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

WP01 Commissioning Report - Site Infrastructure Setup for IG_BH05

APM-REP-01332-0294 **September 2021**

Golder Associates Ltd.

nwmo
NUCLEAR WASTE MANAGEMENT ORGANIZATION
SOCIÉTÉ DE GESTION DES DÉCHETS NUCLÉAIRES

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GOLDER
MEMBER OF WSP

REPORT

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

WP01 Commissioning Report - Site Infrastructure Setup for IG_BH05

Submitted to:

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September 17, 2021

Distribution List

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WP01 COMMISSIONING REPORT
SITE INFRASTRUCTURE SETUP FOR IG_BH05

CLIENT INFORMATION

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Project Number: 20253946

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RR	1	SH	KM	GWS	September 8, 2021	RR = Revised draft released for review and comment
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Issue Codes: RR = Released for Review and Comments, RI = Released for Information

SIGNATURES

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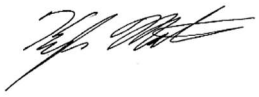
Reviewed by: 

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WP01 Work Package Lead

Approved by: 

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1.0 BACKGROUND

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 NWMO's Adaptive Phased Management (APM) 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 (PRA). The work comprises a total of eleven work packages and is being carried out by a team led by Golder Associates Ltd. (Golder) on behalf of the NWMO. The overall program at IG_BH05 is described in the Borehole Characterization Plan (BCP) for IG_BH05 (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.

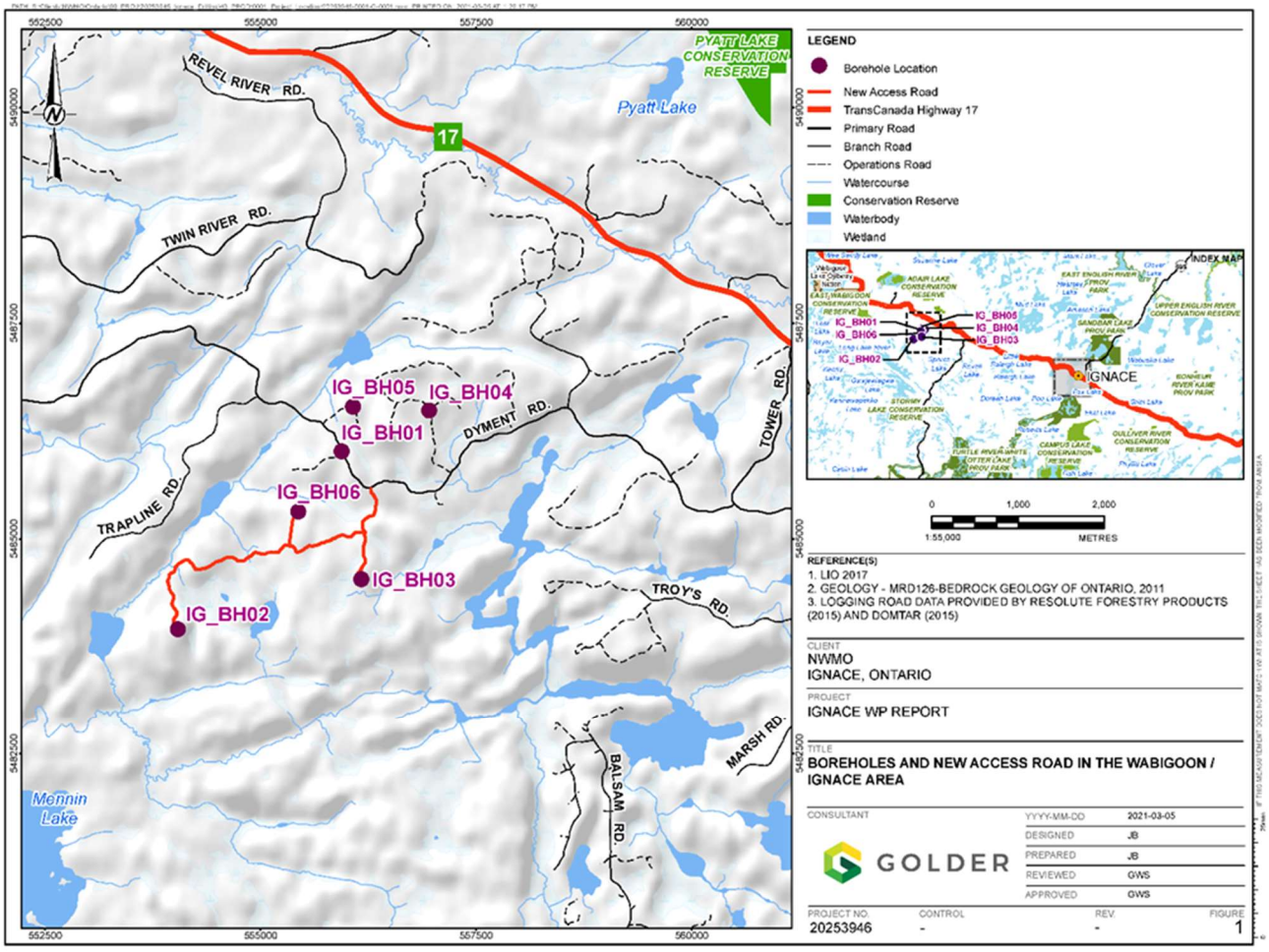


Figure 1 - The Ignace area – access roads and drill sites for IG_BH04, IG_BH05 and IG_BH06

2.0 OBJECTIVES

This report describes the site commissioning activities at borehole IG_BH05. Site commissioning activities included the setup of security fencing, office trailers, washrooms, fuel storage, light towers, shipping containers, a drill rig, site communications, and electrical distribution systems.

As stated in Work Package 01 (WP01) Test Plan - Site Infrastructure for IG_BH04/05/06 (Golder 2021b - Document No. APM-PLAN-01332-0373), a site commissioning technical report is to be submitted for each of the drill sites to document the preparation and setup of site infrastructure. Details regarding the site services, electrical configuration, and as-built data are provided within this report.

3.0 SITE HISTORY

Construction of the drill pad for IG_BH05 including clearing and grubbing, the placement of silt fencing, ditching, placement of a granular base, grading and compaction of the site was previously completed under a separate contract to the NWMO in October 2019. The site remained vacant under third party care, custody and control from October 3, 2019 until NWMO accepted the care, custody and control on March 31, 2021.

On April 1, 2021, a WP01 kickoff meeting and site inspection was conducted with representatives from the NWMO, Wabigoon Lake Ojibway Nation (WLON), Golder, and Rodren Drilling Ltd. (Rodren). The purpose of the site inspection was to identify current site conditions, and to allow for planning of the site setup. During the site inspection, the following was determined:

- The drill pad base was constructed of material descripted to be Granular “A” and was noted to be solid and stable.
- This site had a large, elevated drill pad raised about 0.3 m above the surrounding site grade – the edge of the pad was an abrupt ledge with a 1:1 slope. It was noted that this ledge would be problematic for access and the placement of infrastructure and it would need to be removed.
- No signs of staining or impacts to the granular material were observed anywhere on the site.
- The silt fence needed repair / replacement, particularly the north corner, which was the low spot for drainage off the site.

On April 22, 2021 prior to mobilization, Golder collected three environmental samples at three different locations to document baseline conditions of the site. The sample locations were communicated to the NWMO on April 16, 2021 before collection and included the planned parking area, the previous existing access trail, and the center of the drill pad. A Garmin eTrex® 20 (Unit ID 3879254005) device was used to measure the location coordinates which has an accuracy of ±1.0 metre.

The samples were analysed for the following:

- Benzene, toluene, ethylbenzene, and xylene (BTEX)
- Petroleum Hydrocarbons (PHCs) – Fraction 1 (F1)
- Petroleum Hydrocarbons (PHCs) – Fractions 2-4 (F2-4)
- Ontario Regulation (O.Reg.) 153/04 Metals (Province of Ontario, 1990)

The details of the IG_BH05 baseline samples are summarized in Table 1 below.

Table 1 - IG_BH05 Baseline samples summary

Sample ID	Description of Area	Coordinates (UTM Zone 15N)	Analysis
IG_BH05_Parking_Lot	Parking lot	556041 N, 5486538 E	BTEX/PHCs F1
IG_BH05_Access_Road	End of access road at the pad entrance	556227 N, 5486522 E	PHCs F2-F4
IG_BH05_Pad	Center of drilling pad	556064 N, 5486535 E	O.Reg. 153/04 Metals

Analytical results for the three samples collected are provided in Appendix A. No BTEX or PHCs were detected in any of the three fill samples. The O.Reg. 153/04 metal results did not indicate the presence of contaminants, but all three samples were consistently elevated in copper and cobalt relative to the Ontario Ministry of the Environment, Conservation and Parks (MECP) Table 1 Background, which Golder interprets to be naturally occurring in the crushed rock fill material.

On April 24, 2021 Golder accepted care, custody, and control of the site from NWMO for the proposed work.

4.0 SITE PREPARATION AND SETUP

This section provides a summary of the site infrastructure setup for IG_BH05. Photographs of the IG_BH05 site taken during site setup and commissioning are provided in Appendix B; an aerial view of the as-built site setup is provided in Appendix C; and the Site Commissioning Checklist for IG_BH05 is provided in Appendix D.

4.1 Grading the Drill Pad Area

On April 23, 2021, Ricci's Trucking graded out the 0.3 m ledge surrounding the drill pad area at a slope of 10:1. (Appendix B, Photo 1). The work was conducted as a scope change to the project under Golder supervision.

4.2 Silt Fence Repair

On May 6 and 7, 2021, Ricci's Trucking repaired the silt fence around IG_BH05 work site. The work was conducted as a scope change to the project under Golder supervision.

4.3 Security Fencing

Approximately 220 m (704') of 2.1 m (8") tall fencing was installed around the perimeter of the site to define the work area, provide security, and to discourage wildlife from entering the site. A lockable gate was installed on the west side of the site, to allow worker access to the site from the parking lot. (Appendix B, Photo 2).

In addition to the perimeter fencing, approximately 70 m (230') of 1.8 m (6") tall fencing was installed around the drill rig area to define an exclusion zone. (Appendix B, Photo 3).

Safety signage was installed at the entrances to site, and at defined areas such as the muster station, no-smoking areas, and designated smoking areas. The safety signage posted at the entrance gate is shown in Appendix B, Photo 4.

4.4 Temporary Site Infrastructure and Facilities

An aerial image showing the as-built site layout, along with with a listing of the main site infrastructure elements, is provided in Appendix C.

4.4.1 Office Trailers

A 12 x 3m (40 x 10') mobile office trailer was set up on the north side of the site and two 9.75 x 3m (32 x 10') 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. The office trailers were heated and air conditioned, had electrical power, cellular communication, and internet service via the local cellular network (Appendix B, Photo 5).

4.4.2 Seacans for Technical Workers

Two 12 x 2.5 m (40' x 8') modified shipping containers (seacans) were placed at the east corner of site near the drill rig and functioned as a working space for the all the work package activities. The seacans were modified with doors, insulation, electrical power, heating, and air conditioning (Appendix B, Photo 6). Internet communication was provided to the seacans through a Wi-Fi repeater which was connected to the cellular internet system mounted on the light tower located at the east corner of the time that helped in boosting the internet speed. The seacans were used as working, office, and laboratory space, and for the storage of equipment and samples. One seacan was designated as the WP03 Core Logging Seacan (Core Logging Seacan) and the other was designated as the WP02 Core Storage Seacan (Core Storage Seacan).

Two custom built core photography systems were set up in the seacan designated at the Core Logging Seacan and consist of aluminum frames with suspended cameras for taking core photos (Appendix B, Photo 7). Refrigeration for water samples and select drill core samples was provided by two refrigerators located in the Core Storage Seacan. The refrigeration system was used for temporary sample storage until the samples could be shipped off site to the appropriate laboratories or archives. (Appendix B Photo 8).

An additional 6 x 2.5m (20' x 8') seacan was set up at the south corner of site for general equipment storage, but was not equipped with power, heat, or air conditioning.

4.4.3 Drilling Facilities

Prior to arrival of the drill rig on site, the drill pad was set up with a secondary containment system which was constructed on site to capture any drill fluid spills that could potentially occur at the drill or drill fluid circulation system (Appendix B, Photo 9). The drill pad was graded to slope into the central sump location followed by placing a sand layer approximately 0.10 to 0.15 m (4" to 6") in depth below the location of the secondary containment system to prevent any potential punctures (Appendix B, Photo 10). The containment liner was sealed to the outer casing of the borehole to prevent leaks through the. Wooden rig mats were placed overtop of the drill pad area, to provide a level and solid foundation for the drill rig infrastructure. (Appendix B, Photo 11).

Any drill fluid spills that occurred on the drill pad could be collected in the central sump and then pumped into a wastewater storage tank, as required. The secondary containment system provided approximately 225 m^2 (2,420 ft^2) of lateral coverage, large enough to encompass the footprint of the drill rig, the Australian Mud Company (AMC) Solids Removal Unit (SRU) centrifuge, the core extraction shack, the wastewater tank, and the fluorescein tank. The wastewater and fluorescein tanks were stored in a 6 x 2.5 m (20 x 8') seacan.

The secondary containment system was primarily intended for collecting spills of drill fluid or fluorescein traced water and was not intended to provide primary containment for potential spills of hazardous materials such as oils or fuels. Hazardous materials such as oil and fuel were placed within their own secondary containment.

Upon the completion of the secondary containment, a steel drill water sump was welded to the outer casing of the borehole collar to capture drill fluid as it exited the borehole during drilling and testing.

The drill rig was a rotary EF-100 manufactured by Discovery Drill Manufacturer (DDM) Ltd. (Appendix B, Photo 12). The drill was positioned over the proposed borehole location at a dip of -70° from horizontal and azimuth of 220° (Appendix B, Photo 13).

Items inside the drill rig area included the drill rig, drill rods and tooling, the wastewater and fluorescein tanks seacan, centrifuge unit, core extraction shack, and drill cuttings storage. The drill rig area was also used for storage of drilling supplies.

Drill water was stored in two 28,350 litre (7,500 US gallon) Baker tanks located on the west side of the site (Appendix B, Photo 14). The Baker tanks were initially filled with fresh water sourced from the Township of Ignace municipal supply. One tank (primary tank) was primarily dedicated to receiving the source water, while the other (secondary tank) was primarily dedicated to the storage of fluorescein traced drill water.

4.4.4 Washrooms

During the setup of the site facilities, two temporary portable toilets were provided for use by site workers. A heated and self-contained washroom trailer was later delivered to site once the electrical distribution system was operational. The washroom trailer was divided into two units with separate entrances, each containing one toilet and one sink. The washrooms were serviced for water and waste once a week and cleaned twice per week (Appendix B, Photo 15).

4.4.5 Site Communications

A Uniden cellular signal booster 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, initially located in the Golder office trailer and the Core Logging Seacan respectively. Later in the drilling and logging operations, the turbo hub cellular internet receiver located in the core logging seacan was placed on the top of the light tower for faster internet speed The Turbo Hub located in Golder's office trailer was shared between the Golder, NWMO/WLON and Rodren workers through Wi-Fi repeater located in NWMO/WLON office trailer, while the second Turbo Hub was dedicated to the core logging activities. The signal strength was generally good to excellent, with the nearest communication tower located about 6.6 km south-east of the site and the use of a cellular booster to further improve the signal. In the event of failure of cellular service, emergency communication was still possible using a Garmin In-Reach SE satellite messaging device, located in the Golder office trailer.

5.0 POWER SUPPLY AND DISTRIBUTION

5.1 Power Generation

5.1.1 Electrical Generator

The site was powered by Cummins mobile diesel generator (model C60D6R) generator, which supplied 40.2 kW of 120 V single-phase output. It was used to power the site office trailers, core logging and storage seacans, washroom trailer, and a portable power system on the drill pad. The location of the generator was chosen to minimize the length of electrical distribution cables, to protect the generator from vehicular traffic, and to allow for access by truck if the generator required repairs or replacement. The generator was placed inside a secondary containment berm with a containment capacity of 4800 L (1265 US gallons), sufficient to contain approximately six times the amount of fuel and oil in the system.

An electrical load analysis (ELA) was conducted by Fediuk for the IG_BH05 site set-up. The main purpose of an ELA is to estimate the system capacity needed to supply the worst-case combinations of electrical loads. This was achieved by evaluating the average and maximum demands under all the applicable site conditions. The summary results of the ELA were used to determine the adequacy of the power sources under normal and maximum conditions. Fediuk applied a 10% contingency factor to the maximum electrical load calculated in the ELA and the resulting electrical load requirement was compared to the capacity of the generator. The result indicated that the generator would meet the ELA requirements while running at approximately 80% of its rated capacity. This calculation was conducted after the site setup to ensure that the site would not experience delays due to a power outage as a result of power overload.

The generator is shown in Appendix B, Photo 16.

5.1.2 Fuel Supply

One 4,500 L (1,190 US gallon) double-walled fuel storage tank was located adjacent to the generator, so that refueling of the generator can be performed directly from the fuel storage tank. Another 4,500 L double-walled fuel storage tank was placed near the drill rig area which was used to fuel the drill rig and centrifuge. The fuel tank was placed inside a secondary containment berm with a containment capacity of 5,460 L (1,440 US gallons), sufficient to contain the maximum amount of fuel and oil in the system plus a contingency factor of approximately 20%. The fuel tanks were surrounded by concrete barricades to protect them from vehicular traffic and heavy machinery.

The fuel storage tank is shown in Appendix B, Photo 17.

5.2 Power Distribution

Set up of the electrical distribution system from the generator to the site facilities was performed by Fediuk Electric (Fediuk) under the direction of Justin Fediuk, Master Electrician License #6002843. Power was distributed to the site facilities via double jacketed electrical cables. Most of the power lines were mounted to the site perimeter fencing. In areas where the electrical cables pass through a trafficable area, they were buried underground inside an ABS conduit at 1.0 m depth (3 feet)

A typical trench and conduit are shown in Appendix B, Photo 18.

5.3 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. The light towers were positioned to allow for an even distribution of light. The light tower placement also considered: ground stability, level of activity in the area, and the ability to access the light towers by truck for refueling or repairs. The light towers were all placed within their own secondary spill containment. The containments were sized so that the entire light tower footprint would be within containment. The containment capacities of 2,800 L (740 US Gallons) and 1,150 L (304 US Gallons) exceeded the maximum volume of fuel and oil within the light towers of 180 L (47.5 US Gallons).

A light tower in secondary containment is shown in Appendix B, Photo 19.

5.4 Ground Fault Protection

Exterior power outlets on the office trailers, and outlets located inside the washrooms were outfitted with ground fault circuit interrupters (GFCI). Additional protection was also provided to workers through the use of portable GFCI power bars, which were installed inside office trailers or seacans if testing activities created wet conditions inside the trailers.

5.5 Power Generation at the Rig Area

The drill rig and the centrifuge unit were both diesel-powered units, fueled, monitored, and maintained by Rodren. The main site electrical distribution system provided power at the drill rig area via six GFCI outlets, for use during testing activities.

5.6 Electrical Safety Authority (ESA)

The Electrical Safety Authority (ESA) inspected the electrical installation at IG_BH05 on May 19, 2021 to ensure that the work was in accordance with the requirements of the Ontario Electrical Safety Code.

Items inspected by the ESA include the following:

1. Construction Trailers x5
2. Outlets and Other Devices x3
    a. Receptacles x3
3. LV Distribution Equipment x1
    a. Panel board, 200 AMPS

The ESA certified that the electrical installation was acceptable and provided a Certificate of Acceptance (notification number 17069022) to Fediuk on June 08, 2021.

The ESA Certificate of Acceptance was provided to Golder on June 13, 2021 and is attached in Appendix E.

6.0 HEALTH AND SAFETY EQUIPMENT

6.1 Health And Safety Equipment

Health and safety equipment at site included signage posted at the entrance to site which identified restricted areas, the site muster point, non-smoking areas, designated smoking areas, and PPE requirements. Personal protective equipment such as hard hats, hearing and eye protection, gloves, and high visibility clothing were available from Golder for workers and visitors if they had not arrived with the required equipment.

Emergency response equipment was also provided around site. Eye wash stations were provided in site offices and work areas. First aid kits were provided in each of the site offices and work areas. Fire extinguishers were located at fuel storage tanks, washrooms, smoking area, main power generator and fuel tanks, core storage seacans, site offices, and proximal to light towers and other fuel burning equipment. Eye wash stations, first aid kits, and fire extinguishers were maintained and inspected as part of regular site operations.

6.2 COVID – 19 Prevention and Mitigation Measures

As per Golder's COVID-19 Safe Work Method Statement (Golder 2021c), the site was supplied with non-medical face masks, disinfecting spray, hand sanitizer, paper towels, and disposable gloves for all the site workers and vistors, and were distributed across site in all work areas.

Work stations in all the site trailers and core storages were equipped with hand sanitizer dispensers, disinfecting sprays and paper towels, and workers were required to disinfect their work areas at the begining and the end of their shift. Signs were posted on building entrances indicating the maximum occupancy for that area. COVID-19 information and protocols were posted in site trailers and seacans to remind workers of requirements.

7.0 WASTE AND CHEMICAL STORAGE

7.1 Solid Waste (Non-Hazardous)

Non-hazardous 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 bins were sourced by B&M Deliveries of Dryden, Ontario, and waste material was transported by B&M Deliveries to the Dryden Landfill Site, located southwest of Dryden, Ontario (Appendix B, Photo 20).

7.2 Spill Response

Two petroleum hydrocarbons spill kits (359 L each) were placed beside the site fuel supply and generator, and a universal spill kit was set up near the drill rig area. Two bins full of sawdust were also placed by the washroom trailer as for use in a spill response. Four additional portable spill kits were placed in Golder's site trailer and storage seacans for fast spill response, if required (Appendix B, Photo 21). It is the Golder Site Supervisor's responsibility to arrange for the disposal of contaminated material in accordance with Provincial Environmental Protection Act.

7.3 Hazardous Chemical Storage

Hazardous chemicals were primarily stored in two locations. All hazardous products associated with the operation of the drill rig including engine oil, hydraulic oil, and flocculants were stored in the drilling area, inside secondary containment. All products associated with water testing were stored in the WP03 work seacan. Minor consumer quantities of cleaning supplies were also stored in the site offices and washrooms. Copies of all Safety Data Sheets (SDS) for hazardous materials were kept on site in the Golder office trailer, and where applicable, copies also kept directly with the products for quick reference.

7.4 Hazardous Solid Waste Disposal

Hazardous solid wastes such as hydraulic oil, engine oil, and flocculants were stored in their own secondary containment as described in section 7.3. When equipment servicing was required, these hazardous wastes were removed from site by the subcontracted mechanic and disposed of properly off-site.

Hazardous cleaning products were either consumed at site or removed by the subcontracted cleaning staff.

8.0 SUMMARY

This report describes the site preparation and setup for IG_BH05 including field offices, power, utilities communications systems, health and safety equipment, and perimeter fencing. The site setup for IG_BH05 was completed on May 8, 2021, with a formal inspection and commissioning by Golder on May 8, 2021 (Appendix D, IG_BH05 Site Commissioning Check List).

9.0 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_BH05 (NWMO Document: APM-PLAN-01332-0274), April 2021.

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

Golder, 2021c. COVID-19 Safe Work Method Statement – Appendix G. Found in: Phase 2 Initial Borehole Drilling and Testing at IG_BH04/05/06, Ignace Area, Health, Safety, Security and Environment Plan, (NWMO Document: APM-PLAN-01332-0372), March 2021.

Province of Ontario, 1990. Ontario Regulation 153/04: RECORDS OF SITE CONDITION, Environmental Protection Act - R.R.O. 1990-

APPENDIX A

IG_BH05 Confirmatory Sample Results

Your Project #: 20253946 (5011) (10)
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: 2021/05/05
Report #: R6621864
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1B2800
Received: 2021/04/28, 09:05

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron	3	2021/05/03	2021/05/03	CAM SOP-00408	R153 Ana. Prot. 2011
Hexavalent Chromium in Soil by IC (1)	3	2021/05/03	2021/05/04	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	2	N/A	2021/05/03	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	1	N/A	2021/05/04	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (3)	3	2021/05/03	2021/05/04	CAM SOP-00316	CCME CWS m
Acid Extractable Metals by ICPMS	3	2021/05/03	2021/05/04	CAM SOP-00447	EPA 6020B m
Moisture	3	N/A	2021/04/30	CAM SOP-00445	Carter 2nd ed 51.2 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.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
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) Soils are reported on a dry weight basis unless otherwise specified.
(2) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(3) 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

Your Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Your C.O.C. #: NA

Attention: George Schneider

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

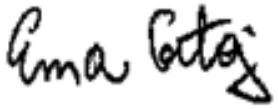
Report Date: 2021/05/05
Report #: R6621864
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C1B2800
Received: 2021/04/28, 09:05

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 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Encryption Key



Ema Gitej
Senior Project Manager
05 May 2021 18:10:38

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

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

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1B2800
Report Date: 2021/05/05

Golder Associates Ltd
Client Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Sampler Initials: SH

O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		PKV970	PKV971	PKV972		
Sampling Date		2021/04/22 14:00	2021/04/22 14:00	2021/04/22 14:00		
COC Number		NA	NA	NA		
	UNITS	IG_BH05_POD	IG_BH05_ACESS_ROAD	IG_BH05_PARKING_LOT	RDL	QC Batch
Inorganics						
Chromium (VI)	ug/g	<0.18	<0.18	<0.18	0.18	7330254
Metals						
Hot Water Ext. Boron (B)	ug/g	<0.050	<0.050	<0.050	0.050	7330383
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	<0.20	0.20	7330628
Acid Extractable Arsenic (As)	ug/g	5.4	7.3	4.6	1.0	7330628
Acid Extractable Barium (Ba)	ug/g	21	19	17	0.50	7330628
Acid Extractable Beryllium (Be)	ug/g	<0.20	<0.20	<0.20	0.20	7330628
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	<5.0	5.0	7330628
Acid Extractable Cadmium (Cd)	ug/g	0.14	0.14	0.18	0.10	7330628
Acid Extractable Chromium (Cr)	ug/g	33	35	36	1.0	7330628
Acid Extractable Cobalt (Co)	ug/g	22	25	26	0.10	7330628
Acid Extractable Copper (Cu)	ug/g	130	170	160	0.50	7330628
Acid Extractable Lead (Pb)	ug/g	1.3	1.2	1.3	1.0	7330628
Acid Extractable Molybdenum (Mo)	ug/g	1.5	1.3	1.1	0.50	7330628
Acid Extractable Nickel (Ni)	ug/g	27	31	33	0.50	7330628
Acid Extractable Selenium (Se)	ug/g	<0.50	0.63	0.66	0.50	7330628
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	0.20	7330628
Acid Extractable Thallium (Tl)	ug/g	<0.050	<0.050	<0.050	0.050	7330628
Acid Extractable Uranium (U)	ug/g	0.17	0.15	0.17	0.050	7330628
Acid Extractable Vanadium (V)	ug/g	69	73	78	5.0	7330628
Acid Extractable Zinc (Zn)	ug/g	45	46	49	5.0	7330628
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	0.050	7330628

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1B2800
Report Date: 2021/05/05

Golder Associates Ltd
Client Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Sampler Initials: SH

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

BV Labs ID		PKV970			PKV970			PKV971		
Sampling Date		2021/04/22 14:00			2021/04/22 14:00			2021/04/22 14:00		
COC Number		NA			NA			NA		
	UNITS	IG_BH05_POD	RDL	QC Batch	IG_BH05_POD Lab-Dup	RDL	QC Batch	IG_BH05_ACESS_ROAD	RDL	QC Batch
Inorganics										
Moisture	%	3.6	1.0	7327819				3.4	1.0	7327819
BTEX & F1 Hydrocarbons										
Benzene	ug/g	<0.020	0.020	7330400	<0.020	0.020	7330400	<0.020	0.020	7330400
Toluene	ug/g	<0.020	0.020	7330400	<0.020	0.020	7330400	<0.020	0.020	7330400
Ethylbenzene	ug/g	<0.020	0.020	7330400	<0.020	0.020	7330400	<0.020	0.020	7330400
o-Xylene	ug/g	<0.020	0.020	7330400	<0.020	0.020	7330400	<0.020	0.020	7330400
p+m-Xylene	ug/g	<0.040	0.040	7330400	<0.040	0.040	7330400	<0.040	0.040	7330400
Total Xylenes	ug/g	<0.040	0.040	7330400	<0.040	0.040	7330400	<0.040	0.040	7330400
F1 (C6-C10)	ug/g	<10	10	7330400	<10	10	7330400	<10	10	7330400
F1 (C6-C10) - BTEX	ug/g	<10	10	7330400	<10	10	7330400	<10	10	7330400
F2-F4 Hydrocarbons										
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	7330539				<10	10	7330539
F3 (C16-C34 Hydrocarbons)	ug/g	<50	50	7330539				<50	50	7330539
F4 (C34-C50 Hydrocarbons)	ug/g	<50	50	7330539				<50	50	7330539
Reached Baseline at C50	ug/g	Yes		7330539				Yes		7330539
Surrogate Recovery (%)										
1,4-Difluorobenzene	%	101		7330400	100		7330400	101		7330400
4-Bromofluorobenzene	%	91		7330400	95		7330400	90		7330400
D10-o-Xylene	%	85		7330400	83		7330400	80		7330400
D4-1,2-Dichloroethane	%	97		7330400	103		7330400	101		7330400
o-Terphenyl	%	94		7330539				94		7330539

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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BV Labs Job #: C1B2800
Report Date: 2021/05/05

Golder Associates Ltd
Client Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Sampler Initials: SH

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

BV Labs ID		PKV972		
Sampling Date		2021/04/22 14:00		
COC Number		NA		
	UNITS	IG_BH05_PARKING_LOT	RDL	QC Batch
Inorganics				
Moisture	%	3.7	1.0	7327819
BTEX & F1 Hydrocarbons				
Benzene	ug/g	<0.020	0.020	7330400
Toluene	ug/g	<0.020	0.020	7330400
Ethylbenzene	ug/g	<0.020	0.020	7330400
o-Xylene	ug/g	<0.020	0.020	7330400
p+m-Xylene	ug/g	<0.040	0.040	7330400
Total Xylenes	ug/g	<0.040	0.040	7330400
F1 (C6-C10)	ug/g	<10	10	7330400
F1 (C6-C10) - BTEX	ug/g	<10	10	7330400
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	7330539
F3 (C16-C34 Hydrocarbons)	ug/g	<50	50	7330539
F4 (C34-C50 Hydrocarbons)	ug/g	<50	50	7330539
Reached Baseline at C50	ug/g	Yes		7330539
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	101		7330400
4-Bromofluorobenzene	%	93		7330400
D10-o-Xylene	%	84		7330400
D4-1,2-Dichloroethane	%	101		7330400
o-Terphenyl	%	93		7330539

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Golder Associates Ltd
Client Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Sampler Initials: SH

TEST SUMMARY

BV Labs ID: PKV970
Sample ID: IG_BH05_POD
Matrix: Soil

Collected: 2021/04/22
Shipped:
Received: 2021/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7330383	2021/05/03	2021/05/03	Meghaben Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7330254	2021/05/03	2021/05/04	Rupinder Sihota
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7330400	N/A	2021/05/04	Joe Paino
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7330539	2021/05/03	2021/05/04	Ksenia Trofimova
Acid Extractable Metals by ICPMS	ICP/MS	7330628	2021/05/03	2021/05/04	Daniel Teclu
Moisture	BAL	7327819	N/A	2021/04/30	Min Yang

BV Labs ID: PKV970 Dup
Sample ID: IG_BH05_POD
Matrix: Soil

Collected: 2021/04/22
Shipped:
Received: 2021/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7330400	N/A	2021/05/03	Joe Paino

BV Labs ID: PKV971
Sample ID: IG_BH05_ACESS_ROAD
Matrix: Soil

Collected: 2021/04/22
Shipped:
Received: 2021/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7330383	2021/05/03	2021/05/03	Meghaben Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7330254	2021/05/03	2021/05/04	Rupinder Sihota
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7330400	N/A	2021/05/03	Joe Paino
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7330539	2021/05/03	2021/05/04	Ksenia Trofimova
Acid Extractable Metals by ICPMS	ICP/MS	7330628	2021/05/03	2021/05/04	Daniel Teclu
Moisture	BAL	7327819	N/A	2021/04/30	Min Yang

BV Labs ID: PKV972
Sample ID: IG_BH05_PARKING_LOT
Matrix: Soil

Collected: 2021/04/22
Shipped:
Received: 2021/04/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	7330383	2021/05/03	2021/05/03	Meghaben Patel
Hexavalent Chromium in Soil by IC	IC/SPEC	7330254	2021/05/03	2021/05/04	Rupinder Sihota
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	7330400	N/A	2021/05/03	Joe Paino
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	7330539	2021/05/03	2021/05/04	Ksenia Trofimova
Acid Extractable Metals by ICPMS	ICP/MS	7330628	2021/05/03	2021/05/04	Daniel Teclu
Moisture	BAL	7327819	N/A	2021/04/30	Min Yang

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

BV Labs Job #: C1B2800
Report Date: 2021/05/05

Golder Associates Ltd
Client Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Sampler Initials: SH

GENERAL COMMENTS

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

Package 1	18.0°C

Sample analyzed for Reg.153 PHCs and Reg.153 Metals - ICPMS, Hg, Cr VI and Hot Water Extractable Boron.

Results relate only to the items tested.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7330400	1,4-Difluorobenzene	2021/05/03	98	60 - 140	99	60 - 140	101	%		
7330400	4-Bromofluorobenzene	2021/05/03	97	60 - 140	98	60 - 140	84	%		
7330400	D10-o-Xylene	2021/05/03	83	60 - 140	83	60 - 140	87	%		
7330400	D4-1,2-Dichloroethane	2021/05/03	92	60 - 140	99	60 - 140	100	%		
7330539	o-Terphenyl	2021/05/04	94	60 - 130	93	60 - 130	99	%		
7327819	Moisture	2021/04/30							3.9	20
7330254	Chromium (VI)	2021/05/04	72	70 - 130	92	80 - 120	<0.18	ug/g	NC	35
7330383	Hot Water Ext. Boron (B)	2021/05/03	NC	75 - 125	97	75 - 125	<0.050	ug/g	5.5	40
7330400	Benzene	2021/05/03	95	50 - 140	95	50 - 140	<0.020	ug/g	NC	50
7330400	Ethylbenzene	2021/05/03	105	50 - 140	103	50 - 140	<0.020	ug/g	NC	50
7330400	F1 (C6-C10) - BTEX	2021/05/03					<10	ug/g	NC	30
7330400	F1 (C6-C10)	2021/05/03	93	60 - 140	92	80 - 120	<10	ug/g	NC	30
7330400	o-Xylene	2021/05/03	105	50 - 140	104	50 - 140	<0.020	ug/g	NC	50
7330400	p+m-Xylene	2021/05/03	100	50 - 140	97	50 - 140	<0.040	ug/g	NC	50
7330400	Toluene	2021/05/03	93	50 - 140	93	50 - 140	<0.020	ug/g	NC	50
7330400	Total Xylenes	2021/05/03					<0.040	ug/g	NC	50
7330539	F2 (C10-C16 Hydrocarbons)	2021/05/04	96	50 - 130	95	80 - 120	<10	ug/g	NC	30
7330539	F3 (C16-C34 Hydrocarbons)	2021/05/04	96	50 - 130	95	80 - 120	<50	ug/g	NC	30
7330539	F4 (C34-C50 Hydrocarbons)	2021/05/04	96	50 - 130	95	80 - 120	<50	ug/g	NC	30
7330628	Acid Extractable Antimony (Sb)	2021/05/04	96	75 - 125	104	80 - 120	<0.20	ug/g	NC	30
7330628	Acid Extractable Arsenic (As)	2021/05/04	102	75 - 125	103	80 - 120	<1.0	ug/g	6.4	30
7330628	Acid Extractable Barium (Ba)	2021/05/04	NC	75 - 125	105	80 - 120	<0.50	ug/g	4.6	30
7330628	Acid Extractable Beryllium (Be)	2021/05/04	100	75 - 125	98	80 - 120	<0.20	ug/g	1.4	30
7330628	Acid Extractable Boron (B)	2021/05/04	95	75 - 125	95	80 - 120	<5.0	ug/g	NC	30
7330628	Acid Extractable Cadmium (Cd)	2021/05/04	102	75 - 125	101	80 - 120	<0.10	ug/g	6.0	30
7330628	Acid Extractable Chromium (Cr)	2021/05/04	98	75 - 125	95	80 - 120	<1.0	ug/g	5.6	30
7330628	Acid Extractable Cobalt (Co)	2021/05/04	99	75 - 125	98	80 - 120	<0.10	ug/g	5.2	30
7330628	Acid Extractable Copper (Cu)	2021/05/04	NC	75 - 125	98	80 - 120	<0.50	ug/g	0.16	30
7330628	Acid Extractable Lead (Pb)	2021/05/04	93	75 - 125	98	80 - 120	<1.0	ug/g	6.5	30
7330628	Acid Extractable Mercury (Hg)	2021/05/04	90	75 - 125	86	80 - 120	<0.050	ug/g	3.5	30
7330628	Acid Extractable Molybdenum (Mo)	2021/05/04	98	75 - 125	97	80 - 120	<0.50	ug/g	NC	30

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
7330628	Acid Extractable Nickel (Ni)	2021/05/04	101	75 - 125	99	80 - 120	<0.50	ug/g	2.1	30
7330628	Acid Extractable Selenium (Se)	2021/05/04	105	75 - 125	102	80 - 120	<0.50	ug/g	NC	30
7330628	Acid Extractable Silver (Ag)	2021/05/04	100	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
7330628	Acid Extractable Thallium (Tl)	2021/05/04	101	75 - 125	99	80 - 120	<0.050	ug/g	2.7	30
7330628	Acid Extractable Uranium (U)	2021/05/04	98	75 - 125	97	80 - 120	<0.050	ug/g	5.5	30
7330628	Acid Extractable Vanadium (V)	2021/05/04	100	75 - 125	98	80 - 120	<5.0	ug/g	5.1	30
7330628	Acid Extractable Zinc (Zn)	2021/05/04	NC	75 - 125	99	80 - 120	<5.0	ug/g	4.7	30

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.

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 (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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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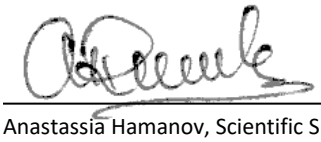
BV Labs Job #: C1B2800
Report Date: 2021/05/05

Golder Associates Ltd
Client Project #: 20253946 (5011) (10)
Site Location: IGNACE, ON
Sampler Initials: SH

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, 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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CLIENT: Golder Associates Ltd

BV Labs Guideline Comparison Tables

PROJECT #: 20253946 (5011) (10), BV LABS JOB: C1B2800

INORGANIC PARAMETERS

MATRIX: SOIL

Select Guideline from list above for comparison.

Note: Window zoom values other than 75% may cause unstable perfc** See Note #5 at bottom of sheet for more information about Guideline Flagging.

Sample ID	Guideline	REPORTING	Units	IG_BH05_POD	G_BH05_ACESS_ROA	G_BH05_PARKING_LO	Matrix Spike	SPIKED BLANK	Method Blank
Laboratory ID / Guideline ID	2011 Table 1-Background	LIMIT		PKV970	PKV971	PKV972	99995	99998	99999
BV Labs Job #	Res/Park/ Inst/Ind/ Comm/Comm'ty			C1B2800	C1B2800	C1B2800	C1B2800	C1B2800	C1B2800
Units	ug/g						%	%	
Sampling Date	Coarse Grained			22-April-2021	22-April-2021	22-April-2021			
Antimony	1.3	0.2	ug/g	<0.20	<0.20	<0.20	96	104	<0.20
Arsenic	18	1	ug/g	5.4	7.3	4.6	102	103	<1.0
Barium	220	0.5	ug/g	21	19	17	NC	105	<0.50
Beryllium	2.5	0.2	ug/g	<0.20	<0.20	<0.20	100	98	<0.20
Boron (Hot Water Soluble)	NV	0.05	ug/g	<0.050	<0.050	<0.050	NC	97	<0.050
Cadmium	1.2	0.1	ug/g	0.14	0.14	0.18	102	101	<0.10
Chromium	70	1	ug/g	33	35	36	98	95	<1.0
Chromium VI	0.66	0.18	ug/g	<0.18	<0.18	<0.18	72	92	<0.18
Cobalt	21	0.1	ug/g	**22**	**25**	**26**	99	98	<0.10
Copper	92	0.5	ug/g	**130**	**170**	**160**	NC	98	<0.50
Lead	120	1	ug/g	1.3	1.2	1.3	93	98	<1.0
Mercury	0.27	0.05	ug/g	<0.050	<0.050	<0.050	90	86	<0.050
Molybdenum	2	0.5	ug/g	1.5	1.3	1.1	98	97	<0.50
Nickel	82	0.5	ug/g	27	31	33	101	99	<0.50
Selenium	1.5	0.5	ug/g	<0.50	0.63	0.66	105	102	<0.50
Silver	0.5	0.2	ug/g	<0.20	<0.20	<0.20	100	100	<0.20
Thallium	1	0.05	ug/g	<0.050	<0.050	<0.050	101	99	<0.050
Vanadium	86	5	ug/g	69	73	78	100	98	<5.0
Zinc	290	5	ug/g	45	46	49	NC	99	<5.0
pH (pH Units)	NV	-	-	-	-	-	-	-	-
Conductivity (ms/cm)	0.57	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio	2.4	-	-	-	-	-	-	-	-
Cyanide, Free	0.051	-	-	-	-	-	-	-	-
Chloride	NV	-	-	-	-	-	-	-	-
Boron (Total)	36	5	ug/g	<5.0	<5.0	<5.0	95	95	<5.0
Uranium	2.5	0.05	ug/g	0.17	0.15	0.17	98	97	<0.050

Criteria exceedences will turn BOLD with Yellow Background.

BOLD with Blue Background indicates non-detected but RDL > Guideline criteria (due to dilution etc)

NOTES:

NV = No value

1. Criteria refers to Ministry of Environment "Soil, Ground Water and and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" March 9, 2004, amended as of July 1, 2011
2. This table represents a summary of the data presented in the Laboratory Certificate of Analysis for convenience purposes only
3. This summary is to be use in conjuction with, not as a replacement of the Laboratory Ceriticate of Analysis which contains all QA/QC information
4. New parameters indicated in the July 1, 2011 amendment, will appear at the bottom of each criteria page.
5. Guideline flagging accuracy only guaranteed when result units correspond with guideline units on spreadsheet.
6. Criteria for 406/19 refers to "Ontario Regulation 406/19: On-Site and Excess Soil Management" December 4, 2019

CLIENT: Golder Associates Ltd

BV Labs Guideline Comparison Tables

PROJECT #: 20253946 (5011) (10), BV LABS JOB: C1B2800

BTEX, CCME PETROLEUM HYDROCARBONS

MATRIX: SOIL

Select Guideline from list above for comparison.

Note: Zoom values other than 75% may cause unstable performar** See Note #5 at bottom of sheet for more information about Guideline Flagging.

Sample ID	Guideline	REPORTING	IG_BH05_POD	IG_BH05_POD DUP 1	G_BH05_ACESS_ROA	G_BH05_PARKING_LO	Matrix Spike	SPIKED BLANK	Method Blank
Laboratory ID / Guideline ID	2011 Table 1-Background	LIMIT	PKV970	PKV970 DUP 1	PKV971	PKV972	99995	99998	99999
BV Labs Job #	Res/Park/ Inst/Ind/ Comm/Comm'ty		C1B2800	C1B2800	C1B2800	C1B2800	C1B2800	C1B2800	C1B2800
Units	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	%	%	ug/g
Sampling Date	Coarse Grained		22-April-2021	22-April-2021	22-April-2021	22-April-2021			
Benzene	0.02	0.02	<0.020	<0.020	<0.020	<0.020	95	95	<0.020
Toluene	0.2	0.02	<0.020	<0.020	<0.020	<0.020	93	93	<0.020
Ethylbenzene	0.05	0.02	<0.020	<0.020	<0.020	<0.020	105	103	<0.020
m/p xylenes	NV	0.04	<0.040	<0.040	<0.040	<0.040	100	97	<0.040
o xylene	NV	0.02	<0.020	<0.020	<0.020	<0.020	105	104	<0.020
Total Xylenes	0.05	0.04	<0.040	<0.040	<0.040	<0.040	-	-	<0.040
F1 (C6-C10)	25	10	<10	<10	<10	<10	93	92	<10
F1 (C6-C10) - BTEX	25	10	<10	<10	<10	<10	-	-	<10
F2 (C10-C16)	10	10	<10	-	<10	<10	96	95	<10
F3 (C16-C34)	240	50	<50	-	<50	<50	96	95	<50
F4 (C34-C50)	120	50	<50	-	<50	<50	96	95	<50
Reached Baseline at C50	NV		YES	-	YES	YES	-	-	-
F4 Gravimetric	120	-	-	-	-	-	-	-	-

Criteria exceedences will turn BOLD with Yellow Background.

BOLD with Blue Background indicates non-detected but RDL > Guideline criteria (due to dilution etc)

NOTES:

NV = No value

1. Criteria refers to Ministry of Environment "Soil, Ground Water and and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act" March 9, 2004, amended as of July 1, 2011
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5. Guideline flagging accuracy only guaranteed when result units correspond with guideline units on spreadsheet.
6. Criteria for 406/19 refers to "Ontario Regulation 406/19: On-Site and Excess Soil Management" December 4, 2019

APPENDIX B

IG_BH05 Site Set-up Photos

Photo 1 - Grading out the edge of the drilling pad for easy access and setup

Photo 2 – 2.1 m Tall site security fence with lockable gate

photo 3 - 1.8 m Tall drilling zone fence

Photo 4 - Site entrance with safety signages.

Photo 5 - Golder, NWMO/WLON and Rodren drilling site trailers.

Photo 6 - Core logging and storage seacans.

Photo 7 - Inside the core logging seacan.

Photo 8 - Core storage, WP02 and WP07 working area.

Photo 9 - Drill pad secondary containment construction.

Photo 10 – Placement of the sand layer prior to the secondary containment construction.

Photo 11 - Placing wooden rig mats.

Photo 12 - Positioning the drill rig at IG_BH05.

Photo 13 - Drill rig after positioning on IG_BH05 at the desired orientation.

Photo 14 - Two 28,350 litre baker tanks.

Photo 15- Self-contained washroom trailer

Photo 16 - Cummins mobile diesel generator (model C60D6R) in secondary containment with a fire extinguisher.

Photo 17 - Double-walled fuel tank - 4500 Litres.

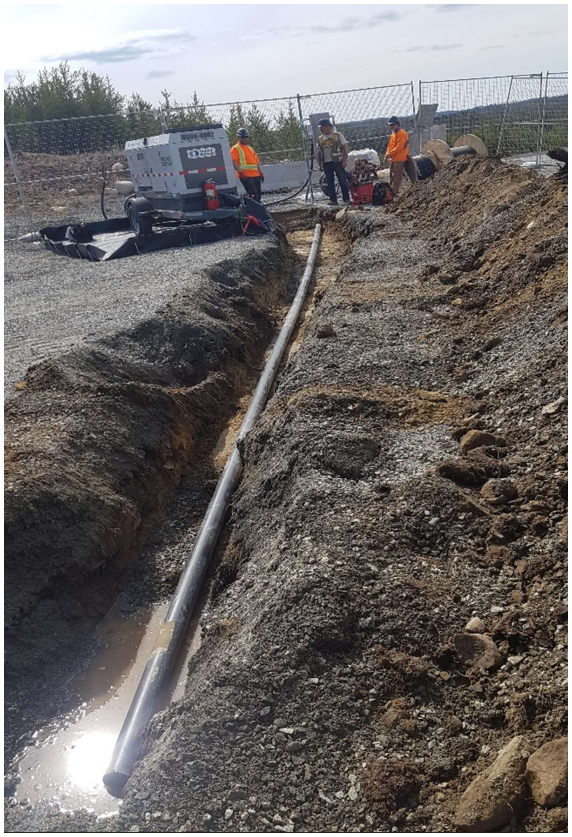

Photo 18 - Trench construction to bury the power cables.

Photo 19 - Light tower in a secondary containment.

Photo 20 - Location of the garbage and recycling bins near the site entrance.

Photo 21 - Spill kits around the fuel tank.

APPENDIX C

IG_BH05 Aerial View of As-Built Site Set-up

As-Built Site Facilities Layout - IG_BH05

Site Facilities Legend – IG_BH05

1	Light Towers- 4-kW - Wacker Neuson Metrolite LTV4	13	Tailgate Meeting Area
2	Power Generator – 36.9 kw Cummins C60D6R-1863744	14	Site Washroom Trailer
3	Fuel Tank - 4,500 L double-walled fuel storage tank	15	Drill Cuttings Storage - drilling cuttings stored in 1m^3 tote bags that are stored in secondary containment
4	Golder's Site Trailer - 40' x 10' mobile office trailer	16	Drill Rods Sloop and Tooling – moving when capturing the photo
5	NWMO/WLON Site Office - 32' x 10' mobile office trailer	17	Drill Rig - Skid Mount rotary drill model EF-100 by Discovery Drill Manufacturer (DDM) LTD.
6	Rodren Drilling Site Office - 32' x 10' mobile office trailer	18	Centrifuge Unit - AMC SRU Centrifuge Recycling Unit
7	Core Logging and Core Storage/WP02 and WP07 Seacans - 40' x 10' modified shipping containers	19	Wastewater, and Fluorescein Tanks Seacan - 20' x 8' seacan
8	General Storage Seacan - 20' x 8' seacan	20	Core Extraction Shack
9	Water Tanks - two 28,350 litre Baker tanks	21	Silt Fence
10	Solid Waste Bins - one garbage bin and one recycling bin	22	Parking Lot – 8 regular site pickups
11	Site Security - One lockable gate	⊕	IG_BH05 Location
12	Security Fence - ~ 220 linear metres of 2.5 m tall fence		

APPENDIX D

IG_BH05 Site Commissioning Checklist

BOREHOLE: IG_BH05

Item No.	Item	General Requirements	Date Commissioned	Checked by	Approved by	Comments
1.0	**SITE INSPECTION**					
1.1	Fill Material / Granular Surface	The site's granular surface is stable and unlikely to produce excessive dust during dry / hot weather or excessively slippery surfaces during wet / cold weather	08 May 2021	Adrian Kowalchuk	GWS	
1.2	Litter and Debris	There is no visible litter or debris observed at the site	08 May 2021	Adrian Kowalchuk	GWS	
1.3	Silt and Snow Fencing	Silt and snow fencings are in place and are functioning as intended	08 May 2021	Adrian Kowalchuk	GWS	Silt fencing was repaired by Raleigh Falls Timber under scope change
1.4	General Site Levelling	Site generally levelled to allow placement of surface facilities and safe movement between facilities	08 May 2021	Adrian Kowalchuk	GWS	Drilling pad is leveled with safe access path slope.
1.4	General Site Drainage	Site grading allows for adequate drainage without ponding	08 May 2021	Adrian Kowalchuk	GWS	Drilling pad is sloped at 2% for rainwater run off.
2.0	**FENCING**					
2.1	Silt Fencing	Silt fencing around site perimeter, properly installed and in good order	08 May 2021	Adrian Kowalchuk	GWS	Silt fencing previously installed by others repaired by Golder (subcontracted to Ricci's Trucking)
2.2	Snow Fencing	Snow fencing around site perimeter, properly installed and in good order	NA	NA	NA	NA
2.3	Modulok Security Fencing	Security fencing around required areas, drill area separated, properly installed and in good order	09 May 2021	Adrian Kowalchuk	GWS	8' security fencing around perimeter of site, and 6' security fencing forming an exclusion zone around the drill rig
3.0	**OFFICE TRAILERS**					
3.1	Trailer 1 (Golder)	Trailer correctly positioned, blocked and levelled, stairs installed, furnishings supplied meet requirements, heated	08 May 2021	Adrian Kowalchuk	GWS	
3.2	Trailer 2 (NWMO)	Trailer correctly positioned, blocked and levelled, stairs installed, furnishings supplied meet requirements, heated	08 May 2021	Adrian Kowalchuk	GWS	
3.3	Trailer 3 (Rodren)	Trailer correctly positioned, blocked and levelled, stairs installed, furnishings supplied meet requirements, heated	08 May 2021	Adrian Kowalchuk	WS	

Item No.	Item	General Requirements	Date Commissioned	Checked by	Approved by	Comments
4.0	**CORE LOGGING AND STORAGE**					
4.1	Core Logging Seacan	Seacan correctly positioned, blocked and levelled, interior meets requirements, heated	08 May 2021	Adrian Kowalchuk	GWS	
4.2	Core Logging Table	Core logging table meets design specifications, correctly installed	08 May 2021	Adrian Kowalchuk	GWS	
4.3	Camera Racking	Camera tracking correctly installed, meet performance criteria	08 May 2021	Adrian Kowalchuk	GWS	
4.4	Core Storage Seacan	Seacan correctly positioned, blocked and levelled, interior meets requirements, heated	08 May 2021	Adrian Kowalchuk	GWS	
4.5	Commercial Refrigerator	Refrigerator installed correctly, operating correctly, provides adequate storage capacity	08 May 2021	Adrian Kowalchuk	GWS	
5.0	**COMMUNICATIONS**				GWS	
5.1	Cellular Phone / Emergency System	Phone is installed and functioning correctly	08 May 2021	Adrian Kowalchuk	GWS	In Reach device is available for emergency use if the cellular network is down.
5.2	Cellular Internet	Cellular Internet Wi-Fi network is installed and functioning correctly, reception is adequate in all required areas of the site	08 May 2021	Adrian Kowalchuk	GWS	
6.0	**GENERATORS**					
6.1	Generator	Generator installed and functioning correctly, installation completed by an electrician, and certified by electrician to meet codes	08 May 2021	Adrian Kowalchuk	GWS	
6.2	Secondary Containment	Secondary spill containment in place beneath fuel tank, correctly installed, of adequate capacity	08 May 2021	Adrian Kowalchuk	GWS	
6.3	Power Distribution	Power distribution panel installed and functioning correctly, installation completed by an electrician, and certified by electrician to meet codes	08 May 2021	Adrian Kowalchuk	GWS	
7.0	**LIGHT TOWERS**					

Item No.	Item	General Requirements	Date Commissioned	Checked by	Approved by	Comments
7.1	Light Tower	All light towers installed and functioning correctly, installation completed by an electrician, and certified by electrician to meet codes	08 May 2021	Adrian Kowalchuk	GWS	
7.2	Secondary Containment	All secondary spill containment in place beneath fuel tank, correctly installed, of adequate capacity	08 May 2021	Adrian Kowalchuk	GWS	
8.0	**FUEL STORAGE**					
8.1	Fuel Tank	Fuel tank correctly installed, blocked and levelled	08 May 2021	Adrian Kowalchuk	GWS	
8.2	Secondary Containment	Secondary spill containment in place beneath fuel tank, correctly installed, of adequate capacity	08 May 2021	Adrian Kowalchuk	GWS	
8.3	Protective Barricade	Tank is adequately protected from inadvertent collision with mobile equipment	08 May 2021	Adrian Kowalchuk	GWS	
9.0	**SANITARY FACILITIES**					
9.1	Washroom	Washroom correctly positioned, blocked and levelled, stairs installed, toilets and sinks functioning correctly, heated	08 May 2021	Adrian Kowalchuk	GWS	
9.2	Fresh Water Tank	Water tank building correctly positioned, blocked and levelled, correctly connected to the washroom building, heated	08 May 2021	Adrian Kowalchuk	GWS	
9.3	Septic Tank	Septic tank building correctly positioned, blocked and levelled, correctly connected to the washroom building, heated	08 May 2021	Adrian Kowalchuk	GWS	
10.0	**GARBAGE BINS**					
10.1	Garbage Bin	Bin placed in suitable location, secure lid	08 May 2021	Adrian Kowalchuk	GWS	
10.2	Recycling Bin	Bin placed in suitable location, secure lid	08 May 2021	Adrian Kowalchuk	GWS	
11.0	**SPILL KITS**					
11.1	Drill Fluid Spill Kit	Spill kit components present, size and type meets requirements	08 May 2021	Adrian Kowalchuk	GWS	

Item No.	Item	General Requirements	Date Commissioned	Checked by	Approved by	Comments
11.2	Fuel Spill Kit	Spill kit components present, size and type meets requirements	08 May 2021	Adrian Kowalchuk	GWS	
11.3	General (Chemical) Spill Kit	Spill kit components present, size and type meets requirements	08 May 2021	Adrian Kowalchuk	GWS	

Checked by: Adrian Kowalchuk _____ Date: 09 May 2021

Adrian Kowalchuk

Approved by: _____ Date: 09 May 2021

George Schneider

APPENDIX E

IG_BH05 ESA Certificate of Acceptance

Electrical Safety Authority
www.esasafe.com

400 Sheldon Dr, Unit 1, Cambridge, ON, N1T 2H9
Toll Free Tel: 1-877-372-7233 Toll Free Fax: 1-800-667-4278
esa.cambridge@electricalsafety.on.ca

Certificate of Acceptance

FEDIUK ELECTRIC INC
SITE 124 BOX 6 RR4
DRYDEN ON
P8N 0A2

Telephone: (807)221-8110
Fax:
Email:

Notice Date:	June 08, 2021
Notification Number:	17069022
Customer ID:	105525
Licence Number:	7013430

RE

BORE HOLD 5

BORE HOLD 5
TOWER ROAD
IGNACE ON

We hereby certify that the electrical installation at the aforementioned address, and as described herein, is accepted in accordance with the requirements of the Ontario Electrical Safety Code.

Work Item	Description	Quantity
1	CONSTRUCTION TRAILER	5
2	OUTLETS AND OTHER DEVICES Receptacles 3.000	3
3	LV DISTRIBUTION EQUIPMENT - 200 AMPS Panelboards 1.000, 200 AMPS	1

The Electrical Safety Authority (ESA) operates as a delegated authority on behalf of the provincial government in accordance with Part VIII , section 113 of the Electricity Act, 1998, S.O. 1998, c.15, Sched. A.(the Act), and the Safety and Consumer Statutes Administration Act, 1996, S.O. 1996, c.19. ESA's mandate is to administer the Act and corresponding Regulations on behalf of the Province of Ontario.

ESA is a not-for-profit corporation under the direction and control of a Board of Directors and is accountable to the Ministry of Government and Consumer Services in accordance with an Administrative Agreement.

golder.com