Response to DEC September 2005 Comments on the April 2005 Draft Fugitive Dust Ecological Risk Assessment

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					General Comments		
Gen-1	-	2	Technical	High	The risk assessment report should include a discussion of the nature and extent of contamination at the site. Figures such as those presented in Ford and Hasselbach (2001) and Hasselbach et al. (2004) should be used to illustrate the extent of contamination along the haul road for important site-related chemicals such as cadmium, lead, and zinc. In addition, the report should compare and contrast data collected for the risk assessment by Exponent and Teck Cominco with comparable data from other recent studies of the site, including Ford and Hasselbach (2001), Hasselbach et al. (2004), and Brabets (2004). Brabets, T.P. 2004. *Occurrence and Distribution of Trace Elements in Snow, Streams, and Streambed Sediments, Cape Krusenstern National Monument, Alaska, 2002-2003.* United States Geological Survey (USGS) Scientific Investigation Report 2004-5229. Ford, J. and L. Hasselbach. 2001. *Heavy Metals in Mosses and Soil on Six Transects Along the Red Dog Mine Haul Road, Alaska.* Western Arctic National Parklands, National Parks Service, NPS/AR/NRTR-2001/38. Hasselbach, L. J.M. Ver Hoef, J. Ford, P. Neitlich, E. Crecelius, S. Berryman, B. Wolk, and T. Bohle. 2004. *Spatial Patterns of Cadmium and Lead Deposition on and Adjacent to National Park Service Lands in the Vicinity of the Red Dog Mine, Alaska*. NPS/AR/NRTR-2004-45.	Additional figures and discussion of the NPS/Hasselbach data have been added in Section 1, as part of a discussion of nature and extent of fugitive dust deposition: New figures are attached to this document. The portion of Section 1.1 (Site Overview) that has been revised is provided below: *Moss studies performed in 2000 and 2001 by the National Park Service (NPS) (Ford and Hasselbach 2001, Hasselbach 2003b, pers. comm., Hasselbach et al. 2005) found elevated concentrations of metals in tundra along the DMTS road and near the port, apparently resulting from fugitive dust from these facilities. A fugitive dust study completed by Teck Cominco in 2001 (Exponent 2002a) provided an initial characterization of the nature and extent of fugitive dust releases from the DMTS corridor and provided baseline data from which to monitor the performance of new transport and handling equipment and dust management practices. A fugitive dust background document was published in spring 2002, providing an overview of local observations and concerns, local and regional background information, Red Dog operations, regulatory history, environmental data, nature and extent of fugitive dust, a preliminary conceptual site model for the risk assessment, and review of regulatory and decision-making frameworks for addressing the fugitive dust issue (DEC et al. 2002).* *Teck Cominco completed additional characterization at the port site in 2002 (Exponent 2003b; Teck Cominco 2003). Sampling programs designed to support the risk assessment were conducted in 2003 and 2004 to obtain data for additional analytes in multiple environments and media. These programs are described in the field sampling plans (Exponent 2003e, 2004a), and in Appendices A and E of this document.* *The nature and extent of dust deposition has been evaluated in these prior studies by Exponent and NPS, as listed above. Some key observations are summarized here:* • *Moss data collected during various sampling efforts by NPS and Teck Cominco, when presented together (Figure 1-9), effectively illustrate the primary source areas and deposition patterns in the vicinity of the DMTS corridor and mine. The moss concentration patterns illustrate how the prevailing wind patterns originating from the southeast to northeast result in greatest deposition to the north and west of DMTS and mine facility areas.* • *Within the DMTS facility areas, metals concentrations decrease away from facility sources (Figure 1-9), and vary along the length of the road corridor, with the highest concentrations near the port and the mine, as a result of concentrate tracking that has historically occurred with haul trucks exiting the concentrate storage buildings at the mine and port (Figure 1-10).* Discussion of the Brabets data is provided below in the response to comment Eco-19.	Response is acceptable.

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Ecological Risk Assessment Comments							
Eco-1	3-33	3.6.3	Technical	Medium	Please clarify how the information from Ott and Morris (2004) is used in this assessment and provide additional information from the Ott and Morris study. What streams are still targeted for study and how do concentrations compare between Aufeis Creek, Omikviorok River and those streams still targeted for further study?	Screening-level food-web models for piscivorous wildlife (represented by the red-throated loon and river otter) incorporated fish tissue data collected from 1993 to 2001 by Alaska Department of Fish and Game. Maximum chemical concentrations in whole-body juvenile Dolly Varden were used to model exposures for piscivorous wildlife in Aufeis Creek, Omikviorok River, and Anxiety Ridge Creek (streams that cross the DMTS road). These data are summarized in Ott and Morris (2004) and in earlier reports. For clarification, notes identifying data sources were added to Tables 3-31 and 3-32 (screening-level food-web model results for otter and loon). Additional juvenile Dolly Varden samples were collected from upstream and downstream locations (relative to the road) in 2002 (Ott and Morris 2004). These data were not available when the screening assessment was conducted. If maximum fish tissue concentrations from 2002 (downstream samples) are included in the screening food-web models, NOAEL-based hazard quotients for cadmium, lead, and zinc are still below 1.0 for both piscivorous receptors. Selenium hazard quotients for loon and otter increase slightly from 1.2 and 1.0 to 1.3 and 1.1, respectively, in Aufeis Creek, and from 1.0 and 0.86 to 1.5 and 1.2, respectively, in Anxiety Ridge Creek. However, in both streams, maximum selenium concentrations in fish collected upstream and downstream of the road were comparable. Thus, because the loon and otter receive most of their selenium exposure from their food (see Tables 3-31 and 3-32), piscivores foraging in reaches downstream of the road would not be at higher risk from selenium toxicity than individuals foraging upstream of the road, and therefore, further evaluation of risks to piscivorous wildlife from selenium in Aufeis and Anxiety Ridge Creeks is not warranted.	Response is acceptable.
						Ott and Morris (2004) recommended continued juvenile Dolly Varden monitoring in streams near the mine, including Anxiety Ridge Creek, Buddy Creek, Mainstem and North Fork Red Dog Creek, and Grayling Junior Creek. The authors recommended discontinuing juvenile Dolly Varden sampling in Aufeis Creek and Omikviorok River, because no clear evidence was found to indicate that the DMTS was the primary source of metals to fish in these streams, chemical concentrations in fish from these streams were relatively low compared to concentrations at sites located near the mine, and they suggested that the fish populations in these creeks were healthy. This information was already included in the third paragraph of Section 3.6.3. The following text was added to the second paragraph of Section 6.3.4.2 (Aquatic Biomonitoring Results): *When the authors compared fish tissue concentrations among streams, they rated cadmium and lead as "low" in Aufeis Creek and Omikviorok River and "medium" or "high" in streams near the mine (Table 2 in Ott and Morris 2004). Selenium concentrations were rated "medium" in all streams except Mainstem Red Dog Creek, where levels were considered "high." Zinc concentrations were rated "low" in Aufeis Creek, "medium" in Omikviorok River, Anxiety Ridge Creek, Buddy Creek, and North Fork Red Dog Creek, and "high" in Mainstem Red Dog Creek and Grayling Junior Creek. Table 2 of Ott and Morris (2004) refers to low, medium, and high data ranges for*	Response is acceptable.

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						cadmium of 0.03 to 0.21, 0.44 to 0.47, and 0.80 to 3.13 mg/kg, respectively. For lead, low, medium, and high referred to data ranges of 0.02 to 0.18, 0.25 to 0.73, and 8.4 mg/kg, respectively. For selenium, low, medium, and high referred to data ranges of 1, 2.2 to 7.2, and 12.7 mg/kg, respectively. For zinc, low, medium, and high referred to data ranges of 78.6 to 90.4, 111 to 124, and 170 to 286 mg/kg, respectively. It should be noted that in Red Dog Creek, metal concentrations have actually declined from historical levels as a result of the Red Dog Creek diversions. In addition, the following text was added to the end of Section 6.3.4.2: *Maximum whole body fish tissues in Anxiety Ridge Creek were similar to or lower than those found in Grayling Junior Creek, a tributary to the naturally mineralized Ikalukrok Creek, located north of the Red Dog Mine (Scannell and Ott 2006). Specifically, the maximum cadmium and zinc concentrations in fish collected from Anxiety Ridge Creek stations (upstream, downstream, and at the DMTS road) were 1.32 and 140 mg/kg (dry weight), respectively, as compared to cadmium and zinc concentrations in Ikalukrok fish (3.78 and 573 mg/kg, dry weight, respectively). Maximum lead (2.86 mg/kg, dry weight) and selenium (8.5 mg/kg, dry weight) concentrations in Anxiety Ridge Creek fish were similar to lead (1.44 mg/kg dry weight) and selenium (7.5 mg/kg dry weight) concentrations measured in Grayling Junior Creek fish.*	
Eco-2	-	Figure 4-2	Editorial	Low	The individual panels in Figure 4-2 should be numbered 42a, 4-2b, etc., not 3-1, 3-2, etc. It appears this may only be a problem with the printed copy of the report. The figure in the final copy should be checked and revised accordingly.	The hardcopy had an error in the numbering of the panels within Figure 4-2. The electronic copy contained the corrected figure. The corrected figure will be used in the final document.	Response is acceptable.
Eco-3	-	Fig. 4-13b	Technical	Medium	This figure gives the impression that the change in metals concentrations with distance from the haul road is greater than the change in pH. However, in this figure, pH is expressed on a logarithmic scale while the metals concentrations are expressed on an arithmetic scale. A change in pH of 3 log units equates to a change in hydrogen ion concentration of 1000 times, which is greater than or equal to the concentration change observed for metals. This fact should be acknowledged in Section 4.2.1 where this figure is discussed. Any implications this fact may have on interpreting the plant survey data should be described.	Plotting hydrogen ions instead of pH yielded plots with less discernable information than the existing plots on Figure 4-13, because of the logarithmic nature of the hydrogen ion data (see Figures CS1 and CS2). Thus, the existing plots in Figure 4-13 will be retained. The following text has been added to Section 4.2.1: “Noting that the pH scale is logarithmic, there is approximately a three order of magnitude difference in hydrogen ion concentrations ($[H_+]=1/10_{pH}$) over the length of the 1,000-m transect, as compared with a two order of magnitude difference in metals concentrations.” No change in interpretation of plant survey data is needed.	Response is acceptable.
Eco-4	6-5	6.1.4 and Table 6-1	Technical	Medium	As agreed in the Risk Assessment Work Plan, no mammals are listed as assessment endpoints for the coastal lagoons. However, Section 6.1.6.2 indicates that muskrats have been observed in lagoons near the port. Are other mammals (e.g., moose) also likely to forage in the coastal lagoons and/or have they been sighted in this habitat type? What can be said about potential risks to mammals in the coastal lagoons based on the relative degree of contamination in the lagoons compared with other habitats where mammals were evaluated?	As noted in the text, one muskrat was observed in the coastal lagoon environment during the baseline studies (Dames & Moore 1983a). Moose were observed in the port area during the Phase 2 investigation, indicating that herbivorous mammals may, at times, use coastal lagoon habitat. Based on these field observations, we decided to add muskrat and moose as receptors representing small- and large-bodied herbivorous mammals in the coastal lagoon environment to evaluate risk. Additional food web models were developed to model dietary exposure for muskrat and moose foraging in the coastal lagoons, and results are presented in Sections 6.5.3.3 and 6.5.4.3 of the main text and in Appendix K (Tables K-101, K-102, K-103, K-104, K-117, K-118, K-119, and K-120). Copies of these tables are attached. The following additional sections were included in Section 6.5.3.3:	Response is acceptable.

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						Section 6.5.3.3.2. Muskrat *The muskrat represents small-bodied mammalian herbivores that may feed on coastal lagoon vegetation. Hazard quotients for all chemicals except aluminum were less than 1.0 for the muskrat. NOAEL-based hazard quotients for aluminum were 4.8 in Port Lagoon North, 7.6 in the North Lagoon, 9.3 in the Reference Lagoon, and 9.7 in the Control Lagoon. Exposures did not exceed the LOAEL TRV for aluminum.* ***Section 6.5.3.3.3. Moose*** *The moose represents large-bodied mammalian herbivores that may forage in and around the coastal lagoons. Aluminum exposures exceeded the NOAEL TRV, but not the LOAEL TRV, in all site and reference lagoons, but hazard quotients for all other CoPCs were less than 1.0. Aluminum hazard quotients were higher in the Reference and Control Lagoons (2.3 and 2.4, respectively) than in Port Lagoon North or the North Lagoon (1.2 and 1.9, respectively).* The following additional sections were included in Section 6.5.4.3: ***Section 6.5.4.3.2. Muskrat*** *Only one CoPC (aluminum) had NOAEL-based hazard quotients greater than 1.0 for muskrat, and hazard quotients were greater in the reference lagoons than in the site lagoons. Therefore, exposure to CoPCs in the site lagoons does not result in incremental risk to herbivorous mammals such as muskrats.* ***Section 6.5.4.3.3. Moose*** *Hazard quotient results for moose were similar to the results for muskrat: aluminum exposures exceeded the NOAEL TRV in all lagoons, and hazard quotients were higher in reference lagoons than in site lagoons. Exposures to other CoPCs did not exceed TRVs. Thus, the risk results for moose support the conclusion that exposure to CoPCs is unlikely to cause adverse effects to herbivorous mammals in the coastal lagoon environment.* Table 6-1 has also been updated to include the assessment of herbivorous mammals in the coastal lagoon environment. Hazard quotients for all chemicals except aluminum were less than 1.0 for both the muskrat and the moose. NOAEL-based hazard quotients for aluminum exceeded 1.0 for muskrat and moose in all site and reference lagoons. However, exposures did not exceed the LOAEL TRV for aluminum. Also, hazard quotients were higher in the Reference Lagoon and Control Lagoon than in the Port Lagoon North or the North Lagoon. Thus, there is no incremental exposure to aluminum for herbivorous mammals foraging in the site lagoons. These results indicate that exposure to CoPCs is unlikely to cause adverse effects to herbivorous mammals in the coastal lagoon environment.	

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Eco-5	-	Table 6-4	Editorial	Medium	Please verify that the headings and/or units used for all values in this table are correct. Typically, R-square values are not expressed in units of percent.	R-square is the coefficient of determination. This value is the percentage of variation in vegetation measure or metal concentration that is explained by the simple linear regression model based on log10 distance. R-square is commonly reported either as a proportion or as a percentage.	Response is acceptable.
Eco-6	6-34	6.2.3.2	Technical	Medium	The last paragraph on this page suggests that cryoturbation may be responsible in part for stressed and dead vegetation near Concentrate Storage Building 1 (CSB1) and refers to similarities in the appearance of cryoturbation features observed elsewhere (Photograph 58) and the situation near CSB1 (Photograph 57). The frost-heave formation shown in Photograph 58 is not surrounded by dead vegetation like that found near CSB1. As such, it does not appear that cryoturbation is a valid explanation for adverse effects on tundra vegetation observed near CSB1. Please revise this section accordingly.	The discussion of cryoturbation was not intended to imply that frost heaves were responsible for the tundra effects observed near the CSB, but rather to suggest that the loss of moss cover and other vegetation in this area may have resulted in increased cryoturbation. As shown below in the language from Section 6.2.3.2, one sentence has been deleted from the paragraph to clarify this point: *The elevated metals concentrations in tundra soil and moss tissue and the proximity of the 10-m and 100-m stations to the CSB suggest that fugitive concentrate is responsible for the stressed and dead vegetation observed directly downwind of CSB1. Historically, port workers would open the CSB door for ventilation, but this is no longer the practice, as dust control inside the building has been improved. Some of the rocks observed in this area may have originated from blasting of bedrock that occurred during construction of CSB1. Other equipment-related disturbance to vegetation in the vicinity of CSB1 may have occurred at the time of construction of CSB1. The barren ground and exposed rocks observed in the tundra at the northwest corner of CSB1 resemble cryoturbation features found across much of the Arctic, such as the sorted patterns shown in Photograph 58, which were observed on a slope near the mine's ambient air/solid waste permit boundary (distant from fugitive dust sources) in 2003. Studies of frost boil formation (the creation of unvegetated or sparsely vegetated patches by differential frost heave in permafrost regions) have shown that plant growth tends to insulate the soil and to reduce the thaw depth (Walker et al. 2004). Thick tundra vegetation mats seem to suppress or mask frost boil formation in the Low Arctic (Walker et al. 2004). The loss of living moss and other vegetation may destabilize the permafrost soils, resulting in exposed cryoturbation features.*	Response is acceptable.
Eco-7	6-28	6.2.2	Technical	High	Include a figure or table in this section that illustrates the comparison of metal levels in moss to critical threshold concentrations in moss.	Tables CK1 and CK2 provide a comparison of moss and lichen concentrations against available effects threshold values from the literature. Although the threshold values are not site-specific, they may be predictive of potential effects, either at present or in the future. (Note: The threshold values are based on a study of elevated copper and zinc concentrations near a brass foundry. The study involved comparable zinc concentrations but much higher copper concentrations than are present at the DMTS, and thus the zinc thresholds may be conservative.) Tables CK1 and CK2 (attached for review) are referred to in Sections 6.6.1.1, 6.2.2, and 6.2.3.1. The tables have been revised to list the source (Folkeson and Andersson-Bringmark 1988) of the moss and lichen data in the footnotes. The full citation for the source is provided below: New Reference: Folkeson, L., and E. Andersson-Bringmark. 1988. Impoverishment of vegetation in a coniferous forest polluted by copper and zinc. Can. J. Bot. 66:417–428.	Response is acceptable.

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Eco-8	6-47	6.3.3.3	Technical	Medium	The conclusion drawn at the end of this section (i.e. “there appears to be a low likelihood of adverse effects to pond vegetation from exposure to COPCs in the DMTS road corridor”) may not be entirely accurate. Overall, the assessment for pond vegetation suggests that adverse effects are possible in ponds near the road and port, based on exceedances of critical plant tissue thresholds for certain elements. Please revise the conclusion of this section accordingly. If it is Exponent’s belief that analysis of unwashed plant tissue samples overestimates “true” plant tissue concentrations, then follow-up analysis of washed samples should be considered.	Conclusions in Section 6.3.3.3 have been modified to indicate that adverse effects to pond vegetation from lead and zinc exposure are possible near port facilities and in low-lying areas to the southwest of the mine’s ambient air/solid waste permit boundary, beyond the mountainous terrain that surrounds the mine. (Note that ponds were not observed in the mountainous terrain surrounding the mine.) If future work is conducted, we will consider collecting unwashed and washed plant tissue samples to assess the contributions of external and internal metals to total metals concentrations in plants. The need for future work will be evaluated during development of the risk management plan. The actual revised text is appended below from Section 6.3.3.3: *In the tundra pond environment, sedges around site and reference tundra ponds seemed to be healthy, and dust was not detectable on their foliage. In site ponds, only cobalt, lead, and zinc concentrations in whole sedge plants exceeded phytotoxicity thresholds for plant foliage and representative reference concentrations (Table 6-23). Only one site sample had a cobalt concentration in excess of the lowest threshold value, and this CoPC also exceeded the lowest threshold at reference station TP-REF-5. Thus, elevated cobalt concentrations in sedges appear to be localized occurrences in both site and reference pond communities (Table 6-23). Lead and zinc concentrations in sedges were scarcely elevated above phytotoxicity thresholds at pond station TP4, although tissue concentrations were greater than the range of reference concentrations (Table 6-23). Lead and zinc concentrations were somewhat higher in sedges at TP1-0100, where plants are subject to dust deposition from port facilities. Based on qualitative observations made during field sampling, tundra pond plant communities located more than 100 m from the DMTS road do not appear to be adversely affected by fugitive dust. The results of the tissue comparisons with phytotoxicity thresholds and reference data also suggest low likelihood of risk to these pond plant communities, with the possible exception of ponds in low-lying areas to the southwest of the mine's ambient air/solid waste permit boundary (e.g., TP4), where incremental exposure to lead and zinc may occur. Note that ponds were not observed in the mountainous terrain surrounding the mine. Exceedances of phytotoxicity thresholds and reference tissue concentrations at pond TP-0100 indicate that adverse effects from lead and zinc are possible at ponds located near port facilities.*	Response is acceptable.
Eco-9	6-49	6.3.4	Technical	High	The information presented in this section indicates the following for Anxiety Ridge Creek: (1) sediment concentrations of cadmium, lead, and zinc downstream from the haul road are elevated above reference levels; (2) levels of cadmium and lead in benthic invertebrates downstream from the haul road are elevated above reference concentrations; and (3) levels of cadmium and lead in fish downstream from the haul road are elevated compared with upstream fish. These observations suggest a road-related effect. Possible adverse impacts on fish in Anxiety Ridge Creek due to the haul road require additional evaluation. Levels of cadmium and lead in fish should be compared with critical tissue concentrations for fish. The results of the comparisons should be included in this section and, if necessary, the risk characterization (Section 6.3.4.3) should be modified accordingly.	Chemical concentrations in juvenile Dolly Varden from Anxiety Ridge Creek are compared with critical tissue concentrations for freshwater fish in Table CS1 (attached). Available tissue residue data were compared against no-effect and effect levels for ecologically relevant endpoints, including survival, growth, and reproduction. Maximum concentrations of cadmium (0.308 mg/kg), lead (0.612 mg/kg), and selenium (2.01 mg/kg) in fish collected near or downstream of the DMTS road were greater than the lowest reported effects thresholds, but were also within the ranges of reported no-effects levels. Maximum cadmium and selenium concentrations in fish collected upstream of the road also exceeded the lowest effect threshold. The maximum zinc concentration in fish tissue (36.1 mg/kg) was below the lowest threshold for effects.	Response is acceptable.

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						Thus, based on a direct comparison to critical tissue residue levels developed in some freshwater fish studies, cadmium, lead, and selenium concentrations in some juvenile Dolly Varden were high enough to suggest a potential for adverse effects. However, because all measured tissue concentrations of these metals are also below the maximum no-effect concentrations, adverse effects to fish cannot be conclusively predicted. An additional section describing fish tissue comparisons with effects thresholds was added to Section 6.3.4, and the risk characterization (Section 6.3.4.4) was modified accordingly. To address this comment, the results of the requested comparisons were included in a new section (Section 6.3.4.3) of the document titled "Fish Tissue Comparisons with Effects Thresholds," which is provided below: *Because significant differences were found between cadmium and lead concentrations in fish collected by Ott and Morris (2004) upstream and those collected downstream of the DMTS road in Anxiety Ridge Creek, chemical concentrations in juvenile Dolly Varden from Anxiety Ridge Creek were compared with critical tissue concentrations for freshwater fish as compiled by Jarvinen and Ankley (1999, Table CS1) as a method of screening to see if these tissue levels indicate the possibility of adverse effects.* *Dolly Varden tissue residue data were compared against no-effect and lowest-adverse effect levels for ecologically relevant endpoints, including survival, growth, and reproduction. Maximum concentrations of cadmium (0.308 mg/kg), lead (0.612 mg/kg), and selenium (2.01 mg/kg) in fish collected near or downstream of the DMTS road were greater than the lowest reported effects thresholds, but were also within the ranges of reported no-effects levels. Maximum cadmium and selenium concentrations in fish collected upstream of the road also exceeded the lowest effect threshold. The maximum zinc concentration in fish tissue (36.1 mg/kg) was below the lowest threshold for effects. Thus, based on a direct comparison to critical tissue residue levels developed in some freshwater fish studies, cadmium, lead, and selenium concentrations in some juvenile Dolly Varden were high enough to suggest a potential for adverse effects. However, because measured tissue concentrations of these metals (with the exception of selenium, which exceeds the freshwater salmonid no effects threshold) are also below the maximum no-effect concentrations, adverse effects to fish cannot be conclusively predicted, as the sensitivity of Dolly Varden relative to the test species is not known.* The second paragraph of Section 6.3.4.4 (Risk Characterization for Freshwater Fish) has also been split into three paragraphs and updated: *Juvenile Dolly Varden captured downstream of the road in Anxiety Ridge Creek had elevated cadmium and lead levels relative to fish captured upstream of the road, perhaps reflecting a road effect on sediment metals concentrations in this creek (Ott and Morris 2004). Fish metals concentrations in Aufeis Creek and the Omikviorok River did not show a consistent pattern related to proximity to the road.*	

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						Based on comparisons with critical tissue concentrations in freshwater fish, adverse effects to individuals from cadmium and selenium exposures are possible both upstream and downstream of the road in Anxiety Ridge Creek, and adverse effects from lead exposure are possible downstream of the road (Table CS1). However, these comparisons do not necessarily suggest a likelihood of unacceptable risk to fish, because ranges of no-effects and effects concentrations overlap considerably, as shown in Table CS1. *Incremental exposure to CoPCs in sediment does not appear to translate into population-level effects in site creeks. Ott and Morris (2004) suggested that the juvenile Dolly Varden populations in creeks near the DMTS appear to be healthy, and that annual population fluctuations are due to environmental conditions. Overall, these findings indicate that risk from exposure to CoPCs is unlikely to have an adverse effect on the abundance of fish in streams that cross the road.*	
Eco-10	6-68	6.5.3.1.1 and Appendix K	Technical	High	**Willow Ptarmigan Risks.** Table K-82 shows that the lowest observed adverse effect level (LOAEL)-based hazard quotient (HQ) for this receptor is 0.99 (i.e., almost exactly 1.0) at terrestrial transect number 7 (TT7) located downwind from the mine. Because the average was used as the exposure point concentration for all media, this HQ represents the risk to the average individual. It follows then that approximately one-half of the ptarmigan population in this area would receive a greater exposure to lead and thus be at risk from lead. This is a significant finding and should be discussed in Section 6.5.3.1.1 or elsewhere in the report, as appropriate. This comment also applies to the LOAEL-based HQ of 0.93 for lead for the ptarmigan at TT5 located near the Port (see Table K-77). Because the LOAEL-based HQ is close to 1.0 for the average case, some portion of the local ptarmigan population at this location would be expected to receive a lead exposure leading to a HQ greater than 1. Again, this is a significant finding and should be discussed in Section 6.5.3.1.1 and/or elsewhere in the report, as appropriate, such as Section 6.7.1. Presentation of ptarmigan risks based only on the average exposure scenario is not acceptable. An estimate of the reasonable maximum exposure and risk must also be presented. For this receptor, either a 95 percent UCL case based on three broad assessment units (mine, road, and port) should be presented as was done for large home-rage receptors (e.g., caribou), or point-by-point risk estimates should be presented as was done for small home-range receptors (e.g., shrew).	The basis of the comment is that a substantial number of individuals (50% in the commenter's estimation) are not protected by use of the mean. The commenter's conclusion is based on an incorrect assumption about where the mean falls within the distribution, since the mean of a lognormal (or skewed) dataset will be higher than the median (the value above or below which 50% of the values lie). However, to address the concerns expressed in this comment, new food-web models for ptarmigan were developed for the reference area, port, road, and mine assessment units, using mean and 95 percent UCL on the mean CoPC concentrations. Methods, results, and risk conclusions for ptarmigan have been updated in the text (see Sections 6.5.1.2, 6.5.3.1.1, 6.5.4.1.1, 6.7.1, and 8.2.1). In response to this comment, the following discussion has been appended to the end of Section 6.6.5.1.6 (CoPC Bioavailability): *In summary, the new risk results for ptarmigan suggest that adverse effects from barium and lead exposures may occur in herbivorous birds foraging near the mine, and that adverse effects from lead exposures are also possible near the port, particularly for the most exposed individuals in the population of birds at the port. In the case of lead, however, over 90 percent of the exposure is attributable to lead in soil. The food-web models assumed 100 percent bioavailability of metals. However, site-specific bioavailability studies using rat have shown the bioavailability of lead in Red Dog ore to be only about 20 percent that of the soluble lead used in the studies on which the TRV is based (ADPH 2001; Arnold and Middaugh 2001; Arnold et al. 2003). If the relative bioavailability of lead in tundra soil to ptarmigan is also about 20 percent, then all LOAEL-based hazard quotients for ptarmigan would be less than 1.0, even using the 95 percent UCL on the mean CoPC concentrations. Similar results might be expected for barium, if site-specific bioavailability values were available for use in the food-web models.* *Although there is some uncertainty involved in extrapolating results across taxonomic classes, these rat results suggest that the food web models substantially over-estimate lead bioavailability to the ptarmigan. This assumption is based on the fact that lead bioavailability is dependent on acid dissolution in the gut, which can be controlled by pH of the stomach and*	Response is acceptable.

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						residence time of food in the stomach. Birds must be as efficient as possible at ingesting and digesting food, and therefore the digestive system of birds has adaptations designed to facilitate flight, such as a shorter intestinal tract in birds relative to mammals (Denbow 2000). Birds also typically have lower retention times (in hours) for fluid and particulate digesta markers in the gastrointestinal tracts than mammals (Stevens and Hume 1988). For example, Stevens and Hume (1988) report mean fluid and particle retention time for a rock ptarmigan at 9.9 and 1.9 hours, respectively. In contrast, the rat has a much longer fluid and particle retention time of 20 and 22 hours, respectively (Stevens and Hume 1988). Therefore, the longer retention time associated with the rat stomach would suggest higher relative bioavailability of lead in soil to the rat. In addition, acid secretion of birds is nearly equivalent to the rat, and more specifically, the pH of gastric juice in the ptarmigan (pH = 2.6, McLelland 1979) is nearly equivalent to that of the rat (pH = 2.7, Chu et al. 1999). Given essentially equivalent pH but a much lower residence time of food or soil in the gastrointestinal system of the bird stomach compared to a mammal suggests that the relative bioavailability of lead would be lower for a bird. Therefore, the suggestion above that bioavailability of lead in tundra soil to ptarmigan is about 20 percent, similar to for the rat (as mentioned above), is a reasonable and conservative approach to extrapolating results from the rat to the ptarmigan. *In the central portion of the road, the likelihood of adverse effects to herbivorous birds foraging in that area is low, as 95 percent UCL on the mean exposures did not exceed LOAEL TRVs, and only exposure to barium exceeded the NOAEL TRV (hazard quotient of 1.7). Again, the same comments made above regarding bioavailability apply here.*	
Eco-11	6-69	6.5.3.1.4 and Appendix K	Technical	Medium	**Moose Risks.** In Tables K-83 to K-88 for the moose, are the exposure point concentrations based on mean or 95 percent UCL on the mean concentration? This point should be clearly indicated in the tables. In Table K-87 for the moose, should the footnotes refer to ST-REF-6 instead of ST-REF-5? If so, please revise the table accordingly.	Exposure point concentrations in stream water, sediment, and plant tissues are means or individual data points. The footnote in Table K-87 (attached) refers to ST-REF-6 instead of ST-REF-5 because, as stated in the footnotes: “*No PHASE1RA sediment or water data collected at ST-REF-6, so ST-REF-5 data used – nearest creek sediment and water station from PHASE1RA.*”	Response is acceptable.
Eco-12	6-75	6.5.4.1.1	Technical	High	See comment Eco-9. How is population defined in Section 6.5.4.1.1?	*In consideration of the fact that risk to ptarmigan has been re-evaluated on an assessment unit basis (see response to comment Eco-10), populations are considered as the animals within that assessment unit. For example, the port assessment unit would include all the ptarmigan that potentially forage within the area inside the port ambient air boundary and up to 2 km on either side of the DMTS road in the vicinity of the port.* *The text in Section 6.5.4.1.1 has been revised as follows:* *All hazard quotients for aluminum, arsenic, cadmium, chromium, molybdenum, selenium, thallium, and vanadium were below 1.0 for ptarmigan. Exposures to these chemicals would therefore be very unlikely to result in adverse effects to herbivorous birds. Exposures to 95 percent UCL on the mean concentrations of mercury (at the port) and zinc (at the port and mine) exceeded the NOAEL TRVs. However, hazard quotients were fairly low (1.2–1.4), and mean exposures did not exceed NOAEL TRVs (Table CK3, attached). Based on the food web model results, dietary exposure to mercury or zinc is unlikely to result in adverse effects to*	Response is acceptable.

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						herbivorous birds. However, risk cannot definitively be concluded to be negligible for the most exposed individuals in the population, where population is considered the animals within each assessment unit.	
Eco-13	6-76	6.5.4.1.3	Technical	Medium	In the second paragraph of this section, how is "overall tundra vole population" defined? Does it refer to all voles in Cape Krusenstern National Monument, all voles north of the haul road, or some smaller local group?	The last sentence in the second paragraph of Section 6.5.4.1.2 has been revised to indicate that in the context of the risk results being presented in this paragraph, the "overall" tundra vole population refers to individuals existing at areas beyond about 100 to 1,000 m from the mine or port facilities. The actual sentence now reads as follows: *The results indicate that if adverse effects occur to voles from exposure to these CoPCs, they are most likely to exist in localized areas near facilities, but may not affect the tundra vole population existing at areas beyond about 100 to 1,000 m from the mine or port facilities.* In addition, the discussion provided below has been added to the end of the uncertainty discussion (Section 6.6.5.6 – Population Level Uncertainty) regarding some of the issues to be considered when defining what constitutes a population for the various wildlife receptors being evaluated in this risk assessment: *An additional uncertainty related to estimating the potential for population-level effects relates to the appropriate definition of what constitutes a population for the receptors being evaluated. For example, as noted above, caribou present at the site, either as migrants or winter residents, are part of a herd (the Western Arctic Caribou Herd) that moves over vast areas of western Alaska. As discussed above, it is inappropriate to extrapolate results of individual-based food web models to conclude population-level effects without putting those results into context with regard to the proportion of the entire WACH population that is potentially exposed to CoPCs at the site. Similarly, although moose do not migrate like caribou, their home ranges can be up to 5 to 10 square kilometers (Wilson and Ruff 1999), and they can make seasonal movements up to almost 100 km during calving, rutting, or wintering (DFG 2003e). Therefore, creek- or lagoon-specific assessments, as were performed for moose, may be conservative with respect to risks to any individual moose, given their home range size in relation to the areas of lagoons and streams from which samples were collected, and even more conservative with respect to the larger moose population that frequents habitats within and beyond the DMTS assessment area.* *Food-web model results for small-home-range receptors, such as shrews and voles, indicate the potential for adverse effects primarily within localized areas (e.g., within 100 m of the road, or around the mine boundary). These adverse effects to individuals, if occurring, could produce detectable higher-level responses, such as decreased population abundance or increased mortality, within these localized areas. However, the individuals in these localized areas are components of larger meta-populations. For example, it is very likely that voles move and disperse near as well as away from the road. Therefore, effects to individuals near the road would probably only translate into population-level effects over larger areas (e.g., square kilometers of tundra) if habitats near the road represent a population "sink" where local environmental factors, including CoPCs, do not permit*	Response is acceptable.

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						reproduction to occur at the replacement rate. This would also be true if immigration of migrants from other sub-populations results in an overall decrease in abundance at the meta-population level. No population data are available to confirm or deny the existence of such a sink near the road or mine. Therefore, there is considerable uncertainty that putative effects to individual small mammals living in habitats near these features would produce detectable population-level changes over broader spatial scales (e.g., within a kilometer from the road, within Cape Krustenstern National Monument, etc.). Broad-scale population surveys would be required to determine whether impacts to populations are occurring over these larger spatial scales.	
Eco-14	6-81	6.6	Technical	High	The zone of cadmium and lead contamination along the haul road reported by Hasselbach et al. (2004) is greater than that generally suggested in the draft risk assessment report (i.e., about 2 km from the haul road). The data and analyses presented in Hasselbach et al. (2004) should be discussed in this section as they relate to the adequacy of the sampling design used for the ERA, the validity of the chosen background location, and how a larger zone of contamination affects the perceived risks posed by the haul road. Hasselbach, L. J.M. Ver Hoef, J. Ford, P. Neitlich, E. Crecelius, S. Berryman, B. Wolk, and T. Bohle. 2004. *Spatial Patterns of Cadmium and Lead Deposition on and Adjacent to National Park Service Lands in the Vicinity of the Red Dog Mine, Alaska*. NPS/AR/NRTR-2004-45.	Additional figures and discussion of the NPS/Hasselbach data have also been added in Section 1 describing nature and extent of fugitive dust deposition. Clearly, the area of depositional influence is of interest and concern to the public, leading to a perception of risk. However, it must be made clear that deposition does not automatically mean effects or unacceptable risks are present. Since the risk assessment focuses not simply on the extent of deposition, but the evaluation of possible risks associated with that deposition, the areas of focus for data collection and assessment were the areas typically within 1-2 km of the DMTS road, port, and mine, where the depositional influence is greatest, the media concentrations highest, and the potential for risk greatest. When risks are low for these areas nearer to the facilities, then risks would be much lower for outlying areas. The results of the risk assessment have illustrated what receptors are potentially at risk, and where the uncertainties are in the analysis. During development of the Risk Management Plan, the risk assessment results can be used to prioritize future actions such as additional data collection or monitoring. Please refer to response to Comment Gen-1 for the revised text for Section 1. The uncertainty assessment in Section 6.6 has been updated with additional discussion (Section 6.6.1 – Uncertainties Related to Reference Area Selection) regarding the selection of the reference areas, uncertainties associated with the reference area data, and its use in the assessment. Section 6.6.1 is provided below: ***Uncertainties Related to Reference Area Selection*** *This section describes the selection and use of the reference areas in the risk assessment, reviews uncertainties about the reference area data, and discusses implications of these uncertainties for the use of the reference area data and the findings of the risk assessment.* ***Terrestrial Reference Area*** *Terrestrial reference areas were selected after review of existing studies and data, with a focus on factors such as prevailing wind directions, bedrock geology, topography and physiography (including slope, aspect, and water features such as streams and tundra ponds), and plant and animal communities. Possible reference areas were considered to the east, north, west, and south of the mine and DMTS. The prevailing wind originates from*	Response is acceptable.

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						the east, between the northeast and southeast quadrants; thus, the most significant dust deposition has occurred to the north and west of the DMTS road and mine. As a result, areas to the north and west were not preferred areas for establishing the terrestrial reference area. Areas to the east were eliminated because the topography is more mountainous than most of the DMTS area. Thus, the focus was on selecting an area to the south of the mine and DMTS road. However, selecting an area too far south would have put the reference area into the Noatak valley, where the plant community includes trees and would not be as good for comparison with plant communities at the site. Therefore, the terrestrial reference area was targeted for placement somewhere within several miles south of the DMTS. Within that band south of the DMTS, the selected area was to be in a geologic area known to be relatively free of lead/zinc base metal mineralization. The selected area also needed to contain a variety of topographic conditions (elevations, slopes, and aspects), streams and ponds, and plant communities, providing the opportunity to sample environments similar to those along the length of the DMTS road. Based on these criteria, the Evaingiknuk Creek drainage was selected as the best choice. This basin met the most criteria, and had low base metal mineralization compared with other possible reference locations that were considered to the south of the DMTS. *Subsequent to the selection of the Evaingiknuk Creek drainage as the terrestrial reference area, sampling was conducted in two phases. The first phase included sampling of moss, which, when included with the overall moss database (including the NPS data, Ford and Hasselbach 2001, Hasselbach 2003b, pers. com., Hasselbach et al. 2005) and plotted together, provided a clearer perspective on overall patterns of deposition in the areas surrounding the DMTS and mine (Figure 1-9). Prior to the first phase of sampling, no moss data were available in that area.* *The mean lead concentration for the three moss samples in the reference area is 8.0 mg/kg. Tundra soil was also sampled in the reference area, and the lead concentration ranged from 2.9 to 23.3 mg/kg, with a mean of 8.9 mg/kg, very similar to the mean moss lead concentration. In the area beyond approximately 16 miles north of the DMTS, where there is no apparent trend in the NPS moss concentration data, the mean lead concentration in moss is 8.5 mg/kg, or 6.4 if one outlier duplicate sample is excluded (Dixon's outlier test was used to confirm that the 38.6 ppm lead result is a statistical outlier at the 0.05 level [0.02 < P < 0.05]). The concentrations in the reference area and the area beyond 16 miles north of the DMTS appear to be similar. In the southern extent of Cape Krusenstern National Monument (CAKR), beyond 12 to 13 miles south of the DMTS, the NPS moss lead concentrations average 2.0 mg/kg. It should also be noted that the area surrounding the Red Dog district is more mineralized than the southern part of CAKR. If there were dust depositional influence in the reference area, or the northern extent of the data collection area, it would appear to be very limited.* *The communities in the reference area appear to be healthy, unimpaired communities suitable for use in reference/site comparisons. Even if there were some evidence suggesting low-level deposition in the reference area, the potential for this dust deposition to cause adverse effects to receptors is*	

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						minimal. The metals concentrations in moss and lichens were very low; copper and zinc concentrations were far below effects levels reported in the literature (e.g., see Tables CK1 and CK2 for moss and lichen comparisons with threshold values). Furthermore, in almost every case, metals concentrations in terrestrial sedge and shrub samples were below phytotoxicity thresholds, even though samples consisted of unwashed tissues (Tables 6-17 and 6-18). Lead and zinc exposures for all wildlife receptors were uniformly low and never exceeded toxicity reference values (TRVs) in the terrestrial reference area. Hazard quotients did exceed 1.0 for some receptors in the reference area, particularly for aluminum and barium, although as discussed in the risk assessment, this appears to be a function of the conservative nature of the TRVs for these metals rather than their concentrations in reference area media. For example, aluminum concentrations in reference area moss were similar to or less than concentrations in the southern extent of the CAKR, many miles further away in a prevailing upwind direction from the DMTS. This would suggest a similar level of risk would be predicted from aluminum in south CAKR. However, because south CAKR is well beyond the potential influence of the DMTS, it just illustrates the overly conservative nature of the aluminum TRV. ***Coastal Plain Reference Area*** *In the second phase of sampling, a plant community assessment was conducted, and in order to better match the coastal plain plant community at the port, an additional reference area was selected south of the port in the CAKR (sample station TS-REF-12). Although moss was not collected at this location, tundra soil had a lead concentration of 5.8 mg/kg, slightly lower than the 8.9 mg/kg concentration in the terrestrial reference area.* ***Reference Lagoons*** *The reference lagoons included the Control Lagoon, approximately 2 miles south of the port, and an unnamed lagoon approximately 5 miles south of the port. The Control Lagoon was established as a reference in early port site studies (ENSR 1990), and the unnamed "Reference" lagoon was added during the first phase of the risk assessment sampling efforts (Exponent 2003e). At these distances, any depositional influence would be small, given prevailing wind directions. Mean sediment concentrations (from the 2003 and 2004 sampling events) in the two lagoons at different distances from the site are almost identical, with lead 9.6 and 9.5 mg/kg, zinc 86.6 and 86.9 mg/kg, and cadmium 0.2 and 0.3 mg/kg in the Control and Reference lagoons, respectively.* ***Marine Reference Area*** *The marine reference area is located approximately 3 miles to the south of the port. Sediment samples were collected there during several marine sampling events. Even if there were any depositional influence this far south, the influence would be very slight, and would likely be largely dissipated by dynamic ocean action, including wind, waves, and prevailing northward currents. Regardless of whether there is any detectable influence at the*	

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						marine reference area, site sediment data from recent sampling events have been below all available screening thresholds, as described in Section 4.3. ***Effect of Uncertainties*** *There are clearly uncertainties with regard to the potential influence from dust deposition on reference areas. However, the possible effect of these uncertainties on the analyses, such as comparison of site and reference area conditions, appears to be limited. Based on the discussion in Section 6.6.1.1, there is very little if any measurable depositional influence from the mine within the terrestrial reference area. Thus, the possible influence of mine dust deposition in the reference area is so small as to be highly unlikely to result in any incremental effects to receptors in that area. Therefore, comparisons of communities (e.g., benthic and plant communities) at the site with those in the reference area are acceptable for the analyses. Further discussion of uncertainty related to the use of reference area comparisons in CoPC selection is included below in Section 6.6.3.* ***Summary*** *While all of the reference areas are suitable for the risk assessment, there are clearly some uncertainties with regard to the potential influence from dust deposition. The possible need for additional study to further address these uncertainties will be considered during development of a risk management plan.*	
Eco-15	6-83	6.6.2.1.1	Technical	Low	Have reference areas been established for the permanent vegetation monitoring plots established in the mine area (ridge-top dwarf shrub tundra, dwarf birch and blueberry shrub, tall willow)?	Yes, four monitoring quadrats were established in a reference area located 3.6 miles southeast of the mine's Personnel Accommodation Complex (RWJ 1998). One reference quadrat was established in ridgetop and birch/blueberry communities, and two reference quadrats were established in the tall willow community. However, please note that the area inside the mine boundary is beyond the scope of the DMTS risk assessment.	Response is acceptable.
Eco-16	6-87	6.6.2.3	Technical	Medium	This section seems to understate the usefulness of the current dataset for understanding reasons for the observed changes in plant communities along the haul road. Physical factors are likely to exert their greatest influence near the road where dust deposition is greatest and drainage may be locally altered. Chemical factors (elevated metals and pH) are likely to become relatively more important at greater distances but cannot be ruled out as being significant near the road. Consider modifying the discussion accordingly. When other possible explanations are offered for effects on foliage, please evaluate them as possibilities rather than just propose them. Consider, for example: Is only road material alkaline, or may concentrate be contributing to high pH? Did reports on impacts from other roads show effects as far as 1000m and 2000m away from the road? Is the fine concentrate material likely to travel further than material used to construct the road?	Section 6.6.4.3 was modified to acknowledge that physical factors are probably most dominant near the road and port facilities and less influential at greater distances from dust sources, whereas chemical factors could influence plant communities both near and at greater distances from dust sources. Section 6.6.4.3 (Uncertainty in Risk Characterization) was updated with the following text: *Multiple lines of evidence were considered in the risk characterization for terrestrial plants, including site and reference comparisons, relationships with distance from the DMTS road, correlations of vegetation and tundra soil parameters, PCA trends, qualitative assessments of plant vitality, and comparisons between plant tissue concentrations and phytotoxicity thresholds. The use of multiple indicators to evaluate potential effects to terrestrial plants enhances confidence that site-related changes in vegetation communities have been identified and that the alterations are related to the influence of the DMTS road.*	Response is acceptable.

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					If seasonal dryness was a contributing factor, what information do you have to support it being a dry year? Why is it supposed that wildlife use was unusually high near TT6 as compared with reference areas?	*The causes of vegetation effects are not known, because tundra soil parameters such as CoPC concentrations and pH are significantly correlated with distance from the road (Table 6-4), and these or other physical factors may potentially contribute to the changes in vegetation communities near the road. It is difficult to determine the relative significance of physical and chemical factors in the vegetation effects observed, because both are correlated with distance from the road. Tundra soil parameters, such as CoPC concentrations and pH, are significantly correlated with distance from the road (Table 6-4), thus, these as well as other physical factors, may potentially contribute to the changes in vegetation communities near the road. Physical factors are likely to exert their greatest influence near the road and port facilities where dust deposition is greatest and drainage may be locally altered. Chemical factors (elevated metals and pH) are likely to become more important than physical factors at greater distances from dust sources, but are also likely to be a significant factor in changes observed near the road and port. Studies of dust deposition along the Dalton Highway have shown that the majority of dust is deposited within 500 m of the road or less. Lamprecht and Grader (1996) modeled fugitive dust deposition along the Dalton Highway and predicted that 20–45 percent of the dust would settle out within 40 m of the road; 65–95 percent would settle out within 200 m of the road; and 75–98 percent would settle out within 400 m of the road. The authors "conclude that at any location along the Dalton Highway, road dust emitted by truck movement should settle out to 98% within an area of less than 500 m of either side of the road." Walker and Everett (1987) measured dust loads along the Dalton Highway using dust collection pans and found that 97 percent of the dust was deposited within 125 m of the road, although silt and clay-sized particles were deposited up to 1 km or farther from the road.* *If dispersion were strictly a function of particle size, concentrate dust would be expected to travel farther than coarse roadbed material (i.e., sand and gravel) but would be expected to behave similarly to the fine particles in road dust. The most common size fraction of dust particles collected over 24 hours at locations 30 m, 70 m, 150 m, and 300 m from the Dalton Highway was the 10–20 µm diameter range (Lamprecht and Grader 1996). Walker and Everett (1987) observed a decrease in median particle size with distance from the road, from predominantly 0.5–2 mm particles at the road source to 0.02–0.25 mm particles at 8 m from the road, to 2–50 µm particles at 125 m and 312 m from the road. The particle size of zinc and lead concentrates is <40 µm, with 80 percent <20 µm (Teck Cominco 2003b,c).* *Vegetation effects along the Dalton Highway tended to coincide with dust deposition and were most pronounced in areas of heavy dust close to the road. Auerbach et al. (1997) assessed vegetation characteristics up to 800 m from the Dalton Highway and observed the greatest effects within 100 m of the road. The 400-m and 800-m samples "were predicted as being beyond the extent of major dust effects." However, the authors did not survey vegetation beyond 800 m. Walker and Everett (1987) noted the most extreme vegetation effects (e.g., elimination of mosses) within 10 or 20 m of the highway, while effects to lichen communities extended beyond 70 m. The authors focused their report on vegetation effects in heavy dust areas*	

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						and did not investigate potential plant community changes at distances beyond 100 m. *Similar to the Dalton Highway studies, vegetation effects along the DMTS road corridor were also most pronounced near dust sources; however, results for lichens suggest that effects may extend beyond distances at which communities were altered along the Dalton Highway. Further study would be required to elucidate the role and spatial gradient effects from site-related CoPCs relative to other road effects commonly observed elsewhere in Alaska.* The last sentence of the fourth paragraph of Section 6.2.3.1 (Coastal Plain and Foothills Mesic Tussock Tundra) was also revised to address this comment: *Road dust deposition is a regional phenomenon akin to windblown loess from river channels (Walker 1996). Calcareous road dust may raise the surface soil pH and enrich the tundra with nutrients such as calcium and magnesium (Walker 1996). Along the DMTS road corridor, dust was visible or detectable by touch on foliage at all 10 m and 100m stations and at stations up to 150 m from the road along tundra transect TT8 (Photograph 24). Alkaline dust from the road bed material (pH 8.4 at material site MS9) is likely contributing to the elevated tundra soil pH measured at 10-m and 100-m stations (Table 6-15). Figure 4-13 indicates that the tundra soil pH is elevated above reference values (3.6–4.5) well beyond 100 m in the tussock tundra, and that tundra soil pH may not stabilize until nearly 1,000 m from the road. In addition, zinc and lead concentrates have pH values ranging from 7.5 to 8.5 (Teck Cominco 2003b,c), and calcium chloride, applied to the road as a dust suppressant, has a pH ranging from 7 to 10 (Tetra 1998). Therefore fugitive dust may contain concentrates, road bed materials, and calcium chloride, all of which may be contributing to elevated soil pH in tundra surrounding the DMTS road and port facilities.* *Zinc and lead concentrates have pH values between 7.5 and 8.5 (Teck Cominco 2003b,c), the pH of road bed material from material site MS9 was measured as 8.4, and the pH of calcium chloride (dust suppressant) is between 7 and 10 (TETRA Chemicals 1998). Therefore, fugitive dust may contain concentrates, road bed materials, and calcium chloride, all of which may be contributing to elevated soil pH in tundra surrounding the DMTS road and port facilities. This text in Section 6.2.3.1 was revised with the above information to acknowledge these sources.* The available information does not definitively determine whether bleached or dry vegetation was more common near the site compared with background. The percent cover of litter (i.e., dry blades or broad leaf litter) was generally similar at site and reference stations (see Tables 6-10 and 6-11, attached for review). Analysis of quantitative vegetation community parameters is discussed in subsections that follow this section. Thus, in Section 6.2.1.3.2 (Summary of Field Observations), text in the fifth paragraph has been revised to state:	

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						Mosses at site and reference stations in the coastal plain community appeared to be dry or bleached in some microplots; perhaps this effect is an exhibition of drought-stress. Coastal plain stations were surveyed following periods of sunny and relatively warm weather, which may have contributed to the dryness in moss (and vascular plant foliage) noted in both site and reference plant communities at that time. Analysis of quantitative vegetation community parameters such as percent cover of litter (i.e., dry blades or broad leaf litter) is discussed below in Section 6.2.1.3.6. In Section 6.2.3.3 (Hillslope Mesic Open Shrubland), the third paragraph has been revised with the following: *Environmental sampling results show that hillslope vegetation up to 1,000 m from the road is exposed to road dust. Tundra soil concentrations of many CoPCs were elevated over reference levels at all stations along transect TT6 (Table 6-15). Qualitative evaluations of vegetation were corroborative. Dust was detected by touch on plant foliage at 10-m and 100-m stations; blackening, bleaching, or drying was observed on foliose lichens and on crowberry, blueberry, and lingonberry shrubs at station TT6-0010, and some willows were partially defoliated at station TT6-0100. However, field notes indicate that the area experiences heavy wildlife use, and herbivory may be a contributing factor to the observed defoliation of shrubs. A variety of species, including bear, caribou, and moose, has been observed in the vicinity of transect TT6, and signs of wildlife use were noted in the field log. The relative contribution of herbivory to defoliation versus that from other causes could not be determined in the field. In addition, browning and bleaching of shrubs was recorded at the hillslope reference station, TS-REF-11, suggesting other possible causes, such as seasonal dryness.* New References: *Teck Cominco. 2003b. Lead concentrate material safety data sheet. Teck Cominco Metals Ltd., Vancouver, BC.* *Teck Cominco. 2003c. Zinc concentrate material safety data sheet. Teck Cominco Metals Ltd., Vancouver, BC.* *Tetra. 1998. Premium anhydrous calcium chloride product data sheet. www.tetratec.com/business_units/calcium_ chloride/data/exp ress.html. Last updated 1998. Accessed September 2, 2004. Tetra Chemicals, Houston, TX.*	
Eco-17	6-97	6.7	Technical	High	For chemicals where the HQ is greater than 1.0 in comparison with a no observed adverse effect level (NOAEL) toxicity reference value (TRV) but less than 1.0 in comparison with a LOAEL TRV, risk cannot definitively be concluded to be negligible, as suggested by the discussion in this section. The true value of the LOAEL for a chemical is not exactly known because it is based on the dose levels selected in the laboratory toxicity study used to derive it. For this reason, Alaska DEC risk assessment guidance places equal or greater emphasis on wildlife risks based on the NOAEL compared with the LOAEL. This fact should be kept in mind when discussing and	In consideration of this comment, in Section 6.5.4 on Risk Characterization for Wildlife, the second and third paragraphs have been re-written to read: *Exposure estimates greater than the NOAEL TRV, but less than the LOAEL TRV indicate that individuals are ingesting chemicals in excess of a toxicity threshold and may exhibit adverse effects similar to those observed in the test organisms. In these cases, risk cannot definitively be concluded to be negligible, because the true effect threshold is not exactly known, only that it lies somewhere between the NOAEL and LOAEL. Furthermore, because the endpoints measure organism-level responses, there is considerable*	Response is acceptable.

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					interpreting the significance of the wildlife HQs in this section and other areas of the risk assessment report.	*uncertainty regarding how these effects, if occurring, would translate to population-level demographics.* *For CoPCs where hazard quotients are greater than 1.0 in comparison to both the NOAEL and LOAEL TRVs, adverse effects could occur in wildlife receptors, and could affect population-level parameters (e.g., survivorship, productivity, population abundance, etc). However, if hazard quotients are less than or comparable to hazard quotients for the same receptor-CoPC exposure scenario in the reference area, then it can be concluded that the site poses no incremental risk over background exposures, regardless of the magnitude of the hazard quotient.* Conclusions regarding significance of risk to wildlife presented in Section 6.7 have been revised to reflect the interpretation of hazard quotient results as stated above. The changes to Section 6.7 are shown below: ***6.7.1. Terrestrial Habitats*** *Effects are observable on coastal plain and tundra plant community structure within 100 m of the DMTS road, primarily due to reduced evergreen shrub, moss, and lichen cover (Tables JS1, JS2, JS3, and JS4). However, at 1,000 m from the road, communities were generally similar to reference communities except for a 2 to 4.5–fold difference in lichen cover. Lichen covers at stations TT5-1000 and TT5-2000 near the port were 2.75 and 8.25 percent, respectively, as compared to 15.75 percent at the coastal plain reference station, and lichen covers at stations TT3-1000 and TT8-1000 along the road were 4.75 and 5 percent, respectively, as compared to 9.75 and 21.8 percent at comparable reference stations. Community shifts within the first 100 m appear to be due, in part, to physical influences of the road and their effect on hydrology, soil chemistry, and plant vitality. Deposition of CoPCs in fugitive dust probably also contributes to observed changes in community parameters, which are interrelated with, and similar to, the effects due to physical and chemical stressors common to other gravel roads in tundra environments. Differences observed between reference and site communities beyond 100 m, specifically the decrease in lichen cover, may be a result of fugitive dust deposition, as non-vascular plants appear to be more sensitive to metals than vascular species. However, road effects or natural variability in plant communities may also be factors contributing to this change in community structure. In port facility areas, particularly in the area immediately downwind of CSB1, the presence of stressed and dead vegetation appears to be primarily related to fugitive concentrate dust deposition.* *Adverse effects to wildlife receptors from fugitive dust releases are expected to be minimal for most receptors (Tables JS5a and JS6). Locations and receptors where NOAEL and LOAEL hazard quotients, or only LOAEL hazard quotients exceeded 1.0 are summarized in Tables JS5a and JS5b, respectively. Table JS6 summarizes the number of LOAEL hazard quotient exceedances per number of sites evaluated for each receptor.* *Herbivorous small mammals (i.e., tundra vole and tundra shrew) inhabiting tundra within 10-100 m of the DMTS road near the port facilities or near the*	

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						mine's ambient air/solid waste boundary (i.e., along transects TT6 and TT7) showed incremental risk from exposure to barium, and aluminum. By 1,000 m, hazard quotients were generally below 1.0 and/or comparable to reference area hazard quotients. No other CoPCs had LOAEL-based hazard quotients greater than 1.0 for these receptors. Therefore, if adverse effects occur to small mammals, they are most likely to exist in localized areas near facilities or within a narrow band of tundra about 100-m wide near the road, as a result of exposure to aluminum or barium. *Regardless, possible effects on individuals in these areas, such as reduced growth (the endpoint for the aluminum TRVs) or increased mortality (the endpoint for the barium LOAEL TRV), are unlikely to translate into regional population-level effects given the limited area where adverse effects could occur, uncertainties related to the derivation of aluminum and barium TRVs, and extrapolation of individual-level responses to population endpoints, as discussed above in Section 6.6. In addition, aluminum and barium TRVs were derived from studies using much more soluble and bioavailable forms of barium and aluminum than those found at the site. Also, the barium endpoints for mammals based on rat studies using these more bioavailable forms (i.e., hypertension for the NOAEL, increased kidney masses and reduced ovarian masses for the LOAEL) are not conclusive as to their potential for effects on the populations. For aluminum, no effects have been found in avian studies, and in mammalian studies, the only effects endpoint was a reduction in weight gain of offspring in the second and third litters of second- and third-generation mice.* *Aluminum and barium are therefore not expected to be the risk drivers, as a result of the low solubility and low bioavailability of the forms present on the site. This was also illustrated in recent bioaccessibility testing work (Shock et al. 2007). The results of that research suggest that bioavailability of aluminum and barium in tundra soil at the mine area would be on the order of 4 percent and 19 percent, respectively. In the risk assessment described throughout this document, the bioavailability of metals in soils was assumed to be 100 percent.* *The food web model results for terrestrial herbivorous birds (i.e., ptarmigan) suggest that adverse effects (mortality or reproductive effects) from barium and lead exposures may occur in individuals foraging near the mine, and that adverse effects from lead are also possible in individuals foraging near the port, particularly for the most highly exposed individuals. These effects, if occurring, could result in population-level effects in areas near the port or mine. However, as stated above, the barium TRVs may overestimate toxicity of the relatively low solubility, low bioavailability forms of barium found on the site. Along the length of the road, the likelihood of adverse effects to herbivorous birds foraging in these areas is low, as 95 percent UCL on the mean exposures did not exceed NOAEL or LOAEL TRVs, except for exposure to barium, which exceeded the NOAEL TRV (hazard quotient of 1.7). Therefore, although risks cannot be considered negligible to ptarmigan inhabiting areas along the length of the road, it is unlikely that effects, if any, would result in a population-level effect in this area.*	

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						For caribou, there is a low likelihood that over-wintering individuals may experience adverse effects from aluminum exposure, as LOAEL-based hazard quotients ranged from 2.2 to 2.5 across the site, and were about 3-fold higher than comparable reference area hazard quotients. However, based on the low proportion of the total herd that could possibly over-winter near the mine site and the uncertainty associated with the aluminum TRV, it is very unlikely that any individual-level effects (e.g., reduced growth) would lead to population-level effects for the entire WACH. No adverse effects are predicted for the vast majority of caribou that only visit the site briefly during migrations. Food-web models also indicate that exposure to CoPCs are unlikely to result in population-level effects to other large-bodied mammalian herbivores (e.g., moose), avian invertivores (e.g., Lapland longspur), and avian and mammalian carnivores (e.g., snowy owl and Arctic fox). *In summary, the potential for adverse effects to wildlife is most pronounced in the first 100 m adjacent to the road or facilities (Table JS5b) and effects in general are not expected to occur at any substantial distance from the road, port facilities or mine ambient air/solid waste boundary. However, lichen cover values at 1,000-m and 2,000-m stations were significantly lower than reference cover values, suggesting that lichen effects may still occur at these distances from the DMTS road corridor. Furthermore, the contribution of metals in producing some of these effects, particularly on plant communities near the DMTS road, is unclear. Overall, results of the ERA suggest that adverse effects to wildlife receptors are largely restricted to localized areas adjacent to the DMTS road, the port facility, and the mine ambient air/solid waste boundary; however, effects on tundra vegetation extend further, with effects on lichens observed at 1,000 to 2,000 m away from these dust sources, and perhaps beyond, as summarized in Table JS7. Further study would be required to define the full nature and extent of lichen effects beyond 1,000 to 2,000 m and to distinguish the relative contributions of causative agents, such as metals and road dust or other factors on lichen toxicity.* ***6.7.2. Freshwater Habitats*** *In general, adverse ecological effects are not predicted in streams that cross the DMTS road, based on multiple lines of evidence. First, the evaluation of benthic macroinvertebrate drift assemblages indicated that the overall characteristics of the communities found in the three site stream stations were similar to reference streams. Second, fish monitoring studies have found relatively low metals concentrations in fish from Aufeis Creek and Omikviorok River compared to streams near the mine, and no consistent evidence of a road effect on fish metals concentrations in these streams (Ott and Morris 2004). Similarly, selenium concentrations in Anxiety Ridge Creek fish were comparable at both upstream and downstream locations, while selenium concentrations were lower at the DMTS road station. In Anxiety Ridge Creek, where cadmium and lead concentrations in juvenile Dolly Varden were significantly higher in downstream fish than upstream fish, maximum concentrations of cadmium and lead also exceeded the lowest literature thresholds for effects to survival, growth, or reproduction, but concentrations were also within the range of no-effects thresholds (Table CS1). Therefore adverse effects to fish cannot be conclusively predicted, as the sensitivity of Dolly Varden relative to the test species is not known.*	

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						Furthermore, maximum whole body fish tissue concentrations reported from a nearby naturally mineralized creek located north of the Red Dog Mine were higher or similar to concentrations reported for Anxiety Ridge Creek fish. Third, metals concentrations in plants were within the range of reference concentrations (with the exception of aluminum and zinc in some willow leaf samples, and aluminum and chromium in sedges from the Omikviorok River) and in general, were not elevated in comparison to literature phytotoxicity thresholds. Fourth, food web models indicated that exposure to CoPCs is unlikely to result in adverse effects to avian and mammalian herbivores (e.g., green-winged teal, muskrat, and moose) or avian invertivores (e.g., common snipe) foraging in the streams, as LOAEL-based hazard quotients were less than or equal to 1.0, or in the case of aluminum ranged from 1.8 to 8.3 for muskrat, but were comparable to reference area hazard quotients. Collectively, these findings indicate that no ecologically significant effects are likely in streams, with the possible exception of potential effects to fish in Anxiety Ridge Creek. *In general, adverse effects are not predicted in tundra ponds located greater than 100 m from the DMTS road and port facilities, with the exception of potential vegetation effects identified based on comparison to literature screening values at ponds situated in low-lying areas to the southwest of the mine's ambient air/solid waste permit boundary. For ponds TP1-1000, TP3, and TP4, CoPC concentrations in sediment were less than the maximum no-effects concentrations for sediments from coastal lagoons that were evaluated in toxicity tests using freshwater test organisms. Vegetation around the ponds appeared to be healthy, and metals concentrations were within the range of reference concentrations (with a few exceptions for cobalt, lead, and zinc), and/or below phytotoxicity thresholds.* *Incremental exposure to lead and zinc at pond TP4 (located along the road near the mine) resulted in minor exceedances of phytotoxicity thresholds in sedge tissue (Table 6-23). However, plant samples were not washed or rinsed prior to analysis. If they had been washed, concentrations may have been below effects thresholds. Also, the vegetation appeared healthy in observations made during field sampling. Given these considerations, adverse effects to vegetation are not expected in tundra pond TP4.* *Tundra ponds observed at the site and reference area were hydrologically disconnected from surface water inputs from streams and are unlikely to support permanent fish populations. Therefore, pathways to fish and piscivorous wildlife are believed to be incomplete, and no adverse effects are expected for these receptors. Food-web models indicate a very low likelihood of adverse effects to survival, growth, or reproduction of herbivorous wildlife potentially foraging at these ponds.* *The possibility of adverse effects to invertebrates and plants could not be conclusively discounted at Station TP1-0100, located near the concentrate conveyor and other port facilities (Photograph 4). As described above in Section 6.3.2, the likelihood of adverse effects to macroinvertebrates in TP1-0100 could not be evaluated, and phytotoxicity threshold comparisons for sedges showed a potential for vegetation effects from lead and zinc exposures. Aerial transport and surface flow are probably the main*	

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						mechanisms by which metals in fugitive dust become deposited in this habitat, as is likely for the surrounding tundra. Ponds near the port facilities, such as TP1-0100, are not true ponds, but rather flooded depressions in the tundra, and may not be permanent as they are dependent on precipitation and surface runoff to maintain volume. The ephemeral nature of the port area ponds suggests that they would be less likely to support the diversity of ecological receptors that the larger, more permanent ponds that occur in the tundra along the DMTS road would. Therefore, any adverse effects in these ponds have less ecological significance than if similar effects were to occur in ponds scattered across the tundra. ***6.7.3. Coastal Lagoons*** *No adverse effects are predicted for ecological communities inhabiting coastal lagoons. Sediment toxicity tests indicated no effects to benthic invertebrates in lagoons, even when exposed to elevated CoPC concentrations in sediments from locations nearest to port facilities. Plant community structure was similar at site and reference lagoons and the few differences that were observed may reflect natural variability among and within lagoon plant communities, which fluctuate seasonally in size and composition as water levels rise and recede. However, plant community surveys were limited to the wetland vegetation at the perimeter of lagoons, and these results may not be directly applicable to other coastal plant communities with different compositions. Food web models indicate that there is a very low likelihood of adverse effects on the survival, growth, and reproduction of herbivorous and invertivorous birds (e.g., brant and black-bellied plover) and herbivorous mammals (e.g., muskrat, moose) that potentially forage in the coastal lagoons. The lagoons evaluated in this risk assessment are not believed to support permanent fish populations due to their physical separation from potential marine and freshwater colonizing sources. Therefore, pathways to fish and piscivorous wildlife are believed to be incomplete, and no adverse effects are expected for these receptors. Collectively, these findings indicate that no ecologically significant effects are likely in coastal lagoons.*	
Eco-18	6-98	6.7.1	Technical	High	A discussion of possible impacts to ptarmigan from lead at terrestrial transects 5 and 7 (TT5 and TT7) should be discussed in this section (see Comment Eco-9).	Please see the response to Eco-10. Also, Section 6.7.1 (Terrestrial Habitats) has been revised in response to this comment, as follows: *The ERA food web model results for terrestrial herbivorous birds (i.e., ptarmigan) suggest that adverse effects (mortality or reproductive effects) from barium and lead exposures may occur in individuals foraging near the mine, and that adverse effects from lead are also possible in individuals foraging near the port, particularly the most highly exposed individuals. These effects, if occurring, could result in population-level effects in these areas. The likelihood of adverse effects to herbivorous birds foraging in the central portion of the road is low, as 95 percent UCL on the mean exposures did not exceed NOAEL or LOAEL TRVs, except for exposure to barium, which exceeded the NOAEL TRV (hazard quotient of 1.7). Therefore, although risks cannot be considered negligible to ptarmigan inhabiting the central portion of the road, it is unlikely that effects near the road, if any, would have a population-level effect in this area.*	Response is acceptable.

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Eco-19	6-99	6.7.2	Technical	High	In the first paragraph, the statement that fish monitoring studies have found " no consistent evidence of a road effect on fish metals concentrations" overlooks the fact that a road-related effect on cadmium and lead levels in fish was observed in Anxiety Ridge Creek (see comment Eco-8). This impact should be discussed in this section. In the second paragraph, the statement "Adverse effects are not predicted in tundra ponds along the DMTS road" may not be entirely accurate. Table 6-23 shows that lead and zinc in sedges from tundra pond TP4 (along the road near the mine) exceed reference sedge concentrations and phytotoxicity thresholds for plant tissues. The exceedances of the phytotoxicity thresholds are not excessive but should not be overlooked in this section. In the third paragraph, the metals responsible for possible adverse effects on plants in the vicinity of TP-0100 should be mentioned (i.e., lead and zinc; see Table 6-23). Does Photograph 4 (small tundra pond near the port facility) show TP-0100? If so, refer to the photograph in this section.	Regarding fish monitoring studies, the text in Section 6.7.2 was changed to read as follows: *Second, fish monitoring studies have found relatively low metals concentrations in fish from Aufeis Creek and Omikviorok River compared to streams near the mine, and no consistent evidence of a road effect on fish metals concentrations in these streams (Ott and Morris 2004). However, in Anxiety Ridge Creek, where cadmium and lead concentrations were significantly higher in downstream fish than upstream fish, the potential for adverse effects to fish cannot be ruled out, because maximum concentrations exceeded the lowest thresholds for effects to survival, growth, or reproduction.* Regarding tundra ponds, the text in Section 6.7.2 has been revised to state: *In general, adverse effects are not predicted in tundra ponds located greater than 100 m from the DMTS road and port facilities, with the exception of potential vegetation effects based on comparison to literature screening values at ponds situated in low-lying areas to the southwest of the mine's ambient air/solid waste permit boundary.*	Response is acceptable.
					Brabets (2004) found sediment concentrations of cadmium and zinc in two streams crossing the haul road (i.e., Deadman and New Heart Creeks) that were up to five times greater than sediment concentrations reported in the draft ERA report (compare Table 8 from Brabets [2004] with Table 6-24 in the draft report). The high sediment concentrations found by Brabets (2004) may be the result of concentrate spills that occurred along the haul road near these two streams. The sediment data from Brabets (2004) should be discussed as it relates to the adequacy of the stream sediment-sampling program used for the ERA and the validity of the conclusions drawn for freshwater stream habitats. Brabets, T.P. 2004. *Occurrence and Distribution of Trace Elements in Snow, Streams, and Streambed Sediments, Cape Krusenstern National Monument, Alaska, 2002-2003.* USGS Scientific Investigation Report 2004-5229.	In the third paragraph of Section 6.7.2, the text has been modified to identify lead and zinc as chemicals of concern for pond vegetation at TP1-0100. A reference to Photograph 4 was added. Stream sediment samples collected by USGS are sieved prior to analysis, and are thus enriched relative to sediment samples collected as part of the ERA. As such, they are not directly comparable to the samples collected as part of the ERA. Regarding the supposition that concentrations in sediments from Deadman and New Heart creeks may have been affected by concentrate spills, that may be possible. However, since the time of the USGS sampling, Teck Cominco has completed survey, sampling, cleanup (where needed), and closure of the former concentrate spill sites (Teck Cominco 2003, 2005). Sediments were not sampled, nor were invertebrate communities assessed in Deadman or New Heart creeks as part of the ERA data collection. Therefore, the ERA cannot provide any direct assessment of what the Brabets (2004) results may mean with regard to ecological risk. The following text was added the end of Section 6.6.5.1.5 (Measured CoPC Concentrations in Environmental Media and Prey): *Exponent (2005) and Brabets (2004) both sampled sediments from the Omikviorok River and Aufeis Creek at the haul road. On average, the sediment concentrations for cadmium, lead, and zinc reported by Brabets (2004) are about twice those reported by Exponent (2005). Stream sediment samples collected by Brabets (2004) were sieved prior to analysis using a 0.063 mm screen, and are thus enriched relative to sediment samples collected as part of the ERA by Exponent (2005). As such, the two sets of samples are not directly comparable, and the Brabets sampling methodology is not appropriate for use in the risk assessment. Since the time of the Brabets (2004) sampling events, Teck Cominco has completed survey, sampling, cleanup (where needed), and closure of former concentrate spill*	Response is acceptable.

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						sites (Teck Cominco 2003, 2005), including those near Deadman and New Heart Creeks. Although sediments and invertebrate communities were sampled and evaluated in five representative creeks along the DMTS road as part of the ERA data collection, Deadman and New Heart creeks were not among those sampled. Future monitoring needs (including the possible need for monitoring in these creeks) will be evaluated during development of the risk management plan.	
Eco-20	-	Table 6-26	Technical	Medium	The assumed diet for the green-winged teal listed in Table 6-26 (100% herbaceous plants) does not match the assumed diet listed in Table 5-2 of the approved work plan (85% herbaceous plants, 15% invertebrates). The diet listed in the work plan is more appropriate for this receptor because the teal is known to feed more on animal matter in the summer (Kaufman 1996). Please explain the reason for this change and the effect it has on the exposure and risk estimates for the teal. Kaufman, K. 1996. *Lives of North American Birds.* Houghton Mifflin.	Although the teal is predominantly herbivorous, and was selected to represent herbivorous birds, 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 (see attached). The table now reports a dietary composition of 85 percent herbaceous plants and 15 percent invertebrates (estimated from Johnson 1995). Also, the text in the third paragraph of Section 6.5.1.2 (CoPC Concentrations) was revised as follows: *In aquatic systems, whole sedge data were used to model exposures for muskrat, brant, moose (at coastal lagoons), and sedge seed data were used to model exposures for green-winged teal. No sedge plants were found in Aufeis Creek during the supplemental sampling event, and thus exposure scenarios were not developed for teal and muskrat in this stream. Willow leaf data collected along stream banks were used in exposure models for the moose as an aquatic receptor. Aquatic invertebrate data from streams and coastal lagoons were used in food-web models for common snipe and black-bellied plover, respectively. Invertebrates also constituted 15 percent of the teal's diet, and where available (i.e., streams), aquatic invertebrate data were used in food-web models for teal. Soil invertebrate data were used to model teal exposure in tundra ponds and to fill gaps in the stream data as needed.* The food web models for teal were updated to include invertebrate chemistry data in the exposure calculations, and the new results are provided in Appendix K (Tables K-58 through K-69). Hazard quotients at the site were all less than 1.0 for all CoPCs, even after the addition of invertebrates to the teal's diet.	Response is acceptable.
Eco-21	6-100	6	Technical	High	A results summary should be added at the end of Section 6 listing all areas where potential risks were identified, the receptor groups affected, and the stressors (chemical and/or physical) potentially responsible for the predicted risks. For example, for tundra vegetation, the results summary should emphasize areas where vegetation parameters (e.g. moss cover, lichen cover, diversity, etc.) differ from background and/or where a road-related effect was observed, regardless of whether the effect is believed to be due to chemical stressors, physical stressors, or a combination of the two. Locations where phytotoxicity benchmarks were exceeded should be summarized. Potential site-related effects in aquatic habitats should be summarized separately for the three creeks/rivers evaluated in the ERA and for tundra ponds and coastal lagoons. For wildlife, a table should be included listing the locations and receptors where NOAEL and/or LOAEL hazard quotients exceeded 1.0 for any chemical. Information in the results summary should be incorporated into the Executive Summary of the risk assessment report and Section 8.2 (Ecological Risk Assessment Conclusions). Because many readers of the risk assessment report may only examine the Executive	After the comment response and resolution process was completed for all comment documents, tables summarizing results were added to Section 6 and to the conclusions in Section 8. The summary tables are attached to this document. In addition, some text from Section 6.7 has been modified due to the inclusion of the summary tables, and is presented in the response to comment ECO-17.	Response is acceptable.

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					Summary and/or Conclusions, it is important that the ecological risks posed by the site be plainly summarized in these sections.		
Eco-22	-	6	Technical	Medium	Teck Cominco (2005) presents results for lead and zinc for soil samples for seven sampling locations to the west of the ambient air boundary of the Red Dog Mine in the general vicinity of TT7. Are the soil data for TT7 used in the ERA representative for this area compared with data from Teck Cominco (2005)? Teck Cominco (2005) indicates that fugitive dust emissions at the mine have been reduced but not eliminated. As such, levels of metals in soil and vegetation near the mine are likely to increase in the future. Hence, the results presented in the draft ERA for terrestrial transect number 7 (TT7) near the ambient air boundary of the mine site should be considered a snapshot of current conditions only. This point should be made in the ERA report where the results for this location are discussed. Teck Cominco. 2005. *Summary of Mine Related Fugitive Dust Studies, Red Dog Mine Site.* Prepared by Teck Cominco Alaska Incorporated, Anchorage, Alaska.	Lead and zinc concentrations at TT7 are comparable to the Teck Cominco (2005) lead and zinc concentrations in the area beyond the mine boundary (although it should be noted that the sample collection methods were somewhat different). The 10-m station TT7-0010 had a tundra soil concentration of 2,630 ppm lead and 6,770 ppm zinc, which are similar to the mean concentrations of 2,475 ppm lead and 6,037 ppm zinc from the seven Teck Cominco tundra soil samples that were collected outside the mine boundary. The transect TT7 10-m station is essentially at the ridgetop ambient air boundary, in a comparable location to the Teck Cominco samples. It appears that results from these stations near the mine boundary may reflect a localized dust deposition occurring on the lee side of the ridge. The TT7 transect stations at 10, 1,000, and 2,000 m were on successive ridgetops and peaks, as planned in the RA work plan. The risk assessment results are a snapshot in time. The text in the *Introduction* section has been revised as follows: • First paragraph, the words “current and future” are deleted. • Second paragraph, second to last sentence is modified to read: *“The results of the risk assessment provide a snapshot of risk under current conditions that will help risk managers to determine what additional actions may be necessary to reduce those risks now and in the future.”* Similar edits were made to *Conclusions* and *Executive Summary* sections.	Response is acceptable.
Eco-23	Table C21	Appendix C	Technical	Low	The specific reports that the moss data were taken from should be clearly identified in Table C-21. For example, if NPS00 refers to data from Ford and Hasselbach (2001), this should be clearly indicated in a footnote to the table. This comment also pertains to other tables in Appendix C that list data from other reports. Ford, J. and L. Hasselbach. 2001. *Heavy Metals in Mosses and Soil on Six Transects Along the Red Dog Mine Haul Road, Alaska.* Western Arctic National Parklands, National Parks Service, NPS/AR/NRTR-2001/38.	Appendix C tables were updated with footnotes regarding survey names and references for data sources. Appendix C, Table C-1, has been included as an example of the updated tables in Appendix C.	Response is acceptable.
Eco-24	-	Appendix E	Editorial	Low	For clarity, the page numbers for Tables E-1 and E-2 should be corrected.	Correction made.	Response is acceptable.
Eco-25	E-13	Appendix E	Editorial	Low	Under the heading “Vegetation Tissue Collection” the first sentence in the second paragraph should refer to “stream vegetation sampling,” not “aquatic invertebrate community analysis.” Please revise accordingly.	Revision made.	Response is acceptable.
Eco-26	E-15	Appendix E	Editorial	Low	Under the heading “Tundra Soil Collection” in the first paragraph, the reference to stream willow/sedge samples appears to be an error. Revise the first paragraph accordingly.	Revision made.	Response is acceptable.
Eco-27	-	Appendix F and 6.4.1	Technical	High	Provide a copy of the sediment toxicity testing report from MEC Analytical Systems for review. A copy of MEC’s report should be included in the risk assessment report, either as part of Appendix F or as a separate appendix.	A copy of the laboratory report for the lagoon sediment toxicity testing (attached for review) has been added as an attachment to Appendix E, and the text in Section 6.4.1 has been revised to reference the lab report and the tabulated results in Appendix G, Table G-38.	Response is acceptable.

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Eco-28		Appendix K	Technical	High	Several EPC calculations were checked, but could not be reproduced. For example, Table K-82 lists an average EPC for lead in soil of 995 mg/kg based on PHASE2RA soil data for TT7. Table G-1 lists four lead soil concentrations for TT7: 2630, 201, 197, 111 mg/kg. The average of the values is 785 mg/kg, not 995 mg/kg as reported in Table K-82. Similar problems in reproducing EPCs were found for other receptors and analytes. Example calculations should be provided in Appendix K (or in a separate appendix) clearly illustrating the data used to derive the EPCs for wildlife provided in the tables in this appendix. An example should be included for each wildlife receptor for at least one chemical for each area where the receptor was evaluated. For example, for the caribou, three example calculations should be provided–one each for the port, haul road, and mine exposure areas. It is suggested that the example calculation focus on elements predicted to pose potential wildlife risks such as aluminum, barium, and lead.	Example calculations of exposure point concentrations have been added to Appendix K as requested. The examples show calculations of lead concentrations in water, soil or sediment, and food. The revised Appendix K tables are attached for review.	Response is acceptable.
Eco-29	-	7.2 and 8.2	Technical	High	Adjust recommendations and conclusions as needed in light of above comments.	Adjustments were made to conclusions as needed in light of the above comments. The revised language from Section 8.2.1 (Terrestrial Habitats) is provided below: ***Terrestrial Habitats*** • *Changes in vegetation community structure are observable within 100 m of the DMTS road and port facilities. These community shifts appear to be due, in part, to physical and chemical influences of the road and their effect on hydrology, soil chemistry, and plant vitality. Physical and chemical stresses are commonly found associated with gravel roads in tundra environments. The importance of CoPCs in fugitive dust relative to physical stresses caused by the DMTS road in producing these changes cannot be determined based on the data available at this time.* • *Differences between reference plant communities and plant communities beyond 1000 to 2000 m from the DMTS road, specifically the 2- to 4.5-fold decrease in lichen cover (Figure 6-4 and Tables 6-10 and 6-11), may be a result of fugitive dust deposition. Further study would be required to define the full nature and extent of lichen effects related to fugitive dust deposition from the DMTS port, road and Red Dog Mine and identify the causative agent(s) of lichen decline.* • *In port facility areas, particularly in the area immediately downwind of CSB1, the presence of stressed and dead vegetation appears to be primarily related to fugitive concentrate dust deposition.* • *Herbivorous and insectivorous small mammals (e.g., voles and shrews) inhabiting tundra within 10-100 m of the DMTS road, near the port facilities, or near the mine's ambient air/solid waste boundary showed incremental risk from exposure to aluminum and barium. However, exposures decreased to no-effects levels or were comparable to reference exposures beyond 100 m from the road and 1,000 m from the mine's ambient air/solid waste boundary. These localized effects on individuals' survival and reproductive performance are unlikely to translate into population-level effects (e.g., changes in abundance or distribution), given the limited spatial scale of the effects, and given uncertainties associated with TRV derivation.*	Response is acceptable.

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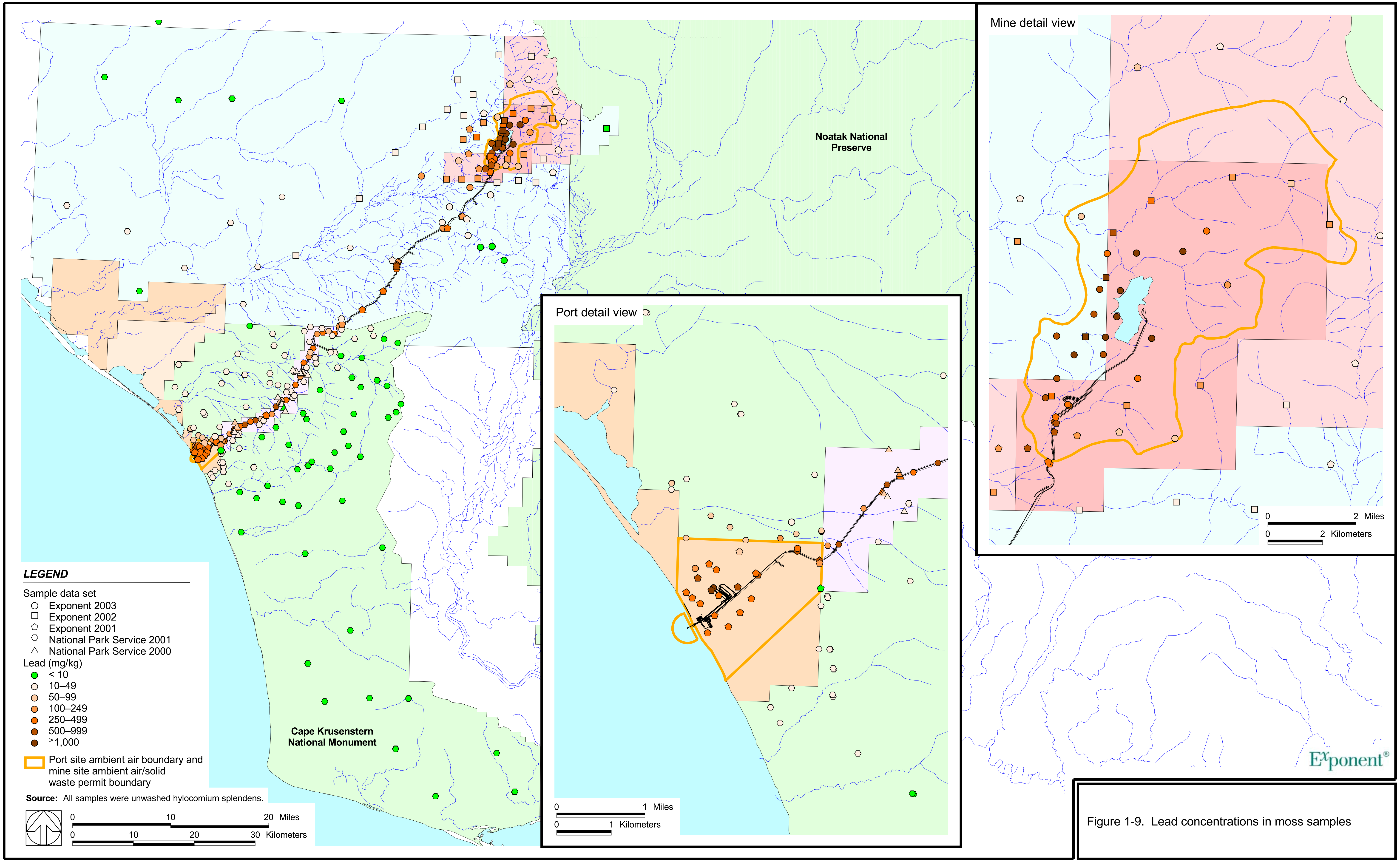
						- *Adverse effects to herbivorous birds (e.g., ptarmigan) are possible in populations near the port and mine. The LOAEL-based hazard quotient for barium exposure near the mine was 2.0 at the 95 percent UCL exposure level (0.94 for mean exposure), but at all other locations estimated barium exposure was below the level at which adverse effects are first expected. At the port, LOAEL-based hazard quotients for lead were 0.84 at the mean and 2.2 at the 95 percent UCL on the mean exposure estimates.* - *For caribou, no adverse effects are predicted for the vast majority of caribou that only pass through the site during migration. There is a low likelihood that individual caribou over-wintering in the mine area may experience adverse effects (reduced growth) from exposure to aluminum, as LOAEL-based hazard quotients ranged from 2.2 to 2.5 across the site, and were about 3-fold higher than comparable reference area hazard quotients. However, the aluminum TRV probably overestimates toxicity of the relatively low solubility, low bioavailability forms of aluminum found in the assessment area. In addition, it is very unlikely that any individual-level growth effects, if occurring, would lead to population-level effects because of the very small proportion of the total herd that could possibly over-winter near the mine site.* - *The likelihood of adverse population-level effects to other terrestrial wildlife, including large-bodied mammalian herbivores (e.g., moose), avian invertivores (e.g., Lapland longspur and snipe), and avian and mammalian carnivores (e.g., snowy owl and Arctic fox), is considered to be negligible.* Also, changes have been made to Section 8.2.4 (Coastal Lagoons): ***Coastal Lagoons*** - *Sediment toxicity tests indicated no effects to benthic invertebrates in lagoons, even when exposed to elevated CoPC concentrations in sediments from locations nearest to port facilities.* - *Plant community structure was similar at site and reference lagoons. Natural variability among and within lagoon plant communities likely accounts for the few differences that were observed. However, only fringing wetland vegetation was assessed. Extrapolation of these results to other coastal plant communities is uncertain.* - *The likelihood of adverse population-level effects to wildlife foraging in coastal lagoons, including herbivorous and invertivorous birds (e.g., brant and black-bellied plover), is considered negligible.*	

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.

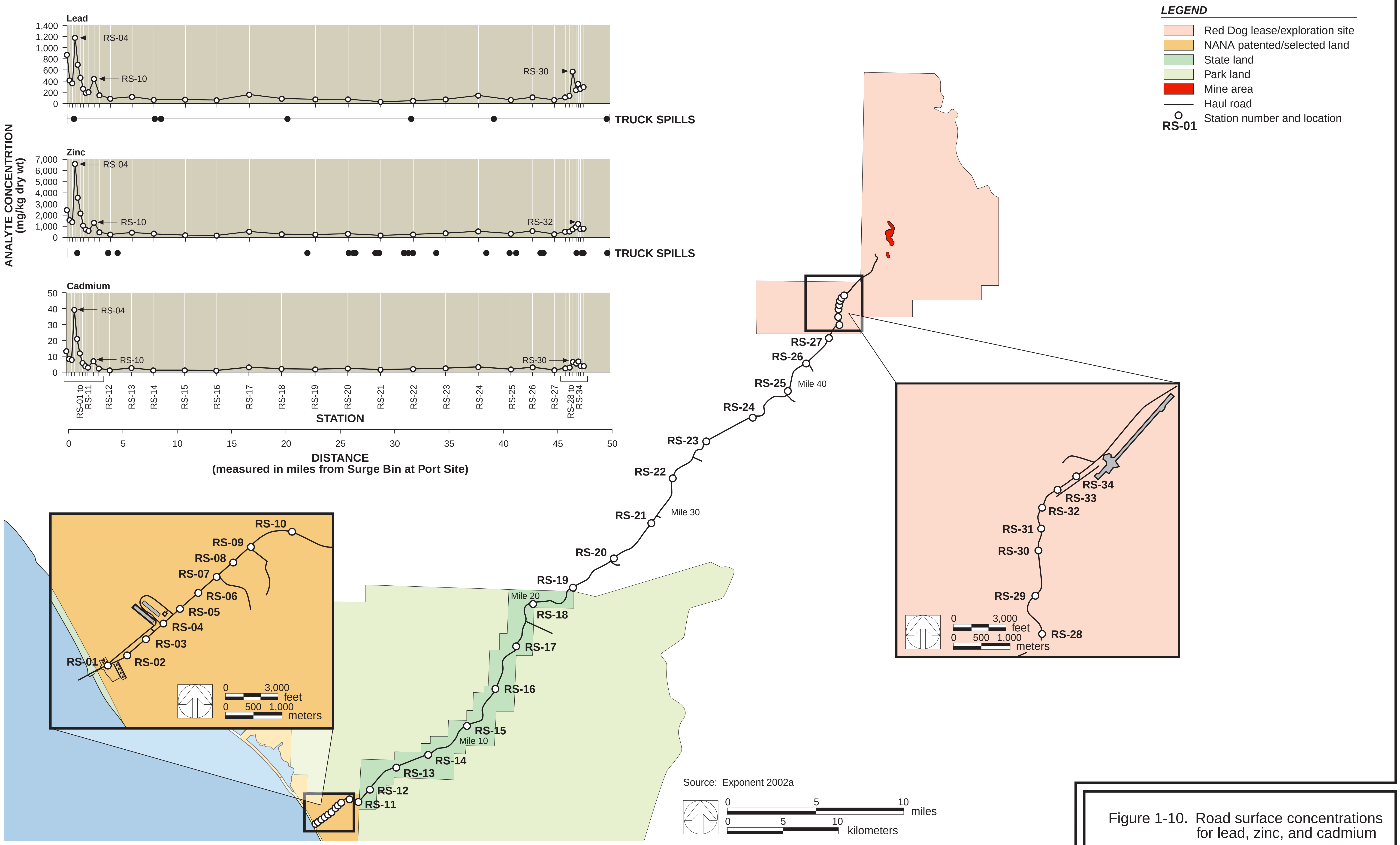
COPC - chemical of potential concern
CSB1 - Concentrate Storage Building 1
DMTS - DeLong Mountain Regional Transportation System
EPC - exposure point concentration
ERA - ecological risk assessment
HQ - hazard quotient
LOAEL - lowest observed adverse effect level
NOAEL - no observed adverse effect level
RA - risk assessment
TP - tundra pond
TT - terrestrial transect
UCL - upper confidence limit (on mean concentration).



Source: All samples were unwashed hylocomium splendens.

Figure 1-9. Lead concentrations in moss samples

8601997.001 4400 | Jan 5, 2006 | all moss view | all moss 11x17 layout | j:\red_dog\projects\moss0106.apr



Source: Exponent 2002a

Figure 1-10. Road surface concentrations for lead, zinc, and cadmium

Table C-1. Analytical results for soil samples (site)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	1006938	9/16/2003	1006938	0	0					2.4				
TECK03	1006939	9/16/2003	1006939	0	0					3.8				
TECK03	1006940	9/11/2003	1006940	0	0					1.9				
TECK03	1006941	9/11/2003	1006941	0	0					1.7				
TECK03	1006944	9/11/2003	1006944	0	0					2.8				
TECK03	1006945	9/11/2003	1006945	0	0					22.7				
TECK03	1006949	9/16/2003	1006949	0	0					2.4				
TECK03	1006952	9/11/2003	1006952	0	0					20.2				
TECK03	1006956	9/11/2003	1006956	0	0					29.6				
TECK03	1006959	9/11/2003	1006959	0	0					15.0				
TECK03	1006960	9/11/2003	1006960	0	0					20.4				
TECK03	1006968	9/12/2003	1006968	0	0					17.1				
TECK03	1006969	9/12/2003	1006969	0	0					6.3				
TECK03	1006973	9/10/2003	1006973	0	0					8.7				
TECK03	1006977	9/9/2003	1006977	0	0					19.2				
TECK03	1006990	9/10/2003	1006990	0	0					9.7				
TECK03	1006991	9/10/2003	1006991	0	0					25.7				
TECK03	1006992	9/10/2003	1006992	0	0					13.3				
TECK03	1006993	9/10/2003	1006993	0	0					14.0				
TECK03	1006994	9/10/2003	1006994	0	0					17.5				
TECK03	1007000	9/10/2003	1007000	0	0					11.9				
TECK03	1007036	6/21/2003	1007036	0	0					10.2				
TECK03	1007038	6/21/2003	1007038	0	0					31.0				
TECK03	1007040	6/21/2003	1007040	0	0					5.9				
TECK03	1007045	6/21/2003	1007045	0	0					23.1				
TECK03	1007055	6/19/2003	1007055	0	0					9.2				
TECK03	1007069	6/21/2003	1007069	0	0					8.5				
TECK03	1007088	7/13/2003	1007088	0	0					72.0				
TECK03	1007089	7/13/2003	1007089	0	0					65.9				
TECK03	1007090	7/13/2003	1007090	0	0					18.5				
TECK03	1007091	7/13/2003	1007091	0	0					16.7				
TECK03	1007092	7/13/2003	1007092	0	0					32.7				
TECK03	1007093	7/13/2003	1007093	0	0					28.6				
TECK03	1007094	7/13/2003	1007094	0	0					38.8				
TECK03	1007095	7/13/2003	1007095	0	0					27.9				
TECK03	1007097	7/13/2003	1007097	0	0					17.2				
TECK03	1007098	7/13/2003	1007098	0	0					43.5				
TECK03	1007128	7/13/2003	1007128	0	0					38.8				
TECK03	1007133	7/13/2003	1007133	0	0					57.9				
TECK03	1007135	7/13/2003	1007135	0	0					225.0				
TECK03	1007136	7/13/2003	1007136	0	0					132.0				
TECK03	1007150	7/14/2003	1007150	0	0					49.0				
TECK03	1007160	7/13/2003	1007160	0	0					67.2				
TECK03	1007164	7/13/2003	1007164	0	0					21.1				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	1007170	7/13/2003	1007170	0	0					32.9				
TECK03	1007176	7/13/2003	1007176	0	0					248.0				
TECK03	1007195	7/14/2003	1007195	0	0					47.9				
TECK03	1007212	7/17/2003	1007212	0	0					28.5				
TECK03	1007215	7/17/2003	1007215	0	0					40.7				
TECK03	1007232	7/17/2003	1007232	0	0					32.2				
TECK03	1007239	7/17/2003	1007239	0	0					5.9				
TECK03	1007242	7/18/2003	1007242	0	0					4.9				
TECK03	1007243	7/18/2003	1007243	0	0					4.2				
TECK03	1007244	7/18/2003	1007244	0	0					12.3				
TECK03	1007245	7/18/2003	1007245	0	0					7.6				
TECK03	1007246	7/18/2003	1007246	0	0					25.3				
TECK03	1007247	7/18/2003	1007247	0	0					9.7				
TECK03	1007248	7/18/2003	1007248	0	0					8.6				
TECK03	1007249	7/18/2003	1007249	0	0					12.6				
TECK03	1007274	7/16/2003	1007274	0	0					26.1				
TECK03	1007278	7/15/2003	1007278	0	0					19.8				
TECK03	1007281	7/15/2003	1007281	0	0					38.5				
TECK03	1007290	7/15/2003	1007290	0	0					7.4				
TECK03	1007299	7/16/2003	1007299	0	0					36.3				
TECK03	1007314	7/17/2003	1007314	0	0					42.4				
TECK03	1007326	7/16/2003	1007326	0	0					26.5				
TECK03	1007333	7/17/2003	1007333	0	0					37.4				
TECK03	1007340	7/18/2003	1007340	0	0					8.8				
TECK03	1007341	7/18/2003	1007341	0	0					2.9				
TECK03	1007342	7/18/2003	1007342	0	0					7.3				
TECK03	1007344	7/18/2003	1007344	0	0					9.8				
TECK03	1007345	7/18/2003	1007345	0	0					10.5				
TECK03	1007346	7/18/2003	1007346	0	0					4.3				
TECK03	1007347	7/18/2003	1007347	0	0					1.5				
TECK03	1007348	7/18/2003	1007348	0	0					9.3				
TECK03	1007350	7/18/2003	1007350	0	0					7.0				
TECK03	1007351	7/18/2003	1007351	0	0					62.7				
TECK03	1007352	7/18/2003	1007352	0	0					10.8				
TECK03	1007353	7/18/2003	1007353	0	0					12.2				
TECK03	1007354	7/18/2003	1007354	0	0					20.2				
TECK03	1007360	7/18/2003	1007360	0	0					53.9				
TECK03	1007362	7/18/2003	1007362	0	0					114.0				
TECK03	1007367	7/18/2003	1007367	0	0					21.7				
TECK03	1007370	7/19/2003	1007370	0	0					13.8				
TECK03	1007377	7/19/2003	1007377	0	0					43.7				
TECK03	1007387	7/20/2003	1007387	0	0					18.3				
TECK03	1007390	7/20/2003	1007390	0	0					15.2				
TECK03	1007391	7/20/2003	1007391	0	0					22.8				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	1007393	7/20/2003	1007393	0	0					19.0				
TECK03	1007394	7/20/2003	1007394	0	0					51.0				
TECK03	1007397	7/20/2003	1007397	0	0					16.5				
TECK03	1007398	7/20/2003	1007398	0	0					15.5				
TECK03	1007400	7/18/2003	1007400	0	0					10.9				
TECK03	1007406	7/18/2003	1007406	0	0					80.3				
TECK03	1007413	7/18/2003	1007413	0	0					59.2				
TECK03	1007419	7/19/2003	1007419	0	0					9.5				
TECK03	1007422	7/19/2003	1007422	0	0					72.2				
TECK03	1007430	7/19/2003	1007430	0	0					40.6				
TECK03	1007439	7/20/2003	1007439	0	0					15.1				
TECK03	1007441	7/20/2003	1007441	0	0					44.4				
TECK03	1007442	7/20/2003	1007442	0	0					19.8				
TECK03	1007445	7/20/2003	1007445	0	0					17.6				
TECK03	1007448	7/20/2003	1007448	0	0					20.7				
TECK03	1007449	7/20/2003	1007449	0	0					47.8				
TECK03	1007450	7/20/2003	1007450	0	0					51.5				
TECK03	1007451	7/20/2003	1007451	0	0					57.0				
TECK03	1007452	7/20/2003	1007452	0	0					24.6				
TECK03	1007458	7/20/2003	1007458	0	0					146.0				
TECK03	1007462	7/21/2003	1007462	0	0					30.3				
TECK03	1007463	7/21/2003	1007463	0	0					23.1				
TECK03	1007465	7/21/2003	1007465	0	0					29.7				
TECK03	1007467	7/21/2003	1007467	0	0					46.4				
TECK03	1007468	7/21/2003	1007468	0	0					98.7				
TECK03	1007469	7/21/2003	1007469	0	0					10.1				
TECK03	1007473	7/22/2003	1007473	0	0					8.40				
TECK03	1007474	7/22/2003	1007474	0	0					20.2				
TECK03	1007475	7/22/2003	1007475	0	0					45.6				
TECK03	1007476	7/22/2003	1007476	0	0					35.6				
TECK03	1007490	7/23/2003	1007490	0	0					44.7				
TECK03	1007491	7/23/2003	1007491	0	0					22.0				
TECK03	1007492	7/23/2003	1007492	0	0					44.1				
TECK03	1007499	7/20/2003	1007499	0	0					85.9				
TECK03	1007500	7/20/2003	1007500	0	0					217.0				
TECK03	1007502	7/21/2003	1007502	0	0					36.2				
TECK03	1007510	7/21/2003	1007510	0	0									
TECK03	1007514	7/22/2003	1007514	0	0					2.9				
TECK03	1007543	7/23/2003	1007543	0	0					2.6				
TECK03	1007544	7/23/2003	1007544	0	0					3.7				
TECK03	1007545	7/24/2003	1007545	0	0					7.6				
TECK03	1007553	7/24/2003	1007553	0	0					2.2				
TECK03	1007554	7/24/2003	1007554	0	0					12.2				
TECK03	1007564	7/23/2003	1007564	0	0					13.3				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	1007566	7/23/2003	1007566	0	0					16.5				
TECK03	1007569	7/23/2003	1007569	0	0					7.4				
TECK03	1007579	7/24/2003	1007579	0	0					20.1				
TECK03	1007582	7/24/2003	1007582	0	0					10.6				
TECK03	1007583	7/24/2003	1007583	0	0					17.9				
TECK03	1007584	7/24/2003	1007584	0	0					13.3				
TECK03	1007585	7/24/2003	1007585	0	0					0.55 *U*				
TECK03	1007591	7/24/2003	1007591	0	0					6.0				
TECK03	1007617	7/26/2003	1007617	0	0					0.60 *U*				
TECK03	1007618	7/26/2003	1007618	0	0					0.50 *U*				
TECK03	1007619	7/26/2003	1007619	0	0					0.55 *U*				
TECK03	1007626	7/27/2003	1007626	0	0					1.3				
TECK03	1007627	7/27/2003	1007627	0	0					7.0				
TECK03	1007648	7/28/2003	1007648	0	0					2.5				
TECK03	1007650	7/28/2003	1007650	0	0					8.0				
TECK03	1007652	7/26/2003	1007652	0	0					0.55 *U*				
TECK03	1007659	7/27/2003	1007659	0	0					2.0				
TECK03	1007661	7/27/2003	1007661	0	0					4.0				
TECK03	1007664	7/27/2003	1007664	0	0					0.55 *U*				
TECK03	1007673	7/28/2003	1007673	0	0					2.1				
TECK03	1007678	7/28/2003	1007678	0	0					2.5 *U*				
TECK03	1007682	7/28/2003	1007682	0	0					2.5 *U*				
TECK03	1007683	7/28/2003	1007683	0	0					2.5 *U*				
TECK03	1007684	7/28/2003	1007684	0	0					4.3				
TECK03	1007685	7/28/2003	1007685	0	0					2.5 *U*				
TECK03	1007687	7/28/2003	1007687	0	0					3.5				
TECK03	1007688	7/28/2003	1007688	0	0					25.4				
TECK03	1007701	7/28/2003	1007701	0	0					2.5 *U*				
TECK03	1007702	7/28/2003	1007702	0	0					2.5 *U*				
TECK03	1007703	7/28/2003	1007703	0	0					2.5 *U*				
TECK03	1007704	7/28/2003	1007704	0	0					2.5 *U*				
TECK03	1007705	7/28/2003	1007705	0	0					2.7				
TECK03	1007901	7/19/2003	1007901	0	0					50.9				
TECK03	1007904	7/21/2003	1007904	0	0					31.9				
TECK03	1007911	7/28/2003	1007911	0	0					2.5 *U*				
TECK03	1007912	7/28/2003	1007912	0	0					6.0				
TECK03	1007916	7/28/2003	1007916	0	0					2.5 *U*				
TECK03	1007966	9/3/2003	1007966	0	0					23.3				
TECK03	1007980	9/7/2003	1007980	0	0					12.7				
TECK03	1007983	9/16/2003	1007983	0	0					0.60 *U*				
TECK03	1007990	9/11/2003	1007990	0	0					2.0				
TECK03	1007991	9/11/2003	1007991	0	0					0.60 *U*				
TECK03	1007992	9/11/2003	1007992	0	0					17.0				
TECK03	1007993	9/11/2003	1007993	0	0					7.2				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	1007995	9/11/2003	1007995	0	0					1.7				
TECK03	1007996	9/11/2003	1007996	0	0					28.5				
TECK03	1007997	9/11/2003	1007997	0	0					4.1				
TECK03	1007998	9/11/2003	1007998	0	0					0.60 *U*				
TECK03	1008242	9/3/2003	1008242	0	0					70.1				
TECK03	1008244	9/3/2003	1008244	0	0					25.7				
TECK03	1008246	9/3/2003	1008246	0	0					36.5				
TECK03	1008247	9/3/2003	1008247	0	0					44.4				
TECK03	1008249	9/3/2003	1008249	0	0					31.8				
TECK03	1008250	9/3/2003	1008250	0	0					37.2				
TECK03	1008253	9/3/2003	1008253	0	0					22.1				
TECK03	1008255	9/3/2003	1008255	0	0					28.0				
TECK03	1008257	9/3/2003	1008257	0	0					22.1				
TECK03	1008258	9/3/2003	1008258	0	0					19.6				
TECK03	1008260	9/3/2003	1008260	0	0					27.5				
TECK03	1008262	9/3/2003	1008262	0	0					16.9				
TECK03	1008263	9/3/2003	1008263	0	0					19.2				
TECK03	1008265	9/4/2003	1008265	0	0					46.3				
TECK03	1008279	9/4/2003	1008279	0	0					5.7				
TECK03	1008287	9/4/2003	1008287	0	0					17.3				
TECK03	1008317	9/7/2003	1008317	0	0					28.7				
TECK03	1008318	9/7/2003	1008318	0	0					21.4				
TECK03	1008341	9/9/2003	1008341	0	0					20.6				
TECK03	1008346	9/10/2003	1008346	0	0					15.8				
TECK03	1008347	9/10/2003	1008347	0	0					15.9				
TECK03	1008357	9/7/2009	1008357	0	0					7.7				
TECK03	1008362	9/7/2009	1008362	0	0					13.3				
TECK03	1008363	9/7/2009	1008363	0	0					23.6				
TECK03	1008364	9/7/2009	1008364	0	0					20.1				
TECK03	1008370	9/7/2009	1008370	0	0					20.8				
TECK03	1008374	9/7/2009	1008374	0	0					20.9				
TECK03	1008375	9/7/2009	1008375	0	0					20.7				
TECK03	1008376	9/7/2009	1008376	0	0					33.2				
TECK03	1008396	9/8/2009	1008396	0	0					1.6				
SUPPRSS	101_A	7/17/2002	RS-101A-VS	0	0					0.5 *U*				
SUPPRSS	101_B	7/17/2002	RS-101B-VS	0	0					0.55 *U*				
SUPPRSS	101_C	7/17/2002	RS-101C-VS	0	0					0.55 *U*				
PSCHAR	106_A1	6/17/2002	RF-106A	0	0					68.2				
PSCHAR	107_A1	6/17/2002	RF-107A	0	0					76.2				
PSCHAR	108_A1	6/17/2002	RF-108A	0	0					53.6				
PSCHAR	109_A1	6/17/2002	RF-109A	0	0					46.7				
PSCHAR	110_A1	6/17/2002	RF-110A	0	0					83.5				
PSCHAR	111_A1	6/17/2002	RF-111A	0	0					115				
PSCHAR	112_A1	6/17/2002	RF-112A	0	0					79.8				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
PSCHAR	113_A1	6/17/2002	RF-113A	0	0	7,070	5.0 *U*	10 *U*	1,030	58.6	14.8	11.9	41.2	
PSCHAR	115_A1	6/17/2002	RF-115-A	0	0					26.1				
PSCHAR	116_A1	6/17/2002	RF-116-A	0	0					24.1				
PSCHAR	122_A1	6/17/2002	RF-122-A	0	0	5,880	5.0 *U*	10 *U*	1,380	35	13	10.5	30.6	
PSCHAR	123_A1	6/17/2002	RF-123-A	1	0					32.6				
PSCHAR	123_A1	6/17/2002	RF-123-A	2	0					30.2				
SUPPRSS	145_A	5/31/2002	RC-145-A	0	0					10.1				
SUPPRSS	145_A	6/1/2002	RS-145-A	0	0	8,150	26 *U*	51.0 *U*	1,380	26.3 *J*	17.9	8.5	29.3	
PSCHAR	145_A1	6/1/2002	RF-145-A	0	0					31.9 *J*				
PSCHAR	148_A1	6/1/2002	RF-148-A	0	0					49.8 *J*				
PSCHAR	149_C1	6/1/2002	RF-149-C	0	0					34.7 *J*				
PSCHAR	150_A1	6/1/2002	RF-150-A	0	0					32.9 *J*				
PSCHAR	150_C1	6/3/2002	RF-150-C	0	0	8,150	25 *U*	50 *U*	1,530	36.2 *J*	22.8	13.6	42.3	
PSCHAR	153_A1	6/3/2002	RF-153-A	0	0					37 *J*				
PSCHAR	153_C1	6/3/2002	RF-153-C	0	0					35.8 *J*				
PSCHAR	154_C1	6/3/2002	RF-154-C	0	0					27.4 *J*				
PSCHAR	155_C1	6/3/2002	RF-155-C	0	0					38.1 *J*				
PSCHAR	156_C1	6/3/2002	RF-156-C	1	0					41.8 *J*				
PSCHAR	156_C1	6/3/2002	RF-156-C	2	0	5,460	25 *U*	50.0 *U*	1,590	34.5	13.3	5.00 *U*	28.5	
PSCHAR	157_A1	6/3/2002	RF-157-A	0	0	8,300	25 *U*	50.5 *U*	1,300	38.5 *J*	17.1	11.6	31.8	
PSCHAR	159_C1	6/3/2002	RF-159-C	0	0					33.3 *J*				
PSCHAR	160_C1	6/3/2002	RF-160-C	0	0					41 *J*				
PSCHAR	165_C1	6/4/2002	RF-165-C	0	0	4,980	25 *U*	50 *U*	1,370	51.8	16.8	10.5	34.3	
PSCHAR	169_A1	6/4/2002	RF-169-A	0	0	6,710	5.00 *U*	10.0 *U*	1,090	72.2	14.5	12.8	46.1	
PSCHAR	170_C1	6/4/2002	RF-170-C	0	0	6,040	5.50 *U*	10.5 *U*	932	26.9	12.7	19.8	25.8	
PSCHAR	171_A1	6/4/2002	RF-171-A	1	0					60.6				
PSCHAR	171_A1	6/4/2002	RF-171-A	2	0					59.8				
PSCHAR	171_C1	6/4/2002	RF-171-C	0	0					35.9				
PSCHAR	175_A1	6/5/2002	RF-175-A	0	0					122				
PSCHAR	176_C1	6/5/2002	RF-176-C	0	0					69.2				
PSCHAR	178_A1	6/5/2002	RF-178-A	0	0	6,890	5.00 *U*	10.5 *U*	1,030	139	16.3	17.4	66.7	
PSCHAR	178_C1	6/5/2002	RF-178-C	0	0					81.8				
PSCHAR	179_C1	6/5/2002	RF-179-C	0	0					86.5				
PSCHAR	180_C1	6/5/2002	RF-180-C	0	0	6,550	5.00 *U*	10.0 *U*	1,560	110	15.0	13.7	62.1	
PSCHAR	189_A1	6/7/2002	RF-189-A	0	0					26.3				
PSCHAR	189_C1	6/7/2002	RF-189-C	0	0	7,330	5.00 *U*	10.0 *U*	1,570	69.1	21.7	14.5	51.9	
PSCHAR	190_C1	6/7/2002	RF-190-C	0	0					48.5				
PSCHAR	191_C1	6/7/2002	RF-191-C	0	0	7,080	5.00 *U*	10.0 *U*	1,550	41.5	15.2	13.3	34.9	
PSCHAR	192_C1	6/7/2002	RF-192-C	0	0					33.6				
PSCHAR	216_A1	6/9/2002	RF-216A	0	0	9,790	5.0 *U*	10 *U*	1,890	9.6	18.2	10.2	26.5	
PSCHAR	220_C1	6/9/2002	RF-220C	0	0					7.1				
PSCHAR	222_C1	6/9/2002	RF-222C	0	0	11,800	5.0 *U*	10 *U*	1,340	16.5	22.7	12.7	26.3	
TECK03	471204	6/6/2003	471204	0	0					7.4				
TECK03	471210	6/6/2003	471210	0	0					1.8				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	471212	6/6/2003	471212	0	0					26.8				
TECK03	471221	6/7/2003	471221	0	0					126.0				
TECK03	471264	6/6/2003	471264	0	0					9.8				
TECK03	471272	6/6/2003	471272	0	0					11.7				
TECK03	471274	6/6/2003	471274	0	0					3.3				
TECK03	471276	6/6/2003	471276	0	0					0.50 *U*				
TECK03	471283	6/7/2003	471283	0	0					0.50 *U*				
TECK03	471287	6/7/2003	471287	0	0					0.55 *U*				
TECK03	471293	6/7/2003	471293	0	0					28.8				
TECK03	471295	6/7/2003	471295	0	0					69.8				
TECK03	471297	6/7/2003	471297	0	0					21.6				
TECK03	471299	6/7/2003	471299	0	0					17.7				
TECK03	471300	6/6/2003	471300	0	0					5.2				
TECK03	471320	6/10/2003	471320	0	0					103.0				
TECK03	471325	6/10/2003	471325	0	0					33.9				
TECK03	471332	6/10/2003	471332	0	0					44.2				
TECK03	471333	6/10/2003	471333	0	0					37.0				
TECK03	471334	6/10/2003	471334	0	0					14.3				
TECK03	471341	6/11/2003	471341	0	0					66.1				
TECK03	471350	6/13/2003	471350	0	0					19.5				
TECK03	471352	6/7/2003	471352	0	0					8.4				
TECK03	471353	6/7/2003	471353	0	0					13.7				
TECK03	471355	6/7/2003	471355	0	0					50.1				
TECK03	471356	6/7/2003	471356	0	0					22.5				
TECK03	471358	6/7/2003	471358	0	0					1.6				
TECK03	471365	6/16/2003	471365	0	0					10.0				
TECK03	471374	6/17/2003	471374	0	0					25.2				
TECK03	471418	6/10/2003	471418	0	0					34.9				
TECK03	471419	6/10/2003	471419	0	0					32.5				
TECK03	471420	6/10/2003	471420	0	0					18.5				
TECK03	471421	6/10/2003	471421	0	0					17.2				
TECK03	471425	6/11/2003	471425	0	0					59.3				
TECK03	471453	6/14/2003	471453	0	0					25.5				
TECK03	471457	6/14/2003	471457	0	0					6.2				
TECK03	471458	6/14/2003	471458	0	0					15.4				
TECK03	471463	6/14/2003	471463	0	0					26.3				
TECK03	471464	6/14/2003	471464	0	0					103.0				
TECK03	471465	6/14/2003	471465	0	0					33.5				
TECK03	471466	6/14/2003	471466	0	0					4.9				
TECK03	471474	6/14/2003	471474	0	0					88.1				
TECK03	471487	6/15/2003	471487	0	0					74.8				
TECK03	471501	6/7/2003	471501	0	0					163.0				
TECK03	471505	6/10/2003	471505	0	0					47.4				
TECK03	471508	6/10/2003	471508	0	0					17.9				

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Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
TECK03	471520	6/21/2003	471520	0	0					18.1				
TECK03	471539	7/13/2003	471539	0	0					40.7				
TECK03	471540	7/13/2003	471540	0	0					30.4				
TECK03	471549	7/17/2003	471549	0	0					5.4				
TECK03	471550	7/18/2003	471550	0	0					27.0				
PSCHAR	CAG-AA28	9/16/2002	CAG-AA28-VS	0	0					1.4 *J*				
PSCHAR	CAG-AA29	8/28/2002	CAG-AA29-VS	0	0					1.6				
PSCHAR	CAG-AA30	8/28/2002	CAG-AA30-VS	0	0					0.55 *U*				
PSCHAR	CAG-AA31	8/28/2002	CAG-AA31-VS	0	0					4.1				
PSCHAR	CAG-F2	7/28/2002	CAG-2-F	0	0					29.4				
PSCHAR	CAG-H30	7/3/2002	CAG-H-30	0	0	7,620		93.6		388 *J*				
PSCHAR	CAG-I1	7/28/2002	CAG-1-I	0	0					60.7				
PSCHAR	CAG-L33	7/3/2002	CAG-L-33	0	0					9.8 *J*				
PSCHAR	CAG-R2	7/1/2002	CAG-R-2-S	0	0					11.4				
PSCHAR	CAG-R32	7/21/2002	CAG-R-32	0	0					10.4				
PSCHAR	CAG-R34	9/19/2002	CAG-R34-VS	0	0					23.9 *J*				
PSCHAR	CAG-S34	9/19/2002	CAG-S34-VS	0	0					22.7 *J*				
PSCHAR	CAG-U130	7/19/2002	CAG-U-130	0	0					45.4				
PSCHAR	CAG-U29	7/3/2002	CAG-U-29	0	0	10,100		11 *U*		28.5 *J*				
PSCHAR	CAG-U34	7/21/2002	CAG-U-34	0	0					12.3				
PSCHAR	CAG-W29	7/1/2002	CAG-W-29	0	0	10,000	14.8	19	1,170	92	20.2	19	37.6	
PSCHAR	CAG-W31	8/28/2002	CAG-W31-VS	0	0					6.8 *J*				
PSCHAR	CAG-X100	8/28/2002	CAG-X100-VS	0	0					0.55 *U*				
PSCHAR	CAG-X101	8/28/2002	CAG-X101-VS	0	0					4.9				
PSCHAR	CAG-X12	7/2/2002	CAG-X-12	0	0					7.4 *J*				
PSCHAR	CAG-X22	7/1/2002	CAG-X-22	0	0					11.4				
PSCHAR	CAG-X26	7/1/2002	CAG-X-26-A	0	0					11.2				
PSCHAR	CAG-X29	8/28/2002	CAG-X29-VS	0	0					7.2 *J*				
PSCHAR	CAG-X30	8/28/2002	CAG-X30-VS	0	0					1.9 *J*				
PSCHAR	CAG-X31	8/28/2002	CAG-X31-VS	0	0					16.4 *J*				
PSCHAR	CAG-X8	7/2/2002	CAG-X-8	0	0					4.4 *J*				
PSCHAR	CAG-Y27	7/1/2002	CAG-Y-27	0	0					32.3				
PSCHAR	CAG-Y28	8/28/2002	CAG-Y28-VS	0	0					4.0 *J*				
PSCHAR	CAG-Y29	9/16/2002	CAG-Y29-VS	0	0					0.50 *U*				
PSCHAR	CAG-Y30	9/16/2002	CAG-Y30-VS	0	0					0.50 *U*				
PSCHAR	CAG-Y31	8/28/2002	CAG-Y31-VS	0	0					55.4 *J*				
PSCHAR	CAG-Y32	8/28/2002	CAG-Y32-VS	0	0					3.8 *J*				
PSCHAR	CAG-Y33	8/28/2002	CAG-Y33-VS	0	0					0.55 *UR*				
PSCHAR	CAG-Z27	8/28/2002	CAG-Z27-VS	0	0					12.3 *J*				
PSCHAR	CAG-Z28	8/28/2002	CAG-Z28-VS	0	0					14.7 *J*				
PSCHAR	CAG-Z29	8/28/2002	CAG-Z29-VS	0	0					0.55 *UR*				
PSCHAR	CAG-Z30	8/28/2002	CAG-Z30-VS	0	0					0.55 *UR*				
PSCHAR	CAG-Z31	8/28/2002	CAG-Z31-VS	0	0					0.50 *UR*				
PSCHAR	CAG-Z32	8/28/2002	CAG-Z32-VS	0	0					13.0 *J*				

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PSCHAR	CAG-Z33	8/28/2002	CAG-Z33-VS	0	0					14 *J*				
PSCHAR	CAG-Z7S	7/1/2002	CAG-Z-7-S	0	0					2.50				
PSCHAR	CIT1250N	6/29/2002	C1T1-250-N	2	0					2.70				
PSCHAR	CVT1-0N	6/29/2002	CVT1-0-N	0	0					5.60				
PSCHAR	CVT1-0S	6/29/2002	CVT1-0-S	0	0					12.5				
PSCHAR	CVT1-10N	6/29/2002	CVT1-10-N	0	0					30.7				
PSCHAR	CVT1-10S	6/29/2002	CVT1-10-S	0	0					23.4				
PSCHAR	CVT2-0N	6/30/2002	CVT2-0-N	1	0					2.70				
PSCHAR	CVT2-0N	6/30/2002	CVT2-0-N	2	0					2.60				
PSCHAR	CVT2-0S	6/30/2002	CVT2-0-S	0	0					5.30				
PSCHAR	CVT3-0N	6/30/2002	CVT3-0-N	0	0	10,600	5.00 *U*	10.0 *U*	357	3.85	20.6	16.7	19.7	
PSCHAR	CVT3-0S	6/30/2002	CVT3-0-S	0	0					4.00				
PSCHAR	CVT4-0N	6/30/2002	CVT4-0-N	0	0					2.20 *J*				
PSCHAR	CVT4-0S	6/30/2002	CVT4-0-S	0	0					1.60 *J*				
PSCHAR	CVT5-0N	6/30/2002	CVT5-0-N	1	0					2.70 *J*				
PSCHAR	CVT5-0N	6/30/2002	CVT5-0-N	2	0					3.00				
PSCHAR	CVT5-0S	6/30/2002	CVT5-0-S	0	0					0.500 *UJ*				
PSCHAR	CVT6-0N	6/30/2002	CVT6-0-N	0	0					6.40				
PSCHAR	CVT6-0S	6/30/2002	CVT6-0-S	0	0					7.60 *J*				
PSCHAR	CVT6-10S	6/30/2002	CVT6-10-S	0	0					5.30 *J*				
PSCHAR	CVT7-0N	7/3/2002	CVT7-0-N	0	0					6 *J*				
PSCHAR	CVT7-0S	7/3/2002	CVT7-0-S	0	0					9 *J*				
PSCHAR	CVT7-10S	7/3/2002	CVT7-10-S	1	0					9.7 *J*				
PSCHAR	CVT7-10S	7/3/2002	CVT7-10-S	2	0					5.30				
PSCHAR	CVT8-0N	7/3/2002	CVT8-0-N	0	0					19.6 *J*				
PSCHAR	CVT8250N	7/3/2002	CVT8-250-N	0	0					1.50				
PSCHAR	CVT9-0N	7/3/2002	CVT9-0-N	0	0					76.7				
PSCHAR	CVT9-50N	7/3/2002	CVT9-50N	0	0					0.500 *U*				
PSCHAR	CVT9150S	7/3/2002	CVT9-150-S	0	0					5.70				
PSCHAR	CVT9300S	7/3/2002	CVT9-300-S	0	0					1.70				
PSCHAR	CVT9500N	7/3/2002	CVT9-500-N	0	0					0.500 *U*				
PSCHAR	DSP-A6	6/23/2002	DSP-A-6	0	0					3.3				
PSCHAR	DSP-AA2	6/23/2002	DSP-AA-2	0	0					2.1				
PSCHAR	DSP-B1	6/23/2002	DSP-B-1	0	0					23.8				
PSCHAR	DSP-B1	7/25/2002	V2-DSP-B-1	0	0					4.6				
PSCHAR	DSP-B4	6/25/2002	DSP-B-4	0	0					5.9				
PSCHAR	DSP-B9	9/19/2002	DSP-B9-VS	0	0					3.7				
PSCHAR	DSP-C3	6/23/2002	DSP-C-3	0	0					11.4				
PSCHAR	DSP-D4	6/23/2002	DSP-D-4	0	0					281				
PSCHAR	DSP-D4	9/19/2002	DSP-D4-VS	0	0					20.2				
PSCHAR	DSP-F6	6/23/2002	DSP-F-6	0	0					12.8				
PSCHAR	DSP-G6	6/23/2002	DSP-G-6	0	0					18.8				
PSCHAR	DSP-G6	9/19/2002	DSP-G6-VS	0	0					6.9				
PSCHAR	DSP-HG5B	7/26/2002	DSP-HG-5-B	0	0					3				

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PSCHAR	DSP-IH5A	7/26/2002	DSP-IH-5-A	1	0					9.1				
PSCHAR	DSP-IH5A	7/26/2002	DSP-IH-5-A	2	0					8.2				
PSCHAR	PG-P5S	7/28/2002	PG-P5S	0	0					0.5 *U*				
PSCHAR	RAT1-0EA	6/27/2002	RAT1-OE-A	0	0					11.6				
PSCHAR	RAT2-50W	7/2/2002	RAT2-50-W	1	0	9,600		11 *U*		17 *J*				
PSCHAR	RAT2-50W	7/2/2002	RAT2-50-W	2	0					17 *J*				
PSCHAR	RAT2250E	6/27/2002	RAT2-250E	2	0					0.4 *U*				
PSCHAR	RAT3-0EA	6/27/2002	RAT3-OEA	0	0					12.4				
PSCHAR	RAT4-0W	7/2/2002	RAT4-0-W	0	0					10.1 *J*				
PSCHAR	RAT5-0NA	6/27/2002	RAT5-0NA	0	0	6,580	6.5 *U*	13 *U*	1,700	218	22.3	17.3	109	
PSCHAR	RAT5-0W	7/2/2002	RAT5-0-W	0	0					35.5 *J*				
PSCHAR	RAT5-10W	7/2/2002	RAT5-10-W	0	0					5.1 *J*				
FUGDST01	RC-01-A	8/22/2001	RC-01-A	0	0			7.20		1.90				
FUGDST01	RC-03-A	8/23/2001	RC-03-A	0	0			3.90		0.500 *U*				
FUGDST01	RC-04-A	8/23/2001	RC-04-A	0	0			1.30		1.30				
FUGDST01	RC-05-A	8/23/2001	RC-05-A	0	0			4.40		2.10				
FUGDST01	RC-06-A	8/23/2001	RC-06-A	0	0	13,000	5.0 *U*	7	5,900	1.00	22.0	19.2	64.6	
FUGDST01	RC-07-A	8/23/2001	RC-07-A	0	0			4.10		1.40				
FUGDST01	RC-08-A	8/24/2001	RC-08-A	0	0			24.2		0.500 *U*				
FUGDST01	RC-09-A	8/24/2001	RC-09-A	0	0			28.2		1.20				
FUGDST01	RF-01	8/26/2001	RF-01	0	0	6,850	5.5 *U*	9	570	6.70	14.7	9.1	17.7	
FUGDST01	RF-02	8/25/2001	RF-02	0	0	7,380	5.5 *U*	8	1,170	6.20	16.8	11.3	22.3	
FUGDST01	RF-03	8/25/2001	RF-03	0	0	3,930	5.5 *U*	7	650	3.75	8.1	6	12.5	
FUGDST01	RF-04	8/26/2001	RF-04	1	0	2,490	5.5 *U*	9	1,010	4.40	7.2	3.8	9.9	
FUGDST01	RF-04	8/26/2001	RF-04	2	0	3,300	5.5 *U*	9	1,200	5.10	8.5	4.7	12.3	
FUGDST01	RF-05	8/26/2001	RF-05	0	0	16,600	5.0 *U*	8	6,290	3.90	24	27	59.1	
FUGDST01	RF-06	8/26/2001	RF-06	0	0	12,100	5.0 *U*	8	2,760	29.3	18	13.1	58.8	
FUGDST01	RF-07	8/26/2001	RF-07	0	0	9,890	5.5 *U*	20	7,090	17.3	17.4	10.2	72.8	
FUGDST01	RF-08	8/26/2001	RF-08	0	0	3,780	5 *U*	10.2	3,770	9.45	7.5	5	36.4	
PHASE1RA	RF-10	7/14/2003	SL0009	0	0	7,940	0.930 *J*	4.40	2,110	9.54 *J*	12.2	8.92	22.2	0.7 *J*
PHASE1RA	RF-107	7/17/2003	SL0019	0	0	5,640	3.73 *J*	9.8	1,660 *J*	50.5 *J*	13.2	10.1	36.5 *J*	0.4 *U*
PHASE1RA	RF-16	7/14/2003	SL0008	0	0	14,200	0.390 *J*	6.30	1,720	3.10 *J*	20.2	13.0	24.0	1.3 *J*
PHASE1RA	RF-18	7/14/2003	SL0007	0	0	3,560	0.590 *J*	3.00	998	2.41 *J*	11.2	7.04	13.9	1 *J*
PHASE1RA	RF-20	7/14/2003	SL0006	0	0	2,270	0.540 *J*	1.40	1,260	2.28 *J*	5.74	4.51	10.6	0.6 *J*
PHASE1RA	RF-22	7/14/2003	SL0005	0	0	1,180	0.380 *J*	1.30	732	2.61 *J*	4.86	4.21	9.76	0.6 *J*
PHASE1RA	RF-24	7/14/2003	SL0004	0	0	2,770	0.560 *J*	3.30	2,150	2.92 *J*	6.37	5.09	14.1	1.1 *J*
PHASE1RA	RF-27	7/22/2003	SL0029	1	0	9,800	0.87 *J*	4.2	5,600 *J*	2.67 *J*	12.9	9.48	42.4 *J*	0.4 *U*
PHASE1RA	RF-27	7/22/2003	SL0029	2	0	10,800	0.79 *J*	4.5	5,800 *J*	3.8 *J*	11.2	8.44	58.1 *J*	0.4 *U*
PHASE1RA	RF-32	7/14/2003	SL0003	0	0	5,610	1.39 *J*	14.0	5,490	9.61 *J*	11.0	8.12	36.2	0.9 *J*
PHASE1RA	RF-34	7/21/2003	SL0026	0	0	6,800	1.33 *J*	11.5	6,640 *J*	6 *J*	9.47	6.78	35.7 *J*	0.4 *U*
PHASE1RA	RF-4	7/14/2003	SL0010	0	0	4,870	4.22 *J*	6.40	1,110	49.8 *J*	9.32	8.16	29.5	0.5 *J*
PHASE1RA	RF-5	7/14/2003	SL0011	1	0	10,200	1.27 *J*	6.30	1,720	21.1 *J*	17.7	11.7	26.7	0.8 *J*
PHASE1RA	RF-5	7/14/2003	SL0011	2	0	10,500	1.20 *J*	5.80	1,520	19.9 *J*	17.0	11.5	26.9	0.9 *J*
FUGDST01	RF-PORT	8/26/2001	RF-PORT	0	0	8,930	6.0 *U*	10	1,210	27.9	17.4	11	29.6	

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
PSCHAR	ROT1-0N	7/3/2002	ROT1-0N	0	0					16.0				
PSCHAR	ROT5-10S	7/5/2002	ROT5-10-S	1	0					3.40				
PSCHAR	ROT5-10S	7/5/2002	ROT5-10-S	2	0					4.5 *J*				
PSCHAR	ROT5-50S	7/5/2002	ROT5-50-S	0	0					17.0				
PSCHAR	ROT5250S	7/5/2002	ROT5-250-S	0	0					0.550 *U*				
PSCHAR	ROT5500S	7/5/2002	ROT5-500-S	0	0					1.20				
PSCHAR	ROT6-10S	7/5/2002	ROT610S	0	0	6,980		12 *U*		11.6				
PSCHAR	ROT6-50S	7/5/2002	ROT650S	0	0					25.6				
PSCHAR	ROT6250S	7/5/2002	ROT6250S	0	0					2.50				
PSCHAR	ROT6500S	7/5/2002	ROT6-500-S	1	0					1.70				
PSCHAR	ROT6500S	7/5/2002	ROT6-500-S	2	0					1.5 *J*				
PSCHAR	ROT7-0S	7/5/2002	ROT7-0-S	0	0					105				
PSCHAR	ROT7-10S	7/5/2002	ROT710S	0	0					4.30				
PSCHAR	ROT8-0S	7/5/2002	ROT8-OS	0	0	6,630		11 *U*		27.6				
PSCHAR	ROT8-10S	7/5/2002	ROT8-10-S	0	0					25.1				
PSCHAR	ROT8-50S	7/5/2002	ROT8-50-S	0	0					10.5				
PSCHAR	ROT8250S	7/5/2002	ROT8-250-S	0	0					0.500 *U*				
PSCHAR	ROT9-0N	7/3/2002	ROT9-0N	0	0					31.8				
PSCHAR	ROT9-0S	7/5/2002	ROT9-OS	1	0					35.1				
PSCHAR	ROT9-0S	7/5/2002	ROT9-OS	2	0					27.1 *J*				
PSCHAR	ROT9-10N	7/5/2002	ROT9-10N	0	0					32.6 *J*				
PSCHAR	ROT9-10S	7/5/2002	ROT9-10-S	0	0					71.8				
FUGDST01	RS-01	8/24/2001	RS-01	0	0			7.70		13.3				
FUGDST01	RS-13	8/25/2001	RS-13	1	0			5.70		2.80				
FUGDST01	RS-13	8/25/2001	RS-13	2	0			5.00		2.60				
FUGDST01	RS-14	8/25/2001	RS-14	0	0			7.80		1.20				
FUGDST01	RS-15	8/25/2001	RS-15	0	0			3.90		1.20				
FUGDST01	RS-16	8/25/2001	RS-16	0	0			5.30		0.500 *U*				
FUGDST01	RS-17	8/25/2001	RS-17	0	0			5.00		3.10				
FUGDST01	RS-18	8/25/2001	RS-18	0	0			3.40		2.10				
FUGDST01	RS-19	8/25/2001	RS-19	0	0	3,780		2.80		1.80				
FUGDST01	RS-20	8/25/2001	RS-20	0	0			2.30		2.40				
FUGDST01	RS-21	8/25/2001	RS-21	0	0			1.70		1.60				
FUGDST01	RS-22	8/26/2001	RS-22	0	0	1,240		4.60		2.00				
FUGDST01	RS-23	8/26/2001	RS-23	0	0			5.10		2.50				
FUGDST01	RS-24	8/26/2001	RS-24	0	0			4.40		3.30				
FUGDST01	RS-25	8/26/2001	RS-25	0	0	12,100		3.80		1.80				
FUGDST01	RS-26	8/26/2001	RS-26	0	0			3.40		3.10				
FUGDST01	RS-27	8/26/2001	RS-27	0	0			2.90		1.30				
FUGDST01	RS-28	8/26/2001	RS-28	0	0			4.00		2.50				
FUGDST01	RS-29	8/26/2001	RS-29	1	0	10,600		5.50		2.90				
FUGDST01	RS-29	8/26/2001	RS-29	2	0	10,600		5.00		2.50				
FUGDST01	RS-30	8/26/2001	RS-30	0	0			15.1		6.50				
FUGDST01	RS-31	8/26/2001	RS-31	0	0			5.70		5.50				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Aluminum (mg/kg dry)	Antimony (mg/kg dry)	Arsenic (mg/kg dry)	Barium (mg/kg dry)	Cadmium (mg/kg dry)	Chromium (mg/kg dry)	Cobalt (mg/kg dry)	Copper (mg/kg dry)	Fluoride (mg/kg dry)
FUGDST01	RS-32	8/26/2001	RS-32	0	0	4,740		11.7		6.80				
FUGDST01	RS-33	8/26/2001	RS-33	1	0			18.4		4.50				
FUGDST01	RS-33	8/26/2001	RS-33	2	0			13.1		4.00				
FUGDST01	RS-34	8/26/2001	RS-34	0	0	5,330		14.8		3.90				
PSCHAR	TUB-1	7/5/2002	TU-1-VS	0	0					0.5 *UJ*				
PSCHAR	TUB-2	7/5/2002	TU-2-VS	0	0					0.5 *UJ*				
PSCHAR	TUB-3	8/11/2002	TU-3-VS	0	0					22 *J*				
PSCHAR	TUB-4	8/11/2002	TU-4-VS	0	0					1.4 *J*				
PSCHAR	TUB-5	7/5/2002	TU-5-VS	0	0					0.55 *UJ*				
PSCHAR	TUF-1	7/9/2002	TUF1	0	0					0.550 *U*				
PSCHAR	TUF-2	7/9/2002	TUF2	0	0					1.30				
PSCHAR	TUF-3	7/9/2002	TUF3	0	0					0.550 *U*				

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	1006938	9/16/2003	1006938	0	0		78							
TECK03	1006939	9/16/2003	1006939	0	0		168							
TECK03	1006940	9/11/2003	1006940	0	0		94							
TECK03	1006941	9/11/2003	1006941	0	0		81							
TECK03	1006944	9/11/2003	1006944	0	0		62							
TECK03	1006945	9/11/2003	1006945	0	0		839							
TECK03	1006949	9/16/2003	1006949	0	0		95							
TECK03	1006952	9/11/2003	1006952	0	0		731							
TECK03	1006956	9/11/2003	1006956	0	0		1,190							
TECK03	1006959	9/11/2003	1006959	0	0		477							
TECK03	1006960	9/11/2003	1006960	0	0		1,040							
TECK03	1006968	9/12/2003	1006968	0	0		2,710							
TECK03	1006969	9/12/2003	1006969	0	0		263							
TECK03	1006973	9/10/2003	1006973	0	0		343							
TECK03	1006977	9/9/2003	1006977	0	0		681							
TECK03	1006990	9/10/2003	1006990	0	0		343							
TECK03	1006991	9/10/2003	1006991	0	0		995							
TECK03	1006992	9/10/2003	1006992	0	0		515							
TECK03	1006993	9/10/2003	1006993	0	0		562							
TECK03	1006994	9/10/2003	1006994	0	0		657							
TECK03	1007000	9/10/2003	1007000	0	0		499							
TECK03	1007036	6/21/2003	1007036	0	0		382							
TECK03	1007038	6/21/2003	1007038	0	0		1,540							
TECK03	1007040	6/21/2003	1007040	0	0		268							
TECK03	1007045	6/21/2003	1007045	0	0		1,020							
TECK03	1007055	6/19/2003	1007055	0	0		393							
TECK03	1007069	6/21/2003	1007069	0	0		351							
TECK03	1007088	7/13/2003	1007088	0	0		2,710							
TECK03	1007089	7/13/2003	1007089	0	0		2,590							
TECK03	1007090	7/13/2003	1007090	0	0		729							
TECK03	1007091	7/13/2003	1007091	0	0		1,030							
TECK03	1007092	7/13/2003	1007092	0	0		1,620							
TECK03	1007093	7/13/2003	1007093	0	0		1,280							
TECK03	1007094	7/13/2003	1007094	0	0		2,620							
TECK03	1007095	7/13/2003	1007095	0	0		1,720							
TECK03	1007097	7/13/2003	1007097	0	0		1,070							
TECK03	1007098	7/13/2003	1007098	0	0		1,750							
TECK03	1007128	7/13/2003	1007128	0	0		1,370							
TECK03	1007133	7/13/2003	1007133	0	0		2,300							
TECK03	1007135	7/13/2003	1007135	0	0		9,180							
TECK03	1007136	7/13/2003	1007136	0	0		5,700							
TECK03	1007150	7/14/2003	1007150	0	0		1,570							
TECK03	1007160	7/13/2003	1007160	0	0		3,080							
TECK03	1007164	7/13/2003	1007164	0	0		763							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	1007170	7/13/2003	1007170	0	0		2,550							
TECK03	1007176	7/13/2003	1007176	0	0		11,000							
TECK03	1007195	7/14/2003	1007195	0	0		2,040							
TECK03	1007212	7/17/2003	1007212	0	0		907							
TECK03	1007215	7/17/2003	1007215	0	0		1,450							
TECK03	1007232	7/17/2003	1007232	0	0		1,370							
TECK03	1007239	7/17/2003	1007239	0	0		214							
TECK03	1007242	7/18/2003	1007242	0	0		223							
TECK03	1007243	7/18/2003	1007243	0	0		195							
TECK03	1007244	7/18/2003	1007244	0	0		545							
TECK03	1007245	7/18/2003	1007245	0	0		247							
TECK03	1007246	7/18/2003	1007246	0	0		873							
TECK03	1007247	7/18/2003	1007247	0	0		303							
TECK03	1007248	7/18/2003	1007248	0	0		345							
TECK03	1007249	7/18/2003	1007249	0	0		514							
TECK03	1007274	7/16/2003	1007274	0	0		1,290							
TECK03	1007278	7/15/2003	1007278	0	0		887							
TECK03	1007281	7/15/2003	1007281	0	0		1,320							
TECK03	1007290	7/15/2003	1007290	0	0		274							
TECK03	1007299	7/16/2003	1007299	0	0		1,190							
TECK03	1007314	7/17/2003	1007314	0	0		1,730							
TECK03	1007326	7/16/2003	1007326	0	0		2,010							
TECK03	1007333	7/17/2003	1007333	0	0		1,570							
TECK03	1007340	7/18/2003	1007340	0	0		274							
TECK03	1007341	7/18/2003	1007341	0	0		98							
TECK03	1007342	7/18/2003	1007342	0	0		289							
TECK03	1007344	7/18/2003	1007344	0	0		356							
TECK03	1007345	7/18/2003	1007345	0	0		397							
TECK03	1007346	7/18/2003	1007346	0	0		170							
TECK03	1007347	7/18/2003	1007347	0	0		79							
TECK03	1007348	7/18/2003	1007348	0	0		391							
TECK03	1007350	7/18/2003	1007350	0	0		299							
TECK03	1007351	7/18/2003	1007351	0	0		2,440							
TECK03	1007352	7/18/2003	1007352	0	0		452							
TECK03	1007353	7/18/2003	1007353	0	0		512							
TECK03	1007354	7/18/2003	1007354	0	0		886							
TECK03	1007360	7/18/2003	1007360	0	0		1,960							
TECK03	1007362	7/18/2003	1007362	0	0		4,140							
TECK03	1007367	7/18/2003	1007367	0	0		879							
TECK03	1007370	7/19/2003	1007370	0	0		407							
TECK03	1007377	7/19/2003	1007377	0	0		1,480							
TECK03	1007387	7/20/2003	1007387	0	0		677							
TECK03	1007390	7/20/2003	1007390	0	0		523							
TECK03	1007391	7/20/2003	1007391	0	0		939							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	1007393	7/20/2003	1007393	0	0		749							
TECK03	1007394	7/20/2003	1007394	0	0		1,150							
TECK03	1007397	7/20/2003	1007397	0	0		666							
TECK03	1007398	7/20/2003	1007398	0	0		563							
TECK03	1007400	7/18/2003	1007400	0	0		393							
TECK03	1007406	7/18/2003	1007406	0	0		2,970							
TECK03	1007413	7/18/2003	1007413	0	0		1,680							
TECK03	1007419	7/19/2003	1007419	0	0		250							
TECK03	1007422	7/19/2003	1007422	0	0		1,010							
TECK03	1007430	7/19/2003	1007430	0	0		1,370							
TECK03	1007439	7/20/2003	1007439	0	0		506							
TECK03	1007441	7/20/2003	1007441	0	0		1,610							
TECK03	1007442	7/20/2003	1007442	0	0		752							
TECK03	1007445	7/20/2003	1007445	0	0		745							
TECK03	1007448	7/20/2003	1007448	0	0		770							
TECK03	1007449	7/20/2003	1007449	0	0		1,710							
TECK03	1007450	7/20/2003	1007450	0	0		2,540							
TECK03	1007451	7/20/2003	1007451	0	0		1,940							
TECK03	1007452	7/20/2003	1007452	0	0		1,020							
TECK03	1007458	7/20/2003	1007458	0	0		4,790							
TECK03	1007462	7/21/2003	1007462	0	0		1,210							
TECK03	1007463	7/21/2003	1007463	0	0		970							
TECK03	1007465	7/21/2003	1007465	0	0		1,420							
TECK03	1007467	7/21/2003	1007467	0	0		3,290							
TECK03	1007468	7/21/2003	1007468	0	0		48,300							
TECK03	1007469	7/21/2003	1007469	0	0		617							
TECK03	1007473	7/22/2003	1007473	0	0		1,050							
TECK03	1007474	7/22/2003	1007474	0	0		744							
TECK03	1007475	7/22/2003	1007475	0	0		1,840							
TECK03	1007476	7/22/2003	1007476	0	0		1,550							
TECK03	1007490	7/23/2003	1007490	0	0		1,570							
TECK03	1007491	7/23/2003	1007491	0	0		1,430							
TECK03	1007492	7/23/2003	1007492	0	0		1,190							
TECK03	1007499	7/20/2003	1007499	0	0		4,460							
TECK03	1007500	7/20/2003	1007500	0	0		8,160							
TECK03	1007502	7/21/2003	1007502	0	0		1,400							
TECK03	1007510	7/21/2003	1007510	0	0		452							
TECK03	1007514	7/22/2003	1007514	0	0		143							
TECK03	1007543	7/23/2003	1007543	0	0		65							
TECK03	1007544	7/23/2003	1007544	0	0		154							
TECK03	1007545	7/24/2003	1007545	0	0		842							
TECK03	1007553	7/24/2003	1007553	0	0		126							
TECK03	1007554	7/24/2003	1007554	0	0		412							
TECK03	1007564	7/23/2003	1007564	0	0		577							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	1007566	7/23/2003	1007566	0	0		764							
TECK03	1007569	7/23/2003	1007569	0	0		353							
TECK03	1007579	7/24/2003	1007579	0	0		949							
TECK03	1007582	7/24/2003	1007582	0	0		502							
TECK03	1007583	7/24/2003	1007583	0	0		745							
TECK03	1007584	7/24/2003	1007584	0	0		563							
TECK03	1007585	7/24/2003	1007585	0	0		43							
TECK03	1007591	7/24/2003	1007591	0	0		212							
TECK03	1007617	7/26/2003	1007617	0	0		12 *U*							
TECK03	1007618	7/26/2003	1007618	0	0		11 *U*							
TECK03	1007619	7/26/2003	1007619	0	0		27							
TECK03	1007626	7/27/2003	1007626	0	0		54							
TECK03	1007627	7/27/2003	1007627	0	0		325							
TECK03	1007648	7/28/2003	1007648	0	0		88							
TECK03	1007650	7/28/2003	1007650	0	0		252							
TECK03	1007652	7/26/2003	1007652	0	0		39							
TECK03	1007659	7/27/2003	1007659	0	0		163							
TECK03	1007661	7/27/2003	1007661	0	0		185							
TECK03	1007664	7/27/2003	1007664	0	0		39							
TECK03	1007673	7/28/2003	1007673	0	0		106							
TECK03	1007678	7/28/2003	1007678	0	0		11 *U*							
TECK03	1007682	7/28/2003	1007682	0	0		45							
TECK03	1007683	7/28/2003	1007683	0	0		41							
TECK03	1007684	7/28/2003	1007684	0	0		167							
TECK03	1007685	7/28/2003	1007685	0	0		110							
TECK03	1007687	7/28/2003	1007687	0	0		105							
TECK03	1007688	7/28/2003	1007688	0	0		857							
TECK03	1007701	7/28/2003	1007701	0	0		46							
TECK03	1007702	7/28/2003	1007702	0	0		11 *U*							
TECK03	1007703	7/28/2003	1007703	0	0		19							
TECK03	1007704	7/28/2003	1007704	0	0		33							
TECK03	1007705	7/28/2003	1007705	0	0		102							
TECK03	1007901	7/19/2003	1007901	0	0		1,670							
TECK03	1007904	7/21/2003	1007904	0	0		1,120							
TECK03	1007911	7/28/2003	1007911	0	0		40							
TECK03	1007912	7/28/2003	1007912	0	0		192							
TECK03	1007916	7/28/2003	1007916	0	0		29							
TECK03	1007966	9/3/2003	1007966	0	0		923							
TECK03	1007980	9/7/2003	1007980	0	0		448							
TECK03	1007983	9/16/2003	1007983	0	0		48							
TECK03	1007990	9/11/2003	1007990	0	0		108							
TECK03	1007991	9/11/2003	1007991	0	0		71							
TECK03	1007992	9/11/2003	1007992	0	0		512							
TECK03	1007993	9/11/2003	1007993	0	0		236							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	1007995	9/11/2003	1007995	0	0		105							
TECK03	1007996	9/11/2003	1007996	0	0		1,570							
TECK03	1007997	9/11/2003	1007997	0	0		146							
TECK03	1007998	9/11/2003	1007998	0	0		33							
TECK03	1008242	9/3/2003	1008242	0	0		2,660							
TECK03	1008244	9/3/2003	1008244	0	0		924							
TECK03	1008246	9/3/2003	1008246	0	0		1,160							
TECK03	1008247	9/3/2003	1008247	0	0		1,600							
TECK03	1008249	9/3/2003	1008249	0	0		1,010							
TECK03	1008250	9/3/2003	1008250	0	0		1,520							
TECK03	1008253	9/3/2003	1008253	0	0		862							
TECK03	1008255	9/3/2003	1008255	0	0		1,070							
TECK03	1008257	9/3/2003	1008257	0	0		711							
TECK03	1008258	9/3/2003	1008258	0	0		655							
TECK03	1008260	9/3/2003	1008260	0	0		968							
TECK03	1008262	9/3/2003	1008262	0	0		1,850							
TECK03	1008263	9/3/2003	1008263	0	0		747							
TECK03	1008265	9/4/2003	1008265	0	0		1,690							
TECK03	1008279	9/4/2003	1008279	0	0		180							
TECK03	1008287	9/4/2003	1008287	0	0		550							
TECK03	1008317	9/7/2003	1008317	0	0		1,090							
TECK03	1008318	9/7/2003	1008318	0	0		695							
TECK03	1008341	9/9/2003	1008341	0	0		766							
TECK03	1008346	9/10/2003	1008346	0	0		486							
TECK03	1008347	9/10/2003	1008347	0	0		718							
TECK03	1008357	9/7/2009	1008357	0	0		285							
TECK03	1008362	9/7/2009	1008362	0	0		689							
TECK03	1008363	9/7/2009	1008363	0	0		1,280							
TECK03	1008364	9/7/2009	1008364	0	0		1,100							
TECK03	1008370	9/7/2009	1008370	0	0		769							
TECK03	1008374	9/7/2009	1008374	0	0		748							
TECK03	1008375	9/7/2009	1008375	0	0		723							
TECK03	1008376	9/7/2009	1008376	0	0		1,980							
TECK03	1008396	9/8/2009	1008396	0	0		86							
SUPPRSS	101_A	7/17/2002	RS-101A-VS	0	0		11 *U*							
SUPPRSS	101_B	7/17/2002	RS-101B-VS	0	0		11 *U*							
SUPPRSS	101_C	7/17/2002	RS-101C-VS	0	0		11 *U*							
PSCHAR	106_A1	6/17/2002	RF-106A	0	0		2,430							
PSCHAR	107_A1	6/17/2002	RF-107A	0	0		2,690							
PSCHAR	108_A1	6/17/2002	RF-108A	0	0		2,070							
PSCHAR	109_A1	6/17/2002	RF-109A	0	0		1,510							
PSCHAR	110_A1	6/17/2002	RF-110A	0	0		2,520							
PSCHAR	111_A1	6/17/2002	RF-111A	0	0		2,370							
PSCHAR	112_A1	6/17/2002	RF-112A	0	0		1,490							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
PSCHAR	113_A1	6/17/2002	RF-113A	0	0	19,300	1,680	427		1 *U*	28.1	10 *U*	1 *U*	
PSCHAR	115_A1	6/17/2002	RF-115-A	0	0		913							
PSCHAR	116_A1	6/17/2002	RF-116-A	0	0		996							
PSCHAR	122_A1	6/17/2002	RF-122-A	0	0	17,200	978	411		1 *U*	25.4	10 *U*	1 *U*	
PSCHAR	123_A1	6/17/2002	RF-123-A	1	0		943							
PSCHAR	123_A1	6/17/2002	RF-123-A	2	0		1,000							
SUPPRSS	145_A	5/31/2002	RC-145-A	0	0		509							
SUPPRSS	145_A	6/1/2002	RS-145-A	0	0	24,000	910	400		5.10 *U*	25.8	51.0 *U*	5.10 *U*	78.7
PSCHAR	145_A1	6/1/2002	RF-145-A	0	0		1,120							
PSCHAR	148_A1	6/1/2002	RF-148-A	0	0		1,970							
PSCHAR	149_C1	6/1/2002	RF-149-C	0	0		1,220							
PSCHAR	150_A1	6/1/2002	RF-150-A	0	0		1,210							
PSCHAR	150_C1	6/3/2002	RF-150-C	0	0	27,000	1,380	677		5.0 *U*	30.9	50 *U*	5.0 *U*	60.4
PSCHAR	153_A1	6/3/2002	RF-153-A	0	0		1,370							
PSCHAR	153_C1	6/3/2002	RF-153-C	0	0		1,310							
PSCHAR	154_C1	6/3/2002	RF-154-C	0	0		1,090							
PSCHAR	155_C1	6/3/2002	RF-155-C	0	0		1,380							
PSCHAR	156_C1	6/3/2002	RF-156-C	1	0		1,470							
PSCHAR	156_C1	6/3/2002	RF-156-C	2	0	19,200	1,300	460		5.00 *U*	21	50.0 *U*	5.00 *U*	57
PSCHAR	157_A1	6/3/2002	RF-157-A	0	0	23,100	1,460	377		5.05 *U*	28.4	50.5 *U*	5.05 *U*	76.2
PSCHAR	159_C1	6/3/2002	RF-159-C	0	0		1,330							
PSCHAR	160_C1	6/3/2002	RF-160-C	0	0		1,680							
PSCHAR	165_C1	6/4/2002	RF-165-C	0	0	19,700	1,800	633		5.0 *U*	22.1	50 *U*	5.0 *U*	65.4
PSCHAR	169_A1	6/4/2002	RF-169-A	0	0	19,500	2,820	380		1.00 *U*	26.3	10.0 *U*	3.05	
PSCHAR	170_C1	6/4/2002	RF-170-C	0	0	22,800	1,140	1,000		1.05 *U*	32.4	10.5 *U*	1.05 *U*	
PSCHAR	171_A1	6/4/2002	RF-171-A	1	0		2,320							
PSCHAR	171_A1	6/4/2002	RF-171-A	2	0		2,370							
PSCHAR	171_C1	6/4/2002	RF-171-C	0	0		1,870							
PSCHAR	175_A1	6/5/2002	RF-175-A	0	0		4,320							
PSCHAR	176_C1	6/5/2002	RF-176-C	0	0		2,630							
PSCHAR	178_A1	6/5/2002	RF-178-A	0	0	23,000	4,520	478		1.05 *U*	27.8	10.5 *U*	5.10	
PSCHAR	178_C1	6/5/2002	RF-178-C	0	0		3,210							
PSCHAR	179_C1	6/5/2002	RF-179-C	0	0		3,640							
PSCHAR	180_C1	6/5/2002	RF-180-C	0	0	17,600	4,110	368		1.00 *U*	24.2	10.0 *U*	5.00	
PSCHAR	189_A1	6/7/2002	RF-189-A	0	0		1,050							
PSCHAR	189_C1	6/7/2002	RF-189-C	0	0	22,200	2,860	527		1.00 *U*	30.5	10.0 *U*	2.40	
PSCHAR	190_C1	6/7/2002	RF-190-C	0	0		1,850							
PSCHAR	191_C1	6/7/2002	RF-191-C	0	0	22,600	1,510	485		1.00 *U*	29.0	10.0 *U*	1.00 *U*	
PSCHAR	192_C1	6/7/2002	RF-192-C	0	0		1,250							
PSCHAR	216_A1	6/9/2002	RF-216A	0	0	24,900	339	489		1 *U*	29.8	10 *U*	1 *U*	65.3
PSCHAR	220_C1	6/9/2002	RF-220C	0	0		279							
PSCHAR	222_C1	6/9/2002	RF-222C	0	0	31,800	579	467		1 *U*	33.7	10 *U*	1 *U*	50.4
TECK03	471204	6/6/2003	471204	0	0		360							
TECK03	471210	6/6/2003	471210	0	0		138							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	471212	6/6/2003	471212	0	0		798							
TECK03	471221	6/7/2003	471221	0	0		8,790							
TECK03	471264	6/6/2003	471264	0	0		408							
TECK03	471272	6/6/2003	471272	0	0		356							
TECK03	471274	6/6/2003	471274	0	0		310							
TECK03	471276	6/6/2003	471276	0	0		72							
TECK03	471283	6/7/2003	471283	0	0		174							
TECK03	471287	6/7/2003	471287	0	0		53							
TECK03	471293	6/7/2003	471293	0	0		1,130							
TECK03	471295	6/7/2003	471295	0	0		2,640							
TECK03	471297	6/7/2003	471297	0	0		1,170							
TECK03	471299	6/7/2003	471299	0	0		686							
TECK03	471300	6/6/2003	471300	0	0		257							
TECK03	471320	6/10/2003	471320	0	0		4,950							
TECK03	471325	6/10/2003	471325	0	0		4,140							
TECK03	471332	6/10/2003	471332	0	0		1,230							
TECK03	471333	6/10/2003	471333	0	0		1,130							
TECK03	471334	6/10/2003	471334	0	0		585							
TECK03	471341	6/11/2003	471341	0	0		2,240							
TECK03	471350	6/13/2003	471350	0	0		666							
TECK03	471352	6/7/2003	471352	0	0		365							
TECK03	471353	6/7/2003	471353	0	0		521							
TECK03	471355	6/7/2003	471355	0	0		1,200							
TECK03	471356	6/7/2003	471356	0	0		1,400							
TECK03	471358	6/7/2003	471358	0	0		125							
TECK03	471365	6/16/2003	471365	0	0		382							
TECK03	471374	6/17/2003	471374	0	0		1,260							
TECK03	471418	6/10/2003	471418	0	0		2,280							
TECK03	471419	6/10/2003	471419	0	0		1,790							
TECK03	471420	6/10/2003	471420	0	0		714							
TECK03	471421	6/10/2003	471421	0	0		830							
TECK03	471425	6/11/2003	471425	0	0		2,330							
TECK03	471453	6/14/2003	471453	0	0		1,480							
TECK03	471457	6/14/2003	471457	0	0		280							
TECK03	471458	6/14/2003	471458	0	0		774							
TECK03	471463	6/14/2003	471463	0	0		854							
TECK03	471464	6/14/2003	471464	0	0		2,710							
TECK03	471465	6/14/2003	471465	0	0		1,460							
TECK03	471466	6/14/2003	471466	0	0		351							
TECK03	471474	6/14/2003	471474	0	0		3,240							
TECK03	471487	6/15/2003	471487	0	0		3,140							
TECK03	471501	6/7/2003	471501	0	0		13,400							
TECK03	471505	6/10/2003	471505	0	0		2,500							
TECK03	471508	6/10/2003	471508	0	0		890							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
TECK03	471520	6/21/2003	471520	0	0		704							
TECK03	471539	7/13/2003	471539	0	0		943							
TECK03	471540	7/13/2003	471540	0	0		2,730							
TECK03	471549	7/17/2003	471549	0	0		247							
TECK03	471550	7/18/2003	471550	0	0		1,040							
PSCHAR	CAG-AA28	9/16/2002	CAG-AA28-VS	0	0		87.8 *J*							
PSCHAR	CAG-AA29	8/28/2002	CAG-AA29-VS	0	0		75.2							
PSCHAR	CAG-AA30	8/28/2002	CAG-AA30-VS	0	0		56.7							
PSCHAR	CAG-AA31	8/28/2002	CAG-AA31-VS	0	0		228							
PSCHAR	CAG-F2	7/28/2002	CAG-2-F	0	0		1,250							
PSCHAR	CAG-H30	7/3/2002	CAG-H-30	0	0	27,800	13,200 *J*							
PSCHAR	CAG-I1	7/28/2002	CAG-1-I	0	0		1,340							
PSCHAR	CAG-L33	7/3/2002	CAG-L-33	0	0		305 *J*							
PSCHAR	CAG-R2	7/1/2002	CAG-R-2-S	0	0		3,410							
PSCHAR	CAG-R32	7/21/2002	CAG-R-32	0	0		331 *J*							
PSCHAR	CAG-R34	9/19/2002	CAG-R34-VS	0	0		1,570 *J*							
PSCHAR	CAG-S34	9/19/2002	CAG-S34-VS	0	0		376 *J*							
PSCHAR	CAG-U130	7/19/2002	CAG-U-130	0	0		1,980							
PSCHAR	CAG-U29	7/3/2002	CAG-U-29	0	0	31,000	2,110 *J*							
PSCHAR	CAG-U34	7/21/2002	CAG-U-34	0	0		888 *J*							
PSCHAR	CAG-W29	7/1/2002	CAG-W-29	0	0	35,000	4,220	442		1.1 *U*	35.2	11 *U*	5.9	42.4
PSCHAR	CAG-W31	8/28/2002	CAG-W31-VS	0	0		333 *J*							
PSCHAR	CAG-X100	8/28/2002	CAG-X100-VS	0	0		70.9							
PSCHAR	CAG-X101	8/28/2002	CAG-X101-VS	0	0		227							
PSCHAR	CAG-X12	7/2/2002	CAG-X-12	0	0		266							
PSCHAR	CAG-X22	7/1/2002	CAG-X-22	0	0		479							
PSCHAR	CAG-X26	7/1/2002	CAG-X-26-A	0	0		861							
PSCHAR	CAG-X29	8/28/2002	CAG-X29-VS	0	0		437 *J*							
PSCHAR	CAG-X30	8/28/2002	CAG-X30-VS	0	0		79 *J*							
PSCHAR	CAG-X31	8/28/2002	CAG-X31-VS	0	0		1,080 *J*							
PSCHAR	CAG-X8	7/2/2002	CAG-X-8	0	0		224							
PSCHAR	CAG-Y27	7/1/2002	CAG-Y-27	0	0		1,030							
PSCHAR	CAG-Y28	8/28/2002	CAG-Y28-VS	0	0		199 *J*							
PSCHAR	CAG-Y29	9/16/2002	CAG-Y29-VS	0	0		21.3 *J*							
PSCHAR	CAG-Y30	9/16/2002	CAG-Y30-VS	0	0		23.0 *J*							
PSCHAR	CAG-Y31	8/28/2002	CAG-Y31-VS	0	0		1,130 *J*							
PSCHAR	CAG-Y32	8/28/2002	CAG-Y32-VS	0	0		220 *J*							
PSCHAR	CAG-Y33	8/28/2002	CAG-Y33-VS	0	0		51.4 *J*							
PSCHAR	CAG-Z27	8/28/2002	CAG-Z27-VS	0	0		532 *J*							
PSCHAR	CAG-Z28	8/28/2002	CAG-Z28-VS	0	0		327 *J*							
PSCHAR	CAG-Z29	8/28/2002	CAG-Z29-VS	0	0		25.6 *J*							
PSCHAR	CAG-Z30	8/28/2002	CAG-Z30-VS	0	0		59.5 *J*							
PSCHAR	CAG-Z31	8/28/2002	CAG-Z31-VS	0	0		40.9 *J*							
PSCHAR	CAG-Z32	8/28/2002	CAG-Z32-VS	0	0		587 *J*							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
PSCHAR	CAG-Z33	8/28/2002	CAG-Z33-VS	0	0		765 *J*							
PSCHAR	CAG-Z7S	7/1/2002	CAG-Z-7-S	0	0		125							
PSCHAR	CIT1250N	6/29/2002	C1T1-250-N	2	0		92.6							
PSCHAR	CVT1-0N	6/29/2002	CVT1-0-N	0	0		294							
PSCHAR	CVT1-0S	6/29/2002	CVT1-0-S	0	0		822							
PSCHAR	CVT1-10N	6/29/2002	CVT1-10-N	0	0		3,530							
PSCHAR	CVT1-10S	6/29/2002	CVT1-10-S	0	0		1,640							
PSCHAR	CVT2-0N	6/30/2002	CVT2-0-N	1	0		86.5							
PSCHAR	CVT2-0N	6/30/2002	CVT2-0-N	2	0		95.6 *J*							
PSCHAR	CVT2-0S	6/30/2002	CVT2-0-S	0	0		190							
PSCHAR	CVT3-0N	6/30/2002	CVT3-0-N	0	0	31,000	132	318		1.60	55.8	10.0 *U*	1.00 *U*	
PSCHAR	CVT3-0S	6/30/2002	CVT3-0-S	0	0		146							
PSCHAR	CVT4-0N	6/30/2002	CVT4-0-N	0	0		87.7							
PSCHAR	CVT4-0S	6/30/2002	CVT4-0-S	0	0		74.4							
PSCHAR	CVT5-0N	6/30/2002	CVT5-0-N	1	0		108							
PSCHAR	CVT5-0N	6/30/2002	CVT5-0-N	2	0		145 *J*							
PSCHAR	CVT5-0S	6/30/2002	CVT5-0-S	0	0		46.0							
PSCHAR	CVT6-0N	6/30/2002	CVT6-0-N	0	0		251							
PSCHAR	CVT6-0S	6/30/2002	CVT6-0-S	0	0		503							
PSCHAR	CVT6-10S	6/30/2002	CVT6-10-S	0	0		226							
PSCHAR	CVT7-0N	7/3/2002	CVT7-0-N	0	0		226							
PSCHAR	CVT7-0S	7/3/2002	CVT7-0-S	0	0		414							
PSCHAR	CVT7-10S	7/3/2002	CVT7-10-S	1	0		431							
PSCHAR	CVT7-10S	7/3/2002	CVT7-10-S	2	0		193							
PSCHAR	CVT8-0N	7/3/2002	CVT8-0-N	0	0		1,030							
PSCHAR	CVT8250N	7/3/2002	CVT8-250-N	0	0		106							
PSCHAR	CVT9-0N	7/3/2002	CVT9-0-N	0	0		2,200							
PSCHAR	CVT9-50N	7/3/2002	CVT9-50N	0	0		36.4							
PSCHAR	CVT9150S	7/3/2002	CVT9-150-S	0	0		462							
PSCHAR	CVT9300S	7/3/2002	CVT9-300-S	0	0		74.5							
PSCHAR	CVT9500N	7/3/2002	CVT9-500-N	0	0		51.2							
PSCHAR	DSP-A6	6/23/2002	DSP-A-6	0	0		117							
PSCHAR	DSP-AA2	6/23/2002	DSP-AA-2	0	0		58.6							
PSCHAR	DSP-B1	6/23/2002	DSP-B-1	0	0		1,060							
PSCHAR	DSP-B1	7/25/2002	V2-DSP-B-1	0	0		259							
PSCHAR	DSP-B4	6/25/2002	DSP-B-4	0	0		482							
PSCHAR	DSP-B9	9/19/2002	DSP-B9-VS	0	0		250 *J*							
PSCHAR	DSP-C3	6/23/2002	DSP-C-3	0	0		465							
PSCHAR	DSP-D4	6/23/2002	DSP-D-4	0	0		22,600							
PSCHAR	DSP-D4	9/19/2002	DSP-D4-VS	0	0		1,240 *J*							
PSCHAR	DSP-F6	6/23/2002	DSP-F-6	0	0		543							
PSCHAR	DSP-G6	6/23/2002	DSP-G-6	0	0		1,540							
PSCHAR	DSP-G6	9/19/2002	DSP-G6-VS	0	0		590 *J*							
PSCHAR	DSP-HG5B	7/26/2002	DSP-HG-5-B	0	0		95.8 *J*							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
PSCHAR	DSP-IH5A	7/26/2002	DSP-IH-5-A	1	0		320 *J*							
PSCHAR	DSP-IH5A	7/26/2002	DSP-IH-5-A	2	0		307 *J*							
PSCHAR	PG-P5S	7/28/2002	PG-P5S	0	0		8.5 *U*							
PSCHAR	RAT1-0EA	6/27/2002	RAT1-OE-A	0	0		455							
PSCHAR	RAT2-50W	7/2/2002	RAT2-50-W	1	0	25,400	473							
PSCHAR	RAT2-50W	7/2/2002	RAT2-50-W	2	0		533							
PSCHAR	RAT2250E	6/27/2002	RAT2-250E	2	0		21.3							
PSCHAR	RAT3-0EA	6/27/2002	RAT3-OEA	0	0		414							
PSCHAR	RAT4-0W	7/2/2002	RAT4-0-W	0	0		345							
PSCHAR	RAT5-0NA	6/27/2002	RAT5-0NA	0	0	16,300	5,090	377		2.7	22.6	13 *U*	8.3	
PSCHAR	RAT5-0W	7/2/2002	RAT5-0-W	0	0		1,300							
PSCHAR	RAT5-10W	7/2/2002	RAT5-10-W	0	0		161							
FUGDST01	RC-01-A	8/22/2001	RC-01-A	0	0		53.3							
FUGDST01	RC-03-A	8/23/2001	RC-03-A	0	0		13.5							
FUGDST01	RC-04-A	8/23/2001	RC-04-A	0	0		15.3							
FUGDST01	RC-05-A	8/23/2001	RC-05-A	0	0		122							
FUGDST01	RC-06-A	8/23/2001	RC-06-A	0	0	26,600	80.4	970		2	56.8		1.0 *U*	
FUGDST01	RC-07-A	8/23/2001	RC-07-A	0	0		88.0							
FUGDST01	RC-08-A	8/24/2001	RC-08-A	0	0		23.7							
FUGDST01	RC-09-A	8/24/2001	RC-09-A	0	0		96.4							
FUGDST01	RF-01	8/26/2001	RF-01	0	0	25,100	301	373		1.1 *U*	24.7		1.1 *U*	
FUGDST01	RF-02	8/25/2001	RF-02	0	0	25,000	299	500		1.1 *U*	26.3		1.1 *U*	
FUGDST01	RF-03	8/25/2001	RF-03	0	0	10,500	116	376		1.1 *U*	17.3		1.1 *U*	
FUGDST01	RF-04	8/26/2001	RF-04	1	0	5,010	146	300		1.2 *U*	16.3		1.2 *U*	
FUGDST01	RF-04	8/26/2001	RF-04	2	0	5,910	182	345		1.2 *U*	20.3		1.2 *U*	
FUGDST01	RF-05	8/26/2001	RF-05	0	0	27,600	180	947		1 *U*	56		1 *U*	
FUGDST01	RF-06	8/26/2001	RF-06	0	0	25,000	2,440	879		1 *U*	46.8		3.5	
FUGDST01	RF-07	8/26/2001	RF-07	0	0	27,600	978	677		3.3	39.4		2.4	
FUGDST01	RF-08	8/26/2001	RF-08	0	0	16,000	421	459		0.90 *U*	21.1		0.90 *U*	
PHASE1RA	RF-10	7/14/2003	SL0009	0	0	22,700	389 *J*	548	0.300	0.490	24.0	0.500 *J*	0.660	55.2
PHASE1RA	RF-107	7/17/2003	SL0019	0	0	16,300	2,030 *J*	435	1.69	1.2 *J*	22.6	3 *J*	2.33	63.1
PHASE1RA	RF-16	7/14/2003	SL0008	0	0	32,000	144 *J*	483	0.160	0.640	37.0	0.700 *J*	0.250	90.1
PHASE1RA	RF-18	7/14/2003	SL0007	0	0	11,300	93.7 *J*	406	0.130	0.440	21.8	0.300 *J*	0.180	41.6
PHASE1RA	RF-20	7/14/2003	SL0006	0	0	6,260	84.1 *J*	403	0.130	0.350	20.1	0.400 *J*	0.170	55.7
PHASE1RA	RF-22	7/14/2003	SL0005	0	0	2,840	89.1 *J*	280	0.140	0.400	19.7	0.400 *J*	0.140	36.2
PHASE1RA	RF-24	7/14/2003	SL0004	0	0	5,670	125 *J*	389	0.160	0.490	21.6	0.400 *J*	0.230	63.5
PHASE1RA	RF-27	7/22/2003	SL0029	1	0	22,800	186	892	0.09	0.93 *J*	36.9	0.7 *J*	0.3	85
PHASE1RA	RF-27	7/22/2003	SL0029	2	0	22,700	185	783	0.1	0.92 *J*	31.4	0.7 *J*	0.34	83.6
PHASE1RA	RF-32	7/14/2003	SL0003	0	0	18,400	506 *J*	673	0.430	2.04	27.1	1.30	0.890	79.7
PHASE1RA	RF-34	7/21/2003	SL0026	0	0	20,600	387	583	0.24	1.09 *J*	20.8	0.9 *J*	0.61	86.3
PHASE1RA	RF-4	7/14/2003	SL0010	0	0	15,300	2,040 *J*	363	1.25	0.710	18.7	2.00	2.42	48.1
PHASE1RA	RF-5	7/14/2003	SL0011	1	0	26,400	888 *J*	566	0.600	0.700	30.9	1.30	1.26	69.1
PHASE1RA	RF-5	7/14/2003	SL0011	2	0	25,500	80.8 *J*	470	0.620	0.670	30.7	1.00 *J*	1.09	59.8
FUGDST01	RF-PORT	8/26/2001	RF-PORT	0	0	24,100	1,060	367		1.2 *U*	29.9		2.0	

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
PSCHAR	ROT1-0N	7/3/2002	ROT1-0N	0	0		671							
PSCHAR	ROT5-10S	7/5/2002	ROT5-10-S	1	0		110							
PSCHAR	ROT5-10S	7/5/2002	ROT5-10-S	2	0		200 *J*							
PSCHAR	ROT5-50S	7/5/2002	ROT5-50-S	0	0		584							
PSCHAR	ROT5250S	7/5/2002	ROT5-250-S	0	0		37.7							
PSCHAR	ROT5500S	7/5/2002	ROT5-500-S	0	0		32.8							
PSCHAR	ROT6-10S	7/5/2002	ROT610S	0	0	25,000	617							
PSCHAR	ROT6-50S	7/5/2002	ROT650S	0	0		1,060							
PSCHAR	ROT6250S	7/5/2002	ROT6250S	0	0		105							
PSCHAR	ROT6500S	7/5/2002	ROT6-500-S	1	0		81.0							
PSCHAR	ROT6500S	7/5/2002	ROT6-500-S	2	0		32.7 *J*							
PSCHAR	ROT7-0S	7/5/2002	ROT7-0-S	0	0		4,400							
PSCHAR	ROT7-10S	7/5/2002	ROT710S	0	0		168							
PSCHAR	ROT8-0S	7/5/2002	ROT8-OS	0	0	17,400	1,190							
PSCHAR	ROT8-10S	7/5/2002	ROT8-10-S	0	0		1,280							
PSCHAR	ROT8-50S	7/5/2002	ROT8-50-S	0	0		543							
PSCHAR	ROT8250S	7/5/2002	ROT8-250-S	0	0		33.8							
PSCHAR	ROT9-0N	7/3/2002	ROT9-0N	0	0		1,140							
PSCHAR	ROT9-0S	7/5/2002	ROT9-OS	1	0		1,340							
PSCHAR	ROT9-0S	7/5/2002	ROT9-OS	2	0		1,020 *J*							
PSCHAR	ROT9-10N	7/5/2002	ROT9-10N	0	0		2,070							
PSCHAR	ROT9-10S	7/5/2002	ROT9-10-S	0	0		3,510							
FUGDST01	RS-01	8/24/2001	RS-01	0	0		875							
FUGDST01	RS-13	8/25/2001	RS-13	1	0		127							
FUGDST01	RS-13	8/25/2001	RS-13	2	0		112							
FUGDST01	RS-14	8/25/2001	RS-14	0	0		66.3							
FUGDST01	RS-15	8/25/2001	RS-15	0	0		69.9							
FUGDST01	RS-16	8/25/2001	RS-16	0	0		59.6							
FUGDST01	RS-17	8/25/2001	RS-17	0	0		159							
FUGDST01	RS-18	8/25/2001	RS-18	0	0		86.6							
FUGDST01	RS-19	8/25/2001	RS-19	0	0	11,000	74.1							
FUGDST01	RS-20	8/25/2001	RS-20	0	0		75.4							
FUGDST01	RS-21	8/25/2001	RS-21	0	0		30.3							
FUGDST01	RS-22	8/26/2001	RS-22	0	0	2,650	49.3							
FUGDST01	RS-23	8/26/2001	RS-23	0	0		73.9							
FUGDST01	RS-24	8/26/2001	RS-24	0	0		144							
FUGDST01	RS-25	8/26/2001	RS-25	0	0	25,500	64.2							
FUGDST01	RS-26	8/26/2001	RS-26	0	0		111							
FUGDST01	RS-27	8/26/2001	RS-27	0	0		62.9							
FUGDST01	RS-28	8/26/2001	RS-28	0	0		111							
FUGDST01	RS-29	8/26/2001	RS-29	1	0	25,800	144							
FUGDST01	RS-29	8/26/2001	RS-29	2	0	22,400	134							
FUGDST01	RS-30	8/26/2001	RS-30	0	0		572							
FUGDST01	RS-31	8/26/2001	RS-31	0	0		240							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Iron (mg/kg dry)	Lead (mg/kg dry)	Manganese (mg/kg dry)	Mercury (mg/kg dry)	Molybdenum (mg/kg dry)	Nickel (mg/kg dry)	Selenium (mg/kg dry)	Silver (mg/kg dry)	Strontium (mg/kg dry)
FUGDST01	RS-32	8/26/2001	RS-32	0	0	17,700	352							
FUGDST01	RS-33	8/26/2001	RS-33	1	0		274							
FUGDST01	RS-33	8/26/2001	RS-33	2	0		253							
FUGDST01	RS-34	8/26/2001	RS-34	0	0	17,900	296							
PSCHAR	TUB-1	7/5/2002	TU-1-VS	0	0		11 *UJ*							
PSCHAR	TUB-2	7/5/2002	TU-2-VS	0	0		30.8 *J*							
PSCHAR	TUB-3	8/11/2002	TU-3-VS	0	0		797							
PSCHAR	TUB-4	8/11/2002	TU-4-VS	0	0		39.6							
PSCHAR	TUB-5	7/5/2002	TU-5-VS	0	0		49.4 *J*							
PSCHAR	TUF-1	7/9/2002	TUF1	0	0		11.0 *UJ*							
PSCHAR	TUF-2	7/9/2002	TUF2	0	0		11.0 *UJ*							
PSCHAR	TUF-3	7/9/2002	TUF3	0	0		10.5 *UJ*							

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	1006938	9/16/2003	1006938	0	0				277
TECK03	1006939	9/16/2003	1006939	0	0				743
TECK03	1006940	9/11/2003	1006940	0	0				396
TECK03	1006941	9/11/2003	1006941	0	0				317
TECK03	1006944	9/11/2003	1006944	0	0				447
TECK03	1006945	9/11/2003	1006945	0	0				3,740
TECK03	1006949	9/16/2003	1006949	0	0				401
TECK03	1006952	9/11/2003	1006952	0	0				3,300
TECK03	1006956	9/11/2003	1006956	0	0				4,820
TECK03	1006959	9/11/2003	1006959	0	0				2,200
TECK03	1006960	9/11/2003	1006960	0	0				3,150
TECK03	1006968	9/12/2003	1006968	0	0				2,850
TECK03	1006969	9/12/2003	1006969	0	0				1,080
TECK03	1006973	9/10/2003	1006973	0	0				1,560
TECK03	1006977	9/9/2003	1006977	0	0				3,240
TECK03	1006990	9/10/2003	1006990	0	0				1,940
TECK03	1006991	9/10/2003	1006991	0	0				5,120
TECK03	1006992	9/10/2003	1006992	0	0				2,410
TECK03	1006993	9/10/2003	1006993	0	0				2,490
TECK03	1006994	9/10/2003	1006994	0	0				3,260
TECK03	1007000	9/10/2003	1007000	0	0				2,170
TECK03	1007036	6/21/2003	1007036	0	0				1,790
TECK03	1007038	6/21/2003	1007038	0	0				5,110
TECK03	1007040	6/21/2003	1007040	0	0				1,210
TECK03	1007045	6/21/2003	1007045	0	0				3,970
TECK03	1007055	6/19/2003	1007055	0	0				1,480
TECK03	1007069	6/21/2003	1007069	0	0				1,670
TECK03	1007088	7/13/2003	1007088	0	0				6,880
TECK03	1007089	7/13/2003	1007089	0	0				10,500
TECK03	1007090	7/13/2003	1007090	0	0				2,870
TECK03	1007091	7/13/2003	1007091	0	0				2,500
TECK03	1007092	7/13/2003	1007092	0	0				5,130
TECK03	1007093	7/13/2003	1007093	0	0				4,720
TECK03	1007094	7/13/2003	1007094	0	0				6,470
TECK03	1007095	7/13/2003	1007095	0	0				4,120
TECK03	1007097	7/13/2003	1007097	0	0				1,720
TECK03	1007098	7/13/2003	1007098	0	0				6,590
TECK03	1007128	7/13/2003	1007128	0	0				8,400
TECK03	1007133	7/13/2003	1007133	0	0				8,390
TECK03	1007135	7/13/2003	1007135	0	0				35,600
TECK03	1007136	7/13/2003	1007136	0	0				21,600
TECK03	1007150	7/14/2003	1007150	0	0				10,200
TECK03	1007160	7/13/2003	1007160	0	0				11,100
TECK03	1007164	7/13/2003	1007164	0	0				3,450

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	1007170	7/13/2003	1007170	0	0				6,630
TECK03	1007176	7/13/2003	1007176	0	0				43,200
TECK03	1007195	7/14/2003	1007195	0	0				7,880
TECK03	1007212	7/17/2003	1007212	0	0				4,500
TECK03	1007215	7/17/2003	1007215	0	0				6,280
TECK03	1007232	7/17/2003	1007232	0	0				5,170
TECK03	1007239	7/17/2003	1007239	0	0				919
TECK03	1007242	7/18/2003	1007242	0	0				854
TECK03	1007243	7/18/2003	1007243	0	0				816
TECK03	1007244	7/18/2003	1007244	0	0				1,680
TECK03	1007245	7/18/2003	1007245	0	0				1,120
TECK03	1007246	7/18/2003	1007246	0	0				3,950
TECK03	1007247	7/18/2003	1007247	0	0				1,420
TECK03	1007248	7/18/2003	1007248	0	0				1,370
TECK03	1007249	7/18/2003	1007249	0	0				1,980
TECK03	1007274	7/16/2003	1007274	0	0				4,030
TECK03	1007278	7/15/2003	1007278	0	0				3,090
TECK03	1007281	7/15/2003	1007281	0	0				5,760
TECK03	1007290	7/15/2003	1007290	0	0				1,210
TECK03	1007299	7/16/2003	1007299	0	0				5,770
TECK03	1007314	7/17/2003	1007314	0	0				4,460
TECK03	1007326	7/16/2003	1007326	0	0				4,670
TECK03	1007333	7/17/2003	1007333	0	0				5,910
TECK03	1007340	7/18/2003	1007340	0	0				1,190
TECK03	1007341	7/18/2003	1007341	0	0				462
TECK03	1007342	7/18/2003	1007342	0	0				1,180
TECK03	1007344	7/18/2003	1007344	0	0				1,560
TECK03	1007345	7/18/2003	1007345	0	0				1,720
TECK03	1007346	7/18/2003	1007346	0	0				609
TECK03	1007347	7/18/2003	1007347	0	0				322
TECK03	1007348	7/18/2003	1007348	0	0				1,570
TECK03	1007350	7/18/2003	1007350	0	0				1,110
TECK03	1007351	7/18/2003	1007351	0	0				9,710
TECK03	1007352	7/18/2003	1007352	0	0				1,780
TECK03	1007353	7/18/2003	1007353	0	0				2,020
TECK03	1007354	7/18/2003	1007354	0	0				3,320
TECK03	1007360	7/18/2003	1007360	0	0				8,220
TECK03	1007362	7/18/2003	1007362	0	0				18,400
TECK03	1007367	7/18/2003	1007367	0	0				3,480
TECK03	1007370	7/19/2003	1007370	0	0				2,310
TECK03	1007377	7/19/2003	1007377	0	0				7,310
TECK03	1007387	7/20/2003	1007387	0	0				2,810
TECK03	1007390	7/20/2003	1007390	0	0				2,110
TECK03	1007391	7/20/2003	1007391	0	0				3,750

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	1007393	7/20/2003	1007393	0	0				3,090
TECK03	1007394	7/20/2003	1007394	0	0				8,040
TECK03	1007397	7/20/2003	1007397	0	0				2,720
TECK03	1007398	7/20/2003	1007398	0	0				2,650
TECK03	1007400	7/18/2003	1007400	0	0				1,700
TECK03	1007406	7/18/2003	1007406	0	0				12,900
TECK03	1007413	7/18/2003	1007413	0	0				9,480
TECK03	1007419	7/19/2003	1007419	0	0				1,410
TECK03	1007422	7/19/2003	1007422	0	0				9,900
TECK03	1007430	7/19/2003	1007430	0	0				6,370
TECK03	1007439	7/20/2003	1007439	0	0				2,540
TECK03	1007441	7/20/2003	1007441	0	0				6,890
TECK03	1007442	7/20/2003	1007442	0	0				3,290
TECK03	1007445	7/20/2003	1007445	0	0				2,820
TECK03	1007448	7/20/2003	1007448	0	0				3,370
TECK03	1007449	7/20/2003	1007449	0	0				8,060
TECK03	1007450	7/20/2003	1007450	0	0				8,560
TECK03	1007451	7/20/2003	1007451	0	0				9,100
TECK03	1007452	7/20/2003	1007452	0	0				4,120
TECK03	1007458	7/20/2003	1007458	0	0				21,500
TECK03	1007462	7/21/2003	1007462	0	0				4,610
TECK03	1007463	7/21/2003	1007463	0	0				3,810
TECK03	1007465	7/21/2003	1007465	0	0				4,090
TECK03	1007467	7/21/2003	1007467	0	0				8,120
TECK03	1007468	7/21/2003	1007468	0	0				17,700
TECK03	1007469	7/21/2003	1007469	0	0				1,420
TECK03	1007473	7/22/2003	1007473	0	0				1,370
TECK03	1007474	7/22/2003	1007474	0	0				3,490
TECK03	1007475	7/22/2003	1007475	0	0				7,690
TECK03	1007476	7/22/2003	1007476	0	0				6,250
TECK03	1007490	7/23/2003	1007490	0	0				6,870
TECK03	1007491	7/23/2003	1007491	0	0				4,350
TECK03	1007492	7/23/2003	1007492	0	0				7,450
TECK03	1007499	7/20/2003	1007499	0	0				11,500
TECK03	1007500	7/20/2003	1007500	0	0				34,700
TECK03	1007502	7/21/2003	1007502	0	0				5,290
TECK03	1007510	7/21/2003	1007510	0	0				1,440
TECK03	1007514	7/22/2003	1007514	0	0				647
TECK03	1007543	7/23/2003	1007543	0	0				548
TECK03	1007544	7/23/2003	1007544	0	0				700
TECK03	1007545	7/24/2003	1007545	0	0				1,530
TECK03	1007553	7/24/2003	1007553	0	0				457
TECK03	1007554	7/24/2003	1007554	0	0				2,320
TECK03	1007564	7/23/2003	1007564	0	0				2,260

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	1007566	7/23/2003	1007566	0	0				2,500
TECK03	1007569	7/23/2003	1007569	0	0				1,260
TECK03	1007579	7/24/2003	1007579	0	0				3,270
TECK03	1007582	7/24/2003	1007582	0	0				1,940
TECK03	1007583	7/24/2003	1007583	0	0				3,290
TECK03	1007584	7/24/2003	1007584	0	0				2,640
TECK03	1007585	7/24/2003	1007585	0	0				232
TECK03	1007591	7/24/2003	1007591	0	0				1,100
TECK03	1007617	7/26/2003	1007617	0	0				84
TECK03	1007618	7/26/2003	1007618	0	0				95
TECK03	1007619	7/26/2003	1007619	0	0				105
TECK03	1007626	7/27/2003	1007626	0	0				274
TECK03	1007627	7/27/2003	1007627	0	0				1,350
TECK03	1007648	7/28/2003	1007648	0	0				441
TECK03	1007650	7/28/2003	1007650	0	0				1,550
TECK03	1007652	7/26/2003	1007652	0	0				156
TECK03	1007659	7/27/2003	1007659	0	0				600
TECK03	1007661	7/27/2003	1007661	0	0				883
TECK03	1007664	7/27/2003	1007664	0	0				118
TECK03	1007673	7/28/2003	1007673	0	0				415
TECK03	1007678	7/28/2003	1007678	0	0				88
TECK03	1007682	7/28/2003	1007682	0	0				151
TECK03	1007683	7/28/2003	1007683	0	0				154
TECK03	1007684	7/28/2003	1007684	0	0				774
TECK03	1007685	7/28/2003	1007685	0	0				512
TECK03	1007687	7/28/2003	1007687	0	0				614
TECK03	1007688	7/28/2003	1007688	0	0				4,390
TECK03	1007701	7/28/2003	1007701	0	0				195
TECK03	1007702	7/28/2003	1007702	0	0				102
TECK03	1007703	7/28/2003	1007703	0	0				132
TECK03	1007704	7/28/2003	1007704	0	0				220
TECK03	1007705	7/28/2003	1007705	0	0				524
TECK03	1007901	7/19/2003	1007901	0	0				7,870
TECK03	1007904	7/21/2003	1007904	0	0				4,950
TECK03	1007911	7/28/2003	1007911	0	0				163
TECK03	1007912	7/28/2003	1007912	0	0				861
TECK03	1007916	7/28/2003	1007916	0	0				148
TECK03	1007966	9/3/2003	1007966	0	0				3,770
TECK03	1007980	9/7/2003	1007980	0	0				2,370
TECK03	1007983	9/16/2003	1007983	0	0				242
TECK03	1007990	9/11/2003	1007990	0	0				599
TECK03	1007991	9/11/2003	1007991	0	0				312
TECK03	1007992	9/11/2003	1007992	0	0				2,970
TECK03	1007993	9/11/2003	1007993	0	0				1,490

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	1007995	9/11/2003	1007995	0	0				480
TECK03	1007996	9/11/2003	1007996	0	0				5,370
TECK03	1007997	9/11/2003	1007997	0	0				744
TECK03	1007998	9/11/2003	1007998	0	0				186
TECK03	1008242	9/3/2003	1008242	0	0				11,400
TECK03	1008244	9/3/2003	1008244	0	0				4,290
TECK03	1008246	9/3/2003	1008246	0	0				5,710
TECK03	1008247	9/3/2003	1008247	0	0				6,870
TECK03	1008249	9/3/2003	1008249	0	0				5,140
TECK03	1008250	9/3/2003	1008250	0	0				5,580
TECK03	1008253	9/3/2003	1008253	0	0				4,060
TECK03	1008255	9/3/2003	1008255	0	0				4,690
TECK03	1008257	9/3/2003	1008257	0	0				3,550
TECK03	1008258	9/3/2003	1008258	0	0				3,120
TECK03	1008260	9/3/2003	1008260	0	0				4,620
TECK03	1008262	9/3/2003	1008262	0	0				2,770
TECK03	1008263	9/3/2003	1008263	0	0				3,160
TECK03	1008265	9/4/2003	1008265	0	0				7,480
TECK03	1008279	9/4/2003	1008279	0	0				965
TECK03	1008287	9/4/2003	1008287	0	0				2,810
TECK03	1008317	9/7/2003	1008317	0	0				4,680
TECK03	1008318	9/7/2003	1008318	0	0				3,460
TECK03	1008341	9/9/2003	1008341	0	0				3,820
TECK03	1008346	9/10/2003	1008346	0	0				2,570
TECK03	1008347	9/10/2003	1008347	0	0				3,210
TECK03	1008357	9/7/2009	1008357	0	0				1,280
TECK03	1008362	9/7/2009	1008362	0	0				2,910
TECK03	1008363	9/7/2009	1008363	0	0				4,770
TECK03	1008364	9/7/2009	1008364	0	0				4,540
TECK03	1008370	9/7/2009	1008370	0	0				3,460
TECK03	1008374	9/7/2009	1008374	0	0				3,590
TECK03	1008375	9/7/2009	1008375	0	0				3,430
TECK03	1008376	9/7/2009	1008376	0	0				5,610
TECK03	1008396	9/8/2009	1008396	0	0				330
SUPPRSS	101_A	7/17/2002	RS-101A-VS	0	0				65.9
SUPPRSS	101_B	7/17/2002	RS-101B-VS	0	0				39.3
SUPPRSS	101_C	7/17/2002	RS-101C-VS	0	0				37.4
PSCHAR	106_A1	6/17/2002	RF-106A	0	0				11,500
PSCHAR	107_A1	6/17/2002	RF-107A	0	0				12,800
PSCHAR	108_A1	6/17/2002	RF-108A	0	0				8,850
PSCHAR	109_A1	6/17/2002	RF-109A	0	0				7,520
PSCHAR	110_A1	6/17/2002	RF-110A	0	0				13,500
PSCHAR	111_A1	6/17/2002	RF-111A	0	0				17,800
PSCHAR	112_A1	6/17/2002	RF-112A	0	0				12,600

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
PSCHAR	113_A1	6/17/2002	RF-113A	0	0			14.5	9,170
PSCHAR	115_A1	6/17/2002	RF-115-A	0	0				4,170
PSCHAR	116_A1	6/17/2002	RF-116-A	0	0				3,740
PSCHAR	122_A1	6/17/2002	RF-122-A	0	0			12	5,660
PSCHAR	123_A1	6/17/2002	RF-123-A	1	0				5,340
PSCHAR	123_A1	6/17/2002	RF-123-A	2	0				4,870
SUPPRSS	145_A	5/31/2002	RC-145-A	0	0				1,660
SUPPRSS	145_A	6/1/2002	RS-145-A	0	0		26 *U*	12.0	4,380 *J*
PSCHAR	145_A1	6/1/2002	RF-145-A	0	0				5,600 *J*
PSCHAR	148_A1	6/1/2002	RF-148-A	0	0				8,840 *J*
PSCHAR	149_C1	6/1/2002	RF-149-C	0	0				6,200 *J*
PSCHAR	150_A1	6/1/2002	RF-150-A	0	0				5,950 *J*
PSCHAR	150_C1	6/3/2002	RF-150-C	0	0		25 *U*	13.4	6,790 *J*
PSCHAR	153_A1	6/3/2002	RF-153-A	0	0				6,570 *J*
PSCHAR	153_C1	6/3/2002	RF-153-C	0	0				6,460 *J*
PSCHAR	154_C1	6/3/2002	RF-154-C	0	0				5,130 *J*
PSCHAR	155_C1	6/3/2002	RF-155-C	0	0				6,870 *J*
PSCHAR	156_C1	6/3/2002	RF-156-C	1	0				7,730 *J*
PSCHAR	156_C1	6/3/2002	RF-156-C	2	0		25 *U*	12.1	6,160
PSCHAR	157_A1	6/3/2002	RF-157-A	0	0		25 *U*	12.3	6,960 *J*
PSCHAR	159_C1	6/3/2002	RF-159-C	0	0				6,200 *J*
PSCHAR	160_C1	6/3/2002	RF-160-C	0	0				7,410 *J*
PSCHAR	165_C1	6/4/2002	RF-165-C	0	0		25 *U*	13	8,990
PSCHAR	169_A1	6/4/2002	RF-169-A	0	0			12.9	11,800
PSCHAR	170_C1	6/4/2002	RF-170-C	0	0			14.4	4,410
PSCHAR	171_A1	6/4/2002	RF-171-A	1	0				10,000
PSCHAR	171_A1	6/4/2002	RF-171-A	2	0				9,710
PSCHAR	171_C1	6/4/2002	RF-171-C	0	0				6,270
PSCHAR	175_A1	6/5/2002	RF-175-A	0	0				19,400
PSCHAR	176_C1	6/5/2002	RF-176-C	0	0				11,400
PSCHAR	178_A1	6/5/2002	RF-178-A	0	0			13.5	22,600
PSCHAR	178_C1	6/5/2002	RF-178-C	0	0				13,800
PSCHAR	179_C1	6/5/2002	RF-179-C	0	0				14,500
PSCHAR	180_C1	6/5/2002	RF-180-C	0	0			13.7	17,200
PSCHAR	189_A1	6/7/2002	RF-189-A	0	0				4,430
PSCHAR	189_C1	6/7/2002	RF-189-C	0	0			15.0	11,100
PSCHAR	190_C1	6/7/2002	RF-190-C	0	0				8,120
PSCHAR	191_C1	6/7/2002	RF-191-C	0	0			13.5	7,020
PSCHAR	192_C1	6/7/2002	RF-192-C	0	0				5,750
PSCHAR	216_A1	6/9/2002	RF-216A	0	0		5.0 *U*	19.4	1,780 *J*
PSCHAR	220_C1	6/9/2002	RF-220C	0	0				1,360 *J*
PSCHAR	222_C1	6/9/2002	RF-222C	0	0		5.0 *U*	20.6	3,060 *J*
TECK03	471204	6/6/2003	471204	0	0				1,210
TECK03	471210	6/6/2003	471210	0	0				460

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	471212	6/6/2003	471212	0	0				4,180
TECK03	471221	6/7/2003	471221	0	0				23,200
TECK03	471264	6/6/2003	471264	0	0				1,570
TECK03	471272	6/6/2003	471272	0	0				1,910
TECK03	471274	6/6/2003	471274	0	0				630
TECK03	471276	6/6/2003	471276	0	0				215
TECK03	471283	6/7/2003	471283	0	0				243
TECK03	471287	6/7/2003	471287	0	0				201
TECK03	471293	6/7/2003	471293	0	0				5,080
TECK03	471295	6/7/2003	471295	0	0				7,300
TECK03	471297	6/7/2003	471297	0	0				3,420
TECK03	471299	6/7/2003	471299	0	0				2,880
TECK03	471300	6/6/2003	471300	0	0				938
TECK03	471320	6/10/2003	471320	0	0				16,800
TECK03	471325	6/10/2003	471325	0	0				4,150
TECK03	471332	6/10/2003	471332	0	0				8,810
TECK03	471333	6/10/2003	471333	0	0				7,370
TECK03	471334	6/10/2003	471334	0	0				2,720
TECK03	471341	6/11/2003	471341	0	0				10,900
TECK03	471350	6/13/2003	471350	0	0				3,580
TECK03	471352	6/7/2003	471352	0	0				1,610
TECK03	471353	6/7/2003	471353	0	0				2,640
TECK03	471355	6/7/2003	471355	0	0				5,440
TECK03	471356	6/7/2003	471356	0	0				4,030
TECK03	471358	6/7/2003	471358	0	0				307
TECK03	471365	6/16/2003	471365	0	0				1,540
TECK03	471374	6/17/2003	471374	0	0				3,860
TECK03	471418	6/10/2003	471418	0	0				5,290
TECK03	471419	6/10/2003	471419	0	0				4,180
TECK03	471420	6/10/2003	471420	0	0				3,840
TECK03	471421	6/10/2003	471421	0	0				3,690
TECK03	471425	6/11/2003	471425	0	0				8,740
TECK03	471453	6/14/2003	471453	0	0				4,440
TECK03	471457	6/14/2003	471457	0	0				999
TECK03	471458	6/14/2003	471458	0	0				3,320
TECK03	471463	6/14/2003	471463	0	0				4,430
TECK03	471464	6/14/2003	471464	0	0				16,800
TECK03	471465	6/14/2003	471465	0	0				5,530
TECK03	471466	6/14/2003	471466	0	0				1,010
TECK03	471474	6/14/2003	471474	0	0				13,900
TECK03	471487	6/15/2003	471487	0	0				11,700
TECK03	471501	6/7/2003	471501	0	0				29,600
TECK03	471505	6/10/2003	471505	0	0				7,950
TECK03	471508	6/10/2003	471508	0	0				3,840

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
TECK03	471520	6/21/2003	471520	0	0				3,230
TECK03	471539	7/13/2003	471539	0	0				8,830
TECK03	471540	7/13/2003	471540	0	0				3,590
TECK03	471549	7/17/2003	471549	0	0				987
TECK03	471550	7/18/2003	471550	0	0				4,260
PSCHAR	CAG-AA28	9/16/2002	CAG-AA28-VS	0	0				191 *J*
PSCHAR	CAG-AA29	8/28/2002	CAG-AA29-VS	0	0				275 *J*
PSCHAR	CAG-AA30	8/28/2002	CAG-AA30-VS	0	0				200 *J*
PSCHAR	CAG-AA31	8/28/2002	CAG-AA31-VS	0	0				813 *J*
PSCHAR	CAG-F2	7/28/2002	CAG-2-F	0	0				5,310
PSCHAR	CAG-H30	7/3/2002	CAG-H-30	0	0				64,300
PSCHAR	CAG-I1	7/28/2002	CAG-1-I	0	0				9,850
PSCHAR	CAG-L33	7/3/2002	CAG-L-33	0	0				1,150
PSCHAR	CAG-R2	7/1/2002	CAG-R-2-S	0	0				1,570
PSCHAR	CAG-R32	7/21/2002	CAG-R-32	0	0				1,620
PSCHAR	CAG-R34	9/19/2002	CAG-R34-VS	0	0				3,570 *J*
PSCHAR	CAG-S34	9/19/2002	CAG-S34-VS	0	0				3,810 *J*
PSCHAR	CAG-U130	7/19/2002	CAG-U-130	0	0				7,320
PSCHAR	CAG-U29	7/3/2002	CAG-U-29	0	0				4,400
PSCHAR	CAG-U34	7/21/2002	CAG-U-34	0	0				1,930
PSCHAR	CAG-W29	7/1/2002	CAG-W-29	0	0		5.0 *U*	17.6	15,400
PSCHAR	CAG-W31	8/28/2002	CAG-W31-VS	0	0				865 *J*
PSCHAR	CAG-X100	8/28/2002	CAG-X100-VS	0	0				204 *J*
PSCHAR	CAG-X101	8/28/2002	CAG-X101-VS	0	0				855 *J*
PSCHAR	CAG-X12	7/2/2002	CAG-X-12	0	0				1,140 *J*
PSCHAR	CAG-X22	7/1/2002	CAG-X-22	0	0				2,110
PSCHAR	CAG-X26	7/1/2002	CAG-X-26-A	0	0				2,090
PSCHAR	CAG-X29	8/28/2002	CAG-X29-VS	0	0				1,250 *J*
PSCHAR	CAG-X30	8/28/2002	CAG-X30-VS	0	0				306 *J*
PSCHAR	CAG-X31	8/28/2002	CAG-X31-VS	0	0				3,120 *J*
PSCHAR	CAG-X8	7/2/2002	CAG-X-8	0	0				685 *J*
PSCHAR	CAG-Y27	7/1/2002	CAG-Y-27	0	0				5,290
PSCHAR	CAG-Y28	8/28/2002	CAG-Y28-VS	0	0				679 *J*
PSCHAR	CAG-Y29	9/16/2002	CAG-Y29-VS	0	0				78.5
PSCHAR	CAG-Y30	9/16/2002	CAG-Y30-VS	0	0				87.4
PSCHAR	CAG-Y31	8/28/2002	CAG-Y31-VS	0	0				9,420 *J*
PSCHAR	CAG-Y32	8/28/2002	CAG-Y32-VS	0	0				651 *J*
PSCHAR	CAG-Y33	8/28/2002	CAG-Y33-VS	0	0				144 *J*
PSCHAR	CAG-Z27	8/28/2002	CAG-Z27-VS	0	0				2,190 *J*
PSCHAR	CAG-Z28	8/28/2002	CAG-Z28-VS	0	0				2,160 *J*
PSCHAR	CAG-Z29	8/28/2002	CAG-Z29-VS	0	0				99.9 *J*
PSCHAR	CAG-Z30	8/28/2002	CAG-Z30-VS	0	0				166 *J*
PSCHAR	CAG-Z31	8/28/2002	CAG-Z31-VS	0	0				133 *J*
PSCHAR	CAG-Z32	8/28/2002	CAG-Z32-VS	0	0				2,280 *J*

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
PSCHAR	CAG-Z33	8/28/2002	CAG-Z33-VS	0	0				2,350 *J*
PSCHAR	CAG-Z7S	7/1/2002	CAG-Z-7-S	0	0				420
PSCHAR	CIT1250N	6/29/2002	C1T1-250-N	2	0				590
PSCHAR	CVT1-0N	6/29/2002	CVT1-0-N	0	0				960
PSCHAR	CVT1-0S	6/29/2002	CVT1-0-S	0	0				2,170
PSCHAR	CVT1-10N	6/29/2002	CVT1-10-N	0	0				5,040
PSCHAR	CVT1-10S	6/29/2002	CVT1-10-S	0	0				4,160
PSCHAR	CVT2-0N	6/30/2002	CVT2-0-N	1	0				383
PSCHAR	CVT2-0N	6/30/2002	CVT2-0-N	2	0				598
PSCHAR	CVT2-0S	6/30/2002	CVT2-0-S	0	0				825
PSCHAR	CVT3-0N	6/30/2002	CVT3-0-N	0	0			14.4	615
PSCHAR	CVT3-0S	6/30/2002	CVT3-0-S	0	0				713
PSCHAR	CVT4-0N	6/30/2002	CVT4-0-N	0	0				457
PSCHAR	CVT4-0S	6/30/2002	CVT4-0-S	0	0				363
PSCHAR	CVT5-0N	6/30/2002	CVT5-0-N	1	0				507
PSCHAR	CVT5-0N	6/30/2002	CVT5-0-N	2	0				576
PSCHAR	CVT5-0S	6/30/2002	CVT5-0-S	0	0				214
PSCHAR	CVT6-0N	6/30/2002	CVT6-0-N	0	0				1,170
PSCHAR	CVT6-0S	6/30/2002	CVT6-0-S	0	0				1,610
PSCHAR	CVT6-10S	6/30/2002	CVT6-10-S	0	0				1,060
PSCHAR	CVT7-0N	7/3/2002	CVT7-0-N	0	0				959 *J*
PSCHAR	CVT7-0S	7/3/2002	CVT7-0-S	0	0				1,480 *J*
PSCHAR	CVT7-10S	7/3/2002	CVT7-10-S	1	0				1,630 *J*
PSCHAR	CVT7-10S	7/3/2002	CVT7-10-S	2	0				1,040
PSCHAR	CVT8-0N	7/3/2002	CVT8-0-N	0	0				3,470 *J*
PSCHAR	CVT8250N	7/3/2002	CVT8-250-N	0	0				338
PSCHAR	CVT9-0N	7/3/2002	CVT9-0-N	0	0				15,000
PSCHAR	CVT9-50N	7/3/2002	CVT9-50N	0	0				202
PSCHAR	CVT9150S	7/3/2002	CVT9-150-S	0	0				916
PSCHAR	CVT9300S	7/3/2002	CVT9-300-S	0	0				262
PSCHAR	CVT9500N	7/3/2002	CVT9-500-N	0	0				236
PSCHAR	DSP-A6	6/23/2002	DSP-A-6	0	0				518
PSCHAR	DSP-AA2	6/23/2002	DSP-AA-2	0	0				264
PSCHAR	DSP-B1	6/23/2002	DSP-B-1	0	0				3,750
PSCHAR	DSP-B1	7/25/2002	V2-DSP-B-1	0	0				673
PSCHAR	DSP-B4	6/25/2002	DSP-B-4	0	0				1,070
PSCHAR	DSP-B9	9/19/2002	DSP-B9-VS	0	0				596
PSCHAR	DSP-C3	6/23/2002	DSP-C-3	0	0				1,830
PSCHAR	DSP-D4	6/23/2002	DSP-D-4	0	0				50,200
PSCHAR	DSP-D4	9/19/2002	DSP-D4-VS	0	0				3,780
PSCHAR	DSP-F6	6/23/2002	DSP-F-6	0	0				1,890
PSCHAR	DSP-G6	6/23/2002	DSP-G-6	0	0				2,910
PSCHAR	DSP-G6	9/19/2002	DSP-G6-VS	0	0				1,090
PSCHAR	DSP-HG5B	7/26/2002	DSP-HG-5-B	0	0				298

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
PSCHAR	DSP-IH5A	7/26/2002	DSP-IH-5-A	1	0				1,550
PSCHAR	DSP-IH5A	7/26/2002	DSP-IH-5-A	2	0				1,400
PSCHAR	PG-P5S	7/28/2002	PG-P5S	0	0				81.7
PSCHAR	RAT1-0EA	6/27/2002	RAT1-OE-A	0	0				1,770
PSCHAR	RAT2-50W	7/2/2002	RAT2-50-W	1	0				2,750 *J*
PSCHAR	RAT2-50W	7/2/2002	RAT2-50-W	2	0				2,640 *J*
PSCHAR	RAT2250E	6/27/2002	RAT2-250E	2	0				76.8
PSCHAR	RAT3-0EA	6/27/2002	RAT3-OEA	0	0				1,880
PSCHAR	RAT4-0W	7/2/2002	RAT4-0-W	0	0				1,590 *J*
PSCHAR	RAT5-0NA	6/27/2002	RAT5-0NA	0	0			16.8	30,100
PSCHAR	RAT5-0W	7/2/2002	RAT5-0-W	0	0				5,220 *J*
PSCHAR	RAT5-10W	7/2/2002	RAT5-10-W	0	0				756 *J*
FUGDST01	RC-01-A	8/22/2001	RC-01-A	0	0				324
FUGDST01	RC-03-A	8/23/2001	RC-03-A	0	0				106
FUGDST01	RC-04-A	8/23/2001	RC-04-A	0	0				102
FUGDST01	RC-05-A	8/23/2001	RC-05-A	0	0				520
FUGDST01	RC-06-A	8/23/2001	RC-06-A	0	0			21.0	379
FUGDST01	RC-07-A	8/23/2001	RC-07-A	0	0				387
FUGDST01	RC-08-A	8/24/2001	RC-08-A	0	0				90.0
FUGDST01	RC-09-A	8/24/2001	RC-09-A	0	0				251
FUGDST01	RF-01	8/26/2001	RF-01	0	0		5.5 *U*	13.6	1,220
FUGDST01	RF-02	8/25/2001	RF-02	0	0			16.3	1,150
FUGDST01	RF-03	8/25/2001	RF-03	0	0			10.8	565
FUGDST01	RF-04	8/26/2001	RF-04	1	0		5.5 *U*	12.4	754
FUGDST01	RF-04	8/26/2001	RF-04	2	0		5.5 *U*	15.1	859
FUGDST01	RF-05	8/26/2001	RF-05	0	0		5.0 *U*	31.8	1,490
FUGDST01	RF-06	8/26/2001	RF-06	0	0		5.0 *U*	24	4,840
FUGDST01	RF-07	8/26/2001	RF-07	0	0		5.5 *U*	25.1	3,140
FUGDST01	RF-08	8/26/2001	RF-08	0	0		5 *U*	9.0	1,620
PHASE1RA	RF-10	7/14/2003	SL0009	0	0	0.292	3.35 *U*	11.8	1,930
PHASE1RA	RF-107	7/17/2003	SL0019	0	0	0.781	3.9 *J*	13.5	7,880
PHASE1RA	RF-16	7/14/2003	SL0008	0	0	0.278	2.25 *U*	19.0	566
PHASE1RA	RF-18	7/14/2003	SL0007	0	0	0.147	2.95 *U*	10.9	406
PHASE1RA	RF-20	7/14/2003	SL0006	0	0	0.120	2.65 *U*	8.61	430
PHASE1RA	RF-22	7/14/2003	SL0005	0	0	0.112	2.30 *U*	8.44	319
PHASE1RA	RF-24	7/14/2003	SL0004	0	0	0.197	4.45 *U*	9.94	515
PHASE1RA	RF-27	7/22/2003	SL0029	1	0	0.437	5.7 *J*	14.7	653
PHASE1RA	RF-27	7/22/2003	SL0029	2	0	0.482	7 *J*	11	815
PHASE1RA	RF-32	7/14/2003	SL0003	0	0	1.32	3.65 *U*	14.7	1,750
PHASE1RA	RF-34	7/21/2003	SL0026	0	0	0.824	2.4 *U*	11.7	1,240
PHASE1RA	RF-4	7/14/2003	SL0010	0	0	0.613	3.20 *U*	7.94	9,380
PHASE1RA	RF-5	7/14/2003	SL0011	1	0	0.462	5.20 *U*	15.7	4,070
PHASE1RA	RF-5	7/14/2003	SL0011	2	0	0.423	3.65 *U*	15.2	3,520
FUGDST01	RF-PORT	8/26/2001	RF-PORT	0	0		6.0 *U*	15.7	4,910

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
PSCHAR	ROT1-0N	7/3/2002	ROT1-0N	0	0				2,580
PSCHAR	ROT5-10S	7/5/2002	ROT5-10-S	1	0				494
PSCHAR	ROT5-10S	7/5/2002	ROT5-10-S	2	0				670 *J*
PSCHAR	ROT5-50S	7/5/2002	ROT5-50-S	0	0				3,240
PSCHAR	ROT5250S	7/5/2002	ROT5-250-S	0	0				92.6
PSCHAR	ROT5500S	7/5/2002	ROT5-500-S	0	0				161
PSCHAR	ROT6-10S	7/5/2002	ROT610S	0	0				1,980
PSCHAR	ROT6-50S	7/5/2002	ROT650S	0	0				3,990
PSCHAR	ROT6250S	7/5/2002	ROT6250S	0	0				483
PSCHAR	ROT6500S	7/5/2002	ROT6-500-S	1	0				277
PSCHAR	ROT6500S	7/5/2002	ROT6-500-S	2	0				126 *J*
PSCHAR	ROT7-0S	7/5/2002	ROT7-0-S	0	0				16,200
PSCHAR	ROT7-10S	7/5/2002	ROT710S	0	0				742
PSCHAR	ROT8-0S	7/5/2002	ROT8-OS	0	0				4,290
PSCHAR	ROT8-10S	7/5/2002	ROT8-10-S	0	0				3,990
PSCHAR	ROT8-50S	7/5/2002	ROT8-50-S	0	0				1,700
PSCHAR	ROT8250S	7/5/2002	ROT8-250-S	0	0				146
PSCHAR	ROT9-0N	7/3/2002	ROT9-0N	0	0				5,030
PSCHAR	ROT9-0S	7/5/2002	ROT9-OS	1	0				5,910
PSCHAR	ROT9-0S	7/5/2002	ROT9-OS	2	0				4,110 *J*
PSCHAR	ROT9-10N	7/5/2002	ROT9-10N	0	0				4,360 *J*
PSCHAR	ROT9-10S	7/5/2002	ROT9-10-S	0	0				11,800
FUGDST01	RS-01	8/24/2001	RS-01	0	0				2,470
FUGDST01	RS-13	8/25/2001	RS-13	1	0				471
FUGDST01	RS-13	8/25/2001	RS-13	2	0				428
FUGDST01	RS-14	8/25/2001	RS-14	0	0				317
FUGDST01	RS-15	8/25/2001	RS-15	0	0				210
FUGDST01	RS-16	8/25/2001	RS-16	0	0				185
FUGDST01	RS-17	8/25/2001	RS-17	0	0				537
FUGDST01	RS-18	8/25/2001	RS-18	0	0				302
FUGDST01	RS-19	8/25/2001	RS-19	0	0				269
FUGDST01	RS-20	8/25/2001	RS-20	0	0				340
FUGDST01	RS-21	8/25/2001	RS-21	0	0				191
FUGDST01	RS-22	8/26/2001	RS-22	0	0				278
FUGDST01	RS-23	8/26/2001	RS-23	0	0				394
FUGDST01	RS-24	8/26/2001	RS-24	0	0				557
FUGDST01	RS-25	8/26/2001	RS-25	0	0				349
FUGDST01	RS-26	8/26/2001	RS-26	0	0				593
FUGDST01	RS-27	8/26/2001	RS-27	0	0				308
FUGDST01	RS-28	8/26/2001	RS-28	0	0				523
FUGDST01	RS-29	8/26/2001	RS-29	1	0				605
FUGDST01	RS-29	8/26/2001	RS-29	2	0				494
FUGDST01	RS-30	8/26/2001	RS-30	0	0				738
FUGDST01	RS-31	8/26/2001	RS-31	0	0				966

Table C-1. (cont.)

Survey	Survey Station	Date	Sample ID	Field Replicate	Subsample	Thallium (mg/kg dry)	Tin (mg/kg dry)	Vanadium (mg/kg dry)	Zinc (mg/kg dry)
FUGDST01	RS-32	8/26/2001	RS-32	0	0				1,230
FUGDST01	RS-33	8/26/2001	RS-33	1	0				801
FUGDST01	RS-33	8/26/2001	RS-33	2	0				755
FUGDST01	RS-34	8/26/2001	RS-34	0	0				804
PSCHAR	TUB-1	7/5/2002	TU-1-VS	0	0				81
PSCHAR	TUB-2	7/5/2002	TU-2-VS	0	0				125
PSCHAR	TUB-3	8/11/2002	TU-3-VS	0	0				3,910
PSCHAR	TUB-4	8/11/2002	TU-4-VS	0	0				178
PSCHAR	TUB-5	7/5/2002	TU-5-VS	0	0				104
PSCHAR	TUF-1	7/9/2002	TUF1	0	0				109 *J*
PSCHAR	TUF-2	7/9/2002	TUF2	0	0				127 *J*
PSCHAR	TUF-3	7/9/2002	TUF3	0	0				76.2 *J*

Note:

J	-	estimated
TCLP	-	toxicity characteristic leaching procedure
U	-	undetected at detection limit shown

Table 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 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 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	--	$\boxed{1.2}$	--
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	$\boxed{1.1}$	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 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 K-59) multipled by 0.66.

Table 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 K-59) multipled by 0.66.

Table 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 K-59) multipled by 0.66.

Table 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 K-59) multipled by 0.66.

Table 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 (ST-REF-3); 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 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 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 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	0.0849	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 K-66) multipled by 0.66.

Table 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 K-66) multipled by 0.66.

Table K-87. Food-web model exposure results for moose 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)	Shrub (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	2.5	51.9	1560	270	1880	5.55	1.9	19	2.9	0.29
Antimony	0.08	0.05	0.05	0.04	0.00150	0.00644	0.264	0.272	0.000802	0.66	--	0.0012	--
Arsenic (arsenate)	2.2	3.5	1.08	0.03	0.0412	0.451	0.870	1.36	0.00402	0.40	1.6	0.010	0.0025
Arsenic (arsenite)	2.2	3.5	1.08	0.03	0.0412	0.451	0.870	1.36	0.00402	0.13	1.3	0.031	0.0031
Barium	222	483	64	24.1	4.16	62.2	181	247	0.730	5.1	20	0.14	0.036
Cadmium	0.07	0.19	0.057	0.558	0.00131	0.0245	3.27	3.30	0.00973	1.0	10	0.0097	0.00097
Chromium	3.71	19.9	4.1	0.2	0.0695	2.56	3.80	6.43	0.0190	3.3	69	0.0058	0.00028
Cobalt	2.72	8.74	1.62	2.06	0.0510	1.13	13.0	14.2	0.0418	0.50	2.0	0.084	0.021
Lead	1.91	5.71	0.74	0.09	0.0358	0.736	0.998	1.77	0.00522	11	90	0.00047	0.000058
Mercury	0.05	0.003	0.025	0.065	0.000937	0.000386	0.393	0.394	0.00116	0.032	0.16	0.036	0.0073
Molybdenum	0.17	0.3	0.147	0.09	0.00319	0.0386	0.616	0.658	0.00194	0.26	2.6	0.0075	0.00075
Selenium	0.2	0.7	0.2	0.05	0.00375	0.0902	0.419	0.513	0.00151	0.20	0.33	0.0076	0.0046
Thallium	0.014	0.07	0.009	0.002	0.000262	0.00902	0.0174	0.0267	0.0000787	0.074	0.74	0.0011	0.00011
Vanadium	5.57	24.8	0.85	0.2	0.104	3.19	1.71	5.01	0.0148	0.21	2.1	0.070	0.0070
Zinc	9.84	33.1	30	92.2	0.184	4.26	554	558	1.65	160	320	0.010	0.0051

Note: The following data were used to develop this scenario: PHASE1RA water (ST-REF-5), Phase1RA sediment for Al, As, Ba, Co, Mo, Se, Tl, V (ST-REF-5); Phase2RA sediment for Cd, Pb, Hg, Zn; PHASE2RA willow; and PHASE2RA whole sedge.

No PHASE1RA sediment or water data collected at ST-REF-6, so ST-REF-5 data used -- nearest creek sediment and water station from PHASE1RA.

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 K-101. Food-web model exposure results for moose exposed to mean CoPC concentrations at the Reference Lagoon

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	182	11100	10.6	3.41	1440	68.3	1510	4.45	1.9	19	2.3	0.23
Antimony	0.12	0.0767	0.0225	0.00225	0.00988	0.145	0.157	0.000463	0.66	--	0.00070	--
Arsenic (arsenate)	76.3	4.43	0.03	1.43	0.570	0.193	2.19	0.00647	0.40	1.6	0.016	0.0040
Arsenic (arsenite)	76.3	4.43	0.03	1.43	0.570	0.193	2.19	0.00647	0.13	1.3	0.050	0.0050
Barium	156	226	17.6	2.92	29.1	113	145	0.428	5.1	20	0.084	0.021
Cadmium	0.223	0.345	0.053	0.00419	0.0444	0.341	0.390	0.00115	1	10	0.0012	0.00012
Chromium	7.16	19.6	0.35	0.134	2.52	2.25	4.91	0.0145	3.3	69	0.0044	0.00021
Cobalt	4.39	6.83	0.205	0.0823	0.880	1.32	2.28	0.00673	0.5	2	0.013	0.0034
Lead	0.363	10.1	0.755	0.00681	1.30	4.86	6.17	0.0182	11	90	0.0017	0.00020
Mercury	0.05	0.05	0.0535	0.000937	0.00644	0.345	0.352	0.00104	0.032	0.16	0.032	0.0065
Molybdenum	0.08	0.773	0.088	0.00150	0.0996	0.567	0.668	0.00197	0.26	2.6	0.0076	0.00076
Selenium	0.2	1.1	0.05	0.00375	0.142	0.322	0.468	0.00138	0.2	0.33	0.0069	0.0042
Thallium	0.008	0.081	0.0025	0.000150	0.0104	0.0161	0.0267	0.0000787	0.074	0.74	0.0011	0.00011
Vanadium	0.4	25.2	0.2	0.00750	3.25	1.29	4.55	0.0134	0.21	2.1	0.064	0.0064
Zinc	22.9	92.2	35.4	0.429	11.9	228	240	0.709	160	320	0.0044	0.0022

Note: Phase2RA whole sedge/grass (CL-REF-1) and sediment, Phase1RA water and sediment.

Sediment concentrations are means of Phase2RA and Phase1RA data from reference lagoon. Assumes a diet of 100% herbaceous plants.

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
UCL - upper confidence limit

Table K-102. Food-web model exposure results for moose exposed to mean CoPC concentrations at the Control Lagoon

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	181.7	11100	21.4	3.41	1440	138	1580	4.65	1.9	19	$\boxed{2.4}$	0.24
Antimony	0.12	0.0767	0.0207	0.00225	0.00988	0.133	0.145	0.000428	0.66	--	0.00065	--
Arsenic (arsenate)	76.3	8.2	0.11	1.43	1.06	0.709	3.19	0.00942	0.40	1.6	0.024	0.0059
Arsenic (arsenite)	76.3	8.2	0.11	1.43	1.06	0.709	3.19	0.00942	0.13	1.3	0.072	0.0072
Barium	156	226	31.6	2.92	29.1	204	236	0.695	5.1	20	0.14	0.035
Cadmium	0.05	0.46	0.0913	0.000937	0.0593	0.588	0.648	0.00191	1	10	0.0019	0.00019
Chromium	7.16	19.6	0.4	0.134	2.52	2.58	5.24	0.0154	3.3	69	0.0047	0.00022
Cobalt	4.39	6.83	0.627	0.0823	0.880	4.04	5.00	0.0147	0.5	2	0.029	0.0074
Lead	0.17	9.65	1.45	0.00319	1.24	9.34	10.6	0.0312	11	90	0.0028	0.00035
Mercury	0.05	0.05	0.041	0.000937	0.00644	0.264	0.271	0.000801	0.032	0.16	0.025	0.0050
Molybdenum	0.08	0.773	0.35	0.00150	0.0996	2.25	2.36	0.00695	0.26	2.6	0.027	0.0027
Selenium	0.2	1.1	0.117	0.00375	0.142	0.751	0.897	0.00265	0.2	0.33	0.013	0.0080
Thallium	0.008	0.081	0.004	0.000150	0.0104	0.0258	0.0363	0.000107	0.074	0.74	0.0014	0.00014
Vanadium	0.4	25.2	0.2	0.00750	3.25	1.29	4.55	0.0134	0.21	2.1	0.064	0.0064
Zinc	19	79.3	43.8	0.356	10.2	282	293	0.863	160	320	0.0054	0.0027

Note: Phase2RA whole sedge/grass and sediment, PSCHAR sediment.

Whole sedge and grass plant data averaged for whole lagoon. Mean of sediment from Phase2 and PSCHAR used; some analytes missing for sediment in control lagoon (Al, Sb, Ba, Cr, Co, Hg, Mo, Se, Tl, V) for these, used mean of reference lagoon stations from Phase1 and Phase2. Assumes a diet of 100% herbaceous plants.

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
UCL - upper confidence limit

Table K-103. Food-web model exposure results for moose exposed to mean CoPC concentrations at the Port Lagoon North

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	44.1	5590	9.7	0.826	719	62.5	783	2.31	1.9	19	$\boxed{1.2}$	0.12
Antimony	0.545	0.225	0.0385	0.0102	0.0290	0.248	0.287	0.000847	0.66	--	0.0013	--
Arsenic (arsenate)	26.7	7.05	0.08	0.499	0.908	0.515	1.92	0.00567	0.40	1.6	0.014	0.0035
Arsenic (arsenite)	26.7	7.05	0.08	0.499	0.908	0.515	1.92	0.00567	0.13	1.3	0.044	0.0044
Barium	412	252	17	7.71	32.5	109	150	0.442	5.1	20	0.087	0.022
Cadmium	0.0933	2.86	0.056	0.00175	0.369	0.361	0.731	0.00216	1	10	0.0022	0.00022
Chromium	1.84	10.3	0.25	0.0344	1.32	1.61	2.97	0.00875	3.3	69	0.0027	0.00013
Cobalt	1.32	5.49	0.09	0.0246	0.707	0.580	1.31	0.00387	0.5	2	0.0077	0.0019
Lead	1.90	92	1.29	0.0357	11.9	8.28	20.2	0.0595	11	90	0.0054	0.00066
Mercury	0.05	0.148	0.0355	0.000937	0.0191	0.229	0.249	0.000734	0.032	0.16	0.023	0.0046
Molybdenum	0.545	0.77	0.154	0.0102	0.0992	0.992	1.10	0.00325	0.26	2.6	0.012	0.0012
Selenium	0.45	0.8	0.125	0.00843	0.103	0.805	0.917	0.00270	0.2	0.33	0.014	0.0082
Thallium	0.029	0.0705	0.004	0.000544	0.00908	0.0258	0.0354	0.000104	0.074	0.74	0.0014	0.00014
Vanadium	0.325	21.1	0.2	0.00609	2.72	1.29	4.01	0.0118	0.21	2.1	0.056	0.0056
Zinc	21.0	556	45.1	0.393	71.7	290	363	1.07	160	320	0.0067	0.0033

Note: Phase2RA whole sedge and sediment (PLNL), Phase1RA sediment and water (PLNL and PLNN), PSCHAR sediment and water (all Port Lagoon North stations).

Whole sedge data averaged for all stations at the lagoon and all sedge/grass types. Sediment and water data averaged at a station, then data from all stations at the lagoon averaged to calculate lagoon-wide means. Assumes a diet of 100% herbaceous plant

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
UCL	-	upper confidence limit

Table K-104. Food-web model exposure results for moose exposed to mean CoPC concentrations at the North Lagoon

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	24.9	8420	24.1	0.467	1080	155	1240	3.66	1.9	19	1.9	0.19
Antimony	0.2	0.085	0.027	0.00375	0.0109	0.174	0.189	0.000556	0.66	--	0.0008	--
Arsenic (arsenate)	4.8	5.95	0.245	0.0900	0.766	1.58	2.43	0.00718	0.40	1.6	0.018	0.0045
Arsenic (arsenite)	4.8	5.95	0.245	0.0900	0.766	1.58	2.43	0.00718	0.13	1.3	0.055	0.0055
Barium	114	270	19.2	2.13	34.8	124	161	0.474	5.1	20	0.093	0.024
Cadmium	0.15	0.996	0.129	0.00281	0.128	0.828	0.959	0.00283	1	10	0.0028	0.00028
Chromium	1.86	11.0	0.4	0.0349	1.42	2.58	4.03	0.0119	3.3	69	0.0036	0.00017
Cobalt	0.45	5.75	0.37	0.00843	0.740	2.38	3.13	0.00924	0.5	2	0.018	0.0046
Lead	0.885	60.7	2.62	0.0166	7.82	16.9	24.7	0.0729	11	90	0.0066	0.00081
Mercury	0.05	0.04	0.033	0.000937	0.00515	0.213	0.219	0.000645	0.032	0.16	0.020	0.0040
Molybdenum	0.34	0.855	0.171	0.00637	0.110	1.10	1.22	0.00359	0.26	2.6	0.014	0.0014
Selenium	0.3	0.75	0.2	0.00562	0.0966	1.29	1.39	0.00410	0.2	0.33	0.021	0.012
Thallium	0.007	0.051	0.007	0.000131	0.00657	0.0451	0.0518	0.000153	0.074	0.74	0.0021	0.00021
Vanadium	0.26	18.4	0.2	0.00487	2.36	1.29	3.66	0.0108	0.21	2.1	0.051	0.0051
Zinc	45.6	189	48.3	0.854	24.3	311	336	0.992	160	320	0.0062	0.0031

Note: Phase2RA whole sedge and sediment (NLF, NLK), Phase1RA sediment (NLF and NLK) and water (NLF, NLK), PSCHAR sediment and water (all North Lagoon stations).

Whole sedge data averaged for all stations at the lagoon and all sedge/grass types. Sediment and water data averaged for a station, then data from all stations at the lagoon averaged to calculate lagoon-wide means. Assumes a diet of 100% herbaceous plan

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
UCL - upper confidence limit

Table K-117. Food-web model exposure results for muskrat exposed to mean CoPC concentrations at the Reference Lagoon

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	182	11100	10.6	0.0169	15.6	0.743	16.4	17.6	1.9	19	$\boxed{9.3}$	0.93
Antimony	0.12	0.0767	0.0225	0.0000112	0.000107	0.00158	0.00170	0.00182	0.66	--	0.0028	--
Arsenic (arsenate)	76.3	4.43	0.03	0.00709	0.00620	0.00210	0.0154	0.0165	0.40	1.6	0.041	0.010
Arsenic (arsenite)	76.3	4.43	0.03	0.00709	0.00620	0.00210	0.0154	0.0165	0.13	1.3	0.13	0.013
Barium	156	226	17.6	0.0145	0.317	1.23	1.56	1.67	5.1	20	0.33	0.084
Cadmium	0.223	0.345	0.053	0.0000208	0.000483	0.00371	0.00422	0.00453	1	10	0.0045	0.00045
Chromium	7.16	19.6	0.35	0.000665	0.0275	0.0245	0.0527	0.0565	3.3	69	0.017	0.00082
Cobalt	4.39	6.83	0.205	0.000408	0.00958	0.0144	0.0243	0.0261	0.5	2	0.052	0.013
Lead	0.363	10.1	0.755	0.0000338	0.0141	0.0529	0.0671	0.0719	11	90	0.0065	0.00080
Mercury	0.05	0.05	0.0535	0.00000465	0.0000701	0.00375	0.00382	0.00410	0.032	0.16	0.13	0.026
Molybdenum	0.08	0.773	0.088	0.00000743	0.00108	0.00617	0.00726	0.00779	0.26	2.6	0.030	0.0030
Selenium	0.2	1.1	0.05	0.0000186	0.00154	0.00350	0.00506	0.00543	0.2	0.33	0.027	0.016
Thallium	0.008	0.081	0.0025	0.000000743	0.000114	0.000175	0.000289	0.000311	0.074	0.74	0.0042	0.00042
Vanadium	0.4	25.2	0.2	0.0000372	0.0354	0.0140	0.0494	0.0530	0.21	2.1	0.25	0.025
Zinc	22.9	92.2	35.4	0.00212	0.129	2.48	2.61	2.80	160	320	0.018	0.0088

Note: Phase2RA whole sedge/grass and sediment (CL-REF-1), Phase1RA water and sediment.

Sediment concentrations are means of Phase2RA and Phase1RA data from reference lagoons (no control lagoon data).

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
UCL	-	upper confidence limit

Table K-118. Food-web model exposure results for muskrat exposed to mean CoPC concentrations at the Control Lagoon

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	182	11100	21.4	0.0169	15.6	1.50	17.1	18.4	1.9	19	9.7	0.97
Antimony	0.12	0.0767	0.0207	0.0000112	0.000107	0.00145	0.00157	0.00168	0.66	--	0.0025	--
Arsenic (arsenate)	76.3	8.2	0.11	0.00709	0.0115	0.00771	0.0263	0.0282	0.40	1.6	0.071	0.018
Arsenic (arsenite)	76.3	8.2	0.11	0.00709	0.0115	0.00771	0.0263	0.0282	0.13	1.3	0.22	0.022
Barium	156	226	31.6	0.0145	0.317	2.21	2.55	2.73	5.1	20	0.54	0.14
Cadmium	0.05	0.46	0.0913	0.00000465	0.000645	0.00640	0.00705	0.00756	1	10	0.0076	0.00076
Chromium	7.16	19.6	0.4	0.000665	0.0275	0.0280	0.0562	0.0603	3.3	69	0.018	0.00087
Cobalt	4.39	6.83	0.627	0.000408	0.00958	0.0439	0.0539	0.0578	0.5	2	0.12	0.029
Lead	0.17	9.65	1.45	0.0000158	0.0135	0.102	0.115	0.124	11	90	0.011	0.0014
Mercury	0.05	0.05	0.041	0.00000465	0.0000701	0.00287	0.00295	0.00316	0.032	0.16	0.10	0.020
Molybdenum	0.08	0.773	0.35	0.00000743	0.00108	0.0245	0.0256	0.0275	0.26	2.6	0.11	0.011
Selenium	0.2	1.1	0.117	0.0000186	0.00154	0.00817	0.00973	0.0104	0.2	0.33	0.052	0.032
Thallium	0.008	0.081	0.004	0.000000743	0.000114	0.000280	0.000395	0.000423	0.074	0.74	0.0057	0.00057
Vanadium	0.4	25.2	0.2	0.0000372	0.0354	0.0140	0.0494	0.0530	0.21	2.1	0.25	0.025
Zinc	19	79.3	43.8	0.00177	0.111	3.07	3.18	3.41	160	320	0.021	0.011

Note: Phase2RA whole sedge/grass and sediment, PSCHAR sediment.

Whole sedge and grass plant data averaged for whole lagoon. Mean of sediment from Phase2 and PSCHAR used; some analytes missing for sediment in control lagoon (Al, Sb, Ba, Cr, Co, Hg, Mo, Se, Tl, V) for these, used mean of reference lagoon stations from Phase1 and Phase2.

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
UCL - upper confidence limit

Table K-119. Food-web model exposure results for muskrat exposed to mean CoPC concentrations at the Port Lagoon North

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (µg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	44.1	5590	9.7	0.00409	7.83	0.680	8.51	9.13	1.9	19	$\boxed{4.8}$	0.48
Antimony	0.545	0.225	0.0385	0.0000506	0.000315	0.00270	0.00306	0.00329	0.66	--	0.0050	--
Arsenic (arsenate)	26.7	7.05	0.08	0.00248	0.00988	0.00561	0.0180	0.0193	0.40	1.6	0.048	0.012
Arsenic (arsenite)	26.7	7.05	0.08	0.00248	0.00988	0.00561	0.0180	0.0193	0.13	1.3	0.15	0.015
Barium	412	252	17	0.0382	0.353	1.19	1.58	1.70	5.1	20	0.33	0.085
Cadmium	0.0933	2.86	0.056	0.00000867	0.00401	0.00392	0.00794	0.00852	1	10	0.0085	0.00085
Chromium	1.84	10.3	0.25	0.000171	0.0144	0.0175	0.0321	0.0344	3.3	69	0.010	0.00050
Cobalt	1.32	5.49	0.09	0.000122	0.00769	0.00631	0.0141	0.0152	0.5	2	0.030	0.0076
Lead	1.90	92	1.29	0.000177	0.129	0.0900	0.219	0.235	11	90	0.021	0.0026
Mercury	0.05	0.148	0.0355	0.00000465	0.000207	0.00249	0.00270	0.00290	0.032	0.16	0.091	0.018
Molybdenum	0.545	0.77	0.154	0.0000506	0.00108	0.0108	0.0119	0.0128	0.26	2.6	0.049	0.0049
Selenium	0.45	0.8	0.125	0.0000418	0.00112	0.00876	0.00992	0.0106	0.2	0.33	0.053	0.032
Thallium	0.029	0.0705	0.004	0.00000269	0.0000988	0.000280	0.000382	0.000410	0.074	0.74	0.0055	0.00055
Vanadium	0.325	21.1	0.2	0.0000302	0.0296	0.0140	0.0436	0.0468	0.21	2.1	0.22	0.022
Zinc	21.0	556	45.1	0.00195	0.780	3.16	3.94	4.23	160	320	0.026	0.013

Note: Phase2RA whole sedge and sediment (PLNL), Phase1RA sediment and water (PLNL and PLNN), PSCHAR sediment and water (all Port Lagoon North stations).

Whole sedge data averaged for all stations at the lagoon and all sedge/grass types. Sediment and water data averaged at a station, then data from all stations at the lagoon averaged to calculate lagoon-wide means.

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
UCL - upper confidence limit

Table K-120. Food-web model exposure results for muskrat exposed to mean CoPC concentrations at the North Lagoon

	Concentration			Daily Exposure					TRV		Year-Round Hazard Quotient	
Analyte	Water (μg/L)	Soil/Sediment (mg/kg dw)	Herb. Plant (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	24.9	8420	24.1	0.00231	11.8	1.69	13.5	14.5	1.9	19	7.6	0.76
Antimony	0.2	0.085	0.027	0.0000186	0.000119	0.00189	0.00203	0.00218	0.66	--	0.0033	--
Arsenic (arsenate)	4.8	5.95	0.245	0.000446	0.00834	0.0172	0.0260	0.0278	0.40	1.6	0.070	0.017
Arsenic (arsenite)	4.8	5.95	0.245	0.000446	0.00834	0.0172	0.0260	0.0278	0.13	1.3	0.21	0.021
Barium	114	270	19.2	0.0105	0.378	1.35	1.73	1.86	5.1	20	0.36	0.093
Cadmium	0.15	0.996	0.129	0.0000139	0.00140	0.00900	0.0104	0.0112	1	10	0.011	0.0011
Chromium	1.86	11.0	0.4	0.000173	0.0154	0.0280	0.0436	0.0468	3.3	69	0.014	0.00068
Cobalt	0.45	5.75	0.37	0.0000418	0.00805	0.0259	0.0340	0.0365	0.5	2	0.073	0.018
Lead	0.885	60.7	2.62	0.0000822	0.0850	0.184	0.269	0.288	11	90	0.026	0.0032
Mercury	0.05	0.04	0.033	0.00000465	0.0000561	0.00231	0.00237	0.00255	0.032	0.16	0.080	0.016
Molybdenum	0.34	0.855	0.171	0.0000316	0.00120	0.0120	0.0132	0.0142	0.26	2.6	0.055	0.0055
Selenium	0.3	0.75	0.2	0.0000279	0.00105	0.0140	0.0151	0.0162	0.2	0.33	0.081	0.049
Thallium	0.007	0.051	0.007	0.000000650	0.0000715	0.000490	0.000563	0.000604	0.074	0.74	0.0082	0.00082
Vanadium	0.26	18.4	0.2	0.0000242	0.0257	0.0140	0.0398	0.0427	0.21	2.1	0.20	0.020
Zinc	45.6	189	48.3	0.00423	0.265	3.38	3.65	3.92	160	320	0.024	0.012

Note: Phase2RA whole sedge and sediment (NLF, NLK), Phase1RA sediment (NLF and NLK) and water (NLF, NLK), PSCHAR sediment and water (all North Lagoon stations).

Whole sedge data averaged for all stations at the lagoon and all sedge/grass types. Sediment and water data averaged for a station, then data from all stations at the lagoon averaged to calculate lagoon-wide means.

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
UCL - upper confidence limit

Table 6-1. Refined assessment endpoints, representative receptors, and measurement endpoints

Environment	Assessment Endpoint	Representative Receptor[a]	Measurement Endpoint
Tundra	Structure and function of terrestrial plant communities	Terrestrial plant communities	Plant abundance, diversity, biomass, percent cover
Tundra	Structure and function of tundra soil fauna communities	Tundra soil fauna communities	Not directly assessed, evaluated through terrestrial plant community analysis
Tundra	Survival, growth, and reproduction of terrestrial avian herbivore populations	Willow ptarmigan	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, soil, and surface water) relative to avian TRVs
Tundra	Survival, growth, and reproduction of terrestrial mammalian herbivore populations	Tundra vole; caribou; moose	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, soil, and surface water) relative to mammalian TRVs
Tundra	Survival, growth, and reproduction of terrestrial avian invertivore populations	Lapland longspur	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, soil, and surface water) relative to avian TRVs
Tundra	Survival, growth, and reproduction of terrestrial mammalian invertivore populations	Tundra shrew	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, soil, and surface water) relative to mammalian TRVs
Tundra	Survival, growth, and reproduction of terrestrial avian carnivore populations	Snowy owl	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, soil, and surface water) relative to avian TRVs
Tundra	Survival, growth, and reproduction of terrestrial mammalian carnivore populations	Arctic fox	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, soil, and surface water) relative to mammalian TRVs
Streams	Structure and function of stream aquatic and wetland plant communities	Stream aquatic and wetland plant communities	Plant abundance, diversity, biomass, percent cover
Streams	Structure and function of stream aquatic invertebrate communities	Stream aquatic invertebrate communities	Abundance and diversity of stream aquatic invertebrates
Streams	Survival, growth, and reproduction of stream avian herbivore populations	Green-winged teal	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to avian TRVs
Streams	Survival, growth, and reproduction of stream mammalian herbivore populations	Muskrat; moose	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to mammalian TRVs

Table 6-1. (cont.)

Environment	Assessment Endpoint	Representative Receptor[a]	Measurement Endpoint
Streams	Survival, growth, and reproduction of stream avian invertivore populations	Common snipe	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to avian TRVs
Tundra ponds	Structure and function of tundra pond aquatic and wetland plant communities	Tundra pond aquatic and wetland plant communities	Plant abundance, diversity, biomass, percent cover
Tundra ponds	Structure and function of tundra pond aquatic invertebrate communities	Tundra pond aquatic invertebrate communities	Abundance and diversity of tundra pond aquatic invertebrates
Tundra ponds	Survival, growth, and reproduction of tundra pond avian herbivore populations	Green-winged teal	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to avian TRVs
Tundra ponds	Survival, growth, and reproduction of tundra pond mammalian herbivore populations	Muskrat	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to mammalian TRVs
Tundra ponds	Survival, growth, and reproduction of tundra pond avian invertivore populations	Common snipe[b]	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to avian TRVs
Coastal lagoons	Structure and function of coastal lagoon aquatic and wetland plant communities	Coastal lagoon aquatic and wetland plant communities	Plant abundance, diversity, biomass, percent cover
Coastal lagoons	Structure and function of coastal lagoon aquatic invertebrate communities	Coastal lagoon aquatic invertebrate communities	Abundance and diversity of coastal lagoon aquatic invertebrates
Coastal lagoons	Survival, growth, and reproduction of coastal lagoon avian invertivore populations	Black-bellied plover	Range of modeled total dietary exposures (based on measured CoPC concentrations in food and sediment) relative to avian TRVs
Coastal lagoons	Survival, growth, and reproduction of coastal lagoon mammalian herbivore populations	Muskrat; moose	Range of modeled total dietary exposures (based on measured CoPC concentrations in food, sediment, and surface water) relative to mammalian TRVs

Note: CoPC - chemical of potential concern
TRV - toxicity reference value

[a] Receptors to be evaluated in the risk assessment.

[b] Evaluated as a terrestrial receptor.

Table CS1. Comparison of juvenile Dolly Varden tissue concentrations with effects thresholds

	Source[a]	Date Collected	N	Total Cadmium Min.	Total Cadmium Max.	Total Lead Min.	Total Lead Max.	Total Selenium Min.	Total Selenium Max.	Total Zinc Min.	Total Zinc Max.
Anxiety Ridge Creek (all)	ADFG	1993–2002	61	0.017	0.308	0.001	0.612	0.010	2.01	11.48	36.12
ARC at Haul Road	ADFG	1993–2000	31	0.022	0.090	0.041	0.612	0.529	1.37	--	--
ARC Upstream	ADFG	2002	15	0.017	0.224	0.001	0.101	0.010	2.01	11.48	36.12
ARC Downstream	ADFG	2002	15	0.039	0.308	0.031	0.138	0.895	2.01	21.97	32.56
Literature values[b] for tissue residue and effect (ppm)											
No effects (range)[c]				0.036–5.0		0.34–5.1		0.12–19		4.5–480	
No effects (range)[d]				0.04–2		0.34–5.1		0.2–0.8		4.5–60	
Effects (range)[c]				0.12–8.0		0.4–4.0		0.66–4.6		40–60	
Effects (range)[d]				0.12–4.0		0.4–4.0		0.66–2.08		--	

Note: Concentrations are reported in ppm wet wt (converted from dry wt).
Based on studies with ecologically relevant endpoints (survival, growth, or reproduction).
If multiple effects thresholds were provided in a single study, the highest no effects threshold value was used.
If multiple effects thresholds were provided in a single study, the lowest effects threshold value was used.
ADFG - Alaska Department of Fish and Game
ARC - Anxiety Ridge Creek
-- - Not available

[a] Ott, A.G., and W.A. Morris. 2004. Juvenile Dolly Varden whole body metals analyses, Red Dog Mine (2002). Technical Report No. 04-01. Alaska Department of Natural Resources, Office of Habitat Management and Permitting.

[b] Jarvinen, A.W., and G.T. Ankley. 1999. Linkage of effects to tissue residues: Development of a comprehensive database for aquatic organisms exposed to inorganic and organic chemicals. SETAC Technical Publication Series. Society of Environmental Toxicology and Chemistry, Pensacola, FL.

[c] Ranges of whole body tissue concentrations for all freshwater fish species (Atlantic salmon, bluegill, brook trout, Chinook salmon, dace, fathead minnow, flagfish, guppy, largemouth bass, perch, rainbow trout, stickleback) exposed to chemicals in water or their diet for at least 30 days.

[d] Ranges of whole body tissue concentrations for only freshwater salmonids (Altantic salmon, brook trout, Chinook salmon, rainbow trout) exposed to chemicals in water or their diet for at least 30 days.

Table CK1. Comparison of tissue threshold concentrations in moss samples (*Hylocomium splendens*)

	Station	Zone	Sample ID	Event	Copper	Tissue Threshold Concentrations[a]	Zinc	Tissue Threshold Concentrations[a]
					mg/kg	A = 25 - 60	μg/g	A = 150 - 290
					dry	B = 35 - 90	dry	B = 190 - 350
						C = 70 - 110		C = 300 - 400
Site								
	001P-M01	ECO-R	001P-M-01	2001			1530	C
	002P-M01	ECO-R	002P-M-01	2001			1970	C
	003P-M01	ECO-R	003P-M-01	2001			2060	C
	004P-M01	ECO-R	004P-M-01	2001			1420	C
	005P-M01	ECO-R	005P-M-01	2001			2090	C
	006P-M01	ECO-R	006P-M-01	2001			1970	C
	007P-M01	ECO-R	007P-M-01	2001			1280	C
	008P-M01	ECO-R	008P-M-01	2001			1330	C
	009D-M01	ECO-R	009D-M-01	2001			3440	C
	009P-M01	ECO-R	009P-M-01	2001			3210	C
	010P-M01	ECO-R	010P-M-01	2001			2490	C
	011P-M01	ECO-R	011P-M-01	2001			1110	C
	013P-M01	ECO-R	013P-M-01	2001			1450	C
	015P-M01	ECO-R	015P-M-01	2001			424	C
	016P-M01	ECO-R	016P-M-01	2001			1160	C
	017P-M01	ECO-R	017P-M-01	2001			191	B
	018D-M01	ECO-R	018D-M-01	2001			261	B
	018P-M01	ECO-R	018P-M-01	2001			264	B
	019P-M01	ECO-R	019P-M-01	2001			518	C
	020P-M01	ECO-R	020P-M-01	2001			901	C
	021P-M01	ECO-R	021P-M-01	2001			1250	C
	022P-M01	ECO-R	022P-M-01	2001			602	C
	023P-M01	ECO-R	023P-M-01	2001			981	C
	024P-M01	ECO-R	024P-M-01	2001			1140	C
	025P-M01	ECO-R	025P-M-01	2001			862	C
	026D-M01	ECO-R	026D-M-01	2001			420	C
	026P-M01	ECO-R	026P-M-01	2001			290	B
	028P-M01	ECO-R	028P-M-01	2001			922	C
	029P-M01	ECO-R	029P-M-01	2001			119	
	030P-M01	ECO-R	030P-M-01	2001			209	B
	030R-M01	ECO-R	030R-M-01	2001			124	
	031P-M01	ECO-R	031P-M-01	2001			301	C
	031R-M01	ECO-R	031R-M-01	2001			348	C
	032P-M01	ECO-R	032P-M-01	2001			207	B
	032R-M01	ECO-R	032R-M-01	2001			169	A
	033P-M01	ECO-R	033P-M-01	2001			117	
	034D-M01	ECO-R	034D-M-01	2001			93.6	
	034P-M01	ECO-R	034P-M-01	2001			109	
	034R-M01	ECO-R	034R-M-01	2001			97.3	
	035P-M01	ECO-R	035P-M-01	2001			92.5	
	036P-M01	ECO-R	036P-M-01	2001			559	C
	036R-M01	ECO-R	036R-M-01	2001			436	C
	037P-M01	ECO-R	037P-M-01	2001			179	A
	038P-M01	ECO-R	038P-M-01	2001			116	
	038R-M01	ECO-R	038R-M-01	2001			153	A
	039P-M01	ECO-R	039P-M-01	2001			187	A
	040P-M01	ECO-R	040P-M-01	2001			72.3	
	040R-M01	ECO-R	040R-M-01	2001			71.9	

Table CK1. (cont.)

Station	Zone	Sample ID	Event	Copper	Tissue Threshold Concentrations[a]	Zinc	Tissue Threshold Concentrations[a]
				mg/kg	A = 25 - 60	µg/g	A = 150 - 290
				dry	B = 35 - 90	dry	B = 190 - 350
					C = 70 - 110		C = 300 - 400
041P-M01	ECO-R	041P-M-01	2001			309	C
042D-M01	ECO-R	042D-M-01	2001			84.2	
042P-M01	ECO-R	042P-M-01	2001			83	
042R-M01	ECO-R	042R-M-01	2001			82.9	
044P-M01	ECO-R	044P-M-01	2001			230	B
044R-M01	ECO-R	044R-M-01	2001			184	A
045P-M01	ECO-R	045P-M-01	2001			74.4	
046P-M01	ECO-R	046P-M-01	2001			223	B
048P-M01	ECO-R	048P-M-01	2001			129	
048R-M01	ECO-R	048R-M-01	2001			148	
050P-M01	ECO-P	050P-M-01	2001			377	C
051A-M01	ECO-P	051A-M-01	2001			358	C
052P-M01	ECO-P	052P-M-01	2001			637	C
053D-M01	ECO-P	053D-M-01	2001			197	B
053P-M01	ECO-P	053P-M-01	2001			193	B
059D-M01	ECO-P	059D-M-01	2001			300	B
059P-M01	ECO-P	059P-M-01	2001			384	C
060P-M01	ECO-P	060P-M-01	2001			340	C
102P-M01	ECO-R	102P-M-01	2001			141	
103P-M01	ECO-R	103P-M-01	2001			85.6	
116P-M01	ECO-R	116P-M-01	2001			87.8	
117P-M01	ECO-R	117P-M-01	2001			101	
117R-M01	ECO-R	117R-M-01	2001			119	
161P-M01	ECO-P	161P-M-01	2001			128	
161R-M01	ECO-P	161R-M-01	2001			156	A
201P-M01	ECO-R	201P-M-01	2001			132	
HR01-01A	ECO-P	HR-01-01-M	2001			4180	C
HR01-02M	ECO-P	HR-01-02-M	2001			2040	C
HR01-03M	ECO-P	HR-01-03-M	2001			273	B
HR02-01M	ECO-P	HR-02-01-M	2001			3140	C
HR02-02M	ECO-P	HR-02-02-M	2001			949	C
HR02-03M	ECO-P	HR-02-03-M	2001			59.2	
HR03-01M	ECO-R	HR-03-01-M	2001			1160	C
HR03-02M	ECO-R	HR-03-02-M	2001			435	C
HR03-03M	ECO-R	HR-03-03-M	2001			164	A
HR04-01B	ECO-R	HR-04-01-M	2001			1240	C
HR04-02M	ECO-R	HR-04-02-M	2001			889	C
HR04-03M	ECO-R	HR-04-03-M	2001			167	A
HR05-01M	ECO-R	HR-05-01-M	2001			1360	C
HR05-02M	ECO-R	HR-05-02-M	2001			460	C
HR05-03M	ECO-R	HR-05-03-M	2001			118	
HR06-01M	ECO-M	HR-06-01-M	2001			1440	C
HR06-02M	ECO-M	HR-06-02-M	2001			1200	C
HR06-03M	ECO-M	HR-06-03-M	2001			1450	C
HR06-04M	ECO-M	HR-06-04-M	2001			433	C
HS1N0003	ECO-R	HS-1N-0003-M	2000			1570	C
HS1N0050	ECO-R	HS-1N-0050-M	2000			1020	C
HS1N0100	ECO-R	HS-1N-0100-M	2000			554	C
HS1N0250	ECO-R	HS-1N-0250-M	2000			281	B

Table CK1. (cont.)

Station	Zone	Sample ID	Event	Copper	Tissue Threshold Concentrations[a]	Zinc		Tissue Threshold Concentrations[a]
				mg/kg	A = 25 - 60	μg/g		A = 150 - 290
				dry	B = 35 - 90	dry		B = 190 - 350
					C = 70 - 110			C = 300 - 400
HS1N1000	ECO-R	HS-1N-1000-M	2000			153		
HS1S0003	ECO-R	HS-1S-0003-M	2000			1500		C
HS1S0050	ECO-R	HS-1S-0050-M	2000			352		C
HS1S0100	ECO-R	HS-1S-0100-M	2000			207		B
HS1S0250	ECO-R	HS-1S-0250-M	2000			148		
HS1S1000	ECO-R	HS-1S-1000-M	2000			111		
HS1S1600	ECO-R	HS-1S-1600-M	2000			96.1		
HS2N0003	ECO-R	HS-2N-0003-M	2000			2750		C
HS2N0050	ECO-R	HS-2N-0050-M	2000			1880		C
HS2N0100	ECO-R	HS-2N-0100-M	2000			1040		C
HS2N0250	ECO-R	HS-2N-0250-M	2000			516		C
HS2N1000	ECO-R	HS-2N-1000-M	2000			237		B
HS2S0003	ECO-R	HS-2S-0003-M	2000			1200		C
HS2S0050	ECO-R	HS-2S-0050-M	2000			321		C
HS2S0100	ECO-R	HS-2S-0100-M	2000			255		B
HS2S0250	ECO-R	HS-2S-0250-M	2000			138		
HS2S1000	ECO-R	HS-2S-1000-M	2000			118		
HS3N0003	ECO-R	HS-3N-0003-M	2000			1180		C
HS3N0050	ECO-R	HS-3N-0050-M	2000			856		C
HS3N0100	ECO-R	HS-3N-0100-M	2000			695		C
HS3N0250	ECO-R	HS-3N-0250-M	2000			259		B
HS3N1000	ECO-R	HS-3N-1000-M	2000			158		A
HS3N1600	ECO-R	HS-3N-1600-M	2000			169		A
HS3S0003	ECO-R	HS-3S-0003-M	2000			2860		C
HS3S0050	ECO-R	HS-3S-0050-M	2000			751		C
HS3S0100	ECO-R	HS-3S-0100-M	2000			453		C
HS3S0250	ECO-R	HS-3S-0250-M	2000			222		B
HS3S1000	ECO-R	HS-3S-1000-M	2000			112		
MI-02M	ECO-M	MI-02-M	2001			589		C
MI-104	ECO-R	MS0024	2003			74.5		
MI-107	ECO-R	MS0020	2003			137		
MI-108	ECO-R	MS0023	2003			386		C
MI-25-M	ECO-R	MI-25-M	2002			440		C
MI-26-M	ECO-R	MI-26-M	2002			166		A
MI-42-M	ECO-M	MI-42-M	2002			611		C
MI-45-M	ECO-M	MI-45-M	2002			748		C
PO-01M	ECO-P	PO-01-M	2001			1370	*J*	C
PO-02M	ECO-P	PO-02-M	2001			2540	*J*	C
PO-04M	ECO-P	PO-04-M	2001			2090	*J*	C
PO-05M	ECO-P	PO-05-M	2001			6480	*J*	C
PO-06M	ECO-P	PO-06-M	2001			3950	*J*	C
PO-07M	ECO-P	PO-07-M	2001			1580	*J*	C
PO-09M	ECO-P	PO-09-M	2001			1560	*J*	C
PO-10M	ECO-P	PO-10-M	2001			1930	*J*	C
PO-11M	ECO-P	PO-11-M	2001			1260	*J*	C
PO-13M	ECO-P	PO-13-M	2001			1580	*J*	C
PO-15M	ECO-P	PO-15-M	2001			1500	*J*	C
PO-16M	ECO-P	PO-16-M	2001			1520	*J*	C
PO-17M	ECO-P	PO-17-M	2001			1550	*J*	C

Table CK1. (cont.)

Station	Zone	Sample ID	Event	Copper	Tissue Threshold Concentrations[a]	Zinc		Tissue Threshold Concentrations[a]
				mg/kg	A = 25 - 60	μg/g		A = 150 - 290
				dry	B = 35 - 90	dry		B = 190 - 350
					C = 70 - 110			C = 300 - 400
PO-18M	ECO-P	PO-18-M	2001			1480	*J*	C
TT1-0100	ECO-P	MS0005	2003	24.2		8120		C
TT1-1000	ECO-P	MS0008	2003	4.56		869		C
TT2-0010	ECO-P	MS0004	2003	21.6		2910		C
TT2-0100	ECO-P	MS0003	2003	13.1		1340		C
TT2-1000	ECO-P	MS0006	2003	3.85		251		B
TT3-0010	ECO-R	MS0002	2003	16.8		1110		C
TT3-0100	ECO-R	MS0001	2003	9.73		595		C
TT3-1000	ECO-R	MS0015	2003	3.49		135		
Reference								
TS-REF-7	ECOREF	MS0011	2003	3.73		47.9		
TS-REF-8	ECOREF	MS0010	2003	4.35		64		
TS-REF10	ECOREF	MS0009	2003	3.29		55		

Note: Tissue threshold concentration ranges defined as follows based on effects thresholds reported for multiple species in Folkeson and Andersson-Bringmark (1988).

A - exceeds minimum threshold for first signs of reduction in cover
B - exceeds minimum threshold for obvious reductions in cover
C - exceeds minimum apparent survival thresholds (some dead individuals observed)

Both site and literature reference samples were unwashed.

J - estimated value

Table CK2. Comparison of tissue threshold concentrations in lichen samples

	Station	Sample ID	Event	Taxon	Zinc		Tissue Threshold Concentrations[a]
					μg/g		A = 480 - 1,300
					dry		B = 550 - 1,800
							C = 600 - 2,200
Site							
	HR01-02L	HR-01-02-L	2001	*Peltigera*	1610		C
	HR02-02L	HR-02-02-L	2001	*Peltigera*	545	*J*	A
	HR02-03L	HR-02-03-L	2001	*Peltigera*	82.2	*J*	
	HR03-03L	HR-03-03-L	2001	*Peltigera*	115	*J*	
	HR05-03L	HR-05-03-L	2001	*Peltigera*	85.2	*J*	
	HR07-01B	HR-07-01-L	2001	*Peltigera*	1720	*J*	C
	HR07-02L	HR-07-02-L	2001	*Peltigera*	1040	*J*	C
	HR07-03L	HR-07-03-L	2001	*Peltigera*	185	*J*	
	HR07-04L	HR-07-04-L	2001	*Peltigera*	121	*J*	
	PO-04L	PO-04-L	2001	*Peltigera*	1010	*J*	C
	PO-11L	PO-11-L	2001	*Peltigera*	1020	*J*	C
	PO-17L	PO-17-L	2001	*Peltigera*	1050	*J*	C
	TT2-0010	LI0018	2004	*Peltigera*	780		C
	TT2-0100	LI0008	2004	*Peltigera*	292		
	TT2-1000	LI0007	2004	*Peltigera*	137		
	TT3-0010	LI0010	2004	*Peltigera*	209		
	TT3-0100	LI0037	2004	*Peltigera*	119	*J*	
	TT3-1000	LI0016	2004	*Cladina*	81.9		
	TT3-1000	LI0017	2004	*Peltigera*	94.4		
	TT5-0010	LI0038	2004	*Peltigera*	594		B
	TT5-0100	LI0006	2004	*Peltigera*	572		B
	TT5-1000	LI0002	2004	*Peltigera*	531		A
	TT5-2000	LI0019	2004	*Cladina*	278		
	TT6-0010	LI0034-D	2004	*Peltigera*	351	*J*	
	TT6-0010	LI0036	2004	*Cladina*	317	*J*	
	TT6-0100	LI0022	2004	*Cladina*	420	*J*	
	TT6-0100	LI0023	2004	*Peltigera*	392	*J*	
	TT6-1000	LI0020	2004	*Peltigera*	335	*J*	
	TT6-1000	LI0021	2004	*Cladina*	386	*J*	
	TT6-2000	LI0026	2004	*Peltigera*	163	*J*	
	TT6-2000	LI0027	2004	*Cladina*	141	*J*	
	TT7-0010	LI0025	2004	*Cladina*	2740	*J*	
	TT7-1000	LI0024	2004	*Cladina*	996	*J*	C
	TT7-2000	LI0039	2004	*Cladina*	1260		C
	TT8-0010	LI0015	2004	*Peltigera*	627		C
	TT8-0100	LI0014	2004	*Peltigera*	397		
	TT8-1000	LI0011	2004	*Cladina*	70		
	TT8-1000	LI0012-D	2004	*Peltigera*	149		
Reference							
	TS-REF-5	LI0028	2004	*Cladina*	45.2		
	TS-REF-5	LI0029	2004	*Peltigera*	48.5		
	TS-REF-7	LI0030	2004	*Cladina*	26.9		
	TS-REF-7	LI0031	2004	*Peltigera*	39.2		
	TS-REF11	LI0032	2004	*Cladina*	19.4	*J*	
	TS-REF11	LI0033	2004	*Peltigera*	29.7	*J*	

Note: Tissue threshold concentration ranges defined as follows based on effects thresholds reported for multiple species in Folkeson and Andersson-Bringmark (1988).

A - exceeds minimum threshold for first signs of reduction in cover
B - exceeds minimum threshold for obvious reductions in cover
C - exceeds minimum apparent survival thresholds (some dead individuals observed)

Both site and literature reference samples were unwashed.

J - estimated value

Table CK3. Food-web exposure modeling results for willow ptarmigan

		NOAEL Hazard Quotient		LOAEL Hazard Quotient	
Assessment Unit	Chemical	Mean	95% UCL	Mean	95% UCL
Port	Lead	2.4	6.2	0.84	2.2
Port	Mercury	0.40	1.2	0.20	0.62
Port	Zinc (TRV2)	0.82	1.3	0.48	0.74
Road	Barium	1.2	1.7	0.59	0.87
Mine	Barium	1.9	4.0	0.94	2.0
Mine	Lead	1.6	3.5	0.55	1.2
Mine	Zinc (TRV2)	0.51	1.4	0.29	0.81

Note: Results shown only for chemicals with NOAEL-based hazard quotients >1.0.

For 10 CoPCs (aluminum, antimony, arsenic, cadmium, chromium, cobalt, molybdenum, selenium, thallium, and vanadium) all hazard quotients were less than 1.0.
No hazard quotients were exceeded for the reference area; all values were < 1.0.

95% UCL - 95 percent upper confidence limit on the mean
LOAEL - lowest-observed-adverse-effect level
NOAEL - no-observed-adverse-effect level

Table 6-10. Average percent cover and frequency results at coastal plain[a] stations

			Site								Reference	
			TT50010		TT50100		TT51000		TT52000		TS-REF-12	
Species	Species Code	Common Name	C	F	C	F	C	F	C	F	C	F
Forbs												
Anemone narcissiflora	ANNA	Anemone	0.25	10	--	--	--	--	--	--	--	--
Androsace sp.	ANsp	Primrose	--	10	--	--	--	--	--	--	--	--
Pedicularis capitata	PECA	Lousewort	--	10	--	--	--	--	--	--	--	--
Petasites frigidus or hyperboreus	PEFR/PEHY	Sweet coltsfoot	4.75	100	7.25	100	--	--	--	--	--	--
Polemonium acutiflorum	POAC	Jacob's ladder	0.25	50	1.25	90	--	--	--	--	--	--
Polygonum viviparum	POVI	Alpine meadow bistort	--	20	--	--	--	--	--	--	--	--
Saussurea angustifolia	SAAN	Saussurea	--	10	--	--	--	--	--	--	--	--
Stellaria laeta	STLA	Chickweed	--	30	0.75	60	--	--	--	--	--	--
Valeriana capitata	VACA	Valerian	--	20	1.75	20	--	--	--	--	--	--
Forbs Total			5.25		11.0		--		--		--	
Graminoids												
Arctagrostis latifolia var. arundinaceae	ARLA	Polar grass	0.25	20	0.50	60	--	--	--	--	--	--
Carex aquatilis	CAAQ	Carex	0.25	10	1.75	30	--	--	1.25	70	1.00	50
Caryx bigelowii	CABI	Bigelow's sedge	0.25	10	0.25	20	1.00	40	--	20	0.75	30
Calamagrostis holmii	CAHO	Bluejoint grass	--	--	--	--	--	--	--	--	0.25	10
Calamagrostis sp.	CAsp	Bluejoint grass	--	--	0.25	10	--	10	--	--	--	--
Eriophorum angustifolium subarcticum	ERAN	Cottongrass	3.25	40	5.25	60	3.50	40	0.25	10	2.50	60
Eriophorum vaginatum	ERVA	Cottongrass	8.25	80	8.00	90	13.5	100	20.5	100	18.3	100
Hierchloe alpina	HIAL	Holy grass	--	10	--	10	--	--	--	--	--	--
Luzula multiflora multiflora	LUMU	Wood rush	0.25	10	--	--	--	--	--	--	--	--
Luzula wahlenbergii	LUWA	Wood rush	--	--	--	--	--	--	--	--	1.00	40
Poa lanata	POLA	Bluegrass	5.25	70	3.75	100	--	--	--	--	--	10
Graminoids Total			17.8		19.8		18.0		22.0		23.8	
Deciduous Shrubs												
Betula nana exilis	BENA	Dwarf birch	9.25	40	23.0	60	14.3	90	12.3	60	3.00	20
Rubus chamaemorus	RUCH	Salmonberry	0.75	60	7.5	100	1.50	80	6.00	100	13.5	100
Salix arctica	SAAR	Arctic willow	--	10	--	--	--	--	--	--	--	--
Salix planifolia pulchra	SAPL	Diamondleaf willow	21.5	70	0.25	10	--	10	--	--	--	--
Salix polaris	SAPO	Polar willow	0.25	10	--	--	--	--	--	--	--	--
Vaccinium uliginosum alpinum	VAUL	Alpine blueberry	--	--	--	--	8.25	90	14.75	100	3.75	50
Deciduous Shrubs Total			31.8		30.8		24.0		33.0		20.3	

Table 6-10. (cont.)

			Site								Reference	
			TT50010		TT50100		TT51000		TT52000		TS-REF-12	
Species		Common Name	C	F	C	F	C	F	C	F	C	F
Evergreen Shrubs												
Empitrum nigrum hermaphroditum	EMNI	Crowberry	--	10	--	--	2.50	60	4.75	50	1.50	10
Ledum palustre decumbens	LEPA	Labrador tea	1.00	40	--	--	12.3	100	14.8	100	21.8	100
Vaccinium vitis-idaea minus	VAVI	Lingonberry	0.25	20	--	--	13.3	100	12.3	100	13.8	100
Evergreen Shrubs Total			1.25		--		28.0		31.8		37.0	
Vegetative Litter												
Broadleaf litter	Broadleaf litter	Broadleaf litter	18.3	90	13.5	100	2.25	100	10.0	100	17.0	100
Dry blades	Dry blades	Dry blades	37.3	100	46.5	100	45.3	100	38.3	100	38.0	100
Vegetative Litter Total			55.5		60.0		47.5		48.3		55.0	
Other												
Lichen	Lichen	Lichen	--	--	0.25	40	2.75	100	8.25	90	15.8	100
Moss	Moss	Moss	4.25	90	62.0	100	34.5	100	39.8	100	45.0	100
Other Total			4.25		62.3		37.3		48.0		60.8	
Unvegetated												
Bare ground	Bare ground	Bare ground	2.25	90	--	--	--	10	--	--	0.50	20
Road gravel	Road gravel	Road gravel	4.00	70	--	--	--	--	--	--	--	--
Water	Water	Water	0.50	20	--	--	--	--	--	--	--	--
Unvegetated Total			6.75		--		--		--		0.50	

Note: -- - not identified in any 1-m^2 microplot
C - average 1-m^2 microplot cover percentage
F - percent frequency in ten 1-m^2 microplots

[a] Coastal plain mesic tussock tundra community.

Table 6-11. Average percent cover and frequency results at tundra[a] stations

			Site												Reference			
			TT30010		TT80010		TT30100		TT80100		TT31000		TT81000		TS-REF-5		TS-REF-7	
Species	Species Code	Common Name	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F
Forbs																		
Arnica lessingii lessingii	ARLE	Arnica	0.25	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Equisetum arvense	EQAR	Horsetail	--	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Petasites frigidus or hyperboreus	PEFR/PEHY	Sweet coltsfoot	--	--	6.50	100	--	--	--	10	--	--	--	--	--	--	1.50	20
Pedicularis labradorica	PELA2	Lousewort	--	--	0.25	10	--	--	0.25	10	0.25	10	--	--	0.25	10	0.50	30
Stellaria laeta	STLA	Chickweed	--	--	--	10	--	--	--	--	--	--	--	--	--	--	--	--
Forbs Total			0.25		6.75		--		0.25		0.25		--		0.25		2.00	
Graminoids																		
Arctagrostis latifolia var. latifolia	ARLA2	Polar grass	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.25	20
Carex aquatilis	CAAQ	Carex	2.50	50	--	--	2.50	60	0.25	10	--	--	2.25	40	--	--	--	--
Caryx bigelowii	CABI	Bigelow's sedge	--	--	15.5	90	--	--	14.3	90	--	50	3.75	50	--	10	1.75	70
Carex rotundata	CARO	Sedge	--	--	--	--	0.25	10	--	--	--	--	--	--	--	--	--	--
Eriophorum angustifolium subarcticum	ERAN	Cottongrass	0.25	10	--	--	2.00	30	--	--	0.25	10	0.25	10	0.25	10	0.25	10
Eriophorum vaginatum	ERVA	Cottongrass	15.8	100	5.25	70	20.5	100	12.8	80	14.8	100	24.3	100	12.3	100	24.5	100
Luzula multiflora multiflora	LUMU	Wood rush	--	--	0.25	10	--	--	--	--	--	--	--	--	--	--	--	--
Graminoids Total			18.5		21.0		25.3		27.3		15.0		30.5		12.5		26.8	
Deciduous Shrubs																		
Betula nana exilis	BENA	Dwarf birch	14.5	100	35.5	100	16.8	100	31.0	100	11.0	100	8.75	100	5.25	70	16.8	100
Rubus chamaemorus	RUCH	Salmonberry	22.8	100	1.00	50	11.8	80	3.75	50	4.75	100	2.75	80	28.5	100	15.3	100
Salix ovalifolia	SAOV	Ovaleaf willow	--	--	--	--	3.75	10	--	--	--	--	--	--	--	--	--	--
Salix planifolia pulchra	SAPL	Diamondleaf willow	--	--	8.00	30	--	--	0.25	10	--	--	--	--	0.25	10	1.75	20
Vaccinium uliginosum alpinum	VAUL	Alpine blueberry	28.8	100	1.00	40	26.3	100	3.00	20	28.8	100	20.0	90	37.8	100	26.5	70
Deciduous Shrubs Total			66.0		45.5		58.5		38.0		44.5		31.5		71.8		60.3	
Evergreen Shrubs																		
Andromeda polifolia	ANPO	Bog rosemary	0.75	70	--	--	2.00	70	--	--	--	--	--	--	0.50	50	0.25	30
Empitrum nigrum hermaphroditum	EMNI	Crowberry	4.25	90	0.75	50	2.50	80	5.25	20	3.75	70	5.00	50	8.50	100	8.50	90
Ledum palustre decumbens	LEPA	Labrador tea	1.75	100	8.75	100	13.5	100	24.0	100	11.3	100	15.8	100	15.5	100	16.0	100
Vaccinium vitis-idaea minus	VAVI	Lingonberry	0.75	90	1.75	100	2.00	40	10.0	100	15.8	100	18.0	100	4.25	100	7.00	100
Evergreen Shurbs Total			7.50		11.3		20.0		39.3		30.8		38.8		28.8		31.8	
Vegetative Litter																		
Broadleaf litter	Broadleaf litter	Broadleaf litter	13.3	100	8.50	100	21.0	80	10.0	100	14.5	90	3.50	100	45.3	100	12.3	100
Dry blades	Dry blades	Dry blades	21.8	100	55.0	100	32.3	100	40.0	100	35.8	100	40.3	100	17.0	100	31.3	100
Vegetative Litter Total			35.0		63.5		53.3		50.0		50.3		43.8		62.3		43.5	
Other																		
Lichen	Lichen	Lichen	--	--	--	--	2.25	60	0.50	50	4.75	100	5.00	100	21.8	100	9.75	100
Moss	Moss	Moss	26.3	100	14.3	100	34.3	90	40.5	100	37.5	100	48.8	100	45.5	100	52.3	100
Other Total			26.3		14.3		36.5		41.0		42.3		53.8		67.3		62.0	

Table 6-11. (cont.)

			Site												Reference			
			TT30010		TT80010		TT30100		TT80100		TT31000		TT81000		TS-REF-5		TS-REF-7	
Species	Species Code	Common Name	C	F	C	F	C	F	C	F	C	F	C	F	C	F	C	F
Unvegetated																		
Bare ground	Bare ground	Bare ground	4.00	20	2.00	30	--	--	0.50	20	--	--	--	--	--	--	--	--
Road gravel	Road gravel	Road gravel	2.25	70	3.75	70	--	--	--	--	--	--	--	--	--	--	--	--
Rock	Rock	Rock	0.50	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Water	Water	Water	1.50	10	0.25	10	18.0	50	3.50	40	--	--	4.75	40	0.50	30	0.75	40
Unvegetated Total			8.25		6.00		--		4.00		--		--		--		--	

Note: -- - not identified in any 1-m^2 microplot
C - average 1-m^2 microplot cover percentage
F - percent frequency in ten 1-m^2 microplots

[a] Foothills mesic tussock tundra community.

Table 6-26. Metals concentrations in site and reference stream sediments and invertebrates

	Stream Sediment					Stream Invertebrates				
	Site			Reference		Site[a]			Reference[b]	
Analyte	AC-R	ARC-R	OR-R	ST-REF-3	ST-REF-6	AC-R	ARC-R	OR-R	ST-REF-3	ST-REF-6
Cadmium	0.49	1.06	0.44 *J*	0.25	0.19	0.228	0.803	0.365	0.696	0.347
Lead	29.2	117	22	9.5	5.71	4.43 *J*	10.9 *J*	5.16 *J*	8.14 *J*	2.73 *J*
Zinc	125	148	107	66.9	33.1	87.8 *J*	96.2 *J*	79 *J*	137 *J*	91.3 *J*

Note: Concentrations in mg/kg dry weight
Field replicates averaged

J - estimated value

[a] Predominantly crane fly larvae, with small proportions of stone fly larvae, caddis fly larvae, and/or amphipods.

[b] Composite of crane fly larvae, caddis fly larvae, and stone fly larvae.

Table JS1. Summary of comparison of vegetation survey parameters at site and reference areas

	Coastal		Tundra and Coastal Plain Combined [a]					
Parameter	Plain	Tundra	All	10 m[b]	100 m[b]	1,000 m[b]	Hillslope	Lagoon
Forb cover	--	--	--	--	--	--	--	--
Graminoid cover	--	--	--	--	--	--	--	--
Deciduous shrub cover	--	Sig. Different	--	--	--	--	--	--
Evergreen shrub cover	--	--	--	Sig. Different	--	--	--	--
Moss cover	--	Sig. Different	Sig. Different	--	Sig. Different	--	--	--
Moss frequency	--		--	--	--	--	--	--
Lichen cover	--	Sig. Different	Sig. Different	Sig. Different	Sig. Different	Sig. Different	--	--
Lichen frequency	--	--	Sig. Different	Sig. Different	Sig. Different	--	--	--
Vegetative litter	--	--	--	--	--	--	--	--
Unvegetated cover	--	--	--	--	Sig. Different	--	--	--
Diversity	--	--	--	--	--	--	--	--
Evenness	--	--	--	Sig. Different	Sig. Different	Sig. Different	--	--
Richness	--	--	--	--	--	Sig. Different	--	--

Source: Table 6-3

Note: Significance level for the statistical comparison is $p < 0.10$.

-- - indicates site vegetation parameters not significantly different from reference site
Sig. Different - indicates site vegetation parameters significantly different from reference site

[a] Coastal plain and tundra communities were similar and thus were combined and tested against their corresponding combined reference samples to increase the sample size and thus increase the power of the test to detect differences between site stations and reference stations.

[b] The coastal plain and tundra communities showed similar changes with distance from the road, so samples were combined according to their respective distance.

Table JS2. Summary of vegetation parameter correlations with distance from DMTS road

	Hillslope, Coast Plain, Tundra Transects	Coastal Plain and Tundra Transects Only
Forb cover	Negative correlation	Negative correlation
Graminoid cover	--	--
Deciduous shrub cover	--	--
Evergreen shrub cover	Positive correlation	Positive correlation
Moss cover	--	Positive correlation
Moss frequency	--	--
Lichen cover	Positive correlation	Positive correlation
Lichen frequency	Positive correlation	Positive correlation
Vegetative litter	--	--
Unvegetated cover	Negative correlation	Negative correlation
Diversity	--	--
Evenness	Positive correlation	Positive correlation
Richness	Negative correlation	Negative correlation

Source: Table 6-4

Note: Spearman rank non-parametric correlation was used.
Positive and negative correlations were significant with distance (p <0.10).

-- - no correlation
Negative correlation - indicates that as one variable increases, the other decreases
Positive correlation - indicates that as one variable increases, so does the other

Table JS3. Locations where phytotoxicity benchmarks were exceeded for vascular plants

CoPC	Number of Site Stations Exceeding Benchmarks	Number of Reference Stations Exceeding Benchmarks	Station Locations with Exceedances
Aluminum	11/29	5/11	TT2-0010, TT3-0100, TT5-0010, TT8-0010, TP-0100, TP-1000, TP-3, TP-4, AC-R, ARC-R, OR-R, ST-REF-3, ST-REF-5, ST-REF-6, TP-REF-3, TP-REF-5
Antimony	0/29	0/11	
Arsenic	0/29	1/11	TP-REF-5
Barium	0/29	0/11	
Cadmium	3/29	0/11	TT2-0010, TT5-0010, TT8-0010
Chromium	3/29	2/11	OR-R, TP1-0100, TP-4, TP-REF-3, TP-REF-5
Cobalt	4/29	2/11	TT3-0100, TT8-0100, TT8-1000, TP1-1000, TP-REF-5, TS-REF-5
Lead	2/29	0/11	TP1-0100, TP-4
Mercury	0/29	0/11	
Molybdenum	0/29	0/11	
Selenium	0/29	0/11	
Thallium	0/29	0/11	
Vanadium	0/29	1/11	TP-REF-3
Zinc	23/29	2/11	TT2-0010, TT2-0100, TT2-1000, TT3-0010, TT3-0100, T3-1000, TT5-0010, TT5-0100, TT5-1000, TT5-2000, TT6-0010, TT6-0100, TT6-2000, TT7-0010, TT7-1000, TT7-2000, TT8-0010, TT8-0100, TT8-1000, TP1-0100, TP-4, AC-R, ARC-R, TS-REF-7, TS-REF-11

Source: Tables 6-16, 6-17, 6-18, 6-22, 6-23

Note:

-0010, -0100, -1000	-	approximate distance of station from DMTS Road or facilities in meters
AC-R	-	Aufeis Creek station, just downstream of the DMTS road crossing
ARC-R	-	Anxiety Ridge Creek station, just downstream of the DMTS road crossing
OR-R	-	Omikviorok River station, just downstream of the DMTS road crossing
REF	-	reference stations
ST	-	stream station
TP	-	tundra pond station
TS	-	tundra soil station
TT	-	terrestrial transect station

Table JS4. Locations where phytotoxicity benchmarks were exceeded for mosses and lichens

CoPC	Number of Site Stations Where Moss Samples Exceeded Benchmarks	Number of Site Stations Where Lichen Samples Exceeded Benchmarks	Number of Reference Stations Where Moss or Lichen Samples Exceeded Benchmarks	Moss Station Locations With Exceedances	Lichen Station Locations With Exceedances
Copper	0/155	--	0/9	None	None
Zinc	120/155	15/32	0/9	001P-M01, 002P-M01, 003P-M01, 004P-M01, 005P-M01, 006-M01, 007P-M01, 008P-M01, 009D-M01, 009-M01, 010P-M01, 011P-M01, 013P-M01, 015-M01, 016P-M01, 017P-M01, 018D-M01, 018P-M01, 019P-M01, 020P-M01, 021P-M01, 022P-M01, 023P-M01, 024P-M01, 025P-M01, 026D-M01, 026D-M01, 028P-M01, 030P-M01, 031P-M01, 031R-M01, 032P-M01, 032R-M01, 036-M01, 036R-M01, 037P-M01, 038R-M01, 039P-M01, 041P-M01, 044P-M01, 044R-M01, 046P-M01, 050P-M01, 051A-M01, 052P-M01, 053D-M01, 053P-M01, 059D-M01, 059P-M01, 060P-M01, 161R-M01, HR01-01A, HR01-02M, HR01-03M, HR02-01M, HR02-02M, HR03-01M, HR03-02M, HR03-03M, HR04-01B, HR04-02M, HR04-03M, HR05-01M, HR05-02M, HR06-01M, HR06-02M, HR06-03M, HR06-04M, HS1N0003, HS1N0050, HS1N0100, HS1N0250, HS1S0003, HS1S0050, HS10100, HS2N0003, HS2N0050, HS2N0100, HSN0250, HSN1000, HS2S0003, HS2S0050, HS2S0100, HS3N0003, HS3N0050, HS3N0100, HS3N0250, HSN3N1000, HS3N1600, HS3S0003, HS3S0050, HS3S0100, HS3S0250, MI-02M, MI-108, MI-25-M, MI26-M, MI-42M, MI-45M, PO-01M, PO-02M, PO-04M, PO-05M, PO-06M, PO-07M, PO-09M, PO-10M, PO-11M, PO-13M, PO-15M, PO-16M, PO-17M, PO-18M, TT1-0100, TT1-1000, TT2-0010, TT2-0100, TT2-1000, TT3-0010, TT3-0100	HR01-02L, HR02-02L, HR01-01B, HR07-02L, PO-04L, PO-11L, PO-17L, TT2-0010, TT5-0010, TT5-0100, TT5-1000, TT7-0010, TT7-1000, TT7-2000, TT8-0010

Source: Tables CK1 and CK2

Note: Copper data not available for lichens along DMTS road.

CoPC - chemical of potential concern
DMTS - DeLong Mountain Regional Transportation System
HR - DMTS road transect samples
HS - National Park Service samples collected along transects at Cape Krusenstern National Monument
MO - National Park Service samples collected in outlying areas at Cape Krusenstern National Monument
PO - Port site samples
TT - terrestrial transect station samples

Table JS5a. Locations and receptors for which NOAEL or LOAEL hazard quotients exceed 1.0

Assessment Unit Location	Aluminum	Antimony	Arsenic (arsenate)	Arsenic (arsenite)	Barium	Cadmium	Chromium	Cobalt	Lead	Mercury	Molybdenum	Selenium	Thallium	Vanadium	Zinc
DMTS Road and Port Operations															
Site Stations															
Whole Site	Moose, caribou				Caribou										
Port Site	Moose, fox, caribou				Caribou				Ptarmigan	Ptarmigan					Ptarmigan
Near Mine	Moose, caribou				Ptarmigan, caribou				Ptarmigan, caribou						Ptarmigan
Road Site	Moose, fox, caribou				Ptarmigan, caribou					Owl, fox					
Reference Stations															
Reference Site	Moose, fox, caribou														
Lagoon Environment															
Site Stations															
Control Lagoon	Moose, muskrat														
North Lagoon	Moose, muskrat														
Port Lagoon North	Moose, muskrat								Plover						
Reference Stations															
Reference Lagoon	Moose, muskrat														
Tundra Pond Environment															
Site Stations															
TP1-0100	Muskrat														
TP1-1000	Muskrat							Muskrat							
TP3	Muskrat				Muskrat										
TP4	Muskrat				Muskrat										
Reference Stations															
TP-REF-2	Muskrat														
TP-REF-3	Teal, muskrat			Muskrat	Muskrat		Teal, muskrat							Muskrat	
TP-REF-5	Teal, muskrat		Muskrat	Muskrat	Muskrat		Teal							Muskrat	
Stream Environment															
Site Stations															
ARC-R	Moose, muskrat				Moose, muskrat										
OR-R	Moose, muskrat			Muskrat	Muskrat									Muskrat	
AC-R	Moose														
Reference Stations															
ST-REF-3	Moose, muskrat			Muskrat											
ST-REF-5	Moose, muskrat				Muskrat										
ST-REF-6	Moose, muskrat				Muskrat										
Terrestrial Environment															
Site Stations															
TT2-0010	Vole, shrew, snipe			Shrew	Vole, shrew	Shrew			Shrew	Shrew				Vole, shrew	Shrew
TT2-0100	Vole, shrew				Vole, shrew	Shrew				Shrew		Shrew		Shrew	
TT2-1000	Vole, shrew									Shrew		Shrew			
TT3-0010	Vole, shrew, snipe			Shrew	Vole, shrew	Shrew				Shrew				Vole, shrew	
TT3-0100	Vole, shrew				Vole, shrew	Shrew				Shrew					
TT3-1000	Vole, shrew				Vole										
TT5-0010	Snipe, vole, shrew			Shrew	Vole, shrew	Shrew			Snipe, vole, shrew	Shrew		Shrew		Shrew	Shrew

Table JS5. (cont.)

Assessment Unit Location	Aluminum	Antimony	Arsenic (arsenate)	Arsenic (arsenite)	Barium	Cadmium	Chromium	Cobalt	Lead	Mercury	Molybdenum	Selenium	Thallium	Vanadium	Zinc
Terrestrial Environment (cont.)															
Site Stations (cont.)															
TT5-0100	Vole, shrew			Shrew	Vole, shrew	Shrew			Snipe, vole, shrew	Shrew				Shrew	Shrew
TT5-1000	Vole, shrew				Vole					Shrew		Shrew			
TT5-2000	Vole, shrew					Shrew				Shrew		Shrew			Shrew
TT6-0010	Vole, shrew, snipe			Vole, shrew	Vole, shrew, snipe	Shrew								Vole, shrew	
TT6-0100	Vole, shrew				Vole, shrew, snipe	Shrew				Shrew					
TT6-1000	Vole, shrew				Vole, shrew	Shrew					Shrew			Shrew	
TT6-2000	Vole				Vole										
TT7-0010	Vole			Vole	Vole				Vole					Vole	
TT7-1000	Vole				Vole				Vole		Vole				
TT7-2000	Vole				Vole										
TT8-0010	Vole				Vole									Vole	
TT8-0100	Vole				Vole										
TT8-1000	Vole														
Reference Stations															
TS-REF-5	Vole, shrew, snipe				Vole, shrew							Shrew		Shrew	
TS-REF-7	Vole				Vole										
TS-REF-11	Vole														

Source: Appendix K tables of this report.

Note:

-0010, -0100, -1000	-	approximate distance of station from DMTS Road or facilities in meters
AC-R	-	Aufeis Creek station, just downstream of the DMTS road crossing
ARC-R	-	Anxiety Ridge Creek station, just downstream of the DMTS road crossing
DMTS	-	DeLong Mountain Regional Transportation System
LOAEL	-	lowest-observed-adverse-effect level
NOAEL	-	no-observed-adverse-effect level
OR-R	-	Omikviorok River station, just downstream of the DMTS road crossing
REF	-	reference stations
ST	-	stream station
TP	-	tundra pond station
TS	-	tundra soil station
TT	-	terrestrial transect station

Table JS5b. Locations and receptors for which only LOAEL hazard quotients exceed 1.0

Assessment Unit Location	Aluminum	Antimony	Arsenic (arsenate)	Arsenic (arsenite)	Barium	Cadmium	Chromium	Cobalt	Lead	Mercury	Molybdenum	Selenium	Thallium	Vanadium	Zinc
DMTS Road and Port Operations															
Site Stations															
Whole Site	Caribou				Caribou										
Port Site	Caribou, fox								Ptarmigan						
Near Mine	Caribou				Ptarmigan, caribou				Ptarmigan						
Road Site	Caribou									Fox, owl					
Reference Stations															
Reference Site	Caribou														
Lagoon Environment															
Site Stations															
Control Lagoon															
North Lagoon															
Port Lagoon North															
Reference Stations															
Reference Lagoon															
Tundra Pond Environment															
Site Stations															
TP1-0100															
TP1-1000															
TP3															
TP4					Muskrat										
Reference Stations															
TP-REF-2															
TP-REF-3	Muskrat														
TP-REF-5	Muskrat														
Stream Environment															
Site Stations															
ARC-R	Muskrat														
OR-R	Muskrat														
AC-R															
Reference Stations															
ST-REF-3	Muskrat														
ST-REF-5	Muskrat														
ST-REF-6	Muskrat														

Table JS5. (cont.)

Assessment Unit Location	Aluminum	Antimony	Arsenic (arsenate)	Arsenic (arsenite)	Barium	Cadmium	Chromium	Cobalt	Lead	Mercury	Molybdenum	Selenium	Thallium	Vanadium	Zinc
Terrestrial Environment															
Site Stations															
TT2-0010	Vole, shrew				Vole, shrew										
TT2-0100	Vole, shrew														
TT2-1000															
TT3-0010	Vole, shrew				Vole, shrew										
TT3-0100	Vole, shrew				Vole, shrew										
TT3-1000															
TT5-0010	Vole, shrew				Vole, shrew										
TT5-0100	Vole, shrew				Vole, shrew										
TT5-1000															
TT5-2000															
TT6-0010	Vole, shrew				Vole, shrew										
TT6-0100	Vole, shrew				Vole, shrew										
TT6-1000	Vole				Shrew										
TT6-2000															
TT7-0010	Vole				Vole										
TT7-1000	Vole				Vole										
TT7-2000					Vole										
TT8-0010	Vole				Vole										
TT8-0100	Vole				Vole										
TT8-1000															
Reference Stations															
TS-REF-5 Site	Vole, shrew														
TS-REF-7 Site															
TS-REF-11 Site															

Source: Appendix K tables of this report.

Note:
-0010, -0100, -1000 - approximate distance of station from DMTS Road or facilities in meters
AC-R - Aufeis Creek station, just downstream of the DMTS road crossing
ARC-R - Anxiety Ridge Creek station, just downstream of the DMTS road crossing
DMTS - DeLong Mountain Regional Transportation System
LOAEL - lowest-observed-adverse-effect level
OR-R - Omikviorok River station, just downstream of the DMTS road crossing

REF - reference stations
ST - stream station
TP - tundra pond station
TS - tundra soil station
TT - terrestrial transect station

Table JS6. Summary of LOAEL hazard quotient exceedances

	Aluminum	Antimony	Arsenic (arsenate)	Arsenic (arsenite)	Barium	Cadmium	Chromium	Cobalt	Lead	Mercury	Molybdenum	Selenium	Thallium	Vanadium	Zinc
Tundra vole															
Site stations	13/20	--	0/20	0/20	12/20	0/20	0/20	0/20	0/20	0/20	0/20	0/20	0/20	0/20	0/20
Reference stations	1/3	--	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3	0/3
Common snipe															
Site stations	--	--	0/13	0/13	0/13	0/16	0/13	--	0/16	0/16	0/13	0/13	0/13	--	0/16
Reference stations	--	--	0/2	0/2	0/2	0/3	0/2	--	0/3	0/3	0/2	0/2	0/2	--	0/3
Lapland longspur															
Site stations	--	--	0/13	0/13	0/13	0/13	0/13	--	0/13	0/13	0/13	0/13	0/13	--	0/13
Reference stations	--	--	0/1	0/1	0/1	0/1	0/1	--	0/1	0/1	0/1	0/1	0/1	--	0/1
Black-bellied plover															
Site stations	--	--	0/3	0/3	0/3	--	--	--	0/3	0/3	0/3	0/3	0/3	--	0/3
Reference stations	--	--	0/1	0/1	0/1	--	--	--	0/1	0/1	0/1	0/1	0/1	--	0/1
Green-winged teal															
Site stations	--	--	0/6	0/6	0/6	0/6	0/6	--	0/6	0/6	0/6	0/6	0/6	--	0/6
Reference stations	--	--	0/6	0/6	0/6	0/6	0/6	--	0/6	0/6	0/6	0/6	0/6	--	0/6
Snowy owl															
Site stations	--	--	0/2	0/2	0/2	0/2	0/2	--	0/2	1/2	0/2	0/2	0/2	--	0/2
Reference stations	--	--	0/1	0/1	0/1	0/1	0/1	--	0/1	0/1	0/1	0/1	0/1	--	0/1
Willow ptarmigan															
Site stations	--	--	0/3	0/3	1/3	0/3	0/3	--	2/3	0/3	0/3	0/3	0/3	--	0/3
Reference stations	--	--	0/1	0/1	0/1	0/1	0/1	--	0/1	0/1	0/1	0/1	0/1	--	0/1
Brant															
Site stations	--	--	0/3	0/3	0/3	0/3	0/3	--	0/3	0/3	0/3	0/3	0/3	--	0/3
Reference stations	--	--	0/1	0/1	0/1	0/1	0/1	--	0/1	0/1	0/1	0/1	0/1	--	0/1
Arctic fox															
Site stations	1/2	--	0/2	0/2	0/2	0/2	0/2	0/2	0/2	1/2	0/2	0/2	0/2	0/2	0/2
Reference stations	0/1	--	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Caribou															
Site stations	4/4	--	0/4	0/4	2/4	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/4	0/4
Reference stations	1/1	--	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Moose															
Site stations	0/10	--	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10	0/10
Reference stations	0/5	--	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5	0/5
Tundra shrew															
Site stations	8/13	--	0/13	0/13	8/13	0/13	0/13	0/13	0/13	0/13	0/13	0/13	0/13	0/13	0/13
Reference stations	1/1	--	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1	0/1
Muskrat															
Site stations	2/9	--	0/9	0/9	1/9	0/9	0/9	0/9	0/9	0/9	0/9	0/9	0/9	0/9	0/9
Reference stations	5/7	--	0/7	0/7	0/7	0/7	0/7	0/7	0/7	0/7	0/7	0/7	0/7	0/7	0/7

Source: Appendix K tables of this report.

Note: Ratios represent number of LOAEL exceedances/number of sites evaluated.
Shaded cells are those with one or more exceedances.

This summary is based on the most conservative scenarios presented in Appendix K.

-- - analyte not analyzed
LOAEL - lowest-observed-adverse-effect level

Table JS7. Summary of observed and predicted ecological effects[a]

Terrestrial Habitats	Observed or Predicted Effects		
Receptor	Near Port	Near Mine[b]	DMTS Road
Caribou	--	--	--
Moose	--	--	--
Lapland longspur	--	--	--
Snowy owl	--	--	--
Arctic fox	--	--	--
Ptarmigan	yes[c]	yes[c]	--
Tundra vole	--	--	--
Tundra shrew	--	--	--
Vegetation	yes[d]	yes[b,e]	yes[d]

Freshwater Habitats	Observed or Predicted Effects			
Receptor	Aufeis Creek	Omikiviorok Creek	Anxiety Ridge Creek	Tundra Ponds
Benthic macroinvertebrates	--	--	--	[f]
Fish	--	--	--[g]	--[h]
Green-winged teal	--	--	--	--
Muskrat	--	--	--	--
Moose	--	--	--	--
Common snipe	--	--	--	--
Vegetation	[f]	[f]	[f]	--[i]

Coastal Lagoon Habitats	Observed or Predicted Effects
Receptor	Lagoons[j]
Benthic macroinvertebrates	--
Fish	--[k]
Brant	--
Muskrat	--
Moose	--
Black-bellied plover	--
Vegetation	--

Source: Summary based on Tables 6-42 and 6-43, and the interpretation of ecological significance (Section 6.7).

Note: -- - indicates very low or no likelihood of adverse effects

[a] Observed or predicted effects indicated as "yes" are to be addressed in a risk management plan, as discussed in Section 8.

[b] The areas evaluated near the mine were outside the mine boundary. The area within the mine boundary was beyond the scope of this assessment.

[c] Potential for adverse effects from lead.

[d] Vegetation survey parameters were statistically compared to reference area data (Tables 6-3 and 6-37), and several differences were observed, as summarized in Table 6-37. No individual metals were isolated as primary causative factors. Multiple causative factors are likely.

[e] The hillslope community vegetation did not show significant difference from the reference site (Tables 6-3 and 6-37). However, at one transect station just west of the mine's ambient air/solid waste permit boundary, some shrubs appeared to be in poor condition.

[f] Not evaluated.

[g] Cadmium and lead levels in some juvenile Dolly Varden exceeded conservative screening levels for fish tissue, but were also within the range of no-effects levels (Table 6-27).

[i] Exception: Effects possible from lead and zinc in ephemeral tundra ponds located within 100 m of port facility structures, based on exceedances of literature-derived effects thresholds. However, tundra pond vegetation appeared healthy during field sampling.

[j] Lagoons located within the port site boundary.

[k] No fish were present in port site lagoons, as they have no open water connections to the Chukchi Sea.

Attachment E-1

Sediment Toxicity Testing Report
MEC Analytical Systems

MEC
ANALYTICAL SYSTEMS
WESTON SOLUTIONS
152 Sunset View Lane, Sequim, WA 98382 / (360) 582-1758 / (360) 582-1679 FAX

August 12, 2004

Scott Shock
Exponent
15375 SE 30th Place, Ste. 250
Bellevue, Washington 98007

Dear Scott:

We are pleased to provide you with the survival and growth results and ancillary data in support of the Red Dog Mine Phase II sediment evaluation. This report includes a brief description of the test methods, test acceptability assessment, and a summary of test results.

Sediment toxicity was evaluated using the 10-day, benthic acute test with *Hyalella azteca*. Sediment treatments SD0001, SD0002, SD0003, SD0004, SD0005, and SD0007 were received on July 7, 2004 in good condition and were stored in the dark at 4°C. *Hyalella azteca* were supplied by Aquatic Biosystems of Boulder Colorado and delivered directly to the Carlsbad Laboratory. Test organisms were reared in the laboratory in native sediments. Native sediment was also provided for control sediment treatments.

The 10-d acute toxicity tests with *Hyalella azteca* were initiated on July 17, 2004. To prepare the test exposures, all jars of sediment were homogenized and approximately 200 mL of sediment were placed in clean, acid and solvent-rinsed 1-L glass jars, which were then filled to 950 mL with deionized water. Eight replicate chambers were prepared for each test treatment and the native sediment control treatment. Test chambers were then placed in randomly assigned positions in a temperature-controlled room at 20°C and allowed to equilibrate overnight. Trickle-flow aeration was provided only if dissolved oxygen concentrations dropped below acceptable levels. The test was initiated by randomly allocating ten 7-day-old *Hyalella* into each test chamber, ensuring that each of the amphipods successfully buried into the sediment. Amphipods that did not bury within approximately 2 hours were replaced with healthy amphipods. Dissolved oxygen, temperature, pH, and salinity were monitored in each replicate at initiation and termination, and in one replicate per treatment on test days 1 through 9.

Target test parameters were as follows:

Dissolved Oxygen:	≥3.4 mg/L
pH:	7.00 ±1.0 units
Temperature:	23°C ±2°C
Conductivity:	<50% variation

The 10-day test was conducted as a static-renewal test, with exchanges of 400 mL of water occurring daily. *Hyalella* were fed daily with 1.0 mL of YCT stock solution (1800 mg YCT/L). At test termination, sediment from each test chamber was sieved through a 0.5-mm screen and all recovered amphipods transferred into a Petri dish. The number of surviving and dead amphipods was then determined under a dissecting microscope, with 10% of the counts being confirmed by a second observer. All surviving amphipods were then transferred to pre-weighed, aluminum foil weigh boats, and then dried in a drying oven at 60°C for approximately 24 hours. Each weigh boat was removed, cooled in a dessication jar, then weighed on a microbalance to 0.01 mg. A water-only, 4-day reference-toxicant test with cadmium chloride was conducted concurrently with the sediment tests.

Results:

A summary of *Hyalella* survival and biomass is presented in Table 1 and a summary of water quality observations is presented in Table 2. Raw data sheets are presented in Appendix A. The *Hyalella* test was validated by greater than 80% survival in the controls and measurable growth in all control replicates. The LC50 for the copper reference-toxicant test was 0.31 mg Cu/L, which is within the control chart limits (0.0 to 0.41 mg Cu/L), indicating that the test organisms used in this study were of similar sensitivity of those previously tested at Carlsbad.

Temperature remained within acceptable limits throughout the test. Dissolved oxygen in treatments SD0001 and SD0004 dropped to 2.2 mg/L and 3.3 mg/L, respectively on Day 1. Trickle-flow aeration was initiated on all test chambers on Day 1 and continued throughout the remainder of the test. In all test treatments, pH was slightly above acceptable limits; however pH for all treatments were within 0.3 pH units of the acceptable limits. Conductivity in the test treatments decreased throughout the test. This was due to acclimation of test sediments to the conductivity of the lab water (0.19 mS/cm). The deviations in water quality did not appear to have an affect on test results as all test treatments exceeded the controls for both survival and growth.

Mean percent survival in the controls was 90.0% for *H. azteca* and mean individual growth, based on the number at initiation, was 0.1 mg/individual. Mean percent survival in the test treatments ranged from 91.3% in SD0003 to 98.8% in SD0001, SD0002, and SD0005. Growth in the test treatments ranged from 0.19 mg/individual in SD0005 and SD0007 to 0.28 mg/individual in SD0002. Survival and growth in each of the test treatments was greater than that of the controls, indicating that there was no biologically significant toxicity in any of the test treatments.

Please call me if there are any questions.

Sincerely,

William Gardiner

Senior Scientist
MEC-Weston Solutions, Inc

Table 1. 10-Day Solid-Phase Test with Hyalella azteca, Red Dog Mine Phase II, Exponent

Sample	Rep	Number Initiated	Number Surviving	% Survival	Mean % Survival	Total Biomass	Growth[a]	Mean Growth	SD
Control	1	10	7	70.0		0.83	0.08		
Control	2	10	9	90.0		1.00	0.10		
Control	3	10	8	80.0		0.96	0.10		
Control	4	10	8	80.0		0.80	0.08		
Control	5	10	10	100.0		1.12	0.11		
Control	6	10	10	100.0		1.23	0.12		
Control	7	10	10	100.0		1.11	0.11		
Control	8	10	10	100.0	**90.0**	1.23	0.12	**0.10**	**0.01**
1	1	10	9	90.0		2.23	0.22		
1	2	10	10	100.0		2.71	0.27		
1	3	10	10	100.0		2.66	0.27		
1	4	10	10	100.0		2.45	0.25		
1	5	10	10	100.0		2.92	0.29		
1	6	10	10	100.0		2.40	0.24		
1	7	10	10	100.0		2.82	0.28		
1	8	10	10	100.0	**98.8**	3.06	0.31	**0.27**	**0.03**
2	1	10	10	100.0		2.66	0.27		
2	2	10	10	100.0		2.74	0.27		
2	3	10	10	100.0		3.10	0.31		
2	4	10	9	90.0		2.25	0.23		
2	5	10	10	100.0		3.16	0.32		
2	6	10	10	100.0		3.10	0.31		
2	7	10	10	100.0		2.62	0.26		
2	8	10	10	100.0	**98.8**	2.82	0.28	**0.28**	**0.03**
3	1	10	7	70.0		0.98	0.10		
3	2	10	10	100.0		2.50	0.25		
3	3	10	10	100.0		2.26	0.23		
3	4	10	9	90.0		2.34	0.23		
3	5	10	10	100.0		2.71	0.27		
3	6	10	10	100.0		2.31	0.23		
3	7	10	7	70.0		1.15	0.12		
3	8	10	10	100.0	**91.3**	2.50	0.25	**0.21**	**0.07**

Table 1. Continued.

Sample	Rep	Number Initiated	Number Surviving	% Survival	Mean % Survival	Total Biomass	Growth[a]	Mean Growth	SD
4	1	10	10	100.0		2.88	0.29		
4	2	10	10	100.0		2.83	0.28		
4	3	10	10	100.0		2.98	0.30		
4	4	10	9	90.0		2.50	0.25		
4	5	10	9	90.0		2.78	0.28		
4	6	10	10	100.0		2.36	0.24		
4	7	10	10	100.0		2.77	0.28		
4	8	10	10	100.0	**97.5**	2.83	0.28	**0.27**	**0.02**
5	1	10	10	100.0		2.04	0.20		
5	2	10	10	100.0		2.23	0.22		
5	3	10	9	90.0		1.45	0.15		
5	4	10	10	100.0		1.98	0.20		
5	5	10	10	100.0		1.66	0.17		
5	6	10	10	100.0		1.60	0.16		
5	7	10	10	100.0		2.16	0.22		
5	8	10	10	100.0	**98.8**	1.73	0.17	**0.19**	**0.03**
7	1	10	8	80.0		1.31	0.13		
7	2	10	9	90.0		1.76	0.18		
7	3	10	9	90.0		1.85	0.19		
7	4	10	10	100.0		2.35	0.24		
7	5	10	10	100.0		1.97	0.20		
7	6	10	10	100.0		1.88	0.19		
7	7	10	10	100.0		1.93	0.19		
7	8	10	10	100.0	**95.0**	2.29	0.23	**0.19**	**0.03**

[a] Growth calculated as total biomass divided by number initiated.

Table 2. Summary of Water Quality Observations for 10-Day Benthic Test with *Hyalella azteca*, Red Dog mine Phase II, Exponent

Sample	Statistic	Dissolved Oxygen (mg/L)	Temperature (°C)	Conductivity (mS/cm)	pH
Control	Minimum	6.7	21.4	0.18	7.7
	Maximum	8.3	22.2	0.21	8.3
SD0001	Minimum	2.2	21.1	0.19	6.9
	Maximum	7.8	22.2	0.45	8.2
SD0002	Minimum	4.8	21.4	0.20	7.2
	Maximum	8.2	22.3	0.67	8.3
SD0003	Minimum	4.2	21.3	0.18	7.4
	Maximum	8.3	22.3	0.24	8.2
SD0004	Minimum	3.3	21.0	0.18	7.0
	Maximum	8.3	22.4	0.42	8.3
SD0005	Minimum	4.6	21.4	0.18	6.9
	Maximum	8.4	22.4	0.23	8.2
SD0007	Minimum	4.7	21.2	0.18	7.1
	Maximum	8.3	22.2	0.21	8.3

Table 3. Total Sulfides Measurements for 10-Day Benthic Test with *Hyalella azteca*, Red Dog mine Phase II, Exponent

Sample	Overlying water			Pore water		
	Day 0	Day 5	Day 10	Day 0	Day 5	Day 10
Control	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0001	**0.05**	**0.12**	**0.22**	**0.19**	**0.60**	<0.05
SD0002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0007	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

MEC ANALYTICAL SYSTEMS, INC.

10 DAY SOLID PHASE TEST DATA SHEET 3 - FRESHWATER

CLIENT	PROJECT	MEC JOB NO.	PROJECT MAN.	MEC LABORATORY	PROTOCOL	SPECIES	ACCLM.MORT.
Exponent	Red Dog Mine Phase II Sampling Program		B. Gardiner	Carlsbad Room 3		*Hyalella azteca*	< 5%

ENDPOINT DATA & OBSERVATIONS

CLIENT/ MEC ID	REP	JAR #	INITIAL #	DAY 1 #DEAD	DAY 1 #SURF.	DAY 2 #DEAD	DAY 2 #SURF.	DAY 3 #DEAD	DAY 3 #SURF.	DAY 4 #DEAD	DAY 4 #SURF.	DAY 5 #DEAD	DAY 5 #SURF.	DAY 6 #DEAD	DAY 6 #SURF.	DAY 7 #DEAD	DAY 7 #SURF.	DAY 8 #DEAD	DAY 8 #SURF.	DAY 9 #DEAD	DAY 9 #SURF.	DAY 10 #DEAD	DAY 10 #SURF.	NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)
				DATE 7-17-04		DATE 7.18-04		DATE 7-19-04		DATE 7/20/04		DATE 7/21/04		DATE 7/22/04		DATE 7/23/04		DATE 7/24/04		DATE 7/25/04		DATE 7/26/04		TS/LH		7-27-04 TS
				TECHNICIAN G		TECHNICIAN RM		TECHNICIAN TS		TECHNICIAN ll		TECHNICIAN am		TECHNICIAN RM		TECHNICIAN RM		TECHNICIAN am		TECHNICIAN am		TECHNICIAN RM				
Control / .	1	41		N		N		N		N		N		N		N		N		N		N		7	45.78	46.61
	2	34																						9	51.52	52.52
	3	31																						8	41.15	42.11
	4	51																						8	48.59	49.39
	5	8																						10	52.79	53.91
	6	11																						10	46.91	48.14
	7	23																						10①	~~4~~50.31 am	51.42
	8	28																						10	51.43	52.66
1 / .	1	56																						9	49.95	52.18
	2	48																						10	48.73	51.44
	3	37																						10	49.58	52.24
	4	14																						10	43.62	46.07
	5	35																						10	41.57	44.49
	6	13																						10	42.54	44.94
	7	49																						10	40.43	43.25
	8	39																1A						10	41.80	44.86
2 / .	1	4																N						10	46.26	48.92
	2	6																						10	40.32	43.06
	3	21																						10	45.56	48.66
	4	55																						TS② ~~10~~ 9	45.24	47.49
	5	15																						10	47.20	50.36
	6	29																						10	47.30	50.40
	7	2																						10	41.53	44.15
	8	19																						10	44.26	47.08

weigh boat #1

24

① IE 7/26/04 am
② IE 7·26·04 TS

7/15/2004 10 day hyalella Endpoint

MEC ANALYTICAL SYSTEMS, INC.

10 DAY SOLID PHASE TEST DATA SHEET 3 - FRESHWATER

CLIENT	PROJECT	MEC JOB NO.	PROJECT MAN.	MEC LABORATORY	PROTOCOL	SPECIES	ACCLM.MORT.
Exponent	Red Dog Mine Phase II Sampling Program		B. Gardiner	Carlsbad Room 3		*Hyalella azteca*	< 5%

ENDPOINT DATA & OBSERVATIONS

CLIENT/ MEC ID	REP	JAR #	INITIAL #	DAY 1		DAY 2		DAY 3		DAY 4		DAY 5		DAY 6		DAY 7		DAY 8		DAY 9		DAY 10		NUMBER REMAINING	TARE WEIGHT (mg)	TOTAL WEIGHT (mg)		weigh boat #			
				DATE 7.17.04		DATE 7.18.04		DATE 7.19.04		DATE 7/20/04		DATE 7/21/04		DATE 7/22/04		DATE 7/23/04		DATE 7/24/04		DATE 7/25/04		DATE 7/26/04				7.27.04 Ts					
				TECHNICIAN CW		TECHNICIAN RM		TECHNICIAN TS		TECHNICIAN kv		TECHNICIAN am		TECHNICIAN RM		TECHNICIAN RM		TECHNICIAN am		TECHNICIAN am		TECHNICIAN RM									
				#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.	#DEAD	#SURF.								
3 %	1	50		N		N		N		N		N		N		N		N		N		N		7	44.85	45.83	25	25			
	2	40																						10	44.35	46.85	26				
	3	3																						10	39.14	41.40	27				
	4	42																						9	41.96	44.30	28				
	5	24																						10	41.85	44.56	29				
	6	36																						Ts ② ~~7~~ ~~10~~	~~47.84~~	~~50.15~~	~~30~~ ~~31~~		10	47.84	50.15
	7	9																						Ts ③ ~~10~~	~~52.05~~	~~53.20~~	~~31~~ ~~30~~		7	52.05	53.20
	8	1																						10	49.69	52.19	32				
4 %	1	22																		8am				10	45.92	48.80					
	2	38																		N				10	46.88	49.71					
	3	53																						10	45.88	48.86					
	4	27																						9	46.19	48.69					
	5	26																						9	46.65	49.43					
	6	16																						10	52.52	54.88					
	7	10																						10	55.52	58.29					
	8	30																						10	54.17	57.00					
5 %	1	47																						10	40.59	42.63					
	2	20																						10	47.59	49.82					
	3	46																						9	48.28	49.73					
	4	25									1A													10	47.05	49.03					
	5	52									N													10	48.82	50.48					
	6	7																						10	49.47	51.07					
	7	12																						10	49.66	51.82					
	8	18																						10	56.84	58.57					
7 %	1	5																						8	58.02	59.33					
	2	17																						9	57.40	59.16					
	3	43																						9	48.42	50.27					
	4	32																						10	53.66	56.01					
	5	33																						10	54.84	56.81					
	6	54																						10	49.41	51.29					
	7	45																						10	49.59	51.52					
	8	44																						10	48.82	51.11		56			

① small animals on sediment surface (≈5) 7/25/04 am

② WC 7.26.04 Ts ③ IW 7.27.04 Ts

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC.

CLIENT Exponent	PROJECT Red Dog Mine Phase II Sampleing Program	SPECIES Hyalella azteca	MEC LABORATORY Carlsbad Room 3
MEC JOB NUMBER	PROJECT MANAGER B. Gardiner	TEST START DATE 16Jul04	TIME 1452 Jw
		TEST END DATE 26Jul04	TIME 1515 TS
		PROTOCOL	

WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD./ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		~~0~~ 11928

CLIENT/MEC ID	DAY	REP	JAR #	D.O. meter	D.O. mg/L	TEMP meter	TEMP °C	CONDUCTIVITY meter	CONDUCTIVITY µS/cm	pH meter	pH unit	OVERLY. NH3 Techn.	OVERLY. NH3 mg/L	HARDNESS Techn.	HARDNESS mg $CaCO_3$/L	ALKALINITY Techn.	ALKALINITY mg $CaCO_3$/L	TECHNICIAN	WATER RENEWAL AM	WATER RENEWAL PM	FEEDING
Control / .	0	1		6	7.9	6	21.8	5	0.19	8	8.0							Jw	6	Jw	Jw
		2			8.2		21.8		0.19		8.0										
		3			7.9		21.8		0.19		7.9										
		4			8.0		22.1		0.19		7.9										
		5			7.7		22.0		0.19		7.9										
		6			7.6		22.1		0.18		7.9										
		7			7.7		22.2		0.18		7.9										
		8			7.6		22.0		0.18		7.9										
② Jw Control / .	1	1		6	6.7	6	22.1	5	0.20	8	7.7							Gr	JW	BH	MAI
Control / .	2	2		6	7.7	6	21.8	5	0.20	8	8.0							Jw	RM	Rm	RM
Control / .	3	3		6	7.9	6	21.7	5	0.20	8	8.1							TS	TS →		→
Control / .	4	4		6	7.2	6	21.5	5	0.20	8	8.1							ew	✓	Jw	Rm
Control / .	5	1		6	8.1													am		RM	RM
Control / .	5	2		6	8.2																
Control / .	5	3		6	8.1																
Control / .	5	4		6	8.2																
Control / .	5	5		6	8.2	6	22.0	5	0.18	8	8.3										
Control / .	5	6		6	8.1																
Control / .	5	7		6	8.2																
Control / .	5	8		6	8.3																
Control / .	6	6		6	7.5	6	21.4	5	0.18	8	8.1							RM	RM →		→
Control / .	7	7		6	8.2	6	21.8	5	0.18	8	8.2							RM	RM →		→
Control / .	8	8		6	8.2	6	21.7	5	0.18	8	8.3							am	am →		→
Control / .	9	1		6	7.8	6	22.0	5	0.18	8	8.2							am	am →		→
Control / .	10	1		6	8.2	6	21.4	5	0.18	8	8.3							RM	RM		
		2			8.1		21.4		0.18		8.3										
		3			8.3		21.5		0.18		8.3										
		4			8.1		21.9		0.18		8.3										
		5			8.1		21.6		0.18		8.3										
		6			8.1		21.4		0.18		8.3										
		7			8.2		21.8		0.18		8.3										
		8			8.2		21.7		0.21		8.3										

① FED 520 µL 7/16/04 Jw

② Test was aerated due to low D.O.'s in other chambers 7.17.04

7/16/2004 10 day hyalella WQ

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC.

CLIENT	Exponent
PROJECT	Red Dog Mine Phase II Sampleing Program
MEC JOB NUMBER	
PROJECT MANAGER	B. Gardiner
SPECIES	*Hyalella azteca*
MEC LABORATORY	Carlsbad Room 3
PROTOCOL	
TEST START DATE	16Jul04
TIME	1452
TEST END DATE	26Jul04
TIME	1515 TS

WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD./ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		# 119278

CLIENT/MEC ID	DAY	REP	JAR #	D.O.		TEMP		CONDUCTIVITY		pH		OVERLY. NH3		HARDNESS		ALKALINITY		TECHNICIAN	WATER RENEWAL		FEED-ING
				meter	mg/L	meter	°C	meter	µS/cm	meter	unit	Techn.	mg/L	Techn.	mg CaCO₃/L	Techn.	mg CaCO₃/L		AM	PM	
① 1 / .	0	1		6	4.2	6	21.9	5	0.45	8	7.0										
		2			5.6		21.9		0.43		7.1										
		3			5.3		22.0		0.43		7.1										
		4			5.4		21.6		0.43		7.1										
		5			5.8		21.9		0.41		7.1										
		6			5.6		21.8		0.42		7.1										
		7			5.1		22.2		0.48		7.0										
		8			5.6		22.1		0.42		7.1										
1 / .	1	1		6	7.2	6	22.2	5	0.40	8	6.9							Gr	JW	BH	MA/
1 / .	2	2		6	6.5	6	21.8	5	0.31	8	7.7								RM	RM	RM
1 / .	3	3		6	3.6 ② TS	6	21.6	5	0.39	8	7.3							TS	TS →		
1 / .	4	4		6	3.6	6	22.1	5	0.26	8	7.9										RM
1 / .	5	1		6	7.3													am		Rm	Rm
1 / .	5	2		6	7.4																
1 / .	5	3		6	7.3																
1 / .	5	4		6	7.8																
1 / .	5	5		6	7.1	6	21.8	5	0.22	8	8.1										
1 / .	5	6		6	6.0																
1 / .	5	7		6	7.2																
1 / .	5	8		6	5.7																
1 / .	6	6		6	5.8	6	21.5	5	0.21	8	8.0							RM	RM →		
1 / .	7	7		6	7.1	6	21.3	5	0.19	8	8.2							RM	RM →		
1 / .	8	8		6	4.3	6	21.8	5	0.21	8	7.3							am	am →		
1 / .	9	1		6	5.9	6	22.0	5	0.21	8	7.8							am	am →		
1 / .	10	1		6	6.0	6	21.8	5	0.21	8	8.0							RM	RM		
		2			5.2		21.9		0.20		8.0										
		3			6.1		21.5		0.19		7.9										
		4			6.4		21.1		0.19		7.9										
		5			6.9		21.5		0.19		7.9										
		6			5.5		21.4		0.19		7.6										
		7			6.7		21.8		0.20		7.8										
		8			6.9		21.7		0.20		7.7										

① FED 520 mL 7/16/04

7/16/2004 10 day hyalella WQ

② Adjusted air line 7.19.04 TS

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC.

CLIENT	Exponent
PROJECT	Red Dog Mine Phase II Sampleing Program
MEC JOB NUMBER	
PROJECT MANAGER	B. Gardiner
SPECIES	*Hyalella azteca*
MEC LABORATORY	Carlsbad Room 3
PROTOCOL	
TEST START DATE	16Jul04
TIME	1452
TEST END DATE	26Jul04
TIME	1515 TS

WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD./ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		119278

CLIENT/MEC ID	DAY	REP	JAR #	D.O. meter	D.O. mg/L	TEMP meter	TEMP °C	CONDUCTIVITY meter	CONDUCTIVITY µS/cm	pH meter	pH unit	OVERLY. NH3 Techn.	OVERLY. NH3 mg/L	HARDNESS Techn.	HARDNESS mg $CaCO_3$/L	ALKALINITY Techn.	ALKALINITY mg $CaCO_3$/L	TECHNICIAN	WATER RENEWAL AM	WATER RENEWAL PM	FEEDING
① 2 / .	0	1		6	5.9	6	21.6	5	0.67	8	7.2								Co		
		2			6.6		21.7		0.58		7.3										
		3			5.7		21.7		0.62		7.3										
		4			6.5		21.6		0.61		7.3										
		5			6.3		21.5		0.58		7.4										
		6			6.4		21.5		0.56		7.4										
		7			6.3		21.5		0.58		7.3										
		8			6.3		21.5		0.59		7.4										
2 / .	1	1		6	4.8	6	22.1	5	0.55	8	7.2							Cr	JW	BH	MA
2 / .	2	2		6	7.1	6	22.1	5	0.43	8	8.0								RM	RM	RM
2 / .	3	3		6	7.5	6	21.6	5	0.44	8	8.1							TS	TS →		
2 / .	4	4		6	6.1	6	21.5	5	0.36	8	7.9									→	RM
2 / .	5	1		6	5.9													am		RM	RM
2 / .	5	2		6	7.0																
2 / .	5	3		6	7.8																
2 / .	5	4		6	7.5																
2 / .	5	5		6	6.4	6	22.3	5	0.29	8	8.0										
2 / .	5	6		6	7.7																
2 / .	5	7		6	7.0																
2 / .	5	8		6	7.2																
2 / .	6	6		6	7.5	6	21.4	5	0.28	8	8.2							RM	RM →		
2 / .	7	7		6	7.5	6	21.7	5	0.24	8	8.2							RM	RM →		
2 / .	8	8		6	7.5	6	21.9	5	0.26	8	7.9							am	am →		
2 / .	9	1		6	6.5	6	21.8	5	0.26	8	7.8							am	am →		
2 / .	10	1		6	7.1	6	21.6	5	0.22	8	7.7							RM	RM		
		2			7.6		21.6		0.22		8.0										
		3			8.2		21.6		0.21		8.3										
		4			8.1		21.8		0.23		8.3										
		5			7.9		21.9		0.22		8.2										
		6			7.5		21.8		0.22		8.2										
		7			7.8		21.6		0.21		8.2										
		8			8.0		21.7		0.22		8.2										

① FED 520 µL 7/16/04

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC

CLIENT Exponent	PROJECT Red Dog Mine Phase II Sampleing Program	SPECIES *Hyalella azteca*	MEC LABORATORY Carlsbad Room 3
MEC JOB NUMBER	PROJECT MANAGER B. Gardiner	TEST START DATE 16Jul04	TIME 1452 Jw
PROTOCOL		TEST END DATE 26Jul04	TIME 1515 TJ

WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD./ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		☉ 19278

CLIENT/MEC ID	DAY	REP	JAR #	D.O.		TEMP		CONDUCTIVITY		pH		OVERLY. NH3		HARDNESS		ALKALINITY		TECHNICIAN	WATER RENEWAL		FEED-ING
				meter	mg/L	meter	°C	meter	µS/cm	meter	unit	Techn.	mg/L	Techn.	mg CaCO₃/L	Techn.	mg CaCO₃/L		AM	PM	
① Jw 3 / .	0	1		6	6.2	6	22.0	5	0.24	8	7.7							Jw	Go	Jw	Jw
		2			6.0		22.0		0.24		7.6										
		3			5.7		21.9		0.24		7.6										
		4			6.5		22.0		0.24		7.9										
		5			6.2		22.0		0.24		7.7										
		6			6.0		21.9		0.24		7.7										
		7			6.1		21.8		0.23		7.7										
		8			5.7		22.0		0.24		7.7										
3 / .	1	1		6	4.2	6	22.3	5	0.24	8	7.4							GT	JW	BH	MA
3 / .	2	2		6	7.0	6	21.9	5	0.21	8	8.0							Jw	RM	RM	RM
3 / .	3	3		6	6.9	6	21.9	5	0.21	8	7.9							TS	TS →		
3 / .	4	4		6	6.8	6	21.8	9	0.20	8	8.0							ee	Jw →		Ru
3 / .	5	1		6	8.0													am		RM	RM
3 / .	5	2		6	7.9																
3 / .	5	3		6	8.1																
3 / .	5	4		6	7.3																
3 / .	5	5		6	8.3	6	22.1	5	0.20	8	8.2										
3 / .	5	6		6	8.1																
3 / .	5	7		6	8.3																
3 / .	5	8		6	7.5																
3 / .	6	6		6	7.6	6	21.3	5	0.19	8	8.2							RM	RM →		
3 / .	7	7		6	8.2	6	21.6	5	0.18	8	8.3							RM	RM →		
3 / .	8	8		6	7.1	6	22.2	5	0.19	8	7.9							am	am →		
3 / .	9	1		6	7.6	6	22.2	5	0.19	8	8.0							am	am →		
3 / .	10	1		6	8.0	6	22.0	5	0.18	8	8.2							RM	RM		
		2			7.8		21.6		0.18		8.2										
		3			8.1		21.7		0.18		8.2										
		4			7.1		21.5		0.18		8.1										
		5			8.2		21.7		0.19		8.2										
		6			8.1		21.6		0.19		8.2										
		7			7.7		21.6		0.18		8.2										
		8			7.3		21.6		0.18		8.1										

① FED 520 mL 7/16/04 Jw

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC.

CLIENT Exponent	PROJECT Red Dog Mine Phase II Sampling Program	SPECIES *Hyalella azteca*		MEC LABORATORY Carlsbad Room 3	PROTOCOL
MEC JOB NUMBER	PROJECT MANAGER B. Gardiner	TEST START DATE 16Jul04	TIME 1452 Jw	TEST END DATE 26Jul04	TIME 1515 Ts

WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD./ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		~~0~~ 119278

CLIENT/MEC ID	DAY	REP	JAR #	D.O.		TEMP		CONDUCTIVITY		pH		OVERLY. NH3		HARDNESS		ALKALINITY		TECHNICIAN	WATER RENEWAL		FEED-ING
				meter	mg/L	meter	°C	meter	µS/cm	meter	unit	Techn.	mg/L	Techn.	mg CaCO₃/L	Techn.	mg CaCO₃/L		AM	PM	
Ow 4 / .	0	1		6	5.4	6	21.2	5	0.37	8	7.2							Jw	Gs	Jw	Jw
		2			5.5		21.4		0.42		7.1										
		3			5.6		21.0		0.40		7.1										
		4			5.4		21.9		0.40		7.1										
		5			5.0		21.9		0.37		7.1										
		6			5.1		21.6		0.39		7.1										
		7			5.0		21.6		0.42		7.0										
		8			5.0		21.5		0.41		7.1										
4 / .	1	1		6	3.3	6	22.4	5	0.32	8	7.1							Cr	JW	BH	MAI
4 / .	2	2		6	6.2	6	22.1	5	0.29	8	7.7							Jw	RM	RM	RM
4 / .	3	3		6	6.5	6	21.9	5	0.27	8	7.8							Ts	Ts ←	→	
4 / .	4	4		6	6.2	6	21.8	5	0.23	8	7.3							el	Jw →		Rm
4 / .	5	1		6	7.5													am		RM	RM
4 / .	5	2		6	7.0																
4 / .	5	3		6	7.2																
4 / .	5	4		6	8.3																
4 / .	5	5		6	8.1	6	21.8	5	0.20	8	8.1										
4 / .	5	6		6	8.2																
4 / .	5	7		6	7.9																
4 / .	5	8		6	7.8																
4 / .	6	6		6	7.3	6	21.8	5	0.19	8	8.2							RM	RM →		→
4 / .	7	7		6	7.9	6	21.5	5	0.18	8	8.3							RM	RM →		→
4 / .	8	8		6	7.9	6	21.8	5	0.19	8	8.0							am	am →		→
4 / .	9	1		6	7.6	6	21.8	5	0.19	8	8.0										
4 / .	10	1		6	7.6	6	21.7	5	0.19	8	8.0							RM	RM		
4 / .		2			7.6		21.6		0.18		8.0										
4 / .		3			7.4		21.9		0.18		8.0										
4 / .		4			8.0		21.8		0.20		8.0										
4 / .		5			7.7		21.7		0.20		8.1										
4 / .		6			7.9		21.8		0.19		8.2										
4 / .		7			8.1		21.2		0.19		8.2										
4 / .		8			7.8		21.7		0.19		8.2										

① FED 520 µL 7/16/04 Jw

7/16/2004 10 day hyalella WQ

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC

CLIENT Exponent	PROJECT Red Dog Mine Phase II Sampleing Program	SPECIES *Hyalella azteca*	MEC LABORATORY Carlsbad Room 3
MEC JOB NUMBER	PROJECT MANAGER B. Gardiner	TEST START DATE 16Jul04	PROTOCOL
		TIME 1452 Jw	TEST END DATE 26Jul04
			TIME 1515 TS

WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD./ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		#119278

CLIENT/MEC ID	DAY	REP	JAR #	D.O.		TEMP		CONDUCTIVITY		pH		OVERLY. NH3		HARDNESS		ALKALINITY		TECHNICIAN	WATER RENEWAL		FEED-ING
				meter	mg/L	meter	°C	meter	µS/cm	meter	unit	Techn.	mg/L	Techn.	mg $CaCO_3$/L	Techn.	mg $CaCO_3$/L		AM	PM	
① Jw 5 / .	0	1		6	6.2	6	21.7	5	0.23	8	7.0							Jw	Gw	Jw	Jw
		2			5.5		21.9		0.23		6.9										
		3			5.7		21.9		0.23		6.9										
		4			5.5		21.9		0.23		6.9										
		5			5.6		22.1		0.22		6.9										
		6			5.8		22.1		0.23		6.9										
		7			5.8		21.9		0.23		6.9										
		8			5.5		22.4		0.23		7.0										
5 / .	1	1		6	4.6	6	22.0	5	0.22	8	7.1							GT	JN	BH	MAI
5 / .	2	2		6	7.3	6	22.2	5	0.20	8	7.9							[illegible]	RM	RM	RM
5 / .	3	3		6	7.8	6	21.9	5	0.20	8	8.1							TS	TS	←	→
5 / .	4	4		6	7.4	6	21.7	5	0.20	8	7.2							[illegible]	Jw	→	RM
5 / .	5	1		6	7.7													am		RM	RM
5 / .	5	2		6	7.7																
5 / .	5	3		6	8.2																
5 / .	5	4		6	8.1																
5 / .	5	5		6	8.4	6	22.1	5	0.18	8	8.2										
5 / .	5	6		6	8.2																
5 / .	5	7		6	8.0																
5 / .	5	8		6	8.1																
5 / .	6	6		6	7.7	6	21.4	5	0.18	8	8.2							RM	RM	→	→
5 / .	7	7		6	7.8	6	21.4	5	0.18	8	8.2							RM	PM	→	→
5 / .	8	8		6	7.6	6	21.8	5	0.18	8	8.0							am	am	→	→
5 / .	9	1		6	7.9	6	21.9	5	0.18	8	8.1							am	am	→	→
5 / .	10	1		6	8.2	6	22.1	5	0.18	8	8.2							RM	RM		
		2			7.5		22.0		0.18		8.1										
		3			8.2		22.1		0.18		8.2										
		4			8.3		22.0		0.18		8.2										
		5			8.0		21.8		0.18		8.2										
		6			8.2		21.9		0.18		8.2										
		7			8.0		21.6		0.18		8.2										
		8			7.6		21.9		0.18		8.1										

① FED 520 µL 7/16/04 Jw

7/16/2004 10 day hyalella WQ

10 DAY SOLID PHASE TEST DATA SHEET 2 - FRESHWATER

MEC ANALYTICAL SYSTEMS, INC.

CLIENT: Exponent
PROJECT: Red Dog Mine Phase II Sampleing Program
MEC JOB NUMBER:
PROJECT MANAGER: B. Gardiner

SPECIES: *Hyalella azteca*
MEC LABORATORY: Carlsbad Room 3
PROTOCOL:
TEST START DATE: 16Jul04
TIME: 1452
TEST END DATE: 26Jul04
TIME: 1515 TS

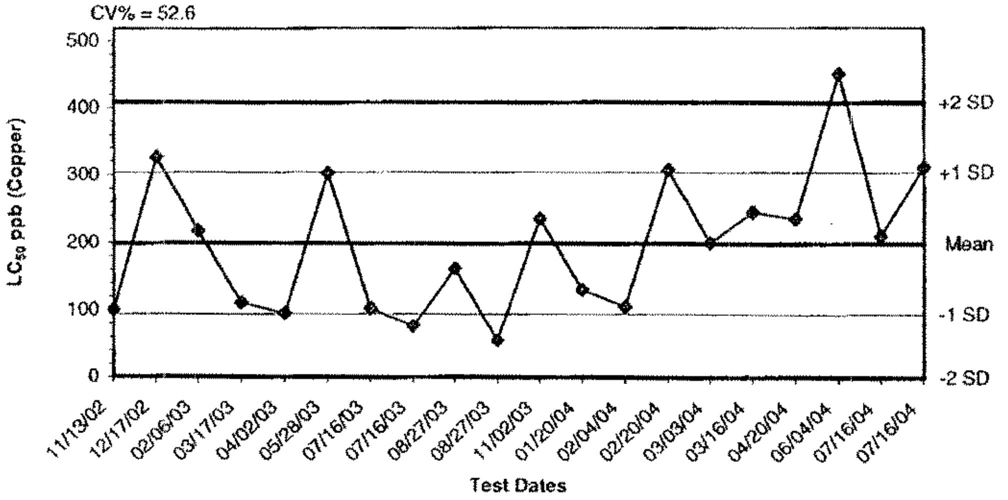
WATER QUALITY DATA

TEST	DO (mg/L)	TEMP (C)	COND.(µS/cm)	pH	NH3 (mg/L)	HARD/ALK.	DILUTION WATER BATCH	TEMP.RECDR./HOBO#
	> 3.4	23±1	vary < 50%	7.0±1.0	vary < 50%	vary < 50%		119778

CLIENT/MEC ID	DAY	REP	JAR #	D.O. meter	D.O. mg/L	TEMP meter	TEMP °C	CONDUCTIVITY meter	CONDUCTIVITY µS/cm	pH meter	pH unit	OVERLY. NH3 Techn.	OVERLY. NH3 mg/L	HARDNESS Techn.	HARDNESS mg CaCO₃/L	ALKALINITY Techn.	ALKALINITY mg CaCO₃/L	TECHNICIAN	WATER RENEWAL AM	WATER RENEWAL PM	FEEDING
Wtr 7 / .	0	1		6	6.3	6	21.2	5	0.21	8	7.2										
		2			5.8		22.1		0.21		7.2										
		3			6.0		21.9		0.21		7.2										
		4			6.0		22.0		0.21		7.2										
		5			5.9		22.2		0.21		7.1										
		6			6.3		21.9		0.21		7.2										
		7			6.2		21.5		0.21		7.2										
		8			6.2		21.9		0.20		7.2										
7 / .	1	1		6	4.7	6	22.0	5	0.21	8	7.2							G	JW	BH	MAI
7 / .	2	2		6	7.5	6	22.2	5	0.20	8	8.0								RM	RM	RM
7 / .	3	3		6	7.8	6	21.9	5	0.20	8	8.2							TS	TS →		
7 / .	4	4		6	7.8	6	21.8	5	0.20	8	7.7								→		Rm
7 / .	5	1		6	7.6													am		RM	RM
7 / .	5	2		6	8.1																
7 / .	5	3		6	8.3																
7 / .	5	4		6	8.2																
7 / .	5	5		6	8.2	6	21.9	5	0.19	8	8.2										
7 / .	5	6		6	8.3																
7 / .	5	7		6	8.2																
7 / .	5	8		6	8.0																
7 / .	6	6		6	7.7	6	21.3	5	0.18	8	8.2							Rm	Rm →		
7 / .	7	7		6	8.2	6	21.8	5	0.18	8	8.2							RM	RM →		
7 / .	8	8		6	7.7	6	21.8	5	0.19	8	8.1							am	am →		
7 / .	9	1		6	7.1	6	21.9	5	0.19	8	8.0							am	am →		
7 / .	10	1		6	8.1	6	21.5	5	0.18	8	8.0							RM	RM		
		2			8.0		22.1		0.19		8.1										
		3			8.1		22.0		0.19		8.2										
		4			8.2		21.7		0.18		8.2										
		5			8.1		21.5		0.18		8.2										
		6			8.3		22.1		0.19		8.3										
		7			8.3		22.0		0.19		8.3										
		8			7.9		22.0		0.19		8.3										

OFED 520 mL 7/11/04

Hyalella azteca Reference Toxicant Control Chart:
96-Hour Survival



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/13/02	100.4460	198.7245	94.1799	0.0000	303.2692	407.8139
12/17/02	326.0900	198.7245	94.1799	0.0000	303.2692	407.8139
02/06/03	217.1340	198.7245	94.1799	0.0000	303.2692	407.8139
03/17/03	110.9400	198.7245	94.1799	0.0000	303.2692	407.8139
04/02/03	95.2116	198.7245	94.1799	0.0000	303.2692	407.8139
05/28/03	301.7120	198.7245	94.1799	0.0000	303.2692	407.8139
07/16/03	102.6800	198.7245	94.1799	0.0000	303.2692	407.8139
07/16/03	75.8930	198.7245	94.1799	0.0000	303.2692	407.8139
08/27/03	161.3200	198.7245	94.1799	0.0000	303.2692	407.8139
08/27/03	54.6880	198.7245	94.1799	0.0000	303.2692	407.8139
11/02/03	234.9690	198.7245	94.1799	0.0000	303.2692	407.8139
01/20/04	130.2640	198.7245	94.1799	0.0000	303.2692	407.8139
02/04/04	105.2500	198.7245	94.1799	0.0000	303.2692	407.8139
02/20/04	306.9640	198.7245	94.1799	0.0000	303.2692	407.8139
03/03/04	199.2700	198.7245	94.1799	0.0000	303.2692	407.8139
03/16/04	244.7800	198.7245	94.1799	0.0000	303.2692	407.8139
04/20/04	235.1490	198.7245	94.1799	0.0000	303.2692	407.8139
06/04/04	450.3920	198.7245	94.1799	0.0000	303.2692	407.8139
07/16/04	210.4460	198.7245	94.1799	0.0000	303.2692	407.8139
07/16/04	310.8920	198.7245	94.1799	0.0000	303.2692	407.8139

* Value within 95% CI range at time of testing
Updated 8/12/04 BH

Acute Sediment Test-4-day Survival

Start Date:	7/16/2004 16:05	Test ID:	C030314.211	Sample ID:	REF-Ref Toxicant
End Date:	7/20/2004 14:35	Lab ID:	CAMECW-MEC WESTON C	Sample Type:	CUSO-Copper sulfate
Sample Date:		Protocol:	EPA 00-EPA Freshwater Sed	Test Species:	HA-Hyalella azteca
Comments:					

Conc-ppb	1	2	3
Control	0.9000	1.0000	0.9000
62.5	1.0000	1.0000	1.0000
125	1.0000	1.0000	1.0000
250	0.7000	0.8000	0.6000
500	0.2000	0.0000	0.0000
1000	0.1000	0.0000	0.0000

			Transform: Untransformed						1-Tailed			
Conc-ppb	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD	Mean	N-Mean
Control	0.9333	1.0000	0.9333	0.9000	1.0000	6.186	3				0.9333	0.0000
62.5	1.0000	1.0714	1.0000	1.0000	1.0000	0.000	3	-1.155	2.500	0.1443	1.0000	-0.0714
125	1.0000	1.0714	1.0000	1.0000	1.0000	0.000	3	-1.155	2.500	0.1443	1.0000	-0.0714
*250	0.7000	0.7500	0.7000	0.6000	0.8000	14.286	3	4.041	2.500	0.1443	0.7000	0.2500
*500	0.0667	0.0714	0.0667	0.0000	0.2000	173.205	3	15.011	2.500	0.1443	0.0667	0.9286
*1000	0.0333	0.0357	0.0333	0.0000	0.1000	173.205	3	15.588	2.500	0.1443	0.0333	0.9643

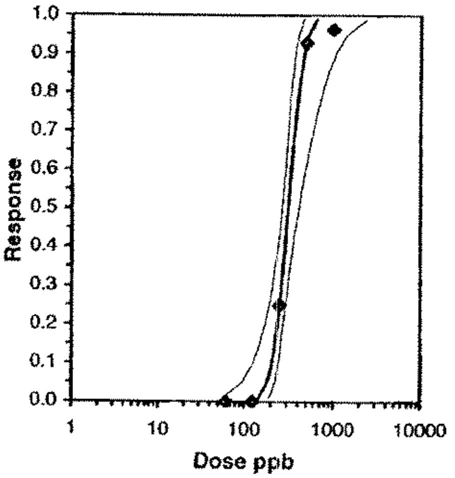
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.91731	0.858	0.70135	0.425
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	125	250	176.777		0.14434	0.15465	0.62622	0.005	6.3E-10	5, 12

Maximum Likelihood-Probit

Parameter	Value	SE	95% Fiducial Limits		Control	Chi-Sq	Critical	P-value	Mu	Sigma	Iter
Slope	7.22675	2.20523	2.9045	11.549	0	1.81656	7.81472	0.61	2.49261	0.13837	5
Intercept	-13.013	5.39065	-23.579	-2.4478							
TSCR											

Point	Probits	ppb	95% Fiducial Limits	
EC01	2.674	148.15	56.8153	192.566
EC05	3.355	184.079	96.1863	223.653
EC10	3.718	206.669	126.492	243.874
EC15	3.964	223.457	151.256	260.094
EC20	4.158	237.767	173.259	275.479
EC25	4.326	250.771	193.286	291.473
EC40	4.747	286.783	242.71	352.513
EC50	5.000	310.892	268.001	410.475
EC60	5.253	337.029	290.124	487.531
EC75	5.674	385.427	323.72	663.557
EC80	5.842	406.508	336.766	752.895
EC85	6.036	432.54	352.073	873.717
EC90	6.282	467.675	371.698	1055.43
EC95	6.645	525.069	401.923	1399.64
EC99	7.326	652.406	463.557	2386.16



Reviewed by:_____

Test: SED-Acute Sediment Test | Test ID: 030314.211
Species: HA-Hyalella azteca | Protocol: EPA 00-EPA Freshwater Sediment
Sample ID: REF-Ref Toxicant | Sample Type: CUSO-Copper sulfate
Start Date: 7/16/2004 16:05 | End Date: 7/20/2004 14:35 | Lab ID: CAMECW-MEC WESTON Carlsbad

Pos	ID	Rep	Group	Day 0	Day 4	Day 7	Day 14	Day 21	Day 28	Total Wgt(mg)	Tare Wgt(mg)	Wgt Count
	1	1	Control	10	9							
	2	2	Control	10	10							
	3	3	Control	10	9							
	4	1	62.500	10	10							
	5	2	62.500	10	10							
	6	3	62.500	10	10							
	7	1	125.000	10	10							
	8	2	125.000	10	10							
	9	3	125.000	10	10							
	10	1	250.000	10	7							
	11	2	250.000	10	8							
	12	3	250.000	10	6							
	13	1	500.000	10	2							
	14	2	500.000	10	0							
	15	3	500.000	10	0							
	16	1	1000.000	10	1							
	17	2	1000.000	10	0							
	18	3	1000.000	10	0							

Comments:

Reviewed by:_____

MEC ANALYTICAL SYSTEMS, INC.

10 DAY SOLID PHASE TEST DATA SHEET 3 - REF TOX - FW

1030314.211

CLIENT Exponent	PROJECT [illegible]	MEC JOB NO.	SPECIES *Hyalella azteca* PROJECT MANAGER B. Gardiner	MEC LABORATORY Carlsbad Room 3	ACCLM.MORT. < 5% PROTOCOL

SURVIVAL & BEHAVIOR DATA

OBSERVATIONS KEY

N = normal
LOE= loss of equilibrium
Q = quiescent
SUR= surfacing
DC = discoloration
OB = on bottom
J = jumper
NB = no body

CLIENT/ MEC ID	CONC.		REP	INITIAL NUMBER	DAY 1			DAY 2			DAY 3			DAY 4		
					DATE			DATE			DATE			DATE 7·20·04		
					TECHNICIAN			TECHNICIAN			TECHNICIAN			TECHNICIAN CG		
	value	units			#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS	#ALIVE	#DEAD	OBS
Ref.Tox.- copper	0	~~mg/L~~ ppb	1											9	1	N
			2											10	0	N
			3											9	0	N
Ref.Tox.- copper	62.5	~~mg/L~~ ppb	1											10	0	N
			2											10	0	N
			3											10	0	N
Ref.Tox.- copper	125	~~mg/L~~ ppb	1											10	0	N
			2					① BH						10	0	N
			3											10	0	N
Ref.Tox.- copper	250	~~mg/L~~ ppb	1											7	2	N
			2											8	1	N
			3											6	1	1Q
Ref.Tox.- copper	500	~~mg/L~~ ppb	1											2	7	2Q
			2											0	10	—
			3											0	10	—
Ref.Tox.- copper	1000	~~mg/L~~ ppb	1											1	8	1Q
			2											0	10	—
			3											0	9	—

① count not performed due to sand substrate. Final counts performed on day 4 8.12.04 BH

MEC ANALYTICAL SYSTEMS, INC.

10 DAY SOLID PHASE TEST DATA SHEET 2 - REF TOX WQ - FRESHWATER

C030314.211

CLIENT Exponent	PROJECT Red Dog Mine Phase II Sampling Program	SPECIES *Hyalella azteca*		MEC LABORATORY Carlsbad Room 3	PROTOCOL
MEC JOB NUMBER	PROJECT MANAGER B. Gardiner	TEST START DATE 16Jul04	TIME 1605 ew	TEST END DATE 20Jul04	TIME 1435 ew

WATER QUALITY DATA

TEST	TEMP (C)	CON.(µS/cm)	DO (mg/L)	HARD./ALK.	DILTN.WAT.BATCH	TEMP REC#	REFERENCE TOX. MATERIAL	REFERENCE TOXICANT	LOT NO.	96-HR LC50
	23±1	vary < 50%	> 3.4	vary < 50%		0	copper chloride	copper		

CLIENT/ MEC ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		CONDUCTIVITY		pH		HARNESS		ALKALINITY		TECHNICIAN	FEEDING	
	value	units			meter	mg/L	meter	°C	meter	µS/cm	meter	unit	Techn.	mg CaCO3/L	Techn.	mg CaCO3/L		am	pm
Ref.Tox.-copper	250	~~mg/L~~ ppb	0	All	6	98	6	21.7	5	0.19	8	7.8					ew		
			1	1															
			2	2															
			3	3															
			4	1	6	8.1	6	22.8	5	①ew 0.22 ~~0.22~~	8	8.2					ew		
				2															
				3															
Ref.Tox.-copper	500	~~mg/L~~ ppb	0	All	6	98	6	21.7	5	0.19	8	7.7					ew		
			1	1															
			2	2															
			3	3															
			4	1	6	8.1	6	22.7	5	0.22	8	8.2					ew		
				2															
				3															
Ref.Tox.-copper	1000	~~mg/L~~ ppb	0	All	6	98	6	21.7	5	0.19	8	7.6					ew		
			1	1															
			2	2															
			3	3															
			4	1	6	6.9	6	22.9	5	0.22	8	8.1					ew		
				2															
				3															

① W.P. 7·20·04 ew

MEC ANALYTICAL SYSTEMS, INC.

10 DAY SOLID PHASE TEST DATA SHEET 2 - REF TOX WQ - FRESHWATER

C030314.211 3.932mL CuSO4 / 20000 DMW TS

CLIENT Exponent	PROJECT Red Dog Mine Phase II Sampleing Program	SPECIES *Hyalella azteca*		MEC LABORATORY Carlsbad Room 3	PROTOCOL
MEC JOB NUMBER	PROJECT MANAGER B. Gardiner	TEST START DATE 15Jul04	TIME 1605 cr	TEST END DATE 20Jul04	TIME 1435 cr

WATER QUALITY DATA

TEST	TEMP (C)	CON.(µS/cm)	DO (mg/L)	HARD./ALK.	DILTN.WAT.BATCH	TEMP REC#	REFERENCE TOX. MATERIAL	REFERENCE TOXICANT	LOT NO.	96-HR LC50
	23±1	vary < 50%	> 3.4	vary < 50%		0	copper chloride	copper		

CLIENT/ MEC ID	CONCENTRATION		DAY	REP	D.O.		TEMP.		CONDUCTIVITY		pH		HARNESS		ALKALINITY		TECHNICIAN	FEEDING	
	value	units			meter	mg/L	meter	°C	meter	µS/cm	meter	unit	Techn.	mg CaCO3/L	Techn.	mg CaCO3/L		am	pm
Ref.Tox.-copper	0	~~mg/L~~ ppb	0	All	6	98	6	21.7	5	0.19	8	7.8					ew		
			1	1															
			2	2															
			3	3															
			4	1	6	8.0	6	23.0	5	0.22	8	8.2					ee		
				2															
				3															
Ref.Tox.-copper	62.5	~~mg/L~~ ppb	0	All	6	97	6	21.7	5	0.19	8	7.7					ew		
			1	1															
			2	2															
			3	3															
			4	1	6	8.1	6	22.8	5	0.22	8	8.2					ee		
				2															
				3															
Ref.Tox.-copper	125	~~mg/L~~ ppb	0	All	6	98	6	21.7	5	0.19	8	7.7					ew		
			1	1															
			2	2															
			3	3															
			4	1	6	8.0	6	22.9	5	0.21	8	8.2					ee		
				2															
				3															

Aquatic Indicators, Inc.
P.O. Box 632 • St. Augustine, FL 32085-0632 • (904) 829-2780

Date 07-14-04

Species:
1. H. azteca
2.
3.

Total Supplied:
1. 1000
2.
3.

Brood Description:
1. E.P.A.
2.
3.

Age:
1. 7 days
2.
3.

Environmental Regime

Feeding: Zooplankton
Artemia NH
✓ phytoPLANKTON

Photo:

L	D
16	8

P.H.: 8.0

Temp: 25°C

Salinity: 0 ‰

Comments:
Thanks!

MEC
ANALYTICAL SYSTEMS
WESTON

ORGANISM RECEIPT LOG

Date: 7/15/04
Time: 1015
MEC Batch No. AI 4414

Organism: H. AZTECA
Source: AQUATIC INICATORS

Address: SAME
Invoice Attached Yes [✓ No]

Phone: SAME
Contact: SAME

No. Ordered: 1000
No. Received: 1000
Source Batch: 7/7/04

Condition of Organisms: GOOD
Approximate Size or Age: 7 DAYS

Shipper: FED EX
B of L (Tracking No.) 6199 2457 4414

Condition of Container: GOOD
Received By:

Confirmation of ID of Organism: Yes [✓ No]
Technician (Initials): —

Notes:

pH (Units)	Temp. (°C)	D.O. (% Sat)	[✓ Conductivity] or Salinity (Include Units)	Technician (Initials)
8.3	22.0	286	0.52 mS/cm	JS

Notes:

CHAIN OF CUSTODY RECORD/SAMPLE ANALYSIS REQUEST FORM

Page 1 of 2

Exponent

Environmental Group

Bellevue, WA
(425) 643-9803
Boston, MA
(781) 466-6681
Boulder, CO
(303) 444-7270
Portland, OR
(503) 636-4338
Washington, D.C.
(301) 577-7830

Project: (Name and Number) Red Dog Mine Phase II Sampling Program (8601997.001)

Exponent Contact: Scott Shock Office: BE

Ship to: MEC Analytical Systems, Inc.
2433 Impala Drive
Carlsbad CA 92008

Lab Contact/Phone: Brian Hestler/760-931-8081

Samplers: SEXTON, IPPOLITO, HARBKE, MAIER

Sample No.	Tag No.	Date	Time	Matrix	Analyses Requested							Extra Container	Archive	Remarks
					Toxicity tests per Soil + Amendment									
SD0001	65327	6/28/04	1420	SD	✓									1 of 4
	65328				✓									2 of 4
	65329				✓									3 of 4
↓	65375	↓	↓		✓									4 of 4
SD0002	65339	6/30/04	1125		✓									1 of 4
	65340				✓									2 of 4
	65341				✓									3 of 4
↓	65376	↓	↓		✓									4 of 4
SD0003	65348	7/2/04	1045		✓									1 of 4
	65349				✓									2 of 4
	65350				✓									3 of 4
↓	65368	↓	↓		✓									4 of 4
SD0004	65378	7/2/04	1530		✓									1 of 4
	65379				✓									2 of 4
	65380				✓									3 of 4
↓	65381	↓	↓		✓									4 of 4
SD0005	65392	7/3/04	1445		✓									1 of 4
	65393				✓									2 of 4
	65394				✓									3 of 4
↓	65395	↓	↓	↓	✓									4 of 4

Matrix Code: GW - Groundwater SL - Soil SD - Sediment SW - Surface water

OTHER - Please identify codes

Priority: ☑ Normal ☐ Rush Rush time period

Shipped via: ☐ FedEx/UPS ☐ Courier Other Northern Air Cargo

Condition of Samples Upon Receipt:

Custody Seal Intact: ☐ Yes ☐ No ☐ None

Relinquished by: Liz Maier (Signature) Date/Time: 7-~~6~~7-04/0700 Received by: Red Dog Shipping Dept. Tracking # 91172270 (Signature) Date/Time: 7-~~6~~7-04/0700

Relinquished by: (Signature) Date/Time: Received by: (Signature) Date/Time:

Distribution: White and Yellow Copies - Accompany Shipment; Pink Copy - Project File

EnviroMatrix Analytical, Inc.

27 July 2004

MEC Analytical Systems
Attn: Brian Hester
2433 Impala Drive
Carlsbad, CA 92008-1514

EMA Log #: 0407183

Project Name: **Exponent Red Dog Mine**

Enclosed are the results of analyses for samples received by the laboratory on 07/19/04 09:22. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

Dan Verdon
Laboratory Director

CA ELAP Certification #: 1931

Client Name: MEC Analytical Systems
Project Name: Exponent Red Dog Mine

EMA Log #: 0407183

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
OV 001	0407183-01	Liquid	07/16/04 11:05	07/19/04 09:22
OV 002	0407183-02	Liquid	07/16/04 11:00	07/19/04 09:22
OV 003	0407183-03	Liquid	07/16/04 11:15	07/19/04 09:22
OV 004	0407183-04	Liquid	07/16/04 11:30	07/19/04 09:22
OV 005	0407183-05	Liquid	07/16/04 12:30	07/19/04 09:22
OV 007	0407183-06	Liquid	07/16/04 12:45	07/19/04 09:22
OV Control	0407183-07	Liquid	07/16/04 10:50	07/19/04 09:22
PW 001	0407183-08	Liquid	07/16/04 12:05	07/19/04 09:22
PW 002	0407183-09	Liquid	07/16/04 14:30	07/19/04 09:22
PW 003	0407183-10	Liquid	07/16/04 14:30	07/19/04 09:22
PW 004	0407183-11	Liquid	07/16/04 14:30	07/19/04 09:22
PW Control	0407183-12	Liquid	07/16/04 12:05	07/19/04 09:22

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Client Name: MEC Analytical Systems
Project Name: Exponent Red Dog Mine

EMA Log #: 0407183

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
OV 001 (0407183-01) Liquid Sampled: 07/16/04 11:05 Received: 07/19/04 09:22									
Total Sulfide	**0.05**	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
OV 002 (0407183-02) Liquid Sampled: 07/16/04 11:00 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
OV 003 (0407183-03) Liquid Sampled: 07/16/04 11:15 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
OV 004 (0407183-04) Liquid Sampled: 07/16/04 11:30 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
OV 005 (0407183-05) Liquid Sampled: 07/16/04 12:30 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
OV 007 (0407183-06) Liquid Sampled: 07/16/04 12:45 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
OV Control (0407183-07) Liquid Sampled: 07/16/04 10:50 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
PW 001 (0407183-08) Liquid Sampled: 07/16/04 12:05 Received: 07/19/04 09:22									
Total Sulfide	**0.19**	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
PW 002 (0407183-09) Liquid Sampled: 07/16/04 14:30 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
PW 003 (0407183-10) Liquid Sampled: 07/16/04 14:30 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
PW 004 (0407183-11) Liquid Sampled: 07/16/04 14:30 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	
PW Control (0407183-12) Liquid Sampled: 07/16/04 12:05 Received: 07/19/04 09:22									
Total Sulfide	ND	0.05	mg/l	1	4072616	07/23/04	07/23/04	SM4500 S D	

EMA # 0407183

MEC ANALYTICAL SYSTEMS, INC.

☒ 2433 Impala Drive • Carlsbad, CA 92008 • (760) 931-8081, FAX 931-1580
☐ 98 Main Street, Suite #428 • Tiburon, CA 94920 • (415) 435-1847, FAX 435-0479
☐ 675 Hegenberger Rd., Ste. 200 • Oakland, CA 94621 • (510) 632-8990, FAX 632-0714
☐ 152 Sunset View Lane • Sequim, WA 98382 • (360) 582-1758, FAX 582-1679

CHAIN OF CUSTODY

№ 6791

JUL 19 '04 10:20

DATE ______ PAGE ______ OF ______

PROJECT NAME/SURVEY/PROJECT NUMBER Exponent Red Dog Mine
PROJECT MANAGER Brian Hester
COMPANY MEC
ADDRESS
PHONE/FAX

	SAMPLE I.D.	DATE	TIME	MATRIX	INITIALS	NUMBER & TYPE OF CONTAINERS	ANALYSIS/TEST REQUESTED Total Sulfides					PRESERVED HOW/ COMMENTS	FOR MEC USE ONLY SAMPLE TEMP. UPON RECEIPT	MEC LAB ID
1	OV 001	7/16/04	1105	L	CO		X					NaOH Zn acetate		
2	OV 002	↓	1100	↓	↓		↓					↓		
3	OV 003	↓	1115	↓	↓		↓					↓		
4	OV 004	↓	1130	↓	↓		↓					↓		
5	OV 005	↓	1230	↓	↓		↓					↓		
6	OV 007	↓	1245	↓	↓		↓					↓		
7	OV control	↓	1050	↓	↓		↓					↓		
8	PW 001	↓	1205	↓	↓		↓					↓		
9	PW 002	↓	1430	↓	↓		↓					↓		
10	PW 003	↓	1430	↓	↓		↓					↓		
11	PW 004	↓	1430	↓	↓		↓					↓		
12	PW control	↓	1205	↓	↓		↓							

SPECIAL INSTRUCTIONS/COMMENTS:
P/u T = 6°C

SHIPPING:
Shipping VIA: Airbill No:

SAMPLE CONDITION UPON RECEIPT (FOR MEC USE ONLY):

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature Chris Osuch	Signature	Signature	Signature	Signature	Signature
Firm MEC - Weston	Firm EMA	Firm	Firm	Firm	Firm
Date/Time 7-19-04 0922	Date/Time 7-19-04 0922	Date/Time	Date/Time	Date/Time	Date/Time

WHITE - return to originator • YELLOW - lab • PINK - retained by originator

EnviroMatrix E M A **Analytical, Inc.**

28 July 2004

MEC Analytical Systems
Attn: Brian Hester
2433 Impala Drive
Carlsbad, CA 92008-1514

EMA Log #: 0407219

Project Name: Exponent- Red Dog Mine

Enclosed are the results of analyses for samples received by the laboratory on 07/22/04 10:05. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

Dan Verdon
Laboratory Director

CA ELAP Certification #: 1931

Client Name: MEC Analytical Systems
Project Name: Exponent- Red Dog Mine

EMA Log #: 0407219

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
002 PW	0407219-01	Liquid	07/21/04 12:35	07/22/04 10:05
Control PW	0407219-02	Liquid	07/21/04 11:55	07/22/04 10:05
007 OV	0407219-03	Liquid	07/21/04 13:30	07/22/04 10:05
001 PW	0407219-04	Liquid	07/21/04 11:57	07/22/04 10:05
003 OV	0407219-05	Liquid	07/21/04 11:35	07/22/04 10:05
Control OV	0407219-06	Liquid	07/21/04 11:05	07/22/04 10:05
001 OV	0407219-07	Liquid	07/21/04 11:00	07/22/04 10:05
004 OV	0407219-08	Liquid	07/21/04 11:50	07/22/04 10:05
003 PW	0407219-09	Liquid	07/21/04 12:37	07/22/04 10:05
002 OV	0407219-10	Liquid	07/21/04 11:30	07/22/04 10:05
004 PW	0407219-11	Liquid	07/21/04 13:10	07/22/04 10:05
005 PW	0407219-12	Liquid	07/21/04 13:12	07/22/04 10:05
007 PW	0407219-13	Liquid	07/21/04 14:35	07/22/04 10:05
005 OV	0407219-14	Liquid	07/21/04 13:15	07/22/04 10:05

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Client Name: MEC Analytical Systems
Project Name: Exponent- Red Dog Mine

EMA Log #: 0407219

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
002 PW (0407219-01) Liquid Sampled: 07/21/04 12:35 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
Control PW (0407219-02) Liquid Sampled: 07/21/04 11:55 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
007 OV (0407219-03) Liquid Sampled: 07/21/04 13:30 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
001 PW (0407219-04) Liquid Sampled: 07/21/04 11:57 Received: 07/22/04 10:05									
Total Sulfide	**0.60**	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
003 OV (0407219-05) Liquid Sampled: 07/21/04 11:35 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
Control OV (0407219-06) Liquid Sampled: 07/21/04 11:05 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
001 OV (0407219-07) Liquid Sampled: 07/21/04 11:00 Received: 07/22/04 10:05									
Total Sulfide	**0.12**	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
004 OV (0407219-08) Liquid Sampled: 07/21/04 11:50 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
003 PW (0407219-09) Liquid Sampled: 07/21/04 12:37 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
002 OV (0407219-10) Liquid Sampled: 07/21/04 11:30 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
004 PW (0407219-11) Liquid Sampled: 07/21/04 13:10 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
005 PW (0407219-12) Liquid Sampled: 07/21/04 13:12 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
007 PW (0407219-13) Liquid Sampled: 07/21/04 14:35 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	
005 OV (0407219-14) Liquid Sampled: 07/21/04 13:15 Received: 07/22/04 10:05									
Total Sulfide	ND	0.05	mg/l	1	4072706	07/27/04	07/27/04	SM4500 S D	

Conventional Chemistry Parameters by Standard/EPA Methods - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 4072706										
Blank (4072706-BLK1)				Prepared & Analyzed: 07/27/04						
Total Sulfide	ND	0.05	mg/l							
LCS (4072706-BS1)				Prepared & Analyzed: 07/27/04						
Total Sulfide	0.19	0.05	mg/l	0.200		95	80-120			
LCS Dup (4072706-BSD1)				Prepared & Analyzed: 07/27/04						
Total Sulfide	0.21	0.05	mg/l	0.200		105	80-120	10	20	
Duplicate (4072706-DUP1)		**Source: 0407219-03**		Prepared & Analyzed: 07/27/04						
Total Sulfide	ND	0.05	mg/l		ND				20	
Matrix Spike (4072706-MS1)		**Source: 0407219-04**		Prepared & Analyzed: 07/27/04						
Total Sulfide	1.44	0.25	mg/l	1.00	0.60	84	80-120			
Matrix Spike Dup (4072706-MSD1)		**Source: 0407219-04**		Prepared & Analyzed: 07/27/04						
Total Sulfide	1.74	0.25	mg/l	1.00	0.60	114	80-120	19	20	

MEC 0407214.
ANALYTICAL SYSTEMS, INC.

☒ 2433 Impala Drive • Carlsbad, CA 92008 • (760) 931-8081, FAX 931-1580
☐ 98 Main Street, Suite #428 • Tiburon, CA 94920 • (415) 435-1847, FAX 435-0479
☐ 675 Hegenberger Rd., Ste. 200 • Oakland, CA 94621 • (510) 632-8990, FAX 632-0714
☐ 152 Sunset View Lane • Sequim, WA 98382 • (360) 582-1758, FAX 582-1679

JUL 22'04

CHAIN OF CUSTODY

№ 6819

DATE 7-22-04 PAGE 1 OF 1

PROJECT NAME/SURVEY/PROJECT NUMBER: EXPONENT - RED DOG MINE
PROJECT MANAGER: BRIAN HESTER
COMPANY: MEC- WESTON
ADDRESS: SAME AS ABOVE
PHONE/FAX: " " "

ANALYSIS/TEST REQUESTED — FOR MEC USE ONLY

SAMPLE I.D.	DATE	TIME	MATRIX	INITIALS	NUMBER & TYPE OF CONTAINERS	TOTAL SULFIDES					PRESERVED HOW/ COMMENTS	SAMPLE TEMP. UPON RECEIPT	MEC LAB ID
002 PW	7/21/04	1235	LIQUID	TS	1						NaOH Zn Acetate		
Control PW	↓	1155	↓	↓	1						↓		
007 OV		1330			1								
001 PW		1157			1								
003 OV		1135			1								
Control OV		1105			1								
001 OV		1100			1								
004 OV		1150			1								
003 PW		1237			1								
002 OV		1130			1								
004 PW		1310			1								
005 PW		1312			1								
007 PW		1435			1								
005 OV		1315			1								

SPECIAL INSTRUCTIONS/COMMENTS:
P/U F/YC.

SHIPPING:
Shipping VIA:
Airbill No:

SAMPLE CONDITION UPON RECEIPT (FOR MEC USE ONLY):

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Firm MEC-Weston	Firm EMA	Firm EMA	Firm EMA	Firm	Firm
Date/Time 7-22-04 1005	Date/Time 22July04	Date/Time 22July04 1305	Date/Time 7/22/04	Date/Time	Date/Time

WHITE - return to originator • YELLOW - lab • PINK - retained by originator

EnviroMatrix Analytical, Inc.

03 August 2004

MEC Analytical Systems
Attn: Brian Hester
2433 Impala Drive
Carlsbad, CA 92008-1514

EMA Log #: 0407290

Project Name: Exponent-Red Dog Mine

Enclosed are the results of analyses for samples received by the laboratory on 07/29/04 17:00. Samples were analyzed pursuant to client request utilizing EPA or other ELAP approved methodologies. I certify that this data is in compliance both technically and for completeness.

Dan Verdon
Laboratory Director

CA ELAP Certification #: 1931

Client Name: MEC Analytical Systems
Project Name: Exponent-Red Dog Mine

EMA Log #: 0407290

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
SD0001-OV	0407290-01	Liquid	07/27/04 17:40	07/29/04 17:00
SD0002-OV	0407290-02	Liquid	07/27/04 17:40	07/29/04 17:00
SD0003-OV	0407290-03	Liquid	07/27/04 17:40	07/29/04 17:00
SD0004-OV	0407290-04	Liquid	07/27/04 17:40	07/29/04 17:00
SD0005-OV	0407290-05	Liquid	07/27/04 17:40	07/29/04 17:00
SD0007-OV	0407290-06	Liquid	07/27/04 17:40	07/29/04 17:00
SD0001-PW	0407290-07	Liquid	07/27/04 17:40	07/29/04 17:00
SD0002-PW	0407290-08	Liquid	07/27/04 17:40	07/29/04 17:00
SD0003-PW	0407290-09	Liquid	07/27/04 17:40	07/29/04 17:00
SD0004-PW	0407290-10	Liquid	07/27/04 17:40	07/29/04 17:00
SD0005-PW	0407290-11	Liquid	07/27/04 17:40	07/29/04 17:00
SD0007-PW	0407290-12	Liquid	07/27/04 17:40	07/29/04 17:00
0-OV	0407290-13	Liquid	07/27/04 17:40	07/29/04 17:00
0-PW	0407290-14	Liquid	07/27/04 17:40	07/29/04 17:00

Client Name: MEC Analytical Systems
Project Name: Exponent-Red Dog Mine

EMA Log #: 0407290

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SD0001-OV (0407290-01) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	**0.22**	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0002-OV (0407290-02) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0003-OV (0407290-03) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0004-OV (0407290-04) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0005-OV (0407290-05) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0007-OV (0407290-06) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0001-PW (0407290-07) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0002-PW (0407290-08) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0003-PW (0407290-09) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	

Conventional Chemistry Parameters by Standard/EPA Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SD0004-PW (0407290-10) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0005-PW (0407290-11) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
SD0007-PW (0407290-12) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
0-OV (0407290-13) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	
0-PW (0407290-14) Liquid Sampled: 07/27/04 17:40 Received: 07/29/04 17:00									
Total Sulfide	ND	0.05	mg/l	1	4080228	08/02/04	08/02/04	SM4500 S D	

1 of 2

CHAIN-OF-CUSTODY RECORD

EnviroMatrix EMA **Analytical, Inc.**

JUL 29 '04 18:46

4340 Viewridge Ave., Ste. A • San Diego, CA 92123 • Phone (858) 560-7717 • Fax (858) 560-7763

EMA LOG #: 0407290

EMA DATE/TIME STAMP

Client: MEC - Weston
Address: 2433 Impala Dr.
Carlsbad CA 92008
Attn: B. Hester
Phone: 760-931-8081
Sampled by: BH
Fax: 760-931-1580
Billing Address: Same

Project: Exponent - Red Dog Mine
PO #:

REQUESTED ANALYSIS

EMA ID #	Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container(s) #	Container(s) Type*	418.1 (TRPH)	Oil & Grease 413.1__ 413.2__ 1664__	TPH (8015B) Gas__ Diesel__	TPH-Extended 8015B__ ASTM D2887__	602 / 8021 BTXE__ MTBE__	601 / 8021 (Purgeable Halocarbons)	608 / 8081 (Pesticides)	608 / 8082 (PCB's)	624 / 8260 (Volatile Organics)	625 / 8270 (Semi Volatile Organics)	TTLC Metals (CAC Title 22)	STLC Metals (CAC Title 22)	TCLP (RCRA) Metals__ Organics__	Cd Cr Cu Pb Ni Ag Zn	pH EC TSS TDS	Total Sulfide
1	SD0001-OV	7/27/04	1740	L	1	P																X
2	SD0002-OV	↓	↓	↓	↓	↓																↓
3	SD0003-OV																					
4	SD0004-OV																					
5	SD0005-OV																					
6	SD0007-OV																					
7																						
8																						
9																						
10																						

*Container Types: B=Brass Tube; V=VOA; G=Glass; [✓ P=Plastic]; O=Other (list)

Tamper-Proof Seals Intact: Yes No [✓ N/A]

Correct Containers: [✓ Yes] No

Sample(s): [✓ Cold] Ambient Warm

VOAs w/ZHS: Yes No [✓ N/A]

All Samples Properly Preserved: [✓ Yes] No N/A

Disposal: [✓ N/C (aqueous)] *EMA (@$5.00/sample) Return Hold

Turnaround Time: 24 hr 48 hr 3 day 4 day 5 day [✓ Normal]

Comments:

T/u 1=9°C

RELINQUISHED BY	DATE/TIME	RECEIVED BY
Signature	29 July 04 1700	Signature
Print Tracy Stoker		Print Jerry Santos
Company: MEC-WESTON		Company: EMA
Signature		Signature
Print		Print
Company:		Company:
Signature		Signature
Print		Print
Company:		Company:

*EMA reserves the right to return samples that do not match our waste profile.

White - EMA Canary - Accounting Pink - Client (w/Report) Goldenrod - Client (Relinquish Samples)

2 of 2

CHAIN-OF-CUSTODY RECORD

EnviroMatrix EMA **Analytical, Inc.**

JUL 29 '04 18:46

4340 Viewridge Ave., Ste. A • San Diego, CA 92123 • Phone (858) 560-7717 • Fax (858) 560-7763

EMA LOG #: 0407290

EMA DATE/TIME STAMP

Client: Same as 1 of 2
Address:
Attn: Phone:
Sampled by: Fax:
Billing Address:
Project: PO #:

REQUESTED ANALYSIS

EMA ID #	Client Sample ID	Sample Date	Sample Time	Sample Matrix	Container(s) #	Container(s) Type*	418.1 (TRPH)	Oil & Grease 413.1__ 413.2__ 1664	TPH (8015B) Gas__ Diesel__	TPH-Extended 8015B__ ASTM D2887__	602 / 8021 BTXE__ MTBE__	601 / 8021 (Purgeable Halocarbons)	608 / 8081 (Pesticides)	608 / 8082 (PCB's)	624 / 8260 (Volatile Organics)	625 / 8270 (Semi Volatile Organics)	TTLC Metals (CAC Title 22)	STLC Metals (CAC Title 22)	TCLP (RCRA) Metals__ Organics__	Cd Cr Cu Pb Ni Ag Zn	pH EC TSS TDS	Total sulfide							
1	SD0001 - PW	7/27/04	1740	L	1	P																X							
2	SD0002 - PW	↓	↓	↓	↓	↓																↓							
3	SD0003 - PW	↓	↓	↓	↓	↓																↓							
4	SD0004 - PW	↓	↓	↓	↓	↓																↓							
5	SD0005 - PW	↓	↓	↓	↓	↓																↓							
6	SD0007 - PW	↓	↓	↓	↓	↓																↓							
7	~~SD~~ 0-OV	↓	↓	↓	↓	↓																↓							
8	0-PW	↓	↓	↓	↓	↓																↓							
9																													
10																													

*Container Types: B=Brass Tube; V=VOA; G=Glass; [✓ P=Plastic] O=Other (list)

Tamper-Proof Seals Intact: Yes No [✓ N/A]

Correct Containers: [✓ Yes] No

Sample(s): [✓ Cold] Ambient Warm

VOAs w/ZHS: Yes No [✓ N/A]

All Samples Properly Preserved: [✓ Yes] No N/A

Disposal: [✓ N/C (aqueous)] *EMA (@$5.00/sample) Return Hold

Turnaround Time: 24 hr 48 hr 3 day 4 day 5 day [✓ Normal]

Comments:

P/U

RELINQUISHED BY	DATE/TIME	RECEIVED BY
Signature:	29 July 04	Signature:
Print: Tracy Staker		Print: [illegible]
Company: MEC WESTON	1700	Company: EMA
Signature:		Signature:
Print:		Print:
Company:		Company:
Signature:		Signature:
Print:		Print:
Company:		Company:

*EMA reserves the right to return samples that do not match our waste profile. White - EMA Canary - Accounting Pink - Client (w/Report) Goldenrod - Client (Relinquish Samples)

Supplemental Information Provided by MEC Analytical Systems

Table 3. Total Sulfides Measurements for 10-Day Benthic Test with *Hyalella azteca*, Red Dog mine Phase II, Exponent

Sample	Overlying water			Pore water		
	Day 0	Day 5	Day 10	Day 0	Day 5	Day 10
Control	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0001	**0.05**	**0.12**	**0.22**	**0.19**	**0.60**	<0.05
SD0002	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0003	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
SD0007	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

8601997.001

Jane Sexton

From: Scott S. Shock
Sent: Tuesday, November 23, 2004 12:19 PM
To: Jane Sexton
Cc: Scott Becker
Subject: FW: Additional information for Red Dog QA review

Jane, is this something you would like to add to the Red Dog toxicity testing review.

Scott

-----Original Message-----
From: Gardiner, William [mailto:Bill.Gardiner@WestonSolutions.com]
Sent: Tuesday, November 23, 2004 11:57 AM
To: ssshock@exponent.com
Subject: Additional information for Red Dog QA review

Scott,

Quite some time ago, Jane had asked me for some additional information for a QA review of the Red Dog Mine testing we had performed in September. I have that information, and I guess I thought I had sent it already, but apparently I did not. So, here is information on sand source, porewater salinity, and hardness/alkalinity.

The control sediment was #16 silica sand from Oglebay Norton Industrial Sands.

Day 10 porewater salinity was measured and the values are in the attached Excel files. I believe Jane only needed Day 10 salinities. I'll send the raw data sheets that have this data, although, I think you should already have them.

Water hardness and alkalinity were measured on Day 0 only and were:
Hardness: 88
Alkalinity: 92

My apologies for the delay.

Bill

Porewater Salinity on Day 10, Hyalella Acute Test, Red Dog Mine

	Salinity (ppt)	
Sample	Refractometer	Conductivity
Control	0	0.18
SD0001	0	0.3
SD0002	1	0.41
SD0003	0	0.34
SD0004	0	0.24
SD0005	0	0.19
SD0007	0	0.38