TABLE E.1 - CAM-5, MACKAR INLET: SUMMARY OF SOIL CONTAMINANT LOCATIONS

LOCATION	SIGNIFICANT SOIL CONTAMINANT (No. of sample results > MDL)									
	Barium	Chromium	Nickel	TPH	PCB	Toluene	PAH	Lead	Mercury	Silver
Landfill A	4	4	3	3	2	2	2	-	-	-
Landfill C	-	3	3	-	-	-	-	-	-	-
POL 2	-	-	-	3	2	-	-	3	-	-
POL 3	-	-	-	2	-	-	2	-	-	-
POL 4	-	-	-	1	1	-	-	1	-	-
Sewage Outfall	-	4	-	-	2	-	-	1	1	1
Stain Area 2	-	-	-	1	1	-	-	2	-	-

Seven water samples from the landfills, outfalls and background were analyzed and chromium was found above criterion in the water supply and a small lake. Nickel was found in two small lakes, however one nickel result was not confirmed in the duplicate analysis. Volatiles benzene, toluene and C14-ethylene were found in samples from the outfall and Landfill A.

E.2.3 EVALUATION FOR EXPOSURE ASSESSMENT

Contaminant data identified in Subsections E.2.1 and E.2.2 were evaluated in order to determine the requirements for each pathway analysis. A summary of soil data required for the exposure assessment is presented in Table E.2. For each contaminant, the concentration ranges from lab data and comparative data are listed. Comparative data includes the minimum lab equipment detection limit (MDL), background concentrations and cleanup guidelines, all previously described in Section 6.0.

The parameters used in the pathway analysis include contaminant concentration and its areal extent, and an estimated exposure for each receptor being analyzed. The total contaminated area shown in Table E.2 is the sum of individual areas from the different locations previously identified. These areas define the contaminant concentration above background levels though for the purposes of risk assessment all contaminated areas were included and the results were then interpreted for background impacts. Three contaminants were identified over large areas covering more than 250,000 m^2.

The exposure fraction given in Table E.2 is the fraction of time a receptor may be exposed to the contaminated area based on criteria defined in Volume 2. For example, 75 percent of the workers' time is spent in the main camp area. Exposure fractions are not additive, because some contaminant areas overlap. Caribou are assumed to graze on site for 20 days a year, an increase from 10 days assumed for most sites because of the nearby calving grounds described in Section 3.5. They graze in the contaminated area for a percentage of time equal to the ratio of contaminated to complete site area. The final receptor pathway analyzed was for vegetation, specifically grasses, and the percent of contaminated area covered with vegetation was estimated from field notes.

Chromium water concentrations were assessed for human exposures and contamination in the small lakes was assessed for exposure to caribou. It was assumed the small lakes would not support fish due to their size, however a safe chromium criteria of 0.02 MGL (hardness dependent) and a safe nickel criteria of 0.03-0.15 MGL (hardness dependent) may be exceeded in the water supply lake and the small lake 400 m north of Landfill A.

E.2.4 UNCERTAINTY ASSESSMENT

Uncertainties associated with the data evaluation were described in Volume 2 including strategies to identify all contaminant locations, the laboratory errors, and the limited background sampling. Such uncertainties specifically associated with the CAM-5 data were described in Section 3.0. For those contaminants identified at concentrations above background, the areal extent of contamination was conservatively estimated to ensure an over-prediction of risk, rather than an under-prediction. Two background samples were analyzed and five significant metal contaminants were found at concentrations above those noted in the background samples. The one silver concentration was near both the MDL and one of the measured background samples.

Finally, although the water sampling was limited, some contamination was found in surface ponds. Water quality may change depending on environmental changes and therefore there may be large uncertainties in assuming the samples analyzed were representative. Sediments which may affect aquatic life were not analyzed and the potential for mercury to migrate into such sediments was evaluated qualitatively as mercury is known to biotransform in sediments. Mercury was found in only one sample in the sewage outfall and since it was not found in samples along the migratory pathway, it is not expected to affect aquatic life.

E.3 EXPOSURE ASSESSMENT

E.3.1 EXPOSURE PATHWAYS

Exposure pathways were analyzed for each of the significant contaminants described in Subsection E.2.3. All potential pathways by which contaminants are transported from the source to the receptor were described in Volume 2 for humans, fauna, and flora. Those relevant pathways through which CAM-5 contaminants can affect people included soil, air and water mediums leading to dermal, ingestion, and inhalation forms of intake. The contaminant concentrations used for the air inhalation pathway were derived from soil contaminant concentrations assuming uptake of soil dust through such mechanisms as wind action. Water pathways were based on water contaminant concentrations analyzed in field samples. Fauna pathways also included flora ingestion. Caribou from the Melville herd, as described in subsection 3.5, were used as surrogates for estimating fauna risks. Finally, contaminant uptakes through soil were evaluated in order to estimate flora risks. The vegetation cover in the CAM-5 site was previously described in Subsection 3.4 and grasses were used as surrogates for estimating flora risks.

Locations without vegetation were generally noted during the field survey and documented in the sample site descriptions given in Appendix B. It was noted that in the lowland areas vegetation cover varied from 40 to 100 percent, providing excellent grazing for caribou. Where vegetation cover was evident the potential flora risks from contaminant uptakes through soil were estimated.

E.3.2 EXPOSURE INTAKES

Results from the pathway analysis of CAM-5 site contaminants for worker exposure are presented in Table E.3. For each relevant pathway, the contaminants are identified along with the chronic daily intakes calculated for both carcinogenic and non-carcinogenic effects. A range of values was calculated for the chronic daily intakes to correspond with a potential range of exposure input parameter values previously described in Volume 2.

Chronic daily intakes were calculated for contaminants transported by five principal pathways as shown in Table E.3. Intakes were estimated for each significant contaminant found on site except for lead and silver. Risk estimates for these contaminants were based on cleanup rather than toxicity criteria as further described in Subsection E.4.

TPH was identified above Level C (12000 mg/kg) in POL 3. The TPH concentration is less than the criterion for potential acute exposure and therefore it was only evaluated for chronic exposures.

The exposure intake results from the fauna pathway analysis are given in Table E.4 in a similar format to that used for human exposure intake results. An additional pathway, ingestion of grasses, was substituted for dermal contact with water for the caribou evaluation. As discussed in Volume 2, only non-carcinogenic intakes were evaluated due to lack of environmental toxicity data.

TABLE E.2 - CAM-5, MACKAR INLET: SOIL DATA EVALUATION FOR EXPOSURE ASSESSMENT

Contaminant	Contaminant Conc. Ranges (mg/kg)				Pathway Analysis				Remarks
	Comparative Data								
	Lab Data	MDL	Back-ground	Guidelines	Total Contaminated Area (m^2)	Worker Exposure Fraction	Caribou Exposure Fraction	% Area with Vegetation	
Barium	29-160	1	29-43	200-2000	12,000	0.32	-	-	Over 250,00 m^2 < background
Chromium	11-56	1	22-37	75-800	63,000	0.32	0.03	-	Over 300,000 m^2 < background
Lead	13-310	10	<10	50-600	40,000	0.23	0.007	15	
Nickel	7-31	5	11-21	50-500	13,000	0.25	0.03	20	Over 280,000 m^2 < background
Mercury	0.33	0.05	<0.05	0.2-10	33,000	0.06	0.003	-	Only found in Sewage Outfall
Silver	6	5	<5-5	2-40	25,000	-	-	-	Only found in Sewage Outfall near MDL
TPH	3-12,000	1	-	100-5,000	15,000	0.23	0.01	-	Hot spot in POL-3
PCB	0.1-1.8	0.01	-	0.1-10	70,000	0.19	0.006	35	
PAH	0.09-0.73	0.02	-	1-200	11,000	0.01	0.0009	-	
Toluene	0.75-0.78	0.002	-	0.1-30	14,000	0.17	0.006	-	Only found in Landfill A

TABLE E.3 - CAM-5, MACKAR INLET: WORKER EXPOSURE INTAKE RESULTS

Pathway	Contaminant	Chronic Daily Intake Range (10^{-6} mg/kg day)	
		Carcinogenic Effects	Non-carcinogenic Effects
Ingestion of Contaminant in Soil	Mercury	-	0.00008-0.0004
	Lead	toxic	toxic
	TPH	-	8-38
	PCB	0.00003-0.0001	-
	PAH	10^{-12}	0.00003-0.0002
	Barium	-	-
	Nickel	-	-
	Chromium	-	0.6-3
	Toluene	-	0.00003-0.0001
	Silver	-	guidelines
Dermal Contact with Contaminant in Soil	Mercury	-	0.0002-0.0004
	Lead	toxic	toxic
	TPH	-	170-370
	PCB	0.0005-0.001	-
	PAH	0.0001-0.0002	0.0007-0.002
	Barium	-	-
	Nickel	-	-
	Chromium	-	12-26
	Toluene	-	0.006-0.01
	Silver	-	guidelines
Inhalation of Airborne Contaminant	Mercury	-	0.0002-0.0005
	Lead	toxic	toxic
	TPH	-	11-25
	PCB	0.0002-0.0004	-
	PAH	0.0003-0.0007	0.002-0.005
	Barium	-	-
	Nickel	-	-
	Chromium	0.2-0.5	2-4
	Toluene	-	0.0002-0.0006
	Silver	-	guidelines
Ingestion of Contaminant in Water	Chromium	-	1700-2800
Dermal Contact with Contaminant in Water	Chromium	-	3-7

TABLE E.4 - CAM-5, MACKAR INLET: CARIBOU EXPOSURE INTAKE RESULTS

Pathway	Contaminant	Chronic Daily Intake (10^{-6} mg/kg day) Non-carcinogenic Effects
Ingestion of Contaminant in Soil	Mercury	0.00003
	Nickel	0.1
	Lead	0.08
	TPH	1
	PCB	0.001
	PAH	0.0003
	Chromium	0.2
	Toluene	0.0003
Inhalation of Airborne Contaminant	Mercury	0.00003
	Nickel	0.1
	Lead	0.1
	TPH	2
	PCB	0.002
	PAH	0.0003
	Chromium	0.3
	Toluene	0.0004
Dermal Contact with Contaminant in Soil	Mercury	0.002
	Nickel	6
	Lead	5
	TPH	78
	PCB	0.08
	PAH	0.02
	Chromium	14
	Toluene	0.02
Ingestion of Contaminated Grasses	Mercury	0.2
	Nickel	3
	Lead	1
	TPH	3100
	PCB	0.06
	PAH	0.1
	Chromium	0.007
	Toluene	0.8
Ingestion of Contaminant in Water	Chromium	0.5
	Nickel	83
	Toluene	0.5

Toxicity criteria for plants were available for nickel, lead and PCBs and the corresponding concentrations in grasses covering the contaminant areas were estimated at 0.9, 1.8, and 0.05 mg/kg, respectively.

E.3.3 UNCERTAINTY ASSESSMENT

Data evaluation uncertainties included the strategies for sampling, identification of contaminant location, laboratory errors, and the limited background sampling as described previously in subsection E.2.4 Further uncertainties in the exposure assessment were generally described in Volume 2. For example the range of values used to estimate exposure for each pathway were presented. These data ranges were used as input for a sensitivity analysis of the exposure assessment in order to determine the corresponding impacts on chronic daily intakes.

Exposure of workers to the different contaminant areas was based on a conservative distribution of a worker's time at each area as described in Volume 2. Northerner exposures were considered as a sensitivity based on additional pathways such as caribou intake. Fauna and flora exposures on site were also evaluated. For each potential receptor the reasonable maximum exposure to a contaminant transported over all principal pathways was estimated. Results could therefore be used directly in the risk assessment where risks associated with a particular contaminant are summed over all pathways through which the contaminant may be exposed to the receptor.

The higher values for the sensitivity results given previously in Table E.3 were subsequently used for the risk assessment in order to represent a maximum exposure level. Such levels were then evaluated to determine the reasonable maximum exposure for one particular receptor given each of the potential pathways for a particular contaminant.

The extent of contaminant migration was based on analysis of limited data from the field survey. Closure was qualitatively estimated through assessment of the geology and hydrology data. The resulting estimate of contaminant areal extent was conservative in order to over predict the contamination area and therefore over estimate the potential risk. Chromium, barium and nickel were found throughout the site at concentrations less than that found in the background sample. For example, in addition to the 12000 m^2 area of significant barium concentrations greater than background, some 250000 m^2 were identified at less than background. Due to the uncertainty associated with the background samples, all exposures were included in the risk assessment. Results were then interpreted to account for the portion of the total risk which is associated with background concentrations. In general all contaminant concentrations were near the lower level guidelines except for one TPH hot spot.

E.4 TOXICITY ASSESSMENT

E.4.1 SITE CONTAMINANT TOXICITIES

The ten site contaminants identified from the exposure assessment as potential risk concerns were evaluated for both carcinogenic and non-carcinogenic human toxicity. Reference toxicity data including the associated uncertainties were collated for all contaminants identified in all 21 DEW Line Sites and presented in Volume 2, Subsection 3.3.1.4. The carcinogen slope factors and non-carcinogen reference dose toxicity measures from this reference are presented in Table E.5 for each of the contaminants. A carcinogenic risk slope factor is unverified at present for lead. The U.S. EPA considers the contaminants for which no slope factors are given as less likely carcinogens. Chronic reference doses were available for all contaminants except PCBs, lead and silver. PCBs are considered carcinogens and due to the present lack of knowledge about lead and silver, therefore reference doses were based on cleanup guidelines as recommended by the U.S. EPA.

TABLE E.5 - CAM-5, MACKAR INLET: CONTAMINANT TOXICITIES

Site Contaminant	Slope Factor Risk Per Unit Dose $(mg/kg/day)^{-1}$	Chronic Reference Dose (mg/kg/day)	Caribou Safe Dose (mg/kg day)	Grass Safe Concentration (mg/kg)
Mercury	-	8×10^{-5}	1×10^{-3}	-
Lead	toxic	toxic	1×10^{-2}	7
TPH	-	1×10^{-1}	70	-
PCB	7.7	-	2×10^{-2}	3
Nickel	-	-	2×10^{-2}	3
Chromium	41	5×10^{-3}	1	-
Toluene	-	2×10^{-1}	3×10^{-3}	-

Toxicity data were not presented in Table E.5 for barium, nickel, silver and the PAHs fluorene and phenathsene.

The environmental risk assessment was based on a review of the limited toxicity data to determine safe levels of contaminant intake or ambient concentrations for caribou, and grasses. Safe intake values were available for seven contaminants based on exposure to dairy cows, and plants and these values were assumed representative for caribou, and grasses as given in Table E.5.

E.4.2 UNCERTAINTY ASSESSMENT

Uncertainties associated with the carcinogenic and non-carcinogenic human toxicity data and the environmental toxicity data were generally described in Volume 2. Specific impacts for the CAM-5 contaminants are summarized in this subsection.

Chromium VI is a known carcinogen when considering the inhalation pathway. PCBs and lead are classified as probable carcinogens based on animal data. The chronic reference doses were based on varying uncertainty factors depending on the contaminant as described in Volume 2. The largest uncertainty factor of 1000, was associated with toluene. The TPH chronic reference dose was based on an acceptable daily intake value for petroleum distillates. TPH is a mixture of many components whereas toxicity values are estimated for specific components and therefore an acceptable daily intake for a mixture of petroleum distillates was used as a generic reference.

E.5 RISK CHARACTERIZATION

Results from the CAM-5 site exposure assessment presented in Subsection E.3 and toxicity assessment presented in Subsection E.4 were integrated in order to characterize the site-specific risk. As described in Volume 2, Section 3.0, the methods for characterizing non-carcinogenic risk are different from those used for carcinogenic risk. The quantification of CAM-5 site risk has therefore been segregated according to these categories as presented in the following subsections.

E.5.1 CARCINOGENIC RISK

Worker carcinogenic risks were estimated for contaminant intakes from each of the relevant pathways identified in the exposure assessment. The chronic daily intake estimated from the exposure assessment was multiplied by the slope factor identified in the toxicity assessment in order to quantify the carcinogenic risk. This risk is defined as the incremental cancer risk over the lifetime of a worker who is exposed at the CAM-5 site.

Lead is considered a potential carcinogen by the U.S. EPA however a slope factor has not yet been determined and therefore the Quebec Soil Contamination Guidelines for cleanup of lead were used as recommended to characterize the risk. Lead concentrations in soils varied from 13-310 mg/kg for all locations and these values were compared to the guideline of 600 mg/kg for implementing corrective measures or restricting land use. Based on these guidelines, the risks from lead were considered small.

Results have been summarized in Table E.6. and as may be seen the total carcinogenic risk was estimated at $\leq 2 \times 10^{-5}$. Based on the U.S. EPA site remediation goal of reducing cancer risks below 10^{-4}, the CAM-5 carcinogenic risk is less than criteria. The principal contributor was chromium intake from the Inhalation pathway. Although only a small area of significant chromium concentration was found, low level concentrations below background were distributed over a large area which resulted in greater potential exposures. The incremental risk above background is therefore much less than that estimated above. As discussed in Volume 2, a large

TABLE E.6 - CAM-5, MACKAR INLET: CARCINOGENIC RISK ESTIMATES

Pathway	Contaminant	Chronic Daily Intake (10^{-6} mg/kg day)	Slope Factor Risk per Unit Dose $(mg/kg\ day)^{-1}$	Risk
Ingestion of Soil	PCB	0.0001	7.7	8×10^{-10}
Dermal Contact of Soil	PCB	0.001	7.7	8×10^{-9}
Inhalation of Airborne Contaminants	PCB	0.0007	7.7	5×10^{-9}
	Chromium	0.5	41	2×10^{-5}
TOTAL				2×10^{-5}
CAM-5 Site Total Carcinogen Risk				2×10^{-5}

slope factor is defined for the hexavelant form of chromium and therefore any portion of the chromium from CAM-5 site which is not in hexavelant form would reduce the estimated risk proportionately.

E.5.2 NON-CARCINOGENIC RISK

The worker non-carcinogenic risk of the CAM-5 site was quantified based on a hazard index previously described in Volume 2, Subsection 3.0. For each contaminant in each pathway identified from the exposure assessment, the chronic daily intake was divided by the comparative reference dose determined from the toxicity assessment. This hazard quotient calculated for each contaminant was summed in order to calculate a pathway total and each pathway total was summed in order to calculate the total exposure hazard index. Should the hazard index exceed unity (1.0) then the contaminant exposure level exceeds the reference and there may be concern for potential non-cancer effects.

The CAM-5 site worker non-carcinogenic hazard index results are summarized in Table E.7. As may be seen ingestion of water contributed the largest amount to the risk index due to the chromium concentration in drinking water. The distribution of hazard quotients from other pathways is given in Figure E.2. The hazard index of 6×10^{-1} is less than the unity criteria however the reference dose was based on chromium VI. The reference dose for chromium III is 200 times greater than that for chromium VI, therefore the portion of chromium which is not in hexavelant form would reduce the estimated risk proportionately.

The estimated contaminant intakes for caribou and grasses were compared to estimated safe values to characterize risk in a method similar to that used for human non-carcinogenic risk assessment. The sum of all hazard quotients in caribou was significantly smaller than the unity criterion and therefore caribou risks are considered small. Likewise, the hazard quotients for PCBs, lead and nickel in grasses were less than unity. The estimated intakes for the remaining contaminants were small, however, toxicity information was not available and therefore risks could not be quantified.

E.5.3 UNCERTAINTY ASSESSMENT

The uncertainties inherent in the risk assessment were documented in each of the data evaluation, exposure assessment, and toxicity assessment sub-tasks. Conservative assumptions were used to deal with the combination of uncertainties in order to ensure the final results were represented an over estimation of the risks. Quantitative risk estimates have been presented for both carcinogenic and non-carcinogenic hazards however the qualitative assessments and evaluations of uncertainties form an integral part of the results.

The carcinogenic risks were quantified for two contaminants and qualitatively assessed for lead. Results were based on conservative assumptions and therefore actual risks are considered to be lower than those presented in this report. The carcinogenic risk is defined as a probability of developing cancer, not of dying from cancer and the U.S. EPA weight-of-evidence classification for each contaminant varied as previously described. The weight of carcinogenic evidence for lead is uncertain at this time.

The total site non-carcinogenic hazard index was developed by summing the hazard quotients from each contaminant in each pathway. As previously discussed the uncertainties associated with both the exposure assessment and toxicity assessment vary for each contaminant and the uncertainties associated with summing hazard quotients also depend on the contaminant mixture among other factors. As a first order approximation the hazard quotient was based on conservative assumptions and therefore presents an over estimation of the potential site risk. The CAM-5 hazard index of 6×10^{-1} is less than the unity criterion however, since the index is close to the criterion, the principal factor should be further evaluated. The principal factor was

TABLE E.7 - CAM-5, MACKAR INLET: NON-CARCINOGENIC HAZARD INDEX

Pathway	Contaminant	Chronic Daily Intake (10^{-6} mg/kg day)	Chronic Reference Dose (10^{-6} mg/kg day)	Hazard Quotient
Ingestion of Soil	Mercury	0.0004	80	5×10^{-6}
	TPH	38	100,000	4×10^{-4}
	Chromium	3	5,000	6×10^{-4}
	Toluene	0.0001	200,000	5×10^{-10}
TOTAL				1×10^{-3}
Dermal Contact of Soil	Mercury	0.0004	80	5×10^{-6}
	TPH	370	100,000	4×10^{-3}
	Chromium	26	5,000	5×10^{-3}
	Toluene	0.01	200,000	5×10^{-8}
TOTAL				9×10^{-3}
Inhalation	Mercury	0.0005	80	6×10^{-6}
	TPH	25	100,000	3×10^{-4}
	Chromium	4	5,000	8×10^{-4}
	Toluene	0.0006	200,000	3×10^{-9}
TOTAL				1×10^{-3}
Ingestion of Water	Chromium			6×10^{-1}
Dermal Contact with Water	Chromium			1×10^{-3}
CAM-5 Site Total Exposure Hazard Index				6×10^{-1}

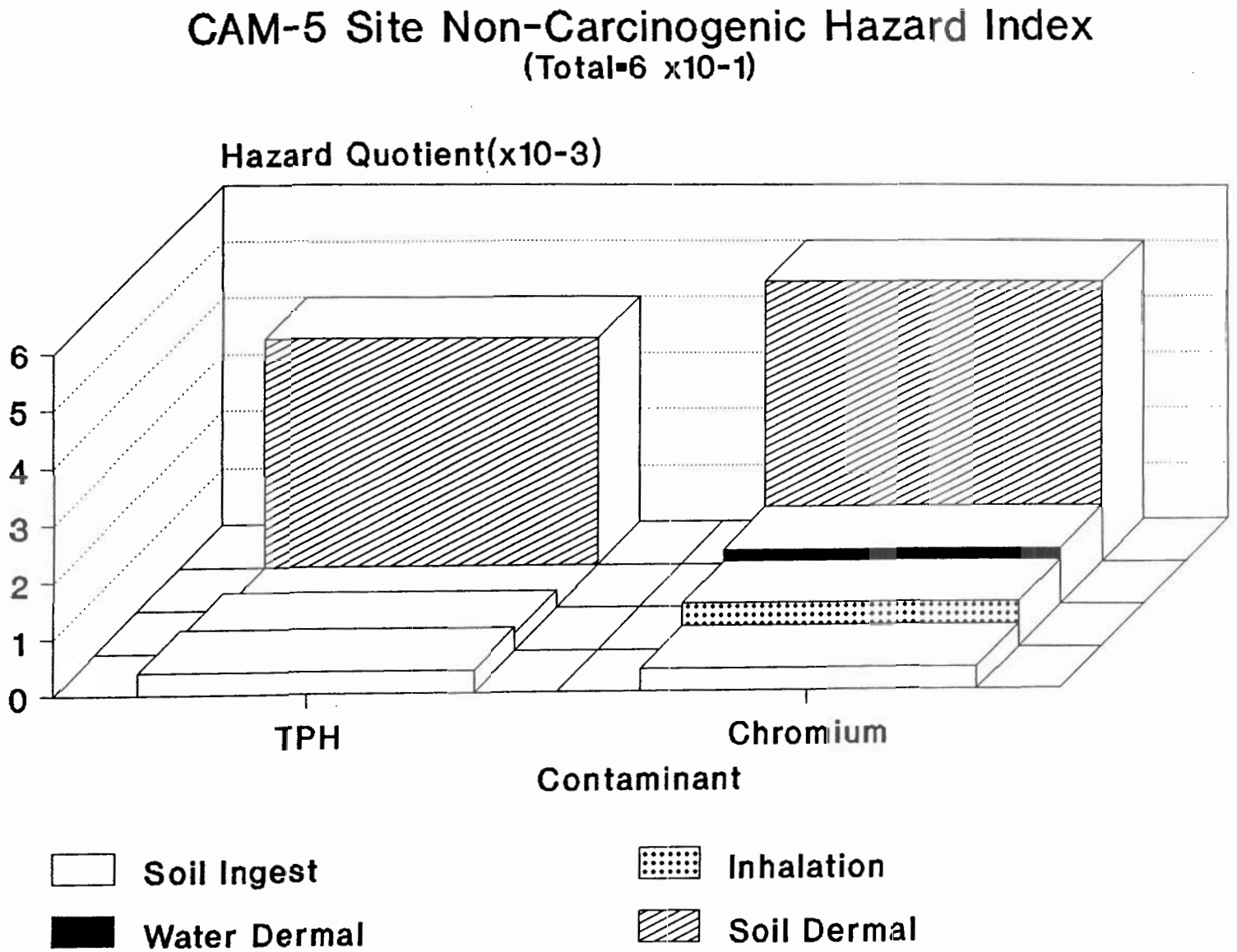
CAM-5 Site Non-Carcinogenic Hazard Index
(Total=6 x10-1)
Hazard Quotient(x10-3)
6
5
4
3
2
1
0
TPH
Chromium
Contaminant
Soil Ingest
Water Dermal
Inhalation
Soil Dermal
Ingestion of water
not included

FIGURE E.2

chromium in drinking water, assumed to be present only in the more toxic hexavelant form, and should this not be the case then the risk index would be reduced. Only one sample was analyzed and therefore the estimated risk is dominated by an inherent uncertainty.

The uncertainty associated with the background soil sampling was discussed previously, however the incremental risk above background was not a significant variable in developing cleanup recommendations for the CAM-5 site.

Defence Construction Canada

Construction de Défense Canada

Please return to Uma - Calgary Attn: Uma Schultz ENA 0141-095-67-02

PROJECT MANAGEMENT OFFICE DEW LINE CLEAN UP

DEFENCE CONSTRUCTION CANADA

PROJECT DESCRIPTION FOR NUNAVUT IMPACT REVIEW BOARD

CLEAN UP OF FIFTEEN DEW LINE SITES IN THE NUNAVUT SETTLEMENT AREA

June 1998

Defence Construction Canada
Construction de Défense Canada

DL PMO – ENV

June 8, 1998

Refer to file number
Mentionner le dossier

Mr. Larry Pokok Aknavigak
Chair, Nunavut Impact Review Board
PO Box 2379
Cambridge Bay, NT X0E 0C0

Dear Sir:

Please find enclosed, on behalf of the Department of National Defence, ten copies of our submission to the Nunavut Impact Review Board for the decommissioning of fourteen Distant Early Warning (DEW Line) radar sites in the Nunavut Settlement Area. This submission is being forwarded to you, as we are required to apply for land use permits pursuant to the *Territorial Land Use Act* and *Regulations*. I would appreciate if the Board could review this at your next session. Our current planning has the clean up of the first of the fourteen sites, Cambridge Bay, beginning on or about July 1, 1998.

The overall project plan has been the result of several initiatives that have taken place since 1989, including:

- Initial site investigations at all of these sites between 1989 and 1994;
- The development of a baseline protocol for the clean up of these sites designed to preclude the migration of contaminants from the sites into the Arctic food chain and to leave the sites in an environmentally safe condition;
- A comprehensive public consultation program that has been undertaken for the past 6 years in a number of Nunavut communities. This program will continue throughout the implementation phase of the project;
- An extensive environmental assessment program pursuant to the *Environmental Assessment and Review Process Guidelines Order*, which I have included ten copies of the report with this submission. This program examined possible impacts that the clean up itself may have on biophysical, socio-economic and cultural/heritage components of the environment. In those cases where possible impacts were predicted, appropriate mitigation actions were proposed and have been or will be incorporated into site specific Environmental Protection Plans; and
- Most recently, extensive consultation with Nunavut Tunngavik Incorporated (NTI) on the environmental provisions for the clean up. This has resulted in the promulgation of an agreement between the Department of National Defence (DND) and the Inuit, which I have included with this submission. It is important to note that this agreement has not yet been signed by either DND or NTI but this is the version submitted to the Minister of National Defence and 1st Vice President of NTI for approval. We expect that this agreement will be signed in the near future and will inform you as soon as this final step is complete.

Place de Ville, Tower B
112 Kent Street, 17th Floor
Ottawa, Ontario K1A 0K3
Fax: 998-1061

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112, rue Kent, 17ième étage
Ottawa, (Ontario) K1A 0K3
Télécopieur: (613) 998-1061

Canada

We are currently awaiting the delivery of our 1:50,000 scale topographic maps and will forward them to you as soon as they arrive.

I trust that we have provided the information you require in accordance with the Board's current procedures. I remain available to you or the board to clarify any issue related to this submission at any time. If you have any questions, please feel free to telephone me at (613) 998-9524. Alternatively, I may be reached by facsimile at (613) 998-1061 or by e-mail at *dccenv@smtp.gc.ca*.

I wish to thank you and the Board, in advance, for your consideration of our submission.

Yours truly,

Shawn D. Bindon, M.Sc., P.Biol.
Environmental Services Division

Enclosures.

cc. Mr. Art Washuta, P.Eng., UMA Engineering Limited
Dr. Ken Reimer, Royal Military College of Canada
Mr. Tony Downs, P.Eng., Department of National Defence
Annette McRobert, Department of Indian and Northern Affairs

Defence Construction Canada
Construction de Défense Canada

DL PMO – ENV

June 8, 1998

Refer to file number / Mentionner le dossier

Annette McRobert
Manager, Land Administration
Department of Indian and Northern Affairs
PO Box 1500
Yellowknife, NT X1A 2R3

Dear Annette:

As we discussed during may last trip to Yellowknife, please find enclosed, on behalf of the Department of National Defence, land use permit and quarry applications and supporting documentation for the clean up of fourteen Distant Early Warning (DEW Line) sites in the Nunavut Settlement Area. The first of these sites to undergo clean up, Cambridge Bay, is scheduled to start on or about July 1, 1998.

For your information, we have concurrently provided a submission to the Nunavut Impact Review Board providing the details of this project. I have included a copy of this submission. An environmental assessment of the clean up of these sites has also been completed and enclosed.

I trust that we have provided all of the required documentation required to allow your Department to issue these permits. I remain available to you or your staff to clarify any issue related to these applications. If you have any questions, please feel free to telephone me at (613) 998-9524. Alternatively, I may be reached by facsimile at (613) 998-1061 or by e-mail at *dccenv@smtp.gc.ca*.

Yours truly,

Shawn D. Bindon, M.Sc., P.Biol.
Environmental Services Division

Enclosures.

cc. Mr. Art Washuta, P.Eng., UMA Engineering Limited
Dr. Ken Reimer, Royal Military College of Canada
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Canada

PROJECT DESCRIPTION FOR NUNAVUT IMPACT REVIEW BOARD
CLEAN UP OF FIFTEEN DEW LINE SITES IN THE NUNAVUT SETTLEMENT AREA

TABLE OF CONTENTS

LIST OF ANNEXES

PROJECT DESCRIPTION FOR NUNAVUT IMPACT REVIEW BOARD CLEAN UP OF FIFTEEN DEW LINE SITES IN THE NUNAVUT SETTLEMENT AREA

PART 1 - PROPONENT IDENTIFICATION INFORMATION

Defence Construction Canada
(on behalf of the Director General Environment, Department of National Defence)
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Lead Authorising Agencies
List Of Approvals, Permits And Licences Required

The lead agency for this project is the Department of National Defence, represented by the Director General Environment. The management of this project is being provided by Defence Construction Canada. These agencies will be responsible for obtaining permits except in those cases where the clean up contractor is required to do so by legislation.

The types of approvals, permits and licences will vary for each DEW Line site, depending on several factors, including:

- Control of land (i.e. DND versus DIAND; no work is to take place on Inuit owned land);
- Types of materials being transported or stored;
- Location/source of mineral resources (i.e., gravel) that is not located on DND reserves; and
- Proximity of work locations to sensitive environmental components such as migratory bird sanctuaries and fish habitat.

It is anticipated that the permits, licences or approvals listed in Annex A may be required at some or all of the DEW Line sites. In addition, a number of permits or licences may be required by the successful contractor at each site. These permits or licences pertain to the operation and maintenance of the contractors camp or owing to his/her status as an employer. Examples of these permits include those related to the possession of firearms, day to day camp operation and federal/territorial labour codes.

There is no requirement anticipated for either the project management office nor the contractor to obtain the following permits or licences: