Response to U.S. Environmental Protection Agency (EPA) Comments (dated 7 July 2005) on the April 2005 Draft DMTS Fugitive Dust Risk Assessment

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EPA-1	**Exposure Areas** The DTMS includes 52 miles of road corridor and the port facility. In such a large study area, it is reasonable for people, especially children, to be primarily exposed to smaller portions of the site. At a minimum, EPCs and associated risk estimates should be calculated separately for the port and the road corridor. The environmental setting and exposure point concentrations significantly differ between the port and the road. The potential exposure from the port area is inappropriately diluted by the overwhelming size of the road corridor.	High	Please provide rationale for using only one EPC as opposed to the method proposed by EPA. In the uncertainty section of the human health RA, please indicate the magnitude of change in the risk estimates that would result for the port and haul road if the areas were evaluated separately versus combined.	Although the site is large, the type of activities that could potentially occur on the site, and which are being evaluated in the risk assessment, would not be focused in one area over time. Unlike a residential scenario, subsistence activities, if they occur on site, would occur over large areas. Exposure would, thus, integrate differing exposure concentrations over the entire site. In addition, subsistence harvesters, and children in particular, would never actually be exposed to the soil metals concentrations used to represent the port area of the site. Those data were collected only on port facilities areas, yet are used in the risk assessment to represent exposure concentrations over the entire assumed 7-km-wide site area around the port despite the fact that concentrations drop off sharply with distance from the DMTS. This fact alone ensures that the EPCs greatly overestimate actual exposure concentrations, both around the port and the road. Nevertheless, as agreed upon in recent discussions with DEC, regarding DEC comment HH-8, two sets of risk estimates are now presented in the main text and tables of the HHRA: 1) Based on area weighting of soil concentrations, as was previously done 2) Based on an average of the port EPCs and the road EPCs, without area weighting. The area-averaged EPCs were calculated as the arithmetic mean of the port soil EPC and the road soil EPC. EPCs based on each of the two methods are presented in Table 5-1. Risk estimates for each of the two methods are presented in Tables 5-17 through 5-48. A complete set of section 5 tables is attached (Tables 5-1 through 5-48).	Response is acceptable.
EPA-2	**Misapplication of Fractional Intake to Large Home Range Species** While the general approach of reducing exposure by the ratio of the site area to the larger exposure area is reasonable for non-mobile exposure media, it is not reasonable for caribou or Dolly Varden. These species are mobile and their body burden of metals reflects their use patterns which occur on and off-site. Although the tissue concentrations are not exclusively caused by site contamination, the unadjusted body burdens are representative of exposure to consumers. The relative contribution of site-related sources to these receptors should be addressed in the uncertainty discussion for these species. For other exposure media, where application of a 0.09 fractional intake term may be more appropriate, it is necessary to account for the remaining 91% of the exposures, assuming "market basket" or background exposures, because IEUBK inputs must account for all sources of exposure, regardless of site-related origin. Because blood levels are reflective of relatively short periods of exposure (acute to subchronic durations of weeks or	High	Please address the issues raised, specifically the relative contribution of site-related sources to body burdens. Augment the uncertainty discussion as recommended by EPA. Revise the text as necessary so it is clear that site–related exposure were added to background exposures in the human health RA.	In response to the comment, Section 5.4.3.7 (Fraction Intake) was updated as follows: *The fractional intake from the site is an area of uncertainty. Fractional intake is intended to account for the fraction of total media exposure (soil, water, berries, sourdock, and ptarmigan) that occurs at the site.* *For stationary subsistence foods (i.e., berry and sourdock) and foods with a small home range (i.e., ptarmigan) the FI represents the fraction of that food type collected from the site relative to all areas where it is collected. It is true that harvesting can only occur where the food item is available, and not evenly throughout the subsistence harvest area. However, in the absence of data to the contrary, it is a reasonable assumption that a person would be equally likely to harvest a given food on a similarly sized area off the site as on the site. As an example, berries do not grow evenly throughout the site. However, the proportion of the "site" harvest area covered by berries can reasonably be assumed to be similar to the proportion of the "non-site" harvest area covered by berries. And if a person is equally likely to harvest from each of the berry harvesting areas, an FI based just on berry-harvesting areas would be the same as the FI that was calculated based on the entire harvest use area. And a person may, in fact, be more likely to use a berry harvesting area nearer to home, which would be off-site, than one onsite that*	Response is acceptable.

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	months as opposed to years), the temporal uncertainties of fractional intake should be discussed. Higher levels of site-related subsistence are more likely to occur over shorter periods of time.			*is further away (and off-limits). Thus, it is likely that the FI, as calculated, overestimates fractional intake from the site.* *For subsistence food animals with large home ranges (e.g., caribou and fish), FI is intended to account for the fraction of the animal's life that is spent at the site, and thus the fraction of metal content in the animal that is theoretically attributable to the site. As with the plant foods and ptarmigan, it is based on the area of the site relative to the total area of subsistence harvest. For caribou and fish, the metals concentrations in those animals already integrate the animals' exposure over their entire home range. But only a fraction of the metals detected in these animals would have been derived from site exposure. Given that there appears to be no significant difference in metals concentrations in site caribou relative to caribou from elsewhere in Alaska (Appendix H), it can be inferred that site caribou do not appear to have been exposed to greater amounts of metals at the site than elsewhere in their home range. Thus, the fraction of metals detected in those caribou that could be attributed to site exposure can be estimated by the fraction of time spent at the site relative to elsewhere in their home range, which can in turn be estimated by the fraction of the area of the site relative to their entire home range. In fact, the home ranges for both caribou and fish are far larger than the subsistence harvest areas for Kivalina or Noatak. Subsistence use over a larger area would reduce the FI related to the site because it would increase the denominator (i.e., the total area used for subsistence harvesting and hunting), without affecting the numerator (i.e., the portion of subsistence use area on the site) in the FI calculation. A lower FI would result in lower risk estimates. Thus, the FI likely greatly overestimates the fraction of metals in these animals that is attributable to the site. In addition, the results of the caribou metals evaluation (Appendix H) suggest that metals concentrations in caribou harvested at the site are not elevated relative to background. If that were indeed the case, any risk estimate based on caribou metals concentrations, regardless of the FI applied, would be an overestimate of site-related risks.* *While it is difficult to quantify the exact fractional intake, it can be estimated using knowledge of use patterns. For the DMTS risk assessment, three primary sources of information were used to estimate fractional intake:* *1) Previously published information on the extent of subsistence use areas for Kivalina and for Noatak (Dames & Moore 1983a,b); 2) Knowledge of the nature and extent of metals concentrations around the DMTS; and* *3) Information about standard work schedules at the Red Dog mine.* *The estimated fractional intakes used in the risk assessment (0.09 in the subsistence use scenarios; 0.67 and 0.03 (while off work) for soil ingestion and 0.045 for food/water consumption in the worker/subsistence use scenario) may over- or underestimate the actual fractional intake from the site. This issue is partly addressed by inclusion of risk estimates using an alternative caribou fractional intake of 0.2, as described in Section 5.2.2.2.3. To further address this uncertainty, the effect of altering the fractional intake on the estimated risks from exposure to non-lead metals was evaluated.*	

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				For the child subsistence use scenario, a cumulative hazard index of 1.0 is estimated only when the assumed fractional intake is 0.36 (i.e., 36 percent of all soil, water, and food consumption was from the site). If a fractional intake of 1.0 is assumed (i.e., that 100 percent of all soil, water, and food consumption was from the site), the resulting cumulative hazard index is2.9. While this hazard index exceeds the target of 1.0, it is still within the degree of uncertainty inherent in the RfDs used to calculate risks. In addition, risks from individual CoPCs are not typically considered cumulative and summed unless the target organ and mechanism of action on which the RfD is based are the same. Only two CoPCs (i.e., barium and cadmium) have RfDs based on effects in the same target organ (the kidney). In reality, the fractional intake from the site would never be 1.0 for a child, and the FI of 0.09 used in the risk assessment likely significantly overestimates an actual child's contact with the site. *For both the adult subsistence use and the combined worker subsistence use scenarios, a cumulative hazard index of 1.0 was estimated only when the assumed fractional intake was 0.95 (i.e., 95 percent of all soil, water and food consumption was from the site). If a fractional intake of 1.0 is assumed, the resulting cumulative hazard index is 1.1. Again, this is within the degree of uncertainty inherent in RfD derivation, and no individual CoPC exposure would result in a cumulative hazard index exceeding 1.0, even with a fractional intake of 1.0. Although an adult may come into contact with the site to a greater degree than a child, an actual adult would still never attain 95 percent of their soil, water, and food from the site. Furthermore, site restrictions do not allow subsistence harvesting on the site at all.* In addition to the site-specific fractional intake, at the request of DEC risks were also calculated using an alternative caribou fractional intake of 0.2. This value was calculated using the area reported to have cadmium levels elevated above background by Hasselbach et. al. (2005) as the site harvest area. . The following text was added to the last paragraph of Section 5.2.2.2.3 (Subsistence Food): *An additional set of risk estimates was calculated using an alternative caribou FI of 0.2 because of the uncertainty surrounding the amount of impact site metals might have on caribou metals concentrations, and because of the unique role of caribou in the diet and culture of people from the region. At the request of DEC, this alternative value was calculated using the area reported to have cadmium levels elevated above background by Hasselbach et. al. (2005) as the site harvest area.* The appropriate degree of future monitoring of subsistence foods will be evaluated during development of the risk management plan. --- DEC's comment indicating that fractional intake should not be applied to ingestion rate referred specifically to the soil ingestion rate in the IEUBK model (see DEC comment HH-14). Accordingly, fractional intake was applied to the soil lead concentration for the IEUBK model input, as requested.	

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				The IEUBK model was applied in a way that takes into account potential background dietary lead exposure. Specifically, current default dietary lead input values were included when running the model. These values are listed in Table 5-6 as *Diet Intake*. In addition, estimated subsistence diet lead intake related to the site was also included when running the model. This value is listed in Table 5-6 as *Alternative Source, Subsistence Food*. Using this method would more likely overestimate dietary lead intake because it assumes that people would consume the amount of lead in a typical complete diet from store bought foods in addition to the estimated amount of lead in subsistence foods. The ALM also takes into account potential background dietary lead intake. Specifically, the baseline blood lead input into the model accounts for lead intake from all sources. Estimated subsistence diet lead intake related to the site was also included when running the model. This value is listed in Table 5-13 as *ADI (Average Daily Intake of lead from subsistence foods)*.	
EPA-3	**Representativeness of Caribou Samples** Exposure point concentrations of caribou do not reflect metal contributions from bone and bone marrow. Omitting of these tissue types is likely to underestimate exposure because bone and marrow are eaten by tribal consumers (Swan, 2005) and these tissues are likely to have higher levels of lead and other metals than other tissue types included in the laboratory analyses.	Medium	Please address in the uncertainty section the potential underestimation of risk due to not including bone and marrow in the evaluation.	The following information was added to the end of Section 5.4.3.10.1: *Despite evidence that caribou metals concentrations were similar to background, those concentrations were conservatively treated as if they were entirely site-related in the risk estimates. Furthermore, given the temporal juxtaposition of site exposure and tissue sampling, there is little reason to believe that bone lead levels would be elevated relative to background when tissue lead levels are not elevated relative to background.* *It should be clarified that bone and bone marrow are two different tissues. When discussing "bone" in this context, it is the mineralized (hard) portion of the bone. Bone marrow is part of the lymphopoietic system (lymphatics, blood, and blood forming tissue) and is related to bone only in its location in the body and in that it shares a name. While bone is a storage site for lead, bone marrow is not, and therefore it is important to discuss the two tissues separately.* *Bone marrow is the more likely of the two tissues to be consumed. Bone marrow would not be expected to be preferentially enriched in lead relative to the organs sampled. In fact, because caribou bone marrow is more than 95 percent fat (Nutrition Data 2006), it is not a good source of minerals in general, and would be less likely to store the metals being evaluated at the site than the muscle and organ tissues that were sampled. In addition, bone marrow would make up an exceedingly small portion of the caribou tissue consumed by humans relative to muscle. Thus, because it is not a storage site and is a relatively small part of dietary intake, inclusion of bone marrow would have little or no impact on the results of the risk assessment. Nevertheless, collection of bone marrow will be considered during the development of the risk management plan.* *Bone is a storage site for lead, and would be more likely to reflect very long-term exposure than soft tissues such as liver, muscle, and kidney. However, as with bone marrow, if bone consumption were included in the risk assessment, it would have little impact on overall risk results because bone would comprise a very small portion of the overall amount of caribou*	Response is acceptable.

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				consumed by people, compared with muscle tissue. In addition, it is important to remember that the caribou metals concentrations used in the risk assessment come from caribou that over-wintered at the site. If site metals do affect metals concentrations in caribou, it would be reflected in the recent "exposure" experienced by these over-wintering caribou, and highly vascularized soft tissues such as liver should reflect that exposure. *The primary limitation in the Exponent (2002e) evaluation (see Appendix H) was the lack of access to data for individual animals for the 1996 study groups from Red Dog and elsewhere in Northern Alaska. Although the comparisons made using means and standard deviations consistently indicate a lack of difference between Red Dog and other areas, a statistical comparison using individual sample concentrations would further clarify this area of uncertainty.* As discussed above, explicit incorporation of bone marrow data, if available, is unlikely to significantly affect the results of the analysis. However, consideration will be given to the possibility of sampling bone marrow as part of the next caribou sampling event.	
EPA-4	**Representativeness of Berry Samples** A tribal representative and community member has questioned the temporal and spatial representativeness of berry samples (Swan, 2005). Sample collection occurred during a year identified as particularly poor harvest (Swan, 2005). The timing of sample collection did not coincide with optimal gathering times defined by subsistence users (Swan, 2005). Additionally, sample locations accessed by helicopter are not representative locations readily accessible by Kivalina berry pickers (Swan, 2005).	Medium	Please discuss the representativeness of the berry sampling with respect to actual subsistence berry collection in the area.	Sampling locations and timing for the berry and sourdock sampling that occurred in 2004 were selected with the assistance of Kivalina community members. The sampling locations were selected in an effort to provide: 1) Additional data for the risk assessment, 2) Adequate data to do spatial and temporal analyses, and 3) Information that could inform public health recommendations for subsistence plant harvest. Although conditions and locations could never perfectly match every possible scenario, the best efforts were exerted to collect samples in locations and under the conditions representative of local practices. Future monitoring of berries will be addressed in development of the Risk Management Plan.	Response is acceptable.
EPA-5	**Moisture content and water losses during cooking** All of the contaminants of concern are metals, which are neither volatile nor lipophilic. Therefore, losses of moisture or fat which occur during heating would tend to concentrate metals. Exposure point concentrations should be adjusted to reflect moisture or fat content consistent with representative preparation techniques (Swan, 2005).	Medium	Please discuss in the uncertainty section the effects of cooking and drying on metal concentrations in subsistence foods and to what extent risk may be underestimated if Swan's recommendation is not followed.	The uncertainties associated with cooking methods are discussed in the revised risk assessment. In general, cooking methods would not alter exposure estimates significantly, if at all. In the risk assessment, subsistence food metals concentrations and consumption rates are based on uncooked wet weight. A cooking method that causes water loss could result in a higher metals concentration if the metals are not also lost in the water. However, consumption rates are standardized to total caloric intake in the risk assessment and water loss would not be accompanied by a loss in caloric content. The same amount of metals would be taken in per calorie eaten regardless of the change in food weight and metals concentrations with cooking. As an example, one pound of raw caribou contains about 570 calories (http://www.nutritiondata.com/facts-B00001-01c21Ch.html). That same one pound of raw caribou might weigh only three-quarters of a pound after roasting, but still contains about 570 calories (http://www.nutritiondata.com/facts-B00001-01c21Ci.html) because the moisture loss during cooking is not accompanied by loss of calories. If the	Response is acceptable.

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				original one pound of raw caribou hypothetically contained 100 *μ*g of lead, assuming no lead is lost during cooking (which may not be the case), there would still 100 *μ*g of lead in the roasted piece of caribou. And because consumption rates are standardized to caloric intake, the same amount of lead would be eaten whether a person ate the roasted three-quarter pound piece or the raw one pound piece.	
EPA-6	**Calculation of Site-Specific Lead Bioavailability** The results of the rat feeding study indicate that galena ore concentrates from Red Dog Mine are likely to have lower bioavailability than most other forms of lead (Arnold & Middaugh, 2001). However, juvenile swine are the preferred animal model for developing quantitative estimates of bioavailability as inputs into the EPA IEUBK Lead Model. The *Short Sheet:IEUBK Model Bioavailability Variable* states (U.S. Environmental Protection Agency Technical Review Workgroup for Lead, 1999): Bioavailability data (other than from published studies using the juvenile swine model) that are intended for use in an EPA risk assessment using the IEUBK should be sent for review by the Office of Emergency and Remedial Response (now EPA Office of Superfund Remediation Technology Innovation (OSRTI)). Pending acceptance of the rat results, or acquisition of additional data, the risk assessment should rely on default measures of bioavailability. The likelihood of less than default bioavailability should be discussed in the uncertainty assessment. Additionally, because of its low initial solubility, powdered galena ore concentrate is likely to be transformed into forms with increased bioavailability as it oxidizes (Brown, Foster & Ostergren, 1999).	High	Please include a discussion of the uncertainty associated with the lead bioavailability values taken from Arnold and Middaugh 2001 in the main text. Please also discuss the possibility that galena can be oxidized to more soluble forms.	There is some degree of uncertainty with regard to soil lead bioavailability at the site. To address this uncertainty, the risk assessment presents results using both EPA default bioavailability values and site-specific bioavailability values (as determined by the NTP rat study). In addition, text was added to the uncertainty section to further address this uncertainty. The following addition at the beginning of Section 5.4.3.3. addresses the fact that the NTP studies were performed using Red Dog ore, not surface soil: *When the ore concentrate particles, primarily galena, are exposed to air and water in the environment, over time the surfaces of these particles could become more oxidized. Increased oxidation could, in turn, increase solubility, which could be associated with increased bioavailability (Brown et. al. 1999). With environmental weathering, the lead in site soils may become more or less bioavailable in the environment. While there are no data available on the bioavailability of soil lead along the DMTS corridor, USGS (2003) has reported on the mineralogy of lead in Red Dog ore concentrate, port soil, Ikalukrok creek alluvium, and colluvial samples from deposits in the area. Scanning electron microscopy shows that galena particles in port soil exhibit morphology similar to ore galena particles: well-developed cubic cleavage with smooth faces. This is in contrast to galena particles from stream alluvium, which are rounded from physical/mechanical processes, and from colluvial samples, which are etched and rounded. It is noteworthy that neither the soil nor the alluvial galena particles are etched, indicating less oxidation than in colluvial samples, which could be related to a lack of acidic conditions. In any case, it should be noted that many of the geochemical forms of lead that would most likely be formed from oxidation of lead sulfide in the environment (e.g., lead sulfites, lead sulfates, and lead oxides) are also considered by U.S. EPA (1999b) to have less than default bioavailability. Thus, the approach used in the risk assessment of estimating risks based on both the IEUBK model default absolute bioavailability of 30 percent and the site-specific value of 9.7 percent should adequately address this area of uncertainty.* The second paragraph of the uncertainty section in Section 5.4.3.4 of the risk assessment has been revised to address limitations in the blood lead studies, consistent with DEC comment HH-23, as follows: *None of the 58 individuals had a blood lead level exceeding 10 μg/dL. Among the Kivalina participants, the geometric mean blood lead among individuals over 18 years of age was 1.1 μg/dL, with individual blood lead levels ranging from less than 1up to 7 μg/dL. Among Noatak residents, the geometric mean blood lead among individuals over 18 years of age was 1.7 μg/dL, with individual blood lead levels also ranging from less than 1 up to 7 μg/dL. It is noteworthy that the geometric mean values in both Kivalina and Noatak are less than or equal to the geometric mean for adult women estimated by the*	Response is acceptable.

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				ALM for this risk assessment. As shown in Table 5-17, the ALM predicted geometric means of 1.9 µg/dL and 1.7 µg/dL for the 30 percent and 9.7 percent bioavailability scenarios, respectively. Blood cadmium levels were similarly low. In addition, the last paragraph of the section prior to the numbered bullets was revised as follows: *Although interpretation of the results of the 2004 blood lead survey from a population level standpoint is limited by the small numbers of participants and the lack of data for small children (0-6 years old), the survey data are consistent with the following observations:* U.S. EPA. 1999b. Short Sheet: IEUBK Model Bioavailability Variable. EPA 540-F-00-006. U.S. Environmental Protection Agency.	
EPA-7	**TRVs for Large Mammalian Ecological Receptors** The use of results from a mouse study for the mammalian TRV for aluminum and results from a rat study for the mammalian TRV for Barium and applying this TRV to large mammals like moose and caribou seems inappropriate. Section 6.6.3.4 on Toxicity Reference Values included a thorough discussion of the background and uses of allometric scaling and briefly discusses how some of the HQ results would change but overall the majority of HQs would remain the same. This approach seems very reasonable when adjusting toxicity values from small animals to large mammals and a section that outlines the results and differences between standard TRVs and TRVs from allometric scaling would be helpful by including a table that would visualize those comparisons for CoPCs that demonstrated significant differences. Even though it may not change the overall conclusions, it would help the reader to see which CoPCs resulted in significant changes and a discussion of how it relates to ecological significance would be helpful.	Low	Please include a table comparing scaled and un-scaled TRVs. Discuss the significant of TRV scaling on the conclusions of the ERA as requested by EPA.	There is no strong evidence for application of scaling factors other than 1 for chronic avian or mammalian TRVs for metals (Sample and Arenal 1999). However, tables comparing scaled and un-scaled TRVs for avian and mammalian receptors are provided in the revised RA (new Tables ERA-1 and ERA-2 are attached for review). Section 6.6.5.5 (Uncertainty in TRV Extrapolation) discusses the implications of allometric scaling of TRVs on the ecological risk conclusions, and references the two additional tables. Overall, results indicate that conclusions regarding risk to wildlife species are largely unchanged whether or not allometric scaling is applied to TRVs. Scaling increases risk estimates for some receptors, such as moose and longspur, and lowers estimates for others, such as tundra shrew. Therefore, not applying scaling factors does not bias or increase uncertainty in risk estimates for receptors. Additional discussion was added to Section 6.6.5.5 (Uncertainty in TRV Extrapolation). The scaled TRVs were discussed in relation to how the risk conclusions for the key site-related chemicals would change if they were utilized for the heaviest and lightest mammalian and avian receptors, so as to provide a comparative range. Revisions were made to the last half of Section 6.6.5.5, and are provided below, starting with the sixth paragraph: *Because of the nature of the allometric scaling equation, application of this factor produces lower TRVs for heavier mammals (Table ERA-2). For example, the LOAEL for lead of 90 mg/kg-day for rats corresponds to a LOAEL of 60 mg/kg-day when scaled to a moose's body weight. To determine whether scaling would produce different conclusions regarding risk, exposure estimates for moose were compared with allometrically scaled TRVs. Using non-scaled TRVs, results for moose indicated NOAEL hazard quotients above 1.0 for aluminum at all sites, and for barium at the road site, but no LOAEL hazard quotients exceeded 1.0 for any of the analytes at any of the sites. Using scaled TRVs, no additional NOAEL or LOAEL exposures exceeded TRVs, with the exception of barium at the mine assessment unit, but only based on the 95% UCL on the mean exposure scenarios; the mean exposure scenario did not indicate barium exposures above TRVs using scaled TRVs. NoNOAEL or LOAEL hazard quotients exceeded 1.0 for cadmium, lead, or zinc using either scaled or non-scaled TRVs. Using the allometrically scaled NOAEL TRV, hazard quotients for barium would exceed*	Response is acceptable.

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				1.0 for the road and mine assessment units based on 95 percent UCL on the mean exposure scenarios, in addition to Anxiety Ridge Creek, where the barium NOAEL hazard quotient also exceeded 1.0 in the risk evaluation using non-scaled TRVs. *To further explore the nature of the allometric scaling equation for mammalian TRVs, shrews were also examined, because shrews are lighter than the test species, as opposed to the moose (above), which was heavier than the test species. Scaled TRVs increased for the shrew receptor, resulting in decreases in all hazard quotients. The greatest difference for shrews is that for a number of stations where NOAEL-based hazard quotients slightly exceeded 1.0 based on non-scaled TRVs, the corresponding hazard quotients are less than 1.0 when scaling is applied. Specifically, these changes occur for arsenic (at TT5-0010, TT5-0100, TT2-0010, TT3-0010, and TT6-0010), cadmium (at TT5-2000 and TT2-0100), mercury (at TT2-0100 and TT2-1000), selenium (at TS-REF-5 and TT2-0100), and vanadium (at TT2-0100). Also, there were no NOAEL-based hazard quotients above 1.0 when scaled TRVs were used for cadmium (at TT5-2000 and TT2-0100) and zinc (at TT5-0100, TT5-2000, and TT2-0010), and there were no changes for lead. In addition, LOAEL-based hazard quotients are less than 1.0 for barium (at TT2-0100 and TT3-0100) and selenium (at TT5-0010) if allometric scaling is applied. Therefore, when scaled TRVs are used to determine hazard quotients for the moose and shrews, which are the heaviest and lightest mammalian receptors examined in this risk assessment, the range of results suggests that scaled TRVs would indicate decreased risk for the shrews, and no changes in risk estimates for the moose, with the exception of barium at one site, and this exception only occurs when using the 95% UCL of the mean concentration.* *For birds, the application of the scaling factor (1.2) recommended by Sample and Arenal (1999) produced the opposite trend (Table ERA-1). For birds, TRVs increased for birds that are heavier than test species, but decreased for lighter wild species. Longspurs, which weigh less than test species, had slightly higher hazard quotients using allometrically scaled TRVs. The greatest difference is that NOAEL-based hazard quotients equal or slightly exceed 1.0 for mercury and zinc at all stations, including the reference area. However, the ranges of the hazard quotients at site stations (0.98-1.9 for mercury and 1.3-2.3 for zinc) are comparable to hazard quotients at the reference station (1.2 for mercury and 1.4 for zinc), indicating that incremental risk is negligible. No cadmium, lead, or zinc hazard quotients exceeded 1.0 for longspurs using either scaled or non-scaled TRVs. Using scaled TRVs, all hazard quotients would decrease slightly for snowy owls, which are heavier than test species, but these changes have no significant effect on risk estimates for any of the analytes, including cadmium, lead and zinc.* *Overall, results indicate that conclusions regarding risk to wildlife species are largely unchanged whether or not allometric scaling is applied to TRVs, and when scaled TRVs are used, results typically change in the direction of less risk, although scaling increases risk estimates for some receptors and lowers estimates for others. Therefore, not applying scaling factors does not bias or increase uncertainty in risk estimates for receptors.*	

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				As a result of questions raised in discussions with DEC, the following revisions were made to the uncertainty section for TRVs (Section 6.6.5.4): *Availability of toxicity data and suitability for use at a given site vary on a case-by-case basis. The selection of TRVs used in this assessment was based on an evaluation of the technical quality and ecological relevance of the study from which the values were taken. Modeled exposures were compared directly with the best available NOAEL and LOAEL TRVs derived from the literature, as outlined in the effects characterization (Section 6.5.2). The best available TRVs were selected based primarily on dietary exposure studies, as opposed to drinking water exposure studies. Dietary exposure studies were preferred to drinking water exposure studies, because drinking water ingestion was a very minor exposure route for wildlife receptors in the vicinity of the DMTS road corridor and reference areas. Those receptors receive the majority of their dietary exposures to CoPCs through the ingestion of food and soil or sediment (see Appendix K), and chemicals are bound up in those matrices and less available than dissolved species.* In addition, the following paragraph was added after the third paragraph of Section 6.6.5.4): *As mentioned above, efforts were made to select the best available TRVs, based on appropriate exposure studies and most relevant endpoints. For example, if both drinking water and dietary exposure studies were available, the dietary exposure study was selected preferentially. U.S. EPA (2005) recommended a mammalian lead NOAEL TRV of 4.7 mg/kg-day. The mammalian NOAEL for lead recommended by U.S. EPA (2005) was based on a drinking water study, and was therefore not an appropriate TRV based on the selection criteria. Additionally, deriving TRVs from exposure studies that are focused on chemicals dissolved in drinking water, which are highly available, is overly conservative and would overestimate exposure. For lead, a dietary exposure study was available, and therefore the mammalian NOAEL TRV used in this risk assessment was based on the more appropriate dietary study. Similarly, U.S. EPA (2005) recommended an avian lead NOAEL TRV of 1.63 mg/kg-day. The avian NOAEL for lead recommended by U.S. EPA (2005) was based on a paper that used Japanese quail as the receptor and the number of eggs produced as the relevant endpoint. Japanese quail have been bred specifically to have unnaturally high egg-laying rates, and therefore the relevance of "egg production" as the endpoint for wild birds is unclear. The meaning of extrapolating any apparent reproductive "effect threshold" in quail to wildlife receptors is unknown and highly questionable, because of differences in reproductive physiology. Instead, the NOAEL was derived from a study (Pattee 1984; see Section 6.5.2.9) that used a wild species (American kestrels), dietary exposure, and the relevant endpoints included body weight, food consumption, clutch initiation, interval between eggs, clutch size, fertility, and eggshell thickness. Therefore, the avian lead NOAEL TRV was based on the Pattee (1984) study.*	

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EPA-8	Page 5-3. The fish EPC was based on Dolly Varden fillets, which may underestimate metals concentrations if other parts of the fish are consumed (Ay, Kalay *et al.*, 1999).	Medium	Please indicate in the uncertainty section that EPCs for fish may be underestimated if other parts of the fish are consumed.	The following text was added to the end of Section 5.4.3.3.4 (Dietary Lead): *Lead concentrations in fillets from adult Dolly Varden collected by the Alaska Department of Fish and Game from the Wulik River from 1991 through 2003 were used in the risk assessment to estimate the fish lead EPC. Although other fish organs may also be consumed, tissue-weighted concentrations were not calculated for fish as they were for caribou and ptarmigan (described in Section 5.2.1.2.7). This is expected to have little to no impact on the risk estimates because 1) tissues other than muscle comprise a relatively small percentage of total fish consumption, 2) lead concentrations do not differ significantly between muscle and most other tissues (e.g., liver and kidney) of Dolly Varden collected in the Wulik by the ADFG (Scannell 2005), and 3) intake of lead from fish is less than 4 percent of total estimated dietary lead intake (Table 5-8).*	Response is acceptable.
EPA-9	Page 5-9. Drinking water exposure point concentrations should have been based on "end of tap samples" instead of unplumbed surface water. A weighted average of first draw and flushed samples is recommended for the input into the IEUBK Lead Model (U.S. Environmental Protection Agency, 2002).	Low	Please clearly indicate in the revised RA whether or not unplumbed surface water is used as drinking water at the site. The human health RA should use EPCs for surface water that reflect actual water use practices at the site.	Surface water *at the site* would only be ingested as unplumbed surface water. Thus, water samples collected directly from site streams were used. This reflects actual water use practices at the site.	Response is acceptable.
EPA-10	Page 5-12. Review fractional intake discussion. • Examine the assumption that all areas are equally likely to be used • Does DMTS road increase access and exposure to the site? • Do other site features (in addition to area) determine exposure likelihood or intensity (e.g., proximity to preferred areas, habitats, or migration routes)?		Please revise the discussion as necessary to ensure that the questions in this comment are answered.	In response to the comment, Section 5.4.3.7 (Fraction Intake) was updated as follows: *Furthermore, site restrictions do not allow subsistence harvesting on the site at all and the DMTS road does not increase access and exposure to the site, because the road is designated strictly for industrial use. Public use of the road is not permitted. Access control practices for mine, DMTS port and DMTS road facilities are defined and regulated by the air quality permits for the mine and DMTS port (No. 289TVP01 Revision 1, 290TVP01, and AQ0289MSS01). Additionally, the DMTS port facility public access control plan (Teck Cominco 2004) is specifically referenced and required by the DMTS port air permits and ADNR Tideland Lease Amendment No. ADL 412501. The only time subsistence users would be on the road is to cross it at one of the designated crossing points. Crossing of the road at other points is not permitted. Crossing of the port facility is permitted along the designated beach corridor, and large warning signs are posted at either end of the beach crossing. In addition, security of the port is also regulated under 33 CFR Subchapter H (homeland security requirements for maritime operations).* For large home range foods (i.e., caribou and fish), access and preferred areas would not affect the fractional intake estimate because for those subsistence foods, FI reflects the relative amount of time those animals spend at the site, which is mostly unrelated to where they were actually harvested. For plant foods, access issues are not relevant because the road is not along the routes from Kivalina and Noatak to preferred plant foods harvest sites. Also, as described above, the road is designated strictly for industrial use, and public use is not permitted. For ptarmigan, during public meetings it was indicated that they are not a preferred food and are rarely, if ever, the focus of hunting. Rather they are	Response is acceptable.

No.	Comment	Priority	Recommendation	Response	DEC Remarks
				harvested only when they present themselves and no other subsistence foods are available. Given the access controls described above, there is no expectation of preferential ptarmigan collection in or near site areas. In addition, changes in fractional intake for ptarmigan would have little impact on overall risk because ptarmigan comprise a small part of the subsistence diet. Teck Cominco. 2004. DeLong Mountain Regional Transportation System port facility, public access control plan. Teck Cominco Alaska Incorporated, Anchorage, Alaska.	
EPA-11	Table 5-11. Why aren't the sum of the species consumption rates equal to the class type totals? For example, land mammals are listed as 168 g/day, but the sum of caribou (155) and moose (35) is 190 g/day.	Low	Please correct any discrepancies.	Consumption rates are taken from the ADFG Community Profile Database, and these estimates are presented in Table 5-11. The fact that individual food consumption rates in a category do not add up to the total for a category is likely an artifact of the questionnaires used to collect the data, or the statistical methods used by ADFG to analyze those data. For example, there may have been separate questions in the surveys for how much caribou was eaten, how much moose was eaten, and how much total meat from land mammals was eaten. The footnote on Table 5-11 discusses this issue. The methodology used in the risk assessment ensures that total subsistence food intake is not likely to be underestimated. Specifically, consumption rates were weighted by caloric intake and all food consumed is assumed to be subsistence food, which in reality is not the case.	Response is acceptable.
EPA-12	Table 5-14. For the sake of transparency, the fractional food intake term 0.09 should be included in all tables with intakes (5-14 and 5-18 through 5-38).	Low	Please make the appropriate changes.	A footnote has been added to these tables to indicate that the consumption rate listed incorporates the site fractional intake of 0.09.	Response is acceptable.
EPA-13	Page 5-31. Although treated as policy/regulatory value by EPA and CDC, 10 µg/dL is not a biological threshold for adverse effects of lead (Centers for Disease Control and Prevention, 1991; B. P. Lanphear, Dietrich *et al.*, 2000; B .P. Lanphear, Canfield *et al.*, 2001; Canfield, Henderson *et al.*, 2003; Canfield, Kreher *et al.*, 2003).	Low	Please make the appropriate changes.	The text indicates that lead risks are expressed by comparing the predicted geometric mean of blood " to the EPA target blood lead level of 10 µg/dL." Consistent with the reviewer's comment, a blood lead level of 10 µg/dL is not referred to as a biological threshold for adverse effects.	Response is acceptable.
EPA-14	Page 5-33. Although, an adult soil ingestion rate of 100 mg/day would be likely to overestimate adult central tendency rates for the conventional occupational or residential scenarios in the Adult Lead Model, its application to a subsistence scenario is uncertain and could underestimate the contact rate. Adult soil ingestion rates encompass a large degree of uncertainty because the database is extremely small. Estimating soil ingestion associated with subsistence activities compounds this uncertainty, yet subsistence activities are typically associated with enhanced contact rates with environmental media (S. G. Harris & Harper, 1997; Simon, 1998; S. Harris & Harper, 2001; Harper, Flett *et al.*, 2002).	Medium	Please add a discussion of the limitation of the Lead Model to subsistence.	In response to the comment, Section 5.4.3.2.1 (Fraction Intake) was updated as follows: *Data on adult soil ingestion is limited, and no quantitative information on soil ingestion during subsistence activities is available. Thus, the soil ingestion rate during subsistence activities is an area of uncertainty. As requested by DEC during work plan comment resolution, a soil ingestion rate during subsistence activities of 100 mg/day was used as an input to the ALM. Subsequently, as part of comment resolution following submittal of the draft risk assessment, DEC requested that an adult soil ingestion rate of 100 mg/day be applied during work time as well. U.S. EPA (1996c) recommends 50 mg/day as central estimate and 100 mg/day as a high-end estimate, based on the best available data. In addition, U.S. EPA (1996c) further notes that 100 mg/day is used to represent agricultural exposure scenarios in EPA risk assessments. For the ALM, a value of 100 mg/day likely overestimates actual exposure because: 1) the ALM is designed to use average values as input assumptions, not upper end estimates; 2) EPA guidance indicates that an ingestion rate of 50 mg/day adequately addresses incidental soil and dust ingestion (U.S. EPA 1996c); and 3) DEC (2002)*	Response is acceptable.

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No.	Comment	Priority	Recommendation	Response	DEC Remarks
				recommends an adult soil ingestion rate of 50 mg/day to calculate cleanup levels for commercial/industrial settings. In fact, if a soil ingestion rate of 50 mg/day were used instead of 100 mg/day for the adult worker/subsistence use scenario, and all other exposure assumptions remained the same, the results for the ALM would not change because the low fractional intake for soil ingestion during subsistence activities minimizes the sensitivity of the model to this parameter. In the paper that the commenter cites, Harris and Harper (1997) refer to the early paper by Hawley (1985) which suggests a high end value for adult soil ingestion during outdoor activities of 480 mg/day, and state "Because no other studies are available, and because a subsistence person has direct contact with the environment at a somewhat lower frequency than someone who works outdoors every day, a rate of 200 mg/d seems reasonably prudent until further studies are done." The soil ingestion rate of 200 mg/day represents a qualitative judgment by the authors. The best quantitative data currently available suggests that typical adult soil ingestion is lower than previously assumed, and is on the order of 10 mg/day (Stanek et al 1997).	
EPA-15	Page 5-40. Discussion concludes that caribou tissue metal concentrations are not indicative of excessive mine-related exposures – this may be true, but it conflicts with the use of the fractional intake term in the risk assessment.	Medium	Please resolve the potential conflict.	The intent of this discussion was to address uncertainties in the risk estimates for subsistence caribou consumption. The caribou study indicates that site caribou metals concentrations do not appear to be significantly different from metals concentrations in caribou from elsewhere. The implication is that even risk estimates for caribou consumption that incorporate site fractional intake are actually measuring risks associated with background exposures. Thus, site risks are being overestimated. Rather than demonstrating a conflict with the use of a fractional intake term, the discussion is meant to identify one way that the risk assessment deals with an area of uncertainty; in this case it uses a fractional intake term that more likely overestimates than underestimates site risks. The text has been revised to more clearly state this point.	Response is acceptable.
EPA-16	Page 6-9. The green winged teal was selected as the representative freshwater semi-aquatic avian herbivore. In the description the diet is listed and includes seeds, plant material, aquatic insects, mollusks and crustaceans. The percentage of each category of the diet should be listed and a discussion of why this species is a representative herbivore when its diet incorporates insects, mollusks and crustaceans should be included.	Medium	Please add the requested information and discussion.	DEC risk assessment guidance recommends the green-winged teal as the default receptor representing freshwater semi-aquatic avian herbivores in risk assessments conducted in the northwest ecoregion of Alaska (DEC 1999). Although the teal is predominantly herbivorous, as discussed in the text (Section 6.5.1.2, third paragraph), it may also consume some invertebrates. The food web model exposure parameters in Table 6-26 have been modified to reflect the diversity of the teal's diet. The table now reports a simplified dietary composition of 85 percent herbaceous plants and 15 percent invertebrates (estimated from Johnson 1995). The food web models for teal were updated to include invertebrates in the exposure calculations, and the results are provided in Appendix K (revised tables attached for review). Hazard quotients at the site were all less than 1.0, even after the addition of invertebrates to the teal's diet. Risks to freshwater avian invertivores were assessed separately by modeling CoPC exposures for the common snipe.	Response is acceptable.
EPA-17	Page 6-10. The muskrat was selected as the representative freshwater semi-aquatic mammalian herbivore; however, the animal's diet is described as occasionally including clams, frogs, shrimp and small fish. The percentage of each category of the diet should be listed and a discussion of why this species is a representative herbivore when its diet incorporates clams, frogs, shrimp and fish should be included.	Medium	Please add the requested information and discussion.	Like the teal (see response to comment EPA-16), the muskrat was selected as a receptor in large part because it is the default indicator species chosen by DEC to represent freshwater semi-aquatic mammalian herbivores for risk assessments conducted in the northwest ecoregion of Alaska (DEC 1999). Although muskrats may consume a range of animal foods, they are primarily herbivorous (DFG 2002). The Wildlife Exposure Factors Handbook reports summer diets for muskrat consisting of 97 to 99 percent plant material (e.g., cattails, rushes, grasses, algae) and up to 3 percent "other" foods, and a	Response is acceptable.

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				winter diet that is entirely plant-based (U.S. EPA 1993). Risks to freshwater invertivorous and piscivorous wildlife were addressed in the RA by modeling CoPC exposures for the common snipe (in the baseline assessment) and the red-throated loon and river otter (in the screening-level assessment), respectively.	
EPA-18	Page 6-24. Discussion of the environmental factors such as slope, topography, etc. that could be leading to differences in the plant community with distance from the road could be discussed in more detail/included in section 6.2.1.3.4.	Low	Please add the requested discussion.	The following discussion has been added to the end of Section 6.2.1.3.4 (Relationships with Distance from the DMTS Road): *Differences in slope, aspect, and elevation among plant community survey stations were most prominent in the hillslope community, where plant species composition and community indices (e.g., species diversity) appeared to be associated with the topographical pattern of the transect rather than trending strictly with distance from the road. Relationships between plant community variables and distance from the road tended to be stronger when tested without the hillslope community data (Table 6-4), indicating that environmental factors such as aspect or substrate characteristics may have had a more dominant influence over vegetation characteristics on the hillslope community transect than on the coastal plain or tundra community transects. The role of environmental factors in the hillslope community is discussed further in Section 6.2.3.3.*	Response is acceptable.
EPA-19	Page 6-50. Include more detail on the results of the 10-day amphipod test, list the percentage survival for each sample location and discuss the level of survival of the negative control sediment for comparison.	Low	Please add the requested information. Please include a copy of the toxicity-testing lab report in an appendix.	A sentence was added to the text stating that the mean survival of amphipods in negative control sediment was 90 percent. The percentage survival for each sample location is provided in Appendix G (Table G-38). A copy of the sediment toxicity testing report was added to Appendix G, as requested.	Response is acceptable.
EPA-20	Page 6-56. The assessment states that the green winged teal is known to eat some aquatic invertebrates but is predominantly herbivorous and represents stream and tundra pond avian herbivore populations. Include additional discussion of percentage of diet in teals that is from invertebrates and discuss why it is appropriate for this species to represent aquatic herbivores.	Low	See recommendation for comment EPA-16.	Please see the response to comment EPA-16.	Response is acceptable.
EPA-21	Page 8-1. Identify cadmium in caribou as the highest hazard quotient. State that the child hazard index for cadmium in caribou exceeds 1 when the fractional intake term is omitted.	Medium	Please revise the report as requested.	A bullet point has been added that indicates consumption of caribou cadmium has the highest hazard quotient and that risks would not exceed 1.0 assuming an FI as high as 82 percent.	Response is acceptable.

Notes: Please note that RA text quoted herein may differ from that in other comment response documents, and in comparison with the final RA document, as a result of successive revisions made during the comment resolution process.

Comments submitted U.S. EPA Region 10, 1200 Sixth Avenue, Seattle, Washington 98101. Comments generated by Marc Stifelman and Jean Zodrow, EPA Office of Environmental Assessment

See the original EPA comment letter for complete citations of cited literature.

DEC - Department of Environmental Conservation (Alaska)
DMTS - DeLong Mountain regional Transportation System
EPA - U.S. Environmental Protection Agency
ERA - ecological risk assessment
HHRA - human health risk assessment
NA - not applicable
RA - risk assessment
TC - Teck Cominco

Table 5-1. Summary of exposure point concentrations for environmental media

	N	#ND	%ND	Min.	Max.	Mean	Std.Dev.	Distribution Tests normal	gamma	lognormal	UCL Method	UCL	EPC
Stream Surface water (μg/L)													
Lead	229	145	63%	0.018	7.3	0.33	0.75	--	--	--	--	--	0.33 Mean
Thallium	28	24	86%	0.016	0.55	0.055	0.11	No	No	No	Chebyshev NP	0.14	0.14 UCL
Soil Subareas (mg/kg)													
Port Soil (mg/kg)													
Antimony	23	18	78%	0.93	26.0	9.6	8.8	No	No	No	Chebyshev NP	17.5	17.5 UCL
Barium	23	0	0%	357	2,110	1,304	383	Yes	Yes	No	Student's-t	1,441	1,441 UCL
Cadmium	428	41	10%	0.40	388	27.6	39.2	No	No	No	Chebyshev NP[a]	39.4	39.4 UCL
Lead	433	12	3%	8.5	48,300	1,255	2,921	--	--	--	--	--	1,255 Mean
Thallium	4	0	0%	0.29	0.78	0.53	0.21		n <10		--	--	0.78 Max
Zinc	433	0	0%	37.4	64,300	4,494	6,415	No	No	No	Chebyshev NP[a]	6,419	6,419 UCL
Road Soil (mg/kg)													
Antimony	12	6	50%	0.38	5.5	2.9	2.4	No	No	No	Chebyshev NP[b]	9.8	5.5 Max
Barium	12	0	0%	650	6,290	2,216	1,870	No	Yes	Yes	Approx. gamma	3,373	3,373 UCL
Cadmium	32	2	6%	0.50	29.3	4.0	5.5	No	No	No	Chebyshev NP	8.3	8.3 UCL
Lead	32	0	0%	13.5	2,440	198	423	--	--	--	--	--	198 Mean
Thallium	6	0	0%	0.11	0.46	0.22	0.13		n<10		--	--	0.46 Max
Zinc	32	0	0%	102	4,840	731	952	No	No	Yes	H-statistic	962	962 UCL
DMTS Area-weighted Soil (mg/kg)[c]													
Antimony	--	--	--	--	--	--	--	--	--	--			6.5 UCL/Max
Barium	--	--	--	--	--	--	--	--	--	--			3,219 UCL
Cadmium	--	--	--	--	--	--	--	--	--	--			10.8 UCL
Lead	--	--	--	--	--	--	--	--	--	--			282 Mean
Thallium	--	--	--	--	--	--	--	--	--	--			0.49 Max
Zinc	--	--	--	--	--	--	--	--	--	--			1,399 UCL
DMTS Area-averaged Soil (mg/kg)[d]													
Antimony	--	--	--	--	--	--	--	--	--	--			11.5 UCL/Max
Barium	--	--	--	--	--	--	--	--	--	--			2,407 UCL
Cadmium	--	--	--	--	--	--	--	--	--	--			23.8 UCL
Lead	--	--	--	--	--	--	--	--	--	--			726 Mean
Thallium	--	--	--	--	--	--	--	--	--	--			0.62 Max
Zinc	--	--	--	--	--	--	--	--	--	--			3,691 UCL

Table 5-1. (cont.)

Note: All UCL calculations were done using ProUCL 3.0. UCL methods are recommendations per EPA guidance (U.S. EPA 2002b). Undetected sample results included based on one-half of the detection limit.

-- - not applicable

N - number of results

DMTS	-	DeLong Mountain Regional Transportation System	ND	-	not detected
EPC	-	exposure point concentration	NP	-	nonparametric
Min.	-	minimum result	Std.Dev.	-	standard deviation
Max.	-	maximum result	UCL	-	upper confidence limit

[a] 97.5% UCL was used to obtain 95% coverage level, per ProUCL recommendation.

[b] 99% UCL was used to obtain 95% coverage level, per ProUCL recommendation.

[c] A DMTS area-weighted soil concentration was derived for each metal assuming that the port area soil samples represent an area of 26 hectares and that the road area soil samples represent an area of 312 hectares (see Figure 5-2). The total assumed DMTS site area is (26 + 312) 338 hectares; therefore, the port soil mean was adjusted by 0.08 (26/338) and the road soil mean was adjusted by 0.92 (312/338): DMTS Area-weighted Soil = (Port Area EPC x 0.08) + (Road Area EPC x 0.92).

[d] A DMTS area-averaged soil concentration was derived for each metal by averaging the EPC for port soil and the EPC for road soil:
DMTS Area-averaged Soil = (Port Area EPC + Road Area EPC) / 2

Table 5-2. Summary of exposure point concentrations for subsistence foods

	N	#ND	%ND	Min.	Max.	Mean	Std.Dev.	Distribution Tests normal	Distribution Tests gamma	Distribution Tests lognormal	UCL Method	UCL	EPC	
Caribou (mg/kg wet)[a]														
Caribou Tissue-Specific Data														
Kidney														
Barium	--	--	--	--	--	--	--	--	--	--	--	--	3.2 [b]	
Cadmium	11	0	0%	1.3	9.9	4.7	2.9	yes	yes	yes	Student's-t	6.3	6.3	UCL
Lead	11	0	0%	0.35	5.8	2.0	1.8	--	--	--	--	--	2.0	Mean
Zinc	11	0	0%	10.0	53.8	22.1	11.8	no	yes	yes	Approx. Gamma	29.1	29.1	UCL
Liver														
Barium	--	--	--	--	--	--	--	--	--	--	--	--	2.7 [b]	
Cadmium	11	0	0%	0.36	3.3	1.4	0.96	yes	yes	yes	Student's-t	1.9	1.9	UCL
Lead	11	0	0%	0.72	5.6	2.6	1.7	--	--	--	--	--	2.6	Mean
Zinc	11	0	0%	20.3	120	39.1	28.0	no	yes	no	Approx. Gamma	54.1	54.1	UCL
Muscle														
Barium	--	--	--	--	--	--	--	--	--	--	--	--	1.2 [b]	
Cadmium	11	3	27%	0.0050	0.080	0.041	0.025	yes	yes	no	Student's-t	0.055	0.055	UCL
Lead	11	0	0%	0.020	0.26	0.11	0.086	--	--	--	--	--	0.11	Mean
Zinc	11	0	0%	20.1	69.0	29.1	13.8	no	no	no	Modified-t NP	36.6	36.6	UCL
Edible Tissue Weighted Average[c]														
Barium	--	--	--	--	--	--	--	--	--	--	--	--	1.3 [b]	
Cadmium	33	--	--	--	--	--	--	--	--	--	--	--	0.22	UCL
Lead	33	--	--	--	--	--	--	--	--	--	--	--	0.19	Mean
Zinc	33	--	--	--	--	--	--	--	--	--	--	--	36.8	UCL
Fish (mg/kg wet)														
Lead	151	83	55%	0.0015	0.091	0.010	0.016	--	--	--	--	--	0.010	Mean
Thallium	--	--	--	--	--	--	--	--	--	--	--	--	0.0026 [d]	
Ptarmigan (mg/kg wet)														
Ptarmigan Tissue-Specific Data														
Breast														
Barium	5	0	0%	0.040	0.48	0.19	0.17		n<10		--	--	0.48	Max
Cadmium	5	0	0%	0.16	0.48	0.31	0.12		n<10		--	--	0.48	Max
Lead	5	0	0%	0.011	0.045	0.025	0.013		n<10		--	--	0.025	Mean
Zinc	5	0	0%	6.3	10.2	8.6	1.5		n<10		--	--	10.2	Max
Kidney														
Barium	5	0	0%	0.38	3.8	1.2	1.5		n<10		--	--	3.8	Max
Cadmium	5	0	0%	52.6	108.1	80.9	26.2		n<10		--	--	108	Max
Lead	5	0	0%	0.44	2.7	1.3	0.9		n<10		--	--	1.3	Mean
Zinc	5	0	0%	41.0	67.1	54.5	9.7		n<10		--	--	67.1	Max

Table 5-2. (cont.)

	N	#ND	%ND	Min.	Max.	Mean	Std.Dev.	Distribution Tests normal	gamma	lognormal	UCL Method	UCL	EPC
Liver													
Barium	5	0	0%	0.12	0.53	0.29	0.16		n<10		--	--	0.53 Max
Cadmium	5	0	0%	7.8	22.5	15.2	6.8		n<10		--	--	22.5 Max
Lead	5	0	0%	0.11	0.97	0.38	0.34		n<10		--	--	0.38 Mean
Zinc	5	0	0%	28.2	64.8	41.8	14.1		n<10		--	--	64.8 Max
Edible tissue weighted average[e]													
Barium	15	--	--	--	--	--	--	--	--	--	--	--	0.52 Max
Cadmium	15	--	--	--	--	--	--	--	--	--	--	--	3.5 Max
Lead	15	--	--	--	--	--	--	--	--	--	--	--	0.07 Mean
Zinc	15	--	--	--	--	--	--	--	--	--	--	--	15.7 Max
Salmonberry (mg/kg wet)													
Barium	6	0	0%	0.022	0.078	0.052	0.019		n<10		--	--	0.078 Max
Cadmium	27	0	0%	0.0069	0.21	0.041	0.038	no	yes	yes	Approx. Gamma	0.052	0.052 UCL
Lead	27	1	4%	0.0011	1.8	0.15	0.34	--	--	--	--	--	0.15 Mean
Zinc	27	0	0%	1.9	9.2	4.2	1.7	no	yes	yes	Approx. Gamma	4.7	4.7 UCL
Sourdock (mg/kg wet)													
Antimony	6	0	0%	0.0037	0.012	0.0084	0.0034		n<10		--	--	0.012 Max
Barium	6	0	0%	0.76	10.6	3.4	3.7		n<10		--	--	10.6 Max
Cadmium	12	0	0%	0.0032	0.021	0.010	0.0053	yes	yes	yes	Student's-t	0.013	0.013 UCL
Lead	12	0	0%	0.047	0.42	0.21	0.11	--	--	--	--	--	0.21 Mean
Thallium	6	4	67%	0.00012	0.00049	0.00020	0.00015		n<10		--	--	0.00049 Max
Zinc	12	0	0%	0.00012	7.4	4.6	1.5	yes	yes	yes	Student's-t	5.4	5.4 UCL

Note: All UCL calculations were done using ProUCL 3.0. UCL methods are recommendations per EPA guidance (U.S. EPA 2002b).
Undetected sample results included based on one-half of the detection limit.

-- - not applicable	Max. - maximum result	Std.Dev. - standard deviation
CoPC - chemical of potential concern	N - number of results	UCL - upper confidence limit
EPC - exposure point concentration	ND - not detected	EPA - U.S. Environmental Protection Agency
Min. - minimum result	NP - non parametric	

[a] Caribou tissue samples were not analyzed for antimony, barium, and thallium. Ptarmigan tissue EPCs were used to predict the caribou barium concentration. Antimony was never detected in ptarmigan, and thallium was only rarely detected and at concentrations near or below reference concentrations. Therefore, antimony and thallium were not included as caribou or ptarmigan CoPCs (see Section 5.2.1.2.1.2).

[b] This calculated EPC value used for barium is based on the relationship between barium and lead in the corresponding ptarmigan tissue (see Section 5.2.1.2.1.2).

[c] The EPC concentration for the edible caribou tissue weighted average was calculated using a mass-weighted calculation. Kidney and liver tissue each contributed 2 percent and muscle tissue contributed 96 percent of the concentration (ADPH 2001).

[d] This calculated EPC value used for thallium is based on the relationship between thallium and lead in stream surface water.

[e] The EPC concentration for the edible ptarmigan tissue weighted average was calculated using a mass-weighted calculation. Muscle tissue contributed 90 percent, kidney tissue contributed 1 percent, and liver tissue contributed 9 percent of the concentration (Kalas et al. 1995; Remington and Braun 1988) (Section 5.2.1.2.2).

Table 5-3. Calculation of predicted fish thallium exposure point concentration

	Max.	Mean	UCL	EPC		Ratio of Thallium Mean to Lead Mean in Surface Water	
Stream Surface Water (µg/L)							
Lead	7.3	0.33	0.55	0.33	Mean		
Thallium	0.55	0.055	0.14	0.14	UCL	0.17	(0.055/0.33)
	Max.	**Mean**	**UCL**	**EPC**		**Calculation of Thallium EPC from Lead UCL in Fish**	
Fish (mg/kg wet)							
Lead	0.091	0.010	0.016	0.010	Mean		
Thallium	--	--		0.0026 [a]		0.0026	(0.016*0.17)

Note: EPC - exposure point concentration
UCL - upper confidence limit

[a] The fish thallium EPC is calculated by multiplying the 95%UCL for lead in fish by the ratio of the mean thallium to mean lead concentrations in surface water.

Table 5-4. Calculation of predicted caribou barium exposure point concentrations for kidney, liver, and muscle tissue

	Max.	Mean	UCL	EPC	Ratios of Ptarmigan Mean Barium Value to Means for: Cadmium	Lead	Zinc
Kidney Tissue							
Ptarmigan (mg/kg wet)							
Barium	3.8	1.2			0.015	0.96	0.023
Cadmium	108	80.9			(1.2/80.9)	(1.2/1.3)	(1.2/54.5)
Lead	2.7	1.3					
Zinc	67.1	54.5					
	Max.	Mean	UCL	EPC	Calculation of Barium EPC from Caribou EPCs through Application of Ratios for Other Metals: Cadmium	Lead	Zinc
Caribou (mg/kg wet)							
Barium	--	--		3.2 [a]	0.10	3.2	0.66
Cadmium	9.9	4.7	6.3	6.3 UCL	(6.3*0.015)	(3.4*0.96)	(29.1*0.023)
Lead	5.82	1.97	3.4	2.0 Mean			
Zinc	53.8	22.1	29.1	29.1 UCL			
	Max.	Mean	UCL	EPC	Ratios of Ptarmigan Mean Barium Value to Means for: Cadmium	Lead	Zinc
Liver Tissue							
Ptarmigan (mg/kg wet)							
Barium	0.53	0.29			0.019	0.77	0.007
Cadmium	22.5	15.2			(0.29/15.2)	(0.29/0.38)	(0.29/41.8)
Lead	0.97	0.38					
Zinc	64.8	41.8					
	Max.	Mean	UCL	EPC	Calculation of Barium EPC from Caribou EPCs through Application of Ratios for Other Metals: Cadmium	Lead	Zinc
Caribou (mg/kg wet)							
Barium	--	--		2.7 [a]	0.038	2.7	0.38
Cadmium	3.32	1.42	1.9	1.9 UCL	(1.9*0.019)	(3.5*0.77)	(54.1*0.007)
Lead	5.6	2.6	3.5	2.6 Mean			
Zinc	120	39.1	54.1	54.1 UCL			
	Max.	Mean	UCL	EPC	Ratios of Ptarmigan Mean Barium Value to Means for: Cadmium	Lead	Zinc
Muscle Tissue							
Ptarmigan (mg/kg wet)							
Barium	0.48	0.19			0.62	7.67	0.022
Cadmium	0.48	0.31			(0.19/0.31)	(0.19/0.025)	(0.19/8.6)
Lead	0.045	0.025					
Zinc	10.2	8.6					
	Max.	Mean	UCL	EPC	Calculation of Barium EPC from Caribou EPCs through Application of Ratios for Other Metals: Cadmium	Lead	Zinc
Caribou (mg/kg wet)							
Barium	--	--		1.2 [a]	0.034	1.2	0.80
Cadmium	0.080	0.041	0.055	0.055 UCL	(0.055*0.62)	(0.16*7.67)	(36.6*0.022)
Lead	0.26	0.11	0.16	0.11 Mean			
Zinc	69.0	29.1	36.6	36.6 UCL			

Note: EPC - exposure point concentration
UCL - upper confidence limit

[a] The predicted caribou barium EPCs were calculated by:
1) Calculating ratios of mean barium to mean cadmium, lead, and zinc in each of the ptarmigan tissues (i.e., kidney, liver, and muscle). For all tissues the ratio of barium to lead gave the highest ratio.
2) Multiplying the barium to lead ratio for each tissue by the 95%UCL for lead in the corresponding caribou tissue.

Table 5-5. Ptarmigan tissue weight calculations

Tissue	Weight (g-wet weight)	Fraction of Total	Basis	Source
Kidney	3	0.01	Twice the highest value for one kidney reported for willow ptarmigan (range was 1.2–1.5 g).	Kalas et al. (1995)
Liver	26.5	0.09	Average liver weight for adult male and female sage grouse.	Remington and Braun (1988)
Muscle	257	0.90	Average weight for adult male and female sage grouse pectoralis and supracorocoideus muscles.	Remington and Braun (1988)
Total	286.5			

Table 5-6. EPA IEUBK lead model exposure parameters and input values

Parameter	Input Value(s)	Source
Air		
Outdoor air lead concentration (μg/m³)	0.100	EPA default
Indoor air lead concentration (percent of outdoor air)	30%	EPA default
Time spent outdoors (hours/day)	1, 2, 3, 4, 4, 4,4	EPA default[a]
Ventilation rates (m³/day)	2, 3, 5, 5, 5, 7 ,7	EPA default[a]
Lung absorption (percentage)	32	EPA default
Diet		
Diet intake (μg/day)	3.16, 2.60, 2.87, 2.74, 2.61, 2.74, 2.99	Update to EPA default[a,b]
Alternative diet values	Not used	EPA default
Alternate source, subsistence food (μg/day)	1.6	Site data, see Table 5-8
Bioavailability of lead in food (percent)	50	EPA default
Drinking Water		
Lead concentration in drinking water (μg/L)	0.33	Site data
Drinking water intake (L/day)	0.20, 0.50, 0.52, 0.53, 0.55, 0.58, 0.59	EPA default[a]
Alternative water values	Not used	EPA default
Bioavailability of lead in drinking water (percent)	50	EPA default
Soil/Dust		
Soil lead levels (ppm; μg/g)	25, 65	Site data[c]
Indoor dust lead levels (percent of soil levels)	70%	EPA default
Ingestion weighting factor (percent soil/percent dust)	45/55	EPA default
Amount of soil/dust ingested daily (g/day)	0.085, 0.135, 0.135, 0.135, 0.100, 0.090, 0.085	EPA default[a]
Bioavailability of lead in soil and dust (percent)	30, 9.7	EPA default and site-specific[d]
Other		
Alternate source, subsistence food (μg/day)	1.6, 3.4	Site data[e], see Table 5-8
Bioavailability of lead from subsistence foods (percent)	50	EPA default
Maternal contribution method	Infant model	EPA default
Maternal blood lead at birth of child (μg/dL)	2.5	EPA default
Geometric standard deviation	1.6	EPA default

Note: EPA - U.S. Environmental Protection Agency
IEUBK - integrated exposure uptake/biokinetic

[a] Value varies by age group. Values listed are for the following ages, respectively: 0–1, 1–2, 2–3, 3–4, 4–5, 5–6, 6–7.

[b] EPA recommends use of updated dietary intake values (citation).

[c] IEUBK model results were derived based on both the area-weighted soil concentration (282 μg/g) and the area-averaged soil concentration (726 μg/g). Each value was multiplied by the site fractional intake (FI) of 0.09 to derive the soil lead level inputs for the model (i.e., 282 x 0.09 = 25; 726 x 0.09 = 65).

[d] The EPA default for the IEUBK lead model is 30 percent. The site-specific value is 9.7 percent (see Table 5-7), based on data from the lead bioavailability study conducted by the National Toxicology Program and reported by the Alaska Division of Public Health (ADPH 2001; Arnold and Middaugh 2001; Arnold et al. 2003).

[e] IEUBK model results were derived using both the site-specific FI of 0.09 and the alternative caribou FI of 0.2 to calculate lead intake from subistence foods.

Table 5-7. Bioavailability of lead in Red Dog ore concentrate

Lead Concentration in Amended Food (mg/kg)[a]	Blood Lead (μg/dL)				
	Lead Acetate	Red Dog Concentrate	Relative Bioavailability	Child Absolute Bioavailability[b]	Adult Absolute Bioavailability[b]
0		5.05	--	--	--
10	16	4.32	27.0%	13.5%	5.4%
30	31.8	5.65	17.8%	8.9%	3.6%
100	84.8	11.5	13.6%	6.8%	2.7%
Average	--	--	19.4%	9.7%	3.9%

Source: ADPH (2001); Arnold and Middaugh (2001); Arnold et al. (2003)

Note: -- - not applicable

[a] Animals were fed a diet amended with either Red Dog ore concentrate or soluble lead acetate so that the animals' food had the specific lead concentrations listed.

[b] Absolute bioavailability is calculated by multiplying the relative bioavailability of Red Dog concentrate by the absolute bioavailability of lead acetate. The absolute bioavailability of lead acetate was assumed to be 50 percent for children and 20 percent for adults, per U.S. EPA (U.S. EPA 1994, 1996c) guidance. For the adult lead model, absolute bioavailability is referred to as absorption fraction.

Table 5-8. Calculaton of subsistence food lead intake for EPA IEUBK child lead model

Scenario Timeframe: Current/Future
Exposure Medium: Food
Exposure Point: Subsistence Food
Receptor Population: Subsistence User
Receptor Age: Young child

Exposure Route	Food		EPC Value	EPC Units	Daily Food Intake[a]	Daily Food Intake Units	Chronic Daily Intake	Chronic Daily Intake Units
Based on Caribou FI=0.09								
	Caribou	Lead	195	µg/kg	7.6E-3	kg/day	1.5	µg/day
	Fish	Lead	10.2	µg/kg	5.6E-3	kg/day	0.06	µg/day
	Ptarmigan	Lead	69.3	µg/kg	9.0E-5	kg/day	0.006	µg/day
	Salmonberry	Lead	147	µg/kg	3.8E-4	kg/day	0.06	µg/day
	Sourdock	Lead	211	µg/kg	6.3E-5	kg/day	0.01	µg/day
						Total	1.6	µg/day
Based on Alternative Caribou FI=0.2								
	Caribou	Lead	195	µg/kg	1.7E-2	kg/day	3.3	µg/day
	Fish	Lead	10.2	µg/kg	5.6E-3	kg/day	0.06	µg/day
	Ptarmigan	Lead	69.3	µg/kg	9.0E-5	kg/day	0.006	µg/day
	Salmonberry	Lead	147	µg/kg	3.8E-4	kg/day	0.06	µg/day
	Sourdock	Lead	211	µg/kg	6.3E-5	kg/day	0.01	µg/day
						Total	3.4	µg/day

Note: -- - not applicable
AT - averaging time
BW - body weight
Cf - concentration in food
CR_f - consumption rate for food
ED - exposure duration
EF - exposure frequency
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
FI - fractional intake
IEUBK - integrated exposure uptake biokinetic

[a] Daily Food Intake = $CR_f \times 10^{-3} \times FI \times EF \times ED / (BW \times AT)$
Chronic Daily Intake (CDI) (mg/kg-day) = C_f x Daily Food Intake
Derivation of consumption rates presented in Table 5-11. All variables defined in Section 5.2.2.2.3.
The daily food intake incorporates the site FI of 0.09 or the alternative caribou FI of 0.2.

Table 5-9. Exposure assumptions used to calculate risk for non-lead metals for adults in the subsistence use scenario

Scenario Timeframe: Current/Future
Receptor Population: Subsistence Use
Receptor Age: Adult

Exposure Medium and Route	Parameter Code	Parameter Definition	Units	Value	Rationale/ Reference	Intake Equation/ Model Name
Soil Ingestion						
	C_S	Chemical concentration in soil	mg/kg	see Table 5-1	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	C_S x CF x IR_S x FI x EF x ED / (BW x AT)
	IR_S	Ingestion rate - soil	mg soil/day	100	DEC (2002)	
	FI	Fractional intake from site	unitless	0.09	Area calculated[a]	
	EF	Exposure frequency	days/year	200	DEC (2002)	
	ED	Exposure duration	years	30	DEC (2002)	
	BW	Body weight	kg	70	DEC (2002)	
	AT	Averaging time	days	10,950	DEC (2002)	
Water Ingestion						
	C_W	Chemical concentration in surface water	μg/L	see Table 5-1	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	mg/μg	0.001	--	C_W x CF x IR_W x FI x EF x ED / (BW x AT)
	IR_W	Ingestion rate for surface water	L/day	2	DEC (2002)	
	FI	Fractional intake from site	unitless	0.09	Area calculated[a]	
	EF	Exposure frequency	days/year	365	DEC (2002)	
	ED	Exposure duration	years	30	DEC (2002)	
	BW	Body weight	kg	70	DEC (2002)	
	AT	Averaging time	days	10,950	DEC (2002)	
Food Ingestion						
	C_F	Chemical concentration in food[b]	mg/kg-wet wt.	see Table 5-2	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/g	0.001	--	C_F x CR_F x CF x FI x EF x ED / (BW x AT)
	CR_F	Consumption rate for food[b]	g/day	see Table 5-11	DFG (2001a)	
	FI	Fractional intake from site	unitless	0.09	Area calculated[a,c]	
	EF	Exposure frequency	days/year	365	DEC (2002)	
	ED	Exposure duration	years	30	DEC (2002)	
	BW	Body weight	kg	70	DEC (2002)	
	AT	Averaging time	days	10,950	DEC (2002)	

Note: -- - not applicable
RME - reasonable maximum exposure

[a] Based on a calculation of the fraction of the assumed subsistence use area on the site divided by the total subsistence use areas for Kivalina and Noatak (see Figures 5-2 and 5-3 and Section 5.2.2.2.3).

[b] A separate calculation is done for each food item.

[c] Risks are calculated using both the site-specific FI of 0.09 and the alternative caribou FI of 0.2.

Table 5-10. Exposure assumptions used to calculate risk for non-lead metals for children in the subsistence use scenario

Scenario Timeframe: Current/Future
Receptor Population: Subsistence Use
Receptor Age: Child

Exposure Medium and Route	Parameter Code	Parameter Definition	Units	Value	Rationale/ Reference	Intake Equation/ Model Name
Soil Ingestion						
	C_S	Chemical concentration in soil	mg/kg	see Table 5-1	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	C_S x CF x IR_S x FI x EF x ED / (BW x AT)
	IR_S	Ingestion rate - soil	mg soil/day	200	DEC (2002)	
	FI	Fractional intake from site	unitless	0.09	Area calculated[a]	
	EF	Exposure frequency	days/year	200	DEC (2002)	
	ED	Exposure duration	years	6	DEC (2002)	
	BW	Body weight	kg	15	DEC (2002)	
	AT	Averaging time	days	2,190	DEC (2002)	
Water Ingestion						
	C_W	Chemical concentration in surface water	µg/L	see Table 5-1	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	mg/µg	0.001	--	C_W x CF x IR_W x FI x EF x ED / (BW x AT)
	IR_W	Ingestion rate for surface water	L/day	1	?	
	FI	Fractional intake from site	unitless	0.09	Area calculated[a]	
	EF	Exposure frequency	days/year	365	DEC (2002)	
	ED	Exposure duration	years	6	DEC (2002)	
	BW	Body weight	kg	15	DEC (2002)	
	AT	Averaging time	days	2,190	DEC (2002)	
Food Ingestion						
	C_F	Chemical concentration in food[b]	mg/kg-wet wt.	see Table 5-2	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/g	0.001	--	C_F x CR_F x CF x FI x EF x ED / (BW x AT)
	CR_F	Consumption rate for food[b]	g/day	see Table 5-11	DFG (2001a)	
	FI	Fractional intake from site	unitless	0.09	Area calculated[a,c]	
	EF	Exposure frequency	days/year	365	DEC (2002)	
	ED	Exposure duration	years	6	DEC (2002)	
	BW	Body weight	kg	15	DEC (2002)	
	AT	Averaging time	days	2,190	DEC (2002)	

Note: -- - not applicable
RME - reasonable maximum exposure

[a] Based on a calculation of the fraction of the assumed subsistence use area on the site divided by the total subsistence use areas for Kivalina and Noatak (see Figures 5-2 and 5-3 and Section 5.2.2.2.3).

[b] A separate calculation is done for each food item.

[c] Risks are calculated using both the site-specific FI of 0.09 and the alternative caribou FI of 0.2.

Table 5-11. Estimated subsistence food consumption rates

	Mean per Capita Consumption (g/day)			Caloric Intake Weighted Mean per Capita Consumption (g/day)	
	Kivalina	Noatak	Average of two villages	Adult	Child
Land Mammals	212.1	305.8	259.0	168	84
Caribou[a]	177.5	300.6	239.1	155	78
Moose	70.0	36.9	53.4	35	17
Migratory Birds	10.6	9.9	10.3	6.7	3.3
Game Birds	3.1	3.1	3.1	2.0	1.0
Ptarmigan[a]	3.1	3.1	3.1	2.0	1.0
All Fish	314.8	248.7	281.7	183	91
Salmon	29.2	216.1	122.6	80	40
Non-salmon fish[a]	296.4	85.0	190.7	124	62
Char	252.3	57.7	155.0	101	50
White fish	28.2	36.0	32.1	21	10
Cod	24.8	1.1	12.9	8.4	4.2
Marine Invertebrates	1.8	3.8	2.8	1.8	0.9
Clams	0.0	1.3	0.6	0.4	0.2
Crabs	0.8	6.4	3.6	2.3	1.2
Shrimp	1.6	0.0	0.8	0.5	0.3
Marine Mammals	415.1	106.0	260.6	169	85
Seal	251.8	101.6	176.7	115	57
Walrus	101.1	52.9	77.0	50	25
Whale	89.8	20.2	55.0	36	18
Vegetation	18.3	7.5	12.9	8.4	4.2
Berries[a]	17.5	8.2	12.9	8.4	4.2
Plants/greens/mushrooms[a]	1.5	2.5	2.0	1.3	0.7
Sum of Main Categories	976	685	830	539	270
Total kcal/day (@5.1 kcal/g)	4,977	3,492	4,234	2,750	1,375
Caloric Intake Weighting Factor	--	--	--	0.65	0.32

Note: Data from Community Profile Database (DFG 2001a). Kivalina data are from 1992. Noatak data are from 1994.

The sum of consumption rates for individual food items, or for sub-categories within a category, does not equal the consumption rate for the entire category in the database. For example, the sum of salmon and non-salmon fish consumption does not equal all fish consumption. This could be an artifact of the statistical methods used to derive consumption rates for entire categories based on data for individual items.

Boxed values are the consumption rates used in the risk assessment.

-- - not applicable

EPC - exposure point concentration

[a]Consumption rates for ptarmigan and non-salmon fish were used to derive risk estimates using EPCs for those foods. Consumption of land mammals was evaluated using EPCs for caribou. Consumption of all berries was evaluated using EPCs for salmonberries. Consumption of all plants, greens, and mushrooms was evaluated based on EPCs for sourdock.

Table 5-12. Daily dietary intake of Alaska native adults

	Males		Females	
	grams	kcal	grams	kcal
Protein	127	508	90	360
Fat	117	1,053	81	729
Carbohydrates	282	1,128	214	856
Total Energy[a]	526	2,689	385	1,945
Average kcal/g		5.1		5.1

Source: Nobmann et al. (1992)

Note: kcal - kilocalories; commonly called calories. Caloric intake was calculated by multiplying the intake in grams from Nobmann et al. (1992) by the number of kcal/g in each energy source: protein, 4 kcal/g; fat, 9 kcal/g; carbohydrate, 4 kcal/g

[a] The total energy estimates differ slightly from the values reported by Nobmann et al. (1992) (i.e., 2,750 kcal for males and 1,950 kcal for females), likely because of the standard rounding used for the specific energy content of protein, fat, and carbohydrates. The values calculated here are used solely for the purpose of calculating the average caloric density of the diet.

Table 5-13. Adult lead model exposure parameters

Scenario Timeframe: Current/Future Receptor Population: Worker/Subsistence User Receptor Age: Adult

Parameter Code	Parameter Definition	Units	Input Parameters	Rationale
C_S	Soil lead concentration average	μg/g or ppm	282, 726	site data[a], see Table 5-1
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	EPA default
BKSF	Biokinetic slope factor	μg/dL per μg/day	0.4	EPA default
GSD_i	Geometric standard deviation PbB	--	2.1	U.S. EPA (2002a)
PbB_0	Baseline PbB	μg/dL	1.53	U.S. EPA (2002a)
IR_{S_W}	Soil ingestion rate while at work (including soil and dust)	g/day	0.100	DEC (2006)
IR_{S_S}	Soil ingestion rate during subsistence activities (including soil and dust)	g/day	0.100	DEC (2004a)
AF_S	Absorption fraction	--	0.039, 0.12	EPA default, site specific[b]
EF_S	Exposure frequency	days/year	200	DEC (2002)
FI_{S_W}	Fractional intake for soil ingestion while at work	--	0.67	Site specific
FI_{S_S}	Fractional intake for soil ingestion during subsistence activities	--	0.03	Site specific
ADI	Average daily intake of lead from subsistence foods	μg/day	1.6, 3.4	site data[c], see Table 5-14
AF_F	Absorption fraction for food	--	0.20	U.S. EPA (1994, 1996c)
EF_F	Exposure frequency for food	days/year	182.5	Site specific
AT	Averaging time	days/year	365	365

Note: -- - not applicable
EPA - U.S. Environmental Protection Agency
PbB - blood lead

[a] Adult lead model results were derived using both the area-weighted lead EPC of 282 μg/g and the area-averaged lead EPC of 726 μg/g.

[b] Adult lead model results were derived using both the site-specific soil lead absorption fraction of 0.039 and the EPA default of 0.12. See Table 5-7 for derivation of the site-specific absorption fraction, also referred to as absolute bioavailability.

[c] Adult lead model results were derived using both the site-specific FI of 0.09 and the alternative caribou FI of 0.2 to calculate subsistence food lead intake.

Table 5-14. Calculaton of subsistence food lead intake for adult lead model

Scenario Timeframe: Current/Future
Exposure Medium: Food
Exposure Point: Subsistence Food
Receptor Population: Worker/Subsistence User
Receptor Age: Adult

Exposure Route	Food		EPC Value	EPC Units	Daily Food Intake[a]	Daily Food Intake Units	Chronic Daily Intake[b]	Chronic Daily Intake Units
Based on Caribou FI=0.09								
	Caribou	Lead	195	µg/kg	7.5E-3	kg/day	1.5	µg/day
	Fish	Lead	10.2	µg/kg	5.6E-3	kg/day	0.06	µg/day
	Ptarmigan	Lead	69.3	µg/kg	9.0E-5	kg/day	0.006	µg/day
	Salmonberry	Lead	147	µg/kg	3.8E-4	kg/day	0.06	µg/day
	Sourdock	Lead	211	µg/kg	5.8E-5	kg/day	0.01	µg/day
						Total	1.6	µg/day
Based on Alternative Caribou FI=0.2								
	Caribou	Lead	195	µg/kg	1.7E-2	kg/day	3.3	µg/day
	Fish	Lead	10.2	µg/kg	5.6E-3	kg/day	0.06	µg/day
	Ptarmigan	Lead	69.3	µg/kg	9.0E-5	kg/day	0.006	µg/day
	Salmonberry	Lead	147	µg/kg	3.8E-4	kg/day	0.06	µg/day
	Sourdock	Lead	211	µg/kg	5.8E-5	kg/day	0.01	µg/day
						Total	3.4	µg/day

Note: AT - averaging time

BW - body weight

Cf - concentration in food

CR_f - consumption rate for food

ED - exposure duration

EF - exposure frequency

EPC - exposure point concentration

FI - fractional intake

FI_{WF} - fractional intake of food from site for workers

[a] Daily Food Intake = $CR_f \times 10^{-3} \times FI_{WF} \times EF \times ED / (BW \times AT)$

Derivation of consumption rates presented in Table 5-11. All variables defined in Section 5.2.2.2.3.
The daily food intake incorporates the site FI of 0.09, giving a worker/subistence user FI_{WF} of 0.045, or the alternative caribou FI of 0.2, giving a worker/subsistence user FI_{WF} of 0.1.

[b] Chronic Daily Intake (CDI) (mg/kg-day) = C_f x Daily Food Intake

Table 5-15. Exposure assumptions used to calculate risk for non-lead metals for adults in the combined worker/subsistence user scenario

Scenario Timeframe: Current/Future
Receptor Population: Combined Worker/Subsistence Use
Receptor Age: Adult

Exposure Medium and Route	Parameter Code	Parameter Definition	Units	Value	Rationale/ Reference	Intake Equation/ Model Name
Soil Ingestion						
	C_S	Chemical concentration in soil	mg/kg	see Table 5-1	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/mg	0.000001	--	C_S x CF x IR_S x (FI_{S_W} + FI_{S_S}) x EF x ED / (BW x AT)
	IR_S	Ingestion rate for soil	mg soil/day	100	DEC (2004a)	
	FI_{S_W}	Fractional intake of site soil for workers	unitless	0.67	Area calculated[a]	
	FI_{S_S}	Fractional intake of site soil during subsistence activities	unitless	0.03	Area calculated[a]	
	EF	Exposure frequency	days/year	200	DEC (2002)	
	ED	Exposure duration	years	25	DEC (2002)	
	BW	Body weight	kg	70	DEC (2002)	
	AT	Averaging time	days	9,125	DEC (2002)	
Water Ingestion						
	C_W	Chemical concentration in surface water	μg/L	see Table 5-1	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	mg/μg	0.001	--	C_W x CF x IR_W x FI_{WW} x EF x ED / (BW x AT)
	IR_W	Ingestion rate for surface water	L/day	2	DEC (2002)	
	FI_{WW}	Fractional intake of water from site for workers	unitless	0.045	Area calculated[a]	
	EF	Exposure frequency	days/year	365	DEC (2002)	
	ED	Exposure duration	years	25	DEC (2002)	
	BW	Body weight	kg	70	DEC (2002)	
	AT	Averaging time	days	9,125	DEC (2002)	
Food Ingestion						
	C_F	Chemical concentration in food[b]	mg/kg-wet wt.	see Table 5-2	--	Chronic Daily Intake (CDI) (mg/kg-day) =
	CF	Conversion factor	kg/g	0.001	--	C_F x CR_F x CF x FI_{wf} x EF x ED / (BW x AT)
	CR_F	Consumption rate for food[b]	g/day	see Table 5-11	DFG (2001a)	
	FI_{WF}	Fractional intake of food from site for workers	unitless	0.045	Area calculated[a,c]	
	EF	Exposure frequency	days/year	365	DEC (2002)	
	ED	Exposure duration	years	25	DEC (2002)	
	BW	Body weight	kg	70	DEC (2002)	
	AT	Averaging time	days	9,125	DEC (2002)	

Note: -- - not applicable
RME - reasonable maximum exposure

[a] Based on a calculation of the fraction of the total subsistence use area comprised of the site, combined with the relative amount of time individuals spend at work vs. off work (see Section 5.2.3.2).

[b] A separate calculation is done for each food item.

[c] Risks are calculated using both the site-specific FI of 0.09, giving a worker/subsistence user FI_{WF} of 0.045, and the alternative caribou FI of 0.20, giving a worker/subsistence user FI_{WF} of 0.10.

Table 5-16. Noncancer toxicity data—oral reference doses

Chemical of Concern	Oral Chronic RfD (mg/kg-day)	Primary Target Organ or System	Uncertainty Factor	Source	Date RfD Accessed
Inorganics					
Antimony	0.0004	Longevity; metabolic	1,000	IRIS	2/1/06
Barium	0.2	Kidney	300	IRIS	2/1/06
Cadmium (food and soil)	0.001	Kidney	10	IRIS	2/1/06
Cadmium (water)	0.0005	Kidney	10	IRIS	2/1/06
Lead	NA	NA	NA	NA	NA
Thallium	0.00008	Liver enzymes	3,000	IRIS	2/1/06
Zinc	0.3	Iron and copper status	3	IRIS	2/1/06

Note: IRIS - Integrated Risk Information System
NA - not applicable
RfD - reference dose

[a] No adverse effects were observed in the studies on which the RfD is based.

Table 5-17. Results for IEUBK child lead model

Scenario Timeframe: Current/Future Exposure Medium: Surface soil, foods, water Exposure Point: DMTS surface soil and subsistence foods Receptor Population: Child subsistence Receptor Age: Child

	Area-weighted Soil Lead				Area-averaged Soil Lead			
	Site-Specific Bioavailability		Default Bioavailability		Site-Specific Bioavailability		Default Bioavailability	
	Geometric Mean Blood Lead (ug/dL)	Percent Chance of Exceeding 10 ug/dL	Geometric Mean Blood Lead (ug/dL)	Percent Chance of Exceeding 10 ug/dL	Geometric Mean Blood Lead (ug/dL)	Percent Chance of Exceeding 10 ug/dL	Geometric Mean Blood Lead (ug/dL)	Percent Chance of Exceeding 10 ug/dL
Site fractional intake	1.0	< 0.0005	1.2	< 0.0005	1.1	< 0.0005	1.6	0.005
Alternative caribou fractional intake	1.3	0.001	1.5	0.004	1.5	0.002	1.9	0.023

Table 5-18. Results for adult lead model

Scenario Timeframe: Current/Future
Exposure Medium: Surface soil and foods
Exposure Point: DMTS surface soil and subsistence foods
Receptor Population: Combined worker/subsistence user
Receptor Age: Adult

Exposure Variable	Description of Exposure Variable	Units	Area-weighted Soil Lead Site-Specific Bioavailability	Area-weighted Soil Lead Default Bioavailability	Area-averaged Soil Lead Site-Specific Bioavailability	Area-averaged Soil Lead Default Bioavailability
C_S	Soil lead concentration average	μg/g or ppm	282	282	726	726
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic slope factor	μg/dL per μg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.1	2.1
PbB_0	Baseline PbB	μg/dL	1.53	1.53	1.53	1.53
IR_S	Soil ingestion rate (including soil and dust)	g/day	0.100	0.100	0.100	0.100
AF_S	Absorption fraction	--	0.039	0.12	0.039	0.12
EF_S	Exposure frequency	days/year	200	200	200	200
FI_{S_W}	Fractional intake for soil ingestion while at work	--	0.67	0.67	0.67	0.67
FI_{S_S}	Fractional intake for soil ingestion during subsistence activities	--	0.03	0.03	0.03	0.03
CDI	Chronic daily intake of lead from subsistence foods (see Table 5-14)	μg/day	1.6	1.6	1.6	1.6
AF_f	Absorption fraction for food	--	0.20	0.20	0.20	0.20
EF_f	Exposure frequency for food	days/year	182.5	182.5	182.5	182.5
AT	Averaging time	days/year	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	μg/dL	1.8	2.1	2.0	2.9
PbB_{fetal}	PbB among fetuses of adult workers, geometric mean	μg/dL	1.6	1.9	1.8	2.6
$PbB_{fetal,\ 0.95}$	95th percentile PbB among fetuses of adult workers	μg/dL	5.4	6.5	6.2	9.0
PbB_t	Target PbB level of concern (e.g., 10 μg/dL)	μg/dL	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.7%	1.3%	1.1%	3.7%

Note: $PbB_{adult} = PbB0 + (BKSF \times ((C_S \times IR_{S\_W} \times (FI_{S\_W} + FI_{S\_S}) \times EF_S \times AF_S) + (CDI \times EF_F \times AF_F)))\ /AT$

$PbB_{fetal,\ 0.95} = PbB_{adult} * (GSD_i^{1.645} * R)$

DMTS - DeLong Mountain Regional Transportation System
PbB - blood lead

Table 5-19. Results for adult lead model using alternative caribou fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Surface soil and foods
Exposure Point: DMTS surface soil and subsistence foods
Receptor Population: Combined worker/subsistence user
Receptor Age: Adult

Exposure Variable	Description of Exposure Variable	Units	Area-weighted Soil Lead Site-Specific Bioavailability	Area-weighted Soil Lead Default Bioavailability	Area-averaged Soil Lead Site-Specific Bioavailability	Area-averaged Soil Lead Default Bioavailability
C_S	Soil lead concentration average	μg/g or ppm	282	282	726	726
$R_{fetal/maternal}$	Fetal/maternal PbB ratio	--	0.9	0.9	0.9	0.9
BKSF	Biokinetic slope factor	μg/dL per μg/day	0.4	0.4	0.4	0.4
GSD_i	Geometric standard deviation PbB	--	2.1	2.1	2.1	2.1
PbB_0	Baseline PbB	μg/dL	1.53	1.53	1.53	1.53
IR_S	Soil ingestion rate (including soil and dust)	g/day	0.100	0.100	0.100	0.100
AF_S	Absorption fraction	--	0.039	0.12	0.039	0.12
EF_S	Exposure frequency	days/year	200	200	200	200
FI_{S_W}	Fractional intake for soil ingestion while at work	--	0.67	0.67	0.67	0.67
FI_{S_S}	Fractional intake for soil ingestion during subsistence activities	--	0.03	0.03	0.03	0.03
CDI	Chronic daily intake of lead from subsistence foods (see Table 5-14)	μg/day	3.4	3.4	3.4	3.4
AF_f	Absorption fraction for food	--	0.20	0.20	0.20	0.20
EF_f	Exposure frequency for food	days/year	182.5	182.5	182.5	182.5
AT	Averaging time	days/year	365	365	365	365
PbB_{adult}	PbB of adult worker, geometric mean	μg/dL	1.8	2.2	2.1	3.0
PbB_{fetal}	PbB among fetuses of adult workers, geometric mean	μg/dL	1.7	2.0	1.9	2.7
$PbB_{fetal, 0.95}$	95th percentile PbB among fetuses of adult workers	μg/dL	5.6	6.7	6.4	9.2
PbB_t	Target PbB level of concern (e.g., 10 μg/dL)	μg/dL	10.0	10.0	10.0	10.0
$P(PbB_{fetal} > PbB_t)$	Probability that fetal PbB > PbB_t, assuming lognormal distribution	%	0.8%	1.5%	1.3%	4.0%

Note: $PbB_{adult} = PbB0 + (BKSF \times ((C_S \times IR_{S\_W} \times (FI_{S\_W} + FI_{S\_S}) \times EF_S \times AF_S) + (CDI \times EF_F \times AF_F)))\ /AT$

$PbB_{fetal, 0.95} = PbB_{adult} * (GSD_i^{1.645} * R)$

DMTS - DeLong Mountain Regional Transportation System
PbB - blood lead

Table 5-20. Noncancer hazards for adult subsistence soil ingestion based on area-weighted soil concentrations

Scenario Timeframe: Current/Future
Exposure Medium: Surface Soil
Exposure Point: DMTS Area Weighted Surface Soil
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	6.5	mg/kg	4.6E-7	mg/kg-day	4.0E-4	mg/kg-day	0.001
	Barium	3,219	mg/kg	2.3E-4	mg/kg-day	2.0E-1	mg/kg-day	0.001
	Cadmium	10.8	mg/kg	7.6E-7	mg/kg-day	1.0E-3	mg/kg-day	0.0008
	Thallium	0.49	mg/kg	3.4E-8	mg/kg-day	8.0E-5	mg/kg-day	0.0004
	Zinc	1,399	mg/kg	9.9E-5	mg/kg-day	3.0E-1	mg/kg-day	0.0003
							Total Hazard Index for All CoPCs	0.004

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-21. Noncancer hazards for adult subsistence soil ingestion based on area-averaged soil concentrations

Scenario Timeframe: Current/Future
Exposure Medium: Surface Soil
Exposure Point: DMTS Area Averaged Surface Soil
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	11.5	mg/kg	8.1E-7	mg/kg-day	4.0E-4	mg/kg-day	0.002
	Barium	2,407	mg/kg	1.7E-4	mg/kg-day	2.0E-1	mg/kg-day	0.0008
	Cadmium	23.8	mg/kg	1.7E-6	mg/kg-day	1.0E-3	mg/kg-day	0.002
	Thallium	0.62	mg/kg	4.4E-8	mg/kg-day	8.0E-5	mg/kg-day	0.0005
	Zinc	3,691	mg/kg	2.6E-4	mg/kg-day	3.0E-1	mg/kg-day	0.0009
							Total Hazard Index for All CoPCs	0.006

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-22. Noncancer hazards for child subsistence soil ingestion based on area-weighted soil concentrations

Scenario Timeframe: Current/Future
Exposure Medium: Surface Soil
Exposure Point: DMTS Area Weighted Surface Soil
Receptor Population: Subsistence User
Receptor Age: Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	6.5	mg/kg	4.2E-6	mg/kg-day	4.0E-4	mg/kg-day	0.01
	Barium	3,219	mg/kg	2.1E-3	mg/kg-day	2.0E-1	mg/kg-day	0.01
	Cadmium	10.8	mg/kg	7.1E-6	mg/kg-day	1.0E-3	mg/kg-day	0.007
	Thallium	0.49	mg/kg	3.2E-7	mg/kg-day	8.0E-5	mg/kg-day	0.004
	Zinc	1,399	mg/kg	9.2E-4	mg/kg-day	3.0E-1	mg/kg-day	0.003
							Total Hazard Index for All CoPCs	0.04

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-23. Noncancer hazards for child subsistence soil ingestion based on area-averaged soil concentrations

Scenario Timeframe: Current/Future
Exposure Medium: Surface Soil
Exposure Point: DMTS Area Averaged Surface Soil
Receptor Population: Subsistence User
Receptor Age: Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	11.5	mg/kg	7.6E-6	mg/kg-day	4.0E-4	mg/kg-day	0.02
	Barium	2,407	mg/kg	1.6E-3	mg/kg-day	2.0E-1	mg/kg-day	0.008
	Cadmium	23.8	mg/kg	1.6E-5	mg/kg-day	1.0E-3	mg/kg-day	0.02
	Thallium	0.62	mg/kg	4.1E-7	mg/kg-day	8.0E-5	mg/kg-day	0.005
	Zinc	3,691	mg/kg	2.4E-3	mg/kg-day	3.0E-1	mg/kg-day	0.008
						Total Hazard Index for All CoPCs		0.06

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-24. Noncancer hazards for adult subsistence surface water ingestion

Scenario Timeframe: Current/Future
Exposure Medium: Surface Water
Exposure Point: Site Stream Surface Water
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Thallium	0.14	µg/L	3.6E-7	mg/kg-day	8.0E-5	mg/kg-day	0.005
							Total Hazard Index for All CoPCs	0.005

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-25. Noncancer hazards for child subsistence surface water ingestion

Scenario Timeframe: Current/Future
Exposure Medium: Surface Water
Exposure Point: Site Stream Surface Water
Receptor Population: Subsistence User
Receptor Age: Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Thallium	0.14	µg/L	8.5E-7	mg/kg-day	8.0E-5	mg/kg-day	0.01
							Total Hazard Index for All CoPCs	0.01

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-26. Noncancer hazards for adult subsistence caribou consumption based on site fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Caribou
Exposure Point: Site Caribou
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	--	mg/kg	--	mg/kg-day	4.0E-4	mg/kg-day	--
	Barium	1.3	mg/kg	2.7E-4	mg/kg-day	2.0E-1	mg/kg-day	0.001
	Cadmium	0.22	mg/kg	4.7E-5	mg/kg-day	1.0E-3	mg/kg-day	0.05
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	36.8	mg/kg	8.0E-3	mg/kg-day	3.0E-1	mg/kg-day	0.03
							Total Hazard Index for All CoPCs	0.07

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-27. Noncancer hazards for adult subsistence caribou consumption based on alternative caribou fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Caribou
Exposure Point: Site Caribou
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	--	mg/kg	--	mg/kg-day	4.0E-4	mg/kg-day	--
	Barium	1.3	mg/kg	6.1E-4	mg/kg-day	2.0E-1	mg/kg-day	0.003
	Cadmium	0.22	mg/kg	1.0E-4	mg/kg-day	1.0E-3	mg/kg-day	0.1
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	36.8	mg/kg	1.8E-2	mg/kg-day	3.0E-1	mg/kg-day	0.06
						Total Hazard Index for All CoPCs		0.2

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-28. Noncancer hazards for child subsistence caribou consumption based on site fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Caribou
Exposure Point: Site Caribou
Receptor Population: Subsistence User
Receptor Age: Young Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	--	mg/kg	--	mg/kg-day	4.0E-4	mg/kg-day	--
	Barium	1.3	mg/kg	6.4E-4	mg/kg-day	2.0E-1	mg/kg-day	0.003
	Cadmium	0.22	mg/kg	1.1E-4	mg/kg-day	1.0E-3	mg/kg-day	0.1
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	36.8	mg/kg	1.9E-2	mg/kg-day	3.0E-1	mg/kg-day	0.06
							Total Hazard Index for All CoPCs	0.2

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-29. Noncancer hazards for child subsistence caribou consumption based on alternative caribou fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Caribou
Exposure Point: Site Caribou
Receptor Population: Subsistence User
Receptor Age: Young Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	--	mg/kg	--	mg/kg-day	4.0E-4	mg/kg-day	--
	Barium	1.3	mg/kg	1.4E-3	mg/kg-day	2.0E-1	mg/kg-day	0.007
	Cadmium	0.22	mg/kg	2.4E-4	mg/kg-day	1.0E-3	mg/kg-day	0.2
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	36.8	mg/kg	4.1E-2	mg/kg-day	3.0E-1	mg/kg-day	0.1
					Total Hazard Index for All CoPCs			0.4

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-30. Noncancer hazards for adult subsistence fish consumption

Scenario Timeframe: Current/Future
Exposure Medium: Fish
Exposure Point: Site Fish
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Thallium	0.0026	mg/kg	4.2E-7	mg/kg-day	8.0E-5	mg/kg-day	0.005
						Total Hazard Index for All CoPCs		0.005

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-31. Noncancer hazards for child subsistence fish consumption

Scenario Timeframe: Current/Future
Exposure Medium: Fish
Exposure Point: Site Fish
Receptor Population: Subsistence User
Receptor Age: Young Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Thallium	0.0026	mg/kg	9.7E-7	mg/kg-day	8.0E-5	mg/kg-day	0.01
							Total Hazard Index for All CoPCs	0.01

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-32. Noncancer hazards for adult subsistence ptarmigan consumption

Scenario Timeframe: Current/Future
Exposure Medium: Ptarmigan
Exposure Point: Site Ptarmigan
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Barium	0.52	mg/kg	1.3E-6	mg/kg-day	2.0E-1	mg/kg-day	0.000007
	Cadmium	3.5	mg/kg	9.1E-6	mg/kg-day	1.0E-3	mg/kg-day	0.009
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	15.7	mg/kg	4.0E-5	mg/kg-day	3.0E-1	mg/kg-day	0.0001
						Total Hazard Index for All CoPCs		0.009

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-33. Noncancer hazards for child subsistence ptarmigan consumption

Scenario Timeframe: Current/Future
Exposure Medium: Ptarmigan
Exposure Point: Site Ptarmigan
Receptor Population: Subsistence User
Receptor Age: Young Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Barium	0.52	mg/kg	3.1E-6	mg/kg-day	2.0E-1	mg/kg-day	0.00002
	Cadmium	3.5	mg/kg	2.1E-5	mg/kg-day	1.0E-3	mg/kg-day	0.02
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	15.7	mg/kg	9.4E-5	mg/kg-day	3.0E-1	mg/kg-day	0.0003
							Total Hazard Index for All CoPCs	0.02

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-34. Noncancer hazards for adult subsistence berry consumption

Scenario Timeframe: Current/Future
Exposure Medium: Berries
Exposure Point: Site Salmonberries
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Barium	0.078	mg/kg	8.4E-7	mg/kg-day	2.0E-1	mg/kg-day	0.000004
	Cadmium	0.052	mg/kg	5.6E-7	mg/kg-day	1.0E-3	mg/kg-day	0.0006
	Zinc	4.7	mg/kg	5.1E-5	mg/kg-day	3.0E-1	mg/kg-day	0.0002
							Total Hazard Index for All CoPCs	0.0007

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-35. Noncancer hazards for child subsistence berry consumption

Scenario Timeframe: Current/Future
Exposure Medium: Berries
Exposure Point: Site Salmonberries
Receptor Population: Subsistence User
Receptor Age: Young Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Barium	0.078	mg/kg	2.0E-6	mg/kg-day	2.0E-1	mg/kg-day	0.00001
	Cadmium	0.052	mg/kg	1.3E-6	mg/kg-day	1.0E-3	mg/kg-day	0.001
	Zinc	4.7	mg/kg	1.2E-4	mg/kg-day	3.0E-1	mg/kg-day	0.0004
						Total Hazard Index for All CoPCs		0.002

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-36. Noncancer hazards for adult subsistence sourdock consumption

Scenario Timeframe: Current/Future
Exposure Medium: Sourdock
Exposure Point: Site Sourdock
Receptor Population: Subsistence User
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	0.012	mg/kg	2.1E-8	mg/kg-day	4.0E-4	mg/kg-day	0.00005
	Barium	10.6	mg/kg	1.8E-5	mg/kg-day	2.0E-1	mg/kg-day	0.00009
	Cadmium	0.013	mg/kg	2.2E-8	mg/kg-day	1.0E-3	mg/kg-day	0.00002
	Thallium	0.00049	mg/kg	8.2E-10	mg/kg-day	8.0E-5	mg/kg-day	0.00001
	Zinc	5.4	mg/kg	9.0E-6	mg/kg-day	3.0E-1	mg/kg-day	0.00003
							Total Hazard Index for All CoPCs	0.0002

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-37. Noncancer hazards for child subsistence sourdock consumption

Scenario Timeframe: Current/Future
Exposure Medium: Sourdock
Exposure Point: Site Sourdock
Receptor Population: Subsistence User
Receptor Age: Young Child

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	0.012	mg/kg	5.2E-8	mg/kg-day	4.0E-4	mg/kg-day	0.0001
	Barium	10.6	mg/kg	4.5E-5	mg/kg-day	2.0E-1	mg/kg-day	0.0002
	Cadmium	0.013	mg/kg	5.5E-8	mg/kg-day	1.0E-3	mg/kg-day	0.00005
	Thallium	0.00049	mg/kg	2.1E-9	mg/kg-day	8.0E-5	mg/kg-day	0.00003
	Zinc	5.4	mg/kg	2.3E-5	mg/kg-day	3.0E-1	mg/kg-day	0.00008
						Total Hazard Index for All CoPCs		0.0005

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-38. Noncancer hazards for adult DMTS worker/subsistence user soil ingestion based on area-weighted soil concentrations

Scenario Timeframe: Current/Future
Exposure Medium: Surface Soil
Exposure Point: DMTS Area Weighted Surface Soil
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	6.5	mg/kg	3.5E-6	mg/kg-day	4.0E-4	mg/kg-day	0.009
	Barium	3,219	mg/kg	1.8E-3	mg/kg-day	2.0E-1	mg/kg-day	0.009
	Cadmium	10.8	mg/kg	5.9E-6	mg/kg-day	1.0E-3	mg/kg-day	0.006
	Thallium	0.49	mg/kg	2.6E-7	mg/kg-day	8.0E-5	mg/kg-day	0.003
	Zinc	1,399	mg/kg	7.6E-4	mg/kg-day	3.0E-1	mg/kg-day	0.003
						Total Hazard Index for All CoPCs		0.03

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-39. Noncancer hazards for adult DMTS worker/subsistence user soil ingestion based on area-averaged soil concentrations

Scenario Timeframe: Current/Future
Exposure Medium: Surface Soil
Exposure Point: DMTS Area Averaged Surface Soil
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	11.5	mg/kg	6.3E-6	mg/kg-day	4.0E-4	mg/kg-day	0.016
	Barium	2,407	mg/kg	1.3E-3	mg/kg-day	2.0E-1	mg/kg-day	0.007
	Cadmium	23.8	mg/kg	1.3E-5	mg/kg-day	1.0E-3	mg/kg-day	0.013
	Thallium	0.62	mg/kg	3.4E-7	mg/kg-day	8.0E-5	mg/kg-day	0.004
	Zinc	3,691	mg/kg	2.0E-3	mg/kg-day	3.0E-1	mg/kg-day	0.007
						Total Hazard Index for All CoPCs		0.05

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-40. Noncancer hazards for adult DMTS worker/subsistence user surface water ingestion

Scenario Timeframe: Current/Future
Exposure Medium: Stream Surface Water
Exposure Point: Site Stream Surface Water
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Thallium	0.14	μg/L	1.8E-7	mg/kg-day	8.0E-5	mg/kg-day	0.002
							Total Hazard Index for All CoPCs	0.002

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-41. Noncancer hazards for adult DMTS worker/subsistence user caribou consumption based on site fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Caribou
Exposure Point: Site Caribou
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	--	mg/kg	--	mg/kg-day	4.0E-4	mg/kg-day	--
	Barium	1.3	mg/kg	1.4E-4	mg/kg-day	2.0E-1	mg/kg-day	0.0007
	Cadmium	0.22	mg/kg	2.3E-5	mg/kg-day	1.0E-3	mg/kg-day	0.02
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	36.8	mg/kg	4.0E-3	mg/kg-day	3.0E-1	mg/kg-day	0.01
							Total Hazard Index for All CoPCs	0.04

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-42. Noncancer hazards for adult DMTS worker/subsistence user caribou consumption based on alternative caribou fractional intake

Scenario Timeframe: Current/Future
Exposure Medium: Caribou
Exposure Point: Site Caribou
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	--	mg/kg	--	mg/kg-day	4.0E-4	mg/kg-day	--
	Barium	1.3	mg/kg	3.0E-4	mg/kg-day	2.0E-1	mg/kg-day	0.002
	Cadmium	0.22	mg/kg	5.2E-5	mg/kg-day	1.0E-3	mg/kg-day	0.05
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	36.8	mg/kg	8.8E-3	mg/kg-day	3.0E-1	mg/kg-day	0.03
						Total Hazard Index for All CoPCs		0.08

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-43. Noncancer hazards for adult DMTS worker/subsistence user fish consumption

Scenario Timeframe: Current/Future
Exposure Medium: Fish
Exposure Point: Site Fish
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Thallium	0.0026	mg/kg	2.1E-7	mg/kg-day	8.0E-5	mg/kg-day	0.003
						Total Hazard Index for All CoPCs		0.003

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-44. Noncancer hazards for adult DMTS worker/subsistence user ptarmigan consumption

Scenario Timeframe: Current/Future
Exposure Medium: Ptarmigan
Exposure Point: Site Ptarmigan
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Barium	0.52	mg/kg	6.6E-7	mg/kg-day	2.0E-1	mg/kg-day	0.000003
	Cadmium	3.5	mg/kg	4.5E-6	mg/kg-day	1.0E-3	mg/kg-day	0.005
	Thallium	--	mg/kg	--	mg/kg-day	8.0E-5	mg/kg-day	--
	Zinc	15.7	mg/kg	2.0E-5	mg/kg-day	3.0E-1	mg/kg-day	0.00007
							Total Hazard Index for All CoPCs	0.005

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-45. Noncancer hazards for adult DMTS worker/subsistence user berry consumption

Scenario Timeframe: Current/Future
Exposure Medium: Berries
Exposure Point: Site Salmonberries
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Barium	0.078	mg/kg	4.2E-7	mg/kg-day	2.0E-1	mg/kg-day	0.000002
	Cadmium	0.052	mg/kg	2.8E-7	mg/kg-day	1.0E-3	mg/kg-day	0.0003
	Zinc	4.7	mg/kg	2.5E-5	mg/kg-day	3.0E-1	mg/kg-day	0.00008
							Total Hazard Index for All CoPCs	0.0004

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-46. Noncancer hazards for adult DMTS worker/subsistence user sourdock consumption

Scenario Timeframe: Current/Future
Exposure Medium: Sourdock
Exposure Point: Site Sourdock
Receptor Population: Worker/Subsistence
Receptor Age: Adult

Exposure Route	CoPC	EPC Value[a]	EPC Units	Intake	Intake Units	Reference Dose[b]	Reference Dose Units	Hazard Quotient
Ingestion								
	Antimony	0.012	mg/kg	1.0E-8	mg/kg-day	4.0E-4	mg/kg-day	0.00003
	Barium	10.6	mg/kg	8.8E-6	mg/kg-day	2.0E-1	mg/kg-day	0.00004
	Cadmium	0.013	mg/kg	1.1E-8	mg/kg-day	1.0E-3	mg/kg-day	0.00001
	Thallium	0.00049	mg/kg	4.1E-10	mg/kg-day	8.0E-5	mg/kg-day	0.000005
	Zinc	5.4	mg/kg	4.5E-6	mg/kg-day	3.0E-1	mg/kg-day	0.00001
							Total Hazard Index for All CoPCs	0.0001

Note: CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
EPA - U.S. Environmental Protection Agency
EPC - exposure point concentration
UCL - upper confidence limit

[a] Values for all chemicals reflect the lower of either the 95th percentile UCL on the mean or the maximum concentration.

[b] Toxicity values obtained from the EPA Integrated Risk Information System (IRIS) (January 2005).

Table 5-47. Summary of total hazard indices for reasonable maximum exposure scenarios

Receptor/Exposure Pathway	Adult Hazard Index	Adult % Contribution by Pathway	Young Child Hazard Index	Young Child % Contribution by Pathway	Chemicals Accounting for 90 percent of Hazard Indices for each Pathway
Subsistence User—Current/Future					
Surface soil ingestion, area-weighted	0.004	4%	0.04	14%	Antimony, barium, cadmium, thallium
Surface soil ingestion, area-averaged	0.006	6%	0.06	22%	Antimony, cadmium, zinc, barium
Water ingestion	0.005	5%	0.01	4%	Thallium
Caribou consumption	0.07	76%	0.2	68%	Cadmium, zinc
Fish consumption	0.005	5%	0.01	5%	Thallium
Ptarmigan consumption	0.009	9.3%	0.02	8.4%	Cadmium
Berry consumption	0.0007	0.7%	0.002	0.7%	Cadmium, zinc
Sourdock consumption	0.0002	0.2%	0.0005	0.2%	Barium, antimony, zinc
Total for Subsistence User based on area-weighted soil	**0.1**	100%	**0.3**	100%	
Total for Subsistence User based on area-averaged soil	**0.1**	100%	**0.3**	100%	
Worker—Current/Future					
Surface soil ingestion, area-weighted	0.03	38%			Antimony, barium, cadmium, thallium
Surface soil ingestion, area-averaged	0.05	60%			Antimony, cadmium, thallium, barium
Water ingestion	0.002	3%			Thallium
Caribou consumption	0.04	49%			Cadmium, zinc
Fish consumption	0.003	3%			Thallium
Ptarmigan consumption	0.005	6.0%			Cadmium
Berry consumption	0.0004	0.5%			Cadmium, zinc
Sourdock consumption	0.0001	0.1%			Barium, antimony, zinc
Total for DMTS Worker based on area-weighted soil	**0.08**	100%			
Total for Subsistence User based on area-averaged soil	**0.09**	100%			

Note: DMTS - DeLong Mountain Regional Transportation System

Lead risks are evaluated using separate models that do not predict hazard indices, so they cannot be directly compared to risks from other metals. Thus, the contribution of lead to pathway risks is not included.

Table 5-48. Summary of total hazard indices based on reasonable maximum exposure scenarios with alternative caribou fractional intake

	Adult		Young Child		
Receptor/Exposure Pathway	Hazard Index	% Contribution by Pathway	Hazard Index	% Contribution by Pathway	Chemicals Accounting for 90 percent of Hazard Indices for each Pathway
Subsistence User—Current/Future					
Surface soil ingestion, area-weighted	0.004	2%	0.04	8%	Antimony, barium, cadmium, thallium
Surface soil ingestion, area-averaged	0.006	3%	0.06	12%	Antimony, cadmium, zinc, barium
Water ingestion	0.005	2%	0.01	2%	Thallium
Caribou consumption	0.2	88%	0.4	83%	Cadmium, zinc
Fish consumption	0.005	3%	0.01	3%	Thallium
Ptarmigan consumption	0.009	4.8%	0.02	4.6%	Cadmium
Berry consumption	0.0007	0.4%	0.002	0.4%	Cadmium, zinc
Sourdock consumption	0.0002	0.1%	0.0005	0.1%	Barium, antimony, zinc
Total for Subsistence User based on area-weighted soil	**0.2**	100%	**0.5**	100%	
Total for Subsistence User based on area-averaged soil	**0.2**	100%	**0.5**	100%	
Worker—Current/Future					
Surface soil ingestion, area-weighted	0.03	24%			Antimony, barium, cadmium, thallium
Surface soil ingestion, area-averaged	0.05	38%			Antimony, cadmium, thallium, barium
Water ingestion	0.002	2%			Thallium
Caribou consumption	0.08	68%			Cadmium, zinc
Fish consumption	0.003	2%			Thallium
Ptarmigan consumption	0.005	3.8%			Cadmium
Berry consumption	0.0004	0.3%			Cadmium, zinc
Sourdock consumption	0.0001	0.1%			Barium, antimony, zinc
Total for DMTS Worker based on area-weighted soil	**0.1**	100%			
Total for Subsistence User based on area-averaged soil	**0.1**	100%			

Note: DMTS - DeLong Mountain Regional Transportation System

Lead risks are evaluated using separate models that do not predict hazard indices, so they cannot be directly compared to risks from other metals. Thus, the contribution of lead to pathway risks is not included.

Table ERA-1. Allometric scaling of avian TRVs

	TRVs (mg/kg-day)						Scaled TRVs (mg/kg-day)													
							Willow ptarmigan		Lapland longspur		Snowy owl		Green-winged teal		Common snipe		Brant		Black-bellied plover	
CoPC	NOAEL	LOAEL	Citation	Test species	Body Wt. (kg)	Reference	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Aluminum	120	NA	Carriere et al. (1986)	ringed doves	0.155	Terres (1980)	150	NA	84	NA	210	NA	140	NA	110	NA	180	NA	130	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic (Arsenate)	10	40	Stanley et al. (1994)	mallards	1	Heinz et al. (1989)	8.8	35	4.8	19	12	47	8.0	32	6.5	26	10	42	7.3	29
Arsenic (Arsenite)	20	50	USFWS (1964)	mallards	1	Heinz et al. (1989)	18	44	9.6	24	24	59	16	40	13	32	21	52	15	37
Barium	21	42	Johnson et al. (1960)	chicks	0.121	US EPA (1988)	28	56	15	31	37	75	25	51	21	41	33	66	23	47
Cadmium	1.5	20	White and Finley (1978)	mallards	1.153	White and Finley (1978)	1.2	17	0.68	9.3	1.7	23	1.1	15	0.92	13	1.5	20	1.0	14
Chromium	0.86	4.3	Haseltine et al. (1985) as cited in Sample et al. (1996)	black duck	1.25	Dunning (1984)	0.72	3.6	0.39	2.0	0.97	4.8	0.65	3.3	0.53	2.7	0.86	4.3	0.60	3.0
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	3.9	NA	Pattee (1984)	American kestrels	0.13	Sample et al. (1996)	5.1	NA	2.8	NA	6.8	NA	4.6	NA	3.8	NA	6.0	NA	4.3	NA
	--	11	Edens	Japanese quail	0.15	Vos et al. (1971)	--	14	--	7.7	--	19	--	13	--	10	--	17	--	12
Mercury[a]	0.032	0.064	Heinz (1974, 1976a,b, 1979)	mallards	1	Heinz et al. (1989)	0.028	0.056	0.015	0.031	0.038	0.075	0.025	0.051	0.021	0.042	0.033	0.067	0.024	0.047
Molybdenum	3.5	35	Lepore and Miller (1965)	chicken	1.5	US EPA (1988)	2.8	28	1.5	15	3.8	38	2.6	26	2.1	21	3.4	34	2.4	24
Selenium	0.40	0.80	Heinz et al. (1989)	mallards	1	Heinz et al. (1989)	0.35	0.70	0.19	0.38	0.47	0.94	0.32	0.64	0.26	0.52	0.42	0.83	0.29	0.59
Thallium	0.24	24	Hudson et al. (1984)	ring-necked pheasants	1	U.S. EPA (1993)	0.21	21	0.11	11	0.28	28	0.19	19	0.15	15	0.25	25	0.17	17
Vanadium	11	NA	White and Dieter (1978)	mallards	1.17	White and Dieter (1978)	9.4	NA	5.1	NA	13	NA	8.5	NA	6.9	NA	11	NA	7.8	NA
Zinc (TRV1)	130	NA	Stahl et al. (1990)	white leghorn hens	1.935	Stahl et al. (1990)	100	NA	55	NA	130	NA	91	NA	74	NA	120	NA	84	NA
Zinc (TRV2)	70	120	Jackson et al. (1986)	Hisex laying hens	1.87	Jackson et al. (1986)	54	93	30	51	73	130	49	84	40	69	64	110	45	78

Note: Avian TRVs were extrapolated from laboratory studies using the following general equation from Sample and Arenal (1999):

$A_w = A_t(BW_t/BW_w)^{1-b}$

A_w - TRV for ecological receptor

A_t - TRV for test species

BW_t - Body weight of laboratory test species

BW_w - Body weight of ecological receptor (see Table 6-26)

b - Allometric scaling factor

Based on recommendations in Sample and Arenal (1999), an allometric scaling factor of 1.2 was used to extrapolate avian TRVs.

-- - not applicable
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NA - not available; no suitable TRV was derived
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Mercury TRVs were based on exposure to methylmercury.

Table ERA-2. Allometric scaling of mammalian TRVs

	TRVs (mg/kg-day)						Scaled TRVs (mg/kg-day) Tundra vole		Caribou		Moose		Tundra shrew		Arctic fox		Muskrat	
CoPC	NOAEL	LOAEL	Citation	Test Species	Body Wt. (kg)	Reference	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Aluminum	1.9	19	Ondreicka et al. (1966)	mice	0.03	U.S. EPA (1988)	1.8	18	1.2	12	1.1	11	2.1	21	1.4	14	1.5	15
Antimony	0.66	NA	Schroeder et al. (1970)	rats	0.35	U.S. EPA (1995)	0.74	NA	0.47	NA	0.43	NA	0.84	NA	0.58	NA	0.62	NA
Arsenic (Arsenate)	0.4	1.6	Nemec et al. (1998)	rabbits	4.4	Nemec et al. (1998)	0.53	2.1	0.33	1.3	0.31	1.2	0.59	2.4	0.41	1.6	0.44	1.8
Arsenic (Arsenite)	0.13	1.3	Schroeder and Mitchener (1971)	mice	0.03	U.S. EPA (1988)	0.12	1.2	0.077	0.77	0.072	0.72	0.14	1.4	0.095	0.95	0.10	1.0
Barium	5.1	--	Perry et al. (1983)	rats	0.435	Perry et al. (1983)	5.8	--	3.7	--	3.4	--	6.6	--	4.5	--	4.9	--
	--	20	Borzelleca et al. (1988)	rats	0.35	U.S. EPA (1988)	--	22	--	14	--	13	--	25	--	17	--	19
Cadmium	1.0	10	Sutou et al. (1980)	rats	0.303	Sutou et al. (1980)	1.1	11	0.70	7.0	0.66	6.6	1.3	13	0.87	8.7	0.93	9.3
Chromium	3.3	--	Mackenzie et al. (1958)	rats	0.35	U.S. EPA (1988)	3.7	--	2.3	--	2.2	--	4.2	--	2.9	--	3.1	--
	--	69	Gross and Heller (1946)	rats	0.168	Gross and Heller (1946)	--	74	--	47	--	44	--	84	--	58	--	62
Cobalt	0.5	2.0	Nation et al. (1983)	rats	0.35	U.S. EPA (1988)	0.56	2.3	0.35	1.4	0.33	1.3	0.64	2.5	0.44	1.8	0.47	1.9
Lead	11	90	Azar et al. (1973)	rats	0.35	U.S. EPA (1988)	13	100	8.0	64	7.5	60	14	120	9.9	79	11	85
Mercury[a]	0.032	0.16	Verschuuren et al. (1976)	rats	0.35	U.S. EPA (1988)	0.036	0.18	0.023	0.11	0.021	0.11	0.041	0.20	0.028	0.14	0.030	0.15
Molybdenum	0.26	2.6	Schroeder and Mitchener (1971)	mice	0.03	U.S. EPA (1988)	0.25	2.5	0.16	1.6	0.15	1.5	0.29	2.9	0.20	2.0	0.21	2.1
Selenium	0.20	0.33	Rosenfeld and Beath (1954)	rats	0.35	U.S. EPA (1988)	0.23	0.37	0.14	0.23	0.13	0.22	0.25	0.42	0.18	0.29	0.19	0.31
Thallium	0.074	0.74	Formigli et al. (1986)	rats	0.365	Formigli et al. (1986)	0.084	0.84	0.053	0.53	0.049	0.49	0.094	0.94	0.065	0.65	0.070	0.70
Vanadium	0.21	2.1	Domingo et al. (1986)	rats	0.26	Domingo et al. (1986)	0.23	2.3	0.15	1.5	0.14	1.4	0.26	2.6	0.18	1.8	0.19	1.9
Zinc	160	320	Schlicker and Cox (1968)	rats	0.35	U.S. EPA (1988)	180	360	110	230	110	210	200	410	140	280	150	300

Note: Mammalian TRVs were extrapolated from laboratory studies using the following general equation from Sample and Arenal (1999):

$A_w = A_t(BW_t/BW_w)^{1-b}$

A_w - TRV for ecological receptor

A_t - TRV for test species

BW_t - Body weight of laboratory test species

BW_w - Body weight of ecological receptor (see Table 6-26)

b - Allometric scaling factor

Based on recommendations in Sample and Arenal (1999), an allometric scaling factor of 0.94 was used to extrapolate mammalian TRVs.

-- - not applicable
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NA - not available; no suitable TRV was derived
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Mercury TRVs were based on exposure to methylmercury.

Table 6-26. Food-web exposure model parameters

Representative Receptor	Community	Body Weight (kg)	Food Ingestion Rate (kg/day(dry wt)	Soil/Sediment Ingestion Rate (kg/day dry wt)	Water Ingestion Rate (L/day)[a]	Diet Composition (percent)		Time Use (days)	Home Range (ha)
Terrestrial									
Willow ptarmigan	Terrestrial avian herbivores	0.53 [b]	0.060 [c]	0.0056 [d]	0.038	90% shrubs, 10% herbaceous plants	[e]	365 [f]	3.93 [g]
Tundra vole	Terrestrial mammalian herbivores	0.047 [h]	0.0085 [i]	0.00020 [j]	0.0063	90% herbaceous plants, 5% moss, 5% lichen	[k]	365 [f]	0.1087 [l]
Caribou	Terrestrial mammalian herbivores	107 [m]	5.0 [n]	0.34 [o]	6.6	70% lichen, 10% shrubs, 10% herbaceous plants, 10% moss	[p]	150 [q]	NA
Moose	Terrestrial mammalian herbivores	339 [r]	6.4 [s]	0.13 [t]	19	90% shrubs, 10% herbaceous plants	[u]	365 [f]	2,849–29,008 [v]
Lapland longspur	Terrestrial avian invertevores	0.0254 [w]	0.0053 [x]	0.000074 [y]	0.0050	90% invertebrates, 10% herbaceous plants	[z]	150 [aa]	1.76 [bb]
Tundra shrew	Terrestrial mammalian invertevores	0.0064 [cc]	0.0021 [dd]	0.00011 [ee]	0.0011	100% invertebrates	[ff]	365 [f]	0.22 [gg]
Snowy owl	Terrestrial avian carnivores	2.28 [hh]	0.10 [ii]	0.0020 [t]	0.10	100% small mammals	[jj]	365 [f]	777 [kk]
Arctic fox	Terrestrial mammalian carnivores	3.2 [ll]	0.11 [mm]	0.0031 [nn]	0.28	100% small mammals	[oo]	365 [f]	407 [pp]
Freshwater Aquatic									
Green-winged teal	Freshwater aquatic avian herbivores	0.32 [qq]	0.053 [rr]	0.0010 [ss]	0.027	85% herbaceous plants, 15% invertebrates	[tt]	123 [uu]	243 [vv]
Muskrat	Freshwater aquatic mammalian herbivores	0.932 [ww]	0.070 [xx]	0.0014 [t]	0.093	100% herbaceous plants	[yy]	365 [f]	0.17 [zz]
Common snipe	Freshwater aquatic avian invertevores	0.116 [qq]	0.015 [aaa]	0.0016 [bbb]	0.014	90% invertebrates, 10% herbaceous plants	[ccc]	109 [ddd]	0.0908–47.7 [eee]
Coastal Lagoon									
Brant	Marine avian herbivores	1.23 [qq]	0.13 [rr]	0.011 [fff]	0.068	95% herbaceous plants, 5% moss	[ggg]	126 [hhh]	201.06 [iii]
Black-bellied plover	Marine avian invertevores	0.214 [jjj]	0.028 [kkk]	0.0082 [lll]	0.021	100% invertebrates	[mmm]	124 [nnn]	53 [ooo]

[a] Based on U.S. EPA (1993) drinking water ingestion equations for all birds or all mammals.

[b] Mean female body weight from West et al. (1970).

[c] Estimated from Andreev (1991).

[d] Based on 9.3 percent soil in wild turkey diet from Beyer et al. (1994).

[e] Estimated from diets reported for Alaska in Hannon et al. (1998).

[f] Assumes receptor is present year-round at the site.

[g] Mean territory size for monogamous males (Hannon and Dobush 1997).

[h] Mean female body weight from Bee and Hall (1956).

[i] Based on Nagy et al. (1999) allometric equation for Rodentia.

[j] Based on 2.4 percent soil in meadow vole diet from Beyer et al. (1994).

[k] Estimated from summer and winter diets at Pearce Point, NWT (Bergman and Krebs 1993).

[l] Mean home range for reproductive females at Pearce Point, NWT (Lambin et al. 1992).

Table 6-26. (cont.)

[m] Mean female in Alaska from Silva and Downing (1995).

[n] Based on mean value from Hanson et al. (1975).

[o] Based on 6.8 percent soil in bison diet from Beyer et al. (1994).

[p] Based on diets reported in Miller (1976), Boertje (1990), and Scotter (1967).

[q] Best professional judgment based on Lent (1966), Hemming (1987, 1988, 1989, 1991), and Pollard (1994a,b).

[r] Mean body weight for female Alaskan moose measured at the Kenai Moose Research Center, Soldotna, AK (Franzmann et al. 1978).

[s] Average daily ingestion rate for all female moose; 1.9% of body weight per day on a dry weight basis (Schwartz et al. 1984).

[t] Based on minimum soil ingestion rate from Beyer et al. (1994).

[u] Estimated from diets reported for Alaska in Franzmann and Schwartz (1997).

[v] Mean home ranges of nonmigratory individuals in Alaska (Franzmann and Schwartz 1997).

[w] Mean female body weight from Irving (1960).

[x] Calculated using an average female daily energy budget of 118 kJ/day and average prey caloric value of 22.16 kJ/g from Custer et al. (1986).

[y] Based on 1.4 percent soil in Lapland longspur diet reported by URS Team (1996).

[z] Estimated from summer diets near Barrow, AK (Custer and Pitelka 1978).

[aa] Based on 150 days from first to last sighting in Cape Thompson area reported by Williamson et al. (1966).

[bb] Mean male breeding territory near Barrow, AK (Seastedt and MacLean 1979).

[cc] Mean body weight from Bee and Hall (1956) and Martell and Pearson (1978).

[dd] Based on measured food consumption from Buckner (1964), assuming a mid-range moisture content of 75 percent in invertebrates from U.S. EPA (1993).

[ee] Best professional judgment based on Beyer et al. (1994).

[ff] Based on Yudin (1962, as cited in Aitchison 1987 and Buckner 1964).

[gg] Mean home range for breeding females (*Sorex vagrans* and *Sorex obscurus*) in British Columbia, Canada (Hawes 1977).

[hh] Mean female body weight from Kerlinger and Lein (1988).

[ii] Estimated from Gessaman (1972) and Pitelka et al. (1955), assuming a moisture content of 68 percent in diet from U.S. EPA (1993).

[jj] Simplified from Parmelee (1992).

[kk] Mean nesting territory near Barrow, AK (Pitelka et al. 1955).

[ll] Mean female body weight from Anthony (1997).

[mm] Based on Nagy et al. (1999) allometric equation for Carnivora.

[nn] Based on 2.8 percent soil in red fox diet from Beyer et al. (1994).

[oo] Simplified from Anthony et al. (2000).

[pp] Mean female home range in western Alaska (Anthony 1997).

[qq] Mean female body weight from Dunning (1993).

[rr] Based on Nagy et al. (1999) allometric equation for all birds.

Table 6-26. (cont.)

[ss] Based on 1.9 percent sediment in green-winged teal diet from Beyer et al. (1999).

[tt] Estimated from autumn diet in southeastern Alaska (Hughes and Young 1982).

[uu] Based on 123 days from first to last sighting in Cape Thompson area reported by Williamson et al. (1966).

[vv] Home range for one pair in South Dakota (Drewien 1967, as cited in Granholm 2003).

[ww] Mean body weight from Fuller (1951).

[xx] Estimated from Campbell et al. (1998).

[yy] Based on diets reported in U.S. EPA (1993).

[zz] Mean female home range in Iowa (Neal 1968, as cited in U.S. EPA 1993).

[aaa] Based on Nagy et al. (1999) allometric equation for Insectivores.

[bbb] Based on 10.4 percent soil in American woodcock diet from Beyer et al. (1994).

[ccc] Based on diets reported in Mueller (1999).

[ddd] Based on 109 days from first to last sighting in Cape Thompson area reported by Williamson et al. (1966).

[eee] Estimated area based on a 17–390 m mean distance (radius) females traveled from nest to feeding sites during incubation period (Green et al. 1990).

[fff] Based on 8.2 percent soil in Canada goose diet from Beyer et al. (1994).

[ggg] Based on breeding season diets reported in Reed et al. (1998).

[hhh] Based on 126 days from first to last sighting in Cape Thompson area reported by Williamson et al. (1966).

[iii] Estimated assuming a maximum foraging distance (radius) of 800 m from nest (Reed et al. 1998).

[jjj] Mean female body weight for Alaska from Paulson (1995).

[kkk] Based on Nagy et al. (1999) allometric equation for Charadriiformes.

[lll] Based on 29% sediment in black-bellied plover diet from Hui and Beyer (1998).

[mmm] Based on breeding season diets reported in Paulson (1995).

[nnn] Based on 124 days from first to last sighting of American golden plover in Cape Thompson area reported by Williamson et al. (1966).

[ooo] Estimated based on average radius of breeding territory in northern Alaska (412 m) (Moitoret pers. comm., as cited in Paulson 1995).

Table ERA-K-58. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP-REF-2 site

	Concentration				Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	14.5	4,310	2.5	5.6	0.000399	4.37	0.158	4.53	14.2	120	--	0.12	--
Antimony	0.02	0.03	0.03	0.003	0.000000550	0.0000304	0.00138	0.00142	0.00442	--	--	--	--
Arsenic (arsenate)	0.5	7	0.18	0.05	0.0000137	0.00710	0.00856	0.0157	0.0490	10	40	0.0049	0.0012
Arsenic (arsenite)	0.5	7	0.18	0.05	0.0000137	0.00710	0.00856	0.0157	0.0490	20	50	0.0024	0.0010
Barium	133	232	42.3	5.63	0.00366	0.235	1.96	2.20	6.88	21	42	0.33	0.16
Cadmium	0.005	0.35	0.119	0.96	0.000000137	0.000355	0.0131	0.0134	0.0420	1.5	20	0.028	0.0021
Chromium	0.18	10.9	0.2	0.3	0.00000495	0.0111	0.0115	0.0225	0.0704	0.86	4.3	0.082	0.016
Cobalt	0.21	8.13	1.34	0.029	0.00000577	0.00824	0.0610	0.0693	0.216	--	--	--	--
Lead	0.06	7.48	0.5	0.15	0.00000165	0.00758	0.0239	0.0315	0.0983	3.9	11	0.025	0.0089
Mercury	0.05	0.03	0.03	0.09	0.00000137	0.0000304	0.00208	0.00211	0.0066	0.032	0.064	0.21	0.10
Molybdenum	0.02	0.46	1.08	0.324	0.00000055	0.000466	0.0516	0.0520	0.163	3.5	35	0.046	0.0046
Selenium	0.5	0.5	0.2	0.65	0.0000137	0.000507	0.0143	0.0148	0.0462	0.40	0.80	0.12	0.058
Thallium	0.003	0.056	0.022	0.002	0.0000000825	0.0000568	0.00101	0.00107	0.00335	0.24	24	0.014	0.00014
Vanadium	0.17	14.9	0.3	0.2	0.00000467	0.0151	0.0152	0.0303	0.0947	11	--	0.0086	--
Zinc (TRV1)	0.59	65.4	28.3	214	0.0000162	0.0663	3.00	3.06	9.57	130	--	0.074	--
Zinc (TRV2)	0.59	65.4	28.3	214	0.0000162	0.0663	3.00	3.06	9.57	70	120	0.14	0.080

Note: The following data were used to develop this scenario: PHASE1RA water data (TP-REF-2); PHASE1RA sediment (TP-REF-2); PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TS-REF-5).

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

Table ERA-K-59. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP-REF-3 site

	Concentration				Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	91.2	17,100	11.1	5.6	0.00251	17.3	0.548	17.9	55.9	120	--	0.47	--
Antimony	0.1	0.05	0.07	0.003	0.00000275	0.0000507	0.00320	0.00325	0.0102	--	--	--	--
Arsenic (arsenate	0.9	2.6	0.07	0.05	0.0000247	0.00264	0.00357	0.00624	0.0195	10	40	0.0019	0.00049
Arsenic (arsenite)	0.9	2.6	0.07	0.05	0.0000247	0.00264	0.00357	0.00624	0.0195	20	50	0.0010	0.00039
Barium	48.4	516	51.2	5.63	0.00133	0.523	2.37	2.89	9.04	21	42	0.43	0.22
Cadmium	0.06	0.27	0.199	0.96	0.00000165	0.000274	0.0167	0.0170	0.0531	1.5	20	0.035	0.0027
Chromium	0.72	28	0.4	0.3	0.0000198	0.0284	0.0205	0.0489	0.153	0.86	4.3	0.18	0.036
Cobalt	0.19	8.01	0.25	0.029	0.00000522	0.00812	0.0116	0.0197	0.0616	--	--	--	--
Lead	0.5	10.5	0.37	0.15	0.0000137	0.0106	0.0180	0.0286	0.0895	3.9	11	0.023	0.0081
Mercury	0.05	0.04	0.033	0.09	0.00000137	0.0000406	0.00222	0.00226	0.00706	0.032	0.064	0.22	0.11
Molybdenum	0.22	0.48	0.829	0.324	0.00000605	0.000487	0.0402	0.0407	0.127	3.5	35	0.036	0.0036
Selenium	0.2	0.7	0.05	0.65	0.00000550	0.000710	0.00747	0.00819	0.0256	0.40	0.80	0.064	0.032
Thallium	0.04	0.174	0.004	0.002	0.00000110	0.000176	0.000197	0.000375	0.00117	0.24	24	0.0049	0.000049
Vanadium	2.41	36.5	0.2	0.2	0.0000663	0.0370	0.0107	0.0477	0.149	11	--	0.014	--
Zinc (TRV1)	2.87	88.7	30	214	0.0000789	0.0899	3.07	3.16	9.89	130	--	0.076	--
Zinc (TRV2)	2.87	88.7	30	214	0.0000789	0.0899	3.07	3.16	9.89	70	120	0.14	0.082

Note: The following data were used to develop this scenario: PHASE1RA water data (TP-REF-3); PHASE1RA sediment (TP-REF-3); PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TS-REF-5).

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

Table ERA-K-60. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP-REF-5 site

	Concentration				Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	170	11,700	714	5.6	0.00467	11.9	32.4	44.3	138	120	--	1.2	--
Antimony	0.05	0.03	0.075	0.003	0.00000137	0.0000304	0.00343	0.00346	0.0108	--	--	--	--
Arsenic (arsenate)	0.5	3.1	9.36	0.05	0.0000137	0.00314	0.425	0.428	1.34	10	40	0.13	0.033
Arsenic (arsenite)	0.5	3.1	9.36	0.05	0.0000137	0.00314	0.425	0.428	1.34	20	50	0.067	0.027
Barium	93.5	508	117	5.63	0.00257	0.515	5.35	5.87	18.3	21	42	0.87	0.44
Cadmium	0.05	0.36	0.179	0.96	0.00000137	0.000365	0.0158	0.0162	0.0505	1.5	20	0.034	0.0025
Chromium	1.98	26.1	6.2	0.3	0.0000544	0.0265	0.284	0.310	0.969	0.86	4.3	1.1	0.23
Cobalt	0.7	11.7	4.56	0.029	0.0000192	0.0119	0.207	0.219	0.684	--	--	--	--
Lead	0.56	10.7	1.1	0.15	0.0000154	0.0108	0.0511	0.0620	0.194	3.9	11	0.050	0.018
Mercury	0.05	0.06	0.033	0.09	0.00000137	0.0000608	0.00222	0.00228	0.00712	0.032	0.064	0.22	0.11
Molybdenum	0.05	0.38	0.38	0.324	0.00000137	0.000385	0.0198	0.0202	0.0632	3.5	35	0.018	0.0018
Selenium	0.3	0.6	0.2	0.65	0.00000825	0.000608	0.0143	0.0149	0.0465	0.40	0.80	0.12	0.058
Thallium	0.003	0.139	0.049	0.002	0.0000000825	0.000141	0.00224	0.00238	0.00744	0.24	24	0.031	0.00031
Vanadium	0.89	32.5	3.9	0.2	0.0000245	0.0329	0.178	0.211	0.661	11	--	0.060	--
Zinc (TRV1)	5.01	68.2	32	214	0.000138	0.0691	3.16	3.23	10.1	130	--	0.078	--
Zinc (TRV2)	5.01	68.2	32	214	0.000138	0.0691	3.16	3.23	10.1	70	120	0.14	0.084

Note: The following data were used to develop this scenario: PHASE1RA water data (TP-REF-5); PHASE1RA sediment (TP-REF-5); PHASE2RA whole sedge (no seed data available); and PHASE2RA terrestrial invertebrates (TS-REF-5).

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

Table ERA-K-61. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP1-0100 site

	Concentration				Daily Exposure								TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/ Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/ Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	Time Use Adjusted Exposure (mg/kg-day)	Ref. Time Use Adjusted Exp. (mg/kg-day)[a]	Total Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	11.4	4,290	12.6	136	0.000313	4.35	1.66	6.01	18.8	6.33	36.9	43.2	120	--	0.36	--
Antimony	0.2	9	0.037	0.081	0.00000550	0.00912	0.00233	0.0115	0.0358	0.0121	0.00671	0.0188	--	--	--	--
Arsenic (arsenate)	0.6	7.5	0.03	0.17	0.0000165	0.00760	0.00272	0.0103	0.0323	0.0109	0.0129	0.0238	10	40	0.0024	0.00060
Arsenic (arsenite)	0.6	7.5	0.03	0.17	0.0000165	0.00760	0.00272	0.0103	0.0323	0.0109	0.0129	0.0238	20	50	0.0012	0.00048
Barium	70.3	498	26.2	46.5	0.00193	0.505	1.56	2.07	6.46	2.18	5.96	8.14	21	42	0.39	0.19
Cadmium	0.27	101	0.062	3.14	0.00000742	0.102	0.0279	0.130	0.407	0.137	0.0350	0.172	1.5	20	0.115	0.0086
Chromium	0.44	13	0.4	0.45	0.0000121	0.0132	0.0217	0.0349	0.109	0.0368	0.101	0.138	0.86	4.3	0.16	0.032
Cobalt	0.88	24.1	0.14	0.166	0.0000242	0.0244	0.00767	0.0321	0.100	0.0338	0.0406	0.0745	--	--	--	--
Lead	1.63	1,810	1.6	16.2	0.0000448	1.83	0.202	2.04	6.37	2.15	0.0591	2.20	3.9	11	0.57	0.20
Mercury	0.05	1.1	0.044	0.115	0.00000137	0.00112	0.00292	0.00403	0.0126	0.00425	0.00466	0.00891	0.032	0.064	0.28	0.14
Molybdenum	0.09	2.43	0.159	0.415	0.00000247	0.00246	0.0105	0.0130	0.0406	0.0137	0.0839	0.0976	3.5	35	0.028	0.0028
Selenium	0.2	3	0.05	0.40	0.00000550	0.00304	0.00547	0.00852	0.0266	0.00897	0.0169	0.0259	0.40	0.80	0.065	0.032
Thallium	0.01	1.64	0.001	0.0235	0.000000275	0.00166	0.000233	0.00190	0.00593	0.00200	0.000773	0.00277	0.24	24	0.012	0.00012
Vanadium	0.24	12.2	0.2	0.4	0.00000660	0.0124	0.0123	0.0246	0.0770	0.0260	0.0985	0.124	11	--	0.011	--
Zinc (TRV1)	99	21,900	65	291	0.00272	22.2	5.28	27.5	85.9	28.9	6.52	35.5	130	--	0.27	--
Zinc (TRV2)	99	21,900	65	291	0.00272	22.2	5.28	27.5	85.9	28.9	6.52	35.5	70	120	0.51	0.30

Note: The following data were used to develop this scenario: PHASE1RA water data (TP1-0100); PHASE1RA sediment; PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TT5-0100).
Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Based on mean daily exposure for teal in pond reference station 3 (Table ERA-K-59) multipled by 0.66.

Table ERA-K-62. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP1-1000 site

	Concentration				Daily Exposure								TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/ Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/ Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	Time Use Adjusted Exposure (mg/kg-day)	Ref. Time Use Adjusted Exp. (mg/kg-day)[a]	Total Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	143	4,330	2	19.3	0.00393	4.39	0.245	4.64	14.5	4.89	36.9	41.8	120	--	0.35	--
Antimony	0.09	0.2	0.046	0.019	0.00000247	0.000203	0.00224	0.00244	0.00764	0.00257	0.00671	0.00928	--	--	--	--
Arsenic (arsenate)	0.4	5.1	0.03	0.105	0.0000110	0.00517	0.00220	0.00738	0.0231	0.00777	0.0129	0.0206	10	40	0.0021	0.00052
Arsenic (arsenite)	0.4	5.1	0.03	0.105	0.0000110	0.00517	0.00220	0.00738	0.0231	0.00777	0.0129	0.0206	20	50	0.0010	0.00041
Barium	39.4	281	47.5	5.78	0.00108	0.285	2.20	2.49	7.77	2.62	5.96	8.58	21	42	0.41	0.20
Cadmium	0.06	0.94	0.079	2.53	0.00000165	0.000953	0.0239	0.0248	0.0776	0.0261	0.0350	0.0612	1.5	20	0.041	0.0031
Chromium	1.56	9.71	0.4	0.2	0.0000429	0.00984	0.0197	0.0296	0.0926	0.0312	0.101	0.132	0.86	4.3	0.15	0.031
Cobalt	1.56	22.6	0.7	0.054	0.0000429	0.0229	0.0322	0.0551	0.172	0.0581	0.0406	0.0987	--	--	--	--
Lead	1.06	8.96	0.79	2.79	0.0000291	0.00908	0.0582	0.0673	0.210	0.0708	0.0591	0.130	3.9	11	0.033	0.012
Mercury	0.05	0.06	0.037	0.15	0.00000137	0.0000608	0.00288	0.00294	0.00919	0.00310	0.00466	0.00776	0.032	0.064	0.24	0.12
Molybdenum	0.02	1.17	0.069	0.289	0.000000550	0.00119	0.00544	0.00663	0.0207	0.00698	0.0839	0.0909	3.5	35	0.026	0.0026
Selenium	0.2	1.6	0.05	0.75	0.00000550	0.00162	0.00827	0.00990	0.0309	0.0104	0.0169	0.0273	0.40	0.80	0.068	0.034
Thallium	0.003	0.021	0.001	0.0085	0.0000000825	0.0000213	0.000113	0.000135	0.000421	0.000142	0.000773	0.000915	0.24	24	0.0038	0.000038
Vanadium	0.28	15.1	0.2	0.4	0.00000770	0.0153	0.0123	0.0276	0.0862	0.0291	0.0985	0.128	11	--	0.012	--
Zinc (TRV1)	30.6	162	58.5	302	0.000841	0.164	5.07	5.23	16.3	5.51	6.52	12.0	130	--	0.093	--
Zinc (TRV2)	30.6	162	58.5	302	0.000841	0.164	5.07	5.23	16.3	5.51	6.52	12.0	70	120	0.17	0.10

Note: The following data were used to develop this scenario: PHASE1RA water data (TP1-1000); PHASE1RA sediment; PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TT5-1000).
Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Based on mean daily exposure for teal in pond reference station 3 (Table ERA-K-59) multipled by 0.66.

Table ERA-K-63. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP3 site

	Concentration				Daily Exposure								TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/ Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/ Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	Time Use Adjusted Exposure (mg/kg-day)	Ref. Time Use Adjusted Exp. (mg/kg-day)[a]	Total Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	75	1,920	10.6	79.8	0.00206	1.95	1.12	3.07	9.59	3.23	36.9	40.1	120	--	0.34	--
Antimony	0.03	0.26	0.5	0.018	0.000000825	0.000264	0.0228	0.0231	0.0721	0.0243	0.00671	0.0310	--	--	--	--
Arsenic (arsenate)	0.5	3.5	0.04	0.14	0.0000137	0.00355	0.00293	0.00650	0.0203	0.00684	0.0129	0.0197	10	40	0.0020	0.00049
Arsenic (arsenite)	0.5	3.5	0.04	0.14	0.0000137	0.00355	0.00293	0.00650	0.0203	0.00684	0.0129	0.0197	20	50	0.00099	0.00040
Barium	46.8	388	44.3	29.9	0.00129	0.393	2.25	2.64	8.26	2.78	5.96	8.75	21	42	0.42	0.21
Cadmium	0.02	1.91	0.143	4.51	0.000000550	0.00194	0.0426	0.0445	0.139	0.0469	0.0350	0.0819	1.5	20	0.055	0.0041
Chromium	1.6	9.42	0.2	0.3	0.0000440	0.00955	0.0115	0.0211	0.0658	0.0222	0.101	0.123	0.86	4.3	0.14	0.029
Cobalt	0.13	7.56	0.426	0.161	0.00000357	0.00766	0.0206	0.0283	0.0884	0.0298	0.0406	0.0704	--	--	--	--
Lead	0.44	93.2	0.49	3.08	0.0000121	0.0945	0.0469	0.141	0.442	0.149	0.0591	0.208	3.9	11	0.053	0.019
Mercury	0.05	0.11	0.04	0.24	0.00000137	0.000112	0.00374	0.00385	0.0120	0.00405	0.00466	0.00871	0.032	0.064	0.27	0.136
Molybdenum	0.05	2	1.49	0.225	0.00000137	0.00203	0.0694	0.0714	0.223	0.0752	0.0839	0.159	3.5	35	0.046	0.0046
Selenium	0.2	0.75	0.1	0.2	0.00000550	0.000760	0.00614	0.00690	0.0216	0.00727	0.0169	0.0242	0.40	0.80	0.061	0.030
Thallium	0.003	0.023	0.001	0.019	0.0000000825	0.0000233	0.000197	0.000221	0.000690	0.000233	0.000773	0.00101	0.24	24	0.0042	0.000042
Vanadium	0.31	28.3	0.3	0.2	0.00000852	0.0287	0.0152	0.0439	0.137	0.0462	0.0985	0.145	11	--	0.013	--
Zinc (TRV1)	6.08	288	57.2	235	0.000167	0.292	4.48	4.77	14.9	5.02	6.52	11.5	130	--	0.089	--
Zinc (TRV2)	6.08	288	57.2	235	0.000167	0.292	4.48	4.77	14.9	5.02	6.52	11.5	70	120	0.17	0.096

Note: The following data were used to develop this scenario: PHASE1RA water data (TP2-0100); PHASE1RA sediment; PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TT3-0100).
Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Based on mean daily exposure for teal in pond reference station 3 (Table ERA-K-59) multipled by 0.66.

Table ERA-K-64. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at TP4 site

	Concentration				Daily Exposure								TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/ Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/ Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	Time Use Adjusted Exposure (mg/kg-day)	Ref. Time Use Adjusted Exp. (mg/kg-day)[a]	Total Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	75	1,920	17.1	78.3	0.00206	1.95	1.40	3.35	10.5	3.53	36.9	40.4	120	--	0.34	--
Antimony	0.03	0.26	1.44	0.027	0.000000825	0.000264	0.0655	0.0658	0.206	0.0693	0.00671	0.0760	--	--	--	--
Arsenic (arsenate)	0.5	3.5	0.09	0.13	0.0000137	0.00355	0.00512	0.00868	0.0271	0.00915	0.0129	0.0220	10	40	0.0022	0.00055
Arsenic (arsenite)	0.5	3.5	0.09	0.13	0.0000137	0.00355	0.00512	0.00868	0.0271	0.00915	0.0129	0.0220	20	50	0.0011	0.00044
Barium	46.8	388	49.9	108	0.00129	0.393	3.13	3.52	11.0	3.71	5.96	9.67	21	42	0.46	0.23
Cadmium	0.02	1.91	0.043	13	0.000000550	0.00194	0.106	0.108	0.337	0.114	0.0350	0.149	1.5	20	0.099	0.0074
Chromium	1.6	9.42	0.65	0.3	0.0000440	0.00955	0.0319	0.0415	0.130	0.0437	0.101	0.145	0.86	4.3	0.17	0.034
Cobalt	0.13	7.56	0.497	0.087	0.00000357	0.00766	0.0232	0.0309	0.0966	0.0325	0.0406	0.0732	--	--	--	--
Lead	0.44	93.2	0.89	10.1	0.0000121	0.0945	0.121	0.216	0.674	0.227	0.0591	0.286	3.9	11	0.073	0.026
Mercury	0.05	0.11	0.05	0.12	0.00000137	0.000112	0.00323	0.00334	0.0104	0.00352	0.00466	0.00818	0.032	0.064	0.26	0.13
Molybdenum	0.05	2	0.182	0.335	0.00000137	0.00203	0.0109	0.0130	0.0405	0.0137	0.0839	0.0976	3.5	35	0.028	0.0028
Selenium	0.2	0.75	0.3	0.2	0.00000550	0.000760	0.0152	0.0160	0.0499	0.0168	0.0169	0.0337	0.40	0.80	0.084	0.042
Thallium	0.003	0.023	0.003	0.02	0.0000000825	0.0000233	0.000296	0.000320	0.00100	0.000336	0.000773	0.00111	0.24	24	0.0046	0.000046
Vanadium	0.31	28.3	0.7	0.2	0.00000852	0.0287	0.0333	0.0620	0.194	0.0653	0.0985	0.164	11	--	0.015	--
Zinc (TRV1)	6.08	288	59.6	310	0.000167	0.292	5.18	5.48	17.1	5.77	6.52	12.3	130	--	0.095	--
Zinc (TRV2)	6.08	288	59.6	310	0.000167	0.292	5.18	5.48	17.1	5.77	6.52	12.3	70	120	0.18	0.10

Note: The following data were used to develop this scenario: PHASE1RA water data (TP2-0100); PHASE1RA sediment; PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TT6-0100).
Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Based on mean daily exposure for teal in pond reference station 3 (Table ERA-K-59) multipled by 0.66.

Table ERA-K-65. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at ST-REF-3 site

	Concentration				Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	17.3	3,620	5.6	5.6	0.000476	3.67	0.299	3.97	12.4	120	--	0.10	--
Antimony	0.01	0.03	0.055	0.003	0.000000275	0.0000304	0.00252	0.00255	0.00797	--	--	--	--
Arsenic (arsenate)	0.1	8.1	0.26	0.05	0.00000275	0.00821	0.0122	0.0204	0.0638	10	40	0.0064	0.0016
Arsenic (arsenite)	0.1	8.1	0.26	0.05	0.00000275	0.00821	0.0122	0.0204	0.0638	20	50	0.0032	0.0013
Barium	169	177	30.2	5.63	0.00465	0.179	1.41	1.60	5.00	21	42	0.24	0.12
Cadmium	0.005	0.245	0.04	0.696	0.000000137	0.000248	0.00738	0.00763	0.0239	1.5	20	0.016	0.0012
Chromium	0.25	7.22	0.3	0.3	0.00000687	0.00732	0.0160	0.0233	0.0729	0.86	4.3	0.085	0.017
Cobalt	0.22	11	0.71	0.029	0.00000605	0.0112	0.0324	0.0436	0.136	--	--	--	--
Lead	0.02	9.50	0.17	8.14	0.000000550	0.00963	0.0729	0.0825	0.258	3.9	11	0.066	0.023
Mercury	0.05	0.022	0.039	0.07	0.00000137	0.0000218	0.00233	0.00235	0.00735	0.032	0.064	0.23	0.11
Molybdenum	0.05	0.52	0.3	0.324	0.00000137	0.000527	0.0162	0.0167	0.0523	3.5	35	0.015	0.0015
Selenium	0.2	0.5	0.2	0.65	0.00000550	0.000507	0.0143	0.0148	0.0462	0.40	0.80	0.12	0.058
Thallium	0.003	0.041	0.002	0.002	0.0000000825	0.0000416	0.000107	0.000148	0.000464	0.24	24	0.0019	0.000019
Vanadium	0.2	10.7	0.3	0.2	0.00000550	0.0108	0.0152	0.0261	0.0814	11	--	0.0074	--
Zinc (TRV1)	0.31	66.9	40.3	137	0.00000852	0.0678	2.92	2.99	9.35	130	--	0.072	--
Zinc (TRV2)	0.31	66.9	40.3	137	0.00000852	0.0678	2.92	2.99	9.35	70	120	0.13	0.078

Note: The following data were used to develop this scenario: PHASE1RA water data (sedge ST-REF-1); PHASE1RA sediment (ST-REF-3); PHASE2RA sediment for Cd, Pb, Hg, Zn; PHASE2RA sedge seeds; PHASE2RA stream invertebrates for Cd, Pb, Hg, Zn; and PHASE2RA terrestrial invertebrates for Al, As, Ba, Cr, Co, Mo, Se, Tl, V (TS-REF-5).

Mean of PHASE1RA and PHASE2RA sediment data used. No water data available for ST-REF-3, so data from closest stream, ST-REF-1, used.

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

Table ERA-K-66. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at ST-REF-5 site

	Concentration				Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	2,770	12,100	5.4	5.6	0.0762	12.3	0.290	12.6	39.5	120	--	0.33	--
Antimony	0.08	0.05	0.04	0.003	0.00000220	0.0000507	0.00184	0.00189	0.00591	--	--	--	--
Arsenic (arsenate)	2.2	3.5	0.09	0.05	0.0000605	0.00355	0.00448	0.00809	0.0253	10	40	0.0025	0.00063
Arsenic (arsenite)	2.2	3.5	0.09	0.05	0.0000605	0.00355	0.00448	0.00809	0.0253	20	50	0.0013	0.00051
Barium	222	483	46.9	5.63	0.00610	0.490	2.17	2.67	8.34	21	42	0.40	0.20
Cadmium	0.07	0.3	0.071	0.96	0.00000192	0.000304	0.0109	0.0112	0.0350	1.5	20	0.023	0.0018
Chromium	3.71	19.9	0.2	0.3	0.000102	0.0202	0.0115	0.0317	0.0992	0.86	4.3	0.12	0.023
Cobalt	2.72	8.74	0.42	0.029	0.0000748	0.00886	0.0193	0.0282	0.0882	--	--	--	--
Lead	1.91	8.87	0.21	0.15	0.0000525	0.00899	0.0107	0.0198	0.0618	3.9	11	0.016	0.0056
Mercury	0.05	0.04	0.031	0.09	0.00000137	0.0000406	0.00213	0.00217	0.00678	0.032	0.064	0.21	0.11
Molybdenum	0.17	0.3	0.506	0.324	0.00000467	0.000304	0.0255	0.0259	0.0808	3.5	35	0.023	0.0023
Selenium	0.2	0.7	0.05	0.65	0.00000550	0.000710	0.00747	0.00819	0.0256	0.40	0.80	0.064	0.032
Thallium	0.014	0.07	0.003	0.002	0.000000385	0.0000710	0.000152	0.000223	0.000698	0.24	24	0.0029	0.000029
Vanadium	5.57	24.8	0.3	0.2	0.000153	0.0251	0.0152	0.0405	0.127	11	--	0.012	--
Zinc (TRV1)	9.84	68.1	31.7	214	0.000271	0.0690	3.15	3.22	10.1	130	--	0.077	--
Zinc (TRV2)	9.84	68.1	31.7	214	0.000271	0.0690	3.15	3.22	10.1	70	120	0.14	0.084

Note: The following data were used to develop this scenario: PHASE1RA water data (ST-REF-5); PHASE1RA sediment (ST-REF-5); PHASE2RA sedge seeds; and PHASE2RA terrestrial invertebrates (TS-REF-5).

No PHASE2RA sediment data collected.

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

Table ERA-K-67. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at ST-REF-6 site

	Concentration				Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	2,770	12,100	396	5.6	0.0762	12.3	18.0	30.3	94.8	120	--	0.79	--
Antimony	0.08	0.05	0.05	0.003	0.00000220	0.0000507	0.00229	0.00234	0.00733	--	--	--	--
Arsenic (arsenate)	2.2	3.5	1.08	0.05	0.0000605	0.00355	0.0494	0.0530	0.166	10	40	0.017	0.0041
Arsenic (arsenite)	2.2	3.5	1.08	0.05	0.0000605	0.00355	0.0494	0.0530	0.166	20	50	0.0083	0.0033
Barium	222	483	64	5.63	0.00610	0.490	2.95	3.44	10.8	21	42	0.51	0.26
Cadmium	0.07	0.19	0.057	0.347	0.00000192	0.000193	0.00536	0.00556	0.0174	1.5	20	0.012	0.00087
Chromium	3.71	19.9	4.1	0.3	0.000102	0.0202	0.188	0.209	0.652	0.86	4.3	0.76	0.15
Cobalt	2.72	8.74	1.62	0.029	0.0000748	0.00886	0.0737	0.0826	0.258	--	--	--	--
Lead	1.91	5.71	0.74	2.73	0.0000525	0.00579	0.0554	0.0613	0.191	3.9	11	0.049	0.017
Mercury	0.05	0.003	0.025	0.14	0.00000137	0.00000304	0.00225	0.00226	0.00706	0.032	0.064	0.22	0.11
Molybdenum	0.17	0.3	0.147	0.324	0.00000467	0.000304	0.00926	0.00957	0.0299	3.5	35	0.0085	0.00085
Selenium	0.2	0.7	0.2	0.65	0.00000550	0.000710	0.0143	0.0150	0.0468	0.40	0.80	0.12	0.059
Thallium	0.014	0.07	0.009	0.002	0.000000385	0.0000710	0.000424	0.000496	0.00155	0.24	24	0.0065	0.000065
Vanadium	5.57	24.8	0.85	0.2	0.000153	0.0251	0.0402	0.0654	0.205	11	--	0.019	--
Zinc (TRV1)	9.84	33.1	30	91.3	0.000271	0.0336	2.09	2.13	6.64	130	--	0.051	--
Zinc (TRV2)	9.84	33.1	30	91.3	0.000271	0.0336	2.09	2.13	6.64	70	120	0.095	0.055

Note: The following data were used to develop this scenario: PHASE1RA water data (ST-REF-5); PHASE1RA sediment for Al, As, Ba, Cr, Co, Mo, Se, Tl, V (ST-REF-5); PHASE2RA sediment for Cd, Pb, Hg, Zn (ST-REF-6); PHASE2RA whole sedge (no seed data available); PHASE2RA stream invertebrates for Cd, Pb, Hg, Zn (ST-REF-6); and PHASE2RA terrestrial invertebrates for Al, As, Ba, Cr, Co, Mo, Se, Tl, V (TS-REF-5).
No sediment or water data collected at ST-REF-6 during PHASE1RA, so data from closest stream (ST-REF-5) was used.
Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

Table ERA-K-68. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at Omikviorok River road site

	Concentration				Daily Exposure								TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/ Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/ Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	Time Use Adjusted Exposure (mg/kg-day)	Ref. Time Use Adjusted Exp. (mg/kg-day)[a]	Total Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	96.3	9,520	163	151	0.00265	9.65	8.60	18.3	57.0	19.2	26.1	45.3	120	--	0.38	--
Antimony	0.063	0.14	0.047	0.037	0.00000173	0.000142	0.00243	0.00257	0.00804	0.00271	0.00390	0.00661	--	--	--	--
Arsenic (arsenate)	0.482	7.6	0.23	0.25	0.0000133	0.00770	0.0124	0.0202	0.0630	0.0212	0.0167	0.0379	10	40	0.0038	0.00095
Arsenic (arsenite)	0.482	7.6	0.23	0.25	0.0000133	0.00770	0.0124	0.0202	0.0630	0.0212	0.0167	0.0379	20	50	0.0019	0.00076
Barium	133	407	74	71.8	0.00366	0.413	3.93	4.35	13.6	4.58	5.50	10.1	21	42	0.48	0.24
Cadmium	0.084942857	0.44	0.137	0.365	0.00000234	0.000441	0.00913	0.00958	0.0299	0.0101	0.0231	0.0332	1.5	20	0.022	0.0017
Chromium	0.396	20.6	0.6	0.3	0.0000109	0.0209	0.0296	0.0505	0.158	0.0532	0.0655	0.119	0.86	4.3	0.14	0.028
Cobalt	0.1	13.5	0.39	0.134	0.00000275	0.0137	0.0188	0.0324	0.101	0.0342	0.0582	0.0924	--	--	--	--
Lead	0.506	22.5	2.6	5.16	0.0000139	0.0228	0.159	0.182	0.569	0.192	0.0408	0.232	3.9	11	0.060	0.021
Mercury	0.0179	0.0315	0.041	0.08	0.000000492	0.0000319	0.00250	0.00253	0.00791	0.00267	0.00447	0.00714	0.032	0.064	0.22	0.11
Molybdenum	0.69	0.49	0.202	0.274	0.0000190	0.000497	0.0114	0.0119	0.0371	0.0125	0.0533	0.0658	3.5	35	0.019	0.0019
Selenium	0.0201	0.6	0.1	0.2	0.000000553	0.000608	0.00614	0.00674	0.0211	0.00710	0.0169	0.0240	0.40	0.80	0.060	0.030
Thallium	0.0428	0.106	0.005	0.014	0.00000118	0.000107	0.000339	0.000447	0.00140	0.000471	0.000461	0.000932	0.24	24	0.0039	0.000039
Vanadium	0.335	24.9	0.5	0.49	0.00000921	0.0252	0.0266	0.0519	0.162	0.0546	0.0835	0.138	11	--	0.013	--
Zinc (TRV1)	6.46	108	57.1	79	0.000178	0.109	3.22	3.33	10.4	3.51	6.64	10.1	130	--	0.078	--
Zinc (TRV2)	6.46	108	57.1	79	0.000178	0.109	3.22	3.33	10.4	3.51	6.64	10.1	70	120	0.15	0.085

Note: The following data were used to develop this scenario: TECK03 water (mean of OmiRoad); PHASE1RA sediment; PHASE2RA sediment for Cd, Pb, Hg, Zn; PHASE2RA sedge seeds; PHASE2RA stream invertebrates for Cd, Pb, Hg, Zn; and PHASE2RA terrestrial invertebrates for Al, As, Ba, Cr, Co, Mo, Se, Tl, V (TT3-0010).

Mean of PHASE1RA and PHASE2RA sediment data used.

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Based on mean daily exposure for teal in stream reference station 5 (Table ERA-K-66) multipled by 0.66.

Table ERA-K-69. Food-web model exposure results for green-winged teal exposed to CoPC concentrations at Anxiety Ridge Creek road site

	Concentration				Daily Exposure								TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/ Sediment (mg/kg dw)	Herb. Plant (mg/kg dw)	Invert. (mg/kg dw)	Water (mg/day)	Soil/ Sediment (mg/day)	Food (mg/day)	Total Daily Intake (mg/day)	BW Normalized Exposure (mg/kg-day)	Time Use Adjusted Exposure (mg/kg-day)	Ref. Time Use Adjusted Exp. (mg/kg-day)[a]	Total Exposure (mg/kg-day)	NOAEL (mg/kg-day)	LOAEL (mg/kg-day)	NOAEL Hazard Quotient	LOAEL Hazard Quotient
Aluminum	208	7,200	307	58	0.00572	7.30	14.4	21.7	67.8	22.8	26.1	48.9	120	--	0.41	--
Antimony	0.063	0.42	0.04	0.017	0.00000173	0.000426	0.00195	0.00238	0.00743	0.00250	0.00390	0.00640	--	--	--	--
Arsenic (arsenate)	0.482	8.4	1.13	0.12	0.0000133	0.00852	0.0522	0.0607	0.190	0.0640	0.0167	0.0807	10	40	0.0081	0.0020
Arsenic (arsenite)	0.482	8.4	1.13	0.12	0.0000133	0.00852	0.0522	0.0607	0.190	0.0640	0.0167	0.0807	20	50	0.0040	0.0016
Barium	140	922	250	52.5	0.00385	0.935	11.8	12.7	39.7	13.4	5.50	18.9	21	42	0.90	0.45
Cadmium	0.0365	1.02	0.638	0.803	0.00000100	0.00103	0.0354	0.0364	0.114	0.0383	0.0231	0.0614	1.5	20	0.041	0.0031
Chromium	0.396	14.6	3.1	0.3	0.0000109	0.0148	0.143	0.158	0.493	0.166	0.0655	0.232	0.86	4.3	0.27	0.054
Cobalt	0.015	11.1	0.92	0.07	0.000000412	0.0113	0.0423	0.0535	0.167	0.0564	0.0582	0.115	--	--	--	--
Lead	0.65	124	14.3	10.9	0.0000179	0.125	0.736	0.861	2.69	0.907	0.0408	0.948	3.9	11	0.24	0.086
Mercury	0.0179	0.06	0.06	0.04	0.000000492	0.0000634	0.00304	0.00311	0.00970	0.00327	0.00447	0.00774	0.032	0.064	0.24	0.12
Molybdenum	0.22	1.62	0.309	0.229	0.00000605	0.00164	0.0158	0.0175	0.0547	0.0184	0.0533	0.0717	3.5	35	0.021	0.0021
Selenium	0.355	1.5	0.3	0.2	0.00000976	0.00152	0.0152	0.0167	0.0523	0.0176	0.0169	0.0345	0.40	0.80	0.086	0.043
Thallium	0.09	0.19	0.027	0.015	0.00000247	0.000193	0.00134	0.00154	0.00481	0.00162	0.000461	0.00208	0.24	24	0.0087	0.000087
Vanadium	0.335	20.5	0.7	0.2	0.00000921	0.0208	0.0333	0.0541	0.169	0.0570	0.0835	0.141	11	--	0.013	--
Zinc (TRV1)	1.79	204	87.4	96.2	0.0000492	0.206	4.73	4.94	15.4	5.20	6.64	11.8	130	--	0.091	--
Zinc (TRV2)	1.79	204	87.4	96.2	0.0000492	0.206	4.73	4.94	15.4	5.20	6.64	11.8	70	120	0.17	0.099

Note: The following data were used to develop this scenario: TECK03 water (ARC-D); PHASE1RA sediment (ARC-D1); PHASE2RA sediment (Cd, Pb, Hg, Zn at ARC-R); PHASE2RA whole sedge (no seed data available); PHASE2RA stream invertebrates for Cd, Pb, Hg, Zn; and PHASE2RA terrestrial invertebrates for Al, As, Ba, Cr, Co, Mo, Se, Tl, V (TT6-0010).

Mean for Anxiety Ridge Creek road station, except PHASE1RA sediment and water from downstream location. Mean of PHASE1RA (ARC_D1) and PHASE2RA (ARC-R) sediment data used.

Hazard quotients greater than 1.0 are boxed.

-- - appropriate TRV not found for analyte
CoPC - chemical of potential concern
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level
TRV - toxicity reference value

[a] Based on mean daily exposure for teal in stream reference station 5 (Table ERA-K-66) multipled by 0.66.