2013 Hope Bay Seepage Monitoring Program

Prepared for

TMAC Resources Inc.

Prepared by

SRK Consulting (Canada) Inc.
1CT022.000
March 2014

2013 Hope Bay Seepage Monitoring Program

March 2014

Prepared for

TMAC Resources Inc.
372 Bay Street, Suite 901
Toronto, ON M5H 2W9

Tel: +1 867 873 4767
Web: www.tmacresources.com

Prepared by

SRK Consulting (Canada) Inc.
2200–1066 West Hastings Street
Vancouver, BC V6E 3X2
Canada

Tel: +1 604 681 4196
Web: www.srk.com

Project No: 1CT022.000

File Name: 1CT022.000_HopeBay_Seepage2013_Report_FINAL_AML_LNB_20140320

srk consulting

Executive Summary

Annual geochemical reporting requirements for the Doris North mine, Hope Bay project include results from the quarry rock, Doris North underground waste rock and seepage monitoring program. In 2013, the monitoring program was limited to the seepage survey as there was no development of the underground mine or at any of the quarries. This report presents results of the 2013 freshet seep survey. The seepage program was completed in accordance with conditions outlined in Part D “Conditions applying to Construction” Item 21 of Water License 2AM-DOH0713 (Nunavut Water Board 2007) and the Quarry A, B & D Management and Monitoring Plan, Revision 01 (SRK 2010).

Seep survey locations were established opportunistically by walking the toes of all roadways, building pads and quarry sites along the Doris North and Doris-Windy roads (Appendix A). A total of 66 seepage sites were established and measured for field parameters. As per the water license, a minimum of 10% of the total sample set, including any sites with elevated conductivity, were submitted to a laboratory for an extended analytical suite. A total of 16 samples were collected and analyzed at a commercial laboratory.

The results of the 2013 sampling program indicated that there are no issues with respect to metal leaching or acid rock drainage (ML/ARD) in seepage associated with the infrastructure at Hope Bay. Results were comparable to historical data. Seepage from waste rock influenced areas had elevated levels of ammonia, chloride and nitrate compared to water quality guidelines though levels have decreased since 2012, suggesting that active flushing of drilling brines and blasting residues from the waste rock pile is ongoing. The majority of this seepage is captured in the water management system implemented at Hope Bay. Continued management of seepage from the waste rock pile is recommended.

ᑐᓴᒐᒃᓴᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ

ᐊᕐᕌᒍᓕᒫᖅᓯᐅᑎᑦ ᓄᓇᓕᕆᔾᔪᑎᑦ ᑐᓴᒐᒃᓴᑦ ᐊᑑᑕᐅᔭᕆᐊᓖᑦ ᐅᕘᖓᖓᔪᓄᑦ Doris North−ᒥ ᐅᔭᕋᓐᓂᐊᕕᖕᒥ, Hope Bay−ᒥ ᐱᓕᕆᐊᒃᓴᓕᕆᔾᔪᑎᑦ ᐃᓚᖏᑦ ᑭᖑᕐᖓᒍᑦ ᐊᑑᑕᐅᓚᐅᖅᑐᓂᒃ ᑐᐊᑉᑕᕕᖕᒥ, ᐅᕙᓂ Doris North−ᒥ ᓄᓇᐅᑉ ᐃᓗᐊᓂ ᐅᔭᖃᑦ ᐊᒃᑕᑯᓂᒃ ᐊᒻᒪᓗ ᖃᒥᑦᑐᖃᒻᒪᖕᒫᖅ ᖃᐅᔨᓴᕈᑎᑦ. ᐅᕙᓂ 2013−ᒥ, ᖃᐅᔨᓴᕈᑎᑦ ᐊᑑᑕᐅᓗᐊᓚᐅᖏᒻᒪᑕ ᖄᒥᓐᓂᐅᓴᔪᑦ ᖃᐅᔨᓴᖅᑕᐅᑎᓪᓗᒋᑦ ᓴᓇᔭᐅᓯᒪᔪᖃᔪᖏᒻᒪᑦ ᓄᓇᐅᑉ ᐃᓗᐊᓂ ᐅᕝᕙᓗᑭᐊᖅ ᑐᐊᑉᑕᕕᖕᓂᒃ. ᐅᑯᐊ ᑐᓴᒐᒃᓴᑦ ᐱᔾᔪᑎᓖᑦ ᐊᑑᑕᐅᔪᒥᓂᕐᓂᒃ ᐅᕙᓂ 2013−ᒥ ᓄᓇᒥ ᐊᐳᑦ ᐊᐅᒐᐃᒻᒪᑦ ᖄᒥᓲᓂᒃ ᖃᐅᔨᓴᕈᑏᑦ.

ᖄᒥᓐᓂᓕᕆᔾᔪᑏᑦ ᐊᓯᐊᓅᖅᑐᖃᓐᓂᖅᐸᑦ ᐱᓕᕆᔾᔪᑎᑦ ᐱᔭᕇᖅᑕᐅᔪᔪᑦ ᒪᓕᒃᑐᑦ ᐊᑑᑕᐅᖁᔭᐅᓯᒪᔪᓂᒃ ᓇᓗᓇᐃᔭᖅᓯᒪᕓᑦᑐᓂᒃ ᐅᕙᓂ ᐃᓚᖓᓂ Part D−ᒥ “ᒪᓕᒃᑕᐅᕆᐊᓖᑦ ᐊᑑᑕᐅᓗᑎᒃ ᓴᓇᔨᓄᑦ” ᐱᔾᔪᑦ” ᐱᔾᔪᑦ 21 ᐃᒥᓕᕆᔾᔪᑦ ᓚᐃᓴ ᐅᓇ 2AM-DOH0713 (ᓄᓇᕗᑦ ᐃᒪᓕᕆᔩᑦ ᑲᑎᒪᔨᖏᓐᓂᒃ 2007−ᒥ) ᐊᒻᒪᓗ ᑐᐊᑉᑕᖅᕕᓕᕆᔪᑦ ᐅᑯᐊ A, B, D ᐊᐅᓚᕝᓯᒍᑎᑦ ᐊᒻᒪᓗ ᖃᓄᖅ ᓱᕋᔪᖃᒻᒪᖕᒫᖅ ᐱᓕᕆᔾᔪᑎᒃᓴᑦ, ᐋᕐᑭᒋᐊᕈᑎᖏᑦ 01 (SRK 2010).

ᖄᒥᓐᓂᐅᓴᔪᓂᒃ ᖃᐅᔨᓴᕈᑏᑦ ᓇᒥ ᓄᓇᒥ ᐋᕿᓱᖅᑕᐅᔪᔪᑦ ᐱᕕᒃᓴᖃᓐᓂᐊᕐᒪᑕ ᐱᓱᒡᓗᑎᒃ ᐊᕐᑯᑎᒃᑯᓪᓗ, ᐃᒡᓗᐃᑦ ᐃᓂᒃᓴᖏᓐᓂ ᐊᒻᒪᓗ ᑐᐊᑉᑕᕕᒃᓴᓂᒃ ᐃᑲᓂ Doris North ᐅᕙᓂᓗ Doris-Windy ᐊᕐᑯᑎᖏᓐᓂ (ᐃᓚᒋᓕᐅᑎᓯᒪᔪᑦ A−ᒥ). ᑲᑎᖠᑎᒃ 66 ᖄᒥᓐᓂᑯᑕᓖᑦ ᓄᓇᓂ ᐋᕿᒃᓱᐃᕕᐅᔪᔪᑦ ᐊᒻᒪᓗ ᐆᒃᑐᕋᖅᑕᐅᓪᓗᑎᒃ ᖃᓄᐃᓪᓗᐊᕐᓂᖏᑦ. ᐊᑐᖅᑕᐅᓪᓗᑎᒃ ᓚᐃᓴᕆᔭᑦ, ᑎᑭᐅᑎᓯᒪᔪᑦ ᐃᒫᒃ 10% ᓈᓴᖅᓯᒪᔭᑦ ᖃᑦᓯᐅᓂᖏᑦ ᐆᒃᑐᕋᖅᓯᒪᔭᑦ, ᐃᓚᒋᔭᐅᓪᓗᑎᒃ ᓇᒥᑐᐃᓐᓇᖅ ᓄᓇᐃᑦ ᖁᕝᕙᓯᒃᑐᒦᑦᑐᑦ, ᑐᓂᔭᐅᔪᒥᔪᑦ ᖃᐅᔨᓴᖅᕕᖓᓄᑦ ᐃᓚᒋᓕᐅᑎᓖᕐᒪᑕ ᖃᐅᔨᓴᖅᑕᓄᑦ. ᐊᑕᖏᖅᓯᑎᒃ 16 ᐆᒃᑐᕋᐅᑎᑦ ᓄᐊᑕᐅᔪᔪᑦ ᐊᒻᒪᓗ ᖃᐅᔨᓴᖅᑕᐅᓖᕐᒪᑕ ᖃᐅᔨᓴᖅᕕᖕᓂ.

ᖃᐅᔨᔭᐅᔪᔪᑦ 2013−ᒥ ᐆᒃᑐᕋᖅᑕᐅᓂᑯᑦ ᖃᐅᔨᒍᑕᐅᔪᔪᑦ ᐱᑕᖃᖕᒋᒋᐊᖕᒋᓐᓂᒃ ᐱᔾᔪᑕᐅᔪᓂᒃ ᓴᕕᕋᔭᒃᓴᔭᖅᑕᓕᖕᓂᒃ ᖄᒥᑦᑐᖃᒻᒪᖕᒫᖅ ᐅᕝᕙᓗᑭᐊᖅ ᐆᑎᕆᔪᓐᓇᖅᑐᓂᒃ ᐅᔭᖃᓂᒃ ᐱᔪᓂᒃ ᖄᒥᑦᑐᖃᑉᐸᑦ ᓇᑭᑦ ᐱᔪᓂᒃ ᓴᓇᔭᐅᓯᒪᔪᒥᒃ ᐃᑲᓂ Hope Bay−ᒥ. ᓴᕿᔪᔪᑦ ᐅᔾᔨᖅᑐᕈᑕᐅᔪᔪᑦ ᐊᑐᖅᑕᐅᓪᓗᑎᒃ ᑕᐃᒪᖓᕐᓂᑕᑦ ᖃᐅᔨᒪᔾᔪᑎᑦ. ᐊᓯᐊᓅᖅᑐᖃᓐᓂᖅᐸᑦ ᖄᒥᓐᓂᑯᓂᒃ ᐱᔪᓂᒃ ᐊᒃᑕᑯᓂᒃ ᐅᔭᖃᓂᒃ ᐃᓚᒍᑕᖅᑕᖏᑦ ᖁᕝᕙᖅᓯᒪᒃᐸᑕ ᐋᓪᓚᑕᖏᑦ ᓱᕋᐃᔪᓐᓇᖅᑐᓂᒃ ᐊᓯᒥᓂᒃ ᐅᔾᔨᖅᑑᑕᐅᕝᓯᐊᔫᒪᑕ ᖃᓄᖅ ᐊᑑᑕᐅᕆᐊᖏᑦ ᐃᒥᐅᑉ ᖃᓄᐃᑦᑑᓂᖓ ᒪᓕᒃᑕᐅᓪᓗᑎᒃ ᐃᒫᖓᐃᓚᔪᑦ ᒥᑭᓂᖅᓴᐅᔪᔪᑦ ᑕᐃᒪᖓᓂᒃ ᐅᕙᓂᐅᔫᒪᑦ 2012, ᐃᓱᒪᒋᔭᐅᔪᔪᑦ ᓱᕋᐃᔪᓐᓇᖅᑐᑦ ᐱᐊᓗᕐᑯᑕᐃᑦ ᐃᑯᑕᕈᑎᓄᑦ ᐃᓚᒍᑕᐅᓲᑦ ᐊᒻᒪᓗ ᖄᖅᑎᕝᓯᒍᑎᓄᑦ ᕿᒻᒪᑯᐃᑦ ᐱᔪᑦ ᐅᔭᖃᓂᒃ ᐊᒃᑕᑯᓂᒃ ᓄᐊᑕᐅᓯᒪᔪᓂᒃ ᖃᓕᕇᓐᓂᒃ ᑕᐃᒪᓐᓇ ᐊᑑᑕᐅᕙᖕᒪᑕ. ᐊᖏᓖᑦ ᐱᓗᐊᖅᑐᑦ ᐱᔪᑦ ᐅᕙᖓᑦ ᖄᒥᑉᐸᑐᑦ ᐱᔭᐅᕙᖕᒪᑕ ᐊᑐᖅᑕᐅᓪᓗᑎᒃ ᐃᒥᓕᕆᔾᔪᑎᑦ ᐋᕿᒃᓯᒪᔭᑦ Hope Bay−ᒥ. ᐊᑑᑕᐅᖏᓐᓇᖃᑦᑕᓚᖓᔪᑦ ᑕᒪᒃᑯᐊ ᖄᒥᓐᓂᐅᓴᔪᑦ ᐊᓯᐊᓄᑦ ᐱᔪᑦ ᐅᔭᖃᓂᒃ ᐊᒃᑕᑯᓂᒃ ᖃᓕᕇᓐᓂᒃ ᑕᐃᒪᓐᓇ ᐊᑑᑕᐅᖁᔭᐅᓯᒪᖕᒪᑕ.

Atanguyat Nainaghimayot Onipkangit

Aipagokangat huangayonik kayangnaktonik onipkagiakakmata tatvani Kapihiliktomi uyagaktakviani, Kapihiliktomi havagiyaoyut ilaliotihimayot hapkua katikhuktaohimayot uyakat tatvanga uyakaktakviohimayonin, tatvani Kapihiliktomi nunap atanin atoktaongitonik kihingoktaohimayonik uyakanik uvalu hapkunanga uyakanit immak makivagiakha. Tatvani 2013-mi, hamna kimilgokutaoyok havagiyat tatvungainak immap makininganit naonaiyaktaohimayok tatva havagiyakangitkaloakmata nunap atani uvalunin uyakanik katikhuktaohimayokangitkaloakmat. Una onipkangat naonaiyaotaoyok tatvani ukkiomi 2013-mi makininganik kimilgokutikakmata. Hamna makininganik immap havagiyat inniktaohimayok malikavlugo hamna pitkutaohimayok titigakhimayot tatvani Elangani D “Malikayaoyughat igulioktunit ” Titigak 21 tatvani Immap Laisikhaktakutaitni 2AM-DOH0713 (Nunavumi Immalikiyiita Katimayiit 2007) uvalu una Uyakaktakvioyonin A, B & D Monagiyaoyoni uvalu Kimilgoktaovaktuni Parnaiyaotait, Notanguktaoyok 01 (SRK 2010).

Immap Makininganik naonaiyakvioyut aolakutaohimayot pihoinakhutik havaktot akuaghinahoakhutik imakmik makiyonik akoaghinahoakhotik apkuhioktaohimayonin,

Igluut tungaviitnin uvalu uyagaktakviohimayonit Kapihiliktomi uvalu tatvanga Kapihiliktomit-Windy-mut apkuhioktaohimayonik (Elaliotihimayok A). Katitlugit hapkua 66-nik immap makivalianinganik naonaiyaihimayot tatvalo kimilgokhimayait kiklikagiaghaitnik. Hamna immap laisikhaita pitjutigivlugit, tatvanganin 10%-nik kititlugit naonaiyaghimayat, ilaliotilogit kitot havakvit kulvaktaohimayot manikamit naonaiyaotait toniyaohimayot tatvunga naonaiyaiyakvikmot

kimilgoktaovaliktoghat immap kanoginingit. Tatvalo kititlugit hapkua 16-goyut immap naonaiyaotighait katighoktaohimayot kimilgoktaovlotik tatvani ihivgioktaovikmi.

Naonaiyaktaohimangmata uvani 2013-mi kimilgokutaitnit ilitugihimayait tatva ihomalotikangitot tatva havivaloknik immakut ilaliotihimayaghaita uvalunin hapkua uyakat huangayunik makivagiakhaita (ML/ARD) tahamanga tamayakatvioyonit Kapihiliktomit. Hapkua naonaiyaotait ajikutagiyait taimaniknitat naonaipkutit katikhuktaohimayot. Immap makininga uyagaktaktaohimayonit naonaitot makivaktot huangayonik kayangnaktonik hapkuninga ammonia, chloride uvalu nitrate kulvatkiyaoyonik haffuma immap kanoginingata maligakiyaitni kihianioyok hapkua kayangnaktot huanganit mihivalikhimaliktot tatvanganin 2012-min, tatva ihomagiyat hamna oaktiginik tamaat ikkutaktagangata uvalu kagaktaktagangata havivaloknik uvalu uyakaluknik kagaktaohimayonik namagiyaonmata havagiyaohimagiakaktait. Tatva amigaitkiyaoyok hamna immap kukloakninga makivalianingalo akoaktaovaktok haffuma immap kanoginingata havagiyaohimaaktitlugo tatvani Kapihiliktomi. Huli hamna immap kukloakninga makiningalo hapkunanga kihingoktaohimayonit katighoktaohimayonit uyakanit havagiyaohimakuyaoyot.

Résumé opérationnel

Les exigences de déclaration annuelles pour le rapport géochimique de la mine de Doris North, du projet Hope Bay comprennent les résultats du programme de surveillance des pierres de carrières, des haldes de stériles souterraines de Doris North et de l'exfiltration. En 2013, le programme de surveillance a été limité à l'enquête de la perte d'eau d'exhaure par infiltration car il n'y avait aucun développement souterrain des carrières. Ce rapport présente les résultats de l'enquête « 2013 freshet seep survey ». Le programme de surveillance d'exfiltration a été réalisé conformément aux conditions énoncées dans la partie D « Conditions applicables à la construction », point 21 du permis d'eau no 2AM-DOH0713 (Office des eaux du Nunavut (OEN) 2007) et du plan de surveillance et de gestion de la carrière A, B et D, Révision 01 (SRK 2010).

L'emplacement des stations d'échantillonnage d'exfiltration a été déterminé de façon opportuniste en parcourant à pied, la marge de la chaussée, les structures de terre-plein et les sites de carrière des routes de Doris North et de Doris-Windy (annexe A). Au total, 66 stations d'échantillonnage ont été mises en place pour mesurer les paramètres de ou du terrain. Conformément aux exigences du permis d'eau, un minimum de 10 % des échantillons prélevés, y compris tous les échantillons des stations ayant une conductivité élevée, ont été analysés en laboratoire. En tout, 16 échantillons ont été recueillis et analysés dans un laboratoire commercial.

Les résultats du programme d'échantillonnage 2013 n'ont démontré aucun problème en ce qui concerne la lixiviation des métaux ou le drainage rocheux acide (ML/ARD) des exfiltrations en provenance des installations du projet Hope Bay. Les résultats du programme étaient comparables aux données historiques. Les zones exposées aux exfiltrations avaient des teneurs élevées en ammoniac, en chlorure et en nitrate par rapport aux lignes directrices de la qualité des eaux, mais ces teneurs ont diminué depuis 2012, ce qui suppose que le rinçage des saumures de forage et le sautage des haldes de stériles sont en cours. La majorité des exfiltrations est recueillie par le système de gestion de l'eau d'Hope Bay. Il est toutefois recommandé que la gestion de l'exfiltration des haldes de stériles se poursuive.

Table of Contents

List of Tables

Appendices

1 Introduction

As part of the verification, monitoring and quarry management plans for the Hope Bay Project, TMAC Resources (TMAC) is required to monitor seep surveys around the Doris North roads, airstrip, camp area and quarries. SRK was asked to complete the seepage surveys and annual reports from 2009 to 2013. Results of the last reported seep survey are in the 2012 Waste Rock and Quarry Monitoring Report (SRK 2013). In 2013, there was no development of the underground mine or any of the quarries, therefore the only monitoring requirement was related to quarry rock and existing infrastructure, which is addressed herein.

This report presents results of the 2013 freshet seep survey. The seepage program was completed in accordance with conditions outlined in Part D "Conditions applying to Construction" Item 21 of Water License 2AM-DOH0713 (Nunavut Water Board 2007) and the Quarry A, B & D Management and Monitoring Plan, Revision 01 (SRK 2010). Specifically, a summary of the 2013 monitoring requirements is provided as follows (HBML 2011):

- A seep survey will be conducted around all infrastructure components that have been constructed or modified within the previous 3 years, and in the mined out quarries. Field pH, electrical conductivity (EC), Eh, and temperature readings will be collected. A minimum of 10% of the samples will be submitted for laboratory analyses, as detailed in the Quarry A, B and D Management and Monitoring Plan (SRK 2010). The seep survey will include all of the rock drains. Reference stations will also be established to provide basis for comparing this to waters that are not influenced by the development activities; and
- An annual quarry monitoring report, including the results and an interpretation of the geochemical data will be prepared and submitted to the NWB by March 31 of the year following sample collection (i.e. within 6 months of collecting the final quarry samples).

2 Methods

2.1 Seep Survey and Sample Collection

The seep survey was carried out between June 4th and June 10th, 2013. Seep survey locations were established opportunistically by walking the toes of all roadways, building pads and quarry sites along the Doris North and Doris-Windy roads (Appendix A). The samples used as reference points (not subject to mine influences) were collected from the same points as the 2010-2012 seep surveys (in the vicinity of the Doris-Windy Road, Appendix A).

Field measurements were taken at all locations where water was observed flowing into and out of construction rock material including true seeps where precipitation runoff and snowmelt came into contact with rock along the roadways, building pads and quarry sites. Electrical conductivity (conductivity), pH, temperature, oxidation-reduction potential (ORP) and flow rates were measured at each of these locations at the time of monitoring. Weather conditions during the survey varied from sunny and clear (18°C) to cloudy with rain, freezing rain and high winds (-3°C to -10°C with wind chill). The cold weather slowed the flow of seepage at site.

A total of 66 seepage sites were established. As per the water license, a minimum of 10% of the total sample set, including any sites with elevated conductivity, were submitted to a laboratory for an extended analytical suite. A total of 16 samples were collected and analyzed. In addition, one duplicate and two field blanks were collected and submitted for laboratory analysis as part of SRK's quality assurance/quality control (QA/QC) program.

2.2 Laboratory Analysis

Sixteen samples were collected by SRK and submitted to ALS Environmental in Vancouver, BC where they were analyzed for pH, conductivity, sulphate, acidity, alkalinity, chloride, fluoride, nitrate, nitrite, phosphorus, ammonia, total dissolved solids (TDS) and low level dissolved metals including mercury and selenium. All samples were filtered and preserved in the field, as required.

2.3 Quality Assurance and Quality Control

One duplicate and two field blanks were collected as part of SRK's QA/QC program. Analysis of the field blanks indicated that parameters were below detection limits. Measured values for TDS demonstrated a strong positive correlation with values for lab conductivity for all of the points; conductivity slightly exceeded TDS for all points.

Duplicate results were well within the accepted range for all parameters, with one exception. QA of the data indicated that all samples had acceptable ion balances (within +/- 10%), except for one reference point sample (13-REF-001). 13-REF-001 had an ion balance of -30% due to low concentrations of anions, specifically alkalinity. Alkalinity data for site 13-REF-001 was re-run for alkalinity and the result was consistent. The value has been excluded from the data set for the purposes of data interpretation on the basis of the following:

- The 2013 alkalinity value was anomalously low compared to the rest of the 2013 sample set;
- The 2013 alkalinity value was anomalously low compared to data from previous years at this site; and
- Results of all other parameters are consistent with previous years.

3 Results and Discussion

3.1 Field Data

A complete set of field observations and measurements is provided in Appendix B. Due to a sudden cold front during the field survey, many seeps with evidence of recent flow had temporarily stopped flowing. On warmer days the snow melt, which was the water source for these seeps, was reporting to the seep location. On the colder days the snow was not melting. An effort was made to return to these locations during the few days with warmer weather to retrieve more data points; in some cases the seep remained dry.

3.1.1 Field Measurements

Table 1 outlines the median calculations for pH and EC from the 66 sites. The data were grouped according to area, specifically the Waste Rock Influenced Area, Doris North areas (Roberts Bay, Tail Lake Road, and the road to the airstrip), Doris-Windy Road, and reference sites (Appendix B). The field data are summarized as follows:

- The pH at all sites was neutral to alkaline.
- The samples from the area influenced by the waste rock pile (n=5) overall had the highest levels of field conductivity, with median levels of 806 µS/cm. Sample 13-WR-03 collected at the toe of the waste rock pile had a conductivity of 4,078 µS/cm, the highest value in 2013. Sample 13-DC-61, at the toe of the road and downstream from the pollution control pond, had an elevated conductivity of 1,028 µS/cm.
- The conductivity measurements in the Doris North areas (n=37) had a median of 222 µS/cm.
- Doris-Windy Road samples (n=24) had a median conductivity of 157 µS/cm.
- The three reference points that were sampled to represent conditions outside the influence of mining operations, had the lowest conductivity values, with a median of 99 µS/cm.

Table 1: Median Field EC and Field pH of Seepage Sites (Grouped According to Area)

Site Area	No. of Samples	Conductivity (µS/cm)	pH
		Median	Median
Waste Rock Influenced Area	5	806	8.1
Doris North Areas	37	222	7.9
Doris-Windy Road	24	157	7.7
Reference Points	3	99	7.2

P:\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\C_Seep_Surveys\June2013 Seepage Survey\Working File\[1CT022.000_Hope Bay_WorkingFile_2013_AML_Rev00.xlsx]

3.2 Laboratory Data

A summary of water quality analyses for the 16 samples is presented in Table 2. Complete results are presented in Appendix B. With the exception of chloride, all parameters were compared to the Canadian Council of Ministers of the Environment (CCME) water quality guidelines for the protection of aquatic life to screen for elevated parameters. Comparisons to these criteria were used solely for screening purposes and are not directly applicable because the seep locations do not support aquatic life. There is no CCME guideline for chloride though it is a contaminant of concern because of drilling brines. Accordingly, the Canadian Water Quality Guideline was used for comparison. Laboratory and field values of pH and conductivity were compared for consistency. Values were equivalent for all samples.

3.2.1 Waste Rock Influenced Area

Three samples from the Waste Rock Influenced Area were submitted for laboratory analysis (Table 2). Laboratory pH levels of these samples ranged from 7.7 to 8.1. Two samples had copper values that were higher than but the same order of magnitude as the CCME guidelines[1]. The CCME guideline for copper ranges from 0.002 to 0.004 mg/L depending on the hardness of the water. For comparisons here, a conservative approach was taken, with data compared against the lowest guideline value. Copper loading rates ranged from 0.25 to 0.58 kg/year and are lower than the predicted rate (0.69 kg/year) made prior to mining (SRK 2007).

Sample 13-WR-03 (collected at the toe of the waste rock pile) had ammonia, nitrate and chloride concentrations that were ten times higher than the respective CCME guidelines. The cadmium concentration for 13-WR-03 was also higher than the guideline but within the same order of magnitude. Sample 13-DC-61 (collected at the toe of the road downstream of the pollution control pond) had levels of nitrate and chloride that were higher than the guidelines but within the same order of magnitude.

3.2.2 Doris North Areas

Seven samples from the Doris North Areas were submitted for laboratory analysis (Table 2). The pH values of the samples were neutral to alkaline (between 7.6 and 8.1). One sample had slightly elevated levels of cadmium (within the same order of magnitude) compared to CCME guidelines. Six of the seven samples had copper levels higher than the CCME guideline. Copper levels were generally the same order of magnitude as the CCME guideline, though two samples had were ten times higher.

3.2.3 Doris-Windy Road

Three samples along the Doris-Windy road were submitted for lab analysis. The pH measurements were neutral to alkaline, ranging from 7.4 to 8.0. Two samples were above the CCME guidelines for copper though values were the same order of magnitude.

3.2.4 Reference Point Samples

All three reference samples were submitted for laboratory analysis. The pH of these samples was neutral, ranging from 7.3 to 7.8. Dissolved metal concentrations were generally equivalent or slightly lower than those measured at other seepage locations. One sample exceeded the CCME guideline for copper though the value was the same order of magnitude.

[1] Comparisons to CCME guideline are intended for screening purposes and are not directly applicable because the seepage sites do not support aquatic life.

Table 2: Summary of Water Quality Results

Group	Sample ID	Field pH	Lab pH	Field EC	Flow	Alkalinity, Total	SO_4	Ammonia*	Nitrate	Chloride**	Al	As	Cd***	Cu	Pb	Ni	Zn
	Units	s.u.	s.u.	uS/cm	L/s	mg $CaCO_3$/L	mg/L	mg N/L	mg N/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	CCME guideline	6.5-9	6.5 - 9					2.3*	2.9	CWQG 128 mgCl/L	0.1	0.005	0.000017	0.002 - 0.004	0.001	0.025	0.03
Waste Rock Influenced Area	13-WR-03	8.0	7.9	4078	2	92	71	**27**	**65**	**1100**	0.011	0.0015	**0.000095**	**0.0092**	0.0001	0.0019	0.002
	13-DC-61	8.1	8.1	1028	na	119	137	1.8	**22**	**247**	0.0098	0.0015	0.000015	**0.0063**	0.00005	0.0017	0.001
	13-DC-30	7.7	8.1	405	5	108	23	0.029	0.65	62	0.0045	0.0003	0.00001	0.0016	0.00005	0.0010	0.001
Doris North Areas	13-DC-01	8.2	7.6	72	1	65	13	0.095	0.96	26	0.048	0.0018	0.00001	**0.015**	0.00005	0.00097	0.011
	13-DC-58	7.9	7.8	414	20	92	31	0.031	1.4	51	0.0076	0.00054	0.00001	**0.0047**	0.00005	0.00086	0.001
	13-RB-05	8.3	8.1	221	1	75	26	0.048	1.3	22	0.033	0.00064	0.00001	0.0013	0.00005	0.00058	0.001
	13-DC-08	7.9	8.1	250	1	62	8.8	0.016	0.041	38	0.014	0.00018	0.00001	**0.0032**	0.00005	0.0005	0.001
	13-DC-20	7.5	8.1	224	1	82	11	0.011	0.29	18	0.014	0.0024	**0.000031**	**0.0080**	0.000053	0.0014	0.0033
	13-TLR-24	8.1	8.1	119	5	37	6.4	0.079	0.66	9.6	0.057	0.00048	0.00001	**0.011**	0.00013	0.00055	0.001
	13-TLR-28	7.7	8.0	117	2	33	3.4	0.072	0.026	17	0.055	0.00021	0.00001	**0.0097**	0.000056	0.0009	0.0025
Doris-Windy Road	13-DW-31	7.7	7.4	198	10	39	3.6	0.074	0.38	34	0.030	0.00036	0.00001	**0.0025**	0.00005	0.0022	0.0014
	13-DW-40	7.9	8.0	236	0.25	76	11	0.033	0.43	23	0.016	0.00045	0.000013	**0.0037**	0.00005	0.0032	0.0027
	13-DW-47	8.0	8.0	131	1	48	4.0	0.018	0.022	8.9	0.0056	0.00024	0.00001	0.0019	0.00005	0.0005	0.001
Reference Points	13-REF-001	7.0	7.7	60.6	10	NA[1]	0.89	0.010	0.005	6.5	0.048	0.00016	0.00001	0.0015	0.00005	0.0021	0.0035
	13-REF-002	7.7	7.3	178	5	59	6.3	0.0062	0.005	16	0.0064	0.00018	0.00001	**0.0025**	0.00005	0.00068	0.0019
	13-REF-003	7.2	7.8	99	1	30	2.7	0.005	0.005	9.3	0.019	0.0001	0.00001	0.0019	0.00005	0.00065	0.0014

P:\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\C_Seep_Surveys\June2013 Seepage Survey\Working File\[1CT022.000_Hope Bay_WorkingFile_2013_AML_Rev00.xlsx]

Notes:

Values in **bold** indicates value exceeds respective water quality guideline, Comparisons to CCME guideline are intended for screening purposes and are not directly applicable because the seepage sites do not support aquatic life.

[1]Alkalinity value for 13-REF-001 excluded from data set after QA/QC review. See Section 2.3 for details.

*Guideline for ammonia is pH and temperature dependant. Seepage waters had an average temperature of 3.1ºC at time of sampling. This guideline value is approximate.

**Chloride guideline from the Canadian Water Quality Guideline.

***Cadmium guideline for a hardness of 25 mg $CaCO_3$ mq/L

3.3 Comparison to Previous Seep Surveys

3.3.1 Waste Rock Influenced Area

A comparison of the samples collected at the toe of the waste rock dump from 2011 to 2013 is presented in Table 3. Underground mining occurred from late 2010 to the end of 2011. The first seepage survey of the waste rock piles occurred in summer 2011 while the mine was operating. The seepage samples collected in 2013 are most comparable to samples from 2012 as both represent closure conditions and the configuration of the waste rock pile was consistent between sampling events. By comparison, in 2011 the waste rock pile was smaller.

In 2011 and 2012 three seeps were sampled whereas there was only one present in 2013 (Table 3). A comparison of the 2013 with previous years is as follows:

- Levels of conductivity (4,078 µS/cm), ammonia (27 mg/L), chloride (1,100 mg/L) and nitrate (65 mg/L) were comparable to the 2011 data and approximately 50% lower than 2012. This suggests that residual blasting residues (ammonia and nitrate) and drilling salts (chloride) are being flushed from the waste rock pile.
- Sulphate levels (71 mg/L), which are attributable to sulphide oxidation, are equivalent to 2012 but higher than 2011.
- Trace metal levels are lower or comparable to previous years. The analytical detection limits are lower than earlier data sets.

Table 3: Comparison of Summary Statistics of the Waste Rock Influenced Area 2011 to 2013

Parameters	Units	2011			2012			2013
		DC09	DC08	DC07	12-WR-SEEP-01	12-WR-SEEP-02	12-WR-SEEP-03	13-WR-03
Temperature (°C)		0.1	0.1	0	<5.5	5.1	6.9	-0.1
EC	uS/cm	5,776	4,410	3,888	10,405	14,600	12,227	4,078
pH		7.4	7.5	7.5	7.6	6.7	8.0	8.0
Alkalinity	mg $CaCO_3$/L	50	70	69	75	80	84	91.8
Ammonia	mg/L as N	35	27	24	68	67	62	27
Chloride	mg/L	1,660	1,220	1,090	2,280	2,550	2,530	1,100
Nitrate	mg/L as N	63	50	44	134	137	136	65.4
Sulfate	mg/L	28	39	36	59	76	75	71
Al	mg/L	<0.03	<0.03	<0.015	0.0074	0.0078	0.0083	0.011
Sb	mg/L	<0.001	<0.001	<0.0005	<0.0005	<0.0005	<0.0005	0.00026
As	mg/L	<0.004	<0.002	<0.003	0.0013	0.0013	0.0013	0.00152
Cd	mg/L	0.00018	<0.00017	<0.000085	0.00029	0.00032	0.00034	0.000095
Cu	mg/L	0.0097	0.014	0.015	0.0065	0.0059	0.0063	0.00917
Fe	mg/L	0.064	<0.03	<0.03	0.046	0.036	0.038	0.011
Pb	mg/L	<0.0005	<0.0005	<0.00025	<0.00025	<0.00025	<0.00025	<0.0001
Mn	mg/L	0.72	0.25	0.23	0.46	0.79	0.82	0.187
Mo	mg/L	0.0017	0.0021	0.0017	0.0029	0.0037	0.0037	0.00606
Ni	mg/L	0.0067	<0.005	0.0031	0.0036	0.0038	0.0045	0.0019
Se	mg/L	<0.01	<0.01	<0.01	0.0012	0.0014	0.0014	0.00124
Zn	mg/L	<0.015	<0.03	<0.03	<0.005	<0.005	<0.005	<0.002

P:\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\C_Seep_Surveys\June2013 Seepage Survey\Working File\[1CT022.000_Hope Bay_WorkingFile_2013_AML_Rev00.xlsx]

3.3.2 All Areas Excluding Waste Rock Influenced Areas

Historical summary statistics of field EC and field pH for all sites except those in the waste rock influenced area are provided in Table 4. The median conductivity of seepage waters across the site was lower in 2013 in comparison to 2009 and 2012 but higher than 2010 and 2011. Levels of pH were consistent since 2009.

Four of the 2013 seepage sites were in the exact same locations as seepage sites in previous years, specifically 13-DC-58, 13-DC-20, 13-TLR-28 and 13-RB-08. A comparison of the data between years in discussed in Table 5.

Table 4: Historical Summary Statistics of Field Conductivity and Field pH of All Areas Excluding Waste Rock Influenced Area

Statistic	Field Conductivity (µS/cm)					Field pH				
	2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
P25	195	162	107	178	144	7.5	7.3	7.6	7.6	7.7
Median	269	197	190	248	221	7.8	7.5	7.8	8.0	7.9
P95	896	671	554	577	414	8.3	8.1	8.2	8.9	8.6
n	75	60	79	72	66	75	60	79	72	66

P:\01_SITES\Hope.Bay\1CH008.023_Geochem_Monitoring\C_Seep_Surveys\June2013 Seepage Survey\Working File\[1CT022.000_Hope Bay_WorkingFile_2013_AML_Rev00.xlsx]

Table 5: Comparison Between Stations Sampled at the Same Location in 2012 and 2013.

Figure	Sample ID		Summary of comparison
	2013	Previous Years	
4	13-DC-58	12-DC-03 11-DC04	• Sulphate levels (31 mg/L) in 2013 were low but marginally higher than 2011 and 2012. • In 2013, ammonia concentrations decreased an order of magnitude from previous years to 0.03 mg/L. Nitrate and chloride levels were consistent between years. • All other water quality results were consistent between years.
4	13-DC-20	12-DC-18	The water quality results have remained consistent at this location.
5	13-TLR-28	12-TLR-10	The water quality results have remained consistent at this location.
2	13-DC-08	12-RB-34	The water quality results have remained consistent at this location.

3.3.3 Reference Points

Results from 2013 reference point samples were compared to results from 2012. These results are consistent with the 2012 reference point samples, taken from the same locations.

4 Conclusions and Recommendations

The results of the 2013 sampling program indicated that there are no issues with respect to ML/ARD in seepage associated with the infrastructure at Hope Bay. Results were comparable to historical data. Seepage from waste rock influenced areas had elevated levels of ammonia, chloride and nitrate compared to water quality guidelines though levels have decreased since 2012, suggesting that active flushing of drilling brines and blasting residues from the waste rock pile is ongoing. The majority of this seepage is captured in the water management system implemented at Hope Bay. Continued management of seepage from the waste rock pile is recommended.

This report, 2013 Hope Bay Seepage Monitoring Program, was prepared by

"Original Signed by Ashley Landriault"

Ashley Landriault, B.Sc.
Staff Consultant (Geochemistry)

and reviewed by

"Original Signed by Lisa Barazzuol"

Lisa Barazzuol, M.Sc.
Senior Consultant (Geochemistry)

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

5 References

CCME, 1999, updated 2007. Canadian Environmental Quality Guidelines. Canadian Council of Ministers of Environment.

Hope Bay Mining Ltd. 2011. Monitoring and Follow-Up Plan Doris North Project, Nunavut. May 2011.

Nunavut Water Board 2007. Licence No: 2AM-DOH0713. September 19, 2007.

SRK 2007. Water Quality Model, Doris North Project, Hope Bay, Nunavut, Canada. Prepared for Miramar Hope Bay Limited by SRK Consulting (Canada) Ltd. March 2007.

SRK 2010. Quarry A, B & D Management and Monitoring Plan. Report 1CH008.038.002 Prepared by SRK Consulting (Canada) Ltd. for Hope Bay Mining Ltd., October 2010.

SRK 2013. 2012 Waste Rock, Ore and Quarry Monitoring Report. 1CH008.023. Prepared for Hope Bay Mining Ltd by SRK Consulting (Canada) Ltd., January 2013.

Appendix A: Key Map and Sample Locations

7562000 7560000 7558000 7556000 7554000 7552000 7550000

436000 434000 432000 430000

Figure 2
Figure 3
Figure 4
Figure 5
Figure 6
Figure 7
Figure 8
Figure 9

0 1 2 Kilometers

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013_keymap.mxd

srk consulting

Job No: 1CT022.000
Filename: 1CT022.000_hb_seepage_maps_2013_keymap

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seepage Survey Locations Key Map

Date:	Approved:	Figure:
November 2013	-	1

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

Legend

2013 Seepage	Previous Surveys
◆ Sampled	○ 2012 Seepage
◆ Not Sampled	△ 2011 Seepage
	□ 2010 Seepage
	⬠ 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000

Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations North

Date:	Approved:	Figure:
November 2013	-	2

N

7,561,750
7,561,500
7,561,250
7,561,000
7,560,750
7,560,500
7,560,250
7,560,000
7,559,750

433,250
433,000
432,750
432,500
432,250

13-DC-13
13-DC-14
13-DC-15
13-DC-16
13-DC-17
13-DC-18
13-DC-19
13-DC-20

0 75 150
Meters

Legend

2013 Seepage
- Sampled
- Not Sampled

Previous Surveys
- 2012 Seepage
- 2011 Seepage
- 2010 Seepage
- 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000
Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

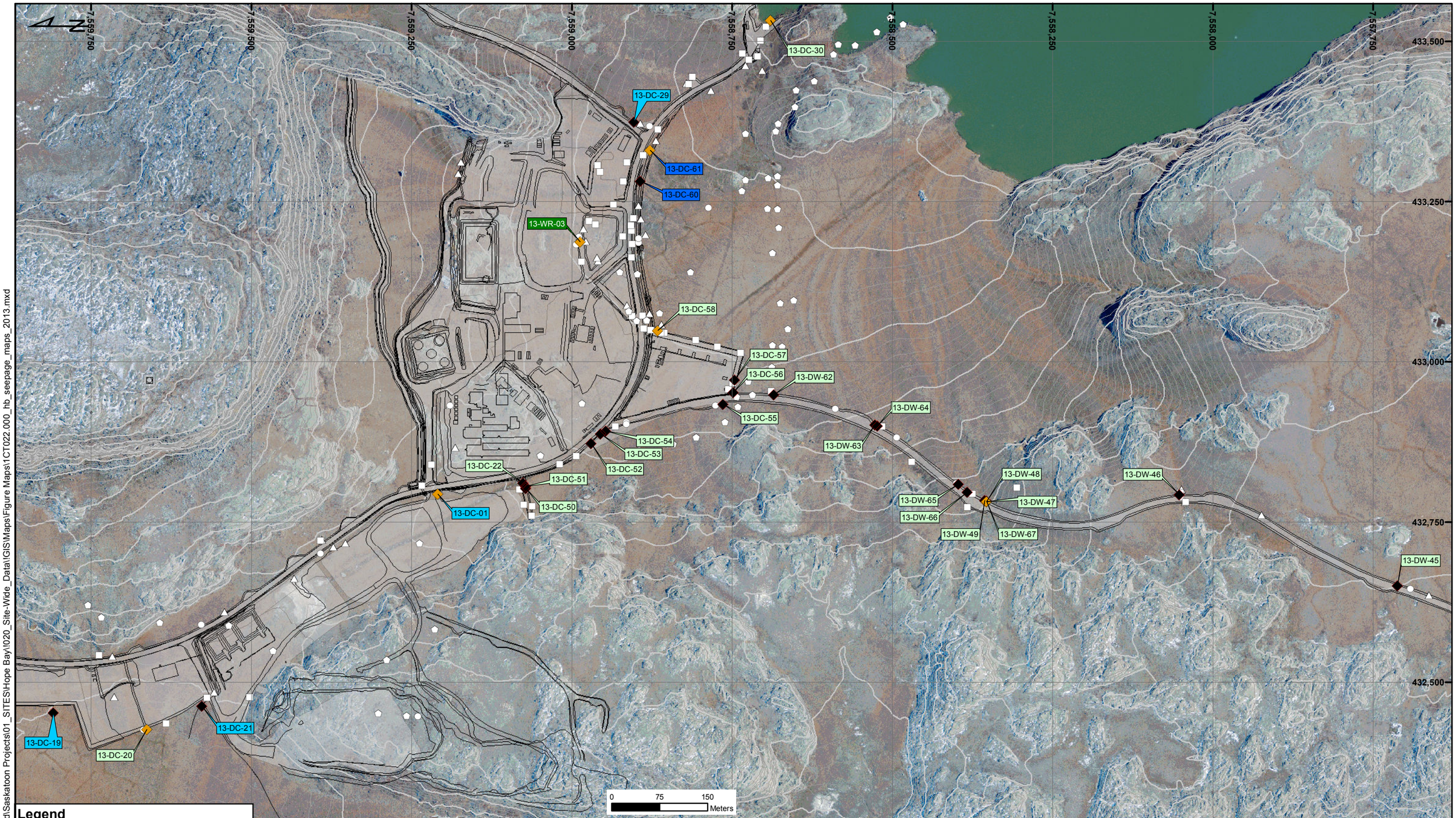
2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations Central

Date:	Approved:	Figure:
November 2013	-	3

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\I020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd



Legend

2013 Seepage	Previous Surveys
◆ Sampled	○ 2012 Seepage
◆ Not Sampled	△ 2011 Seepage
	□ 2010 Seepage
	⬠ 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000
Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations Mine Area

Date:	Approved:	Figure:
November 2013	-	4

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

Legend

2013 Seepage
- Sampled
- Not Sampled

Previous Surveys
- 2012 Seepage
- 2011 Seepage
- 2010 Seepage
- 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000

Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations
Tail Lake Road

Date:	Approved:	Figure:
November 2013	-	5

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\1020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

N

7,557,750
7,557,500
7,557,250
7,557,000
7,556,750
7,556,500
7,556,250
7,556,000

433,000
432,750
432,500
432,250
432,000

13-DW-42
13-DW-43
13-DW-44
13-DW-45
13-REF-003

0 75 150 Meters

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

Legend

2013 Seepage	Previous Surveys
Sampled	2012 Seepage
Not Sampled	2011 Seepage
	2010 Seepage
	2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000
Filename: 1CT022.000_hb_seepage_maps_2013

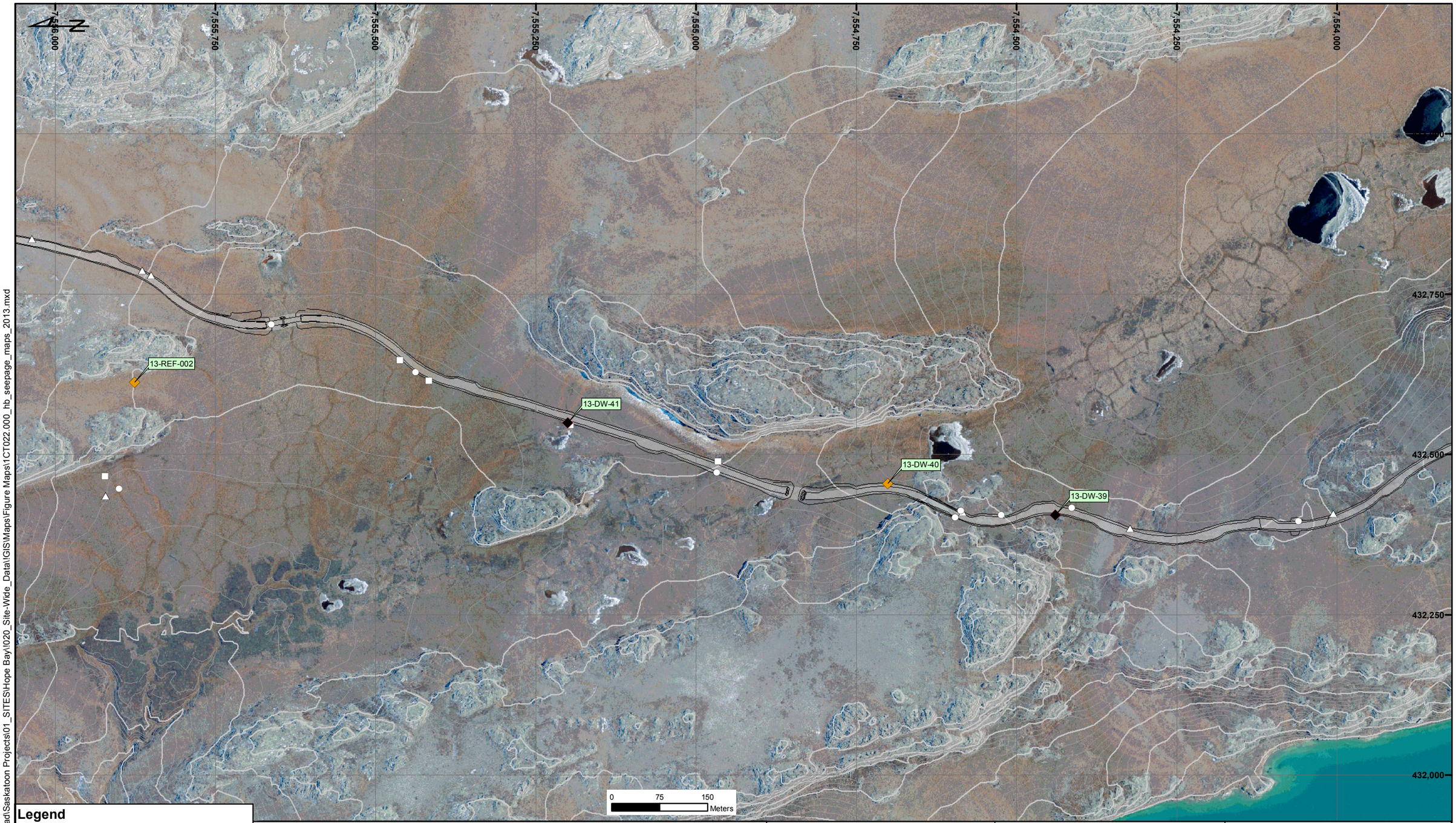
TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations
Doris Windy Road

Date:	Approved:	Figure:
November 2013	-	6



\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

Legend

2013 Seepage	Previous Surveys
◆ Sampled	○ 2012 Seepage
◆ Not Sampled	△ 2011 Seepage
	□ 2010 Seepage
	⬠ 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000

Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations Doris Windy Road

Date:	Approved:	Figure:
November 2013	-	7

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\1020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

Legend

2013 Seepage
- Sampled
- Not Sampled

Previous Surveys
- 2012 Seepage
- 2011 Seepage
- 2010 Seepage
- 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000

Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations Doris Windy Road

Date:	Approved:	Figure:
November 2013	-	8

\\SSK-SVR0.ssk.na.srk.ad\Saskatoon Projects\01_SITES\Hope Bay\1020_Site-Wide_Data\GIS\Maps\Figure Maps\1CT022.000_hb_seepage_maps_2013.mxd

Legend

2013 Seepage	Previous Surveys
◆ Sampled	○ 2012 Seepage
◆ Not Sampled	△ 2011 Seepage
	□ 2010 Seepage
	⬠ 2009 Seepage

	pH 6.5 to 7	pH 7 to 8	pH 8 to 8.7
EC ≤ 500 µS/cm			
500µS/cm<EC<2000µS/cm			
EC>2000µS/cm			

srk consulting

Job No: 1CT022.000

Filename: 1CT022.000_hb_seepage_maps_2013

TMAC RESOURCES

2013 Seepage Monitoring

Hope Bay Gold Project

Seep Survey Locations Doris Windy Road

Date:	Approved:	Figure:
November 2013	-	9

Appendix B: Field Observations and Water Quality Data

Mine Area	Station	WP	Easting	Northing	Date	Time	Sampled (y/n)	Description	Temperature	Field EC	Field pH	ORP	Flow
									°C	uS/cm		mV	L/s
Waste Rock Influenced Area	13-DC-29	29	433374	7558903	6/5/2013	17:23	n	junciton of TLR and Doris camp road, slow flow into murky puddle, algal growth, gravel from snow clearing and tunder interaction in puddle, very slow flow, not measureable, appears to be snowmelt on opp side of TLR.	0.9	299.7	8.12	140.8	
	13-DC-30	30	433533	7558690	6/5/2013	17:40	y	dispersed flow from other side of road, multiple seep exits, gravel bottom, flow is from tundra water on opp side in field coming from uphill of DW road (see temp), pours directly into Doris lake.	18.5	404.6	7.71	123.7	5
	13-DC-60	65	433282	7558893	6/9/2013	19:54	n	could be tundra flow from across field or from under road, stagnant, no flow at time of data point, could be more flow when warmer out. Sediment/dust on bottom, TSS. Murky water, rock bottom	4	806.2	8.1	268	
	13-DC-61	66	433330	7558878	6/9/2013	19:59	y	definite flow from under road, very slow trickle, shallow tundra puddle, mud/gravel/grass bottom, west of sump.	0.2	1028	8.13	283.1	
	13-WR-03	69	433187	7558987	6/9/2013	20:40	y	shallow dispersed seep from under WR pile, clear fast flow, rock/sandy sized grain bottom.	-0.1	4078	7.95	274.8	2
Doris North Area	13-DC-01	1	432794	7559209	6/4/2013	18:42	y	seep water source appears to be NE up road and across. Seep is at start of road out of camp to north. Water is clear, sediment coating on rocks. Dispersed flow, difficult to measure flow rate. Direct water/rock interaction	0.5	71.8	8.17	120.1	1
	13-DC-58	63	433049	7558866	6/9/2013	17:30	y	seep from under corner of heli pad, wide stream, heavy flow, clear water, rock and grass bottom, snow bordering pool. Multiple exits	0.3	413.6	7.9	64.6	20
	13-RB-02	2	432837	7563246	6/5/2013	9:42	n	seep from snow melt/snow clearing. Road side is gravel ~1". Ice bottom pool. Very dusty/murky water. Flow approximated, too shallow and dispersed to measure.	0.7	380.5	7.97	145	1
	13-RB-03	3	433016	7563595	6/5/2013	10:00	n	small seep form now melt on opp side of road spur. Clear water carved channel in ice	0.8		8.05	184	0.2
	13-RB-04	4	433059	7565309	6/5/2013	10:08	n	small seep, clear flowing from under road, now melt on opp side, flowing into small pond (shallow) on tundra		214.9	8.54	107.6	
	13-RB-05	5	433029	7563363	6/5/2013	10:30	y	seep from melt on pad at rob bay, sampled between boulders, clear flow on ice, shallow flow	0	221.1	8.25	120.7	1
	13-RB-06	6	433054	7563115	6/5/2013	10:44	n	seep at road into Rob Bay pad, gravel strewn area (snow clearing), mixed with OB, source appears to b e snow up hill to SW on opp side road. Water is murky, sediment on bottom, dusty area. Flow disperses onto Tundra.	1.2	138.4	8.76	121.4	2
	13-RB-07	7	433065	7563069	6/5/2013	10:52	n	seep at side of road into RB on NE side, snow melt on opp side is source, shallow dispersed flow onto tundra, multiple exits under road.	3.5	163.6	8.48	114,8	
	13-DC-08	8	433083	7563038	6/5/2013	11:10	y	seep water under road, NE side. Source is snow melt on opp side. Clear water, sediment coating on bottom. Sampled at outlet from under road, dispersed flow onto tundra.	6.4	249.9	7.94	147.9	
	13-DC-09	9	433148	7562748	6/5/2013	11:23	n	small seep between airstrip and entrance to Rob bay, shallow small flow from under road. Source is snow melt on opp side, flow disperses onto tundra, cannot measure flow	0.4	143	8.13	152.2	
	13-DC-10	10	433101	7562285	6/5/2013	11:40	n	large tundra pond, appears to be +1m deep, extensive tundra mixing, grass/tundra bottom, OM, birds nesting, borders airstrip, evidence of flow going under strip, no apparent inflow, prev snow melt? See temp.	13.3	196.2	7.53	129	
	13-DC-11	11	433039	7562264	6/5/2013	11:50	n	seep from under strip, source is pond at DC-10, fast flow, dispersed, several exit points, flowing onto tundra and to large pond west of strip. See temp.	9.1	186.7	7.68	115.7	2
	13-DC-12	12	433018	7562179	6/5/2013	12:02	n	flow from under strip source is to east. Feeds into pool/pond on tundra. Slow flow, several exits, pool has scum layer on surface, ice/snow/grass bottom. Pond appears relatively stagnant (no outflow on other side), sampled as close to flow of seep as possible.	0.5	228.2	8.08	128.7	
	13-DC-13	13	432939	7561828	6/5/2013	12:15	n	seep flow from under strip from E. disperses onto tundra, multpile exits, clear flow into vegetated pond, algal growth.	5.2	232.7	7.78	129.7	1
	13-DC-14	14	432873	7561572	6/5/2013	12:25	n	water from tundra (so it appears) tracks to road and along south apron of the airstrip (see diagram in field book). Clear water, gravel/grass bottom, rock water interaction.	11.8	203	7.82	110.8	
	13-DC-15	15	432815	7561031	6/5/2013	12:53	n	seep under road at turn off to explosives shed. Multiple exits, gravel from road top mixed w/ tundra grass. Disperses onto tundra, clear water	6.7	176.2	7.49	92.9	2
	13-DC-16	16	432757	7560866	6/5/2013	13:05	n	rock water interaction, lateral flow from tundra along road, clear water, dusty rock on sides. Gravel from snow clearing on bottom.	6.9	115.2	7.78	127	3
	13-DC-17	17	432760	7560807	6/5/2013	13:15	n	seep from under road, source is on W side, clear water, fast flow, grass/gravel bottom, multiple exits, disperses onto tundra	9.2	268.1	7.46	111	2
	13-DC-18	18	432708	7560561	6/5/2013	13:22	n	clear flow, disperses onto tundra, fast flow, one exit, gravel/grass bottom, very dusty.	6.4	243.2	7.55	109.7	1
	13-DC-19	19	432453	7559809	6/5/2013	13:42	n	snow cleared mixed with gravel pushed off back of pad. Dusty/dirty, snow/ice bottom, water shallow, slow flow, dusty water. Very shallow	0.6	179.6	8.03	252.3	
	13-DC-20	20	432427	7559663	6/5/2013	13:51	y	clear flowing water from under pad, multple exits (4), all ~0.5-1L/s flow. Gravel bottom leading to grass, disperses onto tundra in pools	0.5	224.3	7.53	153.6	1
	13-DC-21	21	432463	7559577	6/5/2013	14:14	n	snow melt across road to south (road to Q2), clear water shallow fast flow, under junction of 3 pipes, grass/ice bottom	0	144.8	8.38	123.8	
	13-DC-22	22	432811	7559076	6/5/2013	14:29	n	clear flow from under road/berm. Fast flow, multiple exits, source to North along road out of camp, lateral flow, part of water managed by site last year.	6.7	337.2	7.95	149.1	5
	13-TLR-23	23	434272	7559148	6/5/2013	15:36	n	down seep from from frozen core dam, near former seep 12-TLR-14, clear water, ice/grass bottom, some settled dust, grass is dusty, snow melt from build up at base of dam, slow dispersed flow, heads down stream to Doris Lake.	0.3	223.3	7.76	130.2	1
	13-TLR-24	24	433723	7559457	6/5/2013	16:15	y	fast heavy flow from outcrop to under pad and out again, rock/water interaction, multple outflows, disperses onto tundra heading down to Doris lake inflow, clear water, rock bottom, some OM in contact with water.	1.1	118.7	8.14	123.1	5
	13-TLR-25	25	433734	7559453	6/5/2013	16:23	n	flow from under pad, multiple exits, clear fast flow, shallow, leads to tundra pools and dispersed flow, can hear more seeps under rocks.	0.4	139	8.67	123	2
	13-TLR-26	26	433660	7559348	6/5/2013	16:48	n	snow melt from opp side of TLR, clear fast flow into murky, OB/grassy pools, hillside very muddy.	2.1	81.4	7.94	121.8	2
	13-TLR-27	27	433661	7559350	6/5/2013	16:59	n	beside TLR 26, slower flow than TLR 26, murky water with TSS	2.2	112.9	7.74	115.1	1
	13-TLR-28	28	433661	7559350	6/5/2013	17:05	y	clear fast flow from under road, sampled between rocks, joins TLR 26 and TLR 27 flows down hill into Doris Lake	2.2	117.2	7.73	117.8	2

Mine Area	Station	Photos	Sample ID	Date Sampled	Time Sampled	ALS Sample ID	Matrix	Conductivity	Hardness (as CaCO3)	Lab pH	Total Dissolved Solids	Acidity (as CaCO3)	Alkalinity, Total	Ammonia	Bromide (Br)	Chloride	Fluoride (F)
								uS/cm	mg/L	pH	mg/L	mg/L	mg CaCO3/L	mg N/L	mg/L	mg/L	mg/L
Waste Rock Influenced Area	13-DC-29	98-99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-30	103-105	13-DC-30	5-Jun-13	17:40	L1313552-7	Water	429	136	8.14	263	2.7	108	0.0289	0.161	61.5	0.072
	13-DC-60	249-250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-61	251-252	13-DC-61	9-Jun-13	19:59	L1314855-10	Water	1320	350	8.1	808	2.7	119	1.81	0.52	247	<0.2
	13-WR-03	256-257	13-WR-03	9-Jun-13	20:40	L1314855-8	Water	3830	1010	7.85	2800	10.2	91.8	27	1.4	1100	<0.4
Doris North Area	13-DC-01		13-DC-01	4-Jun-13	18:42	L1313552-1	Water	214	61.3	7.57	149	6.8	64.7	0.0953	0.064	25.8	0.034
	13-DC-58	235-236	13-DC-58	08-JUN-13	17:30	L1314855-1	Water	392	135	7.81	236	3.8	91.7	0.0309	0.138	50.7	0.053
	13-RB-02	21-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-03	23-24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-04	25-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-05	27-28	13-RB-05	5-Jun-13	10:15	L1313552-2	Water	252	79.9	8.08	152	3	74.8	0.0478	0.072	21.7	0.049
	13-RB-06	29-30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-07	31-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-08	33-35	13-DC-08	5-Jun-13	10:59	L1313552-3	Water	241	68.3	8.08	143	2.8	62.2	0.0161	0.088	38.4	<0.2
	13-DC-09	36-37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-10	38-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-11	40-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-12	42-43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-13	44-46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-14	47-49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-15	50-52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-16	53-54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-17	56-57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-18	58-60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-19	61-62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-20	63-65	13-DC-20	5-Jun-13	13:51	L1313552-4	Water	224	97.4	8.14	147	2.4	82.1	0.0106	<0.05	18.3	0.022
	13-DC-21	66-69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-22	70-71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-23	76-77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-24	83-85	13-TLR-24	5-Jun-13	16:15	L1313552-5	Water	118	40.6	8.1	85	2.5	37	0.0786	<0.05	9.6	0.029
	13-TLR-25	86-88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-26	92-93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-27	94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-28	95	13-TLR-28	5-Jun-13	17:05	L1313552-6	Water	119	33.8	7.95	88	3.4	33.1	0.0721	<0.05	16.5	0.033

Mine Area	Station	Nitrate	Nitrite (as N)	SO_4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg
		mg N /L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Waste Rock Influenced Area	13-DC-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-30	0.653	0.0158	22.6	0.0045	<0.0001	0.0003	0.0133	<0.0001	<0.0005	0.065	<0.00001	40.8	0.00058	0.00012	0.00161	0.084	<0.00005	0.00222	8.3	0.00396	<0.00001
	13-DC-60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-61	21.5	0.031	137	0.0098	0.00053	0.00153	0.0219	<0.0001	<0.0005	0.326	0.000015	107	0.00022	0.00054	0.00626	<0.01	<0.00005	0.00844	20.3	0.0185	<0.00001
	13-WR-03	65.4	0.1	71	0.011	0.00026	0.00152	0.0529	<0.0002	<0.001	0.281	0.000095	352	<0.0002	0.00148	0.00917	0.011	<0.0001	0.0333	31.3	0.187	<0.00001
Doris North Area	13-DC-01	0.956	0.0116	12.8	0.048	<0.0001	0.00181	0.00623	<0.0001	<0.0005	0.047	<0.00001	16	<0.0001	0.00013	0.0152	0.023	<0.00005	0.00092	5.17	0.00612	<0.00001
	13-DC-58	1.42	0.0127	31	0.0076	0.00012	0.00054	0.00589	<0.0001	<0.0005	0.048	<0.00001	39.8	<0.0001	0.00014	0.00474	0.028	<0.00005	0.00116	8.51	0.0139	<0.00001
	13-RB-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-05	1.26	0.225	25.8	0.0331	0.00017	0.00064	0.00233	<0.0001	<0.0005	0.047	<0.00001	22.4	0.00037	0.00016	0.00134	<0.01	<0.00005	0.00162	5.83	0.00701	<0.00001
	13-RB-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-08	0.0406	0.0033	8.84	0.0136	<0.0001	0.00018	0.00371	<0.0001	<0.0005	0.016	<0.00001	18	<0.0001	<0.0001	0.00318	<0.01	<0.00005	0.00056	5.68	0.00271	<0.00001
	13-DC-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-20	0.292	0.0053	10.5	0.0143	<0.0001	0.00243	0.00325	<0.0001	<0.0005	0.023	0.000031	31.3	<0.0001	0.00015	0.00795	0.029	0.000053	0.00119	4.68	0.0123	<0.00001
	13-DC-21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-24	0.662	0.0423	6.36	0.057	<0.0001	0.00048	0.000974	<0.0001	<0.0005	0.023	<0.00001	12	<0.0001	<0.0001	0.0106	0.027	0.000127	<0.0005	2.56	0.00326	<0.00001
	13-TLR-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-28	0.0263	0.003	3.39	0.0548	<0.0001	0.00021	0.00752	<0.0001	<0.0005	0.019	<0.00001	8.73	0.00021	0.00023	0.00967	0.082	0.000056	0.00066	2.91	0.116	<0.00001

Mine Area	Station	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Waste Rock Influenced Area	13-DC-29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-30	0.000708	0.00101	<0.05	3.56	0.00014	1.71	<0.00001	38.1	0.132	7.65	<0.00001	<0.0001	<0.01	0.000087	<0.001	<0.001
	13-DC-60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-61	0.00539	0.00166	<0.05	11.4	0.00258	2.22	<0.00001	128	0.301	43.3	0.000023	<0.0001	<0.01	0.0018	<0.001	<0.001
	13-WR-03	0.00606	0.0019	<0.05	21.9	0.00124	2.1	0.00002	323	0.989	22.6	0.000029	<0.0002	<0.02	0.00073	<0.002	<0.002
Doris North Area	13-DC-01	0.000394	0.00097	<0.05	2.4	0.00033	1.48	<0.00001	19.4	0.0457	4.35	<0.00001	<0.0001	<0.01	0.000202	0.0015	0.0106
	13-DC-58	0.000941	0.00086	<0.05	3.64	0.00029	1.47	<0.00001	31.4	0.0962	10.5	<0.00001	<0.0001	<0.01	0.000561	<0.001	<0.001
	13-RB-02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-05	0.00118	0.00058	<0.05	2.38	0.00024	0.929	<0.00001	19.7	0.0339	8.41	<0.00001	<0.0001	<0.01	0.000115	<0.001	<0.001
	13-RB-06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-RB-07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-08	0.00016	<0.0005	<0.05	1.19	<0.0001	0.781	<0.00001	20.3	0.0353	2.92	<0.00001	<0.0001	<0.01	<0.00001	<0.001	<0.001
	13-DC-09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-20	0.00032	0.00139	<0.05	1.56	0.00016	1.31	<0.00001	10.8	0.0358	3.58	<0.00001	<0.0001	<0.01	0.000158	<0.001	0.0033
	13-DC-21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-24	0.000261	0.00055	<0.05	1.27	0.00017	1.37	<0.00001	6.49	0.0197	2.21	<0.00001	<0.0001	<0.01	0.000117	<0.001	<0.001
	13-TLR-25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-TLR-28	0.000142	0.0009	<0.05	1.21	<0.0001	1.46	<0.00001	8.73	0.0232	1.25	<0.00001	<0.0001	<0.01	0.000027	<0.001	0.0025

Mine Area	Station	WP	Easting	Northing	Date	Time	Sampled (y/n)	Description	Temperature	Field EC	Field pH	ORP	Flow
									°C	uS/cm		mV	L/s
Doris North Area	13-DC-50	55	432803	7559072	6/7/2013	16:38	n	small seep trickling out from under road rocks, creates puddle on tundra, water drainng downhill in direction of helipad/DW road, this point is ~15m west of 13-DC-22.	2	365.3	7.86	97	
	13-DC-51	56	432806	7559072	6/7/2013	16:48	n	small trickle seep flowing from under road rocks, ~5m east of 13-DC-50. Same rock/source/outflow as seep 13-DC-22 and 13-DC-50	2.2	371.2	7.96	88.3	
	13-DC-52	57	432873	7558970	6/7/2013	17:00	n	pool on tundra with rock interaction, not sure of source, could be from under camp pad or from same as 13-DC-51. Clear water, brown tint, grassy pool. Evidence of flow, bent grasses.	2.5	440	7.73	77.6	
	13-DC-53	58	432888	7558955	6/7/2013	17:15	n	20m downhill from 13-DC-52. Appears to be flow from tundra that flows laterally agains road rock. Grassy bottom pool, clear water, brownish tint, slow flow, snow melting on hill to NW.	1.1	402.4	7.95	80	
	13-DC-54	59	432892	7558947	6/8/2013	16:45	n	small flowing seep, shallow, over road rocks. Could be from undre camp pad or lateral from from N up road. Clear water, sediment coating on rocks	0.3	445.8	7.92	76.1	0.75
	13-DC-55	60	432934	7558764	6/8/2013	17:00	n	tundra water from snow melt to west, heading under helipad, contact with road rock, rock bottom with w/ grass, tundra interaction.	0.2	251	7.78	79	
	13-DC-56	61	432952	7558748	6/8/2013	17:10	n	opposite side of road from 13-DC-55, seep is trickling out from between road rocks, ice on grass all around, clear water, shallow. Slow flow.	0	237.4	7.85	82	
	13-DC-57	62	432972	7558746	6/8/2013	17:21	n	water from DC-55 coming out from under heli pad, slow flow into grassy tundra pool, clear water	0.1	248.2	7.74	81.8	0.75
Doris Windy Road	13-DW-31	31	432702	7550453	6/6/2013	9:40	y	seep from opp side, under road, large seep/stream ~0.5m deep, fast flow rate, clear water, bordered by boulders, grass/sand/snow bottom, orange seds/brown	4.7	198	7.65	78.3	10
	13-DW-32	32	432709	7550453	6/6/2013	9:49	n	same descrip as DW-31, sliglty smaller seep, ~10cm deep, leads to stream on tundra, heads into windy lake, clear water rock/grassy bottom, date point between boulders.	4.8	175	7.78	81.1	2
	13-DW-33	33	432711	7550453	6/6/2013	9:58	n	same source across road as DW 31 and DW32, grass bottom between boulders, clear flow, fast, deep, 0.5-0.75m. Discharges onto tundra, into stream heading into windy lake.	4.7	116.1	7.79	85.1	3
	13-DW-34	34	433301	7550635	6/6/2013	10:38	n	very small SLOW flow seep, trickle. Grass bottom, between road rocks, clear but leads to murky puddles on tundra.	3.6	526.3	7.24	130.6	
	13-DW-35	35	433302	7550632	6/6/2013	10:43	n	3ft from DW-34, grass bottom, very slow flow, shallow puddle.	4.5	505.4	7.31	113.2	
	13-DW-36	36	433000	7551778	6/6/2013	11:06	n	snow melt from entrace to quarry D, runs along road side and mixes under toe of road. Shallow pools, slow flow, murky water, sed/pebble bottom.	1.3	568.4	7.82	114.5	
	13-DW-37	37	433001	7551787	6/6/2013	11:18	n	downstream from DW-36, slow flow, shallow, trickle. OM and OB interaction. Road rock interaction further upstream. Clear water, murky pools. Sed/pebble bottom.	1.2	589.3	7.77	134.8	
	13-DW-38	38	432799	7552182	6/6/2013	11:26	n	slow flowing shallow seep, snow melt source on east side of road, murky water, dusty sediment and gravel bottom with OM, disperses into tundra pools which are stagnant.	0.5	126.8	7.68	106.7	
	13-DW-39	39	432406	7554439	6/6/2013	12:26	n	snow melt uphill, same side of road, appears to have been lateral slow flow. At this time, no flow. Sediment/dusty pool, rock bottom, took data point due to total dryness everywhere else in this section.	3.3	185.3	7.82	102.8	
	13-DW-40	40	432455	7554701	6/6/2013	12:40	y	snow melt from opp side of road, very slow trickle into grassy/OB pool. Difficult to get clean sample, water clear, slightly brown.	1.3	235.7	7.85	105.3	
	13-DW-41	41	432550	7555200	6/6/2013	13:07	n	very slow trickle, water is combination tundra pond on same side, w/ small seep coming through from opp side (also snow melt). Data point taken as close to seep outlet as possible. Clear trickle, grassy pool, broken up OB on rocks on road side.	0.8	55.7	7.36	120.9	
	13-DW-42	42	432817	7556711	6/6/2013	13:40	n	data point taken at location south along road from diversion, murky brown water, lots of tundra mixing, water partially from tundra and partially from opp side road, no vis flow but implied by stream moving away to east.	5.2	87.9	7.43	81.3	
	13-DW-43	43	432792	7556711	6/6/2013	13:48	n	upstream side of diversion thing (find out real name). tundra water from pond, grass bottom, OM, OB, sediment, feces. Not from under road, no vis flow except from other side of road water heads east. Murky/brown.	4.2	80.8	7.21	95.4	
	13-DW-44	44	432603	7557195	6/6/2013	14:05	n	pool on tundra in contact with roadside (down steep side). Possible source from up road to NE. Interaction with tundra, OB, grassy bottom. No vis flow.	3.4	153.8	7.54	88.9	
	13-DW-45	45	432651	7557712	6/6/2013	14:17	n	evidence of prev. flow, grass is moved in easterly direction, stream out on tundra, pool quite still but possibly still flowing. Grassy bottom, clear water, brown tint.	2.6	204.9	7.96	53.6	
	13-DW-46	46	432793	7558052	6/6/2013	14:26	n	pool on tundra in contact with road edge, pool/stream on opposite side (west) flowing under road, feels this pool, heads east. Dusty bottom, sediment on rocks, grass and rock bottom.	2.7	112.1	7.7	77.4	
	13-DW-47	47	432782	7558353	6/6/2013	14:35	y	small seep, fast flow, solurce is snow SW on opp side road. Flows down hill to doris lake, clear water, rocky bottom.	1.6	130.7	7.99	83.1	
	13-DW-48	48	DUP of DW-47		6/6/2013		y	Duplicate of DW-47					
	13-DW-49	49	432784	7558356	6/6/2013	14:49	n	same descrip as DW-47. Multiple exits.	1.5	125	7.79	102.8	
	13-DW-62	77	432949	7558685	6/10/2013	15:32	n	clear water, brown tint, grass bottom, seep source is snow melt on west side of DW road, disperses into tundra pools	2.4	161.1	7.73	295.1	2
	13-DW-63	78	432902	7558527	6/10/2013	15:41	n	small seep spilling into small pool, slow flow, source is snow melt on west side of DW road, clear water, slight dusty scum on surface.	0.8	430.6	7.74	330	
	13-DW-64	79	432900	7558523	6/10/2013	15:55	n	clear water, seep flows from between rocks of road onto tundra. Grassy bottom, dusty sed on bottom, flows E/NE and laterally along road.	1.1	257	7.68	339.2	3
	13-DW-65	80	432809	7558397	6/10/2013	16:03	n	clear water, slight dust scum in pools, grassy channel to tundra pool. Algal growth in bottom.	2	127.2	7.68	326.9	
	13-DW-66	81	432797	7558383	6/10/2013	16:10	n	seep from under road, source is snow melt on W side DW road. Clear water, grassy bottom channel w/ road rocks on either side.	3.9	118.4	7.77	255	
	13-DW-67	82	432783	7558353	6/10/2013	16:22	n	3 exits, same source on west side of DW road, snow melting. Clear water, grassy bottom.	5	132.8	7.7	301.9	10
Reference Points	13-REF-001	72	433421	7550226	6/10/2013	14:20	y	clear flow, fast flowing, grass bottom channel	4.1	60.6	6.96	251.1	10
	13-REF-002	73	432613	7555876	6/10/2013	14:43	y	clear, moderate flow, grassy channel	9.5	178.1	7.71	255.3	5
	13-REF-003	76	432091	7557954	6/10/2013	15:00	y	shallow, slow flow, clear, sediment/grass bottom, brown tint, organic matter in water	7.5	99.3	7.21	223.3	1

Mine Area	Station	Photos	Sample ID	Date Sampled	Time Sampled	ALS Sample ID	Matrix	Conductivity	Hardness (as CaCO3)	Lab pH	Total Dissolved Solids	Acidity (as CaCO3)	Alkalinity, Total	Ammonia	Bromide (Br)	Chloride	Fluoride (F)
								uS/cm	mg/L	pH	mg/L	mg/L	mg CaCO3/L	mg N/L	mg/L	mg/L	mg/L
Doris North Area	13-DC-50	208-209	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-51	210-211	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-52	212-213	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-53	214-215	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-54	220-222	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-55	227-228	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-56	231-232	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-57	233-234	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Doris Windy Road	13-DW-31	111-112	13-DW-31	6-Jun-13	09:40	L1313552-10	Water	189	72.4	7.36	145	5.1	38.8	0.0741	<0.05	33.6	0.053
	13-DW-32	113-115	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-33	116-117	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-34	124-125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-35	126	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-36	134-135	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-37	136-137	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-38	140-142	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-39	155-156	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-40	157-159	13-DW-40	6-Jun-13	12:40	L1313552-11	Water	224	84.8	7.98	152	3.6	75.5	0.0332	<0.05	22.9	0.039
	13-DW-41	160-161	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-42	165-166	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-43	164-167	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-44	168-169	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-45	171-172	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-46	173-174	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-47	175-177	13-DW-47	6-Jun-13	14:35	L1313552-12	Water	125	53.6	7.95	83	3.5	47.8	0.0175	<0.05	8.91	<0.02
	13-DW-48		13-DW-48	6-Jun-13	14:49	L1313552-13	Water	126	54	7.98	83	3	48.1	0.0185	<0.05	9.09	<0.02
	13-DW-49	178	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-62	276-277	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-63	278-279	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-64		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-65	280-281	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-66	282-284	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-67	285-287	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reference Points	13-REF-001	266-267	13-REF-001	10-Jun-13	14:20	L1314855-16	Water	55.4	20.8	7.71	60	3.1	*	0.0101	<0.05	6.52	0.056
	13-REF-002	268-269	13-REF-002	10-Jun-13	14:43	L1314855-15	Water	169	74.1	7.25	122	5.4	59	0.0062	<0.05	15.6	0.035
	13-REF-003	270-271	13-REF-003	10-Jun-13	15:00	L1314855-14	Water	94.1	36.5	7.81	64	4.9	30.3	<0.005	<0.05	9.26	<0.02

*Alkalinity value for 13-REF-001 (6.1 mg/L) Removed from data set see Section 2.3

Mine Area	Station	Nitrate	Nitrite (as N)	SO_4	Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg
		mg N /L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris North Area	13-DC-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--	--	--	--
	13-DC-53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Doris Windy Road	13-DW-31	0.375	0.0156	3.61	0.0297	<0.0001	0.00036	0.00771	<0.0001	<0.0005	0.013	<0.00001	21.2	0.00031	0.00025	0.00251	0.141	<0.00005	0.00304	4.72	0.0497	<0.00001
	13-DW-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-40	0.433	0.0163	11	0.0158	<0.0001	0.00045	0.00525	<0.0001	<0.0005	<0.01	0.000013	26.1	0.0004	0.00019	0.00366	0.032	<0.00005	0.00113	4.79	0.0281	<0.00001
	13-DW-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-47	0.0217	0.006	3.99	0.0056	<0.0001	0.00024	0.00216	<0.0001	<0.0005	0.013	<0.00001	17.9	<0.0001	<0.0001	0.00192	<0.01	<0.00005	0.00067	2.15	0.00226	<0.00001
	13-DW-48	0.0222	0.0085	4	0.0056	<0.0001	0.00024	0.00218	<0.0001	<0.0005	0.013	<0.00001	18.1	<0.0001	<0.0001	0.00192	<0.01	<0.00005	0.0007	2.15	0.00222	<0.00001
	13-DW-49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reference Points	13-REF-001	<0.005	<0.001	0.89	0.0475	<0.0001	0.00016	0.00211	<0.0001	<0.0005	<0.01	<0.00001	4.42	0.0004	<0.0001	0.00152	0.11	<0.00005	0.00257	2.38	0.000226	<0.00001
	13-REF-002	<0.005	<0.001	6.33	0.0064	<0.0001	0.00018	0.00282	<0.0001	<0.0005	0.013	<0.00001	23.4	<0.0001	<0.0001	0.00248	0.011	<0.00005	0.0009	3.78	0.000327	<0.00001
	13-REF-003	<0.005	<0.001	2.7	0.0189	<0.0001	<0.0001	0.00326	<0.0001	<0.0005	0.012	<0.00001	10	0.00012	<0.0001	0.00185	0.05	<0.00005	<0.0005	2.79	0.000236	<0.00001

Mine Area	Station	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	S	Tl	Sn	Ti	U	V	Zn
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Doris North Area	13-DC-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DC-57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Doris Windy Road	13-DW-31	0.00034	0.0022	<0.05	2.12	<0.0001	1.46	<0.00001	8.37	0.0519	1.37	<0.00001	<0.0001	<0.01	0.000052	<0.001	0.0014
	13-DW-32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-40	0.000336	0.00319	<0.05	1.44	0.00011	1.67	<0.00001	12.6	0.0545	3.75	<0.00001	<0.0001	<0.01	0.000029	<0.001	0.0027
	13-DW-41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-47	0.000093	<0.0005	<0.05	0.62	<0.0001	1.09	<0.00001	4.74	0.0281	1.41	<0.00001	<0.0001	<0.01	0.000015	<0.001	<0.001
	13-DW-48	0.000087	<0.0005	<0.05	0.6	<0.0001	1.1	<0.00001	4.81	0.0278	1.43	<0.00001	<0.0001	<0.01	0.000015	<0.001	0.0014
	13-DW-49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	13-DW-67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Reference Points	13-REF-001	0.000157	0.00207	<0.05	1.69	<0.0001	1.34	<0.00001	3.4	0.0104	<0.5	<0.00001	<0.0001	<0.01	0.000014	<0.001	0.0035
	13-REF-002	0.000076	0.00068	<0.05	0.82	<0.0001	2.07	<0.00001	6.61	0.0506	2.21	<0.00001	<0.0001	<0.01	0.000015	<0.001	0.0019
	13-REF-003	0.00005	0.00065	<0.05	0.68	<0.0001	1.43	<0.00001	5.29	0.013	1.04	<0.00001	<0.0001	<0.01	<0.00001	<0.001	0.0014