DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-1	**Important Contaminants were inadequately assessed in the Risk Assessment** The target chemical list was used to select chemicals of potential concern (CoPCs). The target list of chemicals evaluated was based on the list of "concentrate constituents" and excluded bismuth, calcium, chloride, gallium, germanium, gold, silicon, sulfate, and sulfur. The latter chemicals were not included on the list because of the Pareto principle, which states that "... a relatively large number of problems (for example, a large proportion of site attributable risk) in a given situation will be found to be caused by only a few factors (or a few hazardous substances) … the target analyte list [substances] … are those manufactured and used in the greatest amounts and that are the most toxic." All ore concentrate constituents are potential environmental and human health pollutants when they are released in quantities sufficient to cause harm. For example, calcium was eliminated from the target chemical list. Recent research on toxicity of total dissolved solids (TDS) in Red Dog mine effluent to salmonids has shown calcium as one of the major toxic components (Stekoll et.al.2003).	Medium	Please respond regarding the need to expand the COPC list to include sulfur and calcium. The specific issue with respect to calcium and salmon should be addressed in the response.
CSP2-2:	None of the elements tested as CoPCs were speciated (e.g. chromium or mercury). Elemental forms and speciations should be examined as separate analytes (for example, mercury and methyl mercury in Table 3-3). It is especially important to assess the most toxic forms of compounds for presence and affects.	Medium	Please discuss the issue of speciation more thoroughly in the uncertainty section.
CSP2-3:	<u>Mercury:</u> The Red Dog fugitive dust risk assessment does not speciate mercury, nor does it clearly present what type of mercury analysis was completed; total, elemental, inorganic or methyl mercury. The risk assessment needs to clearly present testing methods and analytical results for all types of inorganic mercury and methyl mercury in sediments and soils. Detection limits for methyl mercury aren't as good as those for elemental, or inorganic mercury (personal communication Dr. Fred Youngs, environmental research chemist, University of Massachusetts Lowell, director of Citizens Environmental Laboratory, Boston). Since no mercury was detected, detection limits may be too high to examine methyl mercury. Further, **table 3-14** notes that detection limits for mercury are "not applicable." As discussed in Dr. Peplow's audit, mercury is very toxic and it's presence in the environment is ubiquitous. It is imperative that Teck Cominco adequately evaluate environmental and human health risks from all forms of mercury in the risk assessment.	Medium	Please provide response regarding rationale for not analyzing mercury species at the site and how the current lack of information on mercury species affects the risk estimates for mercury. The response should also address the detection limit issues mentioned above.
CSP2-4:	<u>Lead:</u> Lead is one of the major contaminants of concern, yet it was eliminated as a COPC in the marine environment because "there was insufficient statistical power to distinguish the mean site concentration from zero (and therefore insufficient power to distinguish it	Medium	Please clarify any confusing statements in this section, explain and defend the statistical methods used, and defend the sediment screening values used.

No.	Comment	Priority	Recommendation
	from the reference mean), because of the high variability in lead concentrations. Therefore, a statistical comparison with reference was not made for lead." (Page 3-17) Data supporting this statement are presented in Table 3-12. This statement is confusing. The sample size for lead presented in Table 3-12 are N=21 for the reference site and N=129 for the sample sites. This is one of the larges samples sizes used to determine COPCs for any contaminant. The sample size is certainly large enough to determine statistical significance. The high variability of lead concentrations in marine sediment samples is not surprising given the industrial activities in the area. Exponent concludes that based on flawed statistical tests they will eliminate lead as a contaminant of concern in the marine sediment environment even though the maximum concentrations exceed the Washington State marine sediment standards by an order of magnitude. The maximum site value reported was 5,620 mg/kg dry weight (Table 3-12) and the Washington State marine sediment standards for lead are 450 mg/kg dry weight (Chapter 173-204 WAC SEDIMENT MANAGEMENT STANDARDS, Washington Department of Ecology, Sediment Management Unit December 29, 1995 TABLE 1. MARINE SEDIMENT QUALITY STANDARDS – Chemical Criteria Ch. 173-204 WAC—p.7). Exponents elimination of lead, one of the primary contaminants in the ore body, due to statistical difficulties is especially disturbing because, by definition, contaminants that exceed sediment criteria are causing risks to the environment and public health. Yet, Exponent doesn't even discuss this problem or seek an alternate method of assessment. They just eliminate the risks from lead from consideration. This must be rectified in a revised risk assessment.		

DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-5:	**Metals are bioavailable in the environment, thus their risk is underestimated** The risk assessment does not refer to or acknowledge recent scientific advancements in understanding metal bioavailability. Dr. Peplow discusses several natural biological and chemical processes that result in metals being more bioavailable in the environment than the risk assessment discloses. ACAT (May 2004) also presents a lot of information on bioavailability of lead that has not been acknowledged, discussed, nor incorporated into risk characterizations by Exponent. Recent literature has documented that methyl mercury bioaccumulates in terrestrial habitats (Rimmer et al. 2005). Studies have shown that lead can bio-magnify through the food chain (Woodward et al. 1994). There was no presentation of a scientific literature review on recent advancements in understanding metal bioavailability in terrestrial and aquatic environments. Standard methods to predict mineral speciation, the solubility of oxidized metals, and solubility products using Eh-pH stability diagrams were not used. Similarly, sequential extraction techniques to characterize the relative concentrations of the different forms of the metal compounds and the potential bioavailability were not used. Underestimating bioavailability of heavy metals in the environment and food web lead to a grave underestimation of the risks from Red Dog's fugitive dust releases. Exponent's risk assessment inadequately addresses these issues and thus may greatly underestimate risks to the environment, subsistence users and workers.	High	Please provide response regarding the need to present more information in the RA about the form of lead and other COPCs at the site.
CSP2-6:	**Air quality monitoring conducted by TeckCominco 1991-1994, and between October 2004 and present, was not discussed** This data could be helpful in assessing the distances fugitive dust travels, or where and when it accumulates, in particular when compared with wind or weather data. Past data should be compared, where possible, to current and future dust deposition data.	Medium	Please summarize the air monitoring data results.
CSP2-7:	**The retention of metals in roots rather than shoots of plants was not considered during sampling** All sampling of plants (terrestrial and aquatic) was done through the shoots, or the most recent of the plants' growth. However, it has been shown that as much as eighty percent of lead taken up by a plant can be retained in its roots (Vogel-Mikus et. al. 2005). Therefore the amount of contaminates retained in plants as given in the risk assessment may be misleading. Considering this information, it should also be determined whether or not subsistence users consume the roots of any plant.	Low	Please evaluate the reference provided to determine its applicability. If it is applicable, please add the appropriate discussion in the uncertainty section.
CSP2-8:	**The effects of metal mixtures on toxicity and bioavailability are not considered** All sampling sites (terrestrial and aquatic) showed the presence of several heavy metals in combination. Scientific literature has documented that the toxicity of heavy metals interact in a number of ways. Metal mixtures can affect bioavailability and	Low	Please provide response to the issues of metals interactions described in this comment.

No.	Comment	Priority	Recommendation
	bioaccumulation. Youn-Joo et. al. (2004) found that "Binary metal combinations of copper and cadmium, copper and lead, and cadmium and lead produced three types of interactions: concentration additive, synergistic, and antagonistic. …bioaccumulation of one metal was influenced by the presence of other metals in metal mixtures." This phenomenon is further complicated by inter-element interactions that affect the minimum needs and maximum tolerances of organisms to toxic elements. Two-way and three-way metal interactions have been described that alter their toxicities. The variability of toxicity among and between metals to various taxonomic groups differs depending on the environmental conditions. These complex interactions increase the risk of toxicity to receptor species and organs. Although these interactions have not been quantified and captured in water and sediment quality criteria, their contribution to the overall environmental and human health toxicity must be acknowledged in the risk evaluation. Changes to toxicity and risk must be quantified using state of the art techniques and presented in a revised risk assessment. Otherwise, risks to the environment, subsistence users and workers are being knowingly underestimated.		
CSP2-9:	**Reference areas are not appropriately chosen** Sites should be located farther away from the DMTS, in a geographically separate area. There is discussion of the separation provided by a mountain range south of the haul road in the 2004 NPS survey. Further, the location of reference sites should not be based on their situation on the "prevailing upwind" side of the road. Winds don't always blow from the south, especially in the summer (TCAK 2005, figures 8 and 9) when fugitive dust is not captured within the snowpack, and so is at its most mobile. Also, trends in wind direction vary greatly from year to year (personal communication Colleen Swan to Amy Crook, June 14, 2005). Thus these "upwind" sites aren't references, but could and should be subjects of another study, a comparison between north and south transects along the haul road.	High	Please provide rationale for selection of reference locations. Are the points raised valid?
CSP2-10:	**Section Specific Comments:** **2.2.1 Road surface runoff** is "inhibited by interactions with organic materials in the tundra." Does this mean that it goes into the plants? Why isn't this discussed later, as a potential cause for concern? How far does this runoff go (especially under different weather conditions)? See discussion of section **6.7.2** **2.2.2 Port surface runoff see discussion of 2.2.1**	Low	Please clarify section.
CSP2-11:	**2.2.4 Fugitive dust control measures** this section is unclear, and doesn't distinguish between *past* contamination and *potential* contamination (risk).	Low	Please clarify section.

DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-12:	**2.3.3.1 Worker and subsistence use in the terrestrial environment** ADPH 2001 and Exponent 2002a were preliminary studies, and tested different sites than did the 2004 testing conducted by Exponent and summarized in appendix H. A statistical analysis (as discussed in the Methods section of appendix H) should not be used to equate all of the tested sites, as relatively few sites have been tested. When so few data points are available, results cannot be statistically significant.	Low	Please clarify section to ensure that there is no confusion about the applicability of any of these studies.
CSP2-13:	**2.3.3.1.3 Dermal contact with metals in soil** USEPA 2004 says that other minerals' dermal effects should be measured 'qualitatively'; what are the ways in which subsistence gatherers/area residents could be exposed to lead through their skin? E. g. through showers, swimming, gathering berries. This should not be dismissed as a primary pathway; as discussed in Peplow (2005) designation of primary pathways was decided without detailed reasoning.	Medium	The rationale for determining whether a pathway was designated as primary or secondary should be clearly presented.
CSP2-14:	**2.3.3.2 Subsistence and residential use in the freshwater environment** dismisses quantification of exposure through drinking water and/or fish consumption based on previous studies, which aren't cited in this section and may or may not be reliable.	Low	Please provide requested references.
CSP2-15:	**2.3.3.3 Subsistence use in the lagoon and marine environments** should also discuss anadromous fish (chum, char), as it is mentioned on p 2-20 that lagoons open to the ocean are important habitats for these fish. Notes from a meeting in Kivalina (20 April 2005) indicate that two lagoons were seined to check for fish during one field study; during what season were they checked? Assurances should be made that fish do or do not spend time in these lagoons, as the statement made on p 2-20 directly contradicts a statement made by Scott Shock in Kivalina.	Low	Please provide the requested information.
CSP2-16:	**2.4.4 Potential exposure pathways** the primary exposure pathways for aquatic receptors should include not only contact or consumption of surface water, consumption of prey, or contact with sediment, but also contact or consumption of water at any depth; this is particularly important in deeper lagoons and/or offshore, where currents are stronger and may pull surface contaminates to a different depth. Currents may also change seasonally.	Low	Please explain that surface water refers to all parts of a surface water body as opposed to groundwater.
CSP2-17:	**2.4.6 Preliminary assessment and measurement endpoints** compares data with toxicity reference values "derived from the literature." What are these values?	Low	Please amend the text so that it points to the location of these values.
CSP2-18:	**3.1 Target chemical list** DEC's requirement of pH data tells the reader about what risk? This section should explain why a low pH would indicate whatever it does, not only that measurements were taken. Further, it should cite where that data is.	Low	Please amend the text to include the requested information
CSP2-19:	**3.2.2 Data usability, Sample depth** Why were deeper samples not also considered? Fugitive dust has, to some degree, existed since the beginning of mining operations; samples at varying depths could potentially indicate the movement of contaminates originating from the mine through soil over time (since 1989).	Low	Please provide evidence or rationale why deeper samples are not necessary.

DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-20:	**Data quality review** data sets that are not validated should not be used, particularly if they are of lesser importance to begin with "Although some of the analytes have a limited number of sample results, the chemicals that have greater sample coverage (i.e., lead, zinc, and cadmium) may be used as indicators for the spatial distributions of the associated chemicals." What chemicals are associated? How can they be used as indicators for other chemicals? Is this discussed further/cited? How does it work?	Medium	Please clarify the use of unvalidated data.
CSP2-21:	**3.2.3 Terrestrial environment** should describe/include photos of 'inorganic' soil sites; these sites might have been contaminated (according to Bob Winfree, these sites are places from which fill was taken for other projects [pers. comm. 13 June 2005]) Sites should include samplings away from the road (see discussion of section **5.2.1.1**) It should be noted that the majority (provide a number) of both sets of soil samples were taken from in and immediately around the port's ambient air boundary.	Low	If photos of the sites are available, please include in an appendix. (The remainder of the request is included in the document).
CSP2-22:	**3.2.4 Streams** should have sampled more waterways. In particular, sampling should encompass the entirety of the Wulik watershed, because the village of Kivalina sits at the mouth of the whole of the watershed. Should describe physical characteristics of ■ Sediment (and environment of sediment e.g. rocky over sand/all sand ..) ■ Speed of water (easier to measure) / turbulence (harder to measure, but important when taking only surface samples) Why were samples not taken at any depth? In particular in smaller streams nearer to the edges of a watershed, like those closest to the DMTS, water will turn over often, rolling over rocks and catching air. Rather than moving as a wide, slow river, streams will fold in dust, moving it away from the surface and eventually into the sediment that feeds plants in or near streams. Most of the stream study sites are located within the park, not many up closer to the mine site. Does this bias the concentrations low?	Medium	Please provide response about the need to sample additional streams.
CSP2-23:	**3.2.5 Tundra ponds** Sediment and water samples: give distance from road on either side. Transects *should* have been continued farther beyond the road, and more transects should have been tested. Pending this, uncertainty presented by a small sample size should be discussed.	Medium	Provide additional discussion in the uncertainty section about the sample size.
CSP2-24:	**3.2.7 Marine environment** should discuss the potential for currents to make these samples say very little; should include map/chart of currents. Why does site marine water not include offshore samples? This should be discussed.	Medium	Please provide response regarding justification for location of marine sediment sampling sites, rationale for not collecting off-

No.	Comment	Priority	Recommendation
	Reference sites are too close to the port site ambient air boundary to act as true reference sites, especially considering intensity of air and water currents along this coast.		shore samples, and appropriateness of marine reference sites.
CSP2-25:	**3.3.1.2 Comparison of site data with risk-based screening values** utilizes chemical-specific reference doses. Where are these doses listed? Where do they come from?	Low	Please point to the references.
CSP2-26:	**3.3.3 Costal lagoon and marine environments** "a comparison to chemical concentrations in lagoon and marine water from areas not affected by the DMTS." Cite 1) what those areas are and 2) how we know they're 'not affected.'	Low	1) Please provide reference to a map with reference locations 2) Duplicate of comments on reference areas.
CSP2-27:	**3.3.3.1 Comparison of Site Lagoon and Marine Data with Reference Data** The sample sizes for reference samples were very small (N=3). The statistical analysis would have had more power if the sample sizes were increased. Exponent needs to discuss what effect small sample size had on being able to detect statistical significance. "A statistical comparison to reference could not be made for mercury, selenium, tin, or vanadium, because there were too few detections in site and reference data." This statement refers to Table 3-11. No sample size was given in this table for reference or site samples for these contaminants. How many samples were taken for analysis?	Medium	Please supplement the uncertainty section with the drawbacks of having a small sample size.
CSP2-28:	What type of mercury was analyzed for? In sediment methyl mercury should also be sampled for besides inorganic mercury because of its toxicity and bioavailabity in the environment. Was the mercury analytical technique capable of measuring both methyl mercury and inorganic mercury?	Low	Please clearly describe the type of the mercury that was analyzed.
CSP2-29:	**3.3.3.1.1 Lagoon environment** doesn't make it clear that the first set of samples it discusses are reference samples, while it discusses the comparison later. Throughout the document, reference sites are said to be "in the prevailing upwind and upcurrent direction." Where is this shown? Who monitors wind and current, and where is their data?	Medium	Please clarify the text to ensure it is clear when reference samples are being discussed. In addition, please expand the discussion of the selection of reference areas to discuss the answers to the above questions.
CSP2-30:	**3.3.3.1.2 Marine Environment** The risk assessment document states "For lead, there was insufficient statistical power to distinguish the mean site concentration from zero (and therefore insufficient power to distinguish it from the reference mean), because of the high variability in lead concentrations. Therefore, a statistical comparison with reference was not made for lead." (Page 3-17). The Washington State Sediment Standards also set allowable levels for other contaminants in marine sediments:	Medium	Please provide response regarding the final COPC list for the marine environment and how it was arrived at, including a clear description of the screening benchmarks used and why they were selected.

No.	Comment	Priority	Recommendation
	Table I Marine Sediment Quality Standards—Chemical Criteria CHEMICAL PARAMETER MG/KG DRY WEIGHT (PARTS PER MILLION (PPM) DRY) ARSENIC 57 CADMIUM 5.1 CHROMIUM 260 COPPER 390 LEAD 450 MERCURY 0.41 SILVER 6.1 ZINC 410 Comparison of the maximum sediment concentrations presented in Table 3-12 of the risk assessment to the Washington state sediment standards (above) shows that cadmium and zinc also exceed standards. Based on the elevated concentrations of lead, cadmium and zinc in the marine sediments these contaminants should all be retained as COPCs in the risk assessment.		
CSP2-31:	**3.3.3.2.2 Marine Environment** Table 3-26 states: "The maximum zinc concentration in marine sediments (2,550 mg/kg), however, was still lower than the soil screening criteria for zinc of 4,100 mg/kg" (page 3-18). The Marine sediment quality standards presented in Table 3-26 show the zinc standard as 410 mg/kg, not 4100 mg/kg as referenced in the risk assessment. The marine sediment samples exceeded the marine sediment quality standard for zinc and thus should be retained as a COPC. There is no documentation of how many samples exceeded the real sediment quality standard of 410 mg/kg. The sentence "Thus, even with the higher direct contact assumed in the soil screening criteria, human exposure to the zinc concentrations in marine sediments would not pose a risk to human health" should be eliminated. By definition, if sediment standards are exceeded there are risks to the environment and public health. Lead values in the sediment exceeded the Marine sediment quality standards of 450 mg/kg by an order of magnitude. By definition they cause risks to the environment and public health. These risks must be evaluated within a revised risk assessment.	Medium	Please provide response regarding the apparent error in zinc screening values listed above and/or clarify the text to indicate when ecological versus human-health risks are being discussed. Additionally, please provide a response regarding the final COPC list for the marine environment and how it was arrived at, including a clear description of the screening benchmarks used and why they were selected.

DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-32:	**3.3.3.3 Selection of Human Health CoPCs for the Lagoon and Marine Environments** The conclusion drawn in this section are in error for the reasons stated above. Risk to the marine environment from lead, cadmium and zinc must be evaluated	Medium	Please correct the text accordingly for any errors made.
CSP2-33:	**3.5.2.2 Stream surface water** AWQC which are hardness dependent should be listed, with their respective adjustments, in a table cited here in the text	Low	Please include the requested table.
CSP2-34:	**3.5.4.1 Lagoon sediment** discusses guidelines used by the State of Washington as having been used in Alaska, as well. However, they were only determined to apply to Alaska by Exponent in a 1999 study in Ward Cove, for the Ketchikan Pulp Company. There may or not be good reason to allow these guidelines to apply to ecosystems as different as southeast (which is more similar to Washington) and northwest Alaska.	Medium	Please provide an explanation of the applicability of the State of Washington criteria in northwest Alaska.
CSP2-35:	**3.5.6 Wildlife** mentions that water ingestion is not included in the exposure analysis, because chemical concentrations in water were shown to be low and would therefore not have an effect on the results of the analysis. This is not necessarily true, because 1) water sampling may have been conducted in such a way that results don't indicate the true chemical concentrations of the water ingested by wildlife, and 2) the consumption, over time, of even slightly contaminated water could have some cumulative effect on animals' health. Cites **table 3-28**, which presents TRVs, each with a citations. Citations indicate TRVs determined in years ranging from 1946 to 1994, with only two more recent than 1990.	Medium	Please provide response regarding the importance of the drinking water pathway to total exposure. If not already included in the RA report, one or more examples should be prepared to illustrate the relative importance of this pathway. Additionally, please provide response to the criticism that older references are used as sources of wildlife TRVs.
CSP2-36:	**3.5.6.2 Piscivorous wildlife** ■ where was data available for fish? When and where was that data collected? How old were the fish tested? ■ discussion of sampling conducted in 2004 leads the reader to believe that sampling in DMTS creeks was conducted along with sampling in Greens Creek; this should be rephrased, and the data used in this risk assessment cited. ■ thus, because of the uncertainty caused by uncited fish data, the statement that 'further evaluation of risk to piscivorous wildlife foraging in freshwater streams and creeks is not required' should be reconsidered.	Medium	Please provide more specific information about when and where fish samples were collected and the specifics about the fish collected. If this information is provide in another report, summarize the information in this report and refer to other report. This should be done in the review of existing studies. Please clarify what data was used in the RA.
CSP2-37:	**3.6.1.2 Second tier media screening** compares concentrations to those in reference areas. The rationale for this comparison is sound, but the reference areas to which concentrations are compared are not.	High	Duplicate of comment on reference areas.
CSP2-38:	**3.7 Data gaps** states that there were sufficient data to complete the CoPC screening, citing the three or more analyses for every analyte, in every medium, both for site and	High	Please provide additional rationale about the sufficiency of

No.	Comment	Priority	Recommendation
	reference conditions. However, three analyses per analyte standing as a reference, or four, eight, or nine analyses per analyte per site, does not provide enough data to reach a definite conclusion.		the coverage of the sampling. Please acknowledge that it would not be possible to make a definite conclusion, but sufficient samples could be collected to be scientifically defensible and be representative of site conditions.
CSP2-39:	The fate of all of the tundra ponds affected by the DMTS and by Red Dog should not be decided based on *three* samplings, particularly when the numbers vary greatly. For example, four tundra pond sediment samples' lead content varied from 8.96 mg/kg dw to 2,180 mg/kg dw (**table C-9**).	Medium	Please provide additional rationale as to why the number of samples collected is (or is not) sufficient to be representative of tundra ponds.
CSP2-40:	**4.2.2 Freshwater aquatic assessment** states that samples were taken from invertebrate tissue; where does lead collect in small animals? Should these samples have been taken from other parts of them?	Low	Please expand on the explanation of samples collected and terminology used to describe them. Does "invertebrate tissue" refer to whole-body, composite invertebrate samples? Please clarify the text accordingly.
CSP2-41:	**4.2.3 Costal lagoon assessment** says that fish sampling was "attempted." Details should be offered here, in particular following up on the statement made at a meeting in Kivalina (20 April 2005) that lagoon (s?) were seined for fish, and none were found. What time of year were the lagoons checked? How many times? Do subsistence users gather fish from lagoons? Have they been asked?	Low	Please expand on the explanation of samples collected. Please provide the information requested.
CSP2-42:	**4.3 Marine assessment and CoPC screening** mentions a prevailing northward current; this statement should be cited rather than saying "any field modifications" are discussed in Appendix E, those modifications should be detailed here, as they could have a large impact on the outcome of the sampling	High	Please add a new section that summarizes the field modifications.
CSP2-43:	**5 Human health risk assessment** states that "standard procedures developed by EPA and DEC, adapted, when appropriate, to the specific conditions of the site" What does this mean? When and where were these procedures adapted? Are all of these adaptations noted?	High	Please provide a list of the deviations from the EPA and DEC guidelines and an explanation for the deviations.
CSP2-44:	**5.2.1.1 Exposure point concentrations for environmental media** assumes that site soil concentrations are representative of conditions 5 km downwind (north) of the DMTS and ambient air boundaries, and 2 km upwind (south). It has been stated that concentrations of cadmium in moss are unaffected by mining-related deposition beyond 3 km to the south and 12 km to the north of the DMTS within CAKR. Data also suggests that mining-related lead deposition extends at least as far north as the Iyikrok hills, 25 km north of the DMTS (NPS 2004 32). Thus discussion of a 7 km swath as being	High	Please respond to comment and include rationale for the justification for stating that the aforementioned samples are representative of the larger area.

No.	Comment	Priority	Recommendation
	represented by samples taken from near the road may be appropriate given the limited data considered in this section; however, NPS 2004 suggests that there is a strong correlation between distance from the road and concentration of lead, cadmium, zinc, and aluminum. These findings should be considered in this section, and in the refined conceptual site model as a whole, because they present a far greater range of sampling locations then do the Phase I samplings.		
CSP2-45:	**5.2.1.2.1 Data used to calculate fish EPCs** states that all data comes from fillets of adult dolly varden collected. Subsistence users often consume the entire fish in some way, usually by boiling it into soup. If metals, particularly lead (which tends to reside in bone marrow), are contained in other parts of the fish besides its tissue, they wouldn't be considered in this risk assessment, but would be an added exposure pathway. Juvenile fish should also be sampled. While they may not be a primary exposure pathway at time of sampling, data could be used to examine growth and metal accumulation trends in different parts of a particular species.	Medium	Please provide a rationale for the use of fillets and include in the uncertainty section a discussion of the limitations of using fillets exclusively with respect to subsistence users.
CSP2-46:	**5.2.1.2.2 Data used to calculate caribou EPCs** states that all data comes from tissue; all parts of the animal which are consumed by subsistence users should be considered. Notes from a community meeting in Kivalina (20 April 2005) indicate that subsistence users do consume, among other things, caribou bone marrow. Evidence should be given detailing how and where each CoPC interacts with a caribou.	Medium	Please respond to issues raised by comment.
CSP2-47:	**5.2.1.2.3 Data used to calculate ptarmigan EPCs** states that all data comes from tissue; all parts of the bird which are consumed by subsistence users should be considered. Evidence should be given detailing how and where each CoPC interacts with a ptarmigan. Reference ptarmigan are mentioned, but the location of the reference site is not cited. Where is it? Were the reference ptarmigan far enough from the mine and port sites to be unarguably free of mine-related contaminates?	Medium	a) Provide information on which parts of the ptarmagin were analyzed. Please either point to the location or provide a discussion on how birds metabolize metals. b) Provide information requested about the locations where ptarmagin were collected.
CSP2-48:	**5.2.1.2.6.1 Fish** Lead and thallium may undergo different reactions/processes both before and after they are incorporated into a fish. Because of this, it is impossible to "estimate" an EPC for thallium in a fish's tissue by examining the relationship between the two elements in the fish's environment. The RA states that "the mean thallium concentration in surface water was divided by the mean lead concentration in surface water." This is not an appropriate determination of thallium in a fish's tissue. Furthermore, it has been shown that fish exposed to food-borne metals were more susceptible to toxicity than fish exposed to water-borne metals (Peplow 2005). Taking this into consideration, EPCs should have been derived using concentrations of metals in sediment, rather than surface water, to continue in keeping with the RA's conservancy.	Medium	Please provide response regarding the scientific validity of the approach used and possible uncertainties in the risk estimates created by it.

DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-49:	**5.2.1.2.6.2 Caribou** states that muscle tissue stands as 90% of the "food mass." Where does this figure come from? Similarly to fish, different chemicals are taken up at different rates and metabolized through different pathways, depending on their states or what compounds they may start out as a part of. A comparison, or ratio, of one element to another is not an appropriate measurement of toxicity, or an appropriate indicator of the amount of contamination an animal will undergo.	Medium	Please provide reference with respect to "food mass." Please provide the toxicological rationale for the use of ratios of chemicals.
CSP2-50:	**5.2.2.1 Lead exposure** see discussion of section **5.3** **5.2.2.1.2 Gastrointestinal absorption of soil lead** discusses the bioavailability of lead in Red Dog ore. However, it fails to consider the different conditions fugitive dust might undergo in the greater environment, some of which might increase bioavailability. According to Peplow (2005), mineral speciation, solubility of oxidized metals, and solubility products can be predicted using Eh-pH stability diagrams. A failure to examine mineral speciation is a failure to properly assess risk to the environment.	Medium	Duplicate of previous comments on speciation and bioavailability. Please develop a single response to this type of comment and refer to it.
CSP2-51:	**5.2.2.2.3 Subsistence food** again uses a strip 5 km downwind and 2 km upwind of the DMTS and mine ambient air boundary, which should not be representative of the whole of the site; see discussion of section **5.2.1.1** Should cite data that shows the extension of caribous' and fishes' home ranges beyond the subsistence areas. Which anadromous fish confine themselves to a single watershed? For those that do not (dolly varden), where do they go? Where do young fish and caribou do their growing? Animals would be most susceptible to toxic effects during this time.	Medium	Please provide a map or describe home ranges of the species evaluated.
CSP2-52:	**5.2.2.3 Review of existing subsistence food consumption rate** mentions that though dolly varden are anadromous, they are used to represent all of the fish in the Wulik watershed (or, streams in proximity to the DMTS). Salmon are not considered at all, because they are anadromous, and therefore 'spend very little time in freshwater near the DMTS.' First, if anadromous fish ought not to be considered because of their lifecycles, why are dolly varden used as representatives? Second, salmon (and all anadromous fish) spend their *formative* time in the Wulik watershed, where they would be exposed to contamination from fugitive dust. It is during this time that heavy metals, lead in particular, could be taken up into their bodies and, among other health effects, inhibit growth. For this reason, it is irresponsible to dismiss salmon as a species considered in this RA.	Medium	Please provide additional rationale on the selection of fish species evaluated.
CSP2-53:	**5.2.3.1.4 Gastrointestinal absorption fraction of lead from soil** see discussion of **5.2.2.1.2**	Medium	Similar to Peplow comment on exposure routes. Please address the concern in the last paragraph in the uncertainty section.

No.	Comment	Priority	Recommendation
	5.3 Toxicity assessment explains that the CDC measures lead toxicity according to blood lead levels; it should discuss ■ "Only about 32% of the lead taken into the body of a child will leave in the waste. Under conditions of continued exposure, not all the lead that enters the body will be eliminated, and this may result in accumulation of lead in body tissues, notably bone" (ATSDR 1999) ■ "Increases in blood lead levels during infancy and childhood are associated with attention deficits, increased impulsiveness, reduced school performance, aggression, and delinquent behavior" (Schettler et. al. 2001) ■ "These and other data suggest that there may be no threshold for the adverse consequences of lead exposure, and that lead-associated impairments may be both persistent and irreversible" (Canfield et.al. 2003) ■ "In isolation, each of these studies demonstrates merely an association between lead levels and impaired metal development. However, the volume and consistency of the epidemiological evidence and the strength of the prospective, longitudinal study designs, in conjunction with evidence supporting the biologic plausibility of the neurotoxicity of lead, provides persuasive evidence that low-level lead exposure results in persistent impairment of learning and other complex cognitive tasks" (Sanborn et. al. 2002). States that "none of the site CoPCs is classified by EPA as a carcinogen for the exposure routes relevant to this assessment." Peplow (2005) explains that exposure routes, and their completeness, was decided arbitrarily in this RA, implying that some routes may exist that are only partly or are not considered. What if a CoPC acts as a carcinogen for an exposure route that has gone unconsidered?		
CSP2-54:	**5.4.3.3 Discussion of ADPH blood lead surveys** should not be included. The conclusions drawn in the 2004 and 2005 reports are statistically unfounded: a sample size of ten in Kivalina (only two of them under the age of 18, and none under the age of 6) combined with data from Noatak (ADPH 2004), presumably to make a sample size more viable, is not statistically worthwhile, and any statement made or supported by such data is not made or supported by true science.	Medium	Please ensure that the weaknesses of the above mentioned reports are described when these reports are described in the RA.
CSP2-55:	**5.4.3.4 Estimated fish and caribou CoPCs** see discussion of section **5.2.1.2.6.2** **6.7.2 Freshwater habitats** should consider the possibility of runoff from contaminated soil carrying metals into ponds and streams, whether they or temporary or permanent water bodies. This is a potential pathway, as animals might consume or live in temporary ponds filled with contaminated runoff water (in particular, when metals-laden snow melts in the spring, filling depressions which feed and water growing plants, animals, and the plants that animals eat, which do most of their growing in the spring).	Medium	Any seasonal elements of risk that were not evaluated in the ERA should be clearly identified and discussed in the uncertainty section. The need for follow-up investigations to address these uncertainties should be seriously considered.

DEC's comments/recommendations on: Center for Science in Public Participation (CSP2) Comments (dated 11 July 2005) on the DMTS Fugitive Dust Risk Assessment Prepared by Exponent for Teck Cominco Alaska Incorporated (dated April 2005)

No.	Comment	Priority	Recommendation
CSP2-56:	**6.7.3 Coastal lagoons** see discussion of section **4.2.3**, regarding whether or not fish live in coastal lagoons **Appendix A, figure A-3** includes a note stating "Surface water samples at stream stations will be collected separately as part of regular monitoring by Teck Cominco". This data becomes the basis for all of the freshwater stream assessments (CoPC screening, comparisons with references and water quality standards). How were their stations chosen? How were the samples taken?	Low	Please respond to the questions in the comment.
CSP2-57:	**Appendix C** does not include *any* reference data for fish tissue (site data is in **table C-23**)	Medium	Please include the appropriate reference data.
CSP2-58:	**Table 3-3** shows the sample coverage (number of samples) for site (onsite) and reference (offsite) data that were used in the CoPC screening. Several of the metals have very small sample sizes and few locations. There may be too few in some cases to be able to screen out risks to that pathway with statistical confidence. Should reflect how may of each sample by analyte come from each survey – for example: terrestrial / tundra soil / site **Pb** **Phase1RA** approx 15 **PSCHAR** approx 250 **EnSR92** approx 30 Approximations are derived from appendix C, table C-3	Medium	Please provide response regarding sample-size limitations and how they impact the power of statistical comparisons between the site and reference areas.
CSP2-59:	**Figures 5-3 and 5-4** report subsistence areas from a 1983 source, or areas defined more than twenty years ago	Medium	Please use the most up-to-date information available.

Key:
ACAT = Alaska Community Action on Toxins
CSP2 = Center for Science in Public Participation
DEC = Department of Environmental Conservation (Alaska)
NA = Not Applicable
TC = Teck Cominco

Notes:
1. Comments were prepared by Amy Crook (CSP2) and Erin Steinkruger (ACAT) and were submitted on behalf of the following groups: Alaska Community Action on Toxins; Alaskans for Responsible Mining; Trustees for Alaska; Northern Alaska Environment Center; Alaska Center for the Environment; National Parks Conservation Association; Alaska Conservation Voters; and Alaska Conservation Alliance. Dr. Daniel Peplow, University of Washington, provided input to the comments.
2. See original comment letter from CSP2 for full citations of cited literature.