2 million tons over approximately 97 acres and in place for nearly 100 years

1923 Fire Insurance Map



Regulatory Overview

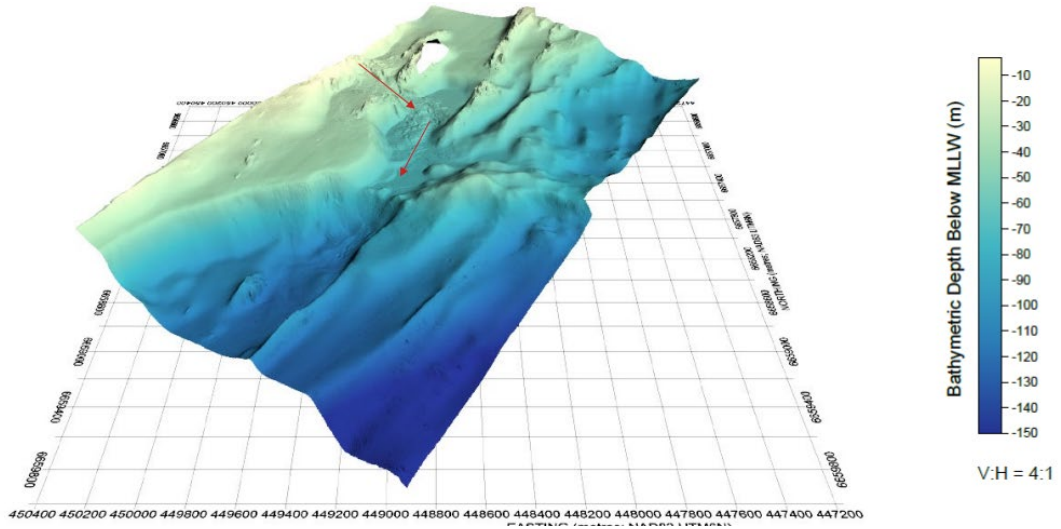
- In coordination with the Alaska Department of Environmental Conservation (DEC), Rio Tinto (on behalf of Minaska, Inc., and its successors) is in the process of designing the remedial action to address impacts from historical mining impacts at the Site caused by former operators
- Alaska State Department of Natural Resources (DNR) state-owned and managed tidelands
- Two different and strategic assessments were conducted in coordination with DEC and DNR to inform adaptive management of the submarine tailings deposit

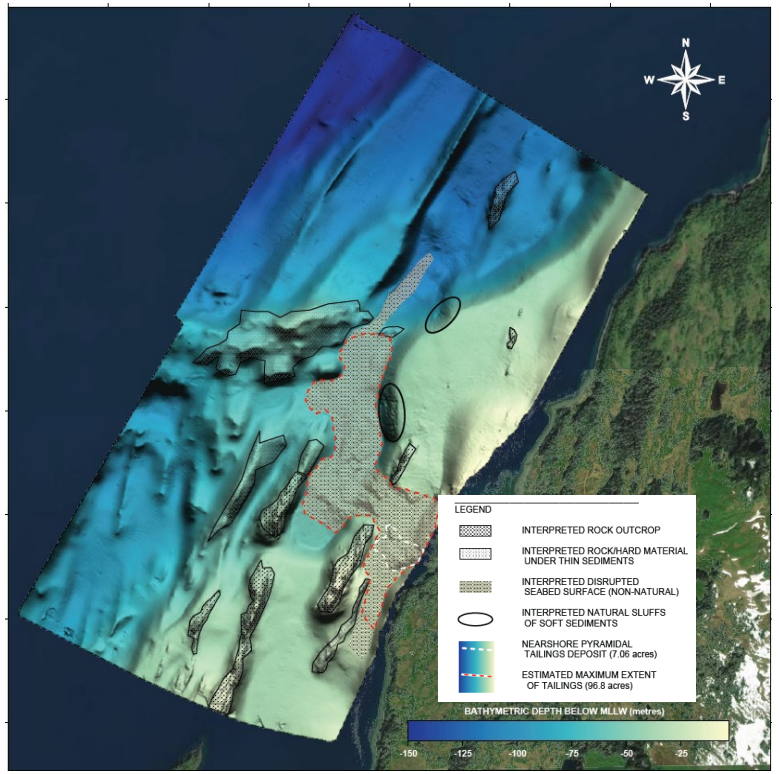
Engagement with Agencies and Alaska Natives

- Early engagement with key information to support informed decision making
- Shared results of tailings investigations ahead of deliverable submittals—meetings with Alaska Natives, and DEC and DNR
- Previewed Net Environmental Benefit Assessment (NEBA) approach and rationale

Submarine Tailings Deposit Configuration

- Sediment grabs and multibeam bathymetry investigations
- Accumulated on series of stepped relatively flat benches, confined by seabed geometry and bedrock ridges
- Relatively deep location, up to approx. 240 feet water depth under mean high-water conditions





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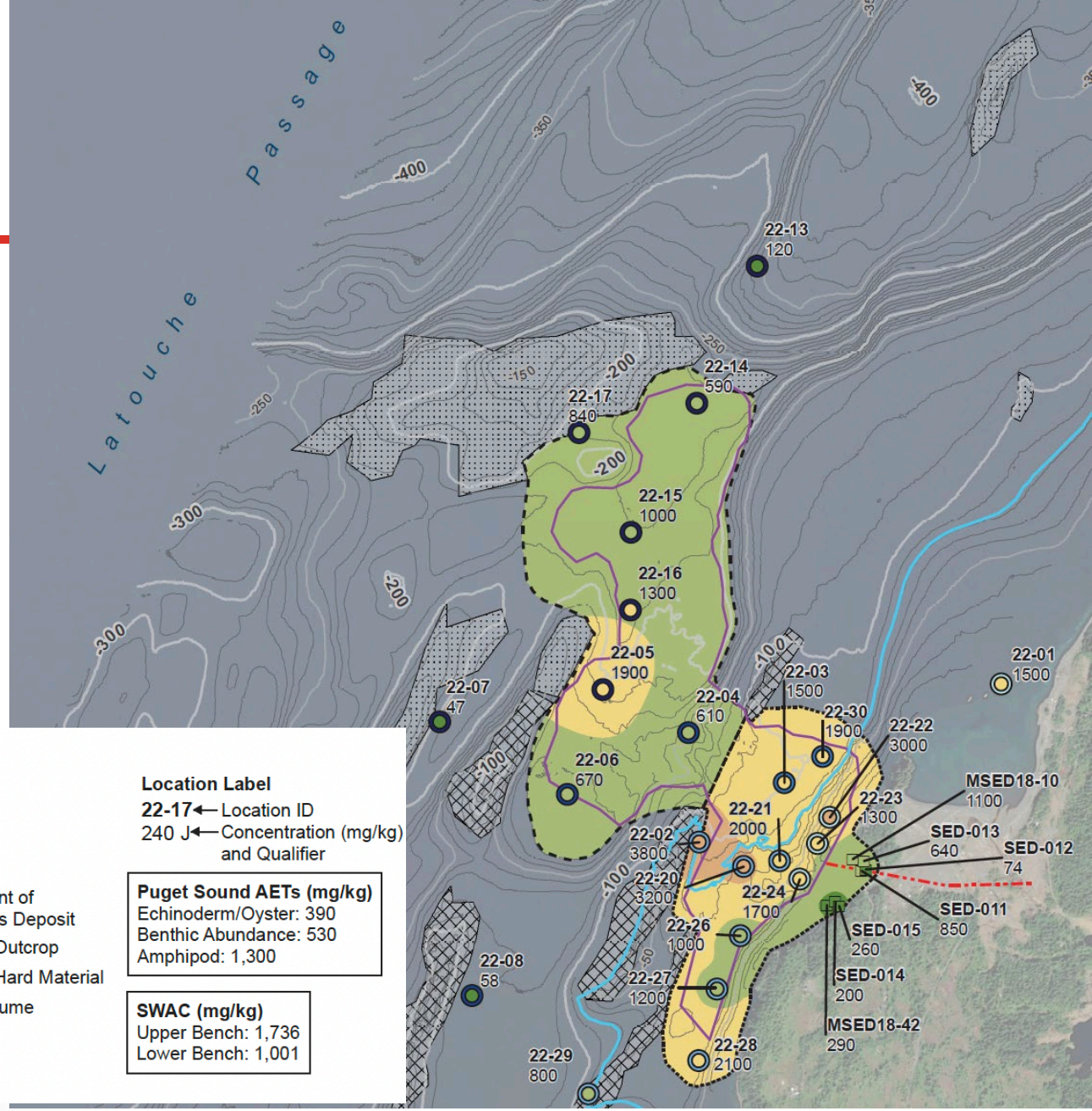
Submarine Tailings Composition

- No state of Alaska sediment standards—but can use sediment standards from other states
- Chemistry relative to Washington State Department of Ecology Sediment Management Standards and Puget Sound Apparent Effects Thresholds



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Net Environmental Benefit Assessment Approach

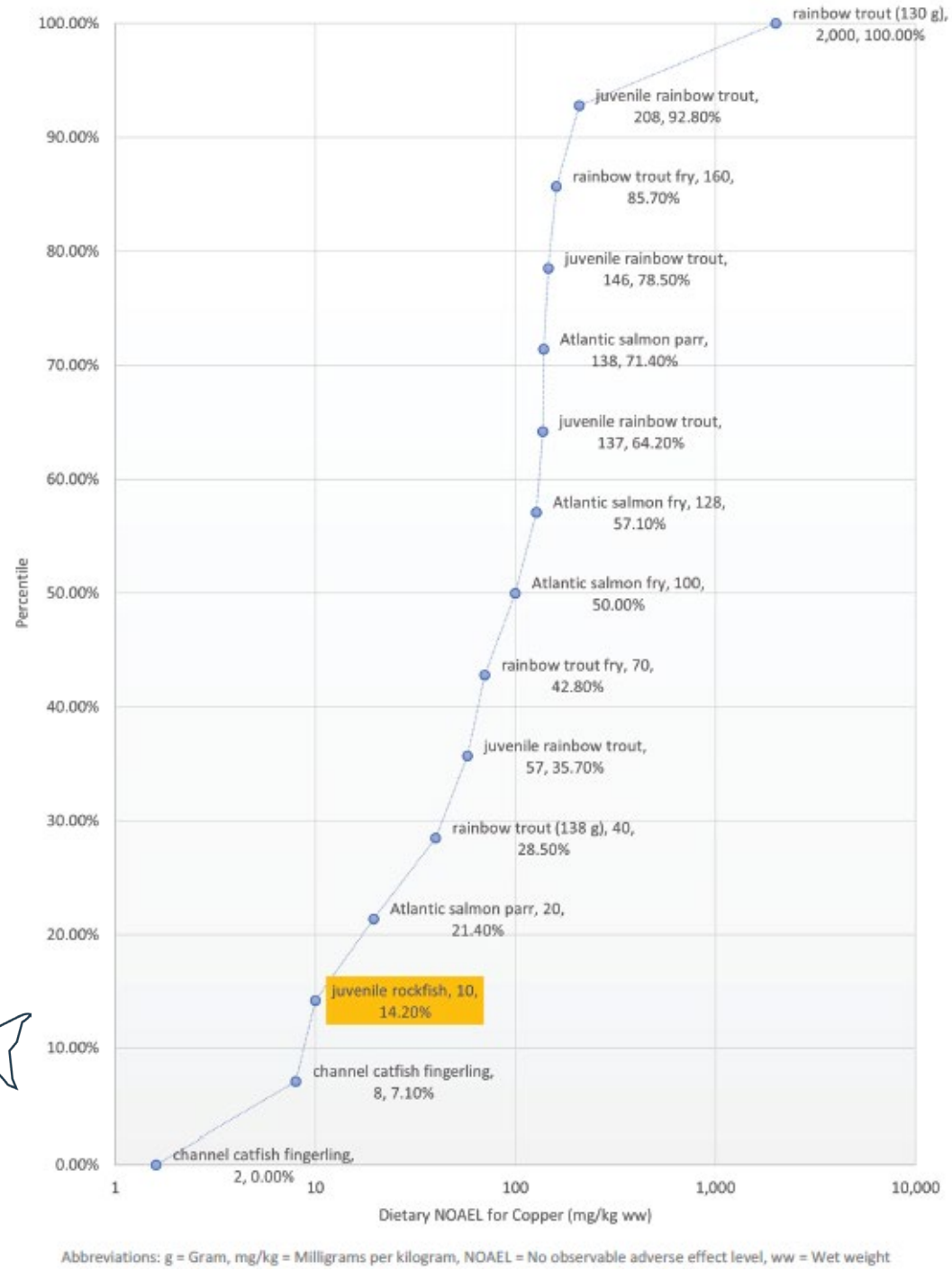
- Early and practical evaluation of remedial action construction to inform regulators on realistic scope
  - Capping and dredging
- Ensure that the environmental impacts of executing a remedial action and disturbing the submarine tailings were understood and considered within the context of potential risk to human and ecological receptors
- No real federal or state regulations on NEBA—some guidance, so regulator relationship/trust and receptivity are critical

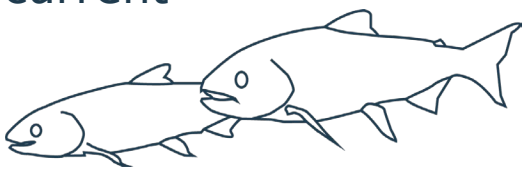
NEBA: Remedial Action and Impacts Evaluation

- NEBA documented the short- and long-term positive and negative impacts of a capping or dredging remedy on natural resources
- Considerations of feasibility, logistical challenges, in-water construction durations and water quality impacts, and the ultimate effectiveness of the actions given the tidal currents, deep water, remote location, bedrock ridges, and surrounding community and commercial natural resource uses
- Dredging:
  - 7+ years of dredging
  - Water quality impacts/material loss during retrieval due to strong currents and water depth (up to 240 feet at high water levels), spreading elevated metals concentrations over a larger area, smothering biota outside dredge prism and other impacts on fish
  - 1.5 million cubic yards of dredged material would be required to be disposed of in lower 48 states
  - Costs estimated at over 1 billion USD
  - Low likelihood of increased environmental benefit, high likelihood of impacts to water quality and aquatic life
- Capping
  - Reduced accuracy of sand placement due to depth, strong currents, scour
  - Water quality impacts to biota, smothering of benthic organisms outside of submarine tailings deposit
  - Costs estimated at ~$150 million USD
  - Low likelihood of increased environmental benefit, high likelihood of impacts to aquatic life

Receptors Assessment

- Receptor impact weight of evidence assessment to evaluate potential impacts to people and ecological receptors from potential exposure to metals at the site
- Evaluated potential impacts to a representative fish species (cabezon/rockfish) by comparing estimated sediment porewater copper concentrations to the the mean genus chronic value (MCGV).
  - Results indicate potential adverse impacts to rockfish are unlikely
  - Because rockfish are relatively sensitive, impacts to other fish species are also unlikely
- Potential impacts from the submarine tailings on the ecological receptors and human users of the site are anticipated to be minimal; the submarine tailings are physically and geochemically stable in their current configuration





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Outcome and Value of NEBA Considerations

- Stakeholder support for managing the tailings in place to prevent disturbance based on understanding current conditions and what cleanup would look like—protection of natural resources
- DNR application, public comment, commissioner approval process
- DNR leasehold location order to prevent any mining of submarine tailings
- Environmental covenant and institutional controls between DEC and DNR—coordination with other state agencies in DNR process
- Objective to prevent disturbance of submarine tailings in their current configuration
- Valuable to continue to build agency familiarity with NEBA approaches and having more examples to point to; we have had success with this approach in Washington as well

Thank you!

- Contact for additional questions:

Jessi Massingale
Floyd|Snider
(206) 805-2157
jessi.massingale@floydsnider.com