

AK-003865-2
Response to Comments
Teck Alaska, Incorporated
Red Dog Mine

U.S. EPA, Region 10
December 2009

Prepared by:
Cindi Godsey, EPA

with the assistance of:
Ronald Rimelman, Tetra Tech, Inc.

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EPA prepared a preliminary Draft Permit and Fact Sheet, which were sent to area Tribes prior to public notice of the Draft Permit. These preliminary documents were also sent to the Alaska Department of Environmental Conservation (ADEC) so the Clean Water Act (CWA) § 401 Certification could be prepared to accompany the Draft Permit.

EPA public noticed the Draft Permit and the Draft Supplemental Environmental Impact Statement (DSEIS) in the Anchorage Daily News and the Arctic Sounder on December 5, 2008. Public hearings on the Draft Permit and DSEIS were held in Kivalina on January 12, 2009, Noatak on January 13, 2009, Kotzebue on January 14, 2009, and Anchorage on January 15, 2009. The comment period ended on February 3, 2009.

Comments on the Draft NPDES Permit were received from the Center for Race, Poverty & the Environment (CRPE), Northern Alaska Environmental Center (NAEC), Native Village of Kotzebue, Trustees for Alaska on behalf of the Native Village of Point Hope and on behalf of the Kivalina IRA Council and Becky Norton (a resident of Kivalina), Robert E. Moran, Teck Alaska, Inc. (Teck), Alaska Community Action on Toxics (ACAT), Keith Silver, and the Center for Science in Public Participation (CSP²). The following presents a detailed summary of the comments received on the Draft Permit, and EPA's responses. Comments on the DSEIS and EPA's responses have been incorporated into the Final SEIS.

In emails dated November 2, 2009, EPA requested an updated species list from USFWS and NMFS.

On November 3, 2009, an e-mail from USFWS confirmed that no listed species occur in the project area.

On November 6, 2009, NMFS provided a letter stating that there would not be an adverse affect on living marine resources including EFH. An e-mail, received on November 10, 2009, clarified that this determination also applied to ESA.

EPA received the final CWA § 401 Certification and Response to Comments from the Alaska Department of Environmental Conservation (ADEC) on December 15, 2009.

General Comments

1. **Comment:** EPA should maintain jurisdiction over the Red Dog mine's permits and not delegate those permits to Alaska.

Response: On October 31, 2008, EPA authorized ADEC to administer the NPDES program for the State of Alaska. ADEC is phasing the Program with different categories of discharges being phased in over a 3-year period. Mining permits will be transferred during the third phase, which, according to the current Memorandum of Agreement between EPA and ADEC, will occur in October 2010. EPA, therefore, is re-issuing the Final Permit at this time. Responsibility for future permit re-issuance is beyond the scope of this action.

2. **Comment:** EPA's demonstrated lack of commitment to enforcing the permit conditions it imposes should be factored into the new permit, and this is a central reason why the bio-monitoring and ambient monitoring provisions should be retained in the federal NPDES permit so that they can be enforced in federal court by members of the affected public like residents of Kivalina.

Response: EPA regrets the commenter's perception that EPA is not committed to enforcing the permit conditions. The Fact Sheet documents the rationale for removing specific monitoring requirements. Please see the section on Ambient Monitoring for responses to specific issues relating to bio-monitoring and ambient monitoring.

3. **Comment:** The EPA did nothing to enforce these permit conditions, and in fact actively impeded the plaintiffs in the suit by relaxing Teck Alaska Incorporated (Teck)'s permit conditions during the pendency of the suit. The current permit must include an easier enforcement mechanism, and EPA must also enforce its own permit.

Response: EPA respectfully disagrees with the commenter that the agency in any way impeded the public's ability to seek enforcement of specific permit conditions included in the current permit. The rationale for all proposed permit changes is documented in the Fact Sheet to the Draft Permit. It is unclear what the commenter means by "an easier enforcement mechanism." EPA remains committed to ensuring compliance with all permit conditions. Methods of enforcing the permit are addressed in Permit Part III., Compliance Responsibilities.

4. **Comment:** Although EPA has all of Teck's DMRs filed under the 1998 permit, and we incorporate them by reference here to document the repeat violations, those DMRs only paint part of the picture of Teck's refusal to abide by federal law and its permit conditions – and, sadly, of EPA's complete refusal to enforce any of the federal laws or permit conditions applicable to the facility.

Response: Comment noted. Please see Response #3.

5. **Comment:** The EPA and ADEC should reject the proposed § 401 Certification because (1) Teck has failed to demonstrate that the proposed site-specific criterion will have no adverse affect on the aquatic ecosystem; (2) the proposed site-specific criterion for Red Dog Creek does not ensure viable habitat downstream; and (3) Teck lacks the historical record to demonstrate it is able and willing to comply with the proposed site-specific criterion.

Response: The site-specific criteria (SSC) have been formally adopted by the State and approved by EPA according to the procedures specified in Alaska's water quality standards (WQS), including protection of aquatic life uses. They are, therefore, appropriately included in the CWA § 401 Certification and Final Permit.

As discussed in Section 3.10 of the Final SEIS, water quality and aquatic life conditions in the main stem of Red Dog Creek have improved from pre-mining conditions, particularly during the past five years. This has led to increased fish passage and usage of the Red Dog Creek watershed. No aspects of the Final Permit will affect the characteristics of the discharges, including TDS levels.

EPA respectfully disagrees with the commenter that the Permittee has not demonstrated the ability to comply with the TDS or cadmium site-specific criteria. Review of the TDS data collected from May 2004 through August 2009 show that there has been only 1 exceedence out of 283 values collected at Station 151. This equates to a compliance rate of 99.996%. Section 3.5 of the Final SEIS anticipates future compliance with the TDS limits. In addition, EPA has included a requirement for a TDS Management Plan in the Final Permit. The levels of cadmium in the effluent from 2003 through 2007 showed a maximum value of 1.8 ug/L and a mean of 0.52 ug/L which are well within the effluent limitations of the Final Permit.

6. **Comment:** While water quality has improved in many cases since the passage of the Federal Water Pollution Control Act ("Clean Water Act" or "CWA"), these three goals [restore and maintain the chemical, physical, and biological integrity of the Nation's waters] have not been attained. Similarly, while water quality has somewhat improved in limited respects around Red Dog Mine, the Permit does not attain these three goals, and in many ways is significantly less stringent than current requirements. Thus, the Permit does not meet the goals or the letter of the Clean Water Act.

Response: The comment is too general for EPA to provide a specific response. EPA asserts that the Final Permit complies with all applicable CWA requirements as documented in the Fact Sheet and addressed in the NEPA analysis.

7. **Comment:** The EPA's decision is not supported by substantial evidence, as it offers almost no support for any of the radical actions it is taking in removing effluent limitations and monitoring requirements and dramatically weakening the remaining effluent limitations. Not only is EPA's action not supported by any evidence, the evidence that does exist contradicts its actions in the Draft Permit. For example, studies demonstrate reduced fertilization rates in salmon at TDS concentrations as low as 250 ppm.

Response: In the Draft and Final permits, EPA has applied the currently applicable WQS which is protective of aquatic life (as further documented in the CWA § 401 Certification). Moreover, Section 3.10 of the Final SEIS fully describes the effects of TDS on the specific species in the Red Dog Mine receiving waters. This includes the most recent studies on impacts on fertilization and early life stages that provided the basis for the TDS site-specific criterion.

8. **Comment:** Teck will likely not comply with the proposed water quality standard.

Teck has repeatedly violated the terms and conditions of its mine site NPDES permit, discharging mine effluent in excess of the limits for total dissolved solids (TDS), cyanide, cadmium and other limitations. Teck was never able to comply with the effluent limitations for TDS in the 1998 permit. Instead, Teck obtained three compliance orders from U.S. EPA and ADEC to allow more time for Teck to comply. However, Teck has repeatedly violated even the terms of the relaxed TDS standards in the compliance orders, which are substantially identical to the proposed TDS revisions it seeks.

Because Teck has not changed its method of treatment or discharge, these violations can be expected to continue in the coming discharge seasons. The predictability of Teck's violations makes the new TDS standard a mockery of the regulatory process: Teck has never complied with its 1998 permit limits for TDS to this point; rather than giving the company a free pass to continue to pollute the creeks and rivers that Kivalina residents rely on, ADEC should force Teck to clean up its act.

Response: EPA acknowledges that Teck has violated the 1998 permit limit for TDS and other permit limits. EPA has taken several enforcement actions that were appropriate. The TDS limits in the Final Permit are based on the TDS site-specific criterion and are higher than the TDS limits in the 1998 permit. Based on long-term monitoring for the discharge, the analysis in the SEIS demonstrated that Teck will be able to comply with the new TDS limits (see also Response #5). With the addition of the TDS Management Plan (Permit Part I.A.7.f.), EPA believes that Teck will be able to consistently comply with the limits included in the Final Permit and also better maintain the site-wide water balance.

9. **Comment:** Past US EPA-authored documents relating to the Red Dog Mine have described potential impacts to soils, vegetation, air quality, land use, and socioeconomics [EA, page 8], yet these impacts have been neglected in the present EA, FONSI and Proposed NPDES Permit. None of these documents provide technical details that justify a Finding of No Significant Impact given that the mine has been discharging a minimum of 2.418 billion gallons per year of effluent from Outfall 001, containing the associated chemical loads of numerous potentially toxic chemical constituents.

Response: This comment is connected to a previous FONSI that is unrelated to the current permit action. EPA notes, however, that the facility's discharge is limited to a maximum of 2.418 billion gallons per year.

10. **Comment:** Significant changes authorized by the Permit result in unacceptable impacts to water quality. The continued protection and maintenance of water quality is of vital significance and importance for the health of present and future Alaskans, the quality of fish and shellfish harvested from State and federal waters, the marketing of fish and shellfish from Alaska, and the maintenance of wildlife throughout the state. The residents of Kivalina are particularly impacted by water quality changes that the dSEIS and Draft NPDES permit contemplate.

Response: Thank you for your comment. As documented in the Final SEIS, the conditions of the new permit will not significantly change the characteristics of Teck's effluent. Therefore, receiving water conditions will be essentially unchanged from current conditions and the Final SEIS demonstrates that there has not been adverse impacts on water quality.

11. **Comment:** The deletion of the requirement for consultation with state and federal agencies on grayling spawning before discharge commences does not protect the grayling.

Response: The State has not included notification or consultation requirements in its CWA § 401 Certification related to initiation of discharges and the grayling spawning period. The Final Permit does require that Teck notify EPA within 24 hours of initiating the discharge. Previous NPDES permits have not required consultation with other Federal agencies before discharges commence.

12. **Comment:** The NPDES permit should be reissued for the discharge of treated mine water into Red Dog creek. History has shown that this has protected the aquatic life of the stream and in fact has improved it. Prior to the development of Red Dog Mine by NANA and Teck-Cominco, Red Dog Creek supported almost no life. Now with the discharge from the mine, the treated mine water dilutes the naturally occurring mineralization of the creek to the point that the creek now sustains aquatic life that was not there before the mine.

Response: Thank you for your comment.

13. **Comment:** The Draft Permit is legally inadequate under the Clean Water Act and EPA's regulations. It also bears the unmistakable imprint of Teck's undue influence in the permitting process, both with EPA and with Alaska regulators.

Response: This comment is too general for EPA to provide a response. EPA respectfully disagrees with the commenter that Teck has had an "undue influence" on EPA in the permitting process.

14. **Comment:** A series of emails between EPA and ADEC (submitted as CRPE Exhibits 28-32) demonstrate that EPA and ADEC are seeking the weakest possible permits with the least public input, all in an apparent effort to appease Teck. The picture these emails paint is not of regulators trying to protect the environment, but rather to weaken the permit and keep Teck happy. These emails demonstrate that EPA and the State negotiated the site-specific criteria to mesh with the permit limits they already had in mind, rather than seeking site-specific criteria that were determined by science or environmental need, that ADEC noted to EPA that it could change the final TDS certification with public notice, that the State was already planning a new Compliance Order by Consent in the event Teck could comply with its permit limitations, that the state has separated the TDS and Cadmium site-specific criteria to facilitate allowing Teck to violate its new permit, that the EPA has asked ADEC to withdraw its previous SSC for TDS of 500 ug/L, that the State negotiated using a lesser number of cadmium samples for the natural condition cadmium SSC, and that EPA actually wrote most of the State's cadmium SSC and sent it to the State (see Exhibit 28-32).

Response: Thank you for your comment. This comment relates to the adoption of the SSC for cadmium and TDS, which are separate from this permit action. Comments on those actions should have been submitted during the criteria adoption comment period. EPA respectfully disagrees that it has worked with the Permittee to "weaken" any aspect of the permit.

15. **Comment:** There is nothing in the environmental review documents that documents when Teck reapplied for the permit renewal, and on information and belief, Teck did not reapply within the statutorily required time.

Response: Section VII. of the Fact Sheet and Section 1.1 of the SEIS noted that Teck originally re-applied for permit re-issuance on February 23, 2003 (received by EPA on February 25). On March 15, 2008, Teck requested that the application be amended to include development of the Aqqaluk Extension Project. Teck has met all applicable permit application requirements since the application was due on March 1, 2003, 180 days prior to the expiration date of August 28, 2003.

16. **Comment:** As an initial matter, it should be noted that the process for public participation and consultation have not resulted in adequate consultation with the tribe and affected communities. The approach by EPA in this environmental review has been different than that which had been used in previous meetings and was confusing. The Native Village of Point Hope IRA Council requests that there be government-to-government consultation before the Red Dog SEIS is finalized and prior to NPDES authorization.

Response: EPA provided sufficient notice to the public regarding release of both the DSEIS and Draft NPDES Permit. Similar to other draft permits, public meetings on the DSEIS and Permit were noticed in the Anchorage Daily News and the Arctic Sounder on December 5, 2008. Meetings were held in Anchorage, Kotzebue, Kivalina, and Noatak in January 2009 consistent with NPDES regulations. The public meetings were not unusual or different, but rather standard practice in which an overview of the project is presented with a question and answer period followed by a formal comment period. EPA clearly explained the format of the meeting at numerous points through the presentation.

In response to Point Hope's request for government-to-government consultation, EPA sent a letter to the Point Hope IRA council stating that EPA would be happy to have a government-to-government consultation meeting (February 25, 2009 letter from Michael A. Bussell, Director EPA Region 10 Office of Water and Watersheds, to Caroline Cannon, President Native Village of Point Hope). EPA sent the letter via both mail and email to the IRA Council President and Tribal Administrator. On June 3, 2009, EPA received an email from Point Hope requesting attendance at a meeting on June 5. Due to the short notice and other commitments EPA was unable to attend but sent an email response requesting a coordinated effort with Point Hope to reschedule the meeting. EPA received no response to that email request.

17. **Comment:** Much of the Draft Permit organization and wording is so unclear that even a water quality specialist is frequently confused as to the intended meaning. It appears that the new Draft Permit is significantly less clearly worded and organized than past versions. Clearly, the issues presented in this Draft Permit were not intended to be understood by the average citizen.

The Draft Permit is 43 pages long. Much of it is composed of text which would have been much more understandable had it been summarized using additional tables.

Because the Draft Permit includes discussion of numerous speculative options, it is unclear what will actually be included in the Final Permit. As such, it is unnecessarily difficult for the public to comment meaningfully.

Response: EPA apologizes for any difficulties the commenter had in understanding the Draft Permit but the agency believes that the requirements are clearly described. While previous Draft Permits included potential options for different requirements, e.g., based on possible adoption of site-specific criteria, this Draft Permit included none of these options and it is unclear to what "speculative" requirements the commenter is referring.

Much of the permit language is required by regulation to be included or cited in the permit. EPA Region 10 prefers to include the language rather than simply citing the regulations. This gives the permittees, as well as interested parties, all the requirements in one package rather than needing a copy of the Code of Federal Regulations (CFR) to determine what the requirements are. The permit follows a format that is consistent with other NPDES permits written by EPA Region 10.

18. **Comment:** Many of the permit provisions found in this revised permit were concocted years ago during the last round of permit renewal (that permit was issued, appealed and then withdrawn, in 2007). Then, and now, the EPA permit and the State Certification appear to be a concerted effort by EPA, ADEC and Teck to avoid any real enforceable limits in the permits. Teck has effectively lobbied the State to weaken its water quality criteria at every turn, with the express ambition of then using those weakened criteria to get weaker EPA permit limitations. See email from Mark Thompson to Luke Boles, November 22, 2005 (Exhibit 27, submitted under separate cover and incorporated here by reference).

Thompson repeatedly seeks weaker permit limitations from the state, which have apparently lead to weaker EPA permit conditions as well: Thompson writes, "EPA has retained the previous zinc limits that were based on natural conditions. Teck requests that the State not re-certify the natural condition zinc criteria and certify that implementation of the current state-wide criteria is consistent with the anti-degradation standards. This should pave the way for EPA to use the higher state-wide standard." What is remarkable are Teck's attempts to get rid of the zinc limits based on natural conditions, because this will allow it to pollute more, while at the same time requesting cadmium limits based on natural conditions, also to allow it to pollute more. Teck is consistently seeking the weakest limits possible, and EPA must reject this naked attempt to play the State off EPA and vice versa. The entire Thompson email is a demonstration that Teck had undue influence in the setting of the Alaska permit and certification limits, and thus in the setting (or more accurately, relaxing) of the EPA permit limitations.

Response: Thank you for your comment. EPA respectfully disagrees that Teck has had any undue influence in setting permit conditions. Please see Response #49 which addresses the change to the zinc and cadmium criteria.

19. **Comment:** The final NPDES Permit should reflect a corporate name change by the Permittee.

Teck Cominco Alaska Incorporated recently changed its name to Teck Alaska Incorporated. Please use "Teck Alaska Incorporated" as the full name of the company, or "Teck" when using an abbreviated form of the company name. The legal entity remains the same, as this is a corporate name change only. Teck has submitted its notification of name change to EPA, and requests that a Final NPDES Permit and related documents reflect this change.

Response: Change made as requested in the Final Permit.

20. **Comment:** There is a typographical error in the fifth paragraph on page 25. The reference to 18 AAC 72.240(l), should instead be 18 AAC 70.255(f) (June 26, 2003).

Response: These comments refer to the CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

21. **Comment:** There is a typographical error in the fifth paragraph on page 25. The reference to 18 AAC 72.240(l), should instead be 18 AAC 70.255(f) (June 26, 2003).

Response: These comments refer to the CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

22. **Comment:** Fact Sheet Section III, page 6, states that the conditions of the 2003 modification did not go into effect. Teck respectfully disagrees with EPA's interpretation and believes that all of the provisions of the 2003 modification went into effect with the exception of the limit applicable to the grayling spawning period. Teck requests that the second paragraph be modified to reflect that the provisions of the 2003 modification are in effect.

Response: As documented in a letter from EPA to Teck on November 17, 2008, the conditions of the 2003 modification to the NPDES permit did not go into effect. This is also described in Chapter 1 of the Final SEIS.

23. **Comment:** Monitoring Requirements. (Ref: Fact Sheet, Section VI.C).

EPA states that monitoring is included for zinc, mercury, and lead at Outfall 001 "solely on the basis of their inclusion in the Effluent Limitation Guidelines." Technically, the ELG's of 40 C.F.R. §§440.102 and 440.103 only apply to "existing sources." Heretofore, Red Dog Mine has been considered a "new source." If EPA is now treating Red Dog Mine as an existing source, it should expressly say so elsewhere in this Fact Sheet. If EPA is still treating Red Dog Mine as a new source, it should refer in this

part of the Fact Sheet to the "Effluent Limitations of the New Source Performance Standards" rather than "Effluent Limitation Guidelines."

Response: The Effluent Limitation Guidelines (ELGs) applicable to lead/zinc mines are found at 40 CFR 440 Subpart J. These ELGs contain requirements for both existing dischargers and new sources. Red Dog Mine is classified as a new source because mining commenced after the ELGs were promulgated. The New Source Performance Standards (NSPS), found at 40 CFR 440.104, are the part of the ELGs that apply to a new source lead/zinc mine such as Red Dog.

Ambient Monitoring

24. **Comment:** At pages 60 through 62 of its March 26, 2006 Comments to the 2006 Draft NPDES Permit (which was later issued and withdrawn), Teck questioned the justification for continuing monitoring at several "Stations" (locations in the field where regularly scheduled monitoring occurs). Specifically, at Page 62 of its Comments, Teck questioned the need for continued WET monitoring at Stations 9 and 12.

In its 2007 Response to Comments on the 2006 Draft NPDES Permit ("2007 RTC"), EPA agreed to eliminate monitoring at Stations 9 and 12 (2007 RTC, #139, page 64: "Monitoring at the two stations referenced by the commenter is not included in the Final Permit") as well as Station 20. See 2007 RTC #66, page 29 ("ADEC found that ambient monitoring requirements at stations 2, 9 and 20 are unnecessary. EPA concurs with ADEC's assessment and has eliminated monitoring requirements for these three stations.").

In the current Draft Permit, however, Section I.C.6, Table 2, requires Ambient Whole Effluent Toxicity monitoring once per month at Station 12. Teck believes that the rationale for eliminating this monitoring is still valid, and EPA should either eliminate this requirement based on its earlier assessment, or present any new or more current information to justify including this provision.

Response: The commenter is correct and WET monitoring at Station 12 was inadvertently included in the Draft Permit. Sufficient, representative data were collected for this station to characterize the toxicity of the North Fork which is unaffected by the discharge from the mine. These data were used in determining the WET limits. Additional data collection is not necessary and WET monitoring at Station 12 has been removed from the Final Permit.

25. **Comment:** It deprives the public of significant information to not include the ambient monitoring results in the monthly DMR, as now allowed by condition I.C.5. Having the data available only once per year does not allow public accountability and diminishes the opportunities for the public to review the data and enforce the permit. All of the ambient monitoring

should be included in each monthly DMR. This is particularly the case for the testing at Station 12, which is "clean" water unpolluted by the mine discharge and offers a baseline of sorts.

Response: Monthly reporting is important for Stations 150, 151, and 160 because they are related to compliance with permit limits. Since the other monitoring stations are generally included to observe long-term trends in water quality rather than compliance with a specific limit, EPA believes that annual reporting of the collective data is appropriate. The annual reports submitted by Teck are available to the public.

26. **Comment:** "Ambient monitoring" is designed to end each year after the mine ceases discharging at the start of winter. ADEC's 2007 Section 401 Certification states that such monitoring may be discontinued "7 days after the Permittee has ceased discharging for the season." According to ADEC, this is adequate to capture any downstream effects while not placing unnecessary monitoring requirements on the Permittee.

EPA's Draft Permit would not allow monitoring to cease until after "30 consecutive days" without a discharge. Teck notes that generally:

"When a State certification specifically prescribes a permit condition or limitation that interprets one of the State's WQS less strictly than the Region might prefer, ...the Region would have to provide a compelling reason for rejecting the State's interpretation of the standard."

In its 2007 Response to Comments (2007 RTC), EPA did not articulate a rationale for its conclusion that "EPA has determined that the collection of such samples [30 days of post-discharge monitoring] is necessary to document in-stream conditions under post-discharge conditions." Teck contends that the ADEC approach is sufficient to monitor the conclusion of the discharge season because it has been established that mine effluent reaches the Chukchi Sea in less than 6 days. Accordingly, there does not appear to be a nexus between the effluent conditions and the proposed permit condition.

Response: As discussed in the Draft Permit (Permit Part I.C.2.), when flowing water is present at a given monitoring station, monitoring should be conducted. Thus, if the discharge is terminated and flowing water is not present at a given station sooner than 30 days following termination of discharge, no monitoring samples are required to be collected at that station. However, if flowing water is present, monitoring is required up to 30 days following the termination of discharge. EPA has determined that the collection of such samples is necessary to document in-stream conditions under post-discharge conditions. Although ADEC may have included 7-day language in the 2007 CWA § 401 Certification, no such language was included in the Certification for this reissuance. If Teck believes that samples collected under certain post-discharge conditions (e.g., sub-zero temperatures) bias the TDS data-set, such an argument

can be made and supported with appropriate evidence in the annual water monitoring report required by the Final Permit.

27. **Comment:** Monitoring of the tributary streams above the mine that feed into the mine is discontinued entirely, so there is no way of determining how much of the pollution in the effluent is a result of natural mineralization flowing into the tailings pond and how much is being added by Teck. Given that Teck is embarking on further development of the mine's footprint through Aqqaluk, it appears particularly irresponsible to stop monitoring the tributaries at this point.

This obfuscation of the actual impacts of Teck is clearly by design, but it is also clearly not protective of human health or the environment.

The deletion of biomonitoring and ambient monitoring means that an important source of information on the mine's environmental impacts will be lost. Such information is critical to determine the impact of offsite pollution by the mine, such as that along the haul road. It is disturbing that the biomonitoring studies are being removed from the permit requirements, particularly as the studies have demonstrated levels of copper in fish livers at levels consistently higher than baseline levels. The deletion of the biomonitoring requirements that are then being included in the state permit means that these requirements will no longer be federally enforceable, and given ADEC's inability or unwillingness to deny Teck almost any permit modification it requests, presage the end of all biomonitoring at the facility as that is surely what Teck will suggest next. Biomonitoring requirements should be retained in the NPDES permit.

Additionally, several important biomonitoring studies are proposed to be deleted entirely, not just moved to the state permit: the periphyton surveys at Stations 9, 7, and upstream and downstream of Dud Creek on Ikalukrok Creek (meaning all the surveys on Ikalukrok Creek), the metals studies of fish in the Wulik, and the studies for fish presence and use in Anxiety Ridge, Evaingiknuk Creek, and Buddy Creek.

It is shocking that EPA is simply deleting these important biomonitoring studies at a time when residents of Kivalina are expressing increased unease with the impacts of the mine on their subsistence resources. EPA cannot hide its head in the sand, and it cannot allow Teck to leave Kivalina residents completely in the dark as to the impacts of the mine on their subsistence resources. The reduction in biomonitoring, apparently spurred by the State's request, has Teck's fingerprints all over it.

Response: EPA believes that the monitoring that has been performed provides a long-term record of the background conditions throughout the watershed, including the tributaries. Ceasing monitoring in the tributaries will not have any effect on protection of water quality in the streams downstream of the NPDES discharge. Consistent with the 1998 permit, EPA has deferred the ambient biomonitoring requirements to the State

through the CWA § 401 Certification because they are directly related to ensuring implementation of the State's WQS and protection of designated uses. It should be noted that all of the 1998 monitoring requirements are incorporated into a broader program proposed in the State's Waste Management Permit.

The impacts of discharges from the haul road are not covered by this permit and, therefore, monitoring upstream and downstream of the haul road is not included in the Final Permit. The haul road and associated upstream and downstream issues are covered by the NPDES permit for the port site, AK-004064-9.

28. **Comment:** There is no support for changing the ambient monitoring from Station 10 to Station 151. Changing the monitoring location will make comparisons of ambient monitoring data from the 1990s and through 2005 with new monitoring data difficult. Both stations should be monitored.

There is no cyanide monitoring at all at Stations 2, 73, 160 or 10 in the new permit, which calls into question EPA's ability to determine, based on any evidence, that the removal of the cyanide effluent limitation will not have any impact downstream. The approach appears to be to remove any monitoring that might actually show impact downstream. Total cyanide monitoring should be conducted at Stations 2, 73, 160, 10 and 151.

Response: The basis for the change from Station 10 to Station 151 is to establish a monitoring location at the boundary of the mixing zone in the main stem of Red Dog Creek. Station 10 was established downstream of the discharge but is listed in the 1998 Permit as being at the mouth of Red Dog Creek. Being the closest site downstream of the discharge, the information was utilized as if the station were at the edge of the mixing zone. With the establishment of Station 151, shown on the map in Permit Part VI., at the edge of the mixing zone, there is no specific need for continued monitoring at Station 10.

The Final Permit includes effluent limitations for cyanide. Cyanide monitoring at Station 151 will allow verification that compliance with WQS is ensured so monitoring further downstream is not necessary. See Response #52 related to monitoring for total versus WAD cyanide.

29. **Comment:** There is no support for deleting the dissolved oxygen and hydrogen sulfide ambient monitoring requirements; there is no environmental analysis of the potential impacts of this permit change. There is no support for deleting the total cyanide ambient monitoring.

Response: Dissolved oxygen and hydrogen sulfide monitoring was only required during the winter. The Fact Sheet (VI.F.2.) states that discharges will not occur during the winter. Since the Final Permit only allows for discharges when water is free flowing in the receiving waters (See Permit Part I.A.), winter monitoring for hydrogen sulfide and dissolved oxygen is

not necessary. See Response #52 related to total versus WAD cyanide monitoring.

30. **Comment:** The biomonitoring for benthic invertebrates (current condition I.F.1.d) has been inexplicably dropped; again, this is backsliding, and a failure to protect the environment. Removing the biomonitoring means that there is no way to determine if there is actually an impact on the environment, making the permit considerably less protective.

The deletion of significant biomonitoring/bioassessment requirements means that significant harm to the environment will go undetected and unreported, and the monitoring requirements will not be federally enforceable.

Response: Permit Part I.F.1.d was previously included as required by the CWA § 401 Certification of the 1998 Permit. EPA has deferred interpretation of these requirements to ADEC and has removed this section since it is not required by the current CWA § 401 Certification.

Under CWA Section 402(o), anti-backsliding requirements for reissued permits apply only to effluent limitations that are less stringent than comparable effluent limitations in previous permits. Because the commenter has not identified a less stringent effluent limitation, section 402(o) does not apply. Under 40 CFR 122.44(l)(1), less stringent "interim effluent limitations, standards, or conditions" are permitted upon reissuance if one of the causes for permit modification in 40 CFR 122.62 is met. Among other things, 40 CFR 122.62 allows for permit modification for new information. To the extent 40 CFR 122.44(l)(1) applies in this context, the CWA § 401 Certification for this reissuance provides new information that supports changes to the monitoring requirements. Note also that Permit Part I.E. includes invertebrate, periphyton, and fish monitoring at several locations.

31. **Comment:** At a minimum, waters at station 10 and Station 151 should be analyzed for the Total Solids content, which would include both the traditional TDS plus the suspended solids. Both the latest volume of Standard Methods For The Examination of Water and Wastewater (20 Edition, 1998) ("Standard Methods") and the standard analytical methods document for the U.S. Geological Survey (Techniques of Water-Resources Investigations of the U.S.G.S., Chapt.A1, Methods For Determination of Inorganic Substances in Water and Fluvial Sediments, third edition, 1989, Book 5) contain methods that would be more suitable for these purposes. For example, see pages beginning on 2-54 in Standard Methods. Also, the detailed chemical composition of these solid fractions should be determined.

Response: EPA does not believe that monitoring for total solids is necessary at Station 151. Total suspended solids are regulated at the discharge point and not in the ambient monitoring. The required ambient

monitoring for TDS should be sufficient to characterize the impacts of the discharge on the receiving waters and determine compliance with WQS. See Response #28 regarding monitoring at Station 151 rather than Station 10.

32. **Comment:** There is a conflict in the permit between the requirements in I.A.7.c.2 and I.D.6, as I.D.6 does not include Station 150's conductivity data in the DMRs. All the ambient monitoring data should be included in the DMRs to resolve this conflict.

Response: Table 2 has been changed to reflect the requirements of Permit Part I.A.7.b.2. (formerly Permit Part I.A.7.c.2.) to include weekly conductivity in conjunction with the required TDS monitoring.

Permit Part I.C.5. requires submittal of all data for Stations 150, 151, and 160 with the monthly DMRs.

33. **Comment:** In the first sentence of the first paragraph on page 28 of the Fact Sheet, the reference should be to existing uses and "designated uses." The first sentence should read:

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.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

34. **Comment:** Bioassessment Program Reporting. (Ref: Draft Permit, I.E.2).

The reference to the annual reporting date in Draft Permit, Section I.E.2, should be removed as it is redundant to the reference in Draft Permit, Section I.I, to a March 1 Annual Water Monitoring Summary Report. There is no need to have the date listed elsewhere in the permit as this could result in conflicting annual reporting dates if a future permit revision resulted in change to one section and not to the other.

Response: Permit Part I.E.2. has been changed to remove the redundancy.

35. **Comment:** Other Requirements or Changes from the Current Permit. (Ref: Fact Sheet, Section VI.F).

ADEC proposes removal of Bioassessment Monitoring requirements from this permit because aquatic and biomonitoring will be more fully addressed in the State of Alaska's Waste Management Permit. The State Waste Management Permit will be broader in scope than this NPDES Permit which is, by statute, limited to aqueous waste streams and focused

upon particular point sources. Biofauna and flora are impacted by a broader array of wastes and sources. Allowing biomonitoring to be part of overall waste management is consistent with the shifting regulatory approach to watershed management rather than isolated waste-stream management. For all these reasons, Teck supports ADEC's proposal to remove biomonitoring from this permit.

Response: In Section VI.F.3 of the Fact Sheet, EPA indicated that it was soliciting comment on whether bioassessment should be removed from the permit where duplication of the requirements of the State's Waste Management Permit may exist. The bioassessment requirements in Permit Part I.E. have been retained in the Final Permit.

36. **Comment:** The permit was modified in 2003 to allow for a higher TDS effluent limit and instream limit, and the results of aquatic biomonitoring in 2004 shows that over the past five years, 2004 was the year with the lowest density of invertebrates in the the main stem of Red Dog Creek at Station 10, in Ikalukrok Creek above Dudd Creek, in Ikalukrok Creek at Station 7. Ott and Morris 2005 (CRPE Exhibit 24). Further, Ott and Morris report that in 2004, no larval arctic grayling were found in the main stem of Red Dog Creek at Station 10, in Ikalukrok Creek above Dudd Creek, in Ikalukrok Creek at Station 7 in 2004 (Ott and Morris 2005, Exhibit 24).

Additional conclusions of the biomonitoring report are that periphyton is decreasing in Ikalukrok Creek, that maximum concentrations of iron, aluminum and lead were higher than pre-mining baseline conditions, and that maximum concentrations of cadmium and median concentrations of cadmium increased in 2004.

Response: See Response #22 pertaining to the 2003 permit modification. While aquatic life conditions vary somewhat on a year-to-year basis, the current conditions are consistently improved over pre-mining conditions. This includes both fish and periphyton levels (see Section 3.10 of the Final SEIS). EPA, therefore, disagrees with the commenter that the TDS limits in the permit are not protective of the aquatic environment.

With respect to metals, pre-mining conditions are represented by a limited dataset while conditions during mining have been monitored for 20 years. As a result, it is logical that a single value obtained during mining, representing a shorter duration than the limited data available pre-mining, may exceed pre-mining conditions. However, the data presented in Table 3.5-7 of the Final SEIS consistently show lower metals levels than pre-mining conditions in Red Dog Creek below Outfall 001. This corresponds to lower metals loadings to Ikalukrok Creek and the Wulik River from Red Dog Creek. Further evidence of improved water quality is provided by the aquatic life conditions cited above.

37. **Comment:** The proposed permit radically scales back the amount of bioassessment monitoring that will be required, including dropping all requirements for biomonitoring in Middle Fork Red Dog Creek, stations on Ikalukrok Creek, the Wulik River, Anxiety Ridge, Evaingiknuk Creek and Buddy Creek. This scaling back (or more appropriately backsliding) is neither explained or justified in any of the environmental review documents. It represents a disappointing capitulation to Teck and a complete failure by EPA to require permit limitations that are protective of the environment. It is not “duplicative” to require reporting the monitoring results in both the monthly DMRs under the federal permit and the annual waste permit report under Alaska regulations – having the reporting in the monthly DMRs not only gives a far more timely reporting to the public, but also makes any failure to report federally enforceable under the Clean Water Act. EPA should keep all biomonitoring reportable in the DMRs, rather than dramatically scaling back the bioassessment monitoring.

Response: The bioassessment requirements in the Final Permit are consistent with the State’s CWA § 401 Certification and intended to assure that the conditions of the Final Permit are protective of aquatic life in the receiving water. EPA believes that it is appropriate to follow the State’s recommendations since the State initially included bioassessment requirements in the CWA § 401 Certification of the 1998 Permit and has had the primary responsibility for reviewing the bioassessment data collected to date.

Bioassessment requirements that are included in the permit remain enforceable under the permit and CWA. See Response #25 regarding annual versus monthly reporting. See Response #30 regarding the issue of backsliding.

Antibacksliding

38. **Comment:** EPA erred in its interpretation and application of the antibacksliding prohibition with regard to WET limits. (Ref: Draft Permit, I.A.1, Table 1; Fact Sheet, Appendix C).

Regarding EPA’s rationale for WET limits, on page 48 of the Fact Sheet an error is made (with respect to changes in WET limits that Permittee had requested) where EPA states: “EPA cannot justify a change in these limits based on antibacksliding.” The WET limit, however, is a water quality-based effluent limit (WQBEL) for which backsliding is permitted as long as the antidegradation standard is not violated.

Teck respectfully requests that EPA delete the statement from the Fact Sheet at page 48 that WET limits may not be made less stringent due to antibacksliding. WET limits are like all other WQBEL parameters in that WQBELs may become less stringent so long as there is no violation of an antidegradation policy. Since ADEC already performed a Tier II analysis to justify changes in three parameters (cadmium, zinc and ammonia), it is

clear that a Tier II analysis could justify a WET limit change as well. In fact, in the prior Certificate for the prior permit iteration, ADEC stated that no WET limit was necessary in the NPDES permit to protect water quality.

Response: The commenter requests that EPA delete a statement from the Fact Sheet relating to WET limits and antibacksliding. EPA does not issue a revised Fact Sheet with the Final Permit.

Antidegradation

39. **Comment:** DEC has not established implementation procedures for its Anti-degradation Policy (ADP) as required by EPA, and as a result, cannot perform an antidegradation analysis for revised permitting standards in the Permit. Thus, when the State says that it “finds the reduction in water quality to be in compliance with the requirements of 18 AAC 70.015” there is no basis for the finding because no antidegradation implementation analysis could be performed. Fact Sheet p. 24. The 401 Certification, which authorizes reduced effluent limitations and significantly larger mixing zones, violates antidegradation requirements.

The State certifies in the Draft 401 Certification that a revised lower effluent limit for zinc is consistent with the State’s antidegradation policy. The State purports to undertake an antidegradation analysis. See Fact Sheet, Appendix B, pp. 32-36. However, because there is no antidegradation policy implementation plan, the State cannot properly perform this analysis, and the certification to allow for backsliding of the effluent limitations for cyanide, zinc, and ammonia is illegal.

Response: The regulations at 18 AAC 70.015 represent the State of Alaska’s antidegradation policy, which tracks the substantive requirements of 40 CFR 131.12. The CWA § 401 Certification demonstrates the State’s compliance with this policy, and addresses the specific criteria that must be met under 18 AAC 70.015 and 40 CFR 131.12 for potentially lowering water quality in “Tier II” waters (water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water). The Main Stem of Red Dog Creek and Ikalukrok Creek are classified for the following uses: contact recreation, *wading only*; secondary recreation, and growth and propagation of fish, shellfish, other aquatic life, and wildlife. The antidegradation analysis is based on a conservative assumption that these are Tier II waters, but also describes naturally occurring water quality conditions in both creeks (high metals concentrations) that have precluded some designated uses, which were removed.

As required by federal and state antidegradation regulations for Tier II waters, the CWA § 401 Certification addresses changes in effluent limitations for zinc, cyanide, and ammonia in light of the following factors: socioeconomic need; compliance with applicable water quality criteria; protection of existing uses; application of the most effective and

reasonable methods of pollution prevention, control and treatment; and achieving the highest statutory and regulatory requirements. Based on this analysis, the CWA § 401 Certification concludes that that the changes to effluent limitations are consistent with the antidegradation policy and will not violate applicable state water quality standards. In addition, in compliance with 18 AAC 70.015(c), the State issued a public notice inviting comments on the CWA § 401 Certification on February 6, 2009.

EPA further notes that the comment regarding the lack of implementation procedures goes to the adequacy of the underlying state water quality standards, of which an antidegradation policy is part. Alaska's water quality standards were approved by EPA in a separate proceeding and are not subject to review or comment in this permit reissuance.

Other responses (see, e.g., Response #'s 49, 52 and 82) address the changes in effluent limitations in the permit.

Contrary to the comment, the mixing zones authorized by ADEC in this permit are the same size as previously authorized in the 1998 Permit.

40. **Comment:** On pages 34-36 of the Antidegradation Analysis and, additionally, on page 25 of the mixing zone analysis, the department provides its support for changing the TDS limits from those found in the 1998 permit to the limits proposed in the Draft Permit. The Antidegradation Analysis itself is somewhat unclear, insofar as it does not explicitly state that the TDS limits are subject to antidegradation review.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

41. **Comment:** On page 34, the lead-in language to the antidegradation analysis should explicitly reference TDS. The sentence should read:

Accordingly, the following antidegradation analysis will focus on these parameters based on the theoretical possibility for water quality degradation: cyanide, zinc, TDS, and ammonia.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

42. **Comment:** We understand that ADEC's antidegradation analysis follows the requirements in 18 AAC 70 and the procedures recommended in EPA's WQS Handbook (Second Edition 1993). We recommend insertion of a paragraph along the following lines into the Antidegradation Analysis:

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 WQS Handbook (Second Edition 1993). In accordance with these requirements and policies, the department determines whether a waterbody, or portion of a waterbody, is a tier 1, tier 2, or tier 3 waterbody. Antidegradation analysis is applied on a pollutant-by-pollutant basis. For tier 2 waters, antidegradation analysis in accordance with 18 AAC 75.015(a)(2) is applied to permit limitations that are relaxed, or which the department concludes should otherwise be subjected to antidegradation analysis. Other factors, such as control of nonpoint sources of pollution, are assessed in light of permit limitations, including controls required under Best Management Plans and Storm Water Pollution Prevention Plans. Last, public participation and intergovernmental coordination is achieved through close coordination with EPA and agencies involved in the NEPA review. The public is afforded an opportunity to influence the department's antidegradation analysis through public hearings and an opportunity for comment on draft antidegradation analyses.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

43. **Comment:** Teck understands that the department is currently working on draft regulations to formalize its Antidegradation Implementation Plan. Until those regulations are finalized, we suggest that the Department include language in the analysis summarizing the antidegradation process and procedures. This step, although not legally required, would clarify for the public the process that the department uses in its antidegradation analyses. A logical place for this explanation is in a new paragraph 2 on the first page of the Antidegradation Analysis (in this case, on page 32).

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

Metals, Cyanide and pH

44. **Comment:** EPA's reasonable potential analysis (RPA) for cyanide is flawed because EPA failed to average replicate samples. Proper consideration of the available data demonstrates that cyanide limits are not warranted in the Permit.

EPA included an Effluent Limit and Monitoring requirement for Weak Acid Dissociable (WAD) Cyanide in the Draft Permit, Section I.A.1. In EPA's RPA analysis for cyanide (Fact Sheet, Appendix C), EPA did not consider available and appropriate cyanide data. Rather, the RPA is driven by a single high value of cyanide (12.4 µg/L) from a sample collected on 9/18/06. However, there was additional data from split samples (on that same date) that EPA should have used to calculate an average value. The

average of the result of replicate samples is most representative of the effluent quality on that day compared to any single value.

Teck provided EPA effluent analysis from 2003 – 2007, which included both total cyanide and weak acid dissociable cyanide (CN-WAD), as well as samples fixed and unfixed to prevent interference from sulfide in the analysis. EPA selected the unfixed CN-WAD data for the RPA. This data set contained 205 values, of which half were replicate analyses.

Because EPA failed to average these available split samples, EPA's RPA for cyanide resulted in a finding that there was reasonable potential to exceed the chronic cyanide standard, and the conclusion that the Permit should contain limits for cyanide. However, if EPA had used the average of all of the split sample analyses for 9/18/06 (versus a single high value of cyanide of 12.4 µg/L), in addition to averaging replicate sets for all other available dates, EPA's RPA would have shown a projected maximum effluent concentration of 3.7 µg/L (with a 2.5 mixing zone dilution) and no reasonable potential for the effluent to exceed WQS in the receiving water. Based on these calculations, no cyanide permit limit would be appropriate.

Furthermore, EPA needs to correct the RPA not only for cyanide, but for any other effluent parameters for which EPA has failed to appropriately include replicate sample data by averaging the replicate results before performing the RPA.

Response: EPA is not under any obligation to average replicate samples, unless there is a specific reason or evidence to suggest that the higher value is inaccurate. Since no reason was provided by the Permittee, the higher values, as well as the replicate values, were used in the reasonable potential analysis to determine the maximum estimated concentration – consistent with EPA's Technical Support Document for Water Quality-based Toxics Control (TSD) procedures for conducting RPAs. There is no basis for the commentor's assertion that the average is most representative of effluent quality on the sampling date.

45. **Comment:** There is presently no cyanide-kill process employed by Teck before discharge. The strategic application of a cheap and effective cyanide-kill process like the addition of ferrous sulfate could target the reduction not only of cyanide, but would also inhibit the release of ammonia, a breakdown product of the cyanide which is also a contaminant of concern in the discharge at Outfall 001.

Response: As documented in the CWA § 401 Certification, ADEC has determined that the proposed cyanide limits are protective of aquatic life in the receiving water. These limits can be met in the discharge at the outfall without additional treatment.

46. **Comment:** Numerous samples from Outfall 001 have failed the cyanide limitations contained in the existing NPDES permit. This was true even

though several forms of cyanide-related compounds are known to be present in the Red Dog effluents (such as metal-cyanide complexes, cyanate, thiocyanate), but are not detected by either the WAD or Total cyanide analytical methods. Nevertheless, with no technical justification provided, the Proposed NPDES Permit states that no enforceable limitations for any form of cyanide will be included in the new permit. This is an unreasonable change in the permit conditions. The 001 Outfall effluents should be analyzed for both WAD and Total Cyanide, and also for cyanate and thiocyanate once per week as noted in the Proposed Permit documentation.

Response: The Draft and Final permits both include effluent limits for cyanide. The WQS for cyanide were changed in 2004 when EPA approved revisions to the State's standards. In this revision, the measure for cyanide was changed from total cyanide to WAD cyanide to better correlate with the criteria which were promulgated as a free cyanide level. See Response #52. Since EPA approved the use of this WQS, measured as WAD cyanide, it was utilized here to determine reasonable potential and calculate effluent limits.

EPA is not aware of the references to cyanate and thiocyanate cited by the commenter and does not believe there is a purpose to require such monitoring in the permit.

47. **Comment:** While the Proposed Red Dog NPDES permit does contain limitations for a few metals and metal-like elements such as aluminum, iron, lead, copper, selenium and zinc, these limitations are extremely high when compared to their respective aquatic life criteria. The same is true for the limitations for ammonia and pH.

Response: Appendix D of the Fact Sheet describes the procedures used to develop average monthly and daily maximum effluent limits from acute and chronic aquatic life criteria. EPA uses conservative statistical procedures to convert criterion with a 4-day or 1-hour exposure over a 3 year period into monthly average and daily maximum effluent limitations. These limits ensure compliance with the applicable WQS for metals, cyanide, and ammonia. Appendix C of the Fact Sheet and the CWA § 401 Certification specifically document the rationale for the pH limits, including how they protect the designated uses of the receiving water. The Fact Sheet analysis demonstrates that the limits were developed to be protective of aquatic life and human health.

48. **Comment:** EPA incorrectly calculated the effluent limits for copper, lead, nickel, and zinc (Draft Permit, I.A.1) because the Agency did not use the effluent hardness concentration to calculate the applicable water quality criteria.

The Draft Permit contains water quality-based limits for copper, lead, nickel, and zinc. As discussed in the Fact Sheet, Appendix C, Section

I.B.1.a, EPA calculated those limits (for hardness-based WQS) using a hardness concentration at the downstream edge of the mixing zone, at which point the creek's assimilative capacity has lowered the hardness concentration significantly compared to end-of-pipe effluent hardness. However, EPA did not apply those calculated criteria at the downstream edge of the mixing zone. Rather, the Agency moved upstream and applied them at end-of-pipe. In short, the error is that WQS were calculated using hardness values from one location, but were then applied to a different location that has different hardness values. This is a critical error and EPA should revise its calculations using end-of-pipe hardness values.

In its comments on the 2006 Draft NPDES Permit, Teck cited the methodologies described by EPA in its TSD as the appropriate means for calculating these water quality-based effluent limits (WQBELs). The TSD describes how to calculate WQBELs using the dilution that is achieved with a mixing zone. Calculation of WQBELs for metals with hardness-dependent water quality criteria should be performed using the hardness concentration of the water at the point in the stream at which the water quality criteria are to be achieved (i.e., the compliance point). Accordingly, using EPA's own methodology, the criteria must be calculated at the downstream edge of the mixing zone where they are to be met. Conversely, if the water quality criteria are to be met at end-of-pipe, calculations should employ the hardness concentration in the effluent at the end-of-pipe.

For the 2007 (withdrawn) NPDES Permit, in its response to Teck's comments, EPA acknowledged that it has followed the method outlined in the TSD when calculating WQBELs for several other Region X permits. However, EPA stated that as a matter of general policy it uses in-stream hardness to calculate WQBELs for metals, especially at mines. This unwritten policy not only conflicts with the written EPA guidance, but it is not scientifically accurate. Calculating metal WQBELs using the hardness concentration at the edge of a downstream mixing zone, at which point there is considerable dilution of the effluent hardness by upstream flows, and then assuming that the resulting water quality criterion applies to 100% effluent, is not technically defensible. The permit limits for copper, lead, nickel, and zinc should be revised by EPA, following its published methodology and WQBELs for metals derived using valid effluent hardness concentration data.

Response: In its 2007 (withdrawn) Response to Comments, EPA acknowledged that some permits have been written using effluent hardness. EPA did not state that this method was in accordance with the TSD or that the method employed in this permit is not. EPA agrees with the commentor that the "calculation of WQBELs for metals with hardness-dependent water quality criteria should be performed using the hardness concentration of the water at the point *in the stream* at which the water quality criteria are to be achieved" (emphasis added). However, EPA does not agree with the commentor that using the hardness of the effluent

prior to discharge would be "in the stream." The designated use protecting aquatic life has been removed from the stream segment where the outfall is located but this designated use does apply at the confluence of the North Fork and downstream. As noted in the CWA § 401 Certification, this point is designated as the edge of the pH mixing zone but pH is monitored at Station 151. The hardness-dependent water quality criteria use the 5th percentile hardness measured at Station 151 (historically at Station 10) in this segment. This hardness value will ensure that the metals criteria and limits are appropriately conservative and protective of aquatic life downstream of the discharge.

49. **Comment:** Consistent with many other aspects of the Proposed NPDES Permit, the zinc limitation at Outfall 001 is also proposed to be weakened. The proposal is to allow the zinc limitation to rise from 210 to 269 ug/L. Zinc has consistently been shown to be toxic to most species of cold water fish.

The Proposed Permit also would weaken the limitations at 001 for cadmium and selenium as well as for zinc.

Response: EPA did not propose to raise the limitations in the permit from 210 to 269 ug/L. The CWA § 401 Certification proposes to rescind the Natural Condition-based *chronic* SSC (NCBSSC) for zinc of 210 ug/L which applied to the main stem that was adopted in the CWA § 401 Certification issued for the 1998 NPDES Permit and approved by EPA. Although the State found in their CWA § 401 Certification that the *chronic* NCBSSC for zinc in the main stem is not required to protect existing uses of the waterbody, EPA has not yet acted on this submittal to change the WQS. Nevertheless, the calculations of the limitations in the permit are driven by the *acute* criterion. Thus, no matter which chronic criterion (NCBSSC or statewide) is used, the limitations in the Final Permit would not change from the draft. See Attachment B.

The permit's selenium average monthly effluent limit (AMEL) is more stringent than the 1998 permit, i.e., 4.4 compared to 4.9 ug/L, and the selenium maximum daily effluent limit (MDEL) is less stringent than the 1998 permit, i.e. 7.2 compared to 5.6 ug/L. As documented in the CWA § 401 Certification, these minor and offsetting changes are the result of statistical variability in the data set used to determine effluent limits but are based on same the WQS/wasteload allocation used in developing the 1998 Permit.

It is the State's judgment that these changes will not affect the levels of zinc and selenium in the discharge and the revised limits are protective of the existing uses of the receiving water.

The cadmium limits in the Final Permit are more stringent than the previous permit. The permit's cadmium average monthly effluent limit is 1.7 ug/L as compared to 2.0 ug/L in the 1998 permit. The cadmium

maximum daily effluent limit is 3.2 ug/L as compared to 3.4 ug/L in the 1998 permit.

50. **Comment:** Allowing the 001 Outfall effluent pH to rise as high as 10.5 s.u. permits discharge of waters that would be toxic to many species of aquatic organisms, strictly due to the high pH. In addition, such an elevated pH tends to increase the dissolved concentrations of numerous metal and metal-like chemical species in the effluent. Several of these elements, such as arsenic, antimony, molybdenum, vanadium, nickel, thallium, uranium, manganese, chromium, are likely to be present in elevated concentrations in the effluent at such pHs, but will not be regulated under the terms of the Proposed NPDES Permit.

The permit is proposing to allow discharges with a pH up to 10.5. The Gold Book, which recommends national water quality standard has a level for pH of from 6.5 - 9. There is no basis for allowing such a high pH discharge especially given the corresponding high permit levels for ammonia.

Response: As explained in Appendix C of the Fact Sheet, the regulation at 40 CFR 440.131(d) allows the technology-based pH level to exceed 9 s.u. to assist in treatment to remove metals. In this case, a pH range of 9.5 to 10.5 s.u. is necessary to optimize metals removal. The CWA § 401 Certification indicates that the pH immediately upstream of the discharge ranges from 5.8 to 6.7 s.u. The pH stabilizes after the discharge and the pH is approximately 7 s.u. at the mouth of Red Dog Creek, i.e., the mixing of basic discharge waters with acidic creek waters results in a slightly basic/neutral pH where fish occur. As a result, the State certified that the pH limits would be protective of aquatic life. Note also that the NPDES permit has been developed to ensure compliance with all applicable aquatic life WQS for metals. See Response #78 for details on the derivation of the ammonia effluent limitations.

51. **Comment:** The permit removes current end-of-pipe permit limitations or monitoring requirements for nickel, silver, TDS, total cyanide, and hardness. No support or analysis is offered in any of the environmental review documents for the removal of most of these analytes.

The new permit should both retain the existing permit's effluent limitations for nickel, silver, TDS, total cyanide and hardness, and also add monitoring and reporting requirements for the various reagents that Teck uses at the mine site.

Response: Nickel limits are included in the Final Permit. The permit's nickel average monthly effluent limit is 80.0 ug/L and the maximum daily effluent limit is 216.5 ug/L. These limits were included in the Draft Permit based on the analysis in Appendix C of the Fact Sheet. The previous permit did not include limits for silver, only monitoring requirements. As documented in the Fact Sheet (Section VI.F.6.), recent monitoring data

show that silver does not demonstrate reasonable potential to exceed the most stringent water quality criteria and therefore, neither continued limits nor monitoring are necessary. Hardness monitoring of the receiving water is used to determine applicable hardness-based water quality criteria. As required by Permit Part I.A.4. and noted in Section VI.F.5. of the Fact Sheet, the hardness of the effluent can be determined by calculation using the monitoring data for individual anions and cations. WAD cyanide monitoring and limits are included in the permit to ensure compliance with the State's WQS for cyanide, which is expressed as free cyanide rather than total cyanide. The rationale for deleting the TDS effluent limit is described in Appendix C, Section I.B.2. of the Fact Sheet. TDS monitoring of the effluent continues to be required.

Teck reported, in their reapplication package, the following list of reagents used at the Red Dog Mill: Nalco 937 Pulv Inhibitor, sodium cyanide, zinc sulphate monohydrate, sodium metabisulfite, sodium sulfide, calcium oxide, copper sulfate, UMSD200, diethylene glycol, methyl isobutyl carbinol (MIBC), potassium ethyl xanthate, potassium amyl xanthate, sodium ethyl xanthate, sodium butyl xanthate, Percol E10, Magnafloc 10, and sodium isobutyl xanthate. The Final Permit does not require monitoring the discharge for each of these reagents since analytical methods to monitor such reagents are limited and WQS are not available for the reagents. However, the monitoring that is required in the permit will monitor some of the constituents of these reagents, for example copper and zinc. The permit requires WET testing, which was included, in part, to evaluate whether the pollutants that are not being monitored or limited could be toxic to aquatic life. If the results of a WET test indicate that the effluent is toxic (i.e., exceeds the permit limits), then additional WET testing is required. If additional WET testing results in another exceedance of the limit, then a Toxicity Reduction Evaluation (TRE) is required to determine the cause of the toxicity and prevent the recurrence of toxicity (See Permit Part I.F.3). Through the TRE, it may be determined whether one or a combination of the reagents listed above is causing a toxicity problem.

52. **Comment:** Monitoring using the total cyanide method is discontinued entirely – at the same time that the permit limitations for cyanide are almost wholly lifted. This creates the situation where there is no effluent limitation for cyanide being discharged, and no testing for it downstream (at Stations 2, 10, 151 and 160, all locations where it is currently monitored for), although Teck discharges millions of pounds of cyanide each year. Thus, the concerned public – particularly residents of Kivalina, who drink the water into which Teck is discharging the cyanide – will have no way of knowing the concentrations of cyanide in the water as it moves downstream.

Response: Alaska's aquatic life and drinking water standards for cyanide are based on "free" cyanide, which is measured as WAD cyanide rather than total cyanide. Ambient monitoring for total cyanide, therefore, was

removed from the permit since it is no longer the measure of compliance with the applicable standard. The Final Permit contains ambient monitoring for WAD cyanide at the edge of the mixing zone at Station 151. Monitoring at stations further downstream is not necessary to determine compliance with effluent limitations or WQS. WAD cyanide limits at the discharge are included in the Final Permit. Note that the monthly average and daily maximum limits of 10.3 ug/L and 22.2 ug/L were derived from the chronic aquatic life WQS and are well below the applicable drinking water standard of 200 ug/L. From July 2003 through October 2007, no total cyanide levels exceeded 20 ug/L at Station 151. Therefore, no impacts on drinking water uses are expected.

53. **Comment:** In the second paragraph on page 35, the department appropriately notes that the statewide zinc standard is protective of the aquatic life designated use. Although it is not explicitly stated here, the department should clarify that the revised zinc is protective of "existing uses," as well as designated uses. We suggest the following revisions:

The rationale for condition 1 of the certification describes why the mixing zones for TDS, cyanide, and ammonia will have no adverse effects on aquatic life or other existing uses. Similarly, the state-wide water quality criterion for zinc, which is the basis for the effluent limits in this permit, is protective of the aquatic designated use and the existing uses in the waterbody. Outfall 001 discharge Zn 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 discharge zinc concentrations are expected to remain 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.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

54. **Comment:** Because the treatment plant has been discharging a minimum of 2.418 billion gallons per year of effluent from Outfall 001, containing the associated chemical loads of numerous potentially toxic chemical constituents, significant effects are likely to occur to the environment, including aquatic life (fish, other aquatic organisms), soils and vegetation. It is the commentor's professional opinion that this change in the permit will cause a potentially significant impact to the environment.

The EA, FONSI and Draft Permit employ a totally misleading and incorrect definition of TDS as a means to avoid focusing on the detailed chemical composition of the effluents discharged from Outfall 001. The EA, page 29, section 5.0 [Water Management and Selective Water Treatment] states:

"The TDS and sulfate concentration of the tailings pond water is approximately the same as the TDS and sulfate concentration of the effluent water. However, the metals that were in the tailings pond water have been removed in the treatment process and replaced with calcium."

The last sentence is simply false, as is obvious by reviewing the NPDES water quality data presented in the Discharge Monitoring Reports (DMRs) submitted by TC to the US EPA. These DMRs reveal significant concentrations of the following metals / metal-like elements: zinc, nickel, manganese, and aluminum. In addition, TC fails to monitor numerous metals for which standards and criteria exist [see *Comment #56*], such as arsenic, which are undoubtedly appearing in the 001 effluent. Clearly it is not true to state that all the metals and metal-like elements are removed by the treatment plant.

Response: EPA disagrees with the commenter that permit development failed to address metals levels in the effluent. Neither the SEIS, which EPA assumes the commenter is referring to, nor the permit suggest that all metals are removed in the treatment process. The characteristics of the effluent have been well-established by many years of monitoring data, including for a wide range of metals. As documented in the Fact Sheet, EPA evaluated these data to determine which pollutants have reasonable potential to cause an exceedance of the applicable WQS. This led to the establishment of the permit limits and monitoring, including limits for cadmium, copper, lead, mercury, selenium, nickel, zinc, aluminum, iron, ammonia, and cyanide. Please see Response #9 to clarify the allowable discharge volume.

Minimum Levels

55. **Comment:** Currently Teck's contract laboratories report values between the MDL and PQL/MRL as estimated results; meaning that they are statistically confident the constituent is present, but the precise quantity cannot be determined with statistical confidence.

With respect to the proposed ML of 10 microgram per liter ($\mu\text{g/L}$) for barium (Draft Permit, Section 1.A.5.b), Teck's contract labs have experienced difficulties quantifying at this level for analyses of mine effluent samples. The interference(s) encountered at concentrations close to this level makes it necessary to dilute the samples, and therefore raise the MDL. For barium, results with an MDL of 20 $\mu\text{g/L}$, as well as results ranging from 8 $\mu\text{g/L}$ to 40 $\mu\text{g/L}$, have been reported.

Iron has a proposed ML of 100 $\mu\text{g/L}$ (Draft Permit, Section 1.A.5.b). Teck's contract labs have experienced difficulties achieving an MDL less than 100 $\mu\text{g/L}$ for reasons similar to those associated with barium analyses. Teck's contract labs occasionally generate iron results <125 $\mu\text{g/L}$ and have reported estimated results approaching 100 $\mu\text{g/L}$.

Accordingly, it has been difficult for Teck's laboratories to quantify barium and iron with statistical confidence at the proposed MLs. 40 C.F.R. Part 136 allows for matrix-specific development of MDLs and MLs. Teck requests that EPA include a provision allowing the Mine to develop site-specific MLs for barium and iron if the proposed MLs are not consistently achievable.

Response: The intent of designating a specific ML is to assure that EPA receives data on these parameters to determine reasonable potential or whether WQS are exceeded. Since the WQS for both iron and barium is 1000 ug/L, an evaluation can be done even with higher MLs. EPA is changing the MLs in the Final Permit to 60 ug/L for Barium (3.18 x the MDL of 20 rounded down) and 125 ug/L for Iron.

Monitoring, Sampling and Reporting Requirements

56. **Comment:** Teck should be required to report detailed chemical analyses for both the untreated water entering the water treatment plant and the treated water being discharged at Outfall 001. These analyses should be reported at least twice during each operating season, and should include, as a minimum, the following constituents: aluminum, antimony, arsenic, barium, cadmium, copper, chromium, cobalt, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, vanadium, zinc; major cations (calcium, magnesium, sodium and potassium), and nonmetals (sulfate, nitrate, ammonia, boron, phosphorus, fluoride, chloride, alkalinity), and natural radioactive constituents (uranium, thorium, potassium-40, gross alpha and beta). These samples should also be analyzed for an Organic Priority Pollutant Scan, together with oil and grease, WAD cyanide, thiocyanate and cyanate, water temperature, pH and WET Testing.

Several of the constituents listed above are potentially toxic to aquatic and other organisms and they are not monitored as part of either the existing or the proposed NPDES permit. All these constituents should be added to the required monitoring and effluent limitations should be developed and included in the Proposed NPDES Permit.

Response: The Final Permit includes all of the effluent and ambient monitoring necessary to determine compliance with permit limits. The basis for the effluent limits and monitoring were described in the Fact Sheet. In addition, the facility has to meet WET limitations which account for toxic effects of parameters that may have not been limited. Influent monitoring is not required or necessary because it is irrelevant to determining permit compliance and effects on the receiving waters. Teck may sample the influent to the treatment plant to ascertain treatment performance but the Final Permit does not require this type of monitoring.

57. **Comment:** The Final Permit should require that additional water quality monitoring, stream sediment sampling, flow measurement and toxicity testing be conducted by some competent, independent party, such as the U.S. Geological Survey, at the 001 Outfall and other strategic locations. This party should be both financially and politically independent of both Teck and the regulatory agencies. This independent monitoring should also include collection of field measurements of pH, water temperature and specific conductance throughout the margins of the Red Dog facilities and along both banks of the local tributaries to define the possibilities of non-point source seepages from the site. Comparable surveys should be conducted during the winter months to evaluate the existence / degree of non-point seepage that might be occurring during the months when the treatment plant is not operating. Such surveys could easily employ the use of various remote sensing techniques.

Response: CWA Section 308(a)(4)(A) requires that permits contain self-monitoring requirements:

“the Administrator shall require the owner or operator of any point source to (i) establish and maintain such records, (ii) make such reports, (iii) install, use, and maintain such monitoring equipment or methods (including, where appropriate, biological monitoring methods), (iv) sample such effluents (in accordance with such methods, at such locations, at such intervals, and in such manner as the Administrator shall prescribe), and (v) provide such other information as he may reasonably require”

EPA supplements monitoring data through inspections and has no authority to require other federal agencies or other independent party to conduct required permit monitoring.

Note that the Permittee must certify the validity of its sampling results with each DMR submitted to EPA, and EPA and the State conduct periodic NPDES compliance inspections at the site.

The Final Permit authorizes point source discharges from the mine and does not address any potential non-point source discharges, which are outside the authority of the NPDES program.

58. **Comment:** At present, all publicly-available water quality and toxicity samples for Outfall 001 and the other monitoring sites are collected, handled and analyzed by Teck or their paid representatives. Considerable public confidence would be generated by developing a source of independent data. As such, the Red Dog Mine is essentially self-monitoring.

Response: See Response #57 related to the CWA's self-monitoring requirements.

59. **Comment:** It is important that EPA clarify the reporting of split samples, but the method chosen in condition I.A.5.e would allow Teck to repeatedly split samples to get lower values to average in with violative results, as it has been doing for the past five years. The permit should require the reporting of the highest value of any valid test of a split sample to discourage this laboratory shopping that Teck has engaged in.

Response: The purpose of split samples is generally to meet quality assurance requirements for laboratory analyses, not to get lower values to average in with "violative results." Since the split samples represent the same water, the results from each sample should generally be comparable. If they are not comparable, the Permittee should investigate and address the sources of the differences as required by the Quality Assurance Plan (QAP).

60. **Comment:** Records of Precipitation and Evaporation Monitoring. (Ref: Draft Permit, I.D.6.b & c).

Manually operated precipitation and evaporation monitoring equipment and manual recording of data from such equipment has been replaced with use of electronic monitoring and recording equipment. The latter provides more accurate information at a far greater frequency than once per day. These two provisions should be either removed or modified to clearly cover automated electronic monitoring (i.e., "individuals" do not perform the readings of remote-monitored, automated weather stations as suggested in the Draft Permit language in Sections I.D.6.b and c).

Response: Draft Permit Parts I.D.6.b. and c. have been deleted. With the deletion of Draft Permit Part I.D.2, Permit Part I.D.6.a. has become Final Permit Part I.D.5.

61. **Comment:** Precipitation/Evaporation Reporting Requirements. (Ref: Draft Permit, I.D.8).

The terms "total precipitation" and "total evaporation rates" are unclear. Teck suggests that the term "rates" be replaced with the term "records."

Response: Change made as requested. With the deletion of Draft Permit Part I.D.2., Permit Part I.D.8. is now Final Permit Part I.D.7.

62. **Comment:** The last sentence of Draft Permit, Section I.A.5.e, states that "all laboratories used shall be identified on the DMR attachment." Teck requests removal of this requirement, as all laboratories used by the Permittee are detailed in the Quality Assurance Plan (QAP)(Draft Permit, Section I.G).

Response: The requested change has not been made. The language in the Final Permit, however, has been clarified to indicate that laboratories

should be recorded on the DMRs only where split sample results are reported.

63. **Comment:** The last sentence, second paragraph, page 5 of the Draft Permit states:

“The Permittee must supply written notice documenting the start of discharge to EPA within 24 hours.”

Because of the remote location of the mine, there can be delays using regular mail. Teck requests that language in this paragraph be modified to expressly allow the Permittee to submit to EPA a facsimile of this written notice by either electronic fax-transmission or email methods either in lieu of, or to be followed by, USPS mailing of original document(s).

Response: The Final Permit language in Permit Part I.A. has been changed to allow electronic notice, via facsimile or email, of the start of discharge, followed up by written notification.

64. **Comment:** Reporting of Monitoring Results. (Ref: Draft Permit, II.B).

Teck requests that language in this paragraph be modified to allow the Permittee to submit to EPA a facsimile of the cover letter and a certification that the DMR is complete by either electronic fax-transmission or email methods if, for example, USPS mailing of a DMR is delayed by unforeseen circumstances.

Response: The Final Permit language has been changed to allow electronic notice, via facsimile or email, of the DMR certification.

65. **Comment:** Precipitation/Evaporation Recording Requirements. (Ref: Draft Permit, I.D.3).

This condition should be amended as follows:

“Precipitation (rain and snow) data shall be recorded daily.”

The deleted language is a relic from historic use of manually operated weather stations (that required daily manual readings and recordings).

Response: The Final Permit has been changed as requested. With the deletion of Draft Permit Part I.D.2., Permit Part I.D.3. has become Final Permit Part I.D.2.

66. **Comment:** In order to streamline reporting requirements and to eliminate the possibility of inadvertently overlooking a once a year DMR attachment, Teck requests this condition (draft Permit Part I.A.7.f.) be amended to require the annual reporting of this information as part of the Annual Report described in Section I.I. of the Draft Permit.

Response: The requested change has not been made. Information confirming the accuracy of the TDS calculations needs to be submitted at the end of the discharge season (as required by final Permit Part I.A.7.e.) not in the Annual Report which is not required until the following March.

Mixing Zones

67. **Comment:** It is not clear in either ADEC's authorization of the mixing zone in its 401 certification, or in EPA's Fact Sheet on the NPDES Permit, why the mixing zone across the North Fork of Red Dog Creek, which exceeds chronic standards for cyanide and ammonia, would not form an avoidance barrier to migration of grayling into the North Fork.

Recommendation: ADEC and EPA should affirmatively demonstrate that the mixing zone for cyanide and ammonia would not form a barrier to migration to grayling, or the mixing zones should not be authorized.

In addition, the mixing zone violates the State's mixing zone regulations because it could create a barrier to fish passage.

In this case, the mixing zone is proposed to run from Outfall 001 to Station 151, which would extend across the mouth of the North Fork of Red Dog Creek, a stream with spawning habitat for Arctic Grayling. Grayling migrate up the Mainstem of Red Dog Creek during early spring to spawn, and must pass through the lower portion of the proposed mixing zone. See Fact Sheet, Appendix A. The spawning period lasts for approximately two weeks, and fish were present from June to September in 1997, indicating that spawning and rearing take place in the Mainstem of Red Dog Creek.

Exposure to toxic substances during this time could cause avoidance of the area, thus creating a barrier to migrating Grayling. Teck's discharges of cyanide and ammonia are highly toxic to fish and it is likely that the proposed mixing zone would constitute a barrier to Grayling migrating up Red Dog Creek into the North Fork to spawn. Since Teck has provided no evidence, and DEC has provided no explanation that these highly toxic chemicals do not constitute a barrier to fish migration, the proposed mixing zone violates 18 AAC 70.250(a)(2)(B). As a result, if a mixing zone is granted, the downstream edge of the mixing zone should not be allowed to impinge on the junction of the North Fork of Red Dog Creek, and to effectively manage that mixing zone, the downstream edge of any mixing zone should be Station 20.

Response: As discussed in the Final SEIS, water quality and aquatic life conditions in the main stem of Red Dog Creek have improved from pre-mining conditions, particularly during the past five years. This has led to increased fish passage and usage of the Red Dog Creek watershed.

A memo, dated September 1, 2006, from Al Ott (OHMP) to Luke Boles (ADEC) states:

"Migration of fish (primarily Arctic grayling and Dolly Varden) into North Fork Red Dog Creek has been documented every year of our sample program. These fish move from overwintering habitats (most likely located in lower Ikalukrok Creek or the Wulik River) through both mixing zones (Ikalukrok Creek and the main stem of Red Dog Creek) and into North Fork Red Dog Creek during each spring breakup period. Movement later in the year also occurs, but our sampling for fish moving into North Fork Red Dog Creek focuses on the spring migration of Arctic grayling which occurs during and shortly after peak flows (i.e., breakup). Ample documentation exists that fish move through both mixing zones. We also have documented that Arctic grayling marked in Bons Pond have returned to North Fork Red Dog Creek. These Arctic grayling had to swim through the two mixing zones."

The Response to Comments, which accompanied the final CWA § 401 Certification, explains that the mixing zones will not cause barriers to fish migration. Note that the mixing zone extends from the confluence with the North Fork to Station 151 where the aquatic life use applies. This use does not apply from the discharge to the confluence with the North Fork.

68. **Comment:** In the general text of its Certification (Fact Sheet, page 24), ADEC describes with particularity the mixing zones and the parameters that may be mixed in each zone. However, the Permit is less clear. ADEC cites three permit provisions related to mixing zones: Draft Permit sections I.A.1, I.A.7a, and I.C.1. Those provisions in the Draft Permit, however, are ambiguous and potentially incomplete, as described below.

Draft Permit I.A.1 (Table 1) makes no reference to mixing zones. Draft Permit I.A.7.a appears to establish a mixing zone only for TDS (TDS). However, the main stem Red Dog Creek mixing zone actually allows mixing of TDS, ammonia, and WAD cyanide.

It would be helpful if the permit itself were to clearly denote (i) which pollutants are subject to a mixing zone; and (ii) where that mixing zone applies in the receiving waters. Footnotes to Table 1 in the permit (Section A.1) could be used to clarify the status of the mixing zones. Additionally, the map on page 29 of the draft certification does not show the mixing zone for pH, which begins at Outfall 001.

We encourage ADEC to work with EPA to improve the clarity of the 401 certification, the permit, and the EPA decision document (Record of Decision) with respect to the mixing zone authorizations.

Response: The purpose of Table 1 is simply to present the effluent limits. There is no reason to identify mixing zones since this information is contained in the CWA § 401 certification. In addition, the rationales for the

limits, including the mixing zones are described in the Fact Sheet. Permit Part I.A.7.a. has been deleted because it does not refer to specific permit requirements. Permit Part I.C.1. has been changed to be consistent with the pH requirements in the CWA § 401 Certification.

69. **Comment:** Teck encourages the department to address the requirements set forth in 18 AAC 70.240 and 70.250 in a more structured manner. Although the department's existing analysis is legally sufficient, it would benefit from a more systematic analysis of the requirements under these two regulations as applied to each of the parameters (TDS, ammonia, cyanide, and pH) for which a mixing zone has been authorized. For example, specific findings should be made that "designated and existing uses of the waterbody as a whole will be maintained and protected." We encourage the department to develop rationale that better tracks the language of the mixing zone regulations.

Response: This comment refers to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

70. **Comment:** In the second sentence under the "Rationale" section at the top of page 27, the department references the "2003 Certification." Because the 2003 permit never came into effect (according to EPA), we recommend that the department delete reference to the 2003 Certification in order to avoid confusion. The revised Rationale statement should read:

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.

Response: This comment refers to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

71. **Comment:** [T]he permit violates the Magnuson-Stevens Act because the mixing zones for cyanide, TDS and ammonia will disrupt essential fish habitat in the Mainstem of Red Dog Creek. The concentrations of cyanide, TDS and ammonia will be allowed to be above the aquatic life criteria in the mixing zones.

The mixing zones for TDS, cyanide and ammonia will create a barrier between the mainstem of Red Dog Creek and the North Fork of Red Dog Creek where fish do spawn. Both ammonia and cyanide degrade naturally. Warm temperatures, sunlight, and oxygenated water help speed the degradation process. Although they ultimately degrade naturally into relatively harmless compounds, they are very toxic to fish and aquatic organisms when present. The mixing zones extend across the mouth of the North Fork of Red Dog Creek. The North Fork is excellent fish habitat. Grayling are known to migrate in and out of the

North Fork, and to use it for spawning. Both the present ADEC mixing zone regulations, and the mixing zone regulations proposed under the Murkowski administration in 2004 (still under consideration by EPA), prohibit 'barriers to migratory species or fish passage.' It is not apparent that either EPA in the NPDES Permit Fact Sheet, or ADEC in its 401 Certification of the mixing zone in the NPDES Permit, have evaluated the potential for cyanide and/or ammonia in the mixing zone to form a barrier to fish migration into the North Fork of Red Dog Creek. This is simply not legal.

Response: Section VII.B. of the Fact Sheet specifically describes compliance with the Magnuson-Stevens Act. As documented in Section 3.10 of the Final SEIS, there are no managed species (i.e., salmon) in the main stem of Red Dog Creek and, therefore, no essential fish habitat exists in the main stem. NMFS has been given the opportunity to comment on EPA's determination and has not made any recommendations regarding any permit requirements necessary to protect fish habitat. See Response #67, the CWA § 401 Certification, and Section 3.10 of the Final SEIS that demonstrates that the mixing zone is not expected to create barriers to fish migration.

72. **Comment:** Mixing zones are usually authorized based on a streamflow analysis of the 7Q10 low flow hydrologic event. However, there is no discussion in the Draft 401 certification of how the 1.5:1 (2.5X) dilution was determined, either by calculation or real-time monitoring, or whether this dilution factor will be applicable or effected at all times, even during low flow events.

Response: The draft CWA § 401 Certification states that "18 AAC 72.240(l) provides for determination of the flow available for dilution by either collecting actual flow data concurrent with the discharge or calculating the low flow of the receiving water. In this case, the Permittee applied for the 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 dilution factor of 2.5 represents the 5th percentile of the ratios for the period May 2003 through September 2005" (page 25 of the Fact Sheet). Similar language is included in the final CWA § 401 Certification. The authorized mixing zones are based on low flow conditions and will be protective of aquatic life for reasons stated in the CWA § 401 Certification.

73. **Comment:** The mixing zone for ammonia and WAD cyanide is based on legally flawed calculations and violates Alaska's mixing zone regulations (18 AAC 70.240-.270).

The length of the mixing zone is inaccurate (Draft 401 Certification, Fact Sheet, p. 24.). Outfall 001 is approximately one mile from the confluence of the Middle Fork and North Fork of Red Dog Creek. Thus, the mixing zone extends from Outfall 001 to Station 151, which is significantly longer

than 1,930 feet, in fact a mile longer, according to the map scale. At Outfall 001 the treatment plant effluent is physically 'mixed' with water flowing down the Middle Fork of Red Dog Creek. Then again at the junction of the Middle Fork with the North Fork, the contaminants TDS, cyanide and ammonia are again diluted with clean water from the North Fork of Red Dog Creek. This is beyond absurd. The mischaracterization of the length of this mixing zone makes it even more egregious.

Response: The regulations promulgated to carry out the CWA found at 40 CFR 131.13 allow the inclusion of mixing zones in State WQS.

In accordance with State Regulations 18 AAC 70.240 - 270, ADEC has the authority to designate mixing zones in permits or certifications. The authorized mixing zones will ensure that the WQS are met at all points outside of the mixing zones.

ADEC considered all aspects required in the Mixing Zone regulations including, but not limited to, the potential risk to aquatic life based on existing monitoring data of the effluent, and Ikalukrok Creek and main stem water quality. The State's CWA § 401 Certification found that the size of the mixing zones authorized for discharge are appropriate and provide reasonable assurance that the existing uses of Ikalukrok Creek and the main stem outside of the mixing zones are maintained and fully protected.

Finally, the mixing zone is the area in which applicable WQS may be exceeded as long as acutely toxic conditions are prevented. The aquatic life use designation and the associated WQS for TDS, cyanide, and ammonia only apply to the main stem of Red Dog Creek below the confluence with North Fork Red Dog Creek (aquatic life standards do not apply above the confluence). The mixing zone for these constituents, therefore, is correctly identified as the reach between the confluence and Station 151 and the cited length is accurate.

74. **Comment:** The controlling regulations [for mixing zones] are those from June 26, 2003. It is important that the department review Teck's mixing request against the requirements of the 2003 EPA-approved mixing zone regulations. The department should specifically state that it has reviewed each of these controlling regulations and make appropriate findings. To avoid any confusion, we suggest the department make clear to the public why it is relying on the 2003 mixing zone regulations (i.e., the 2003 version of the regulations are the most recent that have been approved by EPA).

Citations to the mixing zone regulations on pages 24-25 of the mixing zone discussion should be focused on the 2003 regulations, rather than the 2006 regulations.

Response: This comment refers to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

75. **Comment:** Teck has analyzed relevant information for copper and nickel and believes that a mixing zone would be appropriate for these constituents. Teck is not requesting a mixing zone at this time, but reserves the right to do so at some future date.

A mixing zone in the main stem of Red Dog Creek, for calculating the water quality-based effluent limits for the aquatic life-based criteria for copper and nickel, is justified. Teck has monitored ambient water copper and nickel concentrations at Station 12 in the North Fork of Red Dog Creek for a number of years. The ambient data collected at this station indicates that the maximum copper and nickel concentrations in the North Fork of Red Dog Creek are substantially lower than the applicable aquatic life criteria that apply to the main stem of Red Dog Creek. A mixing zone, if requested, would be identical to the existing mixing zone for ammonia, cyanide, and TDS.

The dilution factor provided for ammonia and cyanide in the main stem is 2.5 (Fact Sheet page 25). This dilution factor is based on the 5th percentile of the ratio of the average daily flow in the mainstem to the average daily flows from Outfall 001. Teck asserts that this dilution factor, adjusted to account for the ambient concentrations of copper and nickel in the North Fork of Red Dog Creek flow, could be used to conduct the reasonable potential analysis (RPA) for these two metals. If reasonable potential were determined using the appropriate dilution factor, then Teck would request that the water quality-based effluent limits for copper and nickel be based on the calculated dilution factor for each of these metals.

Teck has analyzed relevant information for copper and nickel and believes that a mixing zone is appropriate for these constituents. Via this comment, however, Teck is not presently seeking approval of such a mixing zone; Teck does reserve the right to pursue this option at a future time, if necessary.

Response: Thank you for your comment. Mixing zones for copper and nickel have not been requested nor authorized in the Final Permit.

Ammonia

76. **Comment:** The permit is proposing an ammonia standard up to 8.8 mg/l. Fish are sensitive to ammonia and, at a pH of 10.5, the unionized ammonia concentration in the discharge will result in a discharge which is likely to be fairly toxic to fish.

Response: As documented in Appendix C of the Fact Sheet, the ammonia criteria is based on the 95th percentile of pH data at the

boundary of the mixing zone rather than the discharge point where aquatic life uses do not apply. See Response #78 for further details on the derivation of the effluent limitations.

77. **Comment:** EPA made an error in its calculation of the monthly average permit limit for ammonia. It based the limit on 30 samples per month, whereas the correct number of samples is 4 per month. This error results in a monthly average limit for ammonia that is 11 percent lower than it should be.

The derivation of the permit limits for ammonia was provided in Appendix E of the Fact Sheet (pg. 53). The calculation of the average monthly limit (AML) is based on an equation that uses the number of samples collected during the month. EPA's calculation of the ammonia AML in Fact Sheet, Appendix E, uses a value of 30 samples per month, which is incorrect based on the proposed sampling frequency. The sampling frequency is 1/week (see Draft Permit, I.A.1) for ammonia, which totals 4 samples per month. By using an incorrect sample number, EPA set an AML for ammonia that is 11 percent too low.

Using the actual/permitted number of monthly samples in the derivation of permit limits is described in EPA's Technical Support Document for Water Quality-based Toxics Control (TSD). On page 107 of the TSD, EPA states, "Therefore, it is recommended that the actual planned frequency of monitoring normally be used to determine the value of n for calculating the AML." Where equations are provided in the TSD for calculating the AML, the value "n" is shown as the number of samples taken during the month. See TSD, pages 99, 103, 106, E-5, E-9.

Response: As documented in Appendix C of the Fact Sheet, use of 30 samples in the ammonia limit calculations is based on the more recent guidance presented in EPA's 1999 Update of Ambient Water Quality Criteria for Ammonia. This document was specifically referenced in the Fact Sheet.

78. **Comment:** EPA's calculation of the 30-day chronic ammonia standard used in developing the permit limits for ammonia is inconsistent with EPA policy, resulting in an unreasonably conservative standard and permit limits for ammonia that are overly restrictive.

In developing the Draft Permit limits for ammonia, EPA considered the most stringent of three WQS for ammonia (acute, 4-day chronic, 30-day chronic). Of the three standards, the 30-day chronic standard was the most restrictive and ultimately determined the ammonia permit limits.

The 30-day chronic ammonia standard is based on equations that incorporate the pH and temperature of the receiving water. The higher the pH and temperature, the lower, more restrictive the standard. Therefore, EPA selected the upper 95th percentile values of pH and temperature

measured at Station 151 (EPA previously used Station 10, see Response #28) in the main stem of Red Dog Creek from 2003 through 2007 to use in the equations (Fact Sheet, pp. 41-42, 53).

The 95th percentile values used by EPA were 8.0 for pH and 15.02°C for temperature. The 95th percentile of a set of data is the value that is exceeded only 5% of the time. Therefore, only 5% of the pH values were greater than 8.0 and only 5% of the temperature values were greater than 15.02°C. Stated another way, the pH would be expected to be higher than 8.0 only 5 out of every 100 days (and likewise for temperature).

The acute ammonia standard is calculated from an equation that includes the pH of the receiving water. As part of the derivation of the Draft Permit limits for ammonia, EPA calculated the acute ammonia standard (with salmonids present) based on the 95th percentile value of pH data at Station 151 on the main stem of Red Dog Creek, which EPA determined to be 8.0. The calculated ammonia standard with this pH value is 5.62 mg/L, which correlates to the value shown in Table VI of ADEC's "Alaska Water Quality Criteria Manual." In contrast, the value calculated by EPA in the Fact Sheet is 5.38 mg/L (Fact Sheet, pg. 53). As shown below, there are two errors in the equation used by EPA. Although the acute standard calculated by EPA is incorrect, it does not affect the ammonia permit limits because the 30-day chronic standard is the more restrictive. Nevertheless, it should be corrected for accuracy. The acute value shown in Table C-2 of the Fact Sheet should also be corrected.

Because the 30-day chronic standard represents average conditions over 30 days, it should be based on average pH and temperature. The Station 151 pH and temperature data used by EPA for the 30-day chronic standard, however, are daily values, not averages. By using a daily 95th percentile for pH and temperature to calculate the 30-day chronic standard, EPA is effectively saying that such high pH and high temperature conditions persist for 30 days, which is extremely unlikely and not supported by the available data. Using daily values to calculate an average-based chronic standard is not only technically inappropriate because it violates the fundamental statistical principals (described in the TSD), but, as discussed below, it is more restrictive than the approach outlined in EPA guidance.

In EPA's TSD, EPA recommends that excursions from WQS be limited to one in a three-year period (TSD, pg. 36). For a 30-day chronic standard, this could be interpreted as one month out of 36. In the case of Red Dog Mine, however, because it discharges typically only six months each year (May through October), this would be one month out of 18.

EPA did not provide (in the Fact Sheet) the Station 151 pH and temperature data used to calculate the 95th percentile values. However, for the 2007 permit, EPA provided data from 2001 through 2005 when it used the data from Station 10. Because the 95th percentile values for the

Station 10 data set (pH – 7.9, temperature –14.48 °C) are close to the Station 151 data for 2003 – 2007 (pH – 8.0, temperature – 15.02 °C), the 2001-2005 data can be used to estimate the probability that the monthly average pH and temperature would be greater than their 95th percentile daily values over a 3-year period. That probability is only 1 in 131 (0.76%). That is, during only one month out of every 131, would one expect the average pH and temperature to be that high at the same time. Thus, the proposed 30-day chronic ammonia standard calculated by EPA is over 7 times (131 divided by 18) more restrictive than the calculation that should result from application of EPA's TSD guidance.

A more statistically supportable approach for calculating the 30-day chronic standard would be to use the 95th percentile of the monthly averages of pH and temperature. Using the 2001-2005 Station 10 data, the probability of exceeding the 30-day standard based on the 95th percentile of the averages is one month out of 22, which is reasonably close, but still higher than the EPA TSD guidance of 1 in 18. If the 95th percentiles of the monthly averages are used, the 30-day chronic standard still determines the Final Permit limits, and these limits would be 12.3 mg/L for the daily maximum and 8.8 mg/L for the average monthly limit (note: this average monthly limit includes the correction for a sampling frequency of once per week, as explained in the preceding comment).

Response: In conducting the RPA, EPA used methodology consistent with the TSD for all pollutants except ammonia. The TSD does recommend that, for the ammonia criteria that were in effect at the time, the highest temperature and pH be utilized in determining the criteria (page 97). As noted above in Response #77 and as documented in Appendix C of the Fact Sheet, EPA's ammonia limit calculations are based on the more recent guidance presented in EPA's 1999 Update of Ambient Water Quality Criteria for Ammonia. This document was specifically referenced in the Fact Sheet and represents more recent guidance than the 1991 TSD. In addition, the Federal Register notice for the 1999 Update does not specify what statistical measure of temperature and pH to use. EPA was conservative in the selection of the 95th percentile because of the different sampling requirements, the downstream data set does not contain instream values that correspond to the maximum effluent values. As a result, the maximum effect of the effluent on the downstream values cannot directly be determined.

- + May 27, 2003 effluent measure 10.2 – next ambient ammonia not taken until June 5, 2003
- + August 21, 2005, effluent measure 10.7 – next ambient ammonia not taken until September 7, 2005

The pH and temperature data used to determine the WQS are included in Attachment A. The temperature data set used in the Draft Permit contained several pre-2003 values, these have been removed from the data set in Attachment A. Although the statistics on this data set are

slightly different, the final permit limitations do not change since the difference is negligible in the calculations. See also Response #82.

EPA does not issue revised Fact Sheets with Final Permits. However, the commenter is correct that the acute criterion for ammonia is 5.62 mg/L. Note this does not affect the effluent limits in the Final Permit since they are derived from the chronic criterion.

Permit Conditions

79. **Comment:** The new permit deletes several important conditions from the current permit, including I.C.11 on discharge during winter, I.C.14 and I.G.7 on the reopener, and I.C.15 on unauthorized discharge. The deletion of I.C.15 on unauthorized discharge, coupled with new permit condition II.1, gives Teck a permit shield for any unauthorized discharge. This is considerably less protective of the environment and human health than the present permit, which allows federal enforcement of unauthorized discharges.

Response: EPA respectfully disagrees with the commenter. Nothing in the Final Permit provides a shield for discharges not authorized by the permit. Such discharges are illegal under the CWA and federal regulations. Note further, that Permit Part I. "authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process."

The Final Permit contains a re-opener provision in Permit Part IV.K. See Response #29 related to winter discharges, which are not allowed in the Final Permit.

80. **Comment:** [T]he QAPP condition in the current permit, I.I.1, is considerably more detailed and protective than the new condition. Additionally, the certification, data verification, and archiving conditions (conditions I.G.4, 5, 6, 7, 8, 9, 10 and 11) have been deleted without cause or explanation. These are conditions that play an important role in protecting the public, and their deletion significantly weakens the renewed permit. These deletions appear to be backsliding, as are all other permit condition deletions.

Conditions I.C.6 and I.C.7 are considerably less protective of human health and the environment than the current permit and appears to be backsliding. All of the data should be available each month in the DMRs.

Response: The change in the permit language is based on updated language that occurs from time to time in permit development. While the language in the draft Permit was changed from the previous permit, it is important to note that the underlying Quality Assurance Plan (QAP) Requirements have not been changed, including QAP development and

submittal requirements. Note that both permits require that the permittee's plan follow the detailed procedures described in the Requirements for Quality Project Plans, EPA QA/R-5 and Guidance and Guidance on Quality Assurance Project Plans, EPA QA/G-5. The language in the Final permit remains the same as the draft.

Since the information required by Permit Part I.C.6. is not required for monthly compliance purposes, EPA believes it is appropriate to submit the data with the annual monitoring reports. EPA and the State generally review this information on an annual basis along with all of the other data collected during each discharge season. The information gathered under Permit Part I.C.7. is required to be submitted with the monthly DMRs.

Finally, Conditions I.C.6 and I.C.7 include requirements for monitoring numerous parameters and using specified methodologies. The commenter has not provided sufficient information on how it believes these conditions are "considerably less protective of human health" for EPA to provide a response.

81. **Comment:** The renewed permit drops condition I.G, which is even more necessary since there has been precipitate noticed along the Red Dog Creek downstream of the Outfall 001 in recent years. Ott and Morris 2005. This condition should be restored.

Response: The Precipitate Study was included in the previous permit as a requirement of the State's CWA § 401 Certification. Teck complied with the study requirements and the work was subject to review by ADEC and the Alaska Department of Fish and Game (ADF&G). The CWA § 401 Certification for this permit issuance does not include continuation of the Study and therefore, it is not included in the Final Permit.

82. **Comment:** The Permit is legally flawed because it allows backsliding in violation of section 402(o) of the CWA and violates Alaska state anti-degradation regulations.

The Permit allows backsliding for the selenium, lead, zinc, cyanide, and ammonia effluent limits. The State has not promulgated an implementation plan for its antidegradation policy. As a result, the State cannot make the determination that the relaxed effluent limits and mixing zones comply with Alaska's ADP, and the exception that would allow backsliding does not apply.

Response: See Response #39 on antidegradation. The CWA's anti-backsliding provision, Section 402(o), contains several exceptions under which a reissued permit may include less stringent effluent limitations, provided they do not result in violations of state WQS.

Section 402(o)(2) includes an exception for new information that applies to effluent limitations for lead and selenium. Effluent limitations for lead and

selenium are both more stringent (selenium AMEL; lead MDEL) and less stringent (selenium MDEL; lead AMEL) than the 1998 permit. Importantly, however, both WQS/wasteload allocations used in determining the effluent limitations are the same as those used in the 1998 permit with the limitations being slightly different because of the statistical variability within the current data sets. The limitations appropriately are based on the more current data, which is most predictive of future discharges. The current data sets and the observed statistical variability constitutes new information that falls within the anti-backsliding exception set forth in CWA § 402(o)(2)(B)(i).

As discussed in the Fact Sheet, these limits are protective of the downstream designated uses and will ensure compliance with the WQS. In compliance with CWA 402(0)(2)(B), the wasteload allocations (water quality-based) associated with the changed limits remained the same (were not revised) nor were alternative grounds used in translating the water quality standards into effluent limitations. The State's CWA § 401 Certification considers these changes to be minor, resulting from statistical variability in the datasets used to calculate final effluent limitations. Furthermore, ADEC does not believe the modified effluent limitations will affect lead and selenium levels in the receiving water and therefore will not cause degradation.

In addition, Section 402(o)(1) allows for backsliding from water-quality based effluent limitations if the requirements of CWA § 303(d)(4) are met. Under CWA § 303(d)(4)(B), which applies to attainment waters, water-quality based effluent limitations may be relaxed provided doing so is consistent with the State's antidegradation policy. As noted in Response #39, the CWA § 401 Certification includes an analysis based on the requirements of 18 AAC 70.015 and 40 CFR 131.12, which determined that the changes to effluent limitations for cyanide, zinc, lead, selenium, and ammonia are consistent with the antidegradation policy and will not violate applicable state water quality standards.

For ammonia, backsliding requirements do not apply since the previous permit did not include effluent limits for ammonia.

Other responses (see, e.g., Response #'s 49, 52 and 82) address specific changes in effluent limitations in the permit.

83. **Comment:** NPDES permits have been issued for the Red Dog facilities since 1985. Mining began in 1988, and the mill became operational in 1989. The scale of the operations and the volumes of waste produced and discharged have expanded throughout the life of the mine. Approximately 2.4 billion gallons of treated effluent was released into Red Dog Creek. Nevertheless, it appears that the specific permit standards have gotten progressively weaker.

Response: The Final Permit cannot be compared to permits issued in 1998 without also providing the proper context in which each permit was developed. During permit reissuance, the NPDES program can incorporate new data, methods, or standards that may result in permit conditions that differ from the previous permit, provided that any changes comply with all applicable WQS and policies.

84. **Comment:** Under Section 124.55(b), EPA is allowed to modify the permit *only* to make it “consistent with the more stringent conditions which are based upon State law identified in such certification.” (emphasis added). EPA may modify a permit to reflect a change in the State certification of an NPDES permit. See 40 C.F.R. 122.62(a)(3)(iii) . . . That authority, however, also is limited . . . In this case, the certifications contain significantly less stringent conditions than were imposed by the original permit. Accordingly, EPA cannot modify the permit to reflect those changes, but must retain the original, more stringent discharge restrictions.

Response: The regulations cited in this comment set forth certain circumstances under which EPA may modify permits prior to their expiration. One of the cited regulations addresses permit modifications based on regulation changes [40 CFR 122.62(a)(3)(iii)], and the other pertains specifically to State CWA § 401 certifications that are revised based on changes to state law or regulation or judicial action [40 CFR 124.55(b)]. Those provisions do not apply to this action because EPA is reissuing a permit, not modifying a permit during its term, and there has been no interim modification to the CWA § 401 Certification as contemplated by the regulations.

85. **Comment:** The new permit deletes condition IV.J on oil and hazardous substance liability. These deletions are not explained or justified, and make the permit weaker; they should be restored in the Final Permit. Likewise, the new condition IV.M is weaker than the existing permit condition, and the existing permit condition should be restored.

Response: The language cited by the commenter is part of the standard provisions that EPA includes in all permits based on 40 CFR 122. This language can change periodically but EPA does not change the language in existing individual permits until reissuance. The discussion in Permit Part IV.J. of the previous permit has been deleted but nothing in the Final Permit, the CWA, or other Federal regulations limits the Permittee’s oil and hazardous substance liability.

While EPA disagrees that the language in Part IV.I. of the draft Permit is weaker than Permit Part IV.M. of the previous permit, it could be viewed as less direct. EPA has replaced the draft language of Permit Part IV.I. with language that more clearly reflects the requirements of 40 CFR 122.61, Transfer of permits.

86. **Comment:** Teck adds numerous organic and other chemicals during the processing of the lead-zinc ores. The Proposed Permit fails to regulate the majority of these compounds by failing to set limits on any organic compounds, oils and greases, fuels, nitrates or sulfates.

Response: In developing the Final Permit, EPA conducted a detailed evaluation of the facility operations and the historical effluent monitoring data that has been collected by the Permittee. The Final Permit complies with the technology-based requirements in the effluent limitation guidelines and water quality-based effluent limitations are established for pollutants that have the reasonable potential to exceed a State water quality standard. Of specific note, the permit includes limits for total ammonia, which addresses potential effects of explosives use. Sulfate is also addressed through the water quality-based effluent limitations for TDS. The organic pollutants of concern in fuels and oil and grease are addressed by the years of monitoring that the Permittee has conducted for volatile and semi-volatile organic pollutants. This monitoring, which is continued at a reduced frequency in the Final Permit, has shown no organic pollutants at levels that approach the State's WQS. Finally, to address the overall potential toxic effects of the discharge on the receiving water (potentially from parameters that do not have WQS on which to base effluent limits), the permit includes chronic WET testing and limits.

87. **Comment:** Condition II.I is a license to pollute, especially in the context of the deletion of condition I.C.15. Condition I.C.15 should be restored to keep the proper balance in the permit toward the presumption that discharge of unpermitted substances is a permit violation. A good start would be to reinsert the sentence deleted from condition III.B.3 that states, "Except as provided in permit conditions in Part III.G, Bypass of Treatment Facilities and Part III.H, Upset Conditions, nothing in this permit shall be construed to relieve the Permittee of the civil or criminal penalties for non-compliance."

Response: The permit authorizes the regulated discharge of pollutants as required by the CWA. Section 301 states "Except as in compliance with this section and sections 302, 306, 307, 318, 402, and 404 of this Act, the discharge of any pollutant by any person shall be unlawful." The Draft Permit was public noticed to allow the discharge of pollutants into waters of the United States under Section 402 of the CWA. The deletion of Permit Part I.C.15. has no effect on the permit requirements because the introductory language for Permit Part I. specifically indicates that only the discharges authorized by the permit are allowed.

EPA assumes that the commenter was referring to the deleted last sentence of Permit Part III.B.2. in the previous permit since there was no Permit Part III.B.3. in the Draft Permit. This change represents modifications to EPA's standard permit language made since the previous permit was issued. This standard language is included in all permits issued by EPA Region 10. It does not have any effect on the applicability

of the listed civil and criminal penalties for non-compliance with permit requirements.

88. **Comment:** In the Fact Sheet, Section VI.D, the last sentence of this section states that the Site Management Pollution Prevention Plan (SMPPP) "must be amended whenever there is a change in the facility or in the operation of the facility which materially increases the potential for an increased discharge of pollutants." This language is vague and overbroad. Paragraph I.H.7. of the Draft Permit (page 22) has different language, which is somewhat more specific, but still so broad as to be susceptible to subjective differences of opinion. This Draft Permit language calls for amendment to the SMPPP "whenever there is a change in design, construction, operation, or maintenance, which has an effect on the potential for the discharge of pollutants to the waters of the United States." In each of these provisions, the language is broader than authorized by the CWA, Section 304(e).

To provide appropriate guidance to the Permittee on when to amend the SMPPP, and to more closely align the Permit and Fact Sheet with the CWA, Teck proposes that Permit Section I.H.7 and Fact Sheet Section VI.D be revised to state:

"The Permittee shall amend the Plan whenever there is a change in design, construction, operation, or maintenance of the facility, which, in the best professional judgment of Permittee, more likely than not has the potential to contribute significant amounts of toxic or hazardous pollutants to navigable waters."

Response: No change made in the Final Permit. EPA believes that the permit language is appropriate under the CWA and, importantly, ensures that SMPPPs are updated whenever the operator determines that there are changes that have an effect on the potential for the discharge of pollutants to the waters of the United States.

89. **Comment:** Treated Wastewater Dust Suppressant. (Ref: Draft Permit, I.B.10).

The "haul road to the port" is not defined. For purposes of this condition, Teck suggests defining "haul road to the port" as: "that portion of the Delong Mountain Regional Transportation System (DMTS) Port Road south of its intersection with the Tailings Impoundment back-dam road turnout."

Response: Change made as requested.

90. **Comment:** Current permit condition III.F on removed substances should be included in the Final Permit; it is inexplicably deleted in the renewed permit.

Response: The requirement from this permit part was moved to the section for Site Management Pollution Prevention Plan Requirements and can be found in Permit Part I.H.2.i.(ii).

91. **Comment:** The subjects confusingly discussed on page 31, sections 1 and 2 of the Proposed Permit should be incorporated into actual effluent limitations in Table 1.

EPA should provide technical justification for setting an informal antimony effluent limitation of 1 mg / L (1000 ug / L). Does the language on page 31 imply that an arsenic limitation [at Outfall 001] of 500 ug / L exists? This should be clarified, as should the names and limits for the other specific chemical constituents for which this language pertains [see Proposed Permit page 31, sections 1 and 2].

Response: EPA apologizes for any confusion. These are standard permit conditions that are required in all permits and are consistent with the specific requirements in 40 CFR 122.42(a). They are notification levels above which EPA must be notified but are not related to effluent limits included in Table 1. The process for establishing effluent limitations is described in Appendix C of the Fact Sheet.

92. **Comment:** In the "Parameter" column of Draft Permit, I.A.1, Table 1, "Barium" should be footnoted with "2" to indicate total recoverable analysis (as it is referenced in Table 1 of the Fact Sheet).

The footnote "4" to Organic Priority Pollutant Scan (sample frequency column) should be deleted as this footnote does not relate to this parameter.

Response: Changes made as requested in the Final Permit. Barium has been footnoted with a "2" as requested and the Organic Priority Pollutant Scan footnote has been changed to "5."

93. **Comment:** It is unrealistic to state that the permit duration is five years – this is another misleading statement found throughout the environmental review documents. The first permit was in effect for 13 years. It was issued in 1985 and ran until 1998 because it was "administratively extended" after it expired in 1990. The second permit, issued in 1998, expired in 2003, but is still in force today, six years later, making it now in effect for 11 years. One can only expect, given this history, that the present permit will be in effect for far longer than five years. This fact should be disclosed to the public. A suggested change would be to issue two-year permits, which would be administratively extended until they were renewed, so that the actual life of the permit was five years, as the EPA claims it is here. Two-year permits would be a far more nimble vehicle for responding to changing environmental or regulatory conditions.

Response: The Fact Sheet for the Draft Permit explains the history of the permit. The Final Permit duration remains 5 years, according to 40 CFR 122.46(a), which is the same duration as other individual permits under the CWA. As indicated in Section VII.D. of the Fact Sheet, permits may be administratively extended as long as the requirements of 40 CFR 122.6 are met. Note that the permit may be re-opened prior to permit expiration, in accordance with applicable procedural regulations, based on the need to address changes in environmental conditions, facility process or discharge characteristics, and/or regulatory requirements.

Total Dissolved Solids

94. **Comment:** EPA does not discuss [Alaska's antidegradation policy] in either the NPDES permit or its SEIS. This approach represents a failure by EPA to ensure that all existing uses of Red Dog Creek are protected. Indeed, EPA in earlier documents has acknowledged that a 500 ppm TDS limit may not be protective of spawning Arctic grayling, and in this permit has proposed a 1500 ppm limit. Rather than acting proactively to avoid the harm that it had earlier identified (through the Steckoll and Brix studies, for example), EPA has approved the potentially harmful activities. The Brix study, done for Teck, does not support a 1500 ppm in-stream limit. EPA's approval of that limit in Alaska's certification contravenes the antidegradation requirement, which requires EPA to act positively to protect the spawning fish. Once it identified the potential effect on Arctic grayling, EPA should have refused to approve the permit renewal that might cause the impact.

Response: The basis for TDS limits in the draft and Final Permits is a TDS site-specific criterion (SSC) that was developed by ADEC, subject to public notice and comment in a separate process, and approved by EPA in 2006. As noted above, the site-specific criteria have been formally adopted by the State and approved by EPA according to the procedures specified in Alaska's water quality standards (WQS), including protection of aquatic life uses. They are, therefore, appropriately included in the CWA § 401 Certification and Final Permit. See Response #94 on antidegradation.

The SSC is based on studies of the biological impacts of the TDS observed in the effluent on arctic grayling which are found in the receiving water. Specifically, these studies have shown that the higher levels of TDS will not impact arctic grayling spawning. See also the discussion in Section 3.10.3.3 of the FSEIS that describes the basis for the TDS SSC.

95. **Comment:** The Permit renewal violates 33 U.S.C. §1342(o), as it contains effluent limitations which are less stringent than the comparable effluent limitations in the previous permit and Teck meets none of the exceptions found in §1342(o). For example, the previous discharge limit was 196 ppm TDS on a daily basis. That effluent limitation has been entirely removed from the permit, but the new TDS in-stream limitation will

allow TDS discharge from the outfall pipe in excess of 4,000 ppm – a significant jump up from 196 ppm. This is a clear violation of §1342(o).

Response: Clean Water Act Section 402(o)(1) allows for backsliding from water-quality based effluent limitations if the requirements of CWA § 303(d)(4) are met. Under CWA § 303(d)(4)(B), which applies to attainment waters, water-quality based effluent limitations may be relaxed provided doing so is consistent with the State's antidegradation policy. As noted above, the CWA § 401 Certification includes an analysis based on the requirements of 18 AAC 70.015 and 40 CFR 131.12, which determined that changes to effluent limitations are consistent with the antidegradation policy and will not violate applicable state water quality standards. See Response #39. TDS limitations are addressed in the State's antidegradation analysis.

96. **Comment:** In the modified permit from 2003, the TDS was required to be monitored twice per week at the end of the mixing zones; in this permit, that is reduced to once per week. This backsliding is not appropriate and not protective of the environment, particularly given the recentness of the imposition of the mixing zones.

Response: As noted in the Fact Sheet and in Response #22, EPA proposed to modify the permit in 2003 but the conditions were appealed and the changed conditions did not go into effect. The comparable requirement in the 1998 permit required ambient monitoring of TDS at the edge of the mixing zone twice per month. See 1998 Permit Part I.D.7 (Station 10). The Final Permit requires ambient monitoring of TDS at the edge of the mixing zone once per week - more frequently than the 1998 permit. See Permit Part I.A.7. Accordingly, to the extent backsliding requirements apply to changes in monitoring frequency; they are not an issue here.

In addition, EPA believes by applying the approach described in Part I.A.5.h of the Final Permit, the discharger will be able to ensure compliance with the TDS standards at the edges of the mixing zones in the main stem of Red Dog Creek and Ikalukrok Creek. This has been demonstrated through instream monitoring during the previous permit term. As a result, EPA has determined that once per week monitoring is appropriate at Stations 150, 151, and 160.

97. **Comment:** The Fish & Game TDS study may be underestimating the impact of TDS on aquatic organisms. The Fish & Game TDS study states that water samples are filtered through a 2.0 micrometer pore-size filter prior to being evaporated, dried and weighed to determine TDS (TDS) content. It is true that this is a standard analytical method, but it is an inappropriate method to be used at sampling stations in this permit. The effluent water discharged into the mainstem of Red Dog Creek by Teck is not filtered. Due to the addition of water treatment reagents and natural geochemical reactions, this water often contains significant concentrations

of particulate materials, some portion of which may contain constituents potentially toxic to aquatic organisms. Filtration of the TDS samples prior to "analysis" (drying and weighing) removes many of these particles resulting in lowered TDS concentrations. The fish and other aquatic organisms in Red Dog Creek are not being exposed to filtered waters. This analytical procedure, therefore, presents a misleading picture of the chemical conditions to which the aquatic organisms are being exposed. Once the mine's effluent waters enter Red Dog Creek, the suspended and colloidal particles can easily be consumed by organisms. The particles may also dissolve, releasing some of their potentially-toxic constituents, such as metals, or metal cyanide forms. There is considerable debate and uncertainty amongst toxicologists about the toxicity of such particulates from mining wastes.

Response: The procedure described in the comment is the standard procedure for measuring TDS, consistent with Method 2540 C from Standard Methods for the Examination of Water and Wastewater and EPA Method 160.1. The particulates described by the commenter would not be captured in any standard TDS evaluation, but would be captured by measuring total suspended solids, which are also limited in the permit. Finally, the Final Permit includes WET limits and testing that consider the combined toxic effects of the discharge.

98. **Comment:** Conspicuously absent in the environmental review documents is any data on TDS concentrations at points below Station 10 during the discharge season. Such data is crucial, and could help ADEC and the public determine if those TDS concentrations already found as a result of Teck's discharges could affect salmon, grayling, Dolly Varden, and aquatic invertebrates (fish food). The data that is available is troubling. The 2001 Aquatic Biomonitoring study, at Page 41, Figure 36, shows that the reported maximum zinc concentrations at station 10 were between about 1000 and 1800 micrograms per liter during 1999 to 2001. Such zinc concentrations are routinely considered to be extremely toxic to cold water fishes. Yet, EPA proposes to raise Teck's zinc limits. It is true that the U.S. EPA has traditionally allowed higher zinc concentrations in waters with elevated hardness. However, has it been empirically demonstrated, via detailed toxicity testing, that Red Dog effluents with zinc concentrations between 1000 and 1800 micrograms per liter are truly non-toxic to local fish? Or, has this only been assumed because of the use of the Hardness - Toxicity equations presented in documents such as the "Gold Book" (Quality Criteria for Water 1986, U.S. EPA 440/ 5-86-001)?

Most troubling, however, is ADEC's rush to change the TDS limits after the study funded by the Alaska Technology and Science Foundation and Teck, and prepared by the University of Alaska at Juneau, determined that levels of TDS far below 1500 ppm were toxic to salmonid reproduction.

Response: In the Draft and Final permits, EPA has applied the currently applicable WQS (as further documented in the CWA § 401 Certification).

Moreover, Section 3.10 of the Final SEIS fully describes the effects of TDS on the specific species in Red Dog and Ikalukrok creeks. This includes the most recent studies of impacts on fertilization and early life stages. Note also that the Final SEIS discusses TDS levels as well as aquatic life conditions downstream of the Red Dog Creek confluence in Ikalukrok Creek and the Wulik River during the discharge season. The Final Permit requires TDS monitoring at Stations 150 and 160, which are downstream of Station 151 (and Station 10).

The zinc limits in the permit are significantly more stringent than the levels cited by the commenter. It is important to recognize that levels of zinc at Station 140 upstream of the influence of the Red Dog Mine have been measured as high as 42,700 ug/L, see Table 3.5-7 in the Final SEIS. This reflects the natural mineralization in the stream and is true not only for zinc but other metals. Therefore, the elevated levels at Station 10 reflect the influence of natural conditions, not the Red Dog Mine effluent, which actually lowers instream zinc concentration levels.

99. **Comment:** Teck has claimed that the "data we have for Stations 10 and 7 demonstrate that when TDS is at or below 1500 mg/l at Station 10, it does not exceed 500 mg/l at Station 7, except on rare occasions in late September." This is simply not the case. Teck violated the TDS limit of 500 mg/l at Station 7 (located on Ikalukrok Creek several miles downstream from the confluence with main stem Red Dog Creek) on the following dates: July 27, 1999; July 25, 2001; August 27, 28, 29, 2001. None of these violations are the "rare" late September occasions of high TDS at Station 7. Moreover, none of these violations occurred when TDS exceeded 1500 mg/l at Station 10. This data demonstrate that even if Teck complied with the 1500 mg/l proposed standard on Red Dog Creek, waters downstream in Ikalukrok Creek could exceed 500 mg/l. TDS concentrations at this level harm salmon spawning habitat, and are occurring at times when chum salmon and Dolly Varden are spawning in Ikalukrok Creek. Put simply, allowing Teck to pollute so that concentrations of TDS can rise to 1500 mg/L in stream means that spawning fish will be affected at downstream locations; because of this impact, the proposed change to TDS standards must be rejected.

Response: The Final Permit reflects the currently applicable WQS as documented in the CWA § 401 Certification. This includes requiring demonstration that TDS levels are below 500 mg/L after July 25th of each year at Station 160 where spawning occurs in Ikalukrok Creek. The permit does not require that TDS levels be below 500 mg/L at Station 7, which is located between Stations 150 and 160 on Ikalukrok Creek. See Response #94 regarding the SSC of 1500 mg/L for TDS.

100. **Comment:** The term "highest measured effluent values" is not clearly defined. One commenter suggests that the value used in the calculation be the highest TDS value measured in the current and previous year's

discharge season. Another commenter suggests the highest value over the life of the facility.

Response: The highest effluent value represents the maximum value reported for the effluent during the 5 years preceding the current discharge season. This has been clarified Permit Part I.A.7.c. Based on review of the variability in TDS levels in the effluent, EPA is confident that the approach of using 110% of the maximum value (10% above the maximum) over the previous 5 years represents the highest potential concentration in the effluent and will ensure instream compliance with WQS at all times. See Response #101.

101. **Comment:** Because the TDS concentration in the effluent is only monitored once per week, the use of the 110% of the highest effluent value could result in spikes of TDS not being captured by the modeling.

Response: Review of the variability in TDS levels in the effluent shows that the maximum value of 240 samples taken over 5 years was 4270 mg/L. The coefficient of variation is 0.08. EPA used the reasonable potential equations from Appendix C of the Fact Sheet to determine the maximum expected effluent value which is 4357 mg/L. For this 5 year period, the 110% value would be 4697 mg/L which encompasses the maximum value expected from the data collected. EPA is confident that the approach using 110% of the maximum value will incorporate possible TDS spikes noted by the commenter.

102. **Comment:** The 2001 Aquatic Biomonitoring study, at page 39, states that the waters at station 10 rapidly return to background concentrations for TDS, about 150 mg/L, during periods of no mine discharge. This reinforces the notion that the proposed TDS standard of 1500 mg/L is roughly ten times background – the concentrations under which the local aquatic organisms evolved. Baseline data from 1982-83, before the mine began discharge, reveal that the median TDS concentrations in 11 samples was 198 mg/L (the maximum, 876 mg/L is about half of the new proposed standard; the minimum was 9 mg/L). The raising of the TDS concentrations allowed downstream of the discharge, is not protective of the environment.

Response: EPA agrees that TDS levels in the stream are elevated in comparison to pre-mining data. However, the TDS limit is based on an EPA approved SSC. Comments on the SSC should have been submitted during the SSC comment period. Teck has already been discharging at a level that meets the 1500 mg/l SSC in-stream. Therefore, the change in the TDS requirements will not affect the quality of the discharge and will not lead to increased TDS levels in the stream. While aquatic life conditions vary somewhat on a year-to-year basis, the current conditions are consistently improved over pre-mining conditions. This includes both fish and periphyton levels (see Section 3.10 of the Final SEIS). EPA, therefore, disagrees with the commenter that the TDS limits in the permit

are not protective of the aquatic environment. Finally, as documented in the CWA § 401 Certification, the limits are consistent with the State WQS that are protective of aquatic life. Note that the site-specific criterion development for TDS was based on studies that considered toxicity of TDS on early stages of Arctic grayling; it was not developed based on natural conditions.

103. **Comment:** The enforceable portions of the permit have narrowed such that they are now focused on the release of TDS, which is seldom the focus of NPDES permits at other comparable metal mines. The 1998 NPDES permit had a TDS limitation of 170 mg/L (monthly average), which was based on actual baseline (pre-mining) data from the area. The proposed NPDES permit calls for complete elimination of an limitation on TDS at Outfall 001.

The TDS limits found in the present 1998 NPDES permit should be retained.

Response: The Fact Sheet describes in detail the rationale for the revised TDS limits that reflect the changes in the WQS based on the SSC. See Response #94. The SSC requires the facility to meet an instream limitation rather than an end-of-pipe limitation. The in-stream concentrations are controlled by a number of factors including TDS concentrations and flows in both the effluent and the receiving water. This control process restricts the effluent to flow volumes to ensure the attainment of protective TDS concentrations in the receiving waters.

EPA has imposed other requirements on the Red Dog Mine to address this issue including a TDS Management Plan (Permit Part I.A.7.f.) and additional treatment of waste streams high in TDS. The measures identified in the TDS Management Plan are expected to be a more effective means of addressing the generally increasing TDS levels than an end-of-pipe limit. It should be possible to identify the sources of TDS in the wastewater and reduce the amount of TDS entering the wastewater impoundment in the first place. While undertaking those efforts, the receiving waters are protected by the calculated flow limits described in the preceding paragraph.

The Final Permit also has numerous enforceable effluent limits and requirements beyond those applicable to TDS.

104. **Comment:** The permit should require the TDS plan to be issued and approved by EPA before the permit is issued – this type of after-the-fact planning does not protect the environment or the people of Kivalina. The plan should be made available to the public for public comment.

Response: EPA appreciates the comment but does not believe it is necessary to provide for public comment on the TDS Management Plan. In addition, EPA cannot require compliance with a specific permit

condition, such as the TDS Management Plan, before the Final Permit becomes effective. Importantly, as described in the Fact Sheet, the near-term proposed use of barium hydroxide will provide for compliance with the TDS limits. The TDS Management Plan is intended to ensure compliance over the long-term and may include a combination of treatment and source control measures. Regardless of plan submission requirements, Teck is required to comply with the TDS limits in the permit.

105. **Comment:** The instream TDS limitation is not supported by any evidence. Even the Brix and Grosell (2005) study, when read most expansively, would support only a limitation of 1,357 mg/L. Brix and Grosell (2005) did not determine that 1,500 mg/L will be protective of Arctic grayling during all life history phases including the fertilization to egg hardening phase. That study determined that the no observable effects concentration was as low as 132 mg/L, and the lowest observable effect concentration was as low as 254 mg/L. The 1,500 mg/L is not protective of spawning grayling. EPA cannot throw out half the data on TDS toxicity.

EPA appears to have reached a predetermined conclusion and is desperately trying to assemble evidence to support it; unfortunately, such evidence does not exist. The SEIS's statements to the effect that fish surveys indicate that the present level of TDS is not having a negative impact on fish populations are similarly without foundation, as the fish levels are below those of baseline (when there was less TDS) and no studies have been done during a discharge year when TDS levels were lower than they are presently.

Response: In developing the permit, EPA included TDS limits based on the State's applicable WQS. With EPA approval, the State has determined that these standards are protective of downstream aquatic life. The Final SEIS fully describes the effects of the TDS levels on the specific species found in the Red Dog and Ikalukrok creeks and the Wulik River. Based on the discussion in Section 3.10 of the Final SEIS, the biological surveys conducted each year consistently show that current aquatic life conditions are better than pre-mining conditions (when lower TDS levels were observed).

106. **Comment:** The permit is being proposed on the basis of the Final SEIS that found no significant impacts from increasing the discharge limits for TDS. In doing this analysis, the Final SEIS stated that no additional impacts were expected on aquatic invertebrate community. This is in spite of the fact that Teck's WET analyses and subsequent testing have attributed at least 50% of the toxicity in their effluent to TDS. The other half of the cause of toxicity has never been demonstrated. This testing has shown that the discharge has the potential to affect aquatic communities in the receiving stream. To allow increased TDS limits is in conflict with the findings of previous WET testing.

The removal of the effluent limitation for TDS is startling in that Brix (2005) determined that TDS made up half of the toxicity in the Teck effluent, and that source of the other half of the toxicity was not yet determined. More recent representations by Teck to EPA are that TDS makes up all of the effluent toxicity. See CRPE Exhibit 23, June 2005 DMR, at 3 ("all of the effluent toxicity can be attributed to TDS"). The removal of the TDS effluent limitation, and the significant elevation in the TDS in-stream limitation during grayling spawning season, are not supported by the evidence and are directly contradicted by Teck's own submissions to EPA.

Response: The commenter is correct that TDS has been identified as a source of toxicity observed in some of the WET tests. The laboratory tests are designed to measure the effect on a specific species for which there is test methodology. The Final Permit limits are based on the TDS site-specific criterion, developed from the studies of the biological impacts of the TDS observed in the Permittee's effluent on arctic grayling which are found in the receiving water, see Section 3.10 of the Final SEIS. Specifically, these studies have shown that compliance with the TDS limits will not impact arctic grayling spawning. In addition, the WET limits in the Final Permit are unchanged from the previous permit.

107. **Comment:** On page 34, the first bullet should reference the 1998 permit limits and state that the proposed permit would relax those limits. We suggest the following language in lieu of the first bullet on page 34:

For TDS, the permit includes a less stringent limit than the 1998 permit limits of 170 mg/L (monthly average) and 196 mg/L (daily maximum). The new proposed limits are based on site-specific criterion (SSC) adopted subsequent to the 1998 permit. This permit includes an in-stream TDS limit of 1,500 mg/L based on SSC established in the main stem Red Dog Creek. The SSC was adopted in 18 AAC 70.236(b)(5) and has been approved by EPA.

Response: These comments refer to the draft CWA Section Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

108. **Comment:** On page 35, the third paragraph should be clarified to emphasize that the department finds the new TDS limits to be protective of "existing uses." We suggest the following revision:

The TDS SSC demonstrated the 1,500 mg/L is scientifically defensible and protective of designated water uses. The TDS SSC was approved by EPA on April 21, 2006. The department further finds that the TDS limits will be protective of existing uses, as shown in condition 1 of the certification.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

109. **Comment:** The first two sentences in paragraph 3 on page 25 reference the 2003 permit. EPA has indicated that the 2003 permit is not in effect; therefore, it should not be referenced. Teck recommends deletion of the first two sentences and insertion of the following:

For TDS, the water quality within the mixing zone is unchanged from levels authorized by ADEC under compliance orders by consent. Because no spawning occurs within the mixing zone, the levels of TDS authorized in the stream during the spawning period will be the same as that authorized for the non-spawning period.

Response: These comments refer to the draft CWA § 401 Certification and should be addressed by ADEC. EPA notes that it does not issue a revised Fact Sheet with the Final Permit.

110. **Comment:** Ikalukrok Creek provides essential spawning habitat for grayling, chum salmon, and coho salmon. EPA and ADEC must place a high priority on maintaining quality spawning habitat for sources of subsistence fishing. The proposed water quality standard for TDS does not protect spawning habitat.

All of the spawning by these fish is threatened by Teck's ongoing discharges, and will continue to be threatened if the TDS standard is raised. Further, the young fish – including juvenile Dolly Varden and young-of-the-year Arctic grayling – use the Red Dog Creek in the summer months. Fish & Game reports that the presence of 4-day-old fish suggest that Arctic grayling spawned in the Mainstem of Red Dog Creek just below the entrance of the North Fork of Red Dog Creek.

Response: In 1999, the State changed the WQS under 18 AAC 70.020(b)(Note 12) for inorganic dissolved solids, regulated as TDS. The following language is included in the CWA § 401 Certification and this criterion is in effect in Ikalukrok Creek for the areas listed above:

"TDS (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."

The Final Permit and CWA § 401 Certification reflect these requirements, including protecting spawning after July 25th of each year below Station 160 where spawning is documented in Ikalukrok Creek. As documented in Section 3.10 of the Final SEIS, aquatic life conditions throughout the

receiving waters, including spawning activities, have improved compared to pre-mining conditions.

111. **Comment:** Teck has the burden of showing that the proposed WQS will have no adverse effect on aquatic life. EPA, ADEC and Teck Alaska have not demonstrated in any reasonable fashion that the discharge of effluents containing TDS concentrations of 1500 mg/L are not toxic to various forms of aquatic life; absent from available documents for public review are data and analysis by Teck (or anyone else) which demonstrates no adverse effect on aquatic life.

The proposed TDS level of 1500 mg/L is demonstrably harmful to aquatic organisms. Rather than there being no adverse impact on aquatic life, just the opposite is true, as ADEC well knows. An Alaska Department of Fish & Game literature review documents harm to aquatic life when TDS levels are in the range contemplated by the proposed WQS revisions. The information presented in the Fish & Game TDS study shows quite clearly that some waters containing TDS concentrations less than 1500 mg/L can be toxic to fish and other aquatic organisms (many of which are fish food). Indications of the potential for acute and chronic toxicity are best seen in the summary tables presented on pages 6 through 16 of that report. It is clearly unreasonable and technically indefensible to use the results of this literature survey to support an increase in the TDS concentrations allowed downstream of Outfall 001.

Response: The Final Permit reflects the currently applicable WQS as documented in the State's CWA § 401 Certification. Comments on the protectiveness of the WQS should have been submitted during the comment period for adoption of the WQS. See Response #94 regarding the SSC for TDS.

As discussed in Section 3.10 of the Final SEIS, water quality and aquatic life conditions in the main stem of Red Dog Creek have improved from pre-mining conditions, particularly during the past five years. This has led to increased fish passage and usage of the Red Dog Creek watershed.

112. **Comment:** [T]he use of a TDS standard at monitoring stations 10 and 151 masks most of the potential toxicity of these discharges. Simply determining TDS or Total Solids, by whatever method, will reveal almost nothing about the actual or potential chemical toxicity of the discharged waters. The release of waters containing elevated TDS concentrations can impair other potential water uses in addition to aquatic life uses. Such waters may require some form of additional treatment prior to use.

Response: The effluent limits in the Final Permit reflect the most stringent WQS for protection of all designated uses of the entire water body. This is documented in the State's CWA § 401 Certification of the Final Permit. EPA assumes that the commenter may be referring to the downstream use of the Wulik River as a drinking water supply for Kivalina.

The Final SEIS shows that levels of TDS in the Wulik River are well below EPA's recommended secondary drinking water standard (based on taste and odor) and the WQS applicable to the drinking water use of 500 ug/L. Finally, as noted in Response #106 the WET limits in the Final Permit which address the potential overall toxicity of the discharge, are unchanged from the previous permit.

Whole Effluent Toxicity

113. **Comment:** Teck requests that "chronic toxicity" be clearly defined in Draft Permit, Section I.F.6, regarding conditions that trigger the TIE requirement. Presumably, the term refers to a TUC result greater than the MDL and/or AML (as in the toxicity reduction evaluation (TRE) trigger in Draft Permit, Section I.F.5.a). Nevertheless, the meaning of the phrase "if chronic toxicity is detected in the effluent" is ambiguous as presented in this section and could arguably be interpreted as meaning chronic toxicity at any level, i.e., any sample with a TUC>1.0.

Further, the requirement to initiate a TIE if toxicity (presumably, TUC results greater than the MDL and/or AML) is detected in the effluent in any two of the toxicity tests conducted during a discharge season is excessive. Teck suggests the following change to this provision as an appropriate threshold for triggering TIE:

"If chronic toxicity is detected in the effluent in any two consecutive toxicity tests conducted during the discharge season, then the Permittee shall ... initiate a TIE within fifteen (15) days."

The Fact Sheet and EPA's TSD do not provide any basis to require a TIE for "any" level of chronic toxicity in this effluent, especially considering the ambient pre-mine toxicity levels in Red Dog Creek. In fact, earlier in these comments and in its appeal to the EAB, Teck has shown the chronic WET limits in the proposed permit are incorrectly calculated and should be increased. Because the ambient toxicity is high due to natural conditions, Teck strongly opposes any permit provision that would require a TIE to be performed if effluent chronic toxicity values are less than the AML/MDL values in Draft Permit, Section I.F.5.a.

Response: The language in the Final Permit has been revised to clarify that 2 exceedances of WET limits during a season trigger the TIE. EPA has determined that it is appropriate to retain the requirement to conduct a TIE if any 2 samples during the discharge season exceed the WET limits.

114. **Comment:** EPA erred in including the proposed TUC limits for WET. (Ref: Draft Permit, I.A.1, Table 1).

In its April 11, 2007 Petition to the Environmental Appeals Board (EAB), Teck outlined the reasons why the effluent limits for whole effluent toxicity (WET) expressed as chronic toxicity units (TUC) should be removed from

the permit altogether or, at a minimum, be adjusted to reflect actual water balancing. Teck proposed that correctly adjusted limits should be as follows:

Monthly Average 11.2 TU_C (9.7 is EPA's proposed limit)
Daily Maximum 17.6 TU_C (12.2 is EPA's proposed limit)

Teck attached, and incorporated by reference, the analysis, reasoning and arguments provided in the April 2007 EAB Petition and requests these changes to the Draft Permit. The issues included in the EAB Petition address the reasonable potential that the mine drainage could make receiving waters more toxic to aquatic life, that inputs to the 1998 model were flawed, and that the criterion developed from the model is not a site-specific criterion.

Response: Reasonable potential to violate the criterion has been shown whether the criterion is the one EPA utilized in developing permit limitations or the criterion currently requested by Teck. EPA notes that in October 2008, Teck reported a WET exceedence on their Discharge Monitoring Report of 15.1 TU_C which is well above the criterion of 14.5 TU_C that Teck used to calculate its currently requested limits. As a result, inclusion of WET limits is justified.

The WET limits of the 1998 permit were not challenged and EPA finds no basis to alter those limits. EPA notes that ADEC did not propose including a new WET criterion in the final 2009 CWA § 401 Certification, nor was any new criterion evaluated according to the anti-degradation regulations found at 18 AAC 70.015.

Although Teck argues in its 2007 EAB Petition that the resubmitted water balance is more accurate, there is still uncertainty about the incremental flows into the impoundment at any given time. The newer water balance uses the addition of Bons Creek water into the Red Dog system so it is not an accurate depiction of the natural condition.

115. **Comment:** It is unclear how the Permittee is meant to comply with the requirement to report "the [effluent] flow rate at the time of sample collection." WET samples are 24-hour composite samples and the effluent flow rate may vary during the collection period (the composite sampler is programmed to collect flow-weighted aliquots during the 24-hour sampling period). Accordingly, this requirement should be clarified or eliminated.

Response: Permit Part I.F.4.c.(3) has been clarified to indicate that the range of effluent flows during the sampling period should be reported.

116. **Comment:** The WET test must include 7 dilutions to be valid.

Response: Standard protocol is to conduct testing with 5 dilutions and a control. More dilutions would provide better accuracy and may be a benefit to the Permittee but are not required.

117. **Comment:** Teck's previous work has shown that TDS accounts for 50% of the toxicity demonstrated in its effluent. Another 50% was attributed to as yet, unidentified toxicants. The extensive mixing zones being proposed are an indication of the chemical loading being input into the receiving waters below the Red Dog Mine. This loading has to be accounted for when considering the impacts of this discharge on the environment.

Response: Whenever toxicity has been observed in the effluent, Teck has followed the steps required by the permit to identify the source of the toxicity. As noted in the responses to a number of other comments and in Section 3.10 of the Final SEIS, aquatic life conditions in Red Dog Creek have improved compared to pre-mining conditions. The discharge will not change under the Final Permit and the State has certified that the permit requirements, including mixing zones will be protective of aquatic life in main stem Red Dog Creek.

Fact Sheet

118. **Comment:** First paragraph, page 5 of the Fact Sheet: the mine is 82 miles north of Kotzebue (not 90).

Response: EPA acknowledges the correction made by the commenter. EPA does not issue a revised Fact Sheet with the Final Permit.

119. **Comment:** References. (Ref: Fact Sheet, Section VIII).

The referenced "Letter dated April 18, 2008 from John B. Knapp, Teck, to Michael F. Gearheard, EPA, proposing an alternative waterwater [sic] treatment" should be corrected to read,

"... alternative wastewater treatment ..."

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the information provided by the commenter is accurate with respect to clarifying the reference in the Fact Sheet.

120. **Comment:** Fourth paragraph, page 6 of the Fact Sheet states:

"The current dam crest is at elevation 955 feet. The pond elevation is at 950 feet. Upstream (south) of the dam, the impoundment is 8,000 feet long and 2,600 feet wide at its widest point. It is bounded on the south end by the Overburden Stockpile built on the divide between the South Fork of Red Dog Creek and Bons Creek. The impoundment has an ultimate

capacity of approximately 39.3 million cubic yards (cy) of tailings, assuming that the tailings remain covered by water.”

The source and date of the site-specific information in this paragraph should be cited. Alternatively, the source and date of the site-specific information in this paragraph should be updated to reflect current data with the source and date cited.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, as documented in the Final SEIS, the main dam is currently being raised to an elevation of 970 feet, which corresponds to a total height of 192 feet. To accommodate the additional tailings volume associated with developing the Aqqaluk Deposit (i.e., a total volume of 69 million cubic yards), the main dam would need to be raised 16 additional feet to an elevation of 986 feet (208 feet tall at its maximum). The width (2,600 feet) and length (8,000 feet) are approximate values estimated from figures included in the Environmental Information Document for the Aqqaluk Extension (Teck 2007).

121. **Comment:** On page 17 of the Fact Sheet, Section VII.B, while describing protection of Essential Fish Habitat, EPA notes that fish do not come into contact with the discharge at the outfall because “there is also a barrier to fish passage.” Teck presumes that EPA is referencing the rock gabion weir (installed to prevent migration of fish into the Middle Fork of Red Dog Creek) that is located immediately above the confluence with the North Fork of Red Dog Creek. Teck requests that EPA clarify that it is referencing this structure.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, it is correct that the Fact Sheet referenced the weir described in the comment, which creates a barrier to fish passage above the confluence with North Fork Red Dog Creek.

122. **Comment:** The last paragraph, page 7 (Fact Sheet, Section IV.A) says:

“Although there is a discharge of domestic wastewater to the impoundment, these cannot be separated out for coverage under the GP. Instead, this discharge will have an internal wastestream monitoring point to determine compliance with the technology-based limits for domestic wastewater described in Appendix C.”

Teck requests this paragraph be deleted as the matter is not addressed in Appendix C of the Fact Sheet.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the commenter is correct that the cited language is inaccurate, there is no internal monitoring point for domestic wastewater and no technology-based limits for this wastewater are included in the permit. The Final Permit does include fecal coliform limits at Outfall 001

as well as monitoring for biochemical oxygen demand and total residual chlorine.

123. **Comment:** Tailings Impoundment Sources. (Ref: Fact Sheet, Section V).

In the first paragraph, page 8 of the Fact Sheet, "CSB air scrubber" is listed as a potential water source for the Tailings Impoundment. However, the CSB has never been equipped with a scrubber system although it was recently equipped with a bag-house dust control system (which does not generate a water wastestream). The "CSB air scrubber" should be removed from the list of potential sources. The (only) wet-scrubber system in the Red Dog Mine facility is the SAG mill conveyer wet-scrubber system which could be listed as a potential source of water to the Tailings Impoundment.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the information provided by the commenter is accurate with respect to clarifying the language in the Fact Sheet.

124. **Comment:** Sand Filters. (Ref: Fact Sheet, Section V).

In the second paragraph, page 9 of the Fact Sheet, reference is made to "three sand filters operated in parallel." There are actually four (4) filter tanks, each equipped with three (3) independent filter chambers, for a total of twelve (12) independent filter chambers. Piping and valves exists to allow use of a single chamber (1) or up to twelve (12) of the filters in parallel - in virtually any configuration - depending upon discharge rate demand. At any one time, this results in the use of one of a large number of possible filter setup configurations.

Teck recommends the sentence be changed to read as follows:

"Clarifier overflow water then gravity flows to the sand filters."

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the information provided by the commenter is accurate with respect to clarifying the language in the Fact Sheet.

125. **Comment:** At page 11 of the Fact Sheet, Section VI.B.3, the last sentence of the section incorrectly references Part I.I as the location of the SMPPP requirements. This should be changed to reference Part I.H.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the information provided by the commenter is accurate with respect to correcting the reference in the Fact Sheet.

126. **Comment:** Third paragraph, page 5 of the Fact Sheet states:

"Mine production at Red Dog Mine involves the stripping and stockpiling of ore, waste (i.e., rock with sub-economic value), and overburden/topsoil.

Mill production involves crushing, grinding and processing to produce mineral concentrates. Based on the approved mine plan, the Red Dog Mine main pit is expected to remain in production until 2012. The mine produces approximately 9,000 tones [sic] of ore per day. Teck is currently in the process of obtaining approvals to expand the mine into a second pit, Aqqaluk, which would allow for continued mining through 2031."

Without mining Aqqaluk, the main pit will be exhausted in 2011. The meaning of the term "approved mine plan" (Fact Sheet, p. 5), is unclear and should be defined. The Fact Sheet further notes on page 5 that Teck is "obtaining approvals" to expand the mine into Aqqaluk. This language suggests that multiple approvals are required to commence mining in the Aqqaluk area. The only prerequisite for mining the Aqqaluk area is to obtain a Section 404 permit from the Corps of Engineers (to the extent the excavation of jurisdictional wetlands in the Aqqaluk area would require a permit). There is nothing to suggest that the incremental water resulting from Aqqaluk stripping and mining activities could not be covered under the existing NPDES permit. We request the following change to the Fact Sheet: "Teck has sought a renewal of its NPDES permit and, additionally, will be seeking approval from the Corps of Engineers to excavate wetlands in the Aqqaluk area to allow for expansion of mining into that area. Both actions are being evaluated under a Supplemental Environmental Impact Statement."

Response: EPA does not issue a revised Fact Sheet with the Final Permit. EPA disagrees with the commenter because, as part of the permit reissuance process, EPA has considered whether development of the Aqqaluk Deposit would change the nature of the discharge and necessitate new or revised permit conditions. This evaluation was part of the Red Dog Mine – Aqqaluk SEIS analysis. The NEPA process is not complete until EPA issues its Record of Decision and reissues the NPDES permit which will specifically authorize such discharges.

127. **Comment:** Water Quality-Based Evaluation. (Ref: Fact Sheet, Appendix C, I.B).

After discussing Water Quality Based Effluent Limits (WQBELs) and the regulation that triggers whether such limits are necessary, ADEC states:

"The water quality parameters that may be affected by the discharge are metals, cyanide, ammonia, pH, dissolved solids and turbidity" (Fact Sheet, page 38).

This appears to Teck to be a misstatement of the required analysis. A more accurate statement would be:

"The discharge water parameters that have a reasonable potential to cause or contribute to an excursion above any water quality standard are metals, cyanide, ammonia, pH, dissolved solids, and turbidity."

Response: EPA does not issue a revised Fact Sheet with the Final Permit. EPA notes, however, that the regulatory standard stated by the commenter is specifically referenced twice in the preceding paragraphs in the same context and in the same section of the Fact Sheet. Although the information provided by the commenter is accurate, no clarification appears necessary.

128. **Comment:** In the first sentence, first complete paragraph, page 38 of the Fact Sheet, 40 CFR §440.104(b) is cited with reference to "gold" ore. This citation should be corrected to reference "zinc" ore.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the information provided by the commenter is accurate with respect to clarifying the language in the Fact Sheet.

129. **Comment:** On page 37 of the Fact Sheet, EPA says that the pH range of 6.0 – 10.5 included in the previous permit is now included in the Draft Permit. This sentence should be amended to reflect the correct pH range, 6.5 – 10.5, that is proposed in the Draft Permit.

Response: EPA does not issue a revised Fact Sheet with the Final Permit. However, the information provided by the commenter is accurate with respect to clarifying the pH range.

Attachment A
Temperature & pH Data for Ammonia

The pH and temperature data, below, were collected over the 5 year period from 2003 to 2007.

pH, s.u.			
8.5	7.5	7.5	7.6
8.4	7.6	7.5	7.4
7.6	7.7	7.6	7.6
6.8	7.5	7.5	7.5
7.8	7.1	7.6	7.5
7.5	7.3	7.4	6.1
7.9	7.3	7.6	7.9
7.5	6.8	7.4	8
7.8	6.8	7.3	6.9
7.4	7.3	7	7.3
7.2	6.1	7.7	7.8
7.4	6.7	7.4	8.4
1.7	7.1	7.2	8.2
7.4	7	7.8	6.5
7.2	7.1	7.7	8
8	7.1	7.6	7.9
7.2	8	7.3	7.8
8	7.5	7.7	7.8
6.5	7.3	7.6	6.7
7.5	7.4	8.1	7.7
7.8	6.8	7.8	7.4
8	7	8.1	7.8
8	6.5	7.6	7.7
7.9	7.1	7.3	7.7
7.9	7.3	7.8	7.4
7.8	7.4	6.7	7.6
7.7	7.4	7.8	7.7
7.6	7.2	6.8	7.8
7.6	7.7	7.1	7.6
8	7.2	7	7
7.8	7.1	7.6	7.8
7.2	6.9	7.6	8
7.7	7.2	7.4	7.9
7.6	7.8	7.7	7.5
7.8	7.8	7.6	7.5
7.8	6.7	7.5	7.7
7.6	7.8	7.9	7.8
7.3	7.8	6.8	7.9
7.6	7.9	7	7.8
7.1	7.9	7.8	7.8
7.3	7.7	7.2	7.6
7.7	6.6	7.7	7.6
7.8	7	6.7	7.5
7.7	6.8	7.1	7.5

Temperature, °C			
8.1	-0.1	0.08	0.2
10	-0.11	-0.03	0.03
4.7	-0.11	-0.11	0
6.7	-0.11	-0.11	0.03
3.5	-0.11	-0.1	0.04
5.9	0.04	-0.11	0.4
5.3	0.08	7.1	2.9
0.9	1.9	0.05	1
0.3	2.7	0.1	6.5
0.2	0.9	0.09	5.5
0.2	1.7	0.9	9.2
0.5	1.7	0.3	9.7
0.5	1.4	0.7	9.8
0.8	1.2	0.4	7.8
2.3	5	3.5	12.6
7.8	4.8	1	11.1
8.1	11.4	2.2	11.9
8.7	7.4	3.2	13
9.1	7.6	4.2	13.2
16.8	15.7	3.9	19.7
10.5	13.8	5	18.8
11.5	10.3	5.2	19.2
11.5	9.4	5	15.4
7.1	12.8	6.7	15.8
16	9.9	11.1	12.2
13.2	14.9	7.2	15.9
8.6	12.8	8.7	17.1
9.8	11.5	5.3	12.4
10.1	13	6	10.2
10.2	13.1	8.9	13.1
15	11.3	7.9	11.9
10.6	10.9	9.7	14.2
13.1	7.8	6	7.1
10.3	9.7	7.2	8.1
11.4	8.2	15.9	8.1
10.6	8.6	9.2	5.4
6.9	8.9	5.7	7.3
7.4	6.7	10.2	9.5
8.6	8.8	5	7.5
6.9	8.5	8.8	6.7
7.9	2.1	7.6	4.3
5.8	4.6	6.9	4.5
6.5	6.4	7.9	2.2
6.3	5.5	7.5	0.03

pH			
7.8	7.4	7.4	7.5
7.7	6.8	7.8	7.6
7.6	7.1	7.7	7.5
7.5	7.6	7.9	7.4
7.3	7.7	7.9	7.3
7.8	7.3	7.5	6.2
7.8	7.5	7.6	7.4
7.8	7.4	7.7	7.7
7.4	7.5	7.6	8.2
7.5			

Minimum 1.7
Maximum 8.50
95th %-tile 8.00
90th %-tile 7.90

Temperature			
7.5	6.5	5.4	0.03
5.8	5.8	5.3	0.04
2.5	3.8	3.9	0.04
2.7	5.3	4.4	0.05
-0.12	1	3.3	0.06
-0.02	0	0.9	0.06
0.01	0	0.02	0.06
0.02	-0.11	0.01	0.07
-0.12	-0.1	0.04	0.08

Minimum -0.12
Maximum 19.7
95th %-tile 15.18
90th %-tile 12.98

Attachment B
Zinc Effluent Limitation Calculations

Acute $e^{0.8473(\ln \text{Hardness}) + 0.884}$	Chronic SSC 210	Chronic state-wide $e^{0.8473(\ln \text{Hardness}) + 0.884}$
Hardness = 260 269.23		
LTA = WLA * $e^{[0.5\sigma^2 - z\sigma]}$	LTA = WLA * $e^{[0.5\sigma^2 - z\sigma]}$	LTA = WLA * $e^{[0.5\sigma^2 - z\sigma]}$ 269.23
where, z = 2.326 for 99 th %-tile	where, z = 2.326 for 99 th %-tile	where, z = 2.326 for 99 th %-tile
probability basis (per the TSD) CV = 0.43	probability basis (per the TSD) CV = 0.43	probability basis (per the TSD) CV = 0.43
$\sigma^2 = \ln(\text{CV}^2 + 1) = \ln[(0.43)^2 + 1]$	$\sigma^2 = \ln(\text{CV}^2/4 + 1) = \ln[(0.43)^2/4 + 1]$	$\sigma^2 = \ln(\text{CV}^2/4 + 1) = \ln[(0.43)^2/4 + 1]$
= 0.7694119	= 0.70452126	= 0.70452126
$e^{[(0.5 * 0.1697) - (2.326 * 0.4119)]} = 0.418$	$e^{[(0.5 * 0.0452) - (2.326 * 0.2126)]} = 0.624$	$e^{[(0.5 * 0.0452) - (2.326 * 0.2126)]} = 0.624$
LTA = 269.23 * 0.418 = 112.43	LTA = 210 * 0.624 = 131.04	LTA = 269.23 * 0.624 = 168.0
Most stringent LTA is the acute: LTA = 112.43		
Maximum Daily Limitation (MDL) $\text{MDL} = \text{LTA} * e^{(z\sigma - 0.5\sigma^2)}$	Average Monthly Limitation (AML) $\text{AML} = \text{LTA} * e^{(z\sigma - 0.5\sigma^2)}$	
z = 2.326 for 99 th %-tile probability basis (per the TSD) CV = 0.43	z = 1.645 for 95 th %-tile probability basis (per the TSD) CV = 0.43	
$\sigma^2 = \ln(\text{CV}^2 + 1) = \ln[(0.43)^2 + 1] = 0.1697$	$\sigma^2 = \ln(\text{CV}^2/4 + 1) = \ln[(0.43)^2/4 + 1] = 0.0452$	
$\sigma = 0.4119$	$\sigma = 0.2126$	
$e^{(z\sigma - 0.5\sigma^2)} = e^{[2.326 * 0.4119 - 0.5 * 0.1697]} = 2.39$	$e^{(z\sigma - 0.5\sigma^2)} = e^{[1.645 * 0.2126 - 0.5 * 0.0452]} = 1.39$	
MDL = 112.43 * 2.39 = 269.2	AML = 112.43 * 1.39 = 155.9	