

04/22/24

Water Quality Standards Clarification Rulemaking

Technical Support Document

Reclassification of Select Waters on Latouche Island, Prince William Sound

**Prepared by**

**Alaska Department of Environmental Conservation**

**Water Quality Standards Section**

**410 Willoughby Ave**

**Juneau, Alaska 99811**

# Executive Summary

The Department of Environmental Conservation (DEC) is proposing amendments 18 AAC 70.230(e) to reclassify the protected uses of select waterbodies on Latouche Island, Prince William Sound. DEC has been provided with a Use Attainability Analysis (UAA), which demonstrates that human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied, or would cause more environmental damage to correct than to leave in place these waters, are not considered to be *existing uses[[1]](#footnote-1)* per 40 CFR 131.3, and will not be attained by;

1. The imposition of effluent limits required under sections 301(b) and 306 of the Clean Water Act and;
2. Implementation of cost-effective and reasonable best management practices for nonpoint source control.

Rio Tinto, on behalf of Minaska, Inc., has submitted a UAA to DEC documenting water quality in multiple surface waters associated with the former Beatson Mine (Site) located on Latouche Island. These waters have been impacted by mining activities that occurred from 1897 to 1930. The UAA demonstrates non-attainment of protected uses of (1) water supply and (2) growth and propagation of fish, shellfish, other aquatic life, and wildlife and subsequent criteria for the pollutants:

* pH,
* cadmium,
* copper,
* lead,
* zinc

The UAA also demonstrates human-caused and natural sources of pollution (i.e., low pH and metals) cannot be remedied, and it is not feasible to restore these waters to their original condition.

Rio Tinto is working with DEC Contaminated Sites Program to establish a cleanup plan for the Site in accordance with 18 AAC 75 that will combine source control of mine-related waste material, diversion of water where appropriate to keep clean water clean, institutional controls with appropriate land and water use restrictions, and monitored recovery. While the cleanup plan is extensive, the UAA as demonstrated that protected uses cannot be restored to such a condition that the select protected uses will be attained.

# What are Alaska’s Surface Water Quality Standards?

States adopt water quality standards (WQS) to protect public health or welfare, enhance the quality of state waters, and serve the purposes of the CWA. Alaska’s WQS are established in regulations at 18 AAC 70. WQS generally consist of:

* The water quality goals or specific protected uses (i.e., classes and sub-classes) that will be protected in state waters;
* The criteria, both numeric and narrative, that will be used to determine whether such uses are being attained;
* An antidegradation provision to ensure existing water uses and the level of water quality necessary to protect existing uses are maintained and protected; and
* General provisions that affect implementation of WQS in state water pollution control programs (e.g., mixing zones, water quality standards variances).

Under the CWA, the term *criteria* have two different definitions. Under section 304(a), criteria refers to specific numeric concentrations recommended by U.S. Environmental Protection Agency (EPA) that are considered to be protective of aquatic life and human health. Under section 303(c), criteria refers to the numeric or narrative targets considered to be protective of the water quality goals (i.e. classes and subclasses). In each case, a criterion typically includes three components:

* Magnitude: Numeric or narrative value that represent the maximum amount of a pollutant allowed to be present in a waterbody while still considered to be protective of the associated use of that water.
* Duration: The time period used to calculate exposure (e.g., 1-hour or 96-hour average for toxic pollutants).
* Frequency: The allowable number of exceedances of the magnitude value that may occur within a specific time period. Frequency considers the amount to time required for a use to recover from the stress of exposure to a pollutant (e.g., no more than one exceedance every three years).

Protected uses are referenced in state regulation at 18 AAC 70.050.

**18 AAC 70.050. Classification of state water.** Except as specified in 18 AAC 70.230(e), state water is protected for the following use classes:

(1) fresh water - Classes (1)(A), (1)(B), and (1)(C);

(2) groundwater - Class (1)(A);

(3) marine water - Classes (2)(A), (2)(B), (2)(C), and (2)(D).

Use classes are defined as follows:

1. Water supply: (i) drinking water for humans, culinary and food processing (ii) agriculture, including irrigation, (iii) aquaculture, (iv) industrial.
2. Recreation (i) contact recreation (i.e. swimming for humans), (ii) secondary recreation (i.e. boating, fishing and wading).
3. Growth and propagation of fish, shellfish, other aquatic life, and wildlife.
4. Harvesting for consumption of raw mollusks or other raw aquatic life.

## How are Protected Uses Revised?

WQS are revised periodically in accordance with state and federal regulations. Revisions are made to incorporate new science, to meet new state or federal requirements, or to provide additional clarity to the regulated public. Per section 303(c) of the CWA and federal regulations at 40 CFR 131.21, WQS revisions must be submitted to the EPA for review and approval prior to use in water pollution control programs (e.g., APDES permits, waterbody assessments).

State regulations at 18 AAC 70.230 state:

1. Upon application, upon petition, or on its own initiative, the department may adopt, modify, or repeal protected water use classes in 18 AAC 70.050 for a water of the state in accordance with 40 C.F.R. 131.10, revised as of July 1, 2019, and adopted by reference.

Federal regulations at 40 C.F.R 131.10 state:

(g) States may designate a use, or remove a use that is not an existing use, if the State conducts a use attainability analysis as specified in paragraph (j) of this section that demonstrates attaining the use is not feasible because of one of the six factors in this paragraph.

(1) Naturally occurring pollutant concentrations prevent the attainment of the use; or

(2) Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be

met; or

**(3) Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place;** or

(4) Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate such modification in

a way that would result in the attainment of the use; or

(5) Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or

(6) Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact.

(h) States may not remove designated uses if:

(1) They are existing uses, as defined in § 131.3, unless a use requiring more stringent criteria is added; or

(2) Such uses will be attained by implementing effluent limits required under sections 301(b) and 306 of the Act and by implementing cost-effective and reasonable best management practices for nonpoint source control.

## Technical Support Document Application

This technical support document is intended to describe DEC’s technical and legal decision making process and satisfy federal CWA requirements. It does not detail deliberations or specific implementation procedures that will be used by state water pollution control programs.

# UAA Analysis

A UAA is defined in the federal Water Quality Standards regulations (48 CFR 131.3g) as a waterbody survey and assessment, a wasteload allocation, and economic analysis, if appropriate. This assessment focuses on the waterbody survey and assessment component of a UAA. In terms of structure, the UAA must demonstrate that attaining the designated use is not feasible due to one or more of six factors specified in Section 131.10(g) of the federal Water Quality Standards Regulations.

Rio Tinto has provided a UAA for waterbodies and lands associated with the Beatson Mine (Site). The waterbodies in question are provided in Table 1:

**Table 1: Summary of proposed revisions to 18 AAC 70.230(e)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Watershed Name** | **Watershed Number** | **Latitude & Longitude** | **Use Classes Identified for Removal** | **Pollutant of Concern** | **Reach of Water Affected** |
| Copper Creek  | 19020202 | 60° 3' 3" N147° 54' 14" W  | (A) Water supply (i) drinking, culinary and food processing; (ii) agriculture including irrigation and stock watering | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11))Copper (18 AAC 70(b)(11))  | Confluence with Prince William Sound to designated reach break above mining activities. Includes all minor tributaries to Copper Creek and impoundments (including Mine Lake and Historic Copper Creek) within the affected reach. |
| (A) Water supply (iv) industrial  | pH (18 AAC 70(b)(6)) |
| (B) Water recreation (i) contact recreation; (ii) secondary recreation | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11)) |
| (A) Water supply (iii) aquaculture (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11))Copper (18 AAC 70(b)(11)) Lead (18 AAC 70(b)(11))Zinc (18 AAC 70(b)(11)) |
| South Blackbird Creek | 19020202 | 60° 3' 23" N147° 53' 53" W  | (A) Water supply (i) drinking, culinary and food processing; (ii) agriculture including irrigation and stock watering | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11))Copper (18 AAC 70(b)(11))  | Confluence with Prince William Sound to headwaters and includes all minor tributaries. |
| (A) Water supply (iv) industrial  | pH (18 AAC 70(b)(6)) |
| (B) Water recreation (i) contact recreation; (ii) secondary recreation | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11)) |
| (A) Water supply (iii) aquaculture (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11))Copper (18 AAC 70(b)(11)) Lead (18 AAC 70(b)(11))Zinc (18 AAC 70(b)(11)) |
| North Blackbird Creek | 19020202 | 60° 3' 27" N147° 53' 45" W  | (A) Water supply (i) drinking, culinary and food processing; (ii) agriculture including irrigation and stock watering | pH (18 AAC 70(b)(6))Copper (18 AAC 70(b)(11))  | Confluence with Prince William Sound to designated reach break above mining activities and includes all minor tributaries. |
| (A) Water supply (iv) industrial  | pH (18 AAC 70(b)(6)) |
| (B) Water recreation (i) contact recreation; (ii) secondary recreation | pH (18 AAC 70(b)(6)) |
| (A) Water supply (iii) aquaculture (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife | pH (18 AAC 70(b)(6))Cadmium (18 AAC 70(b)(11))Copper (18 AAC 70(b)(11)) Lead (18 AAC 70(b)(11))Zinc (18 AAC 70(b)(11)) |
| Beach Level Portal | 19020202 | 60° 3' 24" N147° 53' 49" W  | (A) Water supply (i) drinking, culinary and food processing; (ii) agriculture including irrigation and stock watering | Copper (18 AAC 70(b)(11))  | Confluence with Prince William Sound to portal entrance. |
| (A) Water supply (iii) aquaculture (C) Growth and propagation of fish, shellfish, other aquatic life, and wildlife | Cadmium (18 AAC 70(b)(11)Copper (18 AAC 70(b)(11) Lead (18 AAC 70(b)(11)Zinc (18 AAC 70(b)(11) |

The protected uses and respective water quality criteria and pollutants of concern associated with the Site are identified in Table 2.

Table 2: Summary of DEC Water Quality Criteria (Rio Tinto 2024)

|  | pH | Copper | Cadmium | Lead | Zinc |
| --- | --- | --- | --- | --- | --- |
| **Class A**  |
| Drinking, culinary, and food processing 1 | 6.0 – 8.5 | 1,300 µg/L1 | 5 µg/L | Effectively zero2 | 9,100 µg/L1 |
| Agriculture, including irrigation and stock watering  | 5.0 – 9.0 | 200 µg/L | 10 µg/L | 50 µg/L | 2,000 µg/L |
| Aquaculture | 6.0 – 8.5 | Hardness-dependent numerical criteria |
| Industrial | 5.0 – 9.0 | Narrative: Cannot present a hazard to incidental human contact |
| **Class B**  |
| Contact recreation | 6.5 – 8.5 | 1,300 µg/L1 | 5 µg/L | No criteria | 9,100 µg/L\* |
| Secondary recreation | 5.0 – 9.0 | Narrative: Cannot present a hazard to incidental human contact |
| **Class C** |
| Growth and propagation of fish, shellfish, other aquatic life, and wildlife \*  | 6.5 – 8.5 | Hardness-dependent numerical criteria  |

**Background Information:** The former Beatson Mine site consists of three former copper mines (Blackbird, Chenega, and Beatson) that were operated by Kennecott Copper Corporation. The mine produced 182 million pounds of copper between 1899 and 1930 with peak production in 1918. The Site was abandoned after 1930 following exhaustion of mineable ore from the orebody. The townsite of Latouche (which no longer exists) included the mill, compressor plant, a power plant with three diesel engines, various fuel aboveground storage tanks, a tram line to connect the town to the mill, a shaft to connect the mill to the mine, a wharf, and various non-industrial buildings.

Geochemical evaluation provided in the UAA demonstrates that the waste rock and tailings are currently acid generating, and there is no reason to believe that acid generationhas occurred since the initial placement of these waste rock and tailings (i.e., 1899-1930). Native rock is also mineralized and is also acid-generating. Between 1890 and 1930, waste rock was stockpiled on site, with no engineering controls (e.g., cover placement) to limit the exposure of sulfide minerals to air and water. The processes associated with acid generation for exposed sulfide minerals with limited neutralization potential would occur relatively fast, which means that metal leaching to groundwater and surface waters would have occurred well before 1975. There is no water quality data available prior to 1975 except a pH measurement of 4.8 from Mine Lake (Shacklette 1961) which reinforces the conclusion that acid generation was occurring prior to 1975.

**Water Quality Evaluation**

Waterbodies associated with the Site include creeks (ephemeral or perennial) and the pit lake formed by mining activities, but also impoundments formed by the placement of waste rock, drainage features created by the placement of rock for road construction by third parties, short drainage sections from mine adits, and seeps. Surface water sampling between 2016 and 2023 occurred over multiple seasons and locations across the Site. Specific sampling locations (i.e., ~70 locations) and timing of sampling is identified at Section 4.0 of the UAA. The UAA (p. 31) demonstrates:

* The five water quality parameters with concentrations that persistently[[2]](#footnote-2) exceed one or more applicable water quality criteria were pH, copper, cadmium, lead, and zinc.
* Water quality summary statistics for the primary substances of interest (i.e., field pH, dissolved copper, cadmium, lead, and zinc) were compiled for each waterbody. These summary statistics are presented with the sample size, magnitude of concentrations, and frequency of exceedances relative to both freshwater aquatic life and human health water quality criteria. Hardness is used to adjust the freshwater aquatic life criteria, where applicable. These results are provided in Tables 3 through 7.
* There were also persistent exceedances of the acceptable pH limits specified in 18 AAC 70.020(b)(6) for the other designated water uses (A[ii] agricultural, including irrigation and stock watering; A[iv] industrial; B(i) contact recreation; B(ii) secondary recreation). The lower limit pH range for these other designated water uses is 5.0 (instead of 6.0 for water supply and 6.5 for aquatic life). pH values were persistently lower than 5.0 in many of the sampling locations in each of the three water courses reviewed in the UAA.

**Table 3: Copper Creek Drainage Water Quality Summary – Upstream to Downstream (Table 6, UAA 2024)**

| Waterbody | Substance of Interest | N | Frequency of Exceedances | Summary Statistics (Dissolved Concentration; µg/L) |
| --- | --- | --- | --- | --- |
| DW | Chronic AW | Acute AW | Human Health  | Min | Mean  | 90th P | Max |
| **Background (Upper Copper Creek Above Influence of Middle Bench)** | Copper | 33 | NA | 36% | 24% | 0% | <0.6 | 3.5 | 3.1 | 14 |
| Cadmium | 33 | 0% | 0% | 0% | NA | <0.037 | 0.1 | 0.1 | <0.14 |
| Lead | 33 | NA | 0% | 0% | NA | <0.04 | 0.2 | 0.2 | 0.17 |
| Zinc | 33 | NA | 0% | 0% | 0% | <0.93 | 4.1 | 7.8 | 8.2 |
| pH | 30 | 27% | 40% | 40% | NA | 4.6 | 6.9 | 8.3 | 9.7 |
| **Middle Shelf Drainage** | Copper | 36 | NA | 100% | 100% | 3% | 52 | 858 | 1260 | 1400 |
| Cadmium | 36 | 0% | 97% | 78% | NA | <0.11 | 1.1 | 1.6 | 3.0 |
| Lead | 36 | NA | 100% | 17% | NA | 0.72 | 20 | 33 | 34 |
| Zinc | 36 | NA | 100% | 100% | 0% | 29 | 410 | 601 | 890 |
| pH | 36 | 81% | 94% | 94% | NA | 3.5 | 6.1 | 6.5 | 6.6 |
| **Chenega South Adit** | Copper | 8 | NA | 88% | 88% | 0% | 4.0 | 29 | 56 | 100 |
| Cadmium | 8 | 0% | 88% | 0% | NA | <0.14 | 0.23 | 0.29 | 0.36 |
| Lead | 8 | NA | 13% | 0% | NA | <0.04 | 0.19 | 0.26 | 0.79 |
| Zinc | 8 | NA | 100% | 100% | 0% | 73 | 130 | 150 | 150 |
| pH | 8 | 25% | 75% | 75% | NA | 5.3 | 6.2 | 6.8 | 6.9 |
| **Chenega North Adit** | Copper | 10 | NA | 50% | 40% | 0% | 1.0 | 7.0 | 11 | 13 |
| Cadmium | 10 | 0% | 50% | 0% | NA | <0.097 | 0.18 | 0.26 | 0.41 |
| Lead | 10 | NA | 0% | 0% | NA | <0.04 | 0.12 | 0.2 | 0.45 |
| Zinc | 10 | NA | 60% | 60% | 0% | 53 | 85 | 109 | 130 |
| pH | 9 | 0% | 44% | 44% | NA | 6.3 | 6.6 | 6.9 | 7.1 |
| **Pond 32** | Copper | 21 | NA | 100% | 100% | 0% | 180 | 352 | 440 | 510 |
| Cadmium | 21 | 0% | 95% | 95% | NA | <0.14 | 0.9 | 1.5 | 2.1 |
| Lead | 21 | NA | 100% | 19% | NA | 1.8 | 5.34 | 6.85 | 8.9 |
| Zinc | 21 | NA | 100% | 100% | 0% | 180 | 344 | 465 | 600 |
| pH | 21 | 100% | 100% | 100% | NA | 3.8 | 4.8 | 5.3 | 5.7 |
| **Upper Copper Creek (Near Tram Dump and Middle Bench)** | Copper | 39 | NA | 100% | 100% | 0% | 1.9 | 208 | 477 | 540 |
| Cadmium | 39 | 0% | 74% | 51% | NA | <0.037 | 0.6 | 1.1 | 1.3 |
| Lead | 39 | NA | 59% | 0% | NA | <0.04 | 1.1 | 2.72 | 3.8 |
| Zinc | 39 | NA | 74% | 74% | 0% | <4.6 | 208 | 388 | 460 |
| pH | 35 | 49% | 69% | 69% | NA | 3.79 | 6.9 | 8.04 | 9.65 |
| **Mine Lake** | Copper | 17 | NA | 100% | 100% | 0% | 5.8 | 125 | 230 | 260 |
| Cadmium | 17 | 0% | 82% | 47% | NA | <0.037 | 0.4 | 0.6 | 0.9 |
| Lead | 17 | NA | 82% | 0% | NA | <0.084 | 1.2 | 1.98 | 3.6 |
| Zinc | 17 | NA | 88% | 88% | 0% | 7.2 | 122 | 210 | 280 |
| pH | 13 | 46% | 69% | 69% | NA | 5.05 | 6.0 | 6.8 | 7.3 |
| **Beatson Main South Adit** | Copper | 20 | NA | 100% | 100% | 0% | 24 | 104 | 158 | 250 |
| Cadmium | 20 | 0% | 90% | 15% | NA | <0.1 | 0.5 | 0.9 | 1.2 |
| Lead | 20 | NA | 30% | 0% | NA | <0.04 | 1.0 | 1.88 | 4.9 |
| Zinc | 20 | NA | 100% | 100% | 0% | 39 | 250 | 426 | 550 |
| pH | 19 | 32% | 74% | 74% | NA | 5.06 | 6.3 | 6.9 | 7.1 |
| **Beatson Main Adit/Lower Copper Creek** | Copper | 28 | NA | 100% | 96% | 0% | 22 | 133 | 277 | 320 |
| Cadmium | 28 | 0% | 93% | 36% | NA | <0.1 | 0.7 | 1.2 | 1.4 |
| Lead | 28 | NA | 57% | 0% | NA | <0.088 | 3.2 | 3.47 | 4.5 |
| Zinc | 28 | NA | 100% | 100% | 0% | 56 | 326 | 507 | 640 |
| pH | 26 | 46% | 81% | 81% | NA | 2.8 | 6.02 | 6.8 | 7.9 |

**Table 4: Historic Copper Creek Drainage Water Quality Summary - Upstream to Downstream (Table 7, UAA 2024)**

| Waterbody | Substance of Interest | N | Frequency of Exceedances | Summary Statistics (Dissolved Concentration; µg/L) |
| --- | --- | --- | --- | --- |
| DW | Chronic AW | Acute AW | Human Health  | Min | Mean  | 90th P | Max |
| **Historic Copper Creek Pool** | Copper | 10 | NA | 100% | 100% | 60% | 640 | 2176 | 3760 | 4800 |
| Cadmium | 10 | 60% | 100% | 90% | NA | 2.2 | 6.7 | 8.8 | 14 |
| Lead | 10 | NA | 100% | 0% | NA | 5.9 | 11 | 15 | 16 |
| Zinc | 10 | NA | 100% | 100% | 0% | 1400 | 3590 | 5320 | 6700 |
| pH | 9 | 100% | 100% | 100% | NA | 3.2 | 3.5 | 3.8 | 4.3 |
| **Historic Copper Creek** | Copper | 42 | NA | 100% | 100% | 12% | 16 | 2100 | 2100 | 2200 |
| Cadmium | 42 | 14% | 86% | 60% | NA | <0.037 | 8.8 | 8.8 | 10 |
| Lead | 42 | NA | 76% | 10% | NA | <0.04 | 8.8 | 11 | 12 |
| Zinc | 42 | NA | 98% | 98% | 0% | 5.6 | 3900 | 3900 | 4500 |
| pH | 36 | 75% | 83% | 83% | NA | 3.3 | 5.8 | 7.2 | 7.2 |

**Table 5: Blackbird Drainage Water Quality Summary- Upstream to Downstream (Table 8, UAA 2024)**

| Waterbody | Substance of Interest | N | Frequency of Exceedances | Summary Statistics (Dissolved Concentration; µg/L) |
| --- | --- | --- | --- | --- |
| DW | Chronic AW | Acute AW | Human Health  | Min | Mean  | 90th P | Max |
| **Background (North Blackbird Creek)** | Copper | 12 | NA | 100% | 100% | 0% | 3.0 | 6.5 | 9.9 | 13 |
| Cadmium | 12 | 0% | 0% | 0% | NA | <0.037 | 0.038 | 0.037 | 0.047 |
| Lead | 12 | NA | 58% | 0% | NA | <0.04 | 0.17 | 0.3 | 0.38 |
| Zinc | 12 | NA | 17% | 17% | 0% | 4.3 | 5.7 | 7.6 | 9.4 |
| pH | 12 | 8% | 42% | 42% | NA | 5.2 | 6.5 | 6.9 | 7.0 |
| **North Blackbird Creek** | Copper | 63 | NA | 100% | 100% | 5% | 6.5 | 1375 | 1620 | 1900 |
| Cadmium | 63 | 0% | 92% | 63% | NA | <0.037 | 2.7 | 3.3 | 3.8 |
| Lead | 63 | NA | 97% | 13% | NA | 0.065 | 29 | 40 | 43 |
| Zinc | 63 | NA | 97% | 97% | 0% | 4.5 | 1094 | 1320 | 1600 |
| pH | 61 | 51% | 82% | 82% | NA | 3.6 | 6.2 | 7.0 | 7.0 |
| **South Blackbird Creek** | Copper | 55 | NA | 100% | 100% | 40% | 61 | 7886 | 10400 | 12000 |
| Cadmium | 55 | 13% | 96% | 73% | NA | <0.14 | 7.4 | 12 | 14 |
| Lead | 55 | NA | 91% | 18% | NA | 0.26 | 51 | 66 | 72 |
| Zinc | 55 | NA | 98% | 98% | 0% | 44 | 3000 | 4440 | 5000 |
| pH | 50 | 78% | 90% | 90% | NA | 2.7 | 5.9 | 7.0 | 7.1 |
| **Beach Level Adit** | Copper | 4 | NA | 100% | 100% | 0% | 50 | 153 | 230 | 260 |
| Cadmium | 4 | 0% | 100% | 0% | NA | 0.96 | 1.5 | 1.8 | 1.8 |
| Lead | 4 | NA | 25% | 0% | NA | <0.2 | 5.8 | 13 | 16 |
| Zinc | 4 | NA | 100% | 100% | 0% | 480 | 770 | 906 | 930 |
| pH | 2 | 0% | 0% | 0% | NA | 7.0 | 7.0 | 7.0 | 7.0 |

**Table 6: South Creek Drainage Water Quality Summary (Table 9, UAA 2024)**

| Waterbody | Substance of Interest | N | Frequency of Exceedances | Summary Statistics (Dissolved Concentration; µg/L) |
| --- | --- | --- | --- | --- |
| DW | Chronic AW | Acute AW | Human Health  | Min | Mean  | 90th P | Max |
| **South Creek** | Copper | 24 | NA | 92% | 83% | 0% | 2.1 | 21 | 30 | 30 |
| Cadmium | 24 | 0% | 8% | 0% | NA | <0.037 | 0.1 | 0.14 | 0.19 |
| Lead | 24 | NA | 54% | 4% | NA | <0.04 | 0.85 | 1.3 | 2.2 |
| Zinc | 24 | NA | 17% | 17% | 0% | <2 | 21 | 21 | 21 |
| pH | 22 | 32% | 59% | 59% | NA | 4.0 | 6.7 | 7.2 | 7.3 |

Biologic Evaluation: Sampling conducted at the Site indicates limited numbers of aquatic invertebrates are observed in the creeks located within the mine-impacted area with no aquatic invertebrates observed in the most mine-impacted creeks. Sampling results are reported in Table 7.

**Table 7 Invertebrate Observation from Site Creeks (Table 10, UAA 2024)**

| Waterbody | Observations | Conclusions |
| --- | --- | --- |
| Upper Copper Creek | 138 invertebrates were sampled from nine locations in Upper Copper Creek, 111 of which were EPT. | Upper Copper Creek, upstream of SW-BG06 (RM 0.2), supports a healthy and diverse population of aquatic invertebrates. |
| Lower Copper Creek | Nine sample locations yielded no invertebrates in Lower Copper Creek.  | Lower Copper Creek does not support a viable population of aquatic invertebrates between the Beatson Main Adit discharge and Prince William Sound. |
| Historic Copper Creek | Seven sample locations yielded no invertebrates. | Historic Copper Creek does not support a viable population of aquatic invertebrates. |
| North Blackbird Creek | 44 invertebrates were sampled from nine locations. 24 were EPT and 42 were sampled upstream of the mine- influenced area of the creek. | All invertebrates observed were sampled from the upper reaches, upgradient of the mine-influenced area (SW-034 at RM 0.3), or near the marine environment. North Blackbird Creek within the mine-influenced area does not support a viable population of invertebrates.  |
| South Blackbird Creek | Three EPT individuals were sampled from nine locations. No other invertebrates were observed. | Only a few aquatic invertebrates were observed in the upper reaches of the creek. South Blackbird Creek within the Site does not support a viable population of invertebrates. |
| South Creek | 45 invertebrates were sampled from nine locations, three of which were EPT. | Invertebrates, including EPT, were observed throughout the surveyed reaches of South Creek. South Creek supports an aquatic invertebrate community which may be sufficient to support fish.  |

**Table 8 Fish Observations from Site Creeks (Table 11, UAA 2024)**

| Waterbody | Observations | Conclusions |
| --- | --- | --- |
| Upper Copper Creek | One Dolly Varden fry was trapped from the five minnow traps set on Upper Copper Creek. | Upstream background conditions in Upper Copper Creek supports fish life. |
| Lower Copper Creek | No fish were sampled from the five set minnow traps. | Lower Copper Creek does not support fish life. |
| Historic Copper Creek | No fish were sampled from the five set minnow traps. | Historic Copper Creek does not support fish life. |
| North Blackbird Creek | No fish were sampled from the five set minnow traps. | North Blackbird Creek does not support fish life within the mine-impacted reaches. A minnow trap was not placed in the background portion of this creek  |
| South Blackbird Creek | No fish were sampled from the five set minnow traps. | South Blackbird Creek does not support fish life. |
| South Creek | Fish were found at one of the five set minnow traps. Nine Dolly Varden fry were trapped at the pool upstream of the airstrip. | Fish were observed only at one location on South Creek. However, the density of fish collected at that location indicate that South Creek can support fish life. |

Based on this information, the department concludes that the protected use of growth and propagation of fish, shellfish, other aquatic life, and wildlife and numeric and narrative criteria pertaining to waters associated with the former Beatson Mine are not attained, nor is this protected use considered to be an existing use per federal and state definition and documentation provided in the UAA (2024).

**Conclusion:** DEC has concluded, based on the UAA (2024) provided by Rio Tinto, the following protected uses and associated criteria will be reclassified (i.e., removed) for the following waterbodies based on 40 C.F.R. 131.10(g)(3) primarily based on the fact that **Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place.**

**Table 9. Protected Uses and Criteria Proposed for Removal (i.e., reclassification).**

| Waterbody | Reach | (A) Water Supply (i) drinking, culinary, and food processing | (A) Water Supply (ii) Agriculture, including irrigation and stock watering | (A) Water Supply (iv) industrial | (B) Water Recreation (i) contact recreation; (ii) secondary recreation | I Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife; (A)(iii) aquaculture |
| --- | --- | --- | --- | --- | --- | --- |
| Copper Creek Drainage | Upstream of Station SW-BG06 (Reach Break) | Retain | Retain | Retain | Retain | Retain |
| Station SW-BG06 (RM 0.2) to Mine Lake | **Remove** (pH) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Middle Shelf Drainage | **Remove** (pH) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Chenega North Adit Discharge\* | **Remove** (pH) | **Remove** | **Remove** | **Remove** (pH) | **Remove** (pH, Cd, Cu, Zn) |
| Chenega South Adit Discharge | **Remove** (pH) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Mine Lake\* | **Remove** (pH) | **Remove** | **Remove** | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Pond 32 | **Remove** (pH) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Beatson Main Adit Discharge | **Remove** (pH) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Beatson Main Adit South Discharge\* | **Remove** (pH) | **Remove** | **Remove** | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Lower Copper Creek | **Remove** (pH) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Historic Copper Creek Drainage | Historic Copper Creek | **Remove** (pH, Cd, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Historic Copper Creek Pool | **Remove** (pH, Cd, Cu) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH, Cd) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| North Blackbird Creek Drainage | Upstream of Station SW-034 (Reach Break) | Retain | Retain | Retain | Retain | Retain |
| Station SW-034 (Reach Break) to Prince William Sound | **Remove** (pH, Cu) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| South Blackbird Creek Drainage | **Remove** (pH, Cd, Cu) | **Remove** (pH, Cu) | **Remove** (pH) | **Remove** (pH, Cd) | **Remove** (pH, Cd, Cu, Pb, Zn) |
| Beach Level Portal Discharge | **Remove** | **Remove** (Cu) | **Remove** | **Remove** | **Remove** (Cd. Cu, Pb, Zn) |
| South Creek | Retain | Retain | Retain | Retain | Retain |

* Reclassification of protected uses for select waters identified in the UAA is consistent with state and federal regulations.The attainment of water quality criteria) for these waterbodies is not anticipated to have occurred since 1975. The timing of the human-caused pollution and alteration, including placement of waste rock with its associated generation of ARD, created conditions that would have been in place for more than forty years before the Clean Water Act was implemented. None of the water uses for the waterbodies identified for removal in Table 1 were existing when the Clean Water Act was first adopted because the waterbodies were already impacted by the mine waste placed prior to 1930.
* Human-caused sources of pollution exist that cannot be remedied or would cause more environmental damage to correct than to leave in place. The UAA provides a detailed explanation of post-remedial modeled water quality in North and South Blackbird Creeks. While the model is specific to copper concentrations, DEC considers the results to be a creditable representation of future concentrations of other pollutants (i.e., pH, select metals) and waters of concern as well. Remediation of visible waste rock and soil contamination is planned that will reduce mass loadings to shallow groundwater and surface water, but it is not feasible to prevent water from infiltrating into the underground workings and from the underground workings back to surface water. Ongoing discharges from water interacting with natural mineralization, mine waste and mine-influenced water via adit discharges, subsidence areas and seeps will continue and prevent the attainment of one or more of the numerical water quality criteria for pH and metals. The aquatic life criteria are hardness-dependent, and thus, very low because the water is very soft. Attaining the pH criteria for the other water uses is also challenging because of the geochemical factors that influence ARD generation. This factor is discussed further in the UAA at Section 5.2.
* **Substantive hydrological modifications occurred to the original waterbodies that prevent attainment of aquatic life water uses and it is not feasible to restore the waterbodies to their original condition.** The specific configuration of the waterbodies prior to the initiation of mining in the 1890s is not known, but likely consisted of a single Blackbird Creek channel draining from the Upper Bench and one Copper Creek channel that followed a path through the Mine Lake footprint and out to Prince William Sound via the Historic Copper Creek channel. The creation of Mine Lake (and subsequent diversion of Copper Creek by the mining activity and much of the shallow groundwater at the site) into the underground workings is an irreversible change in Site hydrology. This factor is discussed further in the UAA at Section 5.3.

# References

Alaska Department of Environmental Conservation. 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. Juneau Alaska.

Stephen, Charles E., et al. 1985. Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. EPA Office of Research and Development, Environmental Research Laboratories. PB85-227049, Duluth, MN.

Sullivan, K., D.J. Martin, R.D. Cardwell, J. E. Toll, and S. Duke. 2000. An analysis of the

effects of temperature on salmonids of the Pacific Northwest with implications for selecting

temperature criteria. Sustainable Ecosystems Institute, Portland Oregon.

U.S. Environmental Protection Agency. 1997 Guidelines for the Preparation of Comprehensive State Water Quality Assessments and Electronic Updates. EPA841-B-97-002A. Office of Water. Washington D.C.

U.S. Environmental Proetction Agency. 2002 National Recommended Water Quality Criteria. EPA-822-R-02-R47. Office of Water. Washington D.C.

U.S. Environmental Protection Agency. 2003. EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards. EPA 910-B-03-002. Region 10 Office of Water, Seattle, WA

U.S. Environmental Protection Agency. 2004. Support Document for EPA’s Action Reviewing New or Revised Water Quality Standards for the State of Oregon.

U.S. Environmental Protection Agency. 2021. Clean Water Act Methods Update Rule for the Analysis of Effluent. EPA-HQ-OW-2018-0826; FRL-10021-59-OW. Office of Water. Washington D.C.

Weber Scannell, P, et al. 2005. Acute and Chronic Toxicity of Hydrocarbons in Marine and Fresh Water with an Emphasis on Alaska Species: a Review of the Literature. Prepared for the Alaska Department of Environmental Conservation. Juneau, AK.

1. 40 C.F.R 131.3(e): Existing uses are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards. [↑](#footnote-ref-1)
2. For toxic pollutants, persistent exceedance occurs when the pollutant has exceeded the Clean Water Act numeric criterion more than once in three years (EPA, 2003). For conventional pollutants, persistent exceedance is defined as greater than ten percent of the time in each dataset (DEC, 2021). [↑](#footnote-ref-2)