

STATE OF ALASKA

**DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF WATER
WASTEWATER DISCHARGE PROGRAM**

SEAN PARNELL, GOVERNOR

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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

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

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 to 1 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