STATE OF ALASKA

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER
WASTEWATER DISCHARGE PROGRAM

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December 15, 2009
Certified Mail #7008-1830-0003-5208-1758
Return Receipt Requested

Mike Bonneau
Teck Alaska, Incorporated
3105 Lakeshore Drive, Bldg. A., Ste 101
Anchorage, AK 99517

Re: NPDES AK-003865-2, Red Dog Mine Site

Dear Mr. Bonneau:

Under Section 401 of the Clean Water Act and provisions of the Alaska Water Quality Standards, Alaska Department of Environmental Conservation (department) issues the enclosed Certificate of Reasonable Assurance for National Pollutant Discharge Elimination System (NPDES) Permit AK-003865-2. Conditions set forth in U.S. Environmental Protection Agency (EPA), NPDES Permit AK-003865-2 regulate the discharge of treated wastewater and stormwater from Red Dog Mine and include discharge points, effluent limitations, and monitoring requirements.

Outfall 002, as listed in the previous version of NPDES Permit AK-003865-2, is not covered by this reissue of the permit. See Part IV.A of the Fact Sheet. Consequently, discharge from Outfall 002 is not considered under this certification.

The proposed activity is located at the Red Dog Mine Site on Red Dog Creek, 82 miles north of Kotzebue, Alaska at latitude 68° 04'17" N and longitude 162° 52' 05" W.

This department action considered reissue of NPDES Permit AK-003865-2 with respect to the Alaska Costal Management Program (ACMP) and reviewed the discharges regarding ACMP and 11 AAC 110. In a letter dated June 16, 2005, the ACMP decided that this reissue of NPDES Permit AK-003865-2 does not require a consistency review because it proposes no modifications to effluent concentrations or volumes when compared to the previous, expired, and ACMP consistent permit. Therefore pursuant to 11 AAC 110.820(k)(4) and 11 AAC 110.830, consistency review is not required for this permit reissue.

Department regulations provide that any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 - 18 AAC 15.340 or an informal review by the Division of Water Director in accordance with 18 AAC 15.185. Informal review requests must be

delivered to the Division of Water Director, 555 Cordova Street, Anchorage, Alaska 99501, within 15 days after receiving this permit decision. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801, within 30 days after the date of this permit decision. If a hearing is not requested within 30 days, the right to appeal is waived.

By copy of this letter, we are advising EPA and ACMP of our actions and enclosing a copy of the Certificate for their use.

Sincerely,

Sharmon Stambaugh
Wastewater Discharge Program Manager

Enclosures: Certificate of Reasonable Assurance

cc:

ADEC/Fairbanks
ADEC/Juneau
ADF&G/Fairbanks
ADNR/M,L, & W/Anchorage
ADNR/DCOM/ACMP/Anchorage
ADNR/Fairbanks
DOL/Fairbanks
Center on Race, Poverty, & the Environment
City of Kivalina
DCED/Fairbanks
EPA/Anchorage
EPA/Seattle
Center for Science in Public Participation
Kivalina Water Resource Program
Michael Moran Associates, LLC.
NANA Corporation/Kotzebue
Northwest Arctic Borough/Kotzebue
NPS/Kotzebue
ADNR/DCOM/Anchorage
Red Dog Mine Site
Trustees for Alaska/Anchorage
USFWS/Fairbanks
USCOE/Fairbanks

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CERTIFICATE OF REASONABLE ASSURANCE

A Certificate of Reasonable Assurance, as required by Section 401 of the Clean Water Act (CWA), has been requested by Teck Alaska, Incorporated (Teck) for National Pollutant Discharge Elimination System (NPDES) Permit AK-003865-2 to discharge treated wastewater and stormwater from Red Dog Mine.

Public notice of the application for this certification was conducted according to 18 Alaska Administrative Code (AAC) 15.140.

A Water Quality Certification is required because the activity is authorized by a U.S. Environmental Protection Agency (EPA) permit identified as NPDES Permit AK-003865-2 and discharges will result from the activity.

This NPDES Permit certification covers wastewater disposal from the following discharges:

1. Outfall 001 – discharge of treated wastewater and excess precipitation to the Lower Middle Fork of Red Dog Creek (Lower Middle Fork) located at latitude 68° 04'17" N and longitude 162° 52' 05" W and

2. Discharge of snowmelt and rainfall runoff from the site as indicated in the Stormwater Pollution Prevention Plan.

Under 18 AAC 70.235(b), the most recent EPA-approved regulation for Alaska site-specific criteria (SSC), the cadmium natural condition-based site-specific criterion (NCBSSC) in the Main Stem Red Dog and Ikalukrok Creeks is 2.0 micrograms per liter derived from total recoverable metal concentrations. This value is representative of the natural condition and will protect all designated and existing uses.

The department reviewed Teck's request to rescind the NCBSSC for zinc applied to the Main Stem that was approved in the 401 certification issued for the 1998 NPDES Permit. At the time of that certification, the zinc NCBSSC was less stringent than the applicable zinc Alaska Water Quality Standards (WQS) in 18 AAC 70.020(b). Since the approval of the NCBSSC for zinc in the 1998 NPDES Permit certification, the WQS for zinc has increased resulting in the NCBSSC being more stringent than the currently applicable WQS for zinc listed in 18 AAC 70.020(b)(11). The department finds that the NCBSSC for zinc in the Main Stem is not required to protect existing uses of the waterbody and removal of the zinc NCBSSC is hereby approved. The applicable WQS for zinc in the Main Stem shall be determined as required in 18 AAC 70.020(b) and the *Alaska Water Quality Criteria Manual*. These are the criteria upon which the effluent limits in the NPDES Permit are based.

The department reviewed the application, NPDES Permit, and this certification with respect to the WQS antidegradation policy and finds the reduction in water quality to be in compliance with the requirements of 18 AAC 70.015, provided that the terms and conditions of this

certification are made part of the NPDES Permit. See Appendix A for the antidegradation analysis of decisions contained in this certification.

This Section 401 Certification applies to reissue of NPDES Permit AK-003865-2. The department reviewed the discharges with respect to the Alaska Costal Management Program (ACMP) under 11 AAC 110. In a letter dated June 16, 2005, the ACMP decided that this reissue of NPDES Permit AK-003865-2 does not require a consistency review because it proposes no modifications to effluent concentrations or volumes when compared to the previous, expired, and ACMP consistent permit. Therefore pursuant to 11 AAC 110.820(k)(4) and 11 AAC 110.830, consistency review is not required for this permit reissue.

Having reviewed the permit, the department certifies that there is reasonable assurance that the proposed activity and any resulting discharge complies the requirements of CWA Section 401, which includes WQS (18 AAC 70). Through this certification, in accordance with 18 AAC 15.120 ADOPTION OF NPDES PERMITS, the NPDES Permit will constitute the permit required under Alaska Statutes (AS) 46.03.100 Waste Disposal Permit, provided that the terms and conditions of this certification are made part of the final NPDES Permit. The department is specifying the following permit terms and conditions under authority of AS 46.03.110(d).

1. This certification authorizes the following three mixing zones (NPDES Permit parts I.A.1, I.A.7a, and I.C.1), which have been numbered for the sake of reference.

   First, mixing zone 1 in the Lower Middle Fork extends from Outfall 001 downstream to the confluence with the North Fork of Red Dog Creek (North Fork). The Lower Middle Fork mixing zone is granted for pH, approximately 7,000 feet long, and shall be monitored at Station 151.

   Second, mixing zone 2 in the Main Stem of Red Dog Creek (Main Stem) extends from the confluence of the Lower Middle Fork with the North Fork to Station 151. The Main Stem mixing zone is approximately 1,930 feet in length and provides mixing in the ratio of 1.5 parts receiving flow to 1 part effluent inflow for a dilution factor of 2.5. This mixing zone is granted for the following parameters: total dissolved solids (TDS), ammonia, and cyanide measured as weak acid dissociable (WAD) cyanide.

   Third, mixing zone 3 in Ikalukrok Creek extends downstream from the confluence of the Main Stem and Ikalukrok Creek to Station 150. The mixing zone is approximately 3,420 feet in length and provides mixing in the ratio of 1 part receiving flow to1 part Main Stem inflow for a dilution factor of 2. The Ikalukrok Creek mixing zone is granted for TDS.

   See the map and schematic diagram in Attachments A and B, respectively.

Rationale: In accordance with State Regulations 18 AAC 70.240 to 18 AAC 70.270 (June 26, 2003), which are the most recent mixing zone regulations approved by EPA for issuance and

certification of NPDES Permits, the department has authority to designate mixing zones in permits or certifications.

a) 18 AAC 70.240(a)(1). The applicable requirements of 18 AAC 70 will be met.

The proposed mixing zones meet the requirements of the State water quality regulations at 18 AAC 70. In addition, the requirements of 18 AAC 70 will be met at all points outside of the mixing zones.

b) 18 AAC 70.245(a). Existing uses of the waterbody outside the mixing zone will be maintained and fully protected, such that existing uses outside the mixing zone are neither partially nor completely eliminated, and the overall biological integrity of the waterbody is not impaired.

In considering whether the mixing zones should be authorized, the department determined that existing uses of the receiving waters will be maintained and fully protected.

The department's review of effluent monitoring data and studies conducted by the Alaska Department of Fish and Game (ADF&G) indicate that existing uses will be maintained and fully protected in areas outside the mixing zones, including in the Main Stem, the North Fork, and Ikalukrok Creek.

In the case of TDS, the discharge concentrations have been authorized by the department under Compliance Orders by Consent (COBCs) for nearly a decade. During this time, discharge water quality and biological impacts have been extensively monitored and analyzed by the department, ADF&G, and EPA. Under the 2003 permit modification, TDS limits at the edge of mixing zone 2 were 1,500 mg/L during Arctic grayling non-spawning and 500 mg/L during grayling spawning periods and 1,000 mg/L at the edge of mixing zone 3. During non-spawning periods, there has been only one instance when water quality within mixing zone 2 did not comply with the limits contained in the 2003 permit modification. Water quality within mixing zone 3 has never deviated from limits contained in the 2003 permit modification. Upon appeal of the 2003 permit modification, the 500 mg/L limit for grayling spawning was remanded to EPA by the Environmental Appeals Board (EAB) for further consideration. Subsequent to the 2004 EAB decision, the department developed, and EPA approved, revised SSC for the Main Stem, which established WQS of 1,500 mg/L for both spawning and non-spawning periods. The department determined that these levels would fully protect designated and existing uses of the waterbody, as summarized in the department's January 27, 2006 decision document supporting the TDS SSC.

Aquatic monitoring has shown fish populations in Red Dog Creek increase and decrease with time. There are, however, no discernible differences between populations in areas affected by discharges from mine operations and the North Fork, which is not affected by mining operations. There also have been no effects on fish populations in the North Fork compared to pre-mining conditions indicating that there have not been adverse impacts on fish passage through the watershed. Last, there have been no observable negative impacts on existing uses, within the mixing zones or outside of them, since mining began. Several years scientific data indicate that

discharges of TDS have not impaired existing uses, either within or outside the mixing zones, and there will be no impairment to the overall biological integrity of the waterbody.

For ammonia, there was no effluent limit in the 1998 permit. The actual discharge of ammonia is expected to be consistent with, or less than, historical levels, and will not contribute to any impairment of existing uses. Based on analysis of discharge data, concentrations of ammonia in the mixing zone are expected to be significantly below the acute WQS, such that chronic levels of ammonia would rarely occur in the mixing zone between the North Fork and Station 151. For these reasons, the department has determined that the water quality associated with the ammonia limit will be adequate to fully protect existing uses.

For cyanide, the permit imposes a new limit based on weak acid dissociable (WAD) cyanide. The actual discharge of cyanide is expected to be consistent with historical levels, and will not contribute to any impairment of existing uses. Discharge data indicates that the median value of WAD cyanide concentration in the effluent is well below chronic levels. Considering dilution that would occur, even chronic levels of cyanide are not anticipated to occur in the mixing zone between the North Fork and Station 151. Additionally, the maximum projected concentration for WAD cyanide at the point of discharge is below the acute WQS. Concentrations of WAD cyanide in the mixing zone are expected to be significantly below the acute and chronic WQS. For these reasons, the department has determined that the water quality associated with the WAD cyanide limit will be adequate to fully protect existing uses.

The mixing zone for pH extends from Outfall 001 to the confluence of the North Fork. pH will be fully protective of the limited existing uses within the mixing zone and of existing uses at all points beyond. Based on water quality monitoring data, the baseline pH at the station just above Outfall 001 ranges from 5.8 to 6.7. An optimum wastewater treatment pH, approximately 9.5 to 10.5, precipitates metals from the effluent before it is discharged through Outfall 001. Data collected in the discharge and in the receiving waters since mine operations began, indicate that pH stabilizes shortly after the discharge into Red Dog Creek. The pH is above 6.5 at Station 20 (upstream of the North Fork confluence) and is approximately 7 at the mouth of the Main Stem; i.e., the mixing of basic discharge waters with naturally acidic creek waters results in near neutral pH where fish occur, ensuring protection of existing uses within the mixing zones and at all points beyond. Beyond the mixing zone, pH standard of 6.5- 8.5 applies to protect aquatic life. Past sampling indicates that pH will be within this range at all points downstream of the mixing zone.

Additionally, under 18 AAC 70.230(e), the Lower Middle Fork has the designated uses of contact recreation (wading only), industrial, and secondary recreation (except fishing). As a result, the most restrictive pH standard that would otherwise apply in the absence of the mixing zone is 6.5-8.5, which are the criteria for contact recreation. Contact use of the Lower Middle Fork consists of mine and agency personnel conducting instream sampling or other necessary instream work performed by the permittee. These uses, and use of the Lower Middle Fork for industrial purposes and secondary recreation, will not be adversely affected by the authorized mixing zone and, additionally, the pH mixing zone will not affect uses further downstream.

Based on this information, the department finds that existing uses outside of the mixing zones will be fully protected and maintained, and that the mixing zones will not impair the overall biological integrity of the waterbody.

c) 18 AAC 70.240(a)(2). The mixing zones will be as small as practicable.

The department finds that the sizes of the mixing zones authorized for discharge in this certification are as small as practicable and consistent with the size limitations of 18 AAC 70.255(e)(3).

Under 18 AAC 70.255(e)(3), the length of a mixing zone established in a stream or other flowing fresh water may not extend downstream beyond the computed point where the variation in the concentration of a water quality parameter across a stream is predicted to be less than 5%, as determined using a standard river flow mixing model.

For mixing zone 1 (Outfall 001 to the North Fork), the size of the pH mixing zone, as discussed above, was based on extensive water quality sampling indicating that the basic treated mine wastewater mixes with the naturally acidic water of Red Dog Creek, reaching an overall pH of 6.5- 7 by the confluence with the North Fork. Based on protection of the designated downstream uses, the department determined that the mixing zone is the smallest practicable size to ensure adequate mixing.

For mixing zone 2 from the confluence of the North Fork to Station 151, the size of the mixing zone was based on the smallest size to ensure adequate mixing. Flow and concentrations have been extensively monitored in Red Dog Creek. No significant dilution is achieved by contributions from side streams or sheetflow from upland sources or seeps. Conductivity is a field parameter that provides real time measurements of water composition, which were used to determine the point of complete mixing in the Main Stem. Transects of conductivity readings on multiple sampling dates were used to determine the length of the mixing zone. The point of complete mixing was determined to be where conductivity readings reached a stable value across the width of the channel. This method of determining complete mixing, based on measuring stable conductivity, is more accurate than mixing models often used by the department. For mixing zone 2, complete mixing occurs near a whirlpool feature, so stream geomorphology appears to control complete mixing. The department determined that this mixing zone, approximately 1, 930 feet in length, is the smallest practicable size to ensure adequate mixing.

For mixing zone 3 from Ikalukrok Creek to Station 150, the same approach was undertaken. Complete mixing occurs near a whirlpool feature where a change in the river bank causes turbulence. The department determined that mixing zone 3, approximately 3,420 feet long, is the smallest practicable size to provide adequate mixing.

d) The maximum pollutant discharge limitations were calculated in compliance with 18 AAC 70.255(f).

18 AAC 70.255(f)) governs calculation of the maximum pollutant discharge limitations in the context of establishing mixing zones. It allows the dilution calculations to be based on either actual flow data collected concurrent with the discharge or the low flow of the receiving water location.

In this case, the permittee requested mixing zones for ammonia and cyanide based on actual data comparing the ratio of the average daily flows at Station 10 in the Main Stem and the outfall from the tailings impoundment. The calculated dilution factor of 2.5 represents the 5th percentile of the ratios for the period from May 2003 through September 2005. Therefore, the dilution factor of 2.5 was used in calculating the maximum pollutant discharge limitations when establishing the mixing zones.

For pH, data collected in the discharge and in the receiving waters since mine operations began, indicate that pH stabilizes shortly after the discharge into Red Dog Creek. The pH is above 6.5 at Station 20 (upstream of the North Fork confluence) and is approximately 7 at the mouth of the Main Stem; i.e. the mixing of basic discharge waters with naturally acidic creek waters results in near neutral pH by the edge of the mixing zone.

e) 18 AAC 70.240(a)(3). The effluent will be treated to remove, reduce, and disperse pollutants using methods found by the department to be the most effective and technologically and economically feasible, consistent with the highest statutory and regulatory treatment requirements.

The mine wastewater treatment plant treats water from the tailings impoundment for discharge to the Lower Middle Fork via Outfall 001 during the summer months, typically late May to early October. Metals, including lead, selenium and zinc, are removed using a high density sludge (HDS) treatment process. For cadmium removal, sodium sulfide is added to the untreated feed water to aid in the removal of this metal to levels below permit limits.

The HDS treatment process uses lime precipitation to treat for metals with their precipitation occurring in tanks equipped with agitators. Flocculent is then added and the precipitated solids are separated from the treated water in a clarifier. Clarifier underflow, containing the metals solids, is recycled back to the process inlet and is ultimately returned to the tailings impoundment while the clarifier overflow passes through sand filters before being discharged to Red Dog Creek. This process replaces the dissolved metals ions with calcium ions in the wastewater, leaving the overall TDS concentration essentially unchanged. However, TDS composition changes from sulfates of various metals to primarily calcium sulfate (gypsum).

Water treatment methods (distillation, membrane filtration, etc.) to significantly reduce TDS concentrations are not practicable or economic for the nature and volume of the effluent from the mine. The most effective and reasonable method for reduction of TDS in the mine's effluent is source control. The mine has implemented a TDS source control program to reduce the amount of TDS contained in the tailings pond water (the wastewater influent source). Source control measures include operation of a third water treatment plant to treat high TDS influent wastewater prior to entering the tailings pond and testing of waste rock and use of waste rock management practices to reduce the amount of TDS entering the tailings pond from waste rock

runoff. Another source control measure currently being implemented includes the oxide-stockpile reclamation project which will reduce/mitigate generation of acid rock drainage (ARD) to the tailings pond. This project was initiated in 2008 and is more than 95% complete. Additionally, the proposed permit requires Teck to develop a TDS Management Plan (Section 1.A.7.f), which must be approved by EPA and the department, and which will provide information on actions Teck will take to provide enhanced treatment and/or source control

For lead, selenium and zinc, these pollutants are associated with the mined ore and waste rock. As a consequence, they are found in the tailings, waste rock drainage to the tailings impoundment, and tailings impoundment discharge. The HDS treatment process represents the most commonly used, reasonable, and effective method for removal of these metals at hard rock mines, such as Red Dog.

For cyanide, this pollutant is used in the lead extraction process as a pyrite (iron) depressant. The mine has investigated alternatives to the use of cyanide in the mill with unacceptable results. Small concentrations of WAD cyanide found in the effluent (less than 15µg/L) are at levels that are not considered to be treatable with available water treatment technology. Some degradation of cyanide occurs in the tailings pond through oxidation. From August 1998 through September 2005, 97 WAD cyanide analyses were conducted on samples collected at Station 10. All 97 samples were reported at levels below the minimum level of quantification (ML) for the WAD cyanide analytical method, and 74 of the samples were reported as less than the method detection limit (MDL) for the WAD cyanide analytical method. Identical results have been documented in Ikalukrok Creek and the Wulik River. A combined 217 samples have been collected and analyzed by the WAD cyanide method at Stations 150, 160, and 2 since August 1998. Results from all samples were reported at levels below the minimum level of quantification (ML), and 189 of the samples were reported as less than the method detection limit (MDL). (EPA, 2006)

In addition, from August 2003 through October 2008, 64 WAD cyanide analyses were conducted on samples collected at Station 151 (located at the downstream edge of the Main Stem mixing zone). Station 151 is upstream of Station 10 and provides a more conservative representation of WAD cyanide concentrations in the Main Stem, as Station 151 is less subject to influence by ambient runoff contribution (and resulting dilution) than is downstream Station 10. Again, all 64 Station 151 samples were reported at levels below the ML for the WAD cyanide analytical method, and 53 of the samples were reported as less than the MDL for the WAD cyanide analytical method.

As demonstrated by the monitoring results described above, the department finds that the treatment for WAD cyanide that occurs in the tailings pond is effective and reasonable for the concentrations present.

For ammonia, traditional water treatment methods for reducing the concentration in effluent (air stripping, biological treatment, chlorination, etc.) are not practicable at the mine, given the volumes and concentrations present. Source control is the most effective and reasonable method for reducing ammonia concentrations in the effluent. The primary source of ammonia in the effluent results from blasting with an ammonium nitrate and fuel oil mixture in wet blast holes in

the mine pit. When placed in wet holes the ammonium nitrate dissolves into the groundwater in the vicinity of the blast hole. Mine drainage water, including the groundwater encountered in blast holes, is collected in the mine drainage sump, which is then pumped into the tailings pond. Since 1999 the mine has implemented the use of an emulsified blasting agent that results in minimal ammonium nitrate dissolving into the groundwater and subsequently entering the mine drainage sump. This source control technique has resulted in decreasing effluent ammonia concentrations since 1999. Condition 5 of this Section 401 Certification contains a specific best management practice (BMP) requirement carried forward to Section I.H.2.i.(vi) of the permit requiring the permittee to develop a BMP to ensure that best blasting practices are used in any wet blast holes to minimize the amount of blasting agent that dissolves in the groundwater in the vicinity of the blast hole.

After review of the applicable statutory and regulatory requirements, including 18 AAC 70 and 18 AAC 72, the department finds that the treatment measures used by the discharger to remove, reduce, and disperse pollutants represent the most effective, technologically and economically feasible techniques for controlling the quality of the mine effluent, and that these treatment measures meet the highest applicable statutory and regulatory requirements.

2. The department authorizes the effluent limits and monitoring requirements contained in the NPDES Permit Part I.A.1 – Table 1.

Rationale: In accordance with State Regulations, 18 AAC 15.090, the department may attach terms and conditions to a permit, variance, or approval, including operating, monitoring, inspection, sampling, access to records, reporting requirements, and the posting of a performance bond or other surety, that it considers necessary to ensure all applicable criteria will be met. The effluent limits included in the permit provide assurance that WQS are being met.

3. NPDES Permit part I.A.7.a shall maintain the following language:

After the commencement of discharge, the permittee shall limit the TDS load discharged from Outfall 001 so as to maintain in-stream TDS concentrations at or below:

(1) 1500 mg/L at the edge of the mixing zone in the Main Stem of Red Dog Creek,

(2) 1000 mg/L at the edge of the mixing zone in Ikalukrok Creek throughout the discharge season, and

(3) 500 mg/L from July 25th through the end of the discharge season at Station 160.

Rationale: The TDS SSC allows TDS concentrations up to 1500 mg/L in the Main Stem without timing restrictions. The department finds that the in-stream TDS limits are required to ensure that existing uses are protected.

Rationale: In 1999, the department changed the WQC under 18 AAC 70.020(b)(Note 12) for inorganic dissolved solids, regulated as TDS. This criterion is in effect in Ikalukrok Creek for the areas listed above:

> *Total Dissolved Solids (TDS) in concentrations up to 1000 mg/L in Ikalukrok Creek are in effect from the confluence of Ikalukrok Creek with the Main Stem to the Wulik River,* ***except*** *during chum salmon and/or Dolly Varden spawning in Ikalukrok Creek, when the aquatic life criterion of 500 mg/L will apply at Station 160.*

Rationale: In accordance with 18 AAC 70.020(b)(4) and note 12, the TDS concentration at Station 160 shall remain at or below 500 mg/L from July 25th through the end of the discharge season to ensure no adverse effect.

In accordance with State Regulations 18 AAC 15.090, the department may attach terms and conditions to a permit, variance, or approval, including operating, monitoring, inspection, sampling, access to records and reporting requirements, and the posting of a performance bond or other surety, that it considers necessary to ensure that all applicable criteria will be met.

4. Permit part I.E – Bioassessment Program Requirements could be removed from the NPDES Permit. The bioassessment program in Red Dog Creek is part of a larger monitoring program that requires aquatic and biomonitoring in Red Dog and Bons Creek drainages. To keep that larger program consistent and intact, it is being incorporated into the department's Waste Management Permit, and duplication here could lead to future inconsistencies. Nonetheless, the following table could be inserted into the NPDES Permit.

Bioassessment Sites	
Sample Site	**Factors Measured**
North Fork	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance Fish presence and use
Main Stem	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance Fish presence and use
Ikalukrok Creek	Periphyton (as chlorophyll-a concentrations) Aquatic invertebrates: taxonomic richness and abundance Fish presence and use

Rationale: In accordance with State Regulations 18 AAC 70.240, the department has authority to ensure that existing uses of the waterbody outside the mixing zone are maintained and fully protected. The specified monitoring will provide evidence to the department that the effluent

treatment and mixing zone sizes are adequate to protect all existing and designated uses in the receiving water. The entire biomonitoring program contained in the current NPDES Permit is also required in the Monitoring Plan associated with the Waste Management Permit issued by the department for the management of tailings, waste rock and other wastes at the facility.

In accordance with State Regulations 18 AAC 15.090, the department may attach terms and conditions to a permit, variance, or approval, including operating, monitoring, inspection, sampling, access to records and reporting requirements, and the posting of a performance bond or other surety, that it considers necessary to ensure that all applicable criteria will be met.

In accordance with Federal Regulation 40 CFR 124.53(e)(3) the department shall include a statement of the extent to which each condition of the permit may be made less stringent without violating the requirements of State law. These statements are included above where it states that a change to the draft permit "could" be made in the final permit.

5. The NPDES Permit shall be updated to include the following permit part I.H.2.i.(vi): Ensure that best blasting practices are used in any wet blast holes to minimize the amount of blasting agent that dissolves into the groundwater in the vicinity of the blast hole.

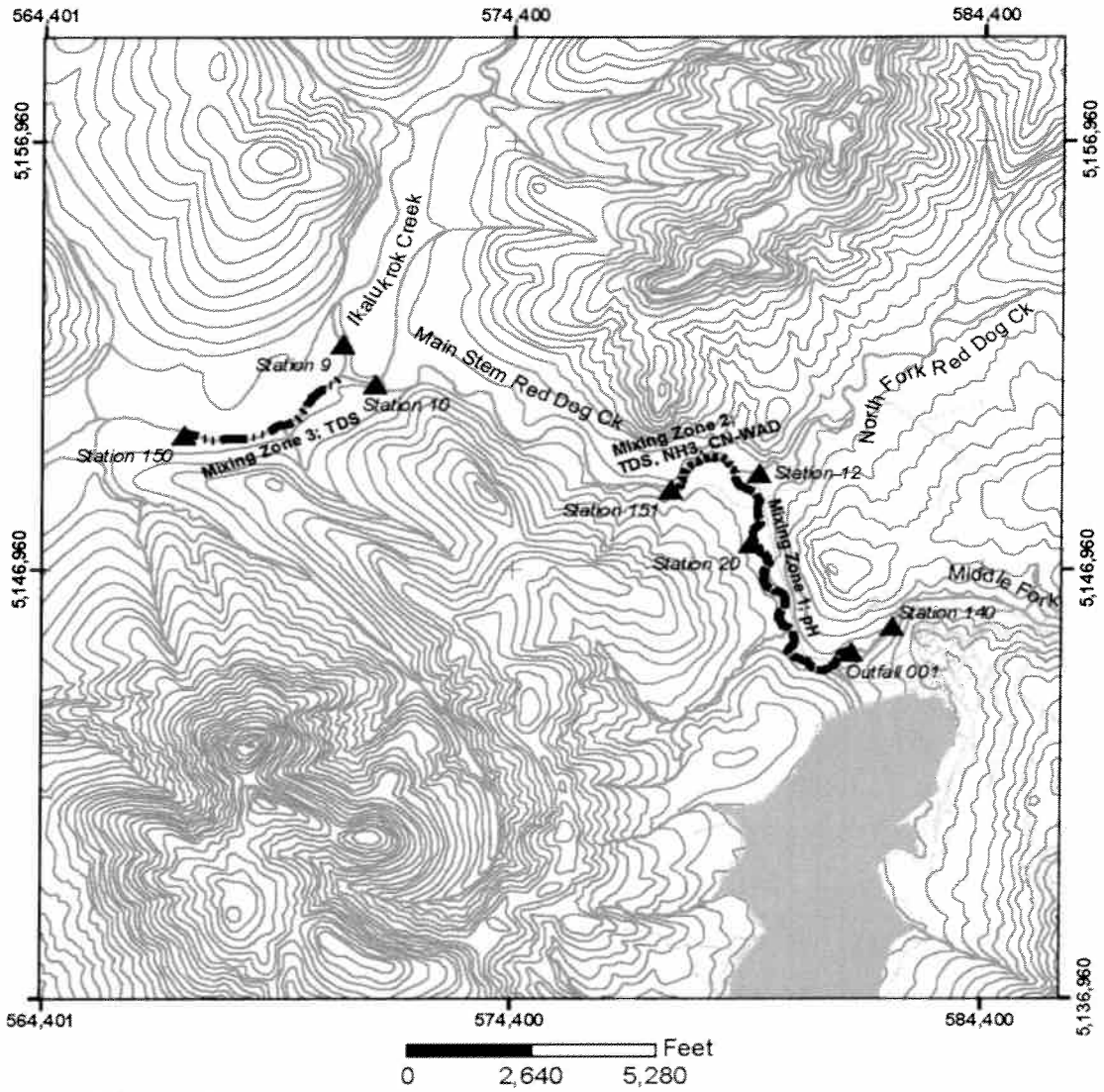
Rationale: In accordance with State Regulations, 18 AAC 15.090, the department may attach terms and conditions to a permit, variance, or approval, including operating, monitoring, inspection, sampling, access to records, reporting requirements, and the posting of a performance bond or other surety, that it considers necessary to ensure all applicable criteria will be met. The department considers this requirement necessary to ensure that appropriate source control measures are undertaken to minimize the amount of ammonia in the effluent.

December 15, 2009
12/15/2009
Date

Sharmon Stambaugh
Program Manager
Wastewater Discharge Program

Attachment A

Red Dog Mine Mixing Zones



Red Dog Mine

▲ Stream Monitoring Stations

NPDES Mixing Zones

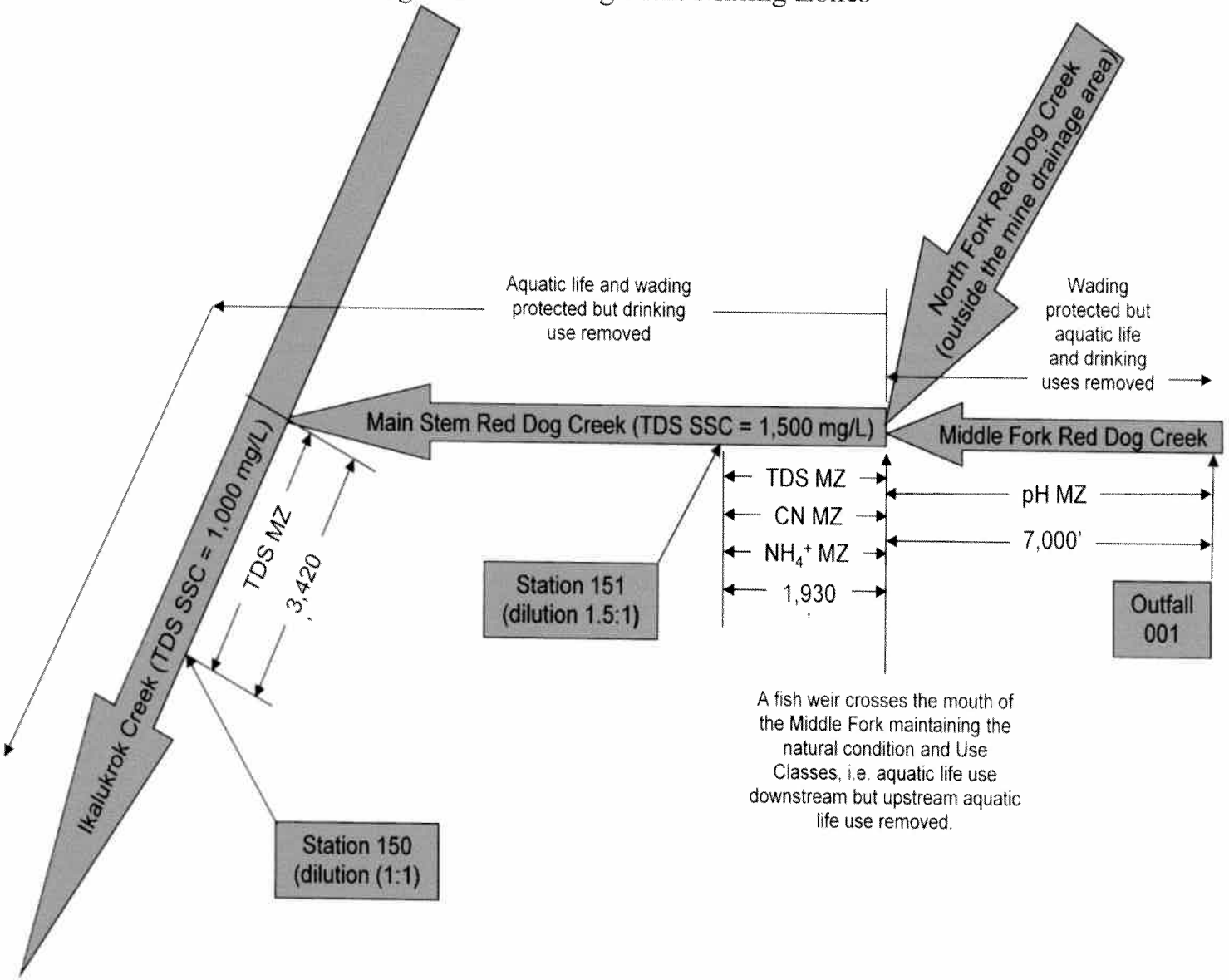
Zone Number

- Mixing Zone 1
- Mixing Zone 2
- Mixing Zone 3

Teck Alaska, May 2009

Attachment B

Diagram of Red Dog Mine Mixing Zones



APPENDIX A
ANTIDEGRADATION ANALYSIS OF THE CERTIFICATE OF REASONABLE ASSURANCE FOR NPDES PERMIT AK-003865-2

The antidegradation policy of the Alaska Water Quality Standards (18 AAC 70.015) states that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected. This appendix analyzes and provides rationale for the department's decisions in Section 401 Certification with respect to the antidegradation policy.

The department's approach to implementing the antidegradation policy found in 18 AAC 70.015 is based on the requirements in 18 AAC 70 and Chapter 4 of EPA's Water Quality Standards Handbook (Second Edition 1993). Using these requirements and policies, the department determines whether a waterbody or portion of a waterbody is classified as Tier 1, Tier 2, or Tier 3. Antidegradation analysis was applied on a pollutant-by pollutant basis. For Tier 2 water, antidegradation analysis under 18 AAC 70.015(a)(2) was applied to permit limits that were relaxed or others which the department concludes should be subjected to antidegradation analysis.

The waters of Red Dog Creek are atypical of most undeveloped Arctic streams because of the high concentrations of cadmium, lead, and zinc that enter the Lower Middle Fork of Red Dog Creek (Lower Middle Fork) as it flows through a highly mineralized orebody. The unique character of the Red Dog mineralization and its interaction with ground and surface waters was recognized in scientific studies of the area in the late 1970s and early 1980s (e.g. Ward and Olson 1980). Natural levels of metals were known to be unusually high, and fish kills in the Main Stem of Red Dog Creek (Main Stem) were documented. From 1981 through 1984, Cominco Alaska funded a series of baseline studies to document water quality and biological conditions in Red Dog Creek, Ikalukrok Creek, and the Wulik River (Houghton 1983, Peterson and Nichols 1983). In 1982, the department funded a detailed toxicological, biophysical, and chemical assessment of Red Dog Creek (EVS Consultants, Ltd. 1983). These studies formed the basis for addressing aquatic and water quality impacts associated with the development of the Red Dog Mine Project in the 1984 Environmental Impact Statement.

Water in the Middle Fork of Red Dog Creek (Middle Fork), beginning adjacent to the highly mineralized orebody, was naturally degraded and remained in this condition downstream to the confluence with the South Fork of Red Dog Creek (South Fork) (Peterson and Nichols 1983). The Middle Fork flowed directly over heavily mineralized rock, and the creek received surface and groundwater draining from the orebody, which contained high metal and sulfide concentrations (U.S. Environmental Protection Agency and U.S. Department of the Interior. 1984). Recovery of water quality began at the confluence of the Middle Fork and the South Fork, but was not particularly significant until flow from the North Fork of Red Dog Creek (North Fork) diluted the Middle Fork to form the Main Stem.

As discussed above, Red Dog and Ikalukrok Creeks have been documented to have naturally occurring water quality conditions that precluded some designated uses, which have been removed (see 18 AAC 70.230(e)(8) and (18-20)). Specifically, the Lower Middle Fork of Red

Dog Creek (Lower Middle Fork) is only classified for contact recreation (wading only), industrial, and secondary recreation (except fishing) uses. This segment is considered a "Tier I" waterbody under 18 AAC 70.015(a)(1), therefore protection of existing uses is the threshold for compliance with Alaska's antidegradation policy. All of the requirements in the permit will ensure protection of these uses. This includes the mixing zone for pH, which will not affect either the instream levels or the existing recreational/contact uses of the segment. The actual contact uses generally only include sampling by mine and agency personnel that will not be impacted by the elevated pH in the immediate vicinity of the discharge.

The Main Stem is classified for growth and propagation of fish, shellfish, and other aquatic life. Aquatic biomonitoring at the Red Dog Mine began in 1990 and has continued annually since then. As noted above, monitoring conducted prior to mining activities showed water quality and aquatic life impacts extending into the Main Stem. Aquatic biomonitoring and ambient water quality monitoring conducted during mine operations demonstrates that the effluent from the facility does not harm existing aquatic life in the Main Stem or Ikalukrok Creeks. These results are summarized in the Comparison of Mainstem Red Dog Creek Pre-Mining and Current Conditions (Scannell, 2005) and the Supplemental Environmental Impact Statement associated with the 2009 NPDES Permit reissue.

Conservatively, the department assumes that the Main Stem and Ikalukrok Creek are Tier II waterbodies. This antidegradation analysis considers changes made in the 2009 permit that relax comparable effluent limits included in the 1998 permit, except, as discussed below, with respect to certain aspects of the total dissolved solids (TDS) limits. The department found the TDS limits consistent with the antidegradation policy pursuant to its Section 401 Certification of the 2003 modification of the 1998 permit. The 1998 permit limits were previously found to be consistent with the State's antidegradation policy.

The specific changes made to effluent limits that are subject to antidegradation analysis include:

- The permit includes more stringent limits for cadmium, copper, and pH than the 1998 permit and the permit includes new limits for nickel and aluminum without a mixing zone. For these pollutants, the permit is more stringent than the previous permit and no antidegradation analysis is required.

- The permit's selenium average monthly effluent limit (AMEL) is more stringent than the 1998 permit, i.e. 4.4 compared to 4.9 µg/L. The selenium maximum daily effluent limit (MDEL) is less stringent than the 1998 permit, i.e. 7.2 compared to 5.6 µg/L. These minor and offsetting changes are the result of statistical variability in data sets used to determine effluent limits. Although, it is the department's judgment that these changes will not affect the levels of these pollutants in the discharge, antidegradation review will be undertaken later in this appendix for the less stringent selenium MDEL.

- The permit's lead AMEL is less stringent than the 1998 permit, i.e. 8.5 compared to 8.1 µg/L, and the lead MDEL is more stringent than the 1998 permit, 18.3 µg/L compared to 19.6 µg/L. These minor and offsetting changes are the result of statistical variability in data sets used to determine effluent limits. Although, it is the department's judgment

that these changes will not affect the levels of these pollutants in the discharge, and antidegradation review will be undertaken later in this appendix for the less stringent lead AMEL.

- For cyanide, the permit includes a less stringent AMEL, i.e. 10.3 versus 4.0 µg/L, and MDEL, i.e. 22.2 versus 9.0 µg/L, than the 1998 permit. Cyanide was previously measured as total cyanide but the Alaska Water Quality Standard is now measured as weak acid dissociable (WAD) cyanide. The department certifies that a mixing zone for WAD cyanide with a dilution ratio of 1.5 parts receiving flow to 1.0 part inflow, for a dilution factor of 2.5, protects water quality. Antidegradation review will be undertaken later in this appendix for the new cyanide limits based on WAD cyanide.

- For zinc, the permit includes a less stringent AMEL and MDEL based on the application of the statewide criteria instead of the natural condition-based site-specific criterion. Antidegradation review will be undertaken later in this appendix for the new zinc limits.

- The permit includes new effluent limits for ammonia based on a mixing zone that provides a dilution ratio of 1.5 parts receiving flow to 1 part inflow for a dilution factor of 2.5. Antidegradation review will be undertaken later in this appendix for the new ammonia limits.

- For TDS, the permit includes a less stringent limit than the 1998 permit limits of 170 mg/L (AMEL) and 196 mg/L (MDEL). The permit contains 3 limits for TDS: (i) 1,500 mg/L measured at station 151 in the Main Stem, (ii) 1,000 mg/L measured at station 150 in Ikalukrok Creek, and (iii) 500 mg/L at Station 160 from July 25th through the end of the discharge season.

  The new instream limit of 1,500 mg/L is based on the SSC in the Main Stem from the North Fork confluence to the confluence with Ikalukrok Creek, which was adopted subsequent to the 1998 permit. The 1,500 mg/L SSC was adopted in 18 AAC 70.236(b)(5) and approved by EPA for periods other than grayling spawning on July 16, 2003. The 2003 modification of the permit established a limit of 1,500 mg/L, measured at Station 151, for periods outside of grayling spawning. The 2003 permit modification was challenged before the Environmental Appeals Board (EAB), and relevant TDS limits and associated conditions have been stayed pending EPA's completion of the remand. Although it has not yet come into effect, the 1,500 mg/L limit was not overturned by the EAB. The SSC was revised in 2006 and established a 1,500 mg/L limit for grayling spawning and non grayling spawning times in the Main Stem from the North Fork confluence to the confluence with Ikalukrok Creek. This revision was approved by EPA on April 21, 2006 and forms the basis for the TDS limit in the current permit.

  The 2003 modification of the permit established a limit of 500 mg/L for the grayling season. That limit was appealed to EAB, and was remanded in 2004 to the agencies for further analysis. EPA is currently working to complete the remand on that issue, which will occur through issuance of the NPDES Permit. Subsequent to the EAB's decision in

2004, the agencies revised the SSC in 2006, as noted above, to establish 1,500 mg/L as the criteria for the grayling spawning season as well as for periods outside the grayling spawning season. This new limit for the grayling season of 1,500 mg/L has not yet been incorporated into the permit. Hence, antidegradation review will be undertaken later in this appendix of the 1,500 mg/L limit as it pertains to the grayling spawning season.

The instream limit of 1,000 mg/L measured at station 150 in Ikalukrok Creek was incorporated by EPA into the 2003 modification of the permit. That limit was certified by the department and subjected to antidegradation review as part of the 2003 modification. Although the 2003 modification was challenged before the EAB and its provisions continue to be stayed, the 1,000 mg/L limit was not overturned by the EAB. Because this limit is not being relaxed from the 2003 permit modification, no additional antidegradation review is required.

The instream limit of 500 mg/L at Station 160 from July 25th through the end of the discharge season was incorporated by EPA into a 2003 modification of the permit. That limit was certified by the department and subjected to antidegradation review as part of the 2003 permit modification. Although the 2003 modification was challenged before the EAB and its provisions continue to be stayed, the 500 mg/L limit was not overturned by the EAB. Because this limit is not being relaxed from the 2003 permit modification, no additional antidegradation review is required.

Accordingly, the department's antidegradation analysis focuses on the following parameters based on the possibility for water quality degradation: TDS, ammonia, cyanide, selenium, lead, and zinc. As discussed in detail below, changes to the 1998 permit limits with regard to these parameters are consistent with 18 AAC 70.015(a)(2), which allows the department to reduce water quality upon finding that five criteria are met.

1. ***18 AAC 70.015(a)(2)(A). Allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.***

On pages 3-324 through 3-326 of its Final Supplemental Environmental Impact Statement: Red Dog Mine Extension – Aqqaluk Project (FSEIS), EPA provides an analysis discussing direct and indirect socioeconomic impacts of Red Dog Mine on the Northwest Arctic Borough (NWAB), NANA, and the local work force. The FSEIS details large contributions by Red Dog Mine to the local economy's job market, and revenue and tax bases. The following was excerpted from Section 3.17.4 of the FSEIS on which the State of Alaska Department of Natural Resources participated as a cooperating agency.

> The Red Dog Mine provides substantial benefit to the NWAB, NANA, and NANA shareholders by providing local employment opportunities, PILT (payments in lieu of taxes), royalties, and dividends. Alternative A would see the end of operations in 2011, 20 years sooner than the other alternatives. Closure in 2011 would result in the loss of $8 million annually in PILT to NWAB, and an estimated loss of $155 million in

annual NANA royalties, $70 million in annual payments to the state, and over 500 jobs held by employees from inside and outside the region.

As noted above, the operation of Red Dog Mine is important to the economy of the NWAB. The department finds that authorization of the mine's discharge accommodates important economic activity in the NWAB.

2. ***18 AAC 70.015(a)(2)(B). Except as allowed under this subsection, reducing water quality will not violate the applicable criteria of 18 AAC 70.020, 18 AAC 70.025, or 18 AAC 70.030.***

The permit limits will not violate water quality or applicable SSC. The mixing zones are specifically authorized in accordance with 18 AAC 70.240 to 18 AAC 70.270 (June 26, 2003). The authorized mixing zones have been sized to ensure that all applicable water quality criteria are met at all points outside of the mixing zone. There is no mixing zone for whole effluent toxicity and the limit is unchanged from the 1998 permit at 12.2 MDEL and 9.7 AMEL.

3. ***18 AAC 70.015(a)(2)(C). The resulting water quality will be adequate to fully protect existing uses of the water.***

The permit reissue application does not propose any changes that would likely result in wastewater of lower quality to be discharged than has been discharged since issuance of the 1998 permit. Although TDS levels have been relaxed in this permit compared to the limits in the 1998 permit, the mine has never been able to comply with the TDS limits from the 1998 permit and, consequently, has been discharging under Compliance Orders by Consent (COBCs). The TDS limits established under the COBCs are identical to those established in the reissued permit. Therefore, an assessment of the impact of discharges on existing uses over the past 5-10 years provides a reasonable means to evaluate the potential impacts on existing uses under the reissued permit.

Aquatic biomonitoring and ambient water quality monitoring conducted for about 20 years of mine operations demonstrates that the effluent from the facility does not negatively affect existing uses in the Main Stem, Ikalukrok Creek, or local tributaries such as the North Fork. As discussed below, the department finds that the resulting water quality will be adequate to fully protect existing uses.

For selenium, the proposed change in the MDEL is a direct result of the application of specific EPA guidance-prescribed calculations that are based on both State water quality standards and on historic facility discharge data for the preceding five year period. The proposed change in the selenium limit will have no bearing on the mine's treatment of wastewater for removal of metals, including selenium. Therefore, treatment effectiveness for selenium will remain unchanged and will continue to contribute to the biologically enhanced conditions of Mainstem Red Dog Creek. Over the past 6 discharge seasons, the effluent's daily maximum measurements of selenium (total) have not exceeded 4.6 µg/L and have averaged only 2.6 µg/l (2003 through 2008; 122 samples), which are below both the proposed and existing daily maximum and monthly average limits respectively. For these reasons, the department has determined that the water quality

associated with the slightly relaxed limit for selenium will be adequate to fully protect existing uses.

For lead, the proposed change in the monthly average limit is a direct result of specific EPA guidance-prescribed calculations that are based on both State water quality standards and on actual, historic, facility, discharge data for the preceding five year period. The proposed limit change has no bearing on the mine's treatment of wastewater for removal of metals, including lead. Therefore, treatment effectiveness for lead will remain unchanged and will continue to contribute to the biologically enhanced conditions of Mainstem Red Dog Creek. Effluent daily maximum total lead concentrations have not exceeded 5 µg/L during the past 6 discharge seasons (2003 through 2008; 122 samples), which is below both the proposed and existing daily maximum and monthly average limits. For these reasons, the department has determined that the water quality associated with the less stringent limit for lead will be adequate to fully protect existing uses.

For zinc, outfall 001 discharge concentrations have not exceeded the current or proposed limits during the previous six discharge seasons. Further, historic zinc concentrations have been relatively stable, and future zinc discharge concentrations are expected at or about the same levels as those observed during previous years. The newly permitted discharge will be consistent with historical discharges, and the information assessed by the department indicates that these discharges have not impacted existing uses. For these reasons, the department has determined that the water quality associated with the less stringent limit for zinc will be adequate to fully protect existing uses.

For cyanide, a new limit based on WAD cyanide is established in the permit. The actual discharge of cyanide is expected to be consistent with historical levels, and will not contribute to any impairment of existing uses. Based on analysis of discharge data, the median value of cyanide at the point of discharge (outfall 001) is below chronic levels. Given the dilution that occurs, chronic levels of cyanide would rarely occur in the mixing zone between the North Fork and Station 151. Additionally, the maximum projected concentration for cyanide at the point of discharge is below the acute water quality standard. Concentrations of cyanide in the mixing zone are, therefore, expected to be significantly below the acute water quality standard. For these reasons, the department determined that the water quality associated with the WAD cyanide limit will be adequate to fully protect existing uses.

For ammonia, a new limit is established in the renewed permit. The actual discharge of ammonia is expected to be consistent with, or less than, historical levels, and will not contribute to any impairment of existing uses. Based on analysis of discharge data, the median value of ammonia at the point of discharge (outfall 001) is below chronic levels. Given the dilution that occurs, chronic levels of ammonia would rarely occur in the mixing zone between the North Fork and Station 151. Concentrations of ammonia in the mixing zone are expected to be significantly below the acute water quality standard. For these reasons, the department has determined that the water quality associated with the ammonia limit will be adequate to fully protect existing uses.

For TDS, the renewed permit provides a new limit of 1,500 mg/L at Station 151 for the grayling spawning season and for periods outside of the grayling spawning season. In the 2003 modification of the permit, the department concluded that the 1,500 mg/L limit for periods outside of grayling spawning was adequate to protect existing uses. The focus here is whether the 1,500 mg/L for the grayling spawning period is adequate to protect existing uses. As noted above, the mine has never been able to comply with the TDS limits imposed by the 1998 permit. As a result, the mine has been subject to COBCs, which since 2006 established TDS limits identical to those proposed in this renewed permit. These limits were based on the 2006 SSC for Red Dog Creek, which set water quality criteria at 1,500 mg/L. The technical analyses by the department and EPA supporting the 2006 SSC indicate that the 1,500 mg/L limit is sufficiently conservative to protect spawning grayling and Dolly Varden (which spawn downstream). Results from toxicity tests undertaken in 2005 consistently demonstrated no effect on reproduction at TDS concentrations in excess of the maximum TDS concentrations tested (2,782 mg/L). In light of the extensive analysis of TDS and its potential impact on grayling and Dolly Varden spawning, the department has determined that the water quality associated with the 1,500 mg/L limit will be adequate to fully protect grayling spawning and other existing uses of the water, including use of the mixing zone as a migration corridor to reaching the North Fork.

In summary, the conditions proposed in this permit reflect virtually the same conditions which have historically demonstrated that the effluent from the facility does not negatively affect existing uses in Red Dog Creek, Ikalukrok Creek, or their tributaries. To illustrate, following is a summarized comparison of biological conditions in the Red Dog Creek drainage for pre-mining and current conditions (Weber Scannell 2005):

- Before development of the Red Dog Mine, (a) water quality was naturally degraded in Red Dog Creek; (b) fish use was limited to migration to the North Fork during high water events; (c) no fish spawning was documented in Red Dog Creek; and (d) natural fish kills commonly occurred in Red Dog Creek;
- Development of the Red Dog Mine included a number of water management practices that resulted in improved water quality in Red Dog Creek. These practices included collection, treatment and discharge of mineralized water; discharge of high volumes of water with low metals concentrations; and improvements in water treatment;
- High volumes of treated water are discharged to Lower Middle Fork. This water dilutes the naturally occurring metals in Red Dog Creek, moderates the pH, and lessens the toxicity of metals by increasing the hardness;
- As a result of improved water quality, Arctic grayling began using Mainstem Red Dog Creek for spawning and rearing and Dolly Varden for rearing;
- Improved water quality was followed by development of abundant and diverse aquatic invertebrate and periphyton communities; and
- Over the last six years (1998 through 2004) there is a viable aquatic community in Mainstem Red Dog Creek with the current water quality and mine discharge.

Biomonitoring in the Red Dog Creek drainage has continued from 2005 to 2008 and results of these studies indicate that the conclusions made by Weber Scannell in 2005 are still valid and appropriate.

4. ***18 AAC 70.015(a)(2)(D). The methods of pollution prevention, control, and treatment found by the department to be most effective and reasonable will be applied to all wastes and other substances to be discharged.***

The mine wastewater treatment uses a lime precipitation process to treat for metals in the wastewater. This process replaces the dissolved metal ions with calcium ions in the wastewater, leaving the overall TDS concentration essentially unchanged. However, the nature of the TDS changes from primarily metal sulfates to calcium sulfates. Water treatment methods for further reducing TDS (distillation, membrane filtration, etc.) are not practicable for the nature and volume of the effluent from the mine. The most effective and reasonable method for reduction of TDS in the mine's effluent is source control. The mine has implemented a TDS source control program to reduce the amount of TDS contained in the tailings pond water (the wastewater influent source). Source control measures include operation of a third water treatment plant to treat high TDS influent wastewater prior to entering the tailings pond, waste rock testing, and application of waste rock management practices to reduce the amount of TDS entering the tailings pond from waste rock runoff.

Water treatment methods for reducing the ammonia concentrations (air stripping, biological treatment, chlorination, etc.) in the effluent are not practicable given the volumes and concentrations present. Source control is the most effective and reasonable method for reducing the ammonia concentrations in the effluent. The primary source of ammonia in the effluent results from blasting with an ammonium nitrate and fuel oil mixture in wet blast holes in the mine pit. When placed in wet holes the ammonium nitrate dissolves into the groundwater in the vicinity of the blast hole. Mine drainage water, including the groundwater encountered in blast holes, is collected in the mine drainage sump which is then pumped into the tailings pond. Since 1999, the mine has implemented the use of an emulsified blasting agent that results in minimal ammonium nitrate dissolving into the groundwater and subsequently entering the mine drainage sump. This source control technique has resulted in decreasing effluent ammonia concentrations since 1999. Condition 5 of the Section 401 Certification contains a specific best management practice (BMP) requirement that is carried over to Section I.H.2.i.(vi) of the permit requiring development of a BMP to ensure that best blasting practices are used in any wet blast holes to minimize the amount of blasting agent that dissolves in the groundwater in the vicinity of the blast hole.

Cyanide is used in the lead extraction process as a pyrite depressant. Teck Alaska, Incorporated has investigated alternatives to the use of cyanide in the mill with unacceptable results. WAD cyanide concentrations less than 15 µg/L found in the effluent are such low levels that they are not considered to be treatable with available water treatment technology. Some degradation of cyanide occurs in the tailings pond through oxidation. The following passage summarizes WAD cyanide monitoring results over the course of a seven-year period.

> From August 1998 through September 2005, 97 WAD cyanide analyses were conducted on samples collected at Station 10. All 97 samples were reported at levels below the minimum level of quantification (ML) for the WAD cyanide analytical method and 74 of the samples were reported as less than the method detection limit (MDL) for the WAD cyanide analytical method. Identical results have been documented in Ikalukrok Creek and the Wulik River. A combined 217 samples have been collected and analyzed by the WAD cyanide method at Stations 150, 160, and 2 since August 1998. Results from all samples were reported at levels below the minimum level of quantification (ML) and 189 of the samples were reported as less than the method detection limit (MDL). (EPA, 2006)

As demonstrated by these monitoring results, the department finds that the amount of treatment for WAD cyanide that occurs in the tailings pond is effective and reasonable for the concentrations present.

Selenium, lead, and zinc are associated with the ore and, therefore, are found in the tailings and the impoundment discharge. The lime precipitation process represents the most commonly used, reasonable, and effective method for removing these metals from wastewater at hard rock mines such as Red Dog.

5. ***18 AAC 70.015(a)(2)(E). All wastes and other substances discharged will be treated and controlled to achieve (i) for new and existing point sources, the highest statutory and regulatory requirements; and (ii) for nonpoint sources, all cost-effective and reasonable best management practices.***

After review of the applicable statutory and regulatory requirements, including 18 AAC 70 and 18 AAC 72, and consideration of the methods of pollution prevention, control, and treatment utilized at the Red Dog Mine, as discussed in detail above, the department finds that the discharges from the existing point source meet the highest applicable statutory and regulatory requirements and that nonpoint sources are fully addressed through cost-effective and reasonable BMPs.

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