



THE STATE  
of **ALASKA**  
GOVERNOR BILL WALKER

**Department of Natural Resources**  
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**September 19, 2017**

Vickie Jackson  
Environmental Protection  
Ministry of Environment  
PO Box 9339 Stn Prov Govt  
Victoria BC, V8W9M1  
Sent via email: [Vickie.Jackson@gov.bc.ca](mailto:Vickie.Jackson@gov.bc.ca)

Ms. Jackson,

Thank you for your email of July 18, 2017 informing me that the Ministry of Environment had posted the 2016 Aquatic Ecological Risk Assessment for the Tulsequah Chief Mine (2016 AERA). I have coordinated with staff in the Alaska Departments of Fish and Game (ADF&G), Environmental Conservation, and Natural Resources to review the 2016 AERA. I offer the following comments, and the enclosed comments from ADF&G, for your consideration.

Photo B-41: NAG Waste Rock Pile (Appendix B) appears to show an off-channel slough and the Tulsequah River. An arrow or other marker to indicate the location of the NAG waste rock pile in the photo would be helpful.

Photo B42: PAG Waste Rock Pile (Appendix B) is the same photo used for Photo B-15: Monitoring well MW11-5. Does this photo show both the PAG waste rock pile (foreground) and MW11-5 (background)? An arrow or other marker to indicate the location of the PAG waste rock pile in the photo would be helpful.

Thank you for posting the 2016 AREA publicly on your website. Please contact me by phone or email if you have any questions about our comments or if you would like to discuss them in greater detail.

Sincerely,

A handwritten signature in black ink, appearing to read "Kyle W. Moselle".

Kyle Moselle  
Associate Director

Enclosure: Memorandum with ADF&G comments

cc: Jackie Timothy, ADF&G  
Allan Nakanishi, ADEC  
Teri Lomax, ADEC  
David Wilfong, ADEC

# MEMORANDUM

State of Alaska

Department of Fish and Game  
Division of Habitat

TO: Kyle Moselle  
Associate Director  
Alaska Department of Natural Resources  
Office of Project Management and Permitting

DATE: 8/17/2017

FILE: Tulsequah Chief Mine

SUBJECT: Ecological Risk Assessment  
ADF&G Review

FROM: Jackie Timothy *JT*  
Southeast Regional Supervisor

PHONE NO: 907-465-4275

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~~Deliberative Draft~~ *uM*

As you requested, the Alaska Department of Fish and Game Division of Habitat reviewed the Tulsequah Chief Mine aquatic ecological risk assessment completed by contractor SLR Consulting (Canada) Ltd. for the BC Ministry of the Environment (SLR 2017). The contractor divided a study area on the Tulsequah River into four exposure zones; Zone 1 is upstream of mine discharge, Zone 2 is at mine discharge, and Zones 3 and 4 are progressively downstream of mine discharge. After identifying fish habitat and use within the zones, the contractor calculated risk estimates for aquatic receptors<sup>1</sup> spatially in receptor specific media<sup>2</sup> using maximum concentrations of receptor specific contaminants of potential concern.<sup>3</sup> The contractor further evaluated risk temporally per fish life history.

Within Zone 2 at mine discharge, the contractor determined contaminants posed unacceptable risks to most receptors but found it unlikely they would spend much time there due to mine induced high turbidity and low pH, and a lack of suitable habitat. Rather, the contractor expects Zone 3 downstream of mine discharge is where most receptors will be exposed, because even though contaminant concentrations are lower, receptors will spend the most time there where the high quality fish habitat and improved water quality provide suitable conditions for year-round use.

The contractor states "Historically samples were not collected within Zone 3 despite containing mine-related sources and high quality fish habitat. Although migratory fish would not spend their

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<sup>1</sup> Migratory and resident fish, fish eggs, and pelagic and benthic aquatic invertebrates.

<sup>2</sup> Surface water, porewater, and sediments.

<sup>3</sup> The contractor selected chemical parameters present in high concentrations, sufficient frequency or spatial extent using a three step process. The selected contaminants of potential concern include pH, aluminum, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, and zinc in surface water; pH, aluminum, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, sulphate and zinc in porewater; and aluminum, arsenic, copper, iron, and zinc in sediments.

entire life cycle within this zone, Zone 3 provides high quality habitat for migratory salmonids. Zone 3 also provides high quality habitat for resident fish such as Trout and Dolly Varden to spawn, rear, and for overwintering juveniles. Exposure would be highest for resident fish such as Stickleback, Sculpin, and sub-adult Dolly Varden. Almost all habitat requirements are met for residents which would allow them to spend all of their life cycle within this Zone, and receive year-round lifelong exposure to mine-related [contaminants of potential concern].”

The Division of Habitat sampled juvenile Dolly Varden char whole body metals concentrations in Zone 3<sup>4</sup> over four years and four seasons. We compared Zone 3 samples with samples collected upstream in Zone 1<sup>5</sup> above mine influence and downstream<sup>6</sup> of Zone 4<sup>7</sup> and mine drainage influence. We found despite the constant exposure, Zone 3 juvenile Dolly Varden char whole body metals concentrations are similar to those in Zone 1 and downstream of Zone 4. Study results are published in Legere and Timothy, 2016, and can be found online at [http://www.adfg.alaska.gov/static/home/library/pdfs/habitat/16\\_06.pdf](http://www.adfg.alaska.gov/static/home/library/pdfs/habitat/16_06.pdf) (accessed August 15, 2017).<sup>8</sup> In the report, we included a compilation of reliable metals concentrations data from across the state of Alaska.

The contractor provides the BC Ministry of the Environment recommendations to address site risks and uncertainties and offer input into remediation planning. We find the recommendations to conduct a full characterization of the spatial extent and contaminant concentrations in all relevant media, and conduct additional aquatic habitat and geochemical assessments, unnecessary. Acid drainage at the Tulsequah Chief Mine is well documented, as are habitats in the Tulsequah River. Instead, we agree with the contractor’s recommendation to restrict overland flow to reduce exposure and risk to aquatic receptors and request all resources be allocated to that endeavor.

## References

- Legere, N.M., and J. Timothy. 2016. Tulsequah Chief acid mine drainage and Dolly Varden char whole body metals concentrations. Alaska Department of Fish and Game, Technical Report No. 16-06, Douglas, AK.
- SLR Consulting (Canada) Ltd. 2017. 2016 Aquatic Ecological Risk Assessment Tulsequah Chief Mine, Skeena Region. Prepared for the BC Ministry of Environment, PO Box 9339, STN PROV GOVT, Victoria, BC V8W 9M1. 13 April 2017.

## Email Cc:

Al Ott, ADF&G Habitat, Fairbanks  
Biologists, ADF&G Habitat, Douglas  
Terri Lomax, DEC, Anchorage  
Alan Nakanishi, DEC, Juneau

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<sup>4</sup> We labeled the Zone 3 sampling site Tulsequah River Mine (TRM) in Legere and Timothy, 2016.

<sup>5</sup> We labeled the Zone 1 sampling site Upper Tulsequah River (UTR) in Legere and Timothy, 2016.

<sup>6</sup> We labeled the Taku River sampling site downstream of Zone 4 Taku River Border (TRB) in Legere and Timothy, 2016.

<sup>7</sup> The contractor estimated acceptable risk for fish and benthic invertebrates within Zone 4.

<sup>8</sup> We also captured overwintering salmon in Zone 3 habitat; our April 2016 sample, when flow was the lowest observed, contained 2 juvenile Dolly Varden char and 38 juvenile coho salmon (Legere and Timothy, 2016, pp. 8, 12).