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Your recent correspondence also advised that the previously proposed plan to move historical contaminated soil stockpiles to use as backfill at the site is not acceptable as it would constitute a deposit of waste pursuant to section 4 of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*. This approach appears to treat naturally occurring trivalent chromium in native soils found on the site in the same category as contaminated soils, which are subject to the remediation requirements under a Type “B” water licence as previously granted to Transport Canada for that purpose. We are concerned about such an approach, which may have broad implications beyond this Project.

The GN has sought independent technical advice to review the test results of the soil samples containing chromium and to provide recommendations on how to manage such soil. Our technical advisors WSP Canada Inc. (WSP) have provided this advice through an Environmental Memorandum, dated September 4, 2014 (**Appendix A**). This memorandum confirmed that Chromium has been detected in various levels across most areas of the airport (shown in **Appendix B**). The memorandum also highlighted that no hexavalent chromium (Cr VI) is present on site. Based on its analysis, WSP has recommended that soil found to contain chromium within the airport site be managed as clean native soil and not as waste as defined under the applicable water regulations in Nunavut.

We note that WSP identified that Total Chromium on site has been detected above the CCME Guideline criteria. However, the CCME Guideline expressly states that the numerical criteria are for general guidance only, and site specific conditions should be considered in the application of these values. To this end, it is our view that WSP’s opinion, which is site specific, is consistent with the intention of the CCME Guideline.

We further note that WSP’s conclusion is consistent with the GN’s understanding that chromium is a naturally occurring element that may exist in several chemical forms and valence states in the environment.¹ Given its innocuous state of trivalent chromium and its low risk to environment and human health, trivalent chromium is specifically excluded from the definition of hazardous waste by the United States Environmental Protection Agency.²

As a result, WSP’s recommendation on how to manage the soil is consistent with the expert opinion of the GN’s Environmental Protection Division, Department of Environment that a risk-based approach is advisable in lieu of total remediation of soil containing chromium. Please see

¹ U.S. Environmental Protection Agency (August 1998) Toxicological Review of Trivalent Chromium, In support of Summary Information on the Integrated Risk Information System (IRIS), pp. 26-28

² U.S. Environmental Protection Agency (October 2009), Identification and Listing of Hazardous Waste 40 CFR §261.4(b): Exclusions: Solid Wastes which are Not Hazardous Wastes, pp. 11-13

email correspondence and approval from Robert Eno, Chief Environmental Protection Officer, attached as **(Appendix C)**.

In conclusion, the Iqaluit International Airport Improvement Project involves moving substantial amounts of earth within the airport bounds. It is reasonable to believe that much of this earth contains some level of chromium. Therefore, it may take a very high rate of sampling in order to eliminate some very small quantities of what appears to be relatively innocuous, naturally occurring materials.

The Government of Nunavut's independent technical expert, WSP has concluded that all investigations and data confirm that hexavalent chromium is not present on site, and the soil will have no negative impact on the local environment or health and safety. As a result, WSP recommended that naturally occurring chromium in soil should not be treated as waste or contaminated material and managed under a water licence.

We respectfully submit that the aforementioned memo from WSP and email from Mr. Eno be considered by the Board in any deliberations related to allowing Project impacted soil containing naturally occurring chromium to be managed as clean native soil. In this respect, we refer the Board to the accompanying letter **(Appendix D)** from AIP, dated September 5, seeking authorization to reuse the soil on site found to contain chromium as native soil for use as backfill in areas that are projected to be covered with a permanent structure.

Your timely and expedited consideration of this matter is much appreciated.

Yours Sincerely,



Jim Stevens
Assistant Deputy Minister
Economic Development & Transportation

cc:

Pauloosie Suvega, Deputy Minister, Economic Development & Transportation, Government of Nunavut
Roy Green, Deputy Minister, Community and Government Services, Government of Nunavut
David Hohnstein, Director of Technical Services, Nunavut Water Board

APPENDIX A



Montréal, September 4, 2014

Mr. Barry Reimer P.Eng., MBA, PMP
Chief Project Officer, Iqaluit International Airport Improvement Project
Government of Nunavut

Re: Environmental Memorandum
Iqaluit Airport - Chromium under the ATB footprint
1126 Mivvik Street Iqaluit, Nunavut

Our file no. 121-60109-15

Mr Reimer:

WSP has conducted a review of the following documents in order to provide environmental recommendations regarding the current state of the Iqaluit Airport construction project:

- Environmental Audit – Biogenie Iqaluit Airport (April 1995)
- Phase II Environmental Site Assessment Subsurface Investigation – First Air Cargo Hangar and Office Building (November 2007)
- Iqaluit – An Airport History (March 1999)
- Pre Existing Environmental Contamination Management Plan (May 2014)
- Addendum to Phase III Report Following Additional Sampling for Chromium Contamination (July 16, 2014)
- Sampling for Possible Chromium Contamination – Property Located at Combined Services Building (CBS) Site, New Iqaluit Airport Project (July 17, 2014)
- Design Builder Supervening Event Notice #1 – Chromium under ATB footprint – Subnotice # 1- Further Details (July 25, 2014)
- Supervening Events Notice #1 – Chromium under the ATB footprint (July 29, 2014)
- Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (total chromium 1997 hexavalent chromium (VI) 1999)
- US EPA Toxicological Review of Trivalent Chromium (August 1998)

Chromium is a metal chemical element found in nature. It is regulated as Total Chromium, the combination of Cr III and Cr VI. Chromium is commonly used in manufacturing activities such as steel production, aerospace engineering, as well as in paints and plating operations. When chromium is utilized in some industrial processes or “hot work” such as welding, it is converted



to Cr VI via oxidation. Unlike the benign Cr III, Cr VI is harmful to human health and safety as well as the natural environment. Cr VI is the driver of more stringent Chromium standards and a clear indicator of historic manufacturing or industrial activities.

WSP understands that soil sampled on site in July 2014 was analyzed for metals. Of those results, seven samples contained concentrations that exceeded the CCME criteria for total chromium (combined total of Cr III and Cr VI). Total chromium was detected above criteria in the soil stockpile (which represents material excavated during construction) as well as natural ground samples. Initially, one sample (SP) was also analyzed for hexavalent chromium and no hexavalent chromium (Cr VI) was detected. Subsequent testing for hexavalent chromium on all samples that exceeded the CCME criteria for total chromium also confirmed that no hexavalent chromium (Cr VI) was detected. Additionally, in the Pre Existing Environmental Contamination Management Plan details sampling in this area from 2013 for chromium as well as Cr VI. The results from TP-10, TP-13, and TP-14 are comparable (all below 20 ppm) for chromium. Cr VI was not detected above laboratory detection limits in any sample. This is a clear indication that the entirety of the Total Chromium results can be attributed to naturally occurring Cr III and not the industrialized Cr VI.

Table 1 on the following page summarizes the results of the July, 2014 sampling exercise. WSP has modified the order in which the samples are presented to show total chromium results from the stockpiled soil and the natural ground.

Each sample result represents a large volume of soil on site. The stockpile of soil contains approximately 8,000m³ of soil. WSP has calculated averages using each of these areas to provide a more comprehensive look at concentrations. It is clear that natural ground and stockpiled soil is of the same composition regarding chromium concentrations. The difference of 10 parts per million (mg/g) is negligible.

As stated in the July 17th sampling report, the results represent Cr III and not hexavalent chromium. While CrO₄²⁻ has a high solubility in soils, Cr III has limited hydroxide solubility and forms strong complexes with soil minerals. Cr III is relatively innocuous and immobile thus making it a very low risk in terms of environmental health and safety. The CCME guideline of 87 mg/g is based on potential risk factors predominantly stemming from the toxicology of Cr VI.

Table 1

	Sample ID	CCME Criteria (mg/g)	Total Cr (mg/g)	Cr VI (mg/g)
Stockpile Average 65 mg/g	S1	87	59	-
	S2	87	34	-
	S5	87	42	<0.50
	S6	87	20	-
	S9	87	107	<0.50
	S12	87	55	-
	S13	87	61	-
	S16	87	109	<0.50
	S17	87	27	-
	S20	87	113	<0.50
	S21	87	49	-
	S24	87	58	-
	S25	87	58	-
	S28	87	88	<0.50
	S31	87	100	<0.50
	SP	-	-	<0.50
	Sample ID	CCME Criteria (mg/g)	Total Cr (mg/g)	Cr VI (mg/g)
Natural Ground Average 54 mg/g	S3	87	25	-
	S7	87	24	-
	S10	87	39	-
	S11	87	61	-
	S14	87	32	-
	S15	87	37	-
	S18	87	20	-
	S19	87	22	-
	S22	87	105	<0.50
	S23	87	41	-
	S26	87	42	-
	S27	87	94	<0.50
	S29	87	75	-
	S30	87	83	-
	S32	87	84	-
	S33	87	79	-



On July 16, 2014, QEC issued a Phase III addendum that included Total Cr results from 22 test pits. After receiving these results, an additional analysis exercise was conducted on September 2, 2014 to determine if Cr VI was present in the samples. Of the additional 14 samples tested for Cr VI from this area, no Cr VI was detected above laboratory detection limits. Results are shown in Table 2 below.

Table 2

	Sample ID	CCME Criteria (mg/g)	Total Cr (mg/g)	Cr VI (mg/g)
Average 118 mg/g	TP 200	87	114	<0.50
	TP 201	87	76	-
	TP 202	87	70	-
	TP 203	87	133	<0.50
	TP 204	87	102	<0.50
	TP 205	87	153	<0.50
	TP 206	87	54	-
	TP 207	87	170	<0.50
	TP 208	87	70	-
	TP 209	87	102	-
	TP 210	87	190	-
	TP 211	87	155	<0.50
	TP 212	87	138	<0.50
	TP 213	87	96	-
	TP 214	87	137	-
	TP 215	87	141	<0.50
	TP 216	87	138	<0.50
	TP 217	87	147	<0.50
	TP 218	87	159	<0.50
	TP 219	87	129	<0.50
	TP 220	87	71	-
	TP 223	87	78	-
	TP-2	87	-	<0.50
	TP-1 DT1	87	-	<0.50
	TP 208-D	87	75	-
	TP 218-D	87	146	-

Conclusion

As the soil results on site have confirmed that Cr VI is not present on site, and that Total Chromium results are consistent with background (natural ground) results, and site averages of Total Chromium results are below the regulatory threshold, WSP recommends managing this



soil as clean native soil and not hazardous waste. WSP recommends providing this recommendation to the Nunavut Water Board in an effort to manage this soil without a license as it complies with the criterion in subsection 5(2) of the Nunavut Waters Regulations, SOR/2013-69. Additionally, WSP recommends that this material be recognized as natural soil rather than as a waste, as it will not adversely affect the environment. "Waste" means any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means, and includes

- a) any substance or water that, for the purposes of the Canada Water Act, is deemed to be waste;
- b) any substance or class of substances specified by the regulations;
- c) water containing any substance or class of substances in a quantity or concentration that is equal to or greater than that prescribed by the regulations; and
- d) water that has been subjected to a treatment or change described by the regulations.

This soil contains no Cr VI as confirmed by the Environmental Audit (April 1995), the Phase II ESA (November 2007), the Pre Existing Environmental Contamination Management Plan (May 2014), the Sampling for Possible Chromium Contamination (July 17, 2014), and additional analysis completed on September 2, 2014. On average the soil contains concentrations of Total Chromium below the regulatory thresholds and equal to those concentrations found in native soil based on previous studies. This soil will have no negative impact on the local environment or health and safety and should be managed as a native soil.

Yours truly,

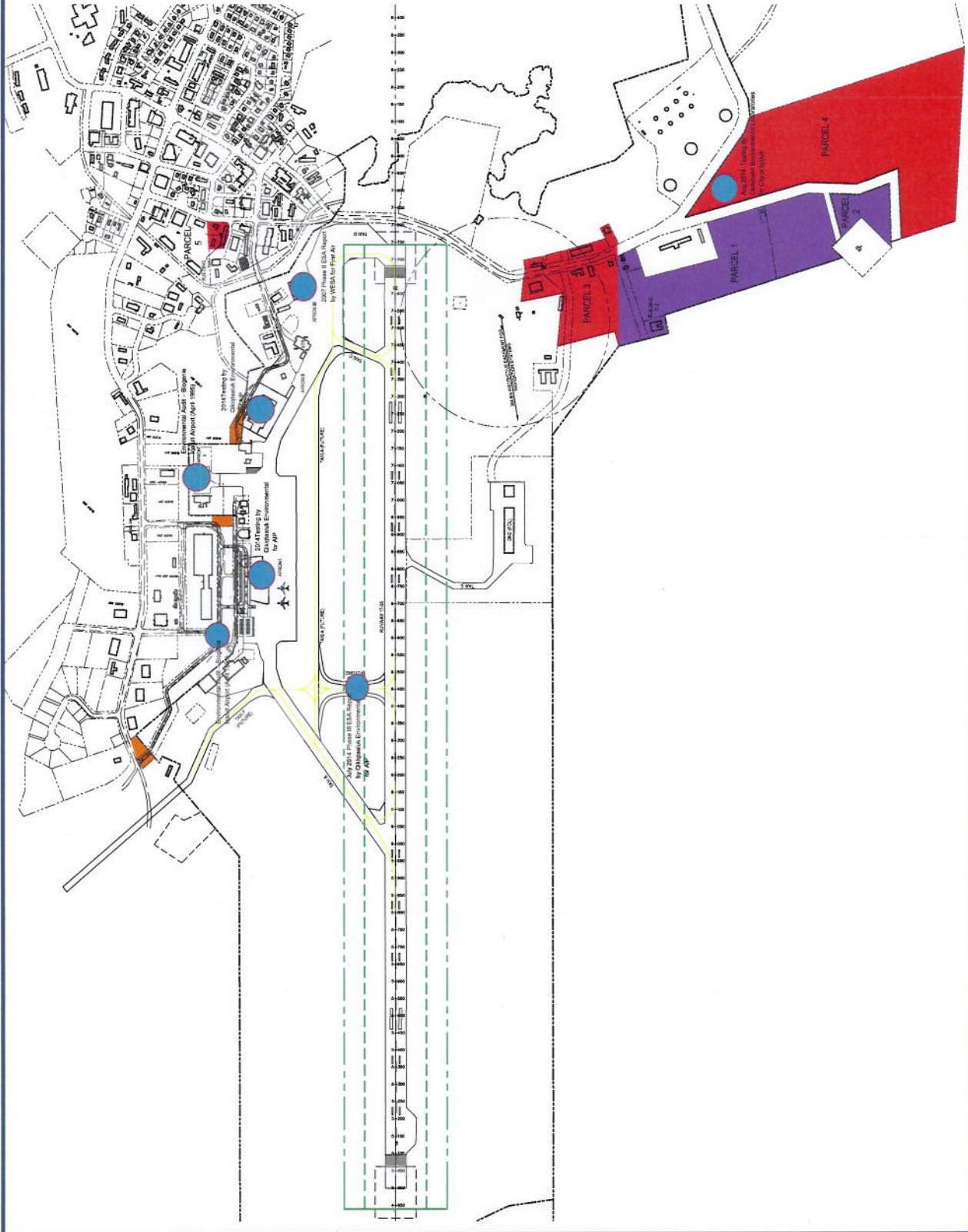
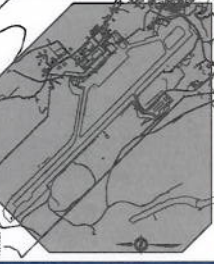
A handwritten signature in black ink, appearing to read "S. Dawson", followed by a horizontal line.

Steven Dawson
Project Manager - Environment

A handwritten signature in blue ink, appearing to read "Kateri Normandeau", enclosed within a rectangular box.

Kateri Normandeau ing. P. Eng. M.Env. PMP
National Strategy Director - Environment

APPENDIX B



APPENDIX C

Appendix 4 - RBC approvals from EPD

Geoffroy Lécureur

Objet: TR: DOE comments on ~COR-082415~

Importance: Haute

De : Michel Boulianne
Envoyé : 21 juin 2014 10:56
À : Geoffroy Lécureur; Patrice Richard
Cc : Thibaut De Lustrac; Amir KHERADMAND
Objet : Tr: DOE comments on ~COR-082415~
Importance : Haute

Messieurs,
Approval of the EPD.
Regards,

Michel Boulianne
Sintra inc.
P 514 341-5331
C 514 239-3176

De: Steinberg, Heidi <hsteinberg@croworld.com>
Envoyé: vendredi 20 juin 2014 20:49
À: Michel Boulianne
Cc: Shepherd, Lindsay
Objet: Fwd: DOE comments on ~COR-082415~

Michel,
See below. EPD approves both submittals. We will update the Soil and Groundwater Plan early next week.
Have a good weekend.

Heidi

Begin forwarded message:

From: "Eno, Robert" <REno@GOV.NU.CA>
Date: June 20, 2014 at 8:27:53 PM EDT
To: "Steinberg, Heidi" <hsteinberg@croworld.com>
Subject: RE: DOE comments on ~COR-082415~

Good Evening Heidi.

Yes, please consider the e-mail as our approval for the proposed works.

Robert

From: Steinberg, Heidi [hsteinberg@croworld.com]
Sent: Friday, June 20, 2014 2:06 PM

To: Eno, Robert
Subject: RE: DOE comments on ~COR-082415~

Hi Robert.

Would like to confirmation with you if your emails below are approval of the two deliverables:

- Tier 3 Risk-Based Approach Criteria (letter)
- Soil and Groundwater Management Plan (report)

Or will you issue an letter with your approval concurrence of these items? Please advise.

Thanks,

Heidi

From: Eno, Robert [<mailto:REno@GOV.NU.CA>]
Sent: Thursday, June 19, 2014 1:54 PM
To: Steinberg, Heidi
Cc: Michel Boulianne; Shepherd, Lindsay; Project Email Filing
Subject: RE: DOE comments on ~COR-082415~

Thanks Heidi.

I am satisfied with CRA's responses to my questions and concerns. I have only one item that I want to clarify and that is my comment with respect to environmental liabilities. When I referred to their "client" was referring to the owner of the lands and facility: the GN. Just to be clear on this.

I should also advise you that the Auditor General of Canada requires the GN to list all of its environmental liabilities and to put a dollar figure on these liabilities wherever possible. The spearheading this effort was assigned to me last month. I am going to suggest – and this is not a condition of our approval, only a suggestion – that concurrent to this project and if it is possible, your client – the GN – may wish to have the various engineering firms that are working on this project to see if they can arrive at a reasonably accurate dollar amount in terms of what environmental liabilities will remain on site once the work has been completed. It may be that this is too far outside of the scope of work that has been assigned to the partners, however, it seems to me that the time to conduct this sort of exercise is when you are excavating the contamination.

Robert Eno
Director,
Environmental Protection Division
Department of Environment

De : [Eno, Robert](#)
A : gjohnson@qenv.ca; Lowe, Kristi
Cc : [Geoffroy Lécureur](#); [Michel Boulianne](#); [Thibaut De Lustrac](#); [Sylvain Laberge](#)
Objet : RE: Airport Project Chromium Contamination
Date : 2 juillet 2014 15:37:42

This sounds acceptable Greg.

I am not questioning the engineering aspects but I have had a lot of experience with bullet-proof systems and "will-never-happen" scenarios. At the end of the day, approval for risk-based approaches in lieu of total remediation has my signature on it and thus I like to have at least some mechanism in place to confirm that nothing is moving offsite. Monitoring wells satisfy this requirement.

The world is littered with several thousands of years' worth of the debris of failed human contrivances which were deemed by the designers to be fail-safe and invincible.

Robert

From: Greg Johnson [gjohnson@qenv.ca]
Sent: Wednesday, July 02, 2014 11:32 AM
To: Eno, Robert; Lowe, Kristi
Cc: 'Geoffroy Lécureur'; 'Michel Boulianne'; 'Thibaut De Lustrac'; 'Sylvain Laberge'
Subject: RE: Airport Project Chromium Contamination

Robert.

To follow up on my previous email the owner manager will be notified with an official letter regarding the environmental contamination.

2 Monitoring wells will be installed next to apron 1 extension where the contaminated soils will be placed as fill and 2 additional monitoring wells will be installed down gradient next to the new taxiway G.

Greg Johnson, M.Sc.A., P.Eng.
Project Director
www.qenv.ca

Pensez vert, est-ce nécessaire d'imprimer ce message? Think green, is it really necessary to print this message?

-----Original Message-----

From: Eno, Robert [<mailto:REno@GOV.NU.CA>]
Sent: July 2 2014 10:47
To: gjohnson@qenv.ca
Cc: 'Geoffroy Lécureur'; 'Michel Boulianne'; 'Thibaut De Lustrac'; 'Sylvain Laberge'
Subject: RE: Airport Project Chromium Contamination

Good Morning Greg.

I am still on holidays in Ontario but gave the report a read-over.

My comments with respect to the proposed management for the chromium-contaminated soils are pretty much the same as the comments I provided to CRA a few weeks ago with respect to the contaminated soil they proposed to use as fill material:

1. The proposed plan looks sound but my main question is how will the owner manager of the property in question ensure that the contaminants will remain on site? Are there any mechanisms in place to monitor the possible offsite

migration of the contaminants? Finally, is the owner manager (the G.N Airports Division) aware that they will be legally responsible for this site in perpetuity? Essentially, they will have on their hands, a permanent environmental liability.

2. As I indicated to CRA, I am currently engaged in a project assigned to me last month and driven by the Auditor General for Canada to develop a dollar-figure accounting of the GN's environmental liabilities. It appears to me that this Airport property will be one of those liabilities if contaminated soil is used as fill material; notwithstanding that it will not be available to humans and to the environment if managed as proposed. While I am sympathetic to the need to keep costs to a minimum and supportive of a risk-based approach to contaminants management, I also believe that your client should be made aware of the environmental liability aspect.

DOE would be supportive of this risk-based approach to managing the contaminated soils if they remain on site and do not migrate and if your client is made aware of their long-term liabilities.

Robert

From: Greg Johnson [gjohnson@qenv.ca]
Sent: Wednesday, July 02, 2014 9:50 AM
To: Eno, Robert
Cc: 'Geoffroy Lécureur'; 'Michel Boulianne'; 'Thibaut De Lustrac'; 'Sylvain Laberge'
Subject: Airport Project Chromium Contamination

Good morning Robert,

QE was mandated to conduct a Phase III ESA at the airport following the work done by CRA last year. A new area was added to the study in the location where Taxiway G will be constructed. In this area there was a pad constructed of imported material. This pad has come back over criteria for Chromium.

We have 5 positive test results in this area, and by the end of the day today I will have additional results from the lab to better delineate the contamination.

In the meantime, can you please review the attached Expert Opinion on the management of the Chromium contaminated soils and let me know if you have any comments?

Below is a plan that shows the test pits that were taken. Contamination has been found in test pits 250, 209, 210, 213 and 214.

[cid:image003.png@01CF95DB.006D6720]

Below you will find a map of the airport that shows the location of the contamination found and a cross-section of the completed taxiway.

[cid:image007.jpg@01CF95DB.006D6720]

[cid:image001.png@01CF9214.AED9BC20]

Greg Johnson, M.Sc.A., P.Eng.

Project Director

[Logo QE Inuktituk] <<http://www.qenv.ca>> Iqaluit & Montreal Toll Free: 1-866-634-6367 x 150

Tel: (514) 940-3332 x 150

Cell: (514) 717-7604

www.qenv.ca <<http://www.qenv.ca>>

P Pensez vert, est-ce nécessaire d'imprimer ce message? Think green, is it really necessary to print this message?

APPENDIX D

IIAIP PROJECT – NOTIFICATION 00092

To: Nunavut Water Board

Date: September 05, 2014

Attention: Mr. David Hohnstein
Director of Technical Services

From: Celine MATHA

cc:

Government of NunavutJim Stevens
Tanya Winmill
Peter Tumilty
John Hawkins
Paul Mulak
Barry Reimer
Eiryn DevereauxAIP

John Wood

NASL

Michael O'Gorman

Bouygues/SintraCéline Matha
Patrice Richard
Geoffroy Lécureur
Michel BoulianneNWB

Damien Côté

Subject: Re: Chromium Impacted Soils

Dear Mr. Hohnstein,

Following the correspondence of July 23rd, 2014 between Mr. Damien Côté and Mr. Michel Boulianne of Sintra and Mr. Greg Johnson of Qikiqtaaluk Environmental (QE), we understood that the Nunavut Water Board recommended that these soils will need to be managed under a water licence if they are to be used as fill, according to the parameters laid out in a risk analysis.

As our application to the Nunavut Water Board for a type B Water license has now been filed and is currently being processed, we are therefore seeking NWB authorisation to reuse the Chromium impacted soils as backfill in areas that are projected to be covered with a permanent structure. This request prior to the formal delivery of the Water license is to explore the possibility of resuming earthworks activities sooner to ease the pressure on the Project Schedule. The proposed management practice for the disposal of the impacted materials based on the Tier 3 Risk-based Approach Criteria was presented to the Government of Nunavut's EPD by our environmental consultant on July 2nd (see below reference); the expert opinion from QE is that the mitigation measure would secure the impacted materials from potential harm to human health and environment. At that time it had not yet been determined what form of Chromium had been found. Since then, additional testing has confirmed that it is not the more toxic hexavalent Chromium, but rather the material is trivalent Chromium.

We remain available would the Nunavut Water Board require further information or wish to meet with us.

Regards,

**Celine MATHA**
Project Director

Attached documents: Expert Opinion on the Potential Risks to the Human Health and the Environment Related to the Management of Chromium Contaminated Soils at the Iqaluit International Airport, Qikiqtaaluk Environmental, 2nd July, 2014, Transmission via Email to Environmental Protection Division – Government of Nunavut