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Response to DEC Comments on the Draft Phase II Field Sampling and Analysis Plan for the DMTS Fugitive Dust Risk Assessment

The following responses are provided in response to DEC comments on the Draft Field Sampling and Analysis Plan for the DMTS Fugitive Dust Risk Assessment dated April 2004. Each DEC comment is provided in italics and numbered as provided in the comment document. Responses are shown beneath each comment in regular type.

Human Health Risk Assessment (Comments 1 through 5)

Comment 1

The list of COPCs to be sampled in Ptarmigan seemed to be based on the road surface soil COPC list. Is the assumption being made that this is the only soil to which the ptarmigan will be exposed? It uncertain that is a reasonable assumption.

Due to changes in human health COPC screening procedures (i.e. eliminating infrequency of detection above screening level criteria), antimony and thallium should be added as analytes for analysis of ptarmigan tissue. Therefore the analytes should be barium, cadmium, lead, zinc, antimony, and thallium. Given that road surface soil is likely not the only media to which a ptarmigan may be exposed, other COPCs may need to be added.

Although metal levels are expected to be highest in kidney and liver tissue of ptarmigan, to evaluate subsistence use it would be important to also sample any additional portions of the ptarmigan that are consumed.

Ptarmigan collected should be equivalent to the size and age of ptarmigan hunted as food source by the local communities. Use of local hunters will assist with this.

Response: The human health CoPC list for the terrestrial environment is based on the soil screening conducted using surface soil samples from the road surface, road shoulder, and port facilities areas. The soil screening criteria used for the human health terrestrial screening are based on direct human contact with soil. They are considered conservative because they are based on a child's residential exposure to metals in soil, rather than the more intermittent exposure that would likely occur at the site. Based on the screening procedures (as modified in response to DEC comments and discussion on the risk assessment work plan), the human health CoPC list for the terrestrial environment includes antimony, barium, cadmium, lead, thallium, and zinc. The metals on the CoPC list that is based on the terrestrial screening will be the risk drivers for the site, and thus will be evaluated in subsistence foods as well as soil. These

screening values are inappropriate for screening media that would not be subject to consistent human contact, such as tundra soil, which is located below the live tundra vegetation mat.

Because of their behavior, ptarmigan would not normally come into contact with tundra soil, which is 2 to 6 in. below the surface, underneath the live vegetation mat. However, even if ptarmigan were to come into contact with tundra soil, rather than using soil-ingestion based screening criteria, the appropriate screening criteria for the tundra soil would be based on uptake into ptarmigan and subsequent human consumption of the ptarmigan. Such criteria do not exist, nor are the data available to confidently derive those criteria. Furthermore, human health soil screening criteria based on this indirect exposure route would be substantially less conservative than criteria based on direct human ingestion of soil. Even if one were to screen the tundra soil in potential ptarmigan habitat against human health direct contact screening criteria, there would be no additional CoPCs because the maximum tundra soil concentrations in that habitat are less than the maximum surface soil concentrations from road surface, port soil, and road shoulder samples that were used in the human health screening, and/or they are below the soil screening criteria. Table 1 presents a comparison of tundra soil samples from potential ptarmigan habitat with surface soil concentrations, as discussed in the comment resolution conference call of May 13, 2004. Ptarmigan habitat does not include areas immediately adjacent to or within active port facilities.

Ptarmigan make up a very small part of the subsistence diet (less than one-half of a percent). The organ meat, if eaten, would comprise a miniscule portion of the diet. The liver and kidney were selected for analysis because 1) they are the organs most likely to accumulate metals consumed by the ptarmigan, and 2) metals concentrations for those organs have been reported in the literature and can be used for comparison. As agreed upon in the comment resolution conference call of May 13, 2004, no additional organs will be analyzed.

Ptarmigan are typically harvested on an opportunistic basis; they are not specifically hunted, but if hunters come across them and have no other meat they may shoot them. As such, the ptarmigan collection conducted in the field sampling program should yield ptarmigan similar to those collected for subsistence use. Only adult animals will be collected.

Comment 2

Page 2-12 of the RAWP lists the representative subsistence foods that will be used in the HHRA. They are:

- *Plants – berries, sourdock*
- *Mammals – caribou*
- *Birds – ptarmigan*
- *Freshwater Fish – various, based on available data*
- *Lagoon and coastal marine species – to be evaluated if metals concentrations in marine sediment and water are elevated*

Based on Table 3-2 of the RAWP (Table 2 of the FSP), available data for these representative foods include:

- *Plants – DEC 2001 investigation, fugitive dust study 2002*
- *Mammals – Exponent 1996, 2002 caribou investigation*
- *Fish – various studies*

As we have discussed, some COPCs were not evaluated in these studies. Based on ongoing dialogue we understand that Teck Cominco's intention is to estimate concentration of additional COPCs in the food source of interest using a simplified model that is based on uptake of metals which were evaluated. This is acceptable to ADEC and this comment is included simply to confirm.

Based on the COPC screening tables in the RAWP there are exceedance of ecological benchmarks in the lagoon and marine sediments, therefore marine species should be evaluated. We recognize that Teck Cominco has already agreed to include sampling of fish in the coastal lagoons based on conversations had regarding the risk assessment.

There is no information in the FSP on collection of additional marine sediment samples or marine species. As Teck Cominco is planning sampling the marine sediment this summer as part of ongoing monitoring of the marine sediment it seems appropriate to include that in the field sampling plan. We feel further evaluation of the marine environment is justified. The community has identified marine fish, shellfish, and sea mammals as subsistence resources (Table 2-4 of RAWP), but the extent of subsistence resources near the port is unclear despite previous marine biota surveys (2001 RWJ Consulting). How will the risk from consuming these subsistence resources be evaluated? Will sediment and water samples be used to model contaminant levels in marine subsistence resources (i.e. clams, fish, marine mammals)? Is sufficient information available to conduct this modeling? If not, it may be appropriate to collect marine samples in the port area, such as shellfish, and data to determine bioaccumulation potential.

Response: Sediment samples will be collected from the shiploader area and analyzed for CoPCs as part of Teck Cominco's ongoing monitoring program. These data will be used to assess current conditions and temporal trends in CoPC concentrations and to determine whether additional evaluations such as sediment toxicity testing may be required. Extra sediment volume will be collected during the sampling and archived for possible use in sediment toxicity testing, pending review of analytical results for the sediment samples. Further details on the sediment sampling and on the criteria under which toxicity testing would be conducted are provided in the revised field sampling plan.

As discussed in the comment resolution conference call of May 13, 2004, a decision on whether and how to evaluate the marine environment for potential impacts on human health is pending the 2004 results of Teck Cominco's ongoing monitoring program. If toxicity testing is performed (per the criteria described in the revised field sampling plan), and the results indicate toxicity from marine sediment is present in the port area, then further review will be made to

determine whether modeling of risk from consumption of marine subsistence food resources may be needed.

Comment 3

Five ptarmigan samples alone may not be adequate if the intention is to use reference values to establish a background level for the purpose of screening out COPCs in ptarmigan. Based on ongoing dialogue we understand that reference ptarmigan samples will not be used to determine background levels. Please confirm.

Response:

The reference ptarmigan will not be used to screen ptarmigan. The purpose of the reference samples is to have a frame of reference of what metals concentrations are under background conditions. Because we know that metals are present naturally in the environment and that ptarmigan will have a certain level of metals in them without any anthropogenic influence, it will be important to have an understanding of what portion of the risk we calculate could be associated with background conditions and, by extension, what portion might be related to the site.

Comment 4

Please take photographs of ptarmigan samples.

Response: Ptarmigan samples will be photographed.

Comment 5

Note – will evaluate if appropriate detection limits are being used upon delivery of the QAPP.

Response: Comment noted.

Ecological Risk Assessment (Comments 6 through 22)

Comment 6

Table 1 would be improved if the specific plants being collected were listed in the "Food Item" column. For example, for the ptarmigan, it would be more informative if "Prostrate Willow (leaves and new shoots)" were listed in this column instead of "Terrestrial Vegetation." This change would allow a reader to readily see which plant species will be used for which receptor without referring to other tables or sections of the sampling plan.

Response: Food items have been identified in Table 1.

Comment 7

Table 1 indicates that only lead and zinc are COPCs for the brant in coastal lagoons. However, the February 2004 Risk Assessment Work Plan (see page 3-34) indicates that cadmium, lead, zinc, and 11 other metals (Al, Sb, As, Ba, Cr, Co, Hg, Mo, Se, Tl, V) will be considered COPCs for this herbivorous receptor. Please address this issue.

Response: Table 1 was incorrect as stated in the draft FSP. The CoPC list for brant has been revised and now includes all 14 metals noted by DEC in Comment 7.

Comment 8

Table 4 indicates that no stream sediment will be collected. However, based on recent discussions, we understand that stream sediment will be collected and analyzed for COPCs in areas where benthic surveys are conducted and aquatic plant samples are taken, so any observed impacts can be related to COPC levels in sediment. Please confirm.

Response: Benthic invertebrate surveys are not being conducted in the stream environment. Instead, drift nets will be used to collect aquatic invertebrates in the water column. Therefore, no paired sampling of stream sediment with invertebrate collections is planned. However, bank tundra soil samples will be collected at the locations where willow and sedge samples will be collected.

Comment 9

Based on recent discussions, ADEC understands that pH, dissolved oxygen, temperature, conductivity, and salinity will be measured in all aquatic habitats sampled (streams, tundra ponds, coastal lagoons). The sampling plan should be revised to reflect this modification.

Response: Water quality parameters (e.g., pH, dissolved oxygen, temperature, conductivity, and salinity) will be measured in all aquatic habitats sampled.

Comment 10

Based on recent discussions, ADEC understands that fish will be collected from coastal lagoons near the Port. The sampling plan should be revised to reflect this modification.

Response: Fish sampling will be attempted at Port Lagoon North and the North Lagoon and at one reference lagoon. Details on methods are provided in the revised FSP.

Comment 11

Based on recent discussions, ADEC understands that sediment toxicity tests may be conducted with sediment from the coastal lagoons and perhaps also from other aquatic habitats. The

sampling plan should be revised to reflect this modification. The specific tests planned should be described.

Response: Benthic community analysis is planned at the site and reference lagoon stations. Sediment toxicity tests are proposed as an alternative measurement endpoint in coastal lagoons if sampling indicates that benthic invertebrates are scarce or absent at site and reference lagoon stations. Sediment toxicity testing may also be conducted in the marine environment, under the conditions described in the revised FSP. Details on methods are provided in the revised FSP.

Comment 12

Small mammals should be taken closer to the road than 100 meters (m) on transects TT2, TT3, TT5, and TT6. Based on the dimensions of the sampling grid shown in Figure 2 (30 x 30 m), a grid centered at 15 m would not overlap the haul road and would be 55 m from the grid centered at 100 m. Because contaminant levels in tundra soil and vegetation are much higher near the road than at a distance of 100 m (Ford and Hasselbach 2001), it is important to collect small mammals as close to the road as possible.

Response: One additional small mammal sampling grid will be placed at 20 m on transects TT2, TT3, TT5, and TT6.

Comment 13

Please provide the rationale as to why small mammals are not being collected from transect TT8.

Response: Characterization sampling has indicated that CoPC concentrations in source media do not vary greatly along the central portion of the DMTS road. Therefore, it is likely that CoPC concentrations in small mammals collected from TT3 will be representative of concentrations in small mammals elsewhere along the central portion of the road.

Comment 14

Please provide the rationale as to why terrestrial invertebrates are being collected only from transects TT5 and TT2 and not also from other transects.

Response: Transects TT5 and TT2 were selected for invertebrate sampling as previous sampling has indicated that these locations have high soil CoPC concentrations and thus are more likely to show uptake by terrestrial invertebrates. Given the expected difficulty in obtaining sufficient invertebrate mass for tissue analysis, the number of samples will need to be limited. However, the FSP has been modified to indicate that additional sampling may be conducted on Transect TT3 depending on the success of invertebrate sampling at TT5 and TT2.

Comment 15

In the RAWP Tin was screened out of the stream surface water and the lagoon water environment based on the lack of screening criteria. At this point it is recommended that you please include tin in COPCs for the stream and lagoon related samples to determine if it is present in higher trophic levels.

Response: Due to the lack of media screening criteria, the risk to lower trophic levels from tin will be discussed qualitatively in the ecological risk assessment. Screening-level food web models indicated that tin is not likely to pose an unacceptable risk to higher trophic level species foraging in tundra, ponds, streams, or lagoons, and no further analysis of tin in prey tissue is proposed.

Comment 16

Vegetation plots should be established closer to the road than 100 m on transects TT5, TT6, and TT8. Because contaminant levels in tundra soil and vegetation are much higher near the road than at a distance of 100 m (Ford and Hasselbach 2001), it is important to evaluate impacts to vegetation at a distance of 10 m.

Response: One additional vegetation sampling plot will be added at 10 m on transects TT3, TT5, and TT6.

Comment 17

It is not clear why the vegetation plots (10 x 10 m) have diagonal transects extending from their corners. According to page 26 (see bullet in middle of page), cover and frequency will be estimated from the ten microplots in each vegetation plot. Why is it also necessary to use transects to estimate cover? Is the design shown in Figure 7 specified by Daubenmire (1959)? If the transects are retained, they should be oriented parallel to the haul road (not diagonal to it) since the goal is to estimate cover at specified distances (10, 100, and 1000 m) from the road.

Response: The study design was selected to be consistent with previous vegetation monitoring conducted around the mine. However, the design shown in Figure 7 has been modified so that transect orientation is parallel to the DMTS road.

Comment 18

The sampling plan indicates that stream benthic invertebrate community structure will be determined at only one reference stream station. Please provide the rationale for this decision. Please address how the natural variability will be accounted for.

Response: The FSP has been modified to indicate that invertebrate community structure will be determined at three reference stream locations. Community structure will be based on organisms collected in drift nets, not benthic samples.

Comment 19

The sampling plan indicates that coastal lagoon benthic invertebrate community structure will be determined at only one reference lagoon station. Please provide the rationale for this decision. Please address how the natural variability will be accounted for.

Response: The FSP has been modified to indicate that benthic community structure will be determined at three reference coastal lagoon stations.

Comment 20

Please photograph all sample locations and samples (soil, sediment, small mammals, ptarmigan, etc.).

Response: All sampling stations will be photographed. Representative photographs will be taken for all sample types collected. Any unusual characteristics of samples collected will also be documented in photographs.

Comment 21

Is hantavirus present in small mammals in western Alaska? If so, precautions should be taken during sample collection and handling to avoid possible transmission of the virus to samplers and analysts.

Response: Hantavirus is not known to occur in small mammals in western Alaska. Basic health and safety concerns are addressed in the Health and Safety Plan.

Comment 22

Sediment samples should be collected from the area at the end of the shiploader. The samples should be analyzed for COPCs and used in sediment toxicity tests with a suitable marine invertebrate. These data are needed to: (1) assess temporal changes in COPC levels at this location since controls were implemented last year; (2) determine if remaining levels of sediment contamination are adversely affecting indigenous benthic life; and (3) to establish a baseline against which future monitoring results can be compared.

Response: Sediment samples will be collected from the shiploader area and analyzed for CoPCs as part of Teck Cominco's ongoing monitoring program. These data will be used to assess current conditions and temporal trends in CoPC concentrations and to determine whether additional evaluations such as sediment toxicity testing may be required. Extra sediment volume will be collected during the sampling and archived for possible use in sediment toxicity testing, pending review of analytical results for the sediment samples, as described in the revised FSP.

Table 1. Comparison of soil and tundra soil concentrations

Chemical	Soil Maximum[a]	Tundra Soil Maximum[b]	Comments
Aluminum	16,600	8,240	Lower than soil
Antimony	14.8	10.8	Lower than soil
Arsenic	93.6	10.3	Lower than soil
Barium	7,090	5,810	Lower than soil
Cadmium	388	67.0	Lower than soil
Chromium	24	13.8	Lower than soil
Cobalt	27	17.9	Lower than soil
Copper	109	37.1	Lower than soil
Fluoride	1.3	ND	Lower than soil
Iron	35,000	23,800	Lower than soil
Lead	48,300	3,600	Lower than soil
Manganese	1,000	2,030	Lower than maximum reference concentration of 6,620
Mercury	1.69	1.58	Lower than soil
Molybdenum	3.3	2.84	Lower than soil
Nickel	56.8	32.5	Lower than soil
Selenium	3.0	3.3	Below soil screening level of 68
Silver	8.3	5.41	Lower than soil
Strontium	90.1	75.6	Lower than soil
Thallium	1.32	1.14	Lower than soil
Tin	6.0	14	Below soil screening level of 8,213
Vanadium	31.8	16.1	Lower than soil
Zinc	64,300	15,000	Lower than soil

Note: ND - no detected values in ptarmigan habitat areas

[a] Maximum soil concentrations (mg/kg) from Table 3-14 in the risk assessment work plan (based on detected results only).

[b] Maximum tundra soil concentrations (mg/kg) in ptarmigan habitat areas (based on detected results only).