PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING AT IG_BH04/05/06 - IGNACE AREA

WP01 Site Demobilization Report - Site Infrastructure for IG_BH04

APM-REP-01332-0306 **February 2022**

Golder Associates Ltd.

nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

Nuclear Waste Management Organization
22 St. Clair Avenue East, 4th Floor
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M4T 2S3
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GOLDER
MEMBER OF WSP

REPORT

PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING AT IG_BH04/05/06. IGNACE AREA

WP01 Site Demobilization Report - Site Infrastructure for IG_BH04

Submitted to:

Nuclear Waste Management Organization
4th Floor
22 St. Clair Avenue East
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NWMO Report: APM-REP-01332-0306

February 16, 2022

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WP01 SITE DEMOBILIZATION REPORT
SITE INFRASTRUCTURE FOR IG_BH04

CLIENT INFORMATION

Project Name: Phase 2 Initial Borehole Drilling and Testing, Ignace Area

Project Number: 20253946

Client PO Number: 2001102

Document Name: 20253946 IG_BH04_WP01_Site_Decom_Report_r3a.docx

Client: Nuclear Waste Management Organization (NWMO)
22 St. Clair Avenue East, 4th Floor
Toronto, Ontario
M4T 2S3

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Issue/Revision Index

Issue Code	Revision					Revision Details
	No.	By	Reviewed	Approved	Date	
RR	0a	SH	KRM	GWS	2021-10-29	Draft for review and comment
RR	1b	SH	GWS	JLC	2022-01-06	Revised draft for review and comment
RR	2a	SH	GWS	JLC	2022-01-25	Revised draft for review and comment
RR	3a	SH	GWS	JLC	2022-02-15	Revised draft for review and comment
RI	3b	SH	GWS	JLC	2022-02-16	Final signed copy

Issue Codes: RR = Released for Review and Comments, RI = Released for Information

SIGNATURES

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APPENDICES

1.0 INTRODUCTION

The Phase 2 Borehole Drilling and Testing at IG_BH04/05/06 project is part of the Phase 2 Geoscientific Preliminary Field Investigations of the Nuclear Waste Management Organization's (NWMO) Adaptive Phased Management Site Selection Phase.

This project involves testing of deep borehole IG_BH04 and the drilling and testing of deep boreholes IG_BH05 and IG_BH06 in the Ignace area within the identified Revell Potential Repository Area. The work comprises a total of 11 work packages and is being carried out by a team led by Golder Associates Ltd. (Golder) on behalf of the NWMO.

Work Package WP01 (WP01) addresses site establishment and site infrastructure activities for the drilling and testing of boreholes IG_BH04, IG_BH05, and IG_BH06. The overall program at IG_BH04 is described in the Borehole Characterization Plan for IG_BH04 (Golder 2021a).

The Ignace area is located a direct distance of approximately 21 km southeast of the Wabigoon Lake Ojibway Nation and a direct distance of 43 km northwest of the Town of Ignace. Access to the area is via Highway 17 and primary logging roads, as shown on Figure 1.

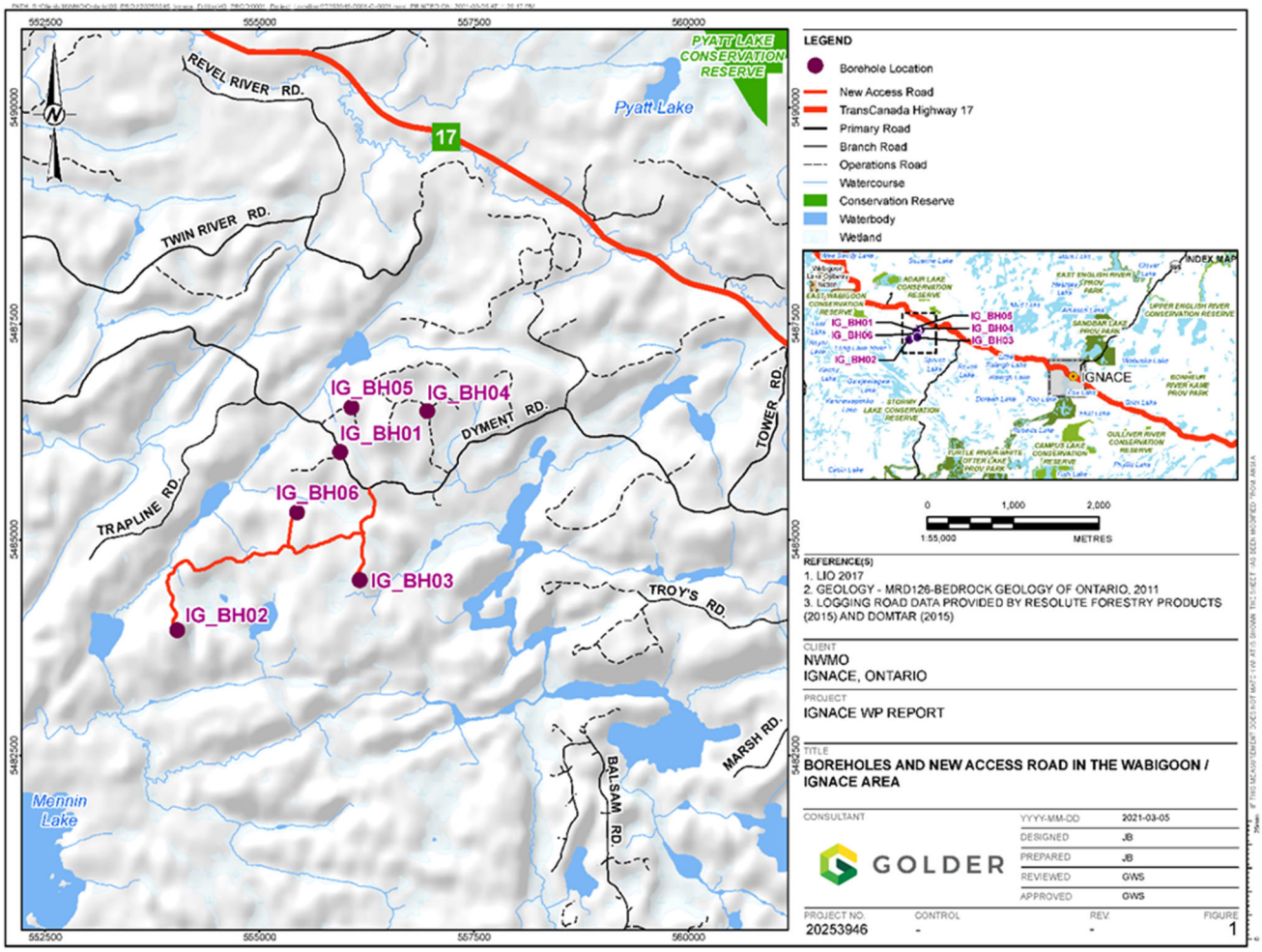

Figure 1: The Ignace Area - access roads and drill sites for IG_BH04, IG_BH05, and IG_BH06

2.0 OBJECTIVE

As stated in the WP01 Test Plan (Golder 2021b), a site decommissioning technical report is to be submitted for each of the drill sites to document the dismantling and demobilization of site infrastructure.

Section 9.5 of the WP01 Test Plan (Golder 2021b), states that the overall objectives of demobilization and decommissioning are as follows:

- To remove all equipment and infrastructure from the site upon completion of borehole drilling and testing in a timely manner;
- To ensure no refuse or waste is left behind either on the site or in the immediate surroundings;
- To remove any potentially impacted fill material from the site, such as petroleum hydrocarbons, drilling mud, or other substances;
- To leave the site in a physically and environmentally acceptable state; and,
- To perform the demobilization safely, and to document the manner in which demobilization was performed.

This report describes the site demobilization and decommissioning activities performed at borehole IG_BH04. An aerial photo of the IG_BH04 site while in operation during April 2021 is provided in Appendix A (Photo 1).

3.0 DEMOBILIZATION AND DECOMISSIONING ACTIVITIES

The demobilization of site facilities from IG_BH04 was carried out by Obish Construction LP (Obish) and their subcontractors, and the demobilization of the drilling infrastructure was carried out by Rodren Drilling Ltd. (Rodren) all under the supervision of Golder.

The demobilization and decommissioning activities at IG_BH04 took place during the following periods and comprised the following general activities.

- May 2021 - Drilling and water management infrastructure was transferred from IG_BH04 to IG_BH05, once drilling and flushing of IG_BH04 was completed.
- August 2021 – The remaining drilling and site infrastructure was demobilized from IG_BH04 and the majority of site clean-up and decommissioning activities were completed.
- September 2021 – The IG_BH04 wellhead was restored and surveyed, and the site decommissioning checklist was completed and signed.
- October 2021 – A site demobilization inspection was completed by Golder with an NWMO representative.
- December 2021 – Disposal activities for material collected during the final walkover including TCLP sampling, obtaining approval from the Township of Ignace, and final disposal.

Further details of these activities are provided in the subsections below.

3.1 Drilling Equipment

3.1.1 May 2021 - Transfer to IG_BH05

Drilling Equipment and Support Infrastructure

On May 1 to 3, 2021 Rodren and Atlas Dewatering (Atlas) transferred the following drilling equipment and support infrastructure from IG_BH04 to IG_BH05:

- May 1, 2021 – Rodren transferred one drill rod sloop using a bulldozer to IG_BH05.
- May 2, 2021 – Rodren transferred one centrifuge (AMC SRU) using a bulldozer and a skid-steer to IG_BH05.
- May 3, 2021 – Atlas transferred the two 28,350 litre (7,500 US gallon) Baker tanks using a speciality transport truck to IG_BH05.

3.1.2 August 2021 – Transfer to IG_BH05/06

Drill Rig to IG_BH05

Drilling and flushing of IG_BH04 was completed on April 30, 2021. The EF-75 drill rig was used for WP02 and WP06 activities at IG_BH04. The EF-75 was moved off the borehole on May 1, 2021 to allow WP05 activities to be undertaken, and the EF-75 was moved back over the borehole for WP06 activities on May 9, 2021.

The EF-75 was moved off the borehole again on July 11, 2021 to provide working space for the WP05 Posiva Flow Logging activities.

As the EF-75 was not required for the remaining work packages at IG_BH04, it was stored on-site until August 14, 2021 when it was transferred by Rodren directly to IG_BH05 using a flat deck transport truck.

Secondary Containment Disposal & Transfer of Rig Matting to IG_BH06

Beneath the drilling rig was a secondary containment system with a central sump which captured drill fluid spills that could potentially occur from the drill rig or drill fluid circulation system. Rig matting was placed over top of the central sump system, to provide a level and solid foundation for the drill rig infrastructure.

The rig mats were removed from the drill pad on August 10, 2021 and stacked on-site in preparation for transfer to IG_BH06. On August 15, 2021 Rodren loaded the rig mats onto a transport truck and transferred the rig mats directly to IG_BH06.

The secondary containment system was disassembled and placed into the waste bin on August 10, 2021 and disposed off-site by Obish's subcontractor, B&M Delivery, on August 20, 2021 (Appendix A, Photo 2).

Other Drilling Equipment & Support Infrastructure to IG_BH05/06

- August 14, 2021
  - Rodren transferred one drill rod sloop to IG_BH05 and one drill rod sloop to IG_BH06 using a flat deck transport truck.
- August 15/16, 2021
  - Rodren transferred the portable car shelter to IG_BH05 using a flat deck transport truck.
  - Obish's subcontractor, Secure Store, transferred a 6 x 2.5 m (20 x 8 ft) shipping container (seacan) containing wastewater and fluorescein tanks to IG_BH06 using a flat deck transport truck.

3.2 Security Fencing

Approximately 190 m (620 ft) of 2.5 m (8 ft) tall fencing was originally installed around the perimeter of the site in April 2021 to define the work area, provide security and to discourage wildlife from entering the site. A lockable gate was installed on the southwest side of the site, to allow worker access to the site from the parking lot.

In addition to the perimeter fencing, approximately 70 m (230 ft) of 1.8 m (6 ft) tall fencing was installed around the drill rig area to define an interior exclusion zone.

Obish took down all perimeter and interior fencing at IG_BH04 on August 11, 2021 and transported the fencing to IG_BH06 (Appendix A, Photo 3).

3.3 Power and Lighting

Fediuk Electric Inc. (Fediuk) from Dryden, Ontario was retained by Obish to disconnect and dismantle the power generation and distribution system at IG_BH04.

3.3.1 Power Distribution

Power from the main site generator was distributed to the site facilities via double jacketed electrical cables. The majority of the power lines were mounted to the site perimeter fence. In areas where the electrical lines passed through a trafficable area, they were buried underground inside ABS conduit.

All power lines and underground cables and conduit were removed by Obish and Fediuk on August 11, 2021. (Appendix A, Photo 4).

3.3.2 Power Generation

IG_BH04 was powered by MQ WhisperWatt 70 diesel-electric generator, which supplied 56 kW (70 kVA) of 120 V single-phase output. It was used to power the site office trailers, core storage seacans, washroom trailer, and a portable power system on the drill pad.

A 4,500 L double-walled fuel storage tank was located adjacent to the generator, so that refuelling of the generator could be performed directly from the fuel storage tank. The fuel tank and generator were placed inside two separate secondary containment berms side by side with containment capacity of 5,460 L each, sufficient to contain the maximum amount of fuel and oil in the system. The fuel tank was surrounded by concrete barricades to protect it from vehicular traffic and heavy machinery.

On August 13, 2021 the generator, fuel storage tank, and protective barricades were removed from IG_BH04 and taken by Obish to IG_BH06. (Appendix A, Photo 5).

3.3.3 Site Illumination

Three 4-kW Wacker Neuson Metrolite LTV4 diesel powered light towers with LED lights were installed at the site to provide outside illumination during work at night. Obish removed all three light towers from IG_BH04 on August 13, 2021 and transported them to IG_BH06.

3.4 Site Trailers

3.4.1 Office Trailers

A 12 x 3 m (40 x 10 ft) mobile office trailer was originally set up on the south corner of the site, and two 7.3 x 3 m (24 x 10 ft) mobile office trailers were set up on the northeast corner of the site. The office trailers functioned as

field offices for Golder, NWMO/WLON, and Rodren, respectively. All three of the office trailers were demobilized from IG_BH04 by Secure Store on August 16, 2021 and were transported to IG_BH06 (Appendix A, Photo 6).

3.4.2 Core Logging and Storage Seacans

Two 12 x 2.5 m (40 x 8 ft) modified shipping containers were placed at the north corner of site near the drill rig and functioned as working space for all work package activities. Upon completion of drilling and testing at IG_BH04, one seacan was transported to IG_BH05 by Secure Store, and the second seacan was transported to IG_BH06. Both Seacans were moved on August 16, 2021.

3.4.3 Washroom Trailer

A heated and self-contained washroom trailer was placed near the south corner of the site adjacent to the Golder office trailer. The washroom trailer was divided into two units with separate entrances, each containing one toilet and one sink. The self-contained washroom trailer was removed from IG_BH04 by Obish subcontractor Balla Bros on August 20, 2021 and transported to IG_BH06.

3.5 Solid Waste

Solid waste was managed using one garbage bin and one recycling bin located near the front entrance to the site, for ease of access by the garbage and recycling truck. The bins were both located inside the fenced area and had lids which could be secured to prevent access by animals.

The garbage and recycling bins were both removed from IG_BH04 by Obish on August 20, 2021 and transported to IG_BH06.

3.6 Site Communications

Cellular signals from the local mobile network were amplified for all site workers using a Uniden cellular signal booster which was installed on the top of the light tower near Golder's office trailer, to improve cellular reception to the site. Internet services were provided on-site using two Bell Canada ZTE MF288 Turbo Hub cellular internet receivers, located in the Golder and NWMO/WLON office trailers, respectively. Emergency satellite communications were provided by a handheld Garmin In-Reach SE.

Following the demobilization of the site, all units were transferred to IG_BH06 by the Golder site supervisor during the week of August 23 to 27, 2021.

3.7 Borehole Casing

The borehole casing at IG_BH04 was cut by Golder with the NWMO's approval to accommodate drilling and testing equipment on April 16, 2021. The original outer casing stick-up was 1.00 metres above ground surface (mags); it was cut to a stick-up of 0.27 mags (Golder removed 0.73 m). The original inner casing stick-up was 0.42 mags; it was cut to a stick-up of 0.27 mags (Golder removed 0.15 m).

Following consultation with the NWMO, on September 5, 2021 Rodren welded a new section of custom fabricated outer casing to the IG_BH04 borehole collar which resulted in a new stick-up measurement of 0.60 mags. Golder also installed a new section of custom fabricated inner casing which resulted in a new stick-up measurement of 0.42 mags, matching original measurements. Rodren also re-installed the locking protective casing at IG_BH04 (Appendix A, Photo 7).

On September 8, 2021 Golder spray painted the exposed surfacing casing blue and installed two locks provided by the NWMO (Appendix A, Photo 8).

3.8 Borehole Survey

A final as-built survey of the borehole was performed by Rugged Geomatics Inc. (Rugged Geomatics) on September 9, 2021, after the IG_BH04 borehole casing was installed. Rugged Geomatics provided the results of this survey in a letter which is attached in Appendix C.

The universal transverse mercator (UTM) zone 15 coordinates and geodetic elevations (CGVD2013 datum) survey results from the Rugged Geomatics as-built survey are provided in the table below.

Table 1 - IG_BH04 Borehole Casing Elevations

Shot Point Description	Northing	Easting	Elevation (CGVD2013)
IG_BH04 – Top of surface (HWT) casing	5486487.88	556957.84	444.67
IG_BH04 – Ground surface	5486487.73	556958.02	444.29

4.0 SITE INSPECTIONS

4.1 Demobilization Inspection - October 2021

Following completion of all site demobilization and decommissioning activities, a site walkover inspection was performed by Golder's WP01 Site Supervisor (Darwin Villeneuve) on October 27, 2021 accompanied by an NWMO representative (Adrian Kowalchuk). A grid pattern was walked across the entire site and it was visually confirmed that there was no remaining litter or construction debris at the site.

During the walkover, there were some small areas which had minor staining attributed to small fuel and oil drips. Golder removed the stained fill material and replaced it with clean fill. An estimated 0.23 m^3 of material was removed. The removed material was stored in a 1 m^3 storage tote at IG_BH05 for future off-site disposal. The storage tote was then transferred to IG_BH06 on November 18, 2021 during IG_BH05 site tear-down. The storage tote was taken to the Township of Ignace landfill by B&M Delivery on November 18, 2021 along with drill cutting from IG_BH05. As the material was not yet sampled and approved for disposal, the storage tote was identified at the landfill and set aside until testing and approvals were completed.

Golder collected a sample of the material and had it characterized for disposal purposes in accordance with Ontario Regulation (O.Reg.) 347 and O.Reg. 588/17. The sample was shipped and submitted to the Bureau Veritas laboratory in Mississauga, Ontario following Chain of Custody protocols. The sample was tested for petroleum hydrocarbons (PHC) F1 and benzene, toluene, ethylbenzene and xylene (BTEX) in leachate, PHC F2-F4 in leachate, and ignitability. The analytical results are provided in Appendix B and show that the fill material was non-hazardous. The fill material was accepted as non-hazardous and approved for disposal by Pinchin Ltd. on December 22, 2021 on behalf of the Township of Ignace. The material was then disposed at the Township of Ignace landfill following the approval process.

4.2 Site Decommissioning Checklist

The completion of demobilization and decommissioning activities were documented as they took place and the results recorded on a site decommissioning checklist. The checklist was signed off by Golder representatives upon completion and is provided in Appendix D.

5.0 FINAL SITE CONDITIONS

An aerial photo of the IG_BH04 drill site was taken following demobilization on September 16, 2021 by Geoff Crann of the NWMO (Appendix A, Photo 9).

6.0 REFERENCES

Golder (Golder Associates Ltd.), 2021a. Phase 2 Initial Borehole Drilling and Testing at IG_BH04/05/06, Ignace Area. Borehole Characterization Plan for IG_BH04 (NWMO Document: APM-PLAN-01332-0369), March 2021.

Golder, 2021b. WP01 Test Plan - Site Infrastructure for IG_BH04/05/06 (NWMO Document: APM-PLAN-01332-0373), March 2021.

Province of Ontario, 1990, Environmental Protection Act - R.S.O. 1990, REGULATION 347 - GENERAL — WASTE MANAGEMENT, 1990.

Province of Ontario, 2017, Infrastructure for Jobs and Prosperity Act, 2015, S.O. 2015, REGULATION 588/17 - ASSET MANAGEMENT PLANNING FOR MUNICIPAL INFRASTRUCTURE, 2017.

APPENDIX A

IG_BH04 Site Demobilization Photos

Photo 1 - Overhead drone photo of the commissioned IG_BH04 site, taken on April 30, 2021.

Photo 2 - Drill rig area with rig mats and secondary containment removed – August 10, 2021

Photo 3 – Disassembly of IG_BH04 perimeter fence – August 11, 2021

Photo 4 – Decommissioning electrical equipment at IG_BH04 – August 11, 2021

Photo 5 – Fuel Tank Demobilization from IG_BH04 – August 13, 2021

Photo 6 – Demobilization of Golder office trailer and wastewater seacan from IG_BH04 – August 16, 2021

Photo 7 – IG_BH04 wellhead after restoration. A new section of outer casing was welded by Rodren and the previous casing cap was reinstalled - September 5, 2021.

Photo 8 – IG_BH04 Surface casing spray painted blue with two locks provided by the NWMO - September 8, 2021.

Photo 9 – Aerial drone photo of IG_BH04 following demobilization - September 16, 2021.

APPENDIX B

Laboratory Results for Waste Characterization

Your P.O. #: 20253946
Your Project #: 20253946
Site#: IG_BH04
Site Location: IGNACE, ON
Your C.O.C. #: na

Attention: George Schneider

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/12/15
Report #: R6922252
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Y4991
Received: 2021/12/10, 08:54

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
CCME F1 Hydrocarbons/BTEX in Leachate	1	2021/12/14	2021/12/14	CAM SOP-00315	CCME PHC-CWS m
CCME F2-F4 Hydrocarbons in Leachate (1)	1	2021/12/14	2021/12/15	CAM SOP-00316	CCME PHC-CWS m
Ignitability of a Sample	1	2021/12/15	2021/12/15	CAM SOP-00432	EPA 1030 Rev. 1 m
TCLP - % Solids	1	2021/12/13	2021/12/14	CAM SOP-00401	EPA 1311 Update I m
TCLP - Extraction Fluid	1	N/A	2021/12/14	CAM SOP-00401	EPA 1311 Update I m
TCLP - Initial and final pH	1	N/A	2021/12/14	CAM SOP-00401	EPA 1311 Update I m
TCLP Zero Headspace Extraction	1	2021/12/13	2021/12/14	CAM SOP-00430	EPA 1311 m

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1

Your P.O. #: 20253946
Your Project #: 20253946
Site#: IG_BH04
Site Location: IGNACE, ON
Your C.O.C. #: na

Attention: George Schneider

Golder Associates Ltd
210 Sheldon Drive
Cambridge, ON
CANADA N1T 1A8

Report Date: 2021/12/15
Report #: R6922252
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1Y4991
Received: 2021/12/10, 08:54
Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ema Gitej, Senior Project Manager
Email: emese.gitej@bureauveritas.com
Phone# (905)817-5829
==========
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

TCLP LEACHATE PREPARATION (SOIL)

Bureau Veritas ID		RHR625		
Sampling Date		2021/12/04 16:00		
COC Number		na		
	UNITS	**IG_BH4_TCLP_WALKOVER_27OCT2021**	**RDL**	**QC Batch**
Inorganics				
Final pH	pH	5.39		7721947
Initial pH	pH	9.34		7721947
TCLP - % Solids	%	100	0.2	7721922
TCLP Extraction Fluid	N/A	FLUID 1		7721946

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

TCLP PHCS, BTEX/F1-F4 (SOIL)

Bureau Veritas ID		RHR625	RHR625		
Sampling Date		2021/12/04 16:00	2021/12/04 16:00		
COC Number		na	na		
	UNITS	IG_BH4_TCLP_WALKOVER_27OCT2021	IG_BH4_TCLP_WALKOVER_27OCT2021 Lab-Dup	RDL	QC Batch
Charge/Prep Analysis					
Amount Extracted (Wet Weight) (g)	N/A	25	25	N/A	7721413
BTEX & F1 Hydrocarbons					
Leachable (ZHE) Benzene	ug/L	<0.8	<0.8	0.8	7726161
Leachable (ZHE) Toluene	ug/L	<0.8	<0.8	0.8	7726161
Leachable (ZHE) Ethylbenzene	ug/L	<0.8	<0.8	0.8	7726161
Leachable (ZHE) o-Xylene	ug/L	<0.8	<0.8	0.8	7726161
Leachable (ZHE) p+m-Xylene	ug/L	<2	<2	2	7726161
Leachable (ZHE) Total Xylenes	ug/L	<2	<2	2	7726161
Leachable (ZHE) F1 (C6-C10)	ug/L	<1000	<1000	1000	7726161
Leachable (ZHE) F1 (C6-C10) - BTEX	ug/L	<1000	<1000	1000	7726161
F2-F4 Hydrocarbons					
Leachable F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	7726200
Leachable F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	7726200
Leachable F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	7726200
Leachable Reached Baseline at C50	ug/L	Yes	Yes	N/A	7726200
Surrogate Recovery (%)					
Leachable (ZHE) 1,4-Difluorobenzene	%	102	103		7726161
Leachable (ZHE) 4-Bromofluorobenzene	%	109	89		7726161
Leachable (ZHE) D10-o-Xylene	%	95	97		7726161
Leachable (ZHE) D4-1,2-Dichloroethane	%	93	90		7726161
Leachable o-Terphenyl	%	96	97		7726200

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

MISCELLANEOUS (SOIL)

Bureau Veritas ID		RHR625	
Sampling Date		2021/12/04 16:00	
COC Number		na	
	UNITS	IG_BH4_TCLP_WALKOVER_27OCT2021	QC Batch
Inorganics			
Ignitability	N/A	NF/NI	7728330
QC Batch = Quality Control Batch			

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

TEST SUMMARY

Bureau Veritas ID: RHR625
Sample ID: IG_BH4_TCLP_WALKOVER_27OCT2021
Matrix: Soil

Collected: 2021/12/04
Shipped:
Received: 2021/12/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	7726161	2021/12/14	2021/12/14	Georgeta Rusu
CCME F2-F4 Hydrocarbons in Leachate	GC/FID	7726200	2021/12/14	2021/12/15	Anna Stuglik-Rolland
Ignitability of a Sample	BAL	7728330	2021/12/15	2021/12/15	Min Yang
TCLP - % Solids	BAL	7721922	2021/12/13	2021/12/14	Jian (Ken) Wang
TCLP - Extraction Fluid		7721946	N/A	2021/12/14	Jian (Ken) Wang
TCLP - Initial and final pH	PH	7721947	N/A	2021/12/14	Jian (Ken) Wang
TCLP Zero Headspace Extraction		7721413	2021/12/13	2021/12/14	Johan Mato

Bureau Veritas ID: RHR625 Dup
Sample ID: IG_BH4_TCLP_WALKOVER_27OCT2021
Matrix: Soil

Collected: 2021/12/04
Shipped:
Received: 2021/12/10

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
CCME F1 Hydrocarbons/BTEX in Leachate	HSGC/MSFD	7726161	2021/12/14	2021/12/14	Georgeta Rusu
CCME F2-F4 Hydrocarbons in Leachate	GC/FID	7726200	2021/12/14	2021/12/15	Anna Stuglik-Rolland
TCLP Zero Headspace Extraction		7721413	2021/12/13	2021/12/14	Johan Mato

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Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	0.0°C

Sample RHR625 [IG_BH4_TCLP_WALKOVER_27OCT2021] : NF/NI=Non Flammable and Non Ignitable

Results relate only to the items tested.

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Bureau Veritas Job #: C1Y4991
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QUALITY ASSURANCE REPORT

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		Leachate Blank	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	Value	UNITS
7726161	Leachable (ZHE) 1,4-Difluorobenzene	2021/12/14	96	70 - 130	98	70 - 130	102	%			104	%
7726161	Leachable (ZHE) 4-Bromofluorobenzene	2021/12/14	115	70 - 130	118	70 - 130	102	%			99	%
7726161	Leachable (ZHE) D10-o-Xylene	2021/12/14	91	70 - 130	90	70 - 130	94	%			97	%
7726161	Leachable (ZHE) D4-1,2-Dichloroethane	2021/12/14	87	70 - 130	85	70 - 130	92	%			94	%
7726200	Leachable o-Terphenyl	2021/12/15	89	60 - 130	94	60 - 130	98	%			94	%
7726161	Leachable (ZHE) Benzene	2021/12/14	96	50 - 140	95	50 - 140	<0.8	ug/L	NC	40	<0.8	ug/L
7726161	Leachable (ZHE) Ethylbenzene	2021/12/14	111	50 - 140	111	50 - 140	<0.8	ug/L	NC	40	<0.8	ug/L
7726161	Leachable (ZHE) F1 (C6-C10) - BTEX	2021/12/14					<1000	ug/L	NC	40	<1000	ug/L
7726161	Leachable (ZHE) F1 (C6-C10)	2021/12/14	92	60 - 140	90	60 - 140	<1000	ug/L	NC	40	<1000	ug/L
7726161	Leachable (ZHE) o-Xylene	2021/12/14	101	50 - 140	99	50 - 140	<0.8	ug/L	NC	40	<0.8	ug/L
7726161	Leachable (ZHE) p+m-Xylene	2021/12/14	116	50 - 140	116	50 - 140	<2	ug/L	NC	40	<2	ug/L
7726161	Leachable (ZHE) Toluene	2021/12/14	98	50 - 140	97	50 - 140	<0.8	ug/L	NC	40	<0.8	ug/L
7726161	Leachable (ZHE) Total Xylenes	2021/12/14					<2	ug/L	NC	40	<2	ug/L
7726200	Leachable F2 (C10-C16 Hydrocarbons)	2021/12/15	65	60 - 130	85	60 - 130	<100	ug/L	NC	40	<100	ug/L
7726200	Leachable F3 (C16-C34 Hydrocarbons)	2021/12/15	93	60 - 130	90	60 - 130	<200	ug/L	NC	40	<200	ug/L
7726200	Leachable F4 (C34-C50 Hydrocarbons)	2021/12/15	84	60 - 130	97	60 - 130	<200	ug/L	NC	40	<200	ug/L
7726200	Leachable Reached Baseline at C50	2021/12/15					YES	ug/L	NC	40	1.0	ug/L

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Leachate Blank: A blank matrix containing all reagents used in the leaching procedure. Used to determine any process contamination.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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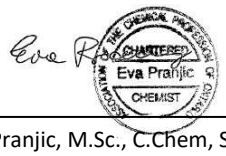
Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15

Golder Associates Ltd
Client Project #: 20253946
Site Location: IGNACE, ON
Your P.O. #: 20253946
Sampler Initials: SH

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

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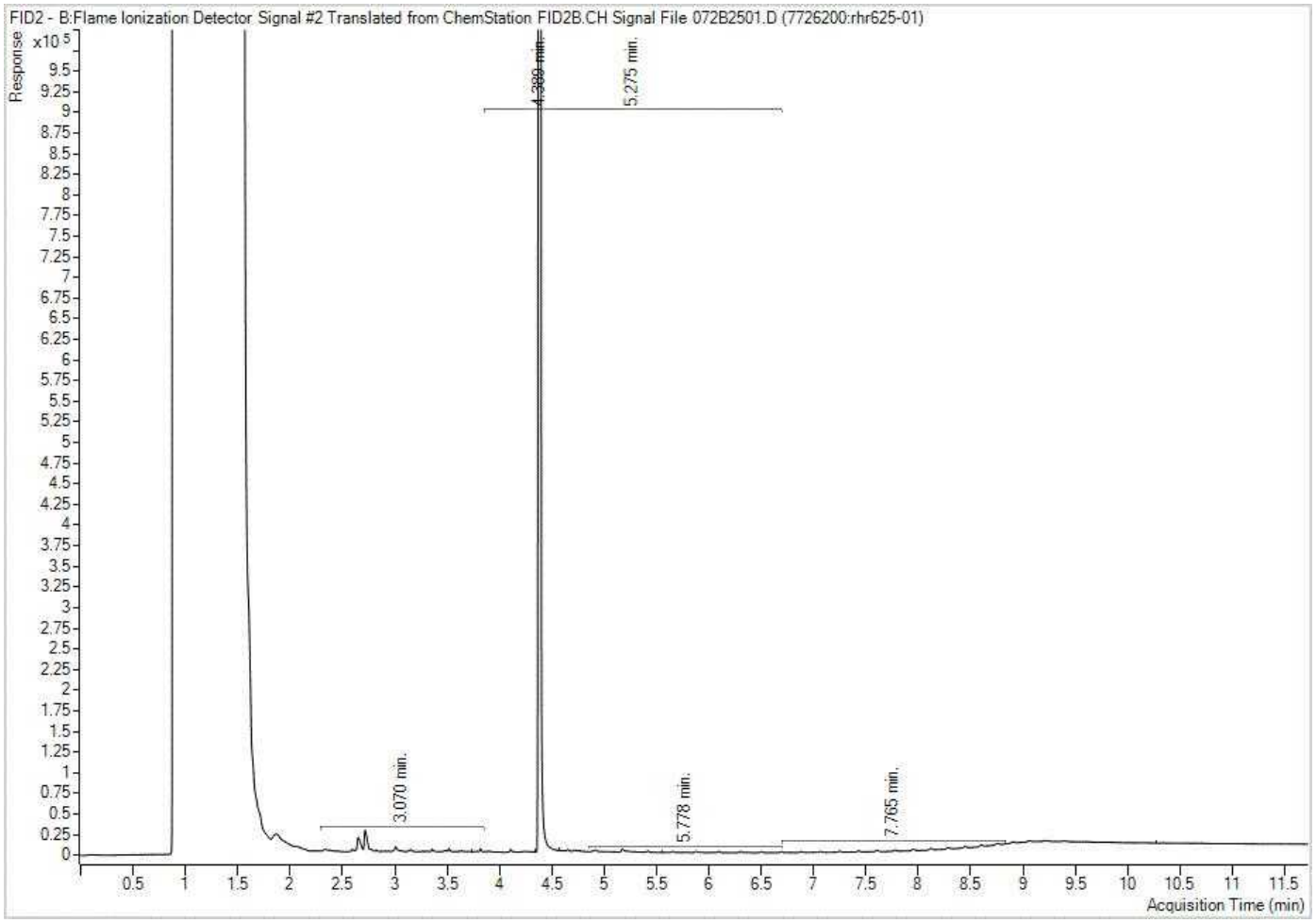
CCME F2-F4 Hydrocarbons in Leachate Chromatogram

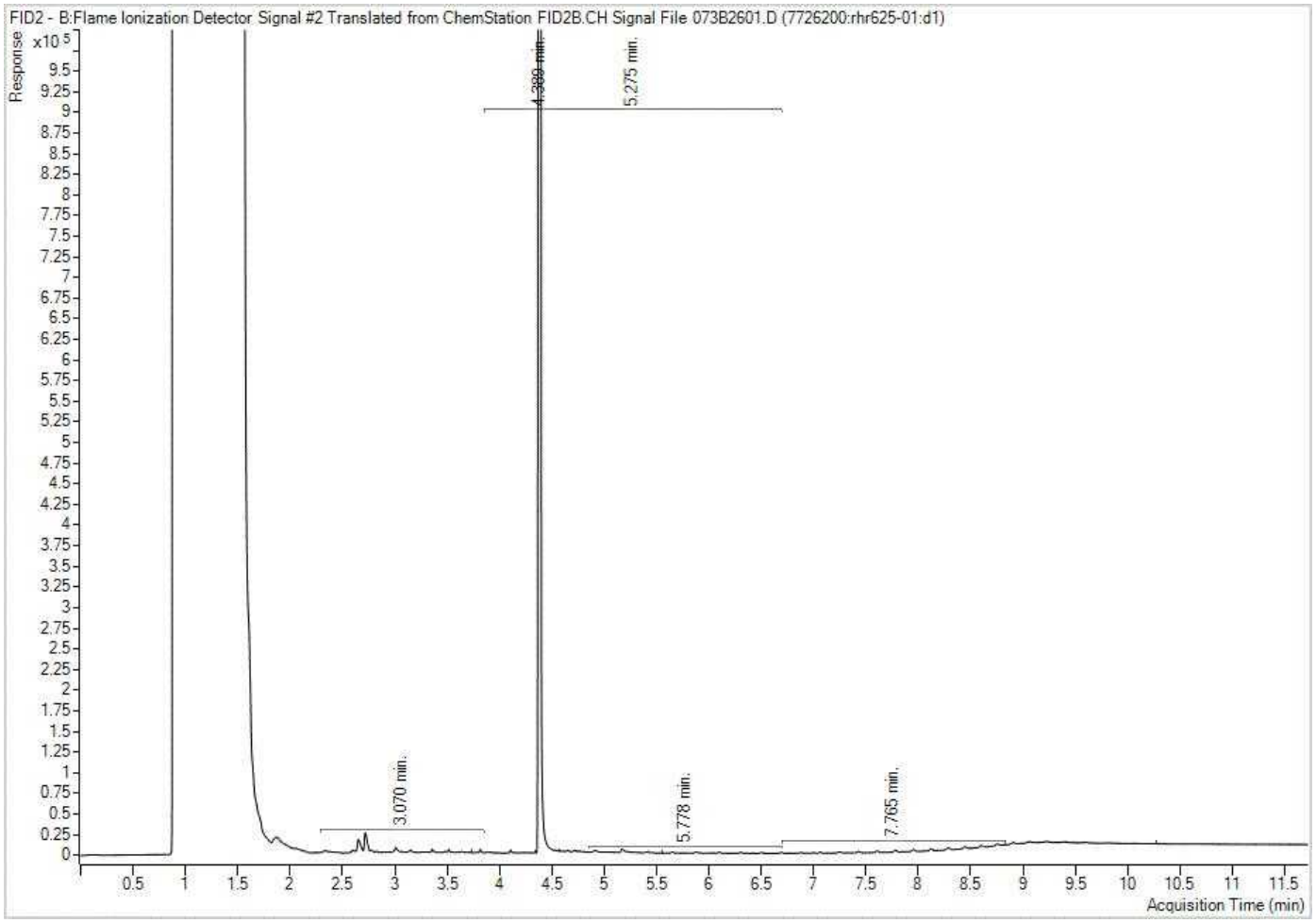


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Bureau Veritas Job #: C1Y4991
Report Date: 2021/12/15
Bureau Veritas Sample: RHR625 Lab-Dup

Golder Associates Ltd
Client Project #: 20253946
Project name: IGNACE, ON
Client ID: IG_BH4_TCLP_WALKOVER_27OCT2021

CCME F2-F4 Hydrocarbons in Leachate Chromatogram



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Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/6

CHAIN OF CUSTODY RECORD

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Golder Associates	Company Name: Golder Associates	Quotation #: NA	[X] Regular TAT (5-7 days) Most analyses
Contact Name: Kyle Matter / George Schneider	Contact Name: Kyle Matter / Shady Hashem	P.O. #/ AFE#: 20253946	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 210 Sheldon Drive, Cambridge, Ontario, Canada N1T 1A8	Address: 210 Sheldon Drive, Cambridge, Ontario, Canada N1T 1A8	Project #: 20253946	Rush TAT (Surcharges will be applied)
Phone: 519 620 1222 Fax:	Phone: 519 620 1222 Fax:	Site Location: Ignace	[ ] 1 Day [ ] 2 Days [ ] 3-4 Days
Email: kyle_matter@golder.com / george_schneider@golder.com	Email: kyle_matter@golder.com / shady_hashem@golder.com	Site #: IG_BH04	Date Required:
MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY		Site Location Province: ____ Ontario	Rush Confirmation #:
		Sampled By: Shady Hashem	

Regulation 153	Other Regulations
[ ] Table 1 [C] Res/Park [ ] Med/ Fine	[ ] CCME [ ] Sanitary Sewer Bylaw
[X] Table 2 [ ] Ind/Comm [X] Coarse	[ ] MISA [ ] Storm Sewer Bylaw
[ ] Table 3 [ ] Agri/ Other	[ ] PWQO Region ____
[ ] Table ____	[ ] Other (Specify) ____
FOR RSC (PLEASE CIRCLE) Y / N	[ ] REG 558 (MIN. 3 DAY TAT REQUIRED)
	[ ] REG 406 Table ____

Include Criteria on Certificate of Analysis: Yes

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	TCLP PHC1-PHC4	TCLP BTEX	TCLP Ignitability												HOLD- DO NOT ANALYZE	COMMENTS
1	IG_BH4_TCLP_walkover_27oct2021	2021-12-04	16:00	Soil	4	X	X	X													
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
		0/0

COOLING MEDIA PRESENT: Y / N

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Shady Hashem	2021/12/05	08:00	VI TRINH	2021/12/10	08:54
Shady Hashem	2021/12/06	1200	VI TRINH	2021/12/10	08:54

10-Dec-21 08:54
Ema Gitej
C1Y4991

DSG ENV 1723

APPENDIX C

IG_BH04 As-Built Survey Letter

RUGGED GEOMATICS
ONTARIO LAND SURVEYORS

2021 10 28

Kyle Matter
Construction Project Manager
Golder Associates Ltd.
6925 Century Avenue
Suite 100
Mississauga, Ontario
L5N 7K2

Dear Mr. Matter;

RE: As-built Survey
Borehole IG_BH04
Nuclear Waste Management Organization
Dyment Site
Our File No. SK18128

Below please find the UTM Zone 15 Coordinate and geodetic elevations(CGVD28 Datum) for the top of the borehole casing. The coordinate for a ground shot in close proximity to the drill hole is also included.

Point	Easting	Northing	Elevation	code
201	556958.02	5486487.73	444.29	ground
206	556957.84	5486487.88	444.67	bh-top

Thanking you for the opportunity to be of service, I remain

Yours Very Truly,

Eric Rody, B.Sc., OLS, CLS

Unit 3, 619 Ninth Street North, Kenora, Ont. P9N 2S9
T: 1+807.464.3677

APPENDIX D

IG_BH04 Site Decommissioning Checklist

BOREHOLE: IG_BH04 (Rev2a)

Item No.	Item	General Requirements	Date Completed	Checked by	Approved by	Comments
1.0	**SITE PREPARATION**					
1.1	Drill pad	Drill pad cleaned of debris and adequately graded.	20211027	Darwin Villeneuve	K Matter	Initially completed by PB on 2021-08-20. Walkover with NWMO completed by DV on 2021-10-27 after IG_BH05 WP12 activities were completed.
1.3	General site levelling	General site cleaned of debris and adequately graded.	20211027	Darwin Villeneuve	K Matter	
1.4	General Site Condition	Site is free of oil sheens and staining.	20211027	Darwin Villeneuve	K Matter	
2.0	**FENCING**					
2.1	Silt fencing	Silt fencing remains in place.	20210820	P Bureau	K Matter	
2.2	Snow fencing	Snow fencing remains in place.	N/A	N/A	N/A	
2.3	Modulok security fencing	Security fencing dismantled and removed from site.	20210811	P Bureau	K Matter	Moved to IG_BH06
3.0	**OFFICE TRAILERS**					
3.1	Trailer 1 (Golder)	Trailer removed from site.	20210816	P Bureau	K Matter	Moved to IG_BH06
3.2	Trailer 2 (NWMO)	Trailer removed from site.	20210816	P Bureau	K Matter	Moved to IG_BH06
3.3	Trailer 3 (Rodren)	Trailer removed from site.	20210816	P Bureau	K Matter	Moved to IG_BH06
4.0	**CORE LOGGING AND STORAGE**					
4.1	Core Logging Shipping Container	Core Logging Shipping Container removed from site.	20210816	P Bureau	K Matter	Moved to IG_BH05
4.2	Core Logging Table	Core logging table put away for storage.	N/A	N/A	N/A	No tables at IG_BH04
4.3	Camera Racking	Camera tracking put away for storage.	N/A	N/A	N/A	No cameras tracking at IG_BH04
4.4	Core Storage Shipping container	Core storage shipping container removed from site.	20210816	P Bureau	K Matter	Moved to IG_BH06
4.5	Commercial Refrigerator	Refrigerators removed from site.	20210816	P Bureau	K Matter	Moved to IG_BH06
5.0	**COMMUNICATIONS**					
5.1	Satellite phone	Satellite phone removed from site.	N/A	N/A	N/A	
5.2	Cellular internet	Cellular Internet Wi-Fi network removed from site.	20210811	P Bureau	K Matter	Moved to IG_BH06
6.0	**GENERATOR**					
6.1	Generator	Generator removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06
6.2	Secondary containment	Secondary spill containment removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06

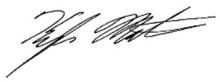
Item No.	Item	General Requirements	Date Completed	Checked by	Approved by	Comments
6.3	Power distribution	Power distribution cables and panels removed from site.	20210811	P Bureau	K Matter	Moved to IG_BH06
7.0	**LIGHT TOWERS**					
7.1	Light Tower	All light towers removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06
7.2	Secondary containment	All secondary spill containments for light towers removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06
8.0	**FUEL STORAGE**					
8.1	Fuel tank	Fuel Tank removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06
8.2	Secondary containment	Secondary spill containment removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06
8.3	Protective barricade	Protective barricades removed from site.	20210813	P Bureau	K Matter	Moved to IG_BH06
9.0	**SANITARY FACILITIES**					
9.1	Washroom	Washroom removed from site.	20210820	P Bureau	K Matter	Moved to IG_BH06
9.2	Water tank	Water tank removed from site.	N/A	P Bureau	K Matter	1 unit with washroom
9.3	Septic tank	Septic tank removed from site.	N/A	P Bureau	K Matter	1 unit with washroom
9.3	Temporary Washroom Facilities	Temporary washroom facilities removed from site.	20210822	P Bureau	K Matter	OFF site
10.0	**GARBAGE BINS**					
10.1	Garbage Bin	Garbage bin removed from site.	20210820	P Bureau	K Matter	
10.2	Recycling Bin	Recycle bin removed from site.	N/A	P Bureau	K Matter	No recycling on site, 2 garbage bins.
11.0	**WELL HEAD**					
11.1	Well Head Survey	Well head casing reference and Westbay casing is surveyed to benchmark.	20210909	F Ansari	K Matter	Inner and outer casing surveyed, along with top of cap and ground elevation. Sept 09, 2021.
11.2	Well Head Security	Well head protective casing is installed, painted for visibility, and locked for security.	20210905	F Ansari	K Matter	Surfacing casing welded on Sept 05, 2021
12.0	**OTHER**					
12.1	Post-Thaw Site Condition	Post-thaw inspection for garbage and debris.	N/A	N/A	N/A	Pre-thaw inspection completed on October 27, 2021 with the NWMO.

Checked by: 

Farid Ansari, WP01 Site Supervisor

2021-09-09

Date:

Approved by: 

Kyle Matter, WP01 Lead

2022-01-24

Date:

golder.com