RESPONSE TO COMMENTS

Environmental Assessment/ Finding of No Significant Impact for
Red Dog Mine Permit Modification (AK 003862-5)

The public comment period for the Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) for the Red Dog Mine permit modification began on March 31, 2003 and ended on May 14, 2003. Comments received include letters from Earthjustice on behalf of Northern Alaska Environmental Center, Southeast Alaska Conservation Council, Alaskans for Responsible Mining, Alaska Community Action on Toxics, and Mineral Policy Center; Center for Science and Public Participation; and Center on Race Poverty and the Environment on behalf of the Kivalina Relocation Planning Committee.

The following is a summary of the comments and EPA's responses (if the same or similar comments were received from several commenters the comment is only addressed once):

Comments from Earthjustice

Comment 1: EPA cannot modify the proposed NPDES permit to make it less restrictive without conducting another environmental assessment and reopening the public comment period.

Response: The final permit modification has been revised to allow the facility to discharge during Arctic grayling spawning. EPA is relying on the State's certification, which states that allowing TDS levels of 500 mg/L during Arctic grayling spawning complies with the newly adopted site-specific criterion for Main Stem Red Dog Creek (i.e., 500 mg/L when Arctic grayling are spawning) as well as the existing state-wide water quality standard (i.e., 500 mg/L). EPA is not reopening the comment period because this change is responsive to a comment received (see Permit Modification Comment #24), is consistent with the existing State standards and the State certification (both of which were subject to public notice and comment), and is not significant enough to render the public notice of the EA and FONSI inadequate. See Response to Comment #2, and Permit Modification Responses to Comments #2 and #24 for additional information.

Comment 2: The Alaska Science and Technology Foundation (ASTF) study casts significant doubt on EPA's FONSI. The only mention of the study occurs on page 26 of the EA, where EPA states that it has asked the State to consider the impact of the ASTF study on state-wide criteria and that "currently, there is one study

suggesting spawning may be adversely impacted by TDS levels less than . . . 500mg/L and two studies showing that 500 mg/L TDS is adequately protective of spawning." The EA does not provide a citation to the other two studies and it is not at all clear that they actually tested the impacts of elevated TDS levels on fertilization.

Response: While the ASTF study (Stekoll et al., 2003) provides evidence that TDS, similar in composition to the Red Dog Mine's effluent, has impacts on fertilization success in salmonids, it also demonstrates that these effects vary widely from species to species. It should be noted that of the six species of salmonids studied by Stekoll et al., none of the species reside in Main Stem Red Dog Creek, and king and chum salmon are the only species known to reside in Ikalukrok Creek.

The modified permit conditions require waters impacted by Red Dog Mine's effluent to remain at or below 500 mg/L in spawning areas, at times when salmonids are spawning. The mine begins discharging effluent at the end of breakup (around the end of May) and continues into October. Arctic grayling are known to spawn in Main Stem Red Dog Creek and North Fork Red Dog Creek. Dolly Varden and chum salmon are known to spawn Ikalukrok Creek. Arctic grayling spawn for a short period from late May until the beginning of June; Dolly Varden and chum salmon spawn from July 25th into October.

King salmon are sparsely represented in Ikalukrok Creek, with only one reported observation of a single pair spawning in the Ikalukrok Creek in 2001, and no juvenile king salmon collected in sampling nets between 1990 and 2003. The Alaska Department of Environmental Conservation reports that the king salmon in Ikalukrok Creek do not represent a significant breeding population. While the ASTF study reported a reduction in fertilization success for king salmon at a TDS concentration of 250 mg/L, it also reported that at least one test concentration greater than 250 mg/L was not significantly different from the control. Due to the uncertainty of the ASTF study results for king salmon, and the lack of an observed breeding population residing in the waters impacted by Red Dog Mine's effluent, the requirements in the modified permit will not adversely impact the king salmon population.

The ASTF study reported a No Observed Effect Concentration (NOEC) of 500 mg/L TDS for chum salmon. Therefore, results from the ASTF study indicate that the modified permit conditions are protective of chum salmon spawning.

The ASTF study did not evaluate the effects of TDS on Arctic grayling, and therefore is inconclusive as to how sensitive this species is to TDS. A literature review yielded no studies that compare the sensitivities of Arctic grayling to those species tested in the ASTF study. Arctic grayling spawn in Main Stem Red Dog Creek and North Fork Red Dog Creek with the majority of spawning occurring in North Fork Red Dog Creek. Spawning has been known to occur in Main Stem Red Dog Creek when breakup occurs later in the year and water temperatures remain colder later in North Fork Red Dog Creek. Field sampling results for Arctic grayling in the Red Dog Creek watershed indicate that populations have increased and decreased between 1993 and 2000 without any predictable upward or downward trend. Field observations indicate that the populations of Arctic grayling in the Red Dog Creek watershed fluctuate widely from a low of 19 in 1998 to a high of 359 in 2000. All age groups from young of the year to adults are routinely observed in the Main Stem Red Dog Creek. The limited data available to compare populations of Arctic grayling in waters impacted by the mine's effluent (Main Stem Red Dog Creek) and those not impacted by the mine's effluent (North Fork Red Dog Creek), indicates that there is no substantial difference between impacted and non-impacted waterbodies. Therefore, the weight of evidence suggests that the modified permit condition, allowing 500 mg/L TDS during spawning, will not adversely impact the Arctic grayling populations in waters impacted by the Red Dog Mine's effluent.

The ASTF study did not evaluate the effects of TDS on Dolly Varden, and therefore is inconclusive as to the effects of TDS on this species' fertilization success. Dolly Varden spawn in Ikalukrok Creek, below the confluence with Dudd Creek. All age groups of Dolly Varden are routinely observed in Ikalukrok Creek. Juvenile Dolly Varden populations in Ikalukrok Creek ranged from a low of 79 in 2001 to a high of 945 in 1999. While populations fluctuated, there was no discernable upward or downward trend in the juvenile Dolly Varden populations from 1997 to 2003. Field observations of Dolly Varden in waterbodies impacted by the mine's effluent (Ikalukrok Creek below the confluence of Main Stem Red Dog Creek, Ikalukrok Creek below the confluence of Dudd Creek, and Ikalukrok Creek below the confluence of the Wulik River) and those not impacted by the mine's effluent (Dudd Creek, Evaingiknuk Creek, Anxiety Ridge Creek, and Ikalukrok Creek above the confluence of Main Stem Red Dog Creek), demonstrate that population cycles are similar in the affected and unaffected area, with no correlation between numbers of Dolly Varden and the presence or absence of mine effluent. Therefore, the weight of evidence suggests

that the modified permit condition allowing 500 mg/L TDS during spawning will not adversely impact the Dolly Varden populations in waters impacted by the Red Dog Mine's effluent.

To provide additional certainty on fertilization success of Arctic grayling and Dolly Varden, EPA has issued a 308 Information Request to Teck Cominco that requires it to conduct tests, similar to those conducted in the ASTF study, to determine the TDS level that will be protective of Dolly Varden and Arctic grayling spawning. The results from these tests will be used to determine if a more stringent effluent limit is required when the permit is reissued.

Finally, the three studies referred to in the EA are:

- *Toxicity of total dissolved solids (TDS) in Red Dog Mine effluent: Fertilization and viability of rainbow trout and chum salmon embryos*, EVS Environmental Consultants, January 1998. This study suggested that TDS levels of 500 mg/L may not be protective of fertilization. However, the results of this study were not definitive because the controls in the study had high mortality rates.

- *High calcium concentration in water increases mortality of salmon and trout eggs*, *Progressive Fish Culturist* 50(3): 129-135. Ketola, H.G., D. Longacre, A. Greulich, L. Phetterplace, and R. Lashomb. 1988. This study suggests that TDS levels of 500 mg/L may be protective of fertilization. However, this study tested the effects of elevated TDS to fish eggs after fertilization and before hardening. These results cannot be used to accurately predict effects that may result from exposure during the fertilization period.

- *Fourth Quarter 2000 report for AST Grant 398-012: salmon as a bioassay model of effects of total dissolved solids*. Stekoll, M., W. Smoker, I. Wang, and B. Bailor. January 2001. This study suggested that 500 mg/L may be protective of spawning, however, these results were only preliminary results.

Comment 3: Any decision to allow concentrations of 500 ppm TDS in Ikalukrok Creek during spawning season, as proposed, would pose a high risk of significant adverse environmental effects and would require a full environmental impact statement.

Response: As discussed above, the ASTF study did not evaluate the effects of TDS on relevant salmonids residing in Ikalukrok Creek. Of the six species that were tested, three were not affected by TDS levels of 500 mg/L. Based on EPA's evaluation of the ASTF study and field data, we conclude that the modified permit condition allowing 500 mg/L TDS during spawning will not significantly impact resident salmonids in Main Stem Red Dog Creek or in Ikalukrok Creek. See Responses to Comments #1 and #2, and Permit Modification Response to Comment #1, for additional discussion.

Comment 4: The EA is insufficient because it fails to address adequately the alternatives to the proposed action. It mentions only that EPA considered retaining the existing TDS standards, but that doing so would require Teck Cominco to expend large sums of money to treat its effluent. The cost estimates for those treatments, however, are accurate only to +/- 40%. This discussion is insufficient, and EPA should evaluate these alternatives more fully either in a new EA or a complete environmental impact statement.

Response: The scope of the EA is to present the proposed change to the NPDES permit and the reasonable alternative, which is to maintain TDS limits in the current permit. For purposes of a comparative analysis, a construction and operation and maintenance cost estimate within an accuracy of +/- 40% is not inappropriate.

Comments from the Center for Science and Public Participation:

Comment 5: The EA and FONSI have not fully considered the new scientific evidence of TDS impacts to spawning fish. This research shows that TDS affects salmon survival and development at lower concentrations than ever thought before (250 ppm). This research is directly relevant to EPA's proposed modification to the current Red Dog mine NPDES permit and DEC's current proposal to create site-specific criteria for TDS.

Response: See Responses to Comments #1 and #2. Additionally, EPA has reviewed and approved the ADEC's site-specific criterion of 1500 mg/L that is applicable after Arctic grayling spawning is complete. EPA has not taken action on the site-specific criterion of 500 mg/L that would be applicable during the Arctic grayling spawning period in view of the ASTF study. That study tested six salmonid species; three showed effects on spawning at 500 mg/L TDS and three did not. However, the ASTF study did not test either Arctic grayling (which spawn in

Main Stem Red Dog Creek) or Dolly Varden (which spawn in Ikalukrok Creek) and therefore is inconclusive as to the sensitivity of these species to TDS. Based on field information it appears that there is successful recruitment of Arctic grayling and Dolly Varden when TDS levels are at 500 mg/L during spawning. However, EPA is requiring Teck Cominco to conduct tests, similar to those conducted in the ASTF study, to determine the TDS level that will be protective of Dolly Varden and Arctic grayling spawning.

Comment 6: The EA needs to quantify the effects to aquatic life in the mixing zones since the ADEC certified mixing zones are integral to the NPDES permit. Is there any time when aquatic invertebrates or eggs or alvins of Arctic Char, Dolly Varden or salmon are exposed to harmful TDS levels in the mixing zones? If so, please quantify the impacts to individuals and the populations.

Response: There are two mixing zones authorized for the Red Dog mine. One is located in Main Stem Red Dog Creek and starts at the confluence of North Fork Creek and continues downstream for 1,930 feet. The other mixing zone is in Ikalukrok Creek and starts at the confluence of with the Main Stem and continues downstream for 3,420 feet.

All fish life-stages except spawning may occur within the mixing zone in Main Stem Red Dog Creek. Arctic grayling spawn in North Fork Red Dog Creek and in lower Main Stem Red Dog Creek. After the fry emerge from the gravel in North Fork Red Dog Creek they could be swept downstream into the mixing zone in Main Stem Red Dog Creek. The ASTF study indicates there were prehatch and posthatch mortality effects at a test concentration of 2,500 mg/L. The highest level of TDS in Main Stem Red Dog Creek would be similar to the effluent concentration (the highest effluent concentration measured in 2002 was 3,640 mg/L) and would decrease as the effluent mixes with the water from North Fork Red Dog Creek. The effluent in the mixing zone could vary from 1,500 mg/L (at the edge of the mixing zone) to 3,640 mg/L (at the beginning of the mixing zone). It is difficult to quantify the effects to Arctic grayling fry because it is not known if the fry are displaced into the Main Stem, nor is it known how long they would be subjected to TDS levels greater than 2,099 mg/L. Any attempts to analyze these effects would be highly speculative.

Field sampling results for Arctic grayling in the Red Dog Creek watershed indicate that populations have increased and decreased between 1993 and 2000 without

any predictable upward or downward trend. Field observations indicate that the populations of Arctic grayling in the Red Dog Creek watershed fluctuate widely from a low of 19 in 1998 to a high of 359 in 2000. All age groups from young of the year to adults are routinely observed in the Main Stem Red Dog Creek. The limited data available to compare populations of Arctic grayling in waters impacted by the mine's effluent (Main Stem Red Dog Creek) and those not impacted by the mine's effluent (North Fork Red Dog Creek), indicates that there is no substantial difference between impacted and non-impacted waterbodies.

Based on laboratory toxicity tests, effects on invertebrates are seen when TDS levels are greater than 1500 mg/L. Since this is the TDS concentration that must be met at the edge of the mixing zone in Main Stem Red Dog Creek, it is assumed that invertebrates in that mixing zone will be adversely affected. Without additional studies, it is not possible to quantify impacts on the invertebrate communities at TDS concentrations greater than 1,500 mg/L.

In the mixing zone in Ikalukrok Creek the TDS level will always be at or below 1500 mg/L, therefore, it is not anticipated that there will be any adverse affects to fish or invertebrates.

Comment 7: The EA needs to provide a summary of TDS concentrations in the main stem of Red Dog Creek with real life dilution calculations based on measured flows (not modeled) to assure that the permit standards of 1000 mg/L of TDS will be met at Station 150.

Response: The TDS values referenced in the EA are actual measurements of TDS taken at Station 150. TDS sample results from Stations 10, 150, and 160 are attached to this Response to Comments document.

Comment 8: Monitoring shows that TDS concentrations in the Main Stem of Red Dog Creek exceeded the proposed SSC of 1500 about 15% of the time. It is necessary to quantify the affects to stream organisms from exposure to these high levels of TDS in the environmental assessment. EPA can reasonably anticipate that exceedances of the TDS standards will occur in the future as they have in the past, because the treatment and discharge systems remain the same. EPA must require changes to the treatment system or discharge practices that will eliminate violations of WQS.

Response: The TDS concentrations in Main Stem Red Dog Creek have exceeded 1500 mg/L approximately 14% of the time. However, as stated in the EA, the facility was operating under a compliance order which allowed the facility to discharge up to 1,600 mg/L for up to 48 hours in any 10-day period. The modified permit does not contain this requirement, therefore, it is anticipated that the facility will not exceed 1500 mg/L and further explanation in the EA is not necessary.

Comment 9: The section of the EA that discusses TDS toxicity studies does not include the recent study from Alaska Science and Technology Foundation. This study is extremely relevant to this proposed permit action and the results need to be incorporated into the EA findings. Please assure that EPA took the findings of the final version of this study into consideration into this proposed action. Please identify how you considered the final report's findings in your response to comments.

Response: See Responses to Comments #1 and #2.

Comment 10: Chum salmon spawning surveys conducted by Fish and Game have documented a decline in the number of returning adult Chum salmon. EPA has documented that Chum salmon were adversely affected by mine drainage from the Red Dog Mine in mid-1990s, and required Teck Cominco to remedy the problem by collecting its mine drainage and upgrading the treatment system to adequately treat its wastewater. It is probable that mine activities are still negatively affecting Chum salmon returns. EPA must require Teck Cominco to conduct field tests to fully determine the effects of mine discharges and other mine activities on aquatic organisms. EPA must require Teck Cominco to improve treatment of their discharges to eliminate effects on aquatic organisms.

Response: It is not clear which mine activities the commenter is referring to, however, this permit modification is limited to issues related to TDS. Additionally, the modified permit contains an extensive biomonitoring program that requires: monitoring of fisheries use in North Fork Red Dog Creek, Red Dog Creek, Anxiety Ridge and Ikalukrok Creek; fish tissue analysis of Dolly Varden; aerial surveys of Dolly Varden and chum salmon; benthic invertebrate monitoring; and periphyton monitoring. No additional monitoring will be added to the final permit modification.

CENTER ON RACE POVERTY AND THE ENVIRONMENT

Comment 11: The ASTF Report is directly relevant to the proposed permit modification. How the EA and FONSI could have gone forward without this crucial information is a mystery to Kivalina Relocation Planning Committee (KRPC), particularly since the findings of the Report directly contradict the EA and the FONSI.

Response: The EA and FONSI were completed prior to the release of the final ASTF study. Please see Responses to Comments #1 and #2, above, for additional information.

Comment 12: There are two mixing zones proposed in the EA and FONSI. According to the EA, and the FONSI, Mixing Zone 1 starts at the confluence of North Fork Red Dog Creek and continues downstream 1,930 feet. However, despite the representations of the EA and the FONSI, there are no requirements for the mixing zones in the permit itself.

Response: The final modified permit has been revised to include the mixing zones in Main Stem Red Dog Creek and Ikalukrok Creek. The permit modification amends effluent limits for TDS to ensure Alaska's new water quality criteria for TDS are met in Main Stem Red Dog Creek and Ikalukrok Creek at the edges of the mixing zones. The modified permit contains the following requirements:

1. In Main Stem Red Dog Creek, after break-up occurs and during Arctic grayling spawning, the permittee must regulate its effluent discharge such that the TDS level in the streams, at the edge of the mixing zone, does not exceed the state-wide TDS criterion of 500 mg/L at any time.

2. In Main Stem Red Dog Creek, after the end of Arctic grayling spawning (typically early June), the permittee must regulate its effluent discharge so that the TDS level in the stream, at the edge of the mixing zone, does not exceed the site-specific criterion of 1,500 mg/L at any time. The mixing zone starts at the confluence of North Fork Red Dog Creek and continues downstream 1,930 feet.

3. In Ikalukrok Creek, from the confluence with Main Stem Red Dog downstream to the confluence with the Wulik River, the permittee

must regulate its effluent discharge so that the TDS level in the stream, at the edge of the mixing zone, does not exceed 1,000 mg/L. The mixing zone starts at the confluence of the Main Stem Red Dog Creek and continues downstream 3,420 feet.

4. When spawning occurs in Ikalukrok Creek (July 25 through the end of the discharge season), the permittee must regulate its effluent discharge so that the TDS level in the stream, where spawning occurs, does not exceed 500 mg/L.

The modified permit requires Teck Cominco to monitor TDS by direct laboratory testing at stations 10, 150, 160, and at the edge of the mixing zones.

Comment 13: Dolly Varden spawn in the Ikalukrok Creek at the mouth of Dudd Creek, where the levels could be above 500 mg/L which is required further downstream in the spawning area. EPA needs to take into account that fish which spawn in the narrow area of Dudd Creek water within the Ikalukrok will then be living in the Ikalukrok and will not be confined to that spawning area, so will be in danger of TDS effects such as those measured in the ASTF study.

Response: The ASTF study tested the effects of TDS levels on fertilization only. Once Dolly Varden fry emerge from the gravel they are no longer at the sensitive life stage tested in the ASTF study, therefore, the results of that study are not applicable.

Comment 14: The EA and FONSI are misleading and fails to inform the public as to the actual size of the mixing zone. The permit modification is not based on meeting the water quality criteria at the boundary of the mixing zone in Main Stem Red Dog Creek, but on meeting the criteria 4,370 feet downstream, at station 10.

Response: The final permit modification has been revised to require monitoring at the edge of the mixing zone in Main Stem Red Dog Creek and at the edge of the mixing zone in Ikalukrok Creek. See Response to Comment #12.

Comment 15: The EA states (p. 6-7) that is has been prepared to support a proposed modification of the mine permit "in response to changes in the State's

water quality standards, and the State's certification (under Clean Water Act Section 401) of the mine's NPDES permit." As the EA predates the state's certification, it can hardly be "in response" to that certification.

Response: Teck Cominco had submitted a request to ADEC to adopt site-specific criteria for TDS and to modify its 401 certification. ADEC was in the process of acting on both of those requests. ADEC has since adopted the TDS site-specific criteria and has finalized the 401 certification.

Comment 16: The EA's Figure 1 conflicts with the description in the EA's text (p. 8) as to where the Dolly Varden spawning area is; Figure 1 shows it to be in Dudd Creek, while the text makes it clear it is in the Ikalukrok Creek.

Response: As stated in the EA, Dolly Varden spawning occurs in Dudd Creek and in Ikalukrok Creek at the mouth of Dudd Creek. The limitations of EPA's computer graphics make it difficult to be more precise than what is depicted in Figure 1.

Comment 17: Although the EA states (p. 19) that "the effluent discharge is limited so as to maintain TDS concentration at or below 500 mg/L in fish spawning habitat," this is not the case as there is Dolly Varden spawning habitat at the mouth of Dudd Creek that is three mile above Station 160, the location where 500 mg/L TDS is required. Testing the water at Station 73 to ensure 500 mg/L would make this statement accurate.

Response: As stated in the EA, there is some Dolly Varden spawning habitat in Ikalukrok Creek at the mouth of Dudd Creek. Teck Cominco collected TDS samples at several transects across Ikalukrok Creek, at the mouth of Dudd Creek, as well as vertical profiles of the water quality. Results from the monitoring show that this spawning habitat is composed primarily of Dudd Creek water with little input from Ikalukrok Creek. Therefore, testing at Station 73 is not necessary.

Comment 18: The use of rainbow trout in toxicity tests is inappropriate, as rainbow trout are not native to this part of Alaska and are not found on the creek system. The ASTF uses TDS that mimics TDS discharged from Red Dog.

Response: Test protocols are designed to determine if a particular test parameter has an effect on the test species. Controls are put in place to eliminate artifacts that may influence or mask a test parameter effect. Controlled test protocols have been

established for rainbow trout. These established protocols were utilized to test the effects of TDS with a composition that mimics that of Red Dog Mine effluent, on various life stages of rainbow trout. Rainbow trout were utilized as an indicator species for the salmonids that reside in those streams impacted by Red Dog Mine effluent. This was a first step in an effort to determine the effects of Red Dog Mine effluent on native species.

If one was to test species native to the Red Dog Mine site, without established protocols, one would not be able to discern if effects observed in the study were the result of the TDS, or an artifact of the test protocol. The ASTF studies established test protocols for some salmonids that reside in those streams impacted by Red Dog Mine effluent. These protocols will be used as a baseline for testing other salmonid species native to the area. EPA has issued a 308 Information Request to Teck Cominco that requires tests to be performed to determine the effects of TDS on the spawning success of Arctic grayling and Dolly Varden. The tests will be designed to determine if TDS from Red Dog Mine effluent has an effect on the fertilization success of these species native to the area.

Comment 19: While the EA states that ADEC "has committed to revisit its criterion as new information becomes available" (EA p. 22), ADEC is in the late stages of finalizing its site-specific criterion for Red Dog Creek, bootstrapping that criterion on EPA's FONSI.

Response: This section of the EA was discussing the ADEC's state-wide criterion for TDS (i.e., 500 mg/L), not the site-specific criterion of 500 mg/L that Teck Cominco requested for Main Stem Red Dog Creek. While ADEC did adopt the TDS site-specific criterion of 500 mg/L (applicable during the Arctic grayling spawning period) EPA has not taken action on it in view of the ASTF study. However, as stated previously, the ASTF study did not specifically test either Arctic grayling (which spawn in Main Stem Red Dog Creek) or Dolly Varden (which spawn in Ikalukrok Creek) and therefore is inconclusive as to the sensitivity of these species to TDS.

Based on field information it appears that there is successful recruitment of Arctic grayling and Dolly Varden when TDS levels are at 500 mg/L during spawning. However, to provide additional certainty on this issue, EPA is requiring Teck Cominco to conduct tests, similar to those conducted in the ASTF study, to

determine the TDS level that will be protective of Dolly Varden and Arctic grayling spawning. The results from these tests will be used to determine if a more stringent effluent limit is required when the permit is reissued. In the interim, the final modified permit allows the facility to discharge during Arctic grayling spawning and Dolly Varden/chum salmon spawning provided the instream TDS concentration does not exceed 500 mg/L.

Comment 20: The EA states that "given the apparent absence of adverse effects on fish by the mine effluent," spending money to reduce TDS levels would not be cost effective (EA p. 27). However, that statement is misleading, as the EA itself concedes on p. 25: "the number of returning adult chum salmon spawners remain lower than pre-mining counts." If there are less fish now than there were before the mine, that seems to indicate an adverse effect on the fish by the mine effluent, directly contradicting the EA's later conclusion. The EA also repeats this type of statement on p. 33.

Response: As stated in the EA, in the early 1990s chum salmon were adversely affected by mine drainage which contained toxic levels of metals. In the mid-1990s, Teck Cominco remedied this problem by collecting its mine drainage and routing it to the tailings pond for treatment. Additionally, Teck Cominco upgraded its treatment system to adequately treat its wastewater for metals removal. While it is correct that chum salmon spawners remain lower than pre-mining counts, field surveys show an apparent trend of increasing numbers of chum salmon since then. The adverse affect to chum salmon was caused by metals, not TDS which is the subject of this EA. There is no information suggesting that TDS is adversely affecting any of the life stages of chum, in fact, toxicity tests indicate that the TDS requirements in the permit modification (i.e., 500 mg/L during spawning) are protective of chum salmon.

Comment 21: The EA states that "the available data indicate that the proposed levels of TDS would not have an adverse impact on invertebrate communities." That statement is not supported by the facts. The 2001 Aquatic Biomonitoring study states that the Invertebrate Density was much greater at upstream station 9 than at station 10, as an average during 2001. This appears to indicate some degree of toxicity from the mine discharge. The EA concedes on p. 30 that "aquatic invertebrate density and abundance at Station 10 were among the lowest found." Thus, its conclusion two paragraphs later that the mine effluent has "apparently not had a

significant impact on aquatic invertebrates" is not supported by the evidence.

Response: Laboratory toxicity tests demonstrated that chironomids were not impacted at 1500 mg/L TDS. The NPDES permit modification will limit the TDS concentration to 1500 mg/L at Station 10. The field data indicates that under current TDS concentrations, macroinvertebrate species abundance and density are greater at non-impacted sites (Station 9) but species taxa richness are about the same in impacted (Stations 8 and 10) and non-impacted sites.

Comment 22: The inability to determine the influence of water quality, particularly TDS, on periphyton, makes an EIS necessary.

Response: The NPDES permit limits are based on the State's existing water quality standard, which EPA has approved in a separate action. Those standards are designed to be protective of aquatic life, including periphyton communities. The Alaska Department of Fish and Game (ADF&G) has conducted periphyton surveys since 1996. In 2002, Teck Cominco regulated the effluent to maintain TDS concentrations in a manner consistent with the terms of the modified permit; in this same year, periphyton concentrations in Red Dog Creek were higher than any of the other sites samples (except North Fork Red Dog Creek and Ikalukrok below the confluence with Red Dog Creek). Scannell (2003) concluded that TDS concentrations at or below 1,500 mg/L have not adversely affected populations of invertebrates in Main Stem Red Dog Creek or Ikalukrok Creek.

Comment 23: The EA outlines several alternative treatment technologies which appear economically feasible given the historical profits of the mine.

Response: See Permit Modification Responses to Comments #9 and #10.

Comment 24: The EA continually refers to modeled TDS concentrations, when there are at least 10 years of actual data that could, and should, be used to determine TDS concentrations downstream of Outfall 001.

Response: The EA does not rely on modeled TDS concentrations. All of the TDS data referred to in the EA is based on actual sampling measurements taken at monitoring stations in Main Stem Red Dog Creek and in Ikalukrok Creek. The TDS data for Stations 10, 15, and 160 are attached to this Response to Comment

document.

Comment 25: The undated, unattributed Teck Cominco document *In-stream control of TDS at Red Dog Mine* describes the model used to predict TDS concentrations in Red Dog Creek and downstream. It is important to know what levels of TDS are actually occurring so that the public can be assured that aquatic resources are adequately protected. Teck Cominco need to supply the public with an analysis of the accuracy of their TDS model prediction and field confirmation of actual TDS concentrations in spawning areas.

Response: The linear regression (the model) established between conductivity and TDS was established to better determine real time instream concentrations of TDS. TDS methodologies are such that there can be a significant amount of time between sample collection and sample results (known concentration of TDS in the ambient water sample). Depending on the laboratory performing the TDS analysis, the time period from sample collection to reporting results can be days, weeks or even months. Conductivity can be measured on a real time basis in ambient waters. In an effort to predict concentrations of TDS in ambient waters on a real time basis, a linear regression analysis was performed on TDS data and conductivity measurements that were collected at the same time. The linear regression allows for real time estimates of TDS concentrations from conductivity measurements.

This linear regression is updated whenever conductivity measurements and TDS measurements are collected at the same time. Estimating real time TDS concentrations from conductivity measurements, allows for better control of the effluent output on a real time basis, thereby providing better assurance that TDS limits are not exceeded in ambient waters. Additionally, the final permit modification requires in-stream monitoring, and requires Teck Cominco to compare the model prediction with the results of the ambient TDS monitoring.

Comment 26: The permit modification at issue here will significantly affect the quality of the human environment and the ASTF Report provides evidence of a significant adverse impact on fish, thus EPA must prepare an EIS.

Response: As discussed in the Response to Comment #2, above, the ASTF study did not evaluate the effects of TDS on the two species of salmonids known to spawn in the Red Dog Mine area, Arctic grayling and Dolly Varden. In order to address this

data gap, EPA has issued a 308 Information Request to Teck Cominco requiring them to conduct tests to determine the Red Dog Mine effluent TDS level that will be protective of Dolly Varden and Arctic grayling spawning. The results from these tests will be used to determine if a more stringent effluent limit is required when the permit is reissued.

Pursuant to 40 C.F.R. § 1501.4 and 40 C.F.R. § 6.108, an Environmental Impact Statement will not be prepared for the permit modification.

Comment 27: When EPA has conducted an appropriate Environmental Impact Statement, and incorporated the findings of the ASTF study into it, then EPA should hold a public hearing in the Village of Kivalina, the home of the population most affected by EPA's decision, before allowing the proposed limit modification.

Response: See Response to Comment #26.