PHASE 2 INITIAL BOREHOLE DRILLING AND TESTING, IGNACE AREA

WP02 Data Report – Borehole Drilling and Coring for IG_BH03

APM-REP-01332-0241 **November 2020**

Golder Associates Ltd.

nwmo
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GOLDER

REPORT

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WP02 Data Report - Borehole Drilling and Coring for IG_BH03

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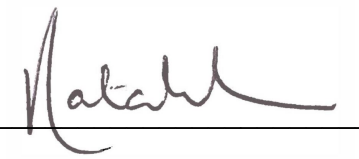
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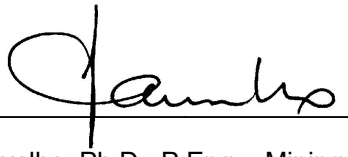
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1.0 INTRODUCTION

The Initial Borehole Drilling and Testing project in the Wabigoon and Ignace Area, Ontario is part of Phase 2 Geoscientific Preliminary Field Investigations of the NWMO's Adaptive Phased Management (APM) Site Selection Phase.

This project involves the drilling and testing of the first of three deep boreholes within the northern portion of the Revell batholith. The second drilled borehole, IG_BH03, is located a direct distance of approximately 23 km southeast of the Wabigoon Lake Ojibway Nation and a direct distance of 42 km northwest of the Town of Ignace. Access to the IG_BH03 drill site is via Highway 17 and primary logging roads, as shown on Figure 1.

The project was carried out by a team led by Golder Associates Ltd. (Golder) on behalf of the NWMO. This report describes the methodology, activities and results for Work Package 2 (WP02): Borehole Drilling and Coring for IG_BH03, which includes: borehole drilling, coring and casing installation, borehole deviation, and drilling fluid management and use of tracers.

2.0 BACKGROUND INFORMATION

2.1 Geological Setting

The approximately 2.7 billion year old Revell batholith is located in the western part of the Wabigoon Subprovince of the Archean Superior Province. The batholith is roughly elliptical in shape trending northwest, is approximately 40 km in length, 15 km in width, and covers an area of approximately 455 km^2. Based on geophysical modelling, the batholith is approximately 2 km to 3 km thick through the center of the northern portion (SGL 2015). The batholith is surrounded by supracrustal rocks of the Raleigh Lake (to the north and east) and Bending Lake (to the southwest) greenstone belts (Figure 2).

IG_BH03 is located within an investigation area of approximately 19 km^2 in size, situated in the northern portion of the Revell batholith. Bedrock exposure in the area is generally very good due to minimal overburden, few water bodies, and relatively recent logging activities. Ground elevations generally range from 400 to 450 m above sea level. The ground surface broadly slopes towards the northwest as indicated by the flow direction of the main rivers in the area. Local water courses tend to flow to the southwest towards Mennin Lake (Figure 1).

Four main rock units are identified in the supracrustal rock group: mafic metavolcanic rocks, intermediate to felsic metavolcanic rocks, metasedimentary rocks, and mafic intrusive rocks (Figure 2). Sedimentation within the supracrustal rock assemblage was largely synvolcanic, although sediment deposition in the Bending Lake area may have continued past the volcanic period (Stone 2009; Stone 2010a; Stone 2010b). All supracrustal rocks are affected, to varying degrees, by penetrative brittle-ductile to ductile deformation under greenschist- to amphibolite-facies metamorphic conditions (Blackburn and Hinz 1996; Stone et al. 1998). In some locations, primary features, such as pillow basalt or bedding in sedimentary rocks are preserved, in other locations, primary relationships are completely masked by penetrative deformation. Uranium-lead (U-Pb) geochronological analysis of the supracrustal rocks produced ages that range between 2734.6 +/-1.1 Ma and 2725 +/-5 Ma (Stone et al. 2010).

Three main suites of plutonic rock are recognized in the Revell batholith, including, from oldest to youngest: a Biotite Tonalite to Granodiorite suite, a Hornblende Tonalite to Granodiorite suite, and a Biotite Granite to Granodiorite suite (Figure 2). Plutonic rocks of the Biotite Tonalite to Granodiorite suite occur along the southwestern and northeastern margins of the Revell batholith. The principal type of rock within this suite is a white to grey, medium-grained, variably massive to foliated or weakly gneissic, biotite tonalite to granodiorite. One sample of foliated and medium-grained biotite tonalite produced a U-Pb age of 2734.2+/-0.8 Ma (Stone et al.

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2010). The Hornblende Tonalite to Granodiorite suite occurs in two irregularly-shaped zones surrounding the central core of the Revell batholith. Rocks of the Hornblende Tonalite to Granodiorite suite range compositionally from tonalite through granodiorite to granite and also include significant proportions of quartz diorite and quartz monzodiorite. One sample of coarse-grained grey mesocratic hornblende tonalite produced a U-Pb age of 2732.3+/-0.8 Ma (Stone et al. 2010). Rocks of the Biotite Granite to Granodiorite suite underlie most of the northern, central and southern portions of the Revell batholith. Rocks of this suite are typically coarse-grained, massive to weakly foliated, and white to pink in colour. The Biotite Granite to Granodiorite suite ranges compositionally from granite through granodiorite to tonalite. A distinct potassium (K)-Feldspar Megacrystic Granite phase of the Biotite Granite to Granodiorite suite occurs as an oval-shaped body in the central portion of the Revell batholith (Figure 2). One sample of coarse-grained, pink, massive K-feldspar megacrystic biotite granite produced a U-Pb age of 2694.0+/-0.9 Ma (Stone et al. 2010).

The bedrock surrounding IG_BH03 is composed mainly of massive to weakly foliated felsic intrusive rocks that vary in composition between granodiorite and tonalite, and together form a relatively homogeneous intrusive complex. Bedrock identified as tonalite transitions gradationally into granodiorite and no distinct contact relationships between these two rock types are typically observed (SRK and Golder 2015; Golder and PGW 2017). Massive to weakly foliated granite is identified at the ground surface to the northwest of the feldspar-megacrystic granite. The granite is observed to intrude into the granodiorite-tonalite bedrock, indicating it is distinct from, and younger than, the intrusive complex (Golder and PGW 2017).

West-northwest trending mafic dykes interpreted from aeromagnetic data extend across the northern portion of the Revell batholith and into the surrounding greenstone belts. One mafic dyke occurrence, located to the northwest of IG_BH01, is approximately 15-20 m wide (Figure 2). All of these mafic dykes have a similar character and are interpreted to be part of the Wabigoon dyke swarm. One sample from the same Wabigoon swarm produced a U-Pb age of 1887+/-13 Ma (Stone et al. 2010), indicating that these mafic dykes are Proterozoic in age. It is assumed based on surface measurements that these mafic dykes are sub-vertical (Golder and PGW 2017).

Long, narrow valleys are located along the western and southern limits of the investigation area (Figure 1). These local valleys host creeks and small lakes that drain to the southwest and may represent the surface expression of structural features that extend into the bedrock. A broad valley is located along the eastern limits of the investigation area and hosts a more continuous, un-named water body that flows to the south. The linear and segmented nature of this waterbody's shorelines may also represent the surface expression of structural features that extend into the bedrock.

Regional observations from mapping have indicated that structural features are widely spaced (typical 30 to 500 cm spacing range) and dominantly comprised of sub-vertical joints with two dominant orientations, northeast and northwest trending (Golder and PGW 2017). Interpreted bedrock lineaments generally follow these same dominant orientations in the northern portion of the Revell batholith (Figure 2); DesRoches et al. 2018). Minor sub-horizontal joints have been observed with minimal alteration, suggesting they are younger and perhaps related to glacial unloading. One mapped regional-scale fault, the Washeibemaga Lake fault, trends east and is located to the west of the Revell batholith (Figure 2). Ductile lineaments, also shown on Figure 2, follow the trend of foliation mapped in the surrounding greenstone belts. Additional details of the lithological units and structures found at surface within the investigation area are reported in Golder and PGW (2017).

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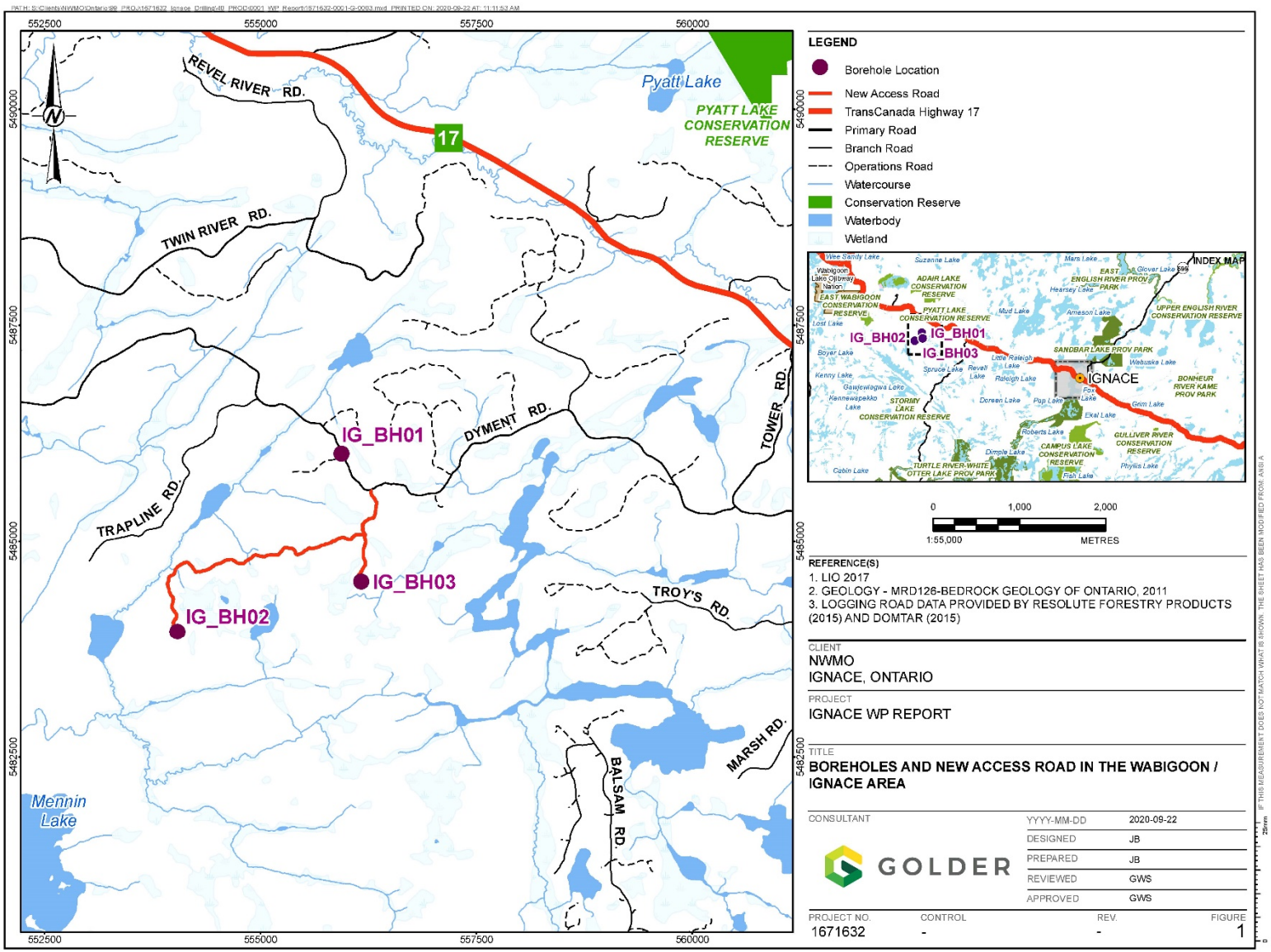


Figure 1: Location of IG_BH03 in Relation to the Wabigoon / Ignace Area

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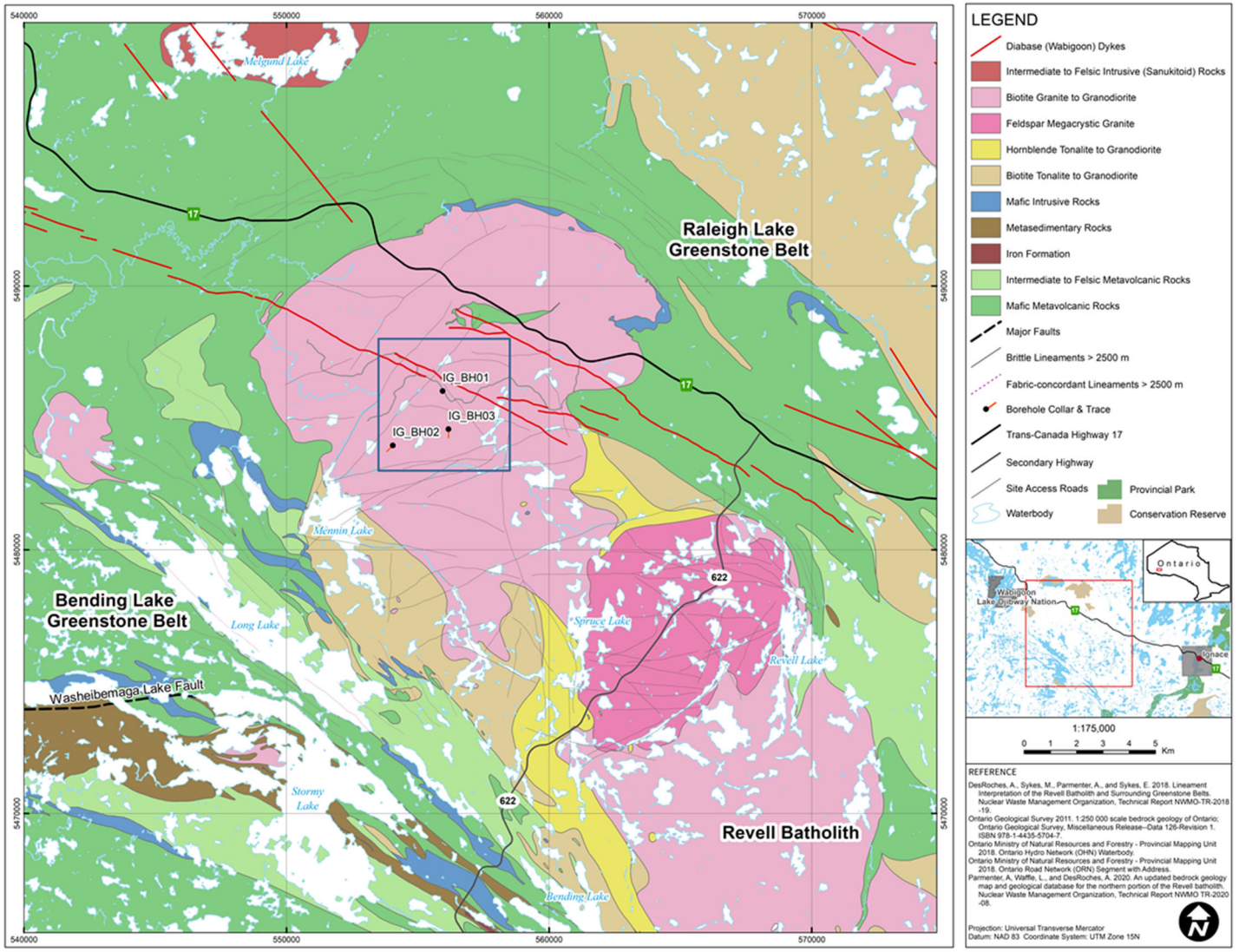


Figure 2: Geological setting and location of boreholes IG_BH01, IG_BH02 and IG_BH03 in the northern portion of the Revell batholith

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2.2 Technical Objectives

The technical objectives of the borehole drilling, coring and casing installation activities are:

- The collection of high quality bedrock core, which will allow geological and geotechnical core logging and the collection of core samples. Core samples will be used for laboratory testing programs to characterize the bedrock environment;
- To provide opportunity to complete supplementary studies such as borehole geophysical logging, hydraulic testing and opportunistic groundwater sampling while drilling; and
- To provide stable borehole walls to allow for future testing and monitoring.

The main objectives of the Drilling Fluid Management and Use of Tracers activities are:

- Optimize drilling to minimize borehole deterioration;
- Effectively remove any cuttings to maintain efficient drilling; and
- Trace the drilling fluids using a fluorescein tracer and measure fluid parameters (e.g. temperature, density and electric conductance) in order to recognize drilling fluid contamination of groundwater (to be discussed in the WP07 Report – Opportunistic Groundwater Sampling for IG_BH03, Golder 2020a) and porewater extraction samples (to be discussed in the WP04C Report – Porewater Extraction and Analysis for Petrographic Analysis for IG_BH03, Golder 2020b).

3.0 DESCRIPTION OF ACTIVITIES

Activities were overseen by Lead Contractor Golder Associates with Rodren Drilling Ltd. (Rodren), based in Winnipeg, Manitoba, contracted by Golder to carry out the drilling for IG_BH03.

Permission to drill was obtained from the Ministry of Natural Resources and Forestry (MNRF) on November 26th, 2018 with formal notification given to Golder via email from the NWMO on November 27th, 2018 with the understanding that drilling and testing would begin in the summer of 2019, following the construction of an access road and the drill site.

Drilling was carried out on a 24 hour, 7 days per week basis. Day shifts ran from 7 am to 7 pm, with night shifts from 7 pm to 7 am. A driller and helper were on site for each day and night shift, and a drilling foreman was typically present during the day shifts, or as required. A Golder drilling supervisor was present on site for all drilling activities. Both the Golder drilling supervisor and the Golder core logger from WP03 followed the same shift schedule as the drillers. Shifts were shortened to manage fatigue up to twice per week where the number of site hours was reduced to 20 for a 24 hour period, that is, a 10 hour day shift and a 10 hour night shift. The Golder site supervisors (WP01) were on site during the 4 hour window, however the drillers also adhered to the fatigue management schedule. When the Golder site supervisor was not on site, the drilling supervisor took over this role. This was documented in the supervisor sign-in sheet located in the Golder trailer at the site entrance.

The Golder drilling supervisor's responsibilities were divided between two main activities: (1) Drilling, Coring and Casing (2) Drilling Fluid Management and Use of Tracers. These activities included the following actions:

Drilling, Coring and Casing

- Verifying drill rig setup;

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- Tracking and recording borehole deviation;
- Supervising installation and cementing casing(s);
- Tracking depth of the borehole;
- Monitoring drilling parameters during drilling; and
- Managing drill cutting collection and disposal.

Drilling Fluid Management and Use of Tracers

- Testing all fresh source water added to the drill fluid system;
- Monitoring drill fluid parameters and volume changes during drilling;
- Identifying any triggers for an opportunistic ground water sample;
- Collecting and archiving drill fluid samples every 50m;
- Supervising borehole flushing prior to geophysical survey (WP05); and
- Recording observed drilling parameters and measured volume changes, drill fluid parameters and borehole depth for each run.

3.1 Health and Safety

The Ignace drilling and testing program conformed to applicable health and safety standards for the duration of the program. A comprehensive “pre-drill” drill rig inspection was completed by Rodren prior to the start of coring, on June 28th, 2019 and included the following checks:

- Emergency switches are in working order;
- Equipment and protective guards are in place;
- Cables, chains, pulleys, cable winches, latches / lifting devices are in proper working order;
- Drill string (coring rods) are manufacturer recommended;
- Mast is unmodified from manufacturer and regularly inspected;
- Drill controls are appropriate and free from obstructions;
- Hydraulic lines are secure and not bent or pinched;
- Pump lines (water hoses) are in good condition with whip checks, where required;
- Fire prevention supplies are present;
- Exhaust piping is directed appropriately;
- Fuel is properly stored; and
- Other general items including maintenance logs to confirm inspections were available.

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Prior to the commencement of drilling on July 9th, 2019, Rodren completed their daily rig inspection with Golder personnel present as further “pre-drill” inspection. Rodren continued to complete daily rig inspections as well as monthly rig inspections to ensure that rig safety was maintained throughout the drilling program.

Once drilling commenced, a Casella Sound Level Meter was used to establish zones where hearing protection was required, that is, all areas with an equivalent sound exposure level exceeding 83 dBA (O.Reg. 851/139) due to the prolonged exposure of 12-hour shifts. The area inside of the drill rig and surrounding support shacks was established as the only area requiring hearing protection.

An RKI Model GX-2012, 4-Gas Monitor was installed in the drill rig and used to monitor for levels of oxygen, carbon monoxide, hydrogen sulphide and combustible gases during drilling. The gas monitor was bump checked by the Golder site supervisor daily. Two batteries were available for the unit to eliminate absences during charging. No exceedances of safe limits of these gases were encountered during drilling of IG_BH03.

Health and safety toolbox meetings were held at the beginning of each shift (day and night), where attendance of all site personnel was mandatory. The meeting reviewed all activities to be completed during that shift, and identified the hazards and mitigation efforts to reduce risk of injury. Any visitors on site, who did not participate in the toolbox meetings, were required to review and acknowledge the toolbox report before allowed to perform work on site.

3.2 Quality Confirmation

Cross-shifts between day and night shift were carried out to transfer knowledge and information about the previous shift activities. These were typically 10-15 minutes, but longer when more specific knowledge needed to be relayed. When the crews did not cross on site, during shortened fatigue management shifts, the knowledge transfer was done in Ignace or over the phone. Cross-shifts were also carried out between crews switching rotations and typically involved spending an entire shift together on site to ensure procedures were kept consistent.

Quality Confirmation was completed for each 24-hour period by the drilling supervisors and included tracking of the drilled depth at the start and end of each day and night shift, verification of the drilling parameters recorded, verification and comments for drill fluid parameter triggers and volume loss observations, as well as drill fluid samples collected, and borehole orientation surveys conducted.

Drilling supervisors ensured all tools were properly calibrated before the start of the project and performed daily calibration checks of all instruments to be used at the start of each 24-hour period. If a tool not anticipated to be used became necessary during the shift, it was calibration checked as required prior to use.

4.0 SUMMARY OF DRILLING, CORING AND CASING

Drilling of IG_BH03 commenced on July 9th, 2019 and was completed on September 16th, 2019. The overall drilling progress and key activities are shown on Figure 3.

The borehole was advanced to 1000.61 metres below ground surface (mbgs) drilled depth (along hole) based on the rod count and measured stickup of the drill rods on the final drill run. The final depth of IG_BH03, based on measurement of the length of retrieved core, was 1000.54 mbgs (along hole), indicating that final core run broke 7 cm higher than the final position of the drill bit and was therefore not recovered. The final true vertical depth of the borehole, calculated using the measured actual orientation of the borehole, is 918.29 mgbs. Further details of the borehole orientation are discussed in Section 4.5.1.

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Coring progress over the program was variable due to bit changes or other drilling related maintenance including drill cuttings management and WP07 ground water sampling. The overall progress is shown graphically on Figure 3, and the daily progress by shift is shown on Figure 4. The maximum meterage attained for a single shift was 24.00 m on August 13, 2019 night shift, but the average rate per shift was 10.07 m (excluding WP07 sampling activities, conductor and surface casing installation and cementing, installation of the centrifuge and extended drill maintenance period).

Drilling of IG_BH03 was completed on the day shift of September 16, 2019. This was followed by the final borehole Reflex SPRINT-IQ™ gyro survey, borehole flushing, rod removal and preparation for geophysical logging. The core logging and sampling supplies were relocated to the site of IG_BH02, though some duplicate monitoring equipment related to WP02 remained at the IG_BH03 site to allow for continued monitoring of drilling fluid during WP05 and WP06 activities.

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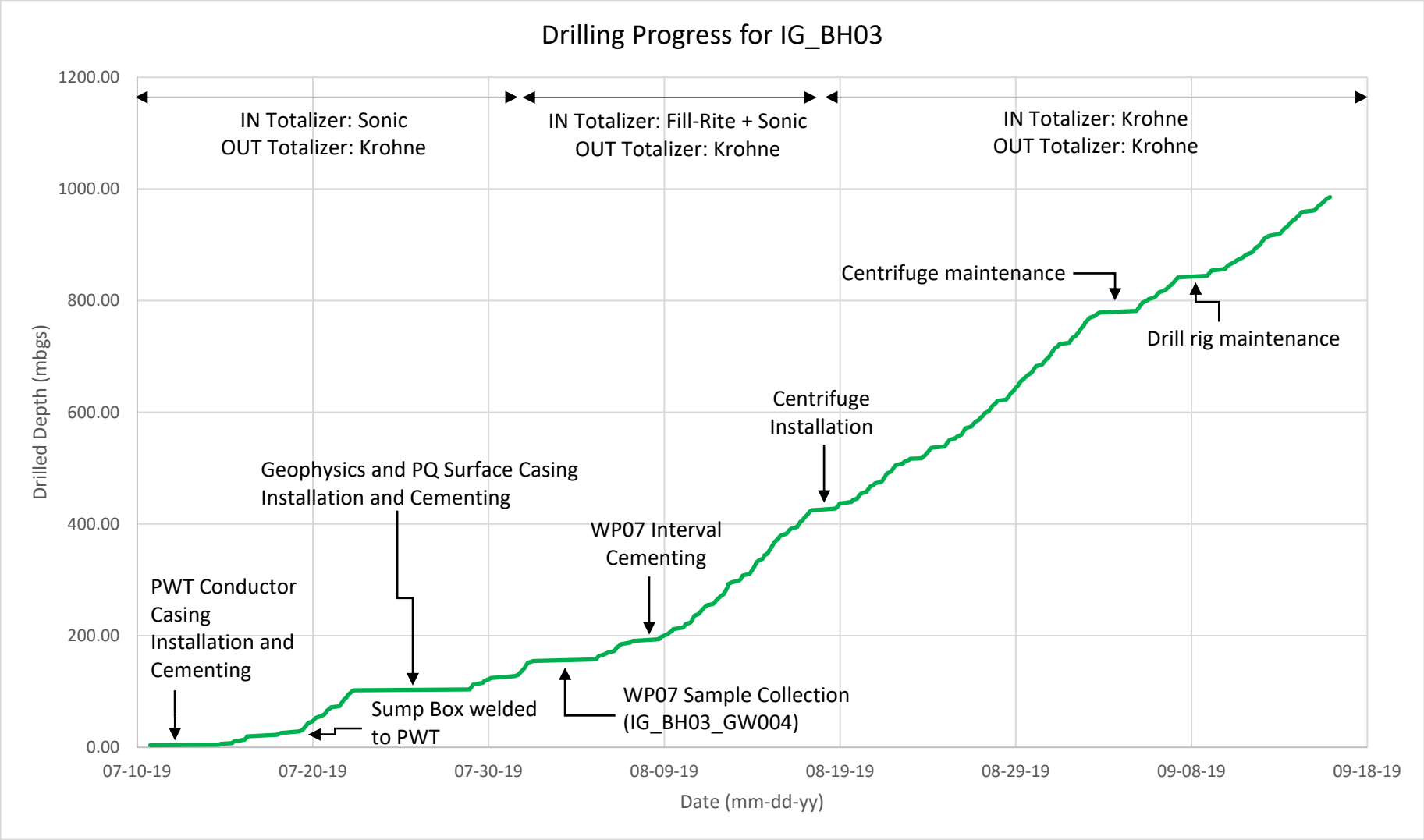


Figure 3: IG_BH03 Drilling Progress and Activities

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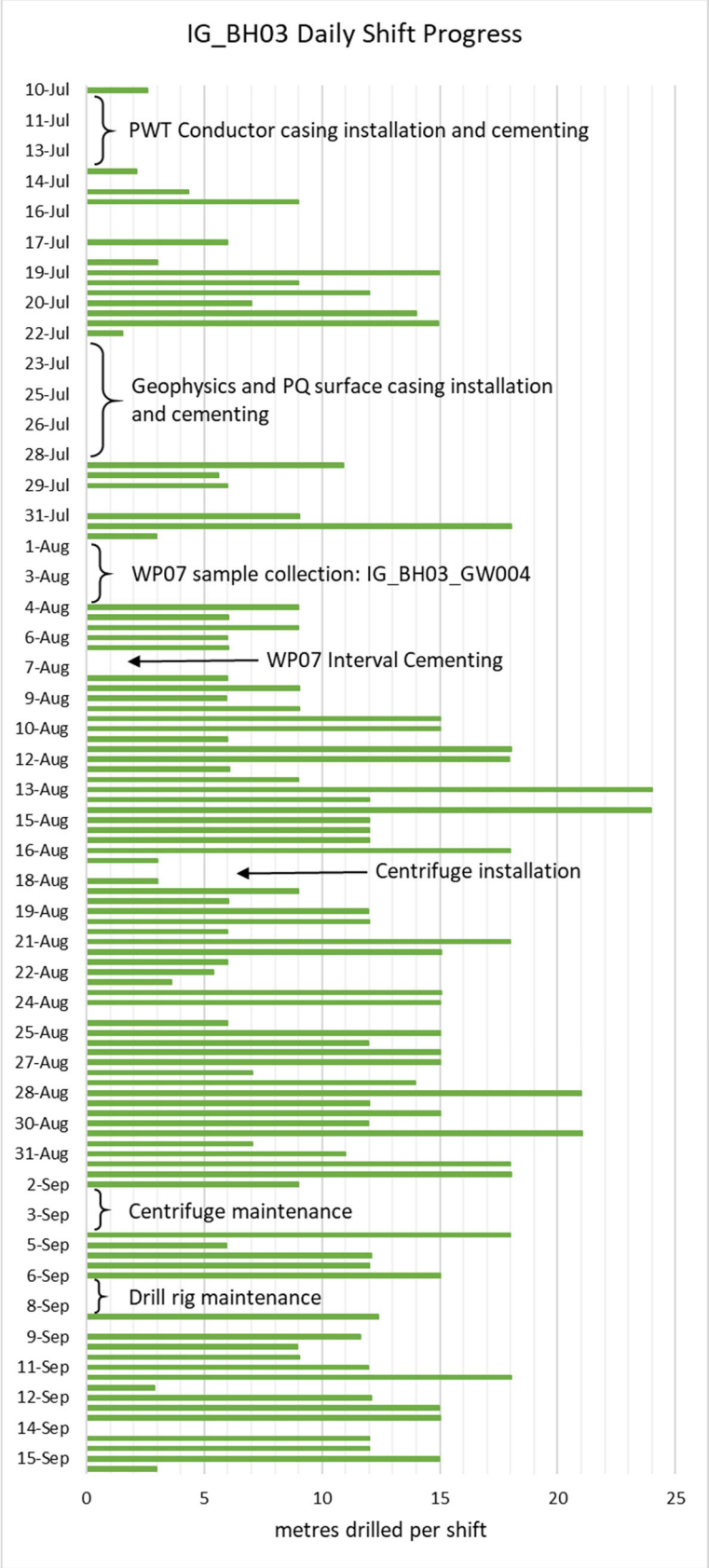


Figure 4: IG_BH03 Daily Shift Progress

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4.1 Drilling Details

4.1.1 Drill Rig Setup

A skid mounted Discovery Diamond Drill model EF-75 12 HH was used for the program, set up with secondary containment to minimize drill fluid entering the environment. Drilling was carried out with a constant water flush, with the drill water (drill fluid) recycled initially using a series of settling tanks with an added flocculant, but switching to the use of a Solids Removal System™ (SRU) from Australian Mud Company Pty Ltd. (AMC) when the borehole was at a depth of 424.64 mbgs (along hole) on August 17-18, 2019. This system utilized a centrifuge to remove cuttings from the return drill fluid and is shown in Figure 5.



Figure 5: Settling tanks (top) and Solids Removal Unit (bottom) – centrifuge used to remove cuttings from drill fluid return

Set-up of the drill rig commenced once the drill pad was prepared as described in the WP01B Commissioning Report (Golder 2020c). The construction of the drill pad included lining an area of approximately 230 m^2 to provide secondary containment beneath the drill and all support equipment including settling tanks / centrifuge,

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the core extraction shack, the wastewater and fluorescein water tanks, as well as all connecting hoses and lines. The drill pad was prepared with a gentle slope towards the borehole collar, so that all fluid contained by the liner was directed to the borehole collar (i.e. the “lower sump”), where it was pumped to a wastewater tank via a submersible sump pump. As described further in Section 4.2, an “upper sump” to contain the return drill fluid from casing and coring activities was constructed around the PWT outer conductor casing.

The planned azimuth and dip for IG_BH03 was 180˚/-70˚. Once the drill pad was constructed and the rig matting in place, the drill was moved into place using an excavator and sighted into alignment using surveyor stakes set in the ground. The stakes were positioned by surveyors using the coordinates of the borehole to set a stake to the north of the rig and two stakes to the south of the rig at 180˚ from each other. This allowed the WP02 staff to use the stakes and the drill mast to sight the azimuth (Figure 6). The dip of the borehole was set by confirming the mast dip at 70˚ using both digital and analogue angle finders, as shown in Figure 6.

Golder WP02 and WP03 staff mobilized to site on July 03, 2019. During the initial days on site, Golder unpacked and set up the site trailers and carried out equipment calibrations, while the drill pad was constructed and Rodren prepared their support equipment. The overall view of the IG_BH03 site is shown in Figure 7, with images of the drill rig shown in Figure 8.

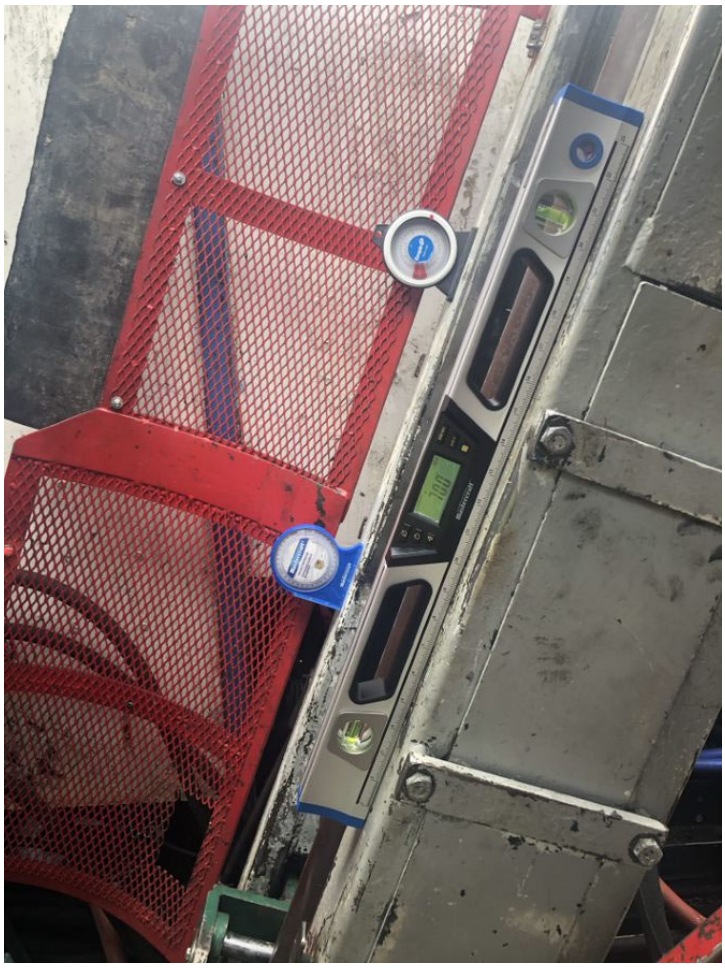


Figure 6: Confirming -70˚ Inclination of Drill mast prior to drilling

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Figure 7: View of IG_BH03 Drill Site facing South

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Figure 8: Select Photographs of the Rodren Drill Rig. Top: Inside of Drill Rig Showing Controls and Gauges and Rig Mast with some drill rods strapped on surface; Bottom: Rodren Core Push and Support Shack

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4.1.2 Rig Maintenance

Maintenance activities of the drill rig and coring supplies during advancement of IG_BH03 were generally typical of a drilling program, but some issues were exacerbated by the use of settling tanks at the outset of the drilling program. This is further described in Section 4.1.4.

4.1.3 Tracking Borehole Depth

The depth of the hole was monitored on a per run basis by the drilling supervisors. This was done by measuring the stickup of the drill rods from a fixed reference point at the completion of each run plus the fixed stick up of that reference point from the ground surface, which was subtracted from the length of the drill string (core barrel plus the drill rods). The chosen reference point was the base of the drill rig mast, which was 1.38 m above ground surface (along hole). During drilling, the depth of the borehole was monitored as meters below ground surface along the hole and throughout this report depths are referred to as mbgs (along hole).

The core barrel assembly was measured as 4.22 m long and included the barrel, a reaming shell and the drill bit. All drill rods on site were confirmed as 3.0 m long (metric) HQ rods. No rod grease was used during the coring process, however thread lubricant was used on the rod threads as they were added to the drill string. As described above, the borehole depth was tracked by the number of rods added to the drill string. Figure 9 shows the verification of the drill rod lengths carried out prior to drilling.



Figure 9: Verifying 3.0 m Standard Drill Rod Length

4.1.4 Drill Cuttings Management and Disposal

At the outset of the field program, the drill fluid recycling system was set up using a series of settling tanks with a flocculant to settle the cuttings from the return fluid. This system was found to require frequent removal of the drill fluid, cleaning out of the tanks and replacement of the drill fluid with fresh, traced water. This increased both the volume of fresh water needed to be brought to site and subsequently sampled, as well as down time needed to service the tanks. The decision was therefore made to switch the drill cuttings management system to use of the SRU™ (centrifuge). This switch took place over the period of August 17-18, 2019.

When the settling tanks were in use, the drill cuttings settled into a viscous slurry at the bottom of the tanks. When replacement of the drill fluid was required due to saturation of the fluid with cuttings, or when the tanks were required to be emptied prior to replacement with the SRU, the drill fluid and cuttings were removed from site via a vacuum truck. Once the centrifuge was in use, the drill fluid return containing cuttings from the borehole was

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pumped directly to the SRU, where the fine solids were separated from the water and directed to buckets that were emptied into steel drum holding containers to await disposal.

These solid drill cuttings were sampled on September 14, 2019 and sent to Bureau Veritas Laboratories in Mississauga to be analyzed according to Ontario Regulation 558. Note that the sample was labelled “Tclp-DC-BH03” instead of IG_BH03_TCLP001. The results indicated that the drill cuttings were safe for disposal and were accepted by the Ignace landfill.

4.2 Casing Installation and Cementing Details

Prior to commencing coring activities, PWT conductor casing was installed and cemented to a depth of 5.81 mbgs (along hole), to prevent drill fluid from escaping through the fractured upper bedrock. Prior to this successful installation, the PWT casing was initially installed (and cemented) to a depth of 4.32 mbgs (along hole), but was observed to loosen and spin while drilling the PQ inner surface casing. On July 12, 2019, the PWT outer conductor casing was therefore advanced deeper into bedrock and re-cemented in place. While fill materials from construction of the drill pad were present at the borehole collar, no overburden was encountered or recovered during the casing installation process.

In order to contain the return drill fluid, a wooden box was constructed around the PWT casing with a liner placed on the inside of the box and clamped around the circumference of the PWT casing. This configuration was found to not be robust enough to adequately withstand drilling activities, and large volume losses were observed during coring of runs CR9 and CR10 where drill fluid was lost to the lower sump. The sump box was therefore replaced with a metal sump box which was welded to the outside of the PWT casing at the collar of the hole on July 18, 2019.

The PQ surface casing was initially advanced just beyond the PWT conductor casing to provide smaller diameter casing to stabilize the HQ sized drill rods during coring. As coring advanced, it was necessary to continue to ream the PQ casing to an intermediate depth of 19.40 mbgs (along hole). This was done to add more weight to the PQ string, helping to mitigate spinning of the PQ, while also providing additional stabilization for the HQ coring.

Routine coring activities then commenced and were halted when the borehole was advanced to 102.12 mbgs (along hole). At this depth, the borehole was flushed and prepared for the televiewer survey. Once the parameters of the flush water were within acceptable criteria (see Section 4.6), the HQ drill rods were removed from the borehole and optical and acoustic televiewer surveys were completed.

The PQ surface casing installation depth was determined, in coordination with NWMO, once the first 100 m of geophysical survey images were reviewed. This depth was selected so that runs with drill fluid volume measurements > 100 L were cased and cemented to seal them from the rest of the hole. Additionally, this casing installation depth covered features observed in the core logging and televiewer surveys with iron staining and aperture. The installation and cementing of the surface casing served to prevent mixing of the ground water from these shallow zones with the rest of the borehole. Golder supervised Rodren throughout the installation of the PQ surface casing and cementing activities.

The surface casing installation process involved first reaming the borehole with a PQ advancer bit to the desired depth of 71 mbgs (along hole). The PQ casing rods were then removed from the borehole and the advancer bit was replaced with a casing shoe bit, and the rods re-lowered. A Van Ruth plug was installed below the casing, leaving a small gap between the casing shoe and the plug. The PQ casing was lifted slightly in order to create space for the cement mixture to flow between the PQ casing shoe and the borehole wall.

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The cement mixture was batched on surface and approximately 300 litres pumped down the inside of the PQ casing. Rodren provided Type HS High Sulphate resistant cement by LaFarge, which is a hydraulic cement that provides high sulphate resistance. The grout was pumped down the hole and chased with a wiper plug, at which point the grout mixture could be observed returning to surface through the annular space between the outside of the PQ casing and the inside of the PWT conductor casing (Figure 10). A sample of the cement mixture was collected from the mixing tank and from the annular return in order to confirm proper curing of the cement at surface. During the curing process, the grout was observed to settle in the annular space approximately 3 m down, and an additional grout mix was batched and used to top up the annular space from surface. Providing this confinement to surface was considered important to protect the PQ casing from excess rattling and vibration from the HQ rods during coring.

The cement was left to cure for approximately 48 hours, at which time a cured cored sample of the cement between the wiper plug and above the Van Ruth plug was retrieved. The Van Ruth plug was retrieved in a subsequent run, as shown in Figure 10. The remainder of the HQ rods required to continue regular coring activities were then added to the drill string and coring resumed for the remainder of the borehole to 1000.54 mbgs (along hole). The final IG_BH03 borehole schematic is shown in Figure 11.



Figure 10: Grout return through annulus of PWT and PQ casings (left) and Cored through Van Ruth Plug (right)

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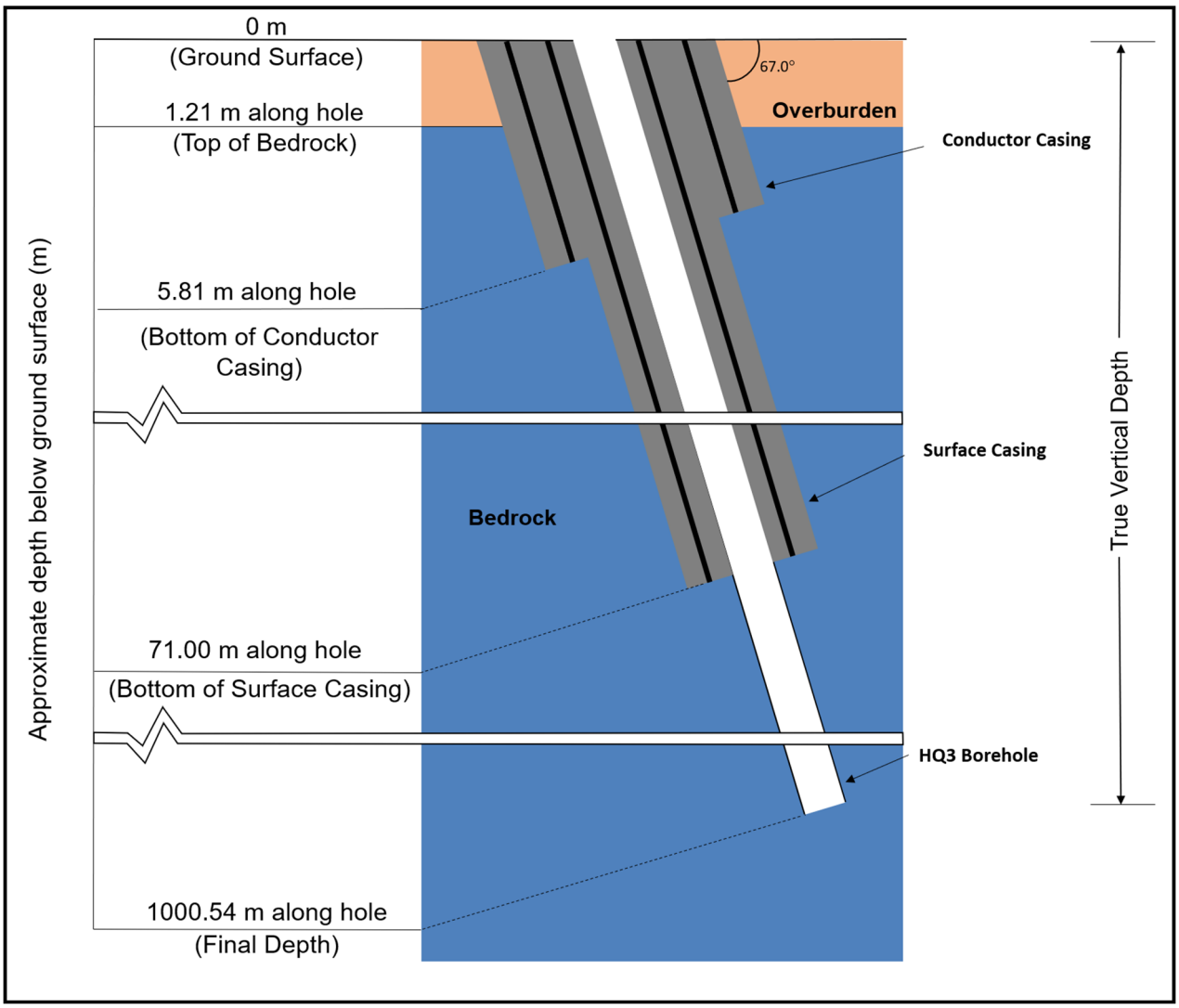


Figure 11: Final IG_BH03 Schematic

4.3 Cementing of Permeable Zones

During drilling of IG_BH03, a permeable zone was encountered and an opportunistic groundwater sample collected as part of WP07. The sampled zone was from 146.88 to 154.61 mbgs (along hole), while the interval selected for cementing, based on core logging observations, was from 147.67 to 153.42 mbgs (along hole) to encompass a fractured dike and iron stained fractures. Most signficantly, continuous drill fluid volume losses, up to approximately 1000 L per run, had been observed during subsequent runs after collection of the groundwater sample, as shown in Table A-2 and Figure B-2 (Appendix B). Drilling continued until the borehole was at a depth of 190.62 mbgs (along hole), where the decision was made to cement the zone.

The procedure followed for cementing of the zone was as follows:

- The HQ drill rods were removed from the borehole and a Van Ruth plug was installed at the bottom of the zone, 153.32 mbgs (along hole);
- The HQ rods were again removed from the borehole, and then lowered with the grout plug to the top of the zone, 147.67 mbgs (along hole);

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- Approximately 270 L of grout (at a ratio of approximately 16.7 L of water per 20 kg bag of LaFarge Type HS cement, with 0.5 L of accellerant per bag) was pumped through the HQ drill rods and chased with about 550 L of drill fluid, until a pressure spike indicated the interval was pressurerized and released the grout plug from the drill rods.
- The HQ drill rods were then removed from the borehole and the curing period for the cemented zone began on August 7 at 16:00.

Coring of the plugs and cemented zone was carried out on August 08, 2019. Some set grout was recovered above the grout plug (approximately 3 m), below which no grout was recovered. The Van Ruth plug was pushed down to the current bottom of the hole (top of rock) and recovered at the top of the next core run, CR76. Coring of the following runs showed volume losses in the range of approximately 200 – 400 L, with no indication of water bearing features observed in the core. By core run CR85, the per run volume losses were down below 100 L. These results suggest that the cementing attempt was unsuccessful, however as volume losses tapered down to acceptable levels, this did not impact the continued drill fluid monitoring. Figure 12 shows the grout plug prior to installation, as well as the recovered Van Ruth and grout plugs.



Figure 12: Grout Plug prior to installation (top left) and recovered after coring through (top right), recovered Van Ruth plug above CR76 (bottom left)

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4.4 Coring Details

Three (3) metre long HQ sized Boart Longyear drill rods were added manually to the drill string one rod at a time as drilling progressed. As with standard deep drilling programs, two core tubes were available at all times, so that when one was removed with a drilled run, the second could be lowered and locked in place while the core was extracted from the first tube. Core tubes were lowered and retrieved using a wireline system in which an overshot tool locked on to the top of the core tube. The core tube was pumped down and locked into the core barrel using the downhole pump; the drillers monitored when it was locked into place by observing a spike in the downhole fluid pressure. This time required to pump and lock the core tube into place to continue coring increased with the depth of hole; having a second tube to start this process while the core was extracted from the first was valuable for efficiency.

After the conductor casing was installed, the borehole was advanced using a triple tube wireline drilling system for the entirety of the hole to minimize disturbance to the recovered drill core. Triple tube coring involves using steel, split core liners to line the inside of the core recovery tube, which is locked within the core barrel during drilling. The core tube is recovered using the wireline at the completion of each drill run, with the split liners removed from the core tube on surface. The split liners help reduce the volume of drill fluid that can circulate within the core tube, helping to prevent the drilled core from being disturbed and to retain fine grained materials encountered. Table 1 presents the details of the casing and coring rods used to complete IG_BH03, while Table 2 presents the borehole diameter details.

Table 1: Details of Casing and Coring Rods used by Rodren for IG_BH03

Casing Type	Outer Diameter (mm)	Inner Diameter (mm)	Joint Torque (Nm)	Weight (kg/m)
Conductor (PWT) Casing	139.7	127.0	N/A	21.4
Surface (PQ) Casing	114.3	101.6	N/A	17.4
PQ Advancing Bit	121.0	94.2	N/A	N/A
PQ Shoe Bit	117.5	100.5	N/A	N/A
HQ Drill Rods	88.9	77.8	2000	11.44
HQ3 Drill Bit	96.0[1]	61.1[2]	N/A	N/A

[1]Open borehole diameter. [2]HQ3 core diameter size.

Table 2: IG_BH03 Borehole Diameter Details

Depth from (mbgs along hole)	Depth to (mbgs along hole)	Casing Type	Outer Borehole Diameter (mm)	Inner Diameter Within Casing (mm)
0	5.81	Conductor (PWT) Casing and Surface (PQ) Casing	143.76	101.6
5.81	71.00	Surface (PQ) Casing	121.0	101.6
71.00	1000.54	Open Borehole (HQ size)	96.0	96.0

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4.4.1 Ground Conditions

In general, ground conditions were good and did not cause problems with the drilling process; there was a single occurrence of a core tube blockage caused by poor quality or fractured rock, which is described in the following Section 4.4.2. No complete circulation losses were encountered, however volume losses up to 1000 L were observed after encountering the permeable zone that was sampled under WP07 between 146.88 to 154.61 mbgs (along hole). While the success of the attempt to cement this zone was not observed to be high (see Section 4.3), volume losses decreased in the runs drilled after, and were generally within normal ranges (+/- 100 L per run) for the remainder of the borehole.

4.4.2 Core Quality

A single occurrence of core loss encountered in IG_BH03 was confirmed with the televiewer logs. Both the core logging and televiewer data indicated a lost core zone approximately 30 cm wide at a depth of 32.4 mbgs (along hole). There were three other instances of lost core logged during drilling, however, these were due to mechanical grinding from the drilling process. The first two mechanical loss zones were 25 cm and 31 cm wide and occurred at a depth of less than 7 mbgs (along hole). These zones are likely due to increased fracturing at surface but could not be confirmed from televiewer data due to the installation of conductor casing. The third instance occurred at 376.6 mbgs (along hole) and was a 4 cm zone noted during a blocked drill run, likely due to mechanical core grinding. This loss was confirmed to be mechanical in origin by the televiewer logs.

Instances of mechanically broken core were also occasionally encountered. These typically occurred where the presence of sand sized ground core within the split tube resulted in the drill core becoming jammed in the core tube. When this occurred, drillers had to use mechanical force on surface to remove the inner split tube, causing damage to the rock core in the process.

“Candy cane” striping was observed on occasion on the drill core, caused by the core tube moving within the barrel during the drilling process. Normally, the back-end assembly at the top of the core tube engages a locking mechanism that prevents the core tube from rotating along with the core barrel. On occasion, this mechanism failed and the “candy cane” pattern was observed on the core; occasional failure of this is not uncommon in deep drilling programs. Inspections of the drill string tooling were carried out to ensure the system was functioning as intended and the striping of the core was not continuous.

Ribbing (uneven or wavy core diameter) of the core tends to occur as the drill bit becomes worn down and increased torque is required to continue coring. Drillers were typically aware when this occurred due to noticeably reduced rates of penetration, and verified suspicions by inspecting the core for these signs. Bit sharpening involved momentarily increasing torque or cutting off the water supply to sharpen the drill bit by exposing fresh diamonds, but results in increased ribbing. Drillers commonly carry out bit sharpening to maintain performance during the life of the bit. Efforts were made to restrict bit sharpening to the start or end of a drill run so that uneven diameter core was not present within the central part of a core run (mainly for aesthetic purposes).

4.4.3 Drill Bit Changes

Drill bit changes were required as coring advanced and the drill bit became worn down. Bit changes involved removing the core tube from the rods, then using the rod handler on the drill rig to remove all the drill rods from the borehole, typically two at time. These stands of rods were stacked in the drill shack during the bit change so that they were easily accessed by the rod handler to go back down the borehole. When all the rods were removed, the core barrel was inspected for damage and signs of wear, and the bit replaced. Drilling in this relatively abrasive rock required frequent bit changes (approximately 1 every 100 m of drilling). Drilling of

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IG_BH03 was carried out using the drill bits listed in Table 3. Note that the specific depths of the six drill bits used between 0 to 722 mbgs (along hole) were not recorded.

Table 3: Summary of Drill Bits used for Coring of IG_BH03

Drill Bit Name	Depth used from (mbgs)	Depth used to (mbgs)	Total drilled length used (m)
4 x Safari 8aa, 2 x Longyear 8	0	722	-
Safari 8aa	722	854	132
Atlas Copco AC7	854	917	63
Atlas Copco AC11	917	1001	84

4.5 Borehole Location and Orientation Details

The planned drill site for IG_BH03 was surveyed by Rugged Geomatics Inc. as part of the access roads survey. This original site survey involved the use of a local reference points (ORPs) derived from GPS observations using the Precise Point Positioning service from Natural Resources Canada.

The as-built borehole collar was surveyed on January 14, 2020 by Rugged Geomatics Inc. Elevation data was measured for the various tops of casings, the sump weld (the point on the PWT casing where the sump box was installed) as well as a ground surface point, with Northings and Eastings only measured for the top of the sump weld and the ground surface point. The coordinates of the measured ground surface point were arbitrary as the surveyor measured some distance away from the actual borehole collar to provide an estimated ground surface elevation at the borehole.

Given the as-built coordinates of the top of the sump weld, the along-hole distance between the sump weld, top of the PQ, PWT and ground surface reference point (from WP02 field notes) as well as the casing orientation of approximately 185˚ / -70˚, the following relationships were used to translate the Northing, Easting and elevation of the sump weld point to the PQ casing, PWT casing, WestBay casing and the ground surface reference point coordinates:

Northing: COS(70˚)*COS(185˚)
Easting: COS(70˚)*SIN(185˚)
Elevation: -SIN(70˚)

The calculated and provided and the as-built coordinates of IG_BH03 are presented in Table 4, with a reference schematic of the borehole survey points provided in Figure 13.

Table 4: IG_BH03 Final Surveyed Collar and Casing Coordinates

Point	Northing (m)	Easting (m)	Elevation (m)	Comment
Borehole Collar - Ground Surface (RP for drilling)	556171.46	5484534.33	441.561	Calculated E, N & Elev
Sump weld	556171.47	5484534.50	442.02	Provided E, N & Elev

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Point	Northing (m)	Easting (m)	Elevation (m)	Comment
Top of conductor (PWT) casing	556171.49	5484534.62	442.36	Calculated E & N
Top PQ Weld	556171.49	5484534.63	442.38	Calculated E & N
Top of surface (PQ) casing	556171.50	5484534.81	442.88	Calculated E & N
Top of WestBay Casing	556171.50	5484534.80	442.86	Calculated E & N

Note: Elevations are Geodetic and referred to the CGVD28 Datum and coordinates are referred to UTM Zone 15, NAD 83 (CSRS).

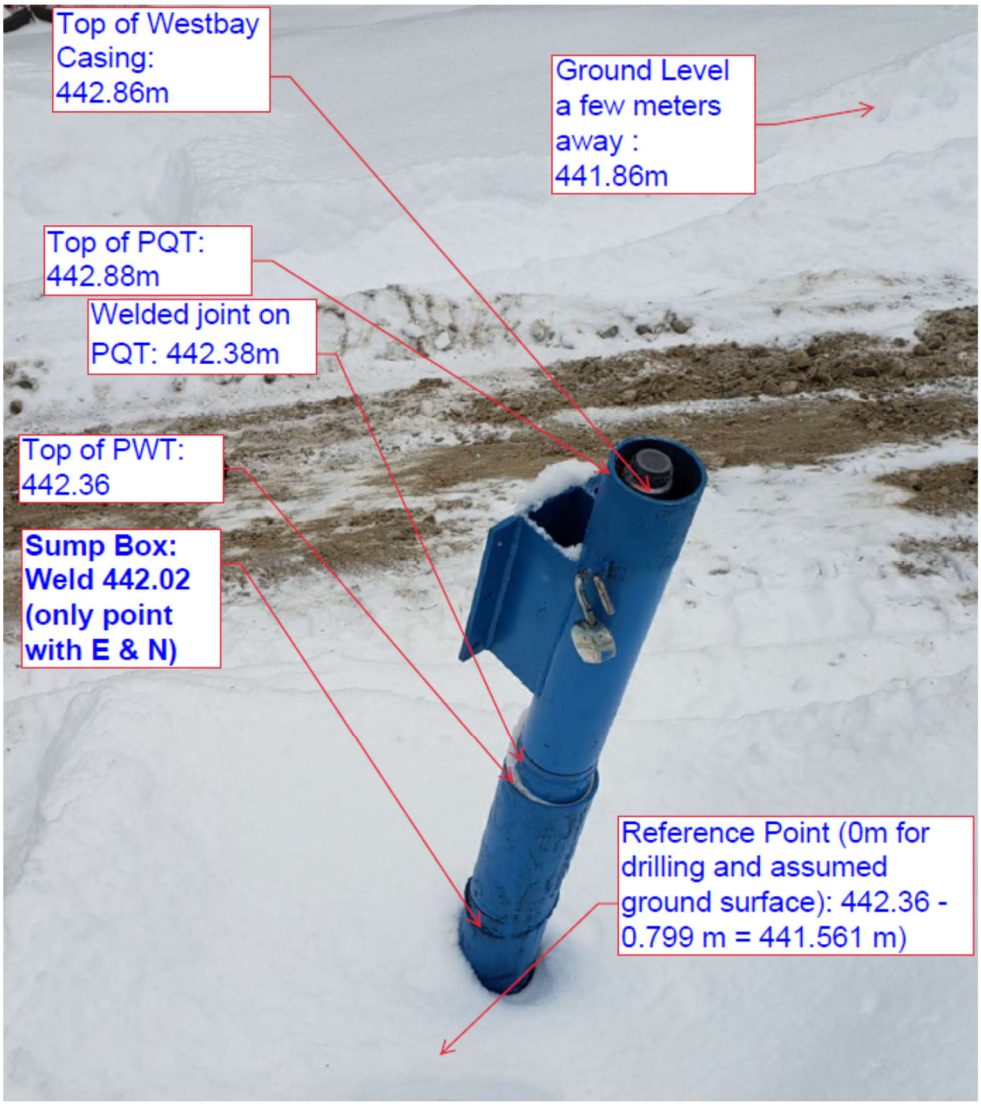


Figure 13: IG_BH03 As-Built Borehole Survey Schematic

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4.5.1 Borehole Orientation

The borehole was planned to be drilled with an azimuth and inclination of 180˚ / 70˚ with no correction made for deviation as the drilling progressed.

The borehole was surveyed every 50 m during drilling with a Boart Longyear TruShot™, a magnetic survey tool. Generally, the borehole was advanced about one run (about 3 m) past the 50 m mark and one or two rods were pulled from the drill string to allow the tool to sit outside of the rods when downhole. The TruShot was then calibration checked on surface following the manufacturer's recommendations and the tool lowered into the borehole to perform the survey. The calibration check was occasionally performed after the survey during the day shift. Rodren then presented the survey results to Golder and they were entered into the acQuire database. The tool's accuracy from the manufacturer is listed as ±1° for azimuth and ±0.3° for dip.

A final borehole survey with a REFLEX SPRINT-IQ™ was carried out upon completion of drilling, with a measurement point taken every 10 m. The tool was set to collect a reading every 10 m, with a starting measurement at 990 mbgs (along hole). The control unit of the tool allows the user to control when the measurement is taken after using the wireline equipped with a depth counter to move the tool along the borehole. At the end of the survey, a measurement point was taken inside the casing at the borehole collar, estimating the original drill rig mast alignment at 185.087˚ / -69.74˚.

Comparison with additional borehole orientation surveys (WP05) and structural measurements (WP03) showed the REFLEX SPRINT-IQ survey was shifted 10 m (along hole) deeper than all other surveys collected under WP05. This was also observed through comparison with the TruShot measurements, though these measurements at 50 m (along hole) increments were coarser and the shift was less obvious. During the initial REFLEX SPRINT-IQ survey, the tool encountered an error in recording the measurement at 930 mbgs (along hole), which was actually the measurement at 920 mbgs (along hole). As the shift was not recognized while in the field, the point at 930 mbgs (along hole) was recaptured and therefore there is a gap in the survey at 920 mbgs (along hole). The end of the borehole was therefore projected considering the final survey point at 980 mbgs (along hole) and the final measured depth of 1000.54 mbgs (along hole).

The final survey with corrected measurements is presented in Table A-1 (Appendix A). Figure 14 presents the borehole deviation graphically, calculated using the minimum curvature method. Inspection of Figure 14 shows the borehole deviating 106.5 m to the West and 40.6 m to the South from the planned end location.

As part of WP05, five additional deviation runs were completed using the OBI40-2G and ABI40-2G probes, as described in WP05 Report (Golder 2020d).

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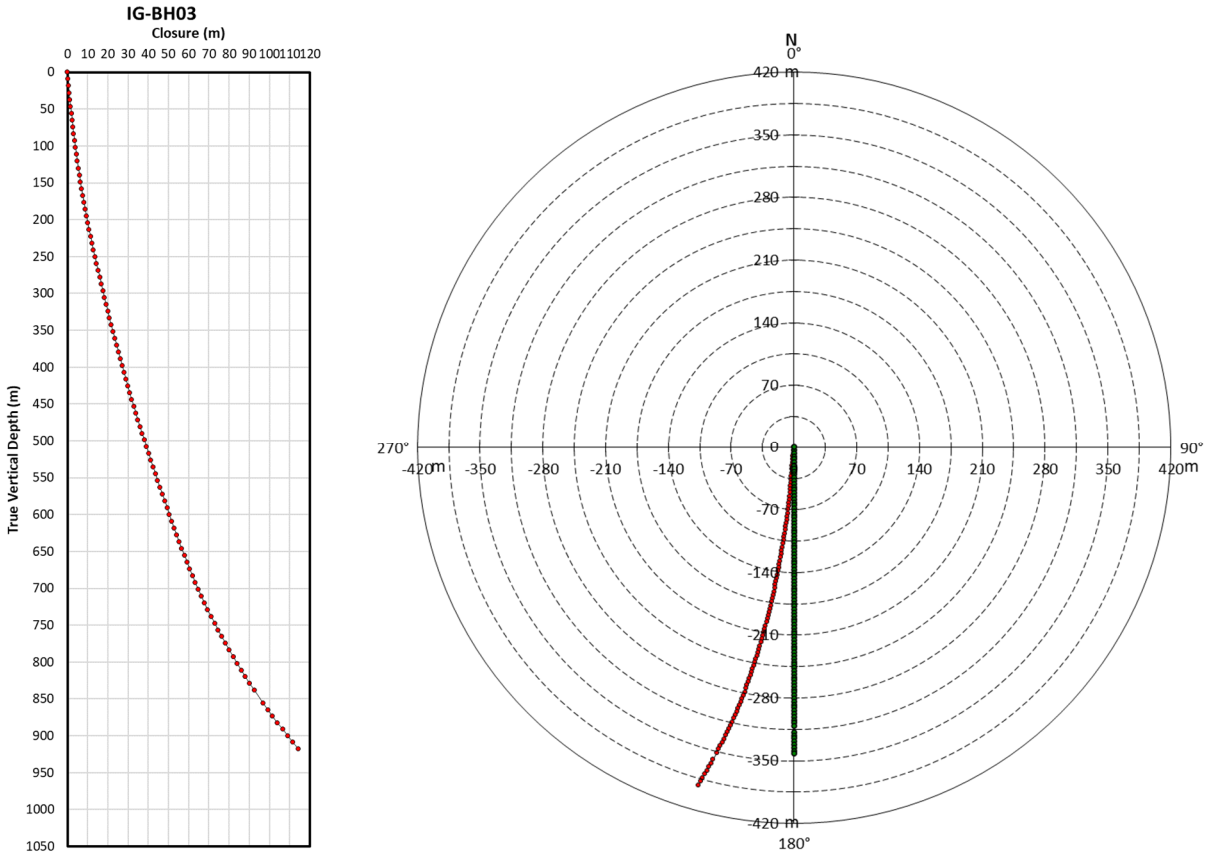


Figure 14: Borehole Deviation (left) and Bullseye Plot (right) from Final SPRINT-IQ™ Survey: red plot lines show the actual borehole trajectory and the black plot line (Bullseye Plot) indicates the planned borehole trajectory

4.6 Monitoring Drilling Parameters

Drilling supervisors were stationed at the rig during coring, to record the start and end times of each drill run and observe the drilling parameters during coring as well as any occurrences of drill fluid spills or maintenance related activities. The drill parameters included torque, thrust / holdback or down pressure, fluid injection pressure and downhole fluid flow. These parameters were observed from the gauges at the drill controls. In general, these parameters were steady over the duration of a 3 m run, with overall patterns observed for IG_BH03.

Results of the drilling parameters collected are shown graphically on Figure B-1 (Appendix B) and presented in Table A-2 (Appendix A). General observations are listed below.

- Rate of Penetration was observed to be relatively consistent, with an overall increasing trend with depth. Anomalous high rates were occasionally observed, but these generally correspond to runs where the bit wore out and had to be changed.
- Bit Rotation Speed was not observed as the corresponding gauge on the drill rig control panel was not functioning.
- Torque and down pressure generally increased with depth, with the down pressure adjusted from thrust to holdback pressure at approximately 550 m. The down pressure was shown on a single gauge, therefore the adjustment from thrust to holdback had to be communicated by the drillers.

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- Pump pressure generally increased with depth as a higher pump rate was required to adequately flush the hole.

It should be noted for all parameters that day shift and night shift drillers had different approaches to their drilling technique and fluctuations in all observed parameters reflect this.

4.7 Borehole Flushing

Borehole flushing was carried out on IG_BH03 with 100 ppb fluorescein traced fresh water prior to geophysical televiewer surveys on two occasions: prior to installation and cementing of the surface casing, and at the completion of drilling.

Fresh water was circulated with a fluorescein tracer (target concentration of 100 ppb, the same used during coring) into the borehole through the drill rods until the return fluid was clear and had water quality indicator parameters that were targeted to be within 10% of the source water for turbidity, dissolved oxygen and electrical conductivity, within 20% of the source water fluorescein concentration and within 0.5 of pH of that of the fresh water used. Once reached, fresh water was to be circulated, targeting an additional 2 borehole volumes of water. After this point, drill rods were withdrawn from the borehole, and the flushed water in the borehole allowed to “settle”, targeting 12 hours before geophysical logging took place.

Prior to surface casing installation, flushing was carried out on July 22, 2019, with the borehole at a depth of 102.12 mbgs (along hole) and an approximate volume of 815 litres. Approximately 8,400 litres of fresh water (over 10 borehole volumes with HQ rods in place) was flushed through the borehole, with the fluid parameters consistently monitored to determine when they were within specified indicator parameters of the fresh water. The final fluid parameters were within 10% of the source water for turbidity, dissolved oxygen and electrical conductivity, within 20% of the source water fluorescein concentration and within 0.5 of pH.

The final IG_BH03 flushing event was carried out over a two day period, from September 16, 2019 to the very early hours of September 18, 2019. Approximately, 42,700 litres representing just under 6 borehole volumes (borehole volume without HQ rods) were flushed through the borehole. Appendix C presents the water quality parameters for the final borehole flushing.

5.0 SUMMARY OF DRILL FLUID MANAGEMENT AND USE OF TRACERS

There were two drill fluid recycling systems used during the drilling of IG_BH03: the settling tanks and the centrifuge. In addition, while monitoring of the drill fluid volume losses and gains during coring was planned and initially carried out through use of totalizing flowmeters, the margin of error encountered through use of these was found to be too large to adequately identify actual drill fluid volume changes. The totalizers employed during the program were found to produce variable readings, and manual measurements of the volume of the drill fluid system components were observed to be the most the reliable means of monitoring the drill fluid volume changes. These modifications and changes, as well as the results of the drill fluid parameter and volume monitoring are described in the subsequent sections.

5.1 Drill Fluid Closed System

5.1.1 Drill Fluid Recycling Systems

Settling Tanks

At the outset of the program, three plastic tanks were set up in series to remove solids from the drill water return and recycle the water for use during coring. These settling tanks had a combined capacity of approximately

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13,500 litres. A slow-dissolving solid flocculant additive (AMC FLOC BLOCK) was placed in the first settling tank, where drill fluid from downhole was returned to surface. The drill water returning to surface was pumped to the first settling tank via a submersible pump, located in the steel sump box sealed at the collar of the hole. Drill cuttings settled out of the fluid over time, and the fluid was cascaded from the first tank, to the second tank and finally to the third tank. Drill fluid from the third tank was then pumped to the plastic tank in the rig for use downhole, hence completing the recirculating closed-loop system, as shown in Figure 15.

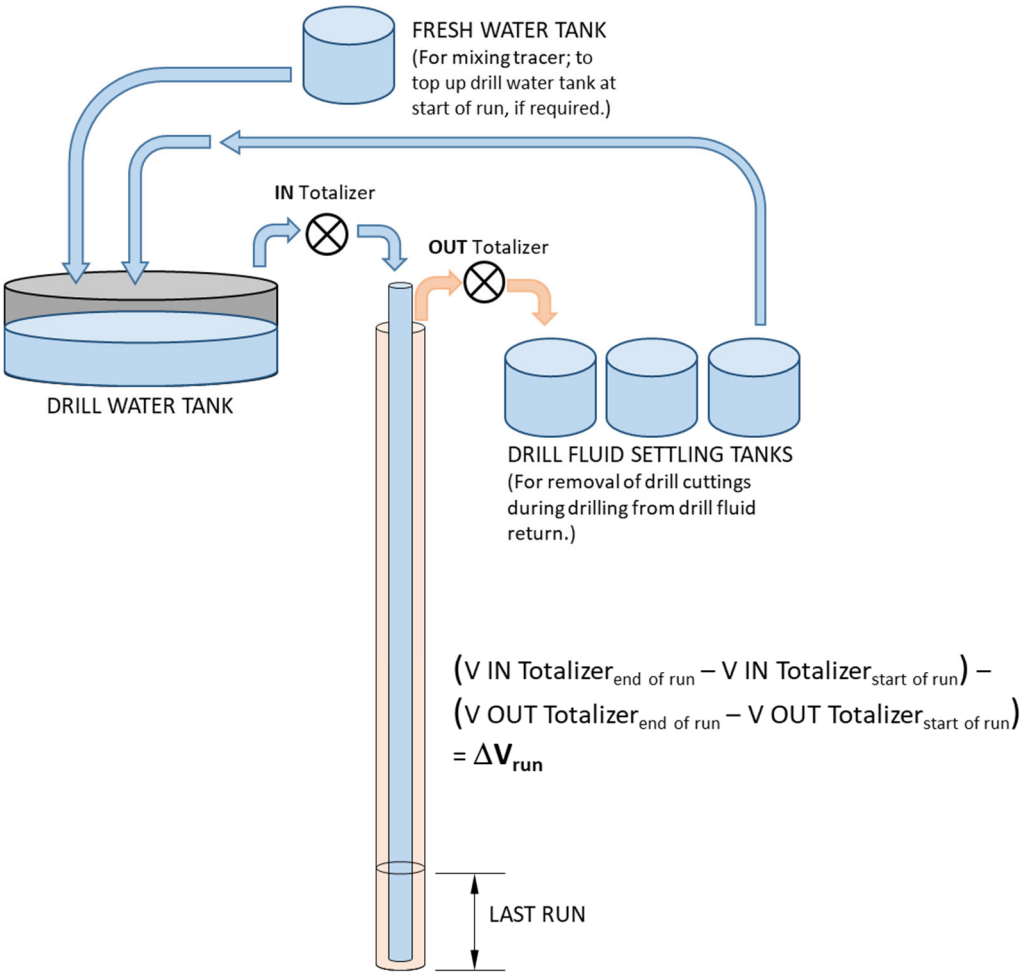


Figure 15: Drill Fluid "Closed System" in use with settling tanks and totalizers

As coring progressed, the increased down time due to maintenance required by the settling tank system became apparent. The large number of hose lines used in the system increased the occurrence of minor drill fluid spills, as blockages in the hose lines between the tanks became more frequent with increased turbidity of the drill fluid. In addition, the system required complete removal of all the drill fluid and replacement with fresh, traced water approximately every 100 m of coring. The drill fluid was also observed to become more saturated with cuttings than anticipated, which required that a higher concentration of drilling mud to be used. This occasionally prevented filtering of the drill fluid for fluorescein readings (for CR69 to CR76). For these reasons, the decision was made to instead use a centrifuge to remove the solid cuttings from the return drill fluid. The installation of the centrifuge was carried out over the period of August 17-18, 2019.

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Centrifuge

This drill fluid system consisted of three components: a centrifuge (SRU™) tank, a plastic mixing tank in the rig and the borehole itself. The centrifuge tank (approximate capacity of 2.60 m^3) pumped water to the tank in the drill rig (approximate capacity of 0.65 m^3) using a submersible pump, from which water was pumped downhole using the rig's pump. The drill water returning to surface was pumped via a submersible pump, located in the steel sump box sealed at the collar of the hole, to the centrifuge where the cuttings were removed, and the cleaned water fell back into the centrifuge tank. This provided a closed system where fresh water was only introduced after confirmation from the Golder drilling supervisor. A schematic representing this closed drill fluid system is shown in Figure 16.

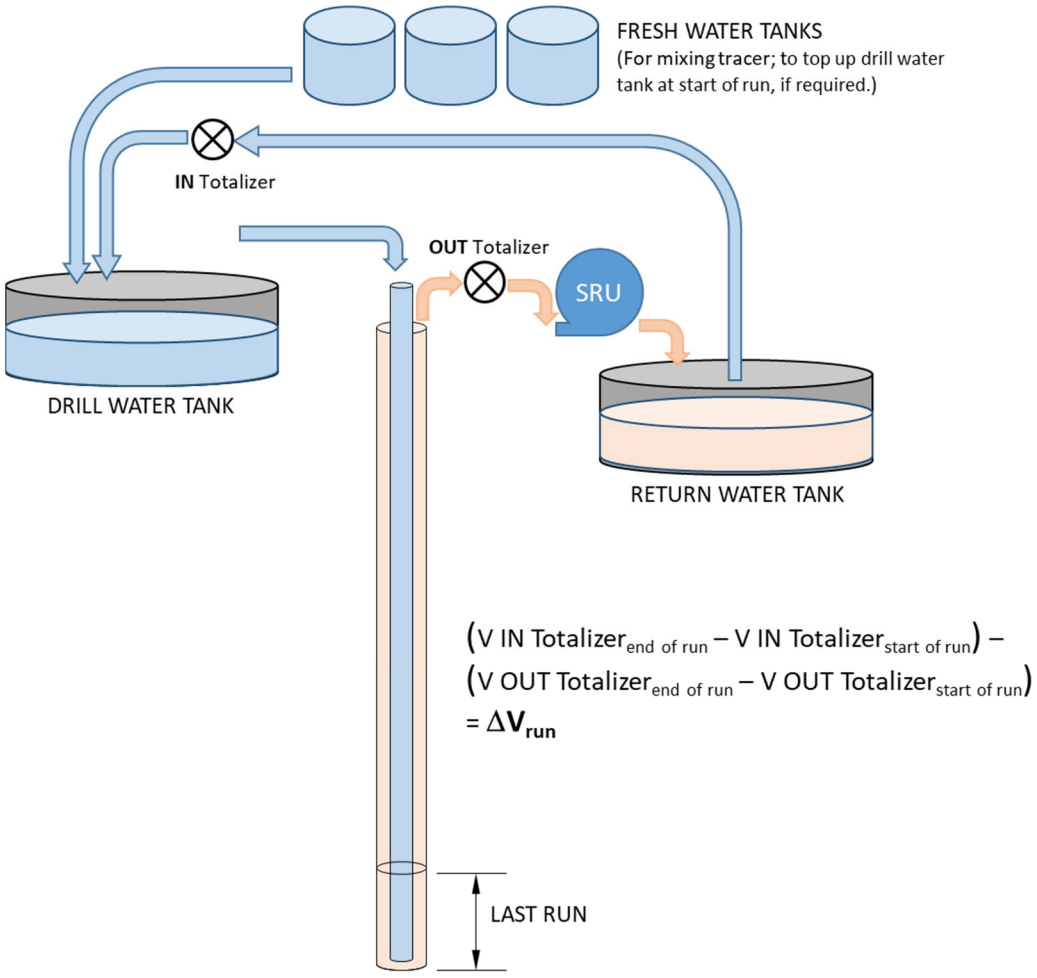


Figure 16: IG_BH03 Drill Fluid System considering manual tank measurements

5.1.2 Drill Fluid Volume Monitoring Methods

The volume of water used during drilling was initially tracked using electronic totalizing flowmeters. These displayed total volume, with one installed inline with the drill pump that feeds drill fluid downhole ("IN" totalizer), and one installed inline with the sump pump that pumps the return drill fluid to the settling tanks ("OUT" totalizer). Prior to commencing coring of a run, the system was paused (i.e. the pumps will be stopped temporarily) and the volume displayed on each totalizer read. The pumps were then be restarted and the run cored. Upon completion of coring, the pumps were again temporarily stopped, and the volume displayed on each totalizer was read.

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The difference in recorded volumes for the “IN” totalizer and the “OUT” totalizer indicated the total volume used during coring and the total volume returned to surface, and was intended to give a reliable indication of the volume of drill fluid lost to or gained from the formation during coring of a given run.

Table 5 lists the various totalizers used over the course of the program. All totalizers were calibration checked in the field prior to commissioning them for use. The Khrone electromagnetic totalizer installed on the outflow was not changed, and was used with both drill fluid recycling systems. At the start of drilling, a sonic totalizer was installed on the inflow after the rig pump, as it was not limited by the pressure experienced by this hose line (downhole fluid pressure). On July 29, 2019, it was noted by WP02 on site staff that the sonic totalizer was glitching on and off during coring, therefore not accurately recording the volume of fluid pumped down hole. After failure to resolve the issues experienced by this totalizer, a simple, mechanical paddle flowmeter was procured by Rodren and installed on the inlet that filled the drill water tank within the rig (due to pressure limitations). This flowmeter had internal calibration factors that required adjustment based on the viscosity of the drill fluid, and was therefore subject to frequent in-field recalibration based on the concentration of drilling mud present in the drill fluid. As this was installed along the inlet to the drill water tank and not directly on the downhole pump, it also required that the tank be at the same water level at the start and end of the run. As a result of the increased time required to manage these flowmeters, a second Krohne electromagnetic flowmeter was procured and installed on site over the same period that the centrifuge was put into service: August 18, 2019.

On September 5, 2019, artificial drill fluid gains were observed based on the difference in the totalizer readings. As a result, manual tank readings were implemented as verification of the totalizer readings. The volume of the system was monitored by measuring the depth of water in the borehole, the drill tank and the centrifuge tank, once all bypasses and pumps were temporarily off so that all water levels were steady. System volumes were measured at the end of each run, as well as at the start of every run when there was a significant delay in drilling, and when fresh water was added into the system. Fresh water was added to the drill system as water was lost to the formation and as the volume of the system increased relative to the volume of drill water in the system (that is, as the hole was deepened, the available volume of the system increased). A baseline reading of the new drill fluid volume in the system was recorded when this was done, so that subsequent fluid losses to the rock could be identified as potential groundwater sampling triggers. More details of the volume monitoring can be found in Section 5.5.

In general, the difficulties experienced with use of the totalizers is attributed to their sensitivity to their installed configuration, and more significantly, the highly variable flow rates and pressures they were subjected to, creating too dynamic an environment for them to provide consistent performance.

Table 5: List of totalizers used during drilling IG_BH03

Date		Depth (m)		Totalizer IN	Totalizer OUT
From	To	From	To		
09-Jul-19	30-Jul-19	0	124.57	Sonic[1]	Krohne[3]
30-Jul-19	18-Aug-19	124.57	436.64	Fill-Rite[2] + Sonic[1]	Krohne[3]
18-Aug-19	16-Sep-19	436.64	1000.61	Krohne[3]	Krohne[3]

[1]Blue-White ultrasonic flowmeter
[2]Fill-Rite in-line digital turbine meter
[3]Krohne Optiflux electromagnetic flowmeters

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5.2 Fresh Water Management and Sampling

Fresh water was stored in two 28,350 litre Baker tanks located on the east side of the site. Fresh water was collected from a municipal source in Ignace and transported to site via a local water truck service. Ignace has a water treatment plant, and municipal water is treated to adhere to Ontario drinking water standards. The municipal water is sourced from Lake Michel, which is located approximately 1km north of Ignace, and undergoes filtration and chlorination at the water treatment plant. Where possible, two individual tanks of fresh water were circulated together using a submersible pump, in order to mix them into a single batch of fresh water for sampling. Each batch of fresh water was individually sampled before being introduced to the drill water system and entering the borehole. All fresh water batches were termed “water source” and designated for sample collection as IG_BH03_WSXXX.

5.2.1 Water Source Samples and Testing

Water source samples were collected from all batches of fresh water delivered to site, prior to fluorescein addition and prior to introducing the water to the drill system. Water was collected from the storage tanks into a clean, triple rinsed 19 litre (5 gallon) bucket, and then transferred into labelled bottles using new syringes, or new tubing with a peristaltic pump. Samples were collected for submission to Bureau Veritas (BV) and Isotope Tracer Technologies (IT2) as per Table 6, and in-field geochemistry analyses were carried out on the samples.

In-field geochemistry analyses methodologies are described in the WP07 Report – Opportunistic Groundwater Sampling for IG_BH03 (Golder 2020a) and include alkalinity, sulphide, ferrous iron and dissolved oxygen analyses.

Table 6: Sample Bottle Requirements for Bureau Veritas and Isotope Tracer Technologies

Parameter Group	Parameter List	Bottle Type Requirement	Sample Volume Requirement	Head Space Requirement	Field Filtering Requirement	Preservative Requirement
Major Elements & Metals (BV)	Na, K, Ca, Mg, Sr, Li, Si, S_{Total}, Fe_{Total}	HDPE plastic bottles	120 mL	Fill line	Yes, 0.45 µm filter	Trace grade nitric acid
	SiO_2	HDPE plastic bottles	250 mL	None	Yes, 0.45 µm filter	None
	S^{2-}_{Total}	HDPE plastic bottles	125 mL	Fill line	Yes, 0.45 µm filter	Zinc acetate and sodium hydroxide solution
Anions & Nutrients (BV)	Br, F, Cl, I, SO_4, PO_4, NO_3, NO_2	HDPE plastic bottles	500 mL	None	Yes, 0.45 µm filter	None
	NH_4+NH_3, N_{Total}	HDPE plastic bottles	250 mL	Fill line	Yes, 0.45 µm filter	Trace grade sulphuric acid
	P_{Total}					
Stable Isotopes (IT2)	$\delta^{18}O$, δ2H	HDPE plastic bottles	30 mL	No headspace	Yes, 0.45 µm filter	None
	$^{87}Sr/^{86}Sr$	HDPE plastic bottle	1000 mL	No headspace	Yes, 0.45 µm filter	None

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Parameter Group	Parameter List	Bottle Type Requirement	Sample Volume Requirement	Head Space Requirement	Field Filtering Requirement	Preservative Requirement
	$\delta^{13}C$ DIC	Amber glass vials, teflon cap	2 x 40 mL glass vials with septa caps	No headspace	Yes, 0.45 µm filter	None
Radio-isotopes (IT2)	^{14}C-DIC	HDPE plastic bottle	500 mL	No headspace	Yes, 0.45 µm filter	None
	^{3}H	HDPE plastic bottle	500 mL	No headspace	Yes, 0.45 µm filter	None

A total of 10 water source samples were collected during the drilling program as follows:

- IG_BH03_WS001 to IG_BH03_WS009 were collected and used during regular coring and flushing activities; and
- IG_BH03_WS010 was collected and used to top up the borehole during the WP05 geophysics and WP06 packer testing activities (to avoid influencing the static water level).

All water source data (including in-field parameters, in-field analyses and laboratory results) are included in the Opportunistic Groundwater Sampling WP07 report for IG_BH03 (Golder 2020a).

5.2.2 Fluorescein Addition

After a sample was collected from the fresh water tank or tanks, fluorescein was measured using an analytical scale (due to the small mass of powdered fluorescein required for each tank) and added to the tank or tanks. Each tank was circulated to mix in the fluorescein using a submersible pump with an attached hose placed inside the tank. Due to their large capacity, the tanks were generally left to circulate and mix for the majority of a 12-hour shift, or until consistent concentration readings were collected. The water was tested for fluorescein concentration using the AquaFluor fluorometer until the desired concentration was achieved. Once the fluorescein concentration was close to the specified target (100 ppb for all activities), the water was transferred to the drill system as required. Figure 17 below shows the tracer being added to the source water in one of the fresh water tanks used during the program.

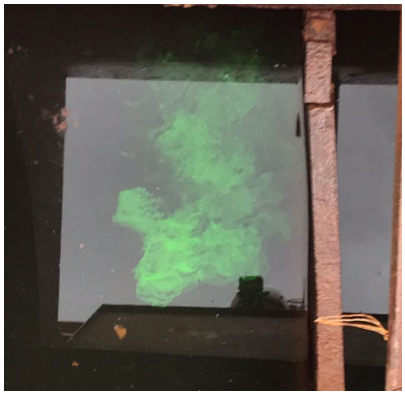


Figure 17: Fluorescein Tracer being added to the Source Water

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5.3 Drill Fluid Field Parameters

At the end of the core run, drilling supervisors communicated with the drillers to time the collection of drill fluid with the completion of the run, to pause to allow a rod stick-up measurement, followed by the temporary shutting off of pumps to record the values on the totalizers as well as measure the fluid volumes in the tanks. Drillers and drill supervisors developed a workflow to communicate when the drillers could proceed to the next activity, that is, when measurements and sample collection were complete, and the drillers could lower the overshot to retrieve the core barrel.

Drill fluid field parameters were measured using a Horiba U52-2 multiparameter water quality meter. A baseline reading was taken prior to the start of drilling, and all subsequent occasions when fresh water was added to the system. New baseline readings were typically collected from the drill tank when the settling tanks were in use, or from the centrifuge tank when the water management system was switched. At the end of each drill run, a sample of water for field parameters was collected from the return drill fluid prior to entering the first settling tank, or from the outlet of the centrifuge that drained into the tank. This system allowed a sample of water directly from the borehole to be collected and tested, providing the most representative parameters possible for that run.

Fluorescein concentration was also measured from this sample. The presence of cuttings in the drill water was observed to mask the fluorescein concentration readings measured with the AquaFluor, and drill fluid samples were therefore filtered using an inline high volume 0.45 µm filter prior to collecting readings.

After run CR274 was drilled (with the borehole at a depth of 760.65 mbgs along hole), the glass hydrometer used to measure the density of the drill fluid was broken. No measurements of density were therefore collected for the return fluid from runs CR275 – CR278. From CR279 to the end of the borehole, density estimates of the drill fluid were taken by weighing an approximately 100 ml sample of the fluid with an analytical scale.

The field parameters of the drill fluid measured each run and the corresponding triggers to initiate a WP07 opportunistic groundwater sample collection attempt are presented in Table 7. These parameters were monitored each run, and if a trigger was considered valid, Golder and the NWMO would coordinate to initiate an opportunistic groundwater sample (WP07).

Table 7: Drill Fluid Monitoring Parameters and WP07 Triggers

Field Parameter	Instrument	Trigger to Initiate WP07 / Target ranges for borehole flushing
Fluorescein dye (tracer)	Aquafluor Handheld Fluorometer/Turbidimeter	20% change in concentration from previous drill fluid source Note: Minimum detection limit of the fluorometer (0.4 ppb)
Turbidity	Horiba U52-2 multiparameter water quality meter	10% change from the previous drill fluid source
Dissolved Oxygen		10% change from the previous drill fluid source
Electrical conductivity		10% change from the previous drill fluid source
pH		change of at least 0.5 from previous drill fluid source
Temperature		N/A
Density	Hydrometer	N/A

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5.3.1 Drill Fluid Parameter Data

The drill fluid parameter data is shown graphically on Figures B-2 and B-3 (Appendix B) and presented in Table A-2 (Appendix A).The change from settlings tanks to the centrifuge is identified on the graphs in Appendix B. General observations and comments are listed below.

- Fluorescein concentration required frequent adjustment in the drill fluid system, with fluorescein added about every 10-15 runs. As the borehole depth and drill fluid system volume increased, the time for the fluorescein readings to equalize in the system when extra fluorescein was added increased, and concentration readings occasionally varied over 20% from run to run. In general, the fluorescein concentration of the drill fluid remained between 80 and 120 ppb.
- The frequent fluorescein adjustments were necessary as the concentration in the drill fluid decreased as the fluid was processed through the centrifuge and cuttings were removed.
- Some gaps appear in the fluorescein readings where the addition of excess drill mud (AMC Pure-Vis) caused the drill fluid to be too viscous to effectively filter.
- Density of the drill fluid increased as the saturation with cuttings increased. When the density is observed to drop back closer to 1 g/cm^3, this generally corresponds with the addition of fresh water to the system. From 769.64 mbgs to the end of the hole, the drill fluid density was assessed by measuring 100 mL (measured in a small beaker) of drill fluid with an analytical balance. These readings are coarser than those measured with the hydrometer, and can be observed to fluctuate between 0.98 and 1.04 g/cm^3 in increments of 0.01 g/cm^3.
- Turbidity remained above the Horiba's measurement range (1000 NTU) for the majority of the program, as the drill fluid became saturated with drill cuttings.
- There are a few notable changes in the drill fluid electrical conductivity and pH. The spikes occurring at the very top of the borehole and around 200 mbgs (along hole) are related to the initial casing installation and the cementing of the permeable zone. Corresponding spikes in pH can also be observed at these locations. With the exception of these spikes, electrical conductivity and pH were fairly consistent while the drill fluid was recycled using the settling tanks. After the centrifuge was installed, electrical conductivity can be observed to increase fairly consistently with depth, with a large spike around 960 mbgs (along hole). pH can be observed to decrease after implementation of the centrifuge.
- Dissolved oxygen (DO) fluctuated continuously in the sensor's range. Through these fluctuations, DO appears to decrease in the system when the settling tanks were in use, and increase over time when the centrifuge was use.
- The temperature of the drill fluid system was higher at the start of drilling, related to the higher seasonal temperatures during July, and stabilized to a fairly consistent range of 15-20˚C as drilling progressed and the centrifuge was implemented.

5.4 Drill Fluid Additives

Throughout the drilling of IG_BH03, a bio-degradable polymer-based drilling additive, AMC Pure-Vis, was added to the drill fluid via the drill tank in the rig. This additive generally improves the ability of the fluid to lift cuttings from the drill bit and out of the borehole, helping to manage the drill bit binding with cuttings and causing spikes in the torque. A sample of the drill fluid containing this additive was taken during the initial PWT casing installation

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process and denoted IG_BH03_DW001. As previously described, while the settling tanks were in use, a slow-dissolving solid flocculant (AMC FLOC BLOCK) was added to the first settling tank to aid in the settlement of solid cuttings from the drill fluid. A sample of the drill fluid containing the flocculant was collected when the borehole was at a depth of 25.61 mbgs along hole, and denoted IG_BH03_DW002. A third drill fluid additive sample, IG_BH03_DW005, was collected with the borehole at a depth of 124.57 mbgs along hole, when more Pure-Vis was added. In addition, an archive drill fluid sample, IG_BH03_DW010 was collected when Pure-Vis was added in a higher than normal concentration. This sample was not sent to the analytical laboratory for testing, but is available for future testing if required. After this, Pure-Vis was continually added to the drill fluid as required. Further samples were not collected, but any additions were noted by the drilling supervisors on the drill run forms.

All drill fluid additive samples were tested for the major anions and dissolved metals. The results are included in the Opportunistic Groundwater Sampling WP07 report for IG_BH03 (Golder 2020a).

5.5 Drill Fluid Return Volume Monitoring Data

Drill fluid volumes were monitored continuously during coring activities through use of the totalizers and after a depth of 805.64 mbgs (along hole), volumes changes were verified by checking the water levels in the centrifuge, drill tank and borehole. When losses or gains greater than 100 litres were observed, the Golder WP07 lead was contacted following the opportunistic groundwater sampling protocol as described in WP07. If a volume change was observed, the drillers were instructed not to proceed with setting up for the next core run until the core was extracted and could be observed for indications of water bearing features. The system volume gradually increased as the hole was deepened, and water was occasionally lost on surface due to human error (sump box overflowing if pump shut off, pulling core tube too quickly resulting in drill fluid splashing out, displaced hoses), as well as bound in the cuttings. Gradual system losses required occasional topping up of the system with fresh, fluorescein water. Table B-2 includes volume changes for each drill run. Comments are included to document specific instances of water losses observed.

Following cementing of the conductor casing, typically, losses greater than 100 litres could be explained by water losses observed on surface, or attributed to uncertainty in the totalizer readings. The exception to this occurred following the sampling of the permeable zone from 146.88 to 154.61 mbgs (along hole), which is discussed in Section 4.3.

5.6 Drill Fluid Archive Samples and Testing

Drill fluid samples were collected and archived in 1 litre amber bottles every 50 m during drilling. These samples were generally collected from the return drill fluid prior to entering the first settling tank, or from the centrifuge outlet into a clean, triple rinsed 19 litre (5 gallon) bucket, which was taken to the sampling area and transferred into the labelled bottles using new syringes, or new tubing with a peristaltic pump.

Drill fluid samples were also collected during opportunistic groundwater sample collection. In this instance, since coring was not actively occurring at the time of WP07 initiation, the drill fluid sample was collected from the drill tank.

Drill fluid samples were also collected at three specified depths where microbiology core samples were collected. These samples were collected from the return drill fluid prior to entering the first settling tank or from the centrifuge outlet during drilling of the core and are covered under research and development activities.

A complete list of drill water sample field parameters collected under WP02 are provided in Table B-3.

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6.0 OPPORTUNISTIC GROUNDWATER SAMPLE LOCATIONS

A single opportunistic groundwater sample was successfully collected during drilling of IG_BH03 (sample IG_BH03_GW004). During run CR63, from 151.63 to 154.61 mbgs (along hole), a volume loss of 192 L was observed, along with stained joints and an amphibolite dyke (located at 148.65 to 149.84 mbgs (along hole)).

No further opportunistic groundwater samples were attempted for the remainder of the drilling of IG_BH03.

Further details of the sample collection and results are presented in the WP07 Opportunistic Groundwater Sampling Report (Golder 2020a).

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APPENDIX A

Table A-1: IG_BH03 Final and Interim Borehole Orientation Measurements

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Table A-3: Field Parameters of Archived Drill Water Samples

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Depth	[1]Survey Type	Azimuth (°)	Dip (°)
0	Planned	180	70
52.62	TruShotD	181.4	-69.6
100.58	TruShotD	186.8	-67.8
152	TruShotD	189.1	-67.8
206	TruShotD	186.2	-68.1
251	TruShotD	187.7	-67.8
302	TruShotD	188.9	-67.5
352	TruShotD	193.5	-67.1
403	TruShotD	194.7	-67.1
451	TruShotD	192	-67.4
502	TruShotD	197.5	-67.1
551	TruShotD	195.6	-67.6
605	TruShotD	198.3	-67.7
656	TruShotD	200.5	-67.5
701	TruShotD	202.1	-67.3
752	TruShotD	204.6	-66.5
801	TruShotD	206.5	-65.7
851	TruShotD	207.3	-65.5
900	TruShotD	210.7	-63.8
951	TruShotD	212.5	-62.4
0	AtCollar	185.087	-69.74
10	GyroSp-IQP	185.23	-69.42
20	GyroSp-IQP	184.84	-69.18
30	GyroSp-IQP	184.78	-69
40	GyroSp-IQP	184.15	-69.03
50	GyroSp-IQP	185.25	-68.8
60	GyroSp-IQP	184.32	-68.66
70	GyroSp-IQP	183.35	-68.47
80	GyroSp-IQP	184.65	-68.31
90	GyroSp-IQP	184.85	-68.21
100	GyroSp-IQP	184.28	-68.03
110	GyroSp-IQP	184.88	-67.8
120	GyroSp-IQP	184.71	-67.71
130	GyroSp-IQP	184.86	-67.63
140	GyroSp-IQP	185.25	-67.63
150	GyroSp-IQP	186.22	-67.67
160	GyroSp-IQP	185.67	-67.74
170	GyroSp-IQP	187.36	-67.73
180	GyroSp-IQP	186.76	-67.73
190	GyroSp-IQP	186.47	-67.69
200	GyroSp-IQP	186.06	-67.73
210	GyroSp-IQP	187.92	-67.58
220	GyroSp-IQP	188.68	-67.51
230	GyroSp-IQP	189.06	-67.5
240	GyroSp-IQP	188.86	-67.46
250	GyroSp-IQP	188.44	-67.4
260	GyroSp-IQP	188.77	-67.27
270	GyroSp-IQP	189.98	-67.22
280	GyroSp-IQP	190.03	-67.19

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Depth	[1]Survey Type	Azimuth (°)	Dip (°)
290	GyroSp-IQP	188.85	-67.24
300	GyroSp-IQP	189.99	-67.14
310	GyroSp-IQP	190.37	-67.11
320	GyroSp-IQP	189.2	-67.05
330	GyroSp-IQP	189.83	-67.1
340	GyroSp-IQP	190.5	-67.02
350	GyroSp-IQP	189.61	-67.09
360	GyroSp-IQP	191.06	-67.11
370	GyroSp-IQP	191.12	-67.12
380	GyroSp-IQP	190.61	-67.09
390	GyroSp-IQP	191.63	-67.09
400	GyroSp-IQP	191.99	-67.12
410	GyroSp-IQP	192.07	-67.09
420	GyroSp-IQP	192.02	-67.11
430	GyroSp-IQP	191.95	-67.11
440	GyroSp-IQP	192.26	-67.13
450	GyroSp-IQP	193.89	-67.09
460	GyroSp-IQP	193.12	-67.04
470	GyroSp-IQP	193.66	-67.1
480	GyroSp-IQP	193.28	-67.1
490	GyroSp-IQP	193.63	-67.1
500	GyroSp-IQP	194.01	-67.08
510	GyroSp-IQP	194.82	-67.03
520	GyroSp-IQP	195.01	-67.01
530	GyroSp-IQP	194.48	-67.07
540	GyroSp-IQP	195.69	-67.01
550	GyroSp-IQP	195.73	-67.03
560	GyroSp-IQP	195.6	-67.19
570	GyroSp-IQP	195.71	-67.13
580	GyroSp-IQP	195.4	-67.22
590	GyroSp-IQP	196.24	-67.19
600	GyroSp-IQP	197.94	-67.18
610	GyroSp-IQP	197.36	-67.18
620	GyroSp-IQP	196.97	-67.23
630	GyroSp-IQP	196.95	-67.24
640	GyroSp-IQP	198.04	-67.21
650	GyroSp-IQP	197.53	-67.22
660	GyroSp-IQP	197.9	-67.24
670	GyroSp-IQP	198.35	-67.25
680	GyroSp-IQP	198.63	-67.25
690	GyroSp-IQP	198.91	-67.27
700	GyroSp-IQP	199.3	-67.21
710	GyroSp-IQP	200.62	-67.23
720	GyroSp-IQP	200.12	-67.29
730	GyroSp-IQP	200.13	-67.2
740	GyroSp-IQP	200.58	-67.04
750	GyroSp-IQP	200.54	-66.8
760	GyroSp-IQP	201.86	-66.54
770	GyroSp-IQP	202.12	-66.32

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Depth	[1]Survey Type	Azimuth (°)	Dip (°)
780	GyroSp-IQP	203.31	-66.05
790	GyroSp-IQP	203.5	-65.84
800	GyroSp-IQP	204.14	-65.59
810	GyroSp-IQP	204.2	-65.49
820	GyroSp-IQP	204.67	-65.5
830	GyroSp-IQP	205.09	-65.4
840	GyroSp-IQP	205.69	-65.23
850	GyroSp-IQP	206.27	-65.08
860	GyroSp-IQP	206.55	-64.92
870	GyroSp-IQP	206.98	-64.63
880	GyroSp-IQP	207.49	-64.36
890	GyroSp-IQP	208.04	-64.09
900	GyroSp-IQP	208.1	-63.88
910	GyroSp-IQP	207.89	-63.69
930	GyroSp-IQP	209.08	-63.17
940	GyroSp-IQP	209	-62.91
950	GyroSp-IQP	209.75	-62.55
960	GyroSp-IQP	210.35	-62.25
970	GyroSp-IQP	209.59	-61.98
980	GyroSp-IQP	210.227	-61.677

Notes:

[1]TruShotD measurements were collected during drilling of IG_BH03, GyroSp-IQP measurements were collected post drilling of IG_BH03

GOLDER

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
10-Jul-19	17:42	1	1.21	4.15	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19.73	3000	50	75	1500	Initial run, drill fluid parameters not taken.
14-Jul-19	16:13	2	4.15	4.62	-		No volumes measured	-	-	-	28.22	-	-	2.800	-	11.83	-	8.63	-	0	-	-81	-	-	-	-	-	Short run to get rod threads flush with drill head.
14-Jul-19	17:49	3	4.62	6.28	-		No volumes measured	-	-	-	26.34	-	-	2.800	0%	11.92	0.09	9.84	14%	0	0%	-62	16.27	2300	65	175	1900	Run drilled to bottom of PQ casing.
15-Jul-19	09:54	4	6.28	7.65	-		No volumes measured	-	-	-	24.74	10.4	1.00	0.670	-76%	11.13	-0.79	8.00	-19%	1000	100%	-2	9.85	2500	65	75	1200	Short run to get rod threads flush with drill head.
15-Jul-19	12:17	5	7.65	10.61	-		No volumes measured	-	-	-	31.55	10.5	1.00	0.637	-5%	11.17	0.04	6.90	-14%	648	-35%	-42	13.74	2500	75	70	1000	-
16-Jul-19	02:56	6	10.61	13.61	60	60	Some overflow of 3rd settling tank due to pump rate differential.	95.23	93.53	-2%	31.50	10.8	0.99	0.236	-63%	10.68	-0.49	6.65	-4%	1000	54%	69	22.00	2000	75	53	1200	Change in drill fluid source; new source is clean fluorescein water, previous source was polymerized (AMC Pure-Viz).
16-Jul-19	04:53	7	13.61	16.61	17	43	-	95.92	94.33	-2%	31.56	10.5	1.00	0.216	-8%	10.21	-0.47	6.42	-3%	1000	0%	32	18.33	1900	80	40	1200	-
16-Jul-19	06:15	8	16.61	19.62	57	-40	-	95.39	95.37	0%	33.73	10.5	1.00	0.213	-1%	9.76	-0.45	6.37	-1%	1000	0%	42	16.67	1900	80	38	1000	-
17-Jul-19	23:25	9	19.62	22.60	-1566	1623	Return lost to secondary containment/waste due to unsealed/torn liner - PQ casing still spinning. Calculated volume change in waste tank was 1948 L over run, including runoff from rain event. Change in volume attributed to loss to waste tank, not groundwater feature.	91.63	102.6	12%	27.47	10.2	1.00	0.118	-45%	9.95	0.19	5.61	-12%	1000	0%	1	13.33	1800	75	35	1400	Initial run after resetting PQ casing, return water leaking past sump box into secondary containment. Volume change attriuted to fluid loss to secondary containment.
18-Jul-19	04:20	10	22.60	25.61	-509	-1057	Volume change estimated for waste tank 1037 + 441 L. Run paused midway to fix sump liner. 34 L difference in IN totalizer during pause.	104.7	101.9	-3%	27.04	9.9	1.00	0.141	19%	10.08	0.13	6.79	21%	1000	0%	13	17.94	1800	75	35	1200	Fluid loss (return) to secondary contain observed. Run paused to fix sump liner. Water return to settling tanks and to waste tanks appears to maintain <100L difference. Change in fluid parameters attributed to return to more regular drilling and circulation. Volume change attriuted to fluid loss to secondary runoff containment.
19-Jul-19	05:48	11	25.61	28.63	52	-562	Slight flow out of BH after drilling for ~10 min @ 4L/min	103.9	101.4	-2%	27.78	9.8	1.00	0.166	18%	10.13	0.05	4.12	-39%	1000	0%	21	12.25	1800	75	34	1100	Initial run after replacing sump box and advancing PQ casing. Parameters stabilizing.
19-Jul-19	10:24	12	28.63	31.62	-46	98	Some back flow through OUT totalizer that got measured twice	94.51	97.31	3%	31.19	10.5	1.00	0.207	25%	10.41	0.28	4.18	1%	956	-4%	42	9.67	3000	50	65	1500	Conductivity stabilizing.
19-Jul-19	12:09	13	31.62	34.62	-5	-40	-	97.31	96.06	-1%	30.54	10.4	1.00	0.205	-1%	10.27	-0.14	3.97	-5%	592	-38%	35	8.67	3000	70	70	1200	Delayed in reading turbidity; settling likely occurred.
19-Jul-19	14:07	14	34.62	37.63	-4	-1	-	98.27	95	-3%	32.89	10.4	1.00	0.197	-4%	10.21	-0.06	4.12	4%	1000	69%	37	13.00	3000	70	65	1150	-
19-Jul-19	15:51	15	37.63	40.61	19	-23	-	96.21	95.17	-1%	32.25	10.5	1.00	0.192	-3%	10.38	0.17	4.32	5%	1000	0%	13	12.33	3100	40	65	1050	-
19-Jul-19	17:48	16	40.61	43.61	-52	71	-	90.45	93.39	3%	34.11	10.4	1.00	0.188	-2%	10.30	-0.08	4.64	7%	1000	0%	-5	13.67	3000	50	65	1500	-
19-Jul-19	23:54	17	43.61	46.61	75	-127	Final volume reading after borehole stops back flowing (~+30L since pump shut down)	98.79	98.56	0%	30.19	9.9	1.00	0.170	-10%	10.29	-0.01	6.11	32%	1000	0%	-50	19.00	2000	60	39	1000	-
20-Jul-19	01:41	18	46.61	49.59	14	60	-	98.45	100.1	2%	30.99	9.6	1.00	0.171	1%	10.26	-0.03	6.39	5%	1000	0%	-42	20.13	2000	50	40	800	-
20-Jul-19	03:29	19	49.59	52.62	8	6	-	102.3	102.2	0%	31.28	9.3	1.00	0.172	1%	10.22	-0.04	5.78	-10%	1000	0%	-79	20.79	1800	50	40	1500	-
20-Jul-19	10:19	20	52.62	55.62	158	-150	No features in core to indicate water loss	87.07	96.16	10%	33.88	10.1	1.00	0.187	9%	10.01	-0.21	4.55	-21%	1000	0%	-31	16.33	3250	85	75	1500	-
20-Jul-19	15:11	21	55.62	58.62	5	152	-	98.35	95.15	-3%	33.24	10.1	1.00	0.185	-1%	9.89	-0.12	3.58	-21%	1000	0%	-8	12.33	3250	100	75	1500	-
20-Jul-19	17:31	22	58.62	61.61	157	-152	No features in core to indicate water loss	96.1	94.91	-1%	35.39	10.1	1.00	0.191	3%	9.79	-0.10	4.91	37%	1000	0%	-42	21.00	3250	90	75	1500	-
20-Jul-19	18:40	23	61.61	64.62	-11	168	-	94.16	92.56	-2%	36.75	10	1.00	0.190	-1%	9.78	-0.01	4.42	-10%	1000	0%	-49	7.33	3000	100	75	1700	-
20-Jul-19	21:06	24	64.62	67.61	-13	2	-	97.79	96.31	-2%	31.78	9.2	1.01	0.195	3%	9.67	-0.11	4.28	-3%	1000	0%	-116	18.73	2600	75	39	1100	-
20-Jul-19	21:57	25	67.61	67.91	-8	-5	-	95.9	96.09	0%	29.43	9.4	1.00	0.189	-3%	9.78	0.11	6.30	47%	1000	0%	-88	43.33	2300	75	40	1100	Bit change; partial run.
21-Jul-19	00:00	26	67.91	70.63	-4	-4	-	98.14	96.88	-1%	28.10	8	1.01	0.216	14%	9.73	-0.05	5.06	-20%	1000	0%	-139	9.56	2200	75	34	1200	Initial run after bit change; higher cuttings content observed.
21-Jul-19	00:50	27	70.63	71.62	-44	40	-	97.72		-100%			-	0.191	-12%	9.87	0.14	3.43	-32%	1000	0%		22.00	2200	75	40	1200	Run ended abruptly due to blockage then hydraulic leak; no return sample collected. Values entered were collected prior to CR28 and may not be indicative of CR27 but were used to establish a reference for CR28.
21-Jul-19	11:09	28	71.62	73.61	11	-55	-	93.84	90.73	-3%	31.54	9.9	1.00	0.202	6%	9.79	-0.08	2.70	-21%	1000	0%	52	9.00	3100	90	75	1100	-
21-Jul-19	12:29	29	73.61	73.74	47	-36	-	94.36	92.61	-2%	26.31	9.7	1.00	0.195	-3%	9.84	0.05	3.72	38%	1000	0%	81	15.38	3000	80	65	1500	-
21-Jul-19	13:48	30	73.74	76.61	-8	55	-	88.37	89.57	1%	25.17	9.6	1.00	0.198	2%	9.83	-0.01	3.59	-3%	1000	0%	80	9.33	3200	90	70	1150	-
21-Jul-19	15:14	31	76.61	79.62	18	-26	-	90.43	87.99	-3%	35.17	9.7	1.00	0.207	5%	9.66	-0.17	3.44	-4%	1000	0%	65	13.00	3200	100	75	1450	-
21-Jul-19	17:17	32	79.62	82.64	-58	76	-	87.14	86.98	0%	35.43	9.6	1.00	0.218	5%	9.62	-0.04	3.91	14%	1000	0%	67	14.00	3150	70	75	1500	-
21-Jul-19	18:30	33	82.64	85.63	26	-85	-	86.87	86.88	0%	36.26	9.5	1.00	0.216	-1%	9.61	-0.01	4.19	7%	1000	0%	85	9.00	3200	60	70	1500	-
21-Jul-19	21:36	34	85.63	88.61	-7	33	-	93.17	91.75	-2%	28.36	8.6	1.01	0.228	6%	9.70	0.09	4.76	14%	1000	0%	-99	19.13	2300	60	41	1500	-
21-Jul-19	23:09	35	88.61	91.61	-10	3	-	92.65	90.87	-2%	29.42	8.3	1.01	0.239	5%	9.67	-0.03	5.25	10%	1000	0%	-98	20.33	2400	60	39	1300	-
22-Jul-19	00:22	36	91.61	94.60	27	-37	-	91.84	90.49	-1%	29.29	7.6	1.02	0.254	6%	9.66	-0.01	4.52	-14%	1000	0%	-114	15.05	2400	50	35	1400	-
22-Jul-19	03:31	37	94.60	97.62	10	16	-	93.03	90.61	-3%	27.24	8.1	1.01	0.248	-2%	10.02	0.36	6.83	51%	1000	0%	-31	13.93	2400	60	39	1400	Initial run after rods were pulled to retrieve core tube.
22-Jul-19	05:12	38	97.62	100.58	-5	15	-	90.83	91.50	1%	28.31	8.2	1.01	0.255	3%	10.03	0.01	6.31	-8%	1000	0%	-30	17.54	2200	50	40	1500	Final run before cementing of PQ casing.
22-Jul-19	08:13	39	100.58	102.12	-18	13	-	80.97	81.02	0%	30.15	8.8	1.01	0.261	2%	9.95	-0.08	5.42	-14%	1000	0%	148	10.39	3250	95	75	1500	-

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
28-Jul-19	22:22	40	102.12	103.61	36	-54	-	94.9	88.95	-6%	22.84	8.9	1.01	0.251	-4%	9.97	0.02	5.37	-1%	1000	0%	-118	11.41	2000	50	34	1500	Intial run after cementing PQ casing and recovering VR plug.
28-Jul-19	23:43	41	103.61	106.61	112	-76	No features in core to indicate water loss	95.47	96.45	1%	26.44	9.4	1.00	0.341	36%	10.42	0.45	4.29	-20%	1000	0%	-129	15.33	2000	60	34	1800	Parameters still stabilizing as drilling resumes.
29-Jul-19	01:27	42	106.61	109.59	216	-104	Inflow totalizer stopped recording during the run	95.58	95.93	0%	26.43	8.6	1.01	0.304	-11%	10.25	-0.17	4.49	5%	1000	0%	-91	23.83	2200	50	30	1500	-
29-Jul-19	03:11	43	109.59	112.61	111	104	No features in core to indicate water loss	96.25	94.39	-2%	26.92	9.3	1.00	0.305	0%	10.24	-0.01	6.61	47%	1000	0%	-87	15.56	2400	50	29	1200	-
29-Jul-19	04:24	44	112.61	112.92	33	78	-	95.56	95.97	0%	24.88	10.1	1.00	0.304	0%	10.38	0.14	5.34	-19%	1000	0%	-53	80.65	2500	50	30	1100	Run ended short due to torquing up of rods; hole was flushed for a few minutes before sampling return.
29-Jul-19	05:08	45	112.92	113.00	43	-10	-	95.15	95.28	0%	24.85	9.8	1.00	0.297	-2%	10.35	-0.03	5.12	-4%	1000	0%	-82	100.00	-	-	-	-	Run ended early to change bit, no drilling parameters read.
29-Jul-19	16:19	46	113.00	115.61	213	-170	IN totalizer freezing during drilling	95.12	96.28	1%	24.41	9.3	1.00	0.249	-16%	10.28	-0.07	6.88	34%	1000	0%	-91	13.03	2900	80	75	1500	Initial run after bit change.
29-Jul-19	17:53	47	115.61	118.61	85	128	-	94.51	97.36	3%	25.08	8.9	1.01	0.279	12%	10.30	0.02	6.03	-12%	1000	0%	-91	10.33	3000	75	75	1500	-
29-Jul-19	22:05	48	118.61	121.22	322	-237	IN totalizer freezing during drilling	97.18	97.71	1%	25.29	9.9	1.00	0.571	105%	10.90	0.60	7.28	21%	1000	0%	-38	32.57	3000	60	36	1300	Long duration run.
30-Jul-19	00:11	49	121.22	121.63	76	246	Inflow totalizer reset	98.74	98.56	0%	22.10	9.6	1.00	0.401	-30%	10.70	-0.20	6.83	-6%	1000	0%	-32	39.02	2800	60	45	1700	-
30-Jul-19	02:40	50	121.63	124.08	395	-318	IN totalizer freezing during drilling	98.45	97.73	-1%	23.67	9.7	1.00	0.330	-18%	10.53	-0.17	5.74	-16%	1000	0%	-36	33.88	2700	100	55	2000	Drilling paused several times to flush borehole.
30-Jul-19	05:02	51	124.08	124.38	285	109	IN totalizer freezing during drilling	98.91	100.20	1%	24.54	9.7	1.00	0.337	2%	10.45	-0.08	7.07	23%	1000	0%	-37	203.33	2600	100	55	2000	Drilling paused several times to flush borehole.
30-Jul-19	06:01	52	124.38	124.57	81	204	-	98.07	97.53	-1%	24.81	9.7	1.00	0.340	1%	10.50	0.05	5.86	-17%	1000	0%	-26	142.11	2500	100	62	1600	Drilling paused several times to flush borehole.
31-Jul-19	11:43	53	124.57	127.60	-49	130	-	84.96	84.17	-1%	16.93	6.5	1.03	0.321	-6%	10.28	-0.22	4.33	-26%	1000	0%	-23	8.33	2500	200	75	1300	Initial run after AMC Pure-Viz additive added to drill fluid.
31-Jul-19	17:33	54	127.60	130.61	53	-102	-	-	-	-	21.07	9.6	1.00	0.209	-35%	9.88	-0.40	3.71	-14%	1000	0%	-148	9.33	2800	120	75	1600	Initial run after adding fresh traced water to drill fluid.
31-Jul-19	18:48	55	130.61	133.61	102	-48	No features in core to indicate water loss	-	-	-	21.99	8.9	1.01	0.181	-13%	9.93	0.05	3.77	2%	1000	0%	-95	11.00	2900	70	70	1550	-
31-Jul-19	21:30	56	133.61	136.62	64	37	-	85.71	80.79	-6%	23.37	8.6	1.01	0.203	12%	9.87	-0.06	5.24	39%	1000	0%	-114	19.93	2600	70	70	1800	-
31-Jul-19	23:15	57	136.62	139.59	85	-20	-	85.35	74.77	-12%	22.57	8.7	1.01	0.201	-1%	9.82	-0.05	4.00	-24%	1000	0%	-115	16.50	2600	80	65	1700	-
01-Aug-19	01:28	58	139.59	142.64	46	38	-	83.13	84.14	1%	22.10	6.6	1.02	0.228	13%	9.83	0.01	4.64	16%	1000	0%	-141	9.51	2500	50	65	1200	-
01-Aug-19	02:36	59	142.64	145.62	-5	51	-	85.51	74.89	-12%	22.82	7.6	1.02	0.226	-1%	9.68	-0.15	4.67	1%	1000	0%	-151	10.74	2500	60	65	1300	-
01-Aug-19	04:04	60	145.62	148.58	56	-60	-	83.75	83.15	-1%	22.98	7.5	1.02	0.232	3%	9.72	0.04	4.49	-4%	1000	0%	-146	11.49	2600	50	65	1500	3 coated fractures observed.
01-Aug-19	04:55	61	148.58	150.58	-79	135	-	79.22	77.46	-2%	22.57	5.5	1.03	0.284	22%	9.80	0.08	4.72	5%	1000	0%	-106	6.00	2200	50	65	2000	Core tube blocked. Mafic dyke, several fractures and alteration observed.
01-Aug-19	06:06	62	150.58	151.63	-30	-50	-	87.16	80.18	-8%	21.64	6.9	1.02	0.233	-18%	9.66	-0.14	4.65	-1%	1000	0%	-131	9.52	2700	60	60	1500	Several fractures and alteration observed.
01-Aug-19	13:20	63	151.63	154.61	-192	163	-	-	-	-	22.31	7	1.02	0.243	4%	9.59	-0.07	3.83	-18%	1000	0%	-44	8.33	2850	130	75	1800	WP07 trigger; sample collected from zone 146.88-154.61 mbgs. Fluorescein not measured due to fluid thickness.
05-Aug-19	02:56	64	154.61	157.55	-572	379	-	110.9	117.00	6%	22.83	9.7	1.00	0.204	-16%	9.04	-0.55	3.33	-13%	1000	0%	-2	19.73	2500	50	70	1750	1 broken joint. High fluid loss to sampled zone 146.88-154.61 mbgs.
05-Aug-19	04:25	65	157.55	160.59	-275	-297	-	105.3	107.50	2%	23.31	9.5	1.00	0.214	5%	9.13	0.09	3.32	0%	1000	0%	-56	14.80	2600	50	70	1750	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs.
05-Aug-19	06:37	66	160.59	163.59	131	-405	-	104.2	107.30	3%	23.20	9.3	1.00	0.219	2%	9.18	0.05	2.00	-40%	1000	0%	-102	16.67	2400	50	70	1750	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs.
05-Aug-19	13:50	67	163.59	166.60	-407	537	-	83.32	73.91	-11%	26.27	9.4	1.00	0.213	-3%	9.03	-0.15	4.13	107%	1000	0%	-83	18.33	2700	100	70	2000	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs.
05-Aug-19	18:45	68	166.60	169.62	-814	408	-	74.54	95.81	29%	20.92	10.1	1.00	0.072	-66%	7.68	-1.35	4.20	2%	316	-68%	316	55.00	2900	113	70	1850	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs. Initial run after adding fresh traced water to drill fluid.
06-Aug-19	03:32	69	169.62	172.61	-1169	354	-	-	-	-	19.18	9.7	1.00	0.143	99%	8.41	0.73	1.42	-66%	1000	216%	97	12.75	2500	100	70	1700	High fluid loss to sampled zone 146.88-154.61 mbgs. AMC Pure-Viz added to increase viscosity of drill fluid. Fluorescein not measured due to drillwater viscosity.
06-Aug-19	05:37	70	172.61	175.63	-272	-896	-	-	-	-	17.57	9.5	1.00	0.161	13%	8.61	0.20	1.48	4%	1000	0%	-61	12.58	2500	75	70	2000	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs. Fluorescein not measured due to drillwater viscosity.
06-Aug-19	06:29	71	175.63	178.62	-143	-129	-	-	-	-	17.69	9.3	1.00	0.174	8%	8.86	0.25	0.73	-51%	1000	0%	-146	7.69	2500	100	70	1600	One fault, no staining. High fluid loss to sampled zone 146.88-154.61 mbgs. Fluorescein not measured due to drillwater viscosity.
06-Aug-19	10:40	72	178.62	169.62	-387	244	-	-	-	-	18.83	9.2	1.01	0.181	4%	8.52	-0.34	3.30	352%	1000	0%	-104	11.67	2700	175	70	1850	One fault, no staining. High fluid loss to sampled zone 146.88-154.61 mbgs.Fluorescein not measured due to drillwater viscosity.
06-Aug-19	12:05	73	169.62	172.61	-392	5	-	-	-	-	19.86	9.1	1.01	0.184	2%	8.74	0.22	11.19	239%	1000	0%	-54	13.33	2500	175	70	2000	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs. Fluorescein not measured due to drillwater viscosity.
07-Aug-19	01:47	74	172.61	175.63	-780	388	-	-	-	-	19.30	9.3	1.00	0.160	-13%	8.71	-0.03	1.79	-84%	1000	0%	-41	16.39	2750	100	70	1750	Stick core. High fluid loss to sampled zone 146.88-154.61 mbgs. Fluorescein not measured due to drillwater viscosity.
07-Aug-19	04:52	75	175.63	178.62	-687	-93	Volume losses verified with manual tank readings.	-	-	-	18.89	9.1	1.01	0.176	10%	8.74	0.03	1.67	-7%	1000	0%	-51	15.05	2250	225	70	1750	One fault, no staining. High fluid loss to sampled zone 146.88-154.61 mbgs. Fluorescein not measured due to drillwater viscosity.
08-Aug-19	16:45	76	178.62	181.60	-224	-463	First run after cementing permeable zone above	-	-	-	19.34	9.8	1.00	2.110	1099%	11.69	2.95	5.30	217%	1000	0%	-272	13.56	2500	50	60	1500	Fluorescein not measured due to drillwater viscosity. One joint, no staining.
08-Aug-19	18:10	77	181.60	184.59	-189	-35	-	82.2	78.74	-4%	19.50	9.9	1.00	2.050	-3%	11.64	-0.05	6.20	17%	1000	0%	-264	11.55	2400	100	60	1500	-

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
08-Aug-19	22:36	78	184.59	187.63	-446	256	Clogged lines, settling tank 1 overflowing, removed water from entire system to prevent spills and finish the run	-	78.30	-1%	19.16	9.9	1.00	2.150	5%	11.79	0.15	3.43	-45%	1000	0%	-150	36.98	2100	75	70	1500	Drilling paused numerous times due to settling tank issues. Single fluorescein reading taken at the end of run due to high drill fluid viscosity.
09-Aug-19	03:30	79	187.63	190.62	-260	-185	After removal of water, had to add new fluorescein water, attempted to raise level back to beginning of run 78 starting level	-	70.44	-10%	16.81	9.9	1.00	2.100	-2%	11.83	0.04	3.80	11%	1000	0%	-149	33.87	2500	50	70	1750	Initial run after adding fresh traced water to drill fluid. Single fluorescein reading taken at the end of run due to high drill fluid viscosity.
09-Aug-19	04:34	80	190.62	193.57	-129	-131	-	-	68.94	-2%	16.78	9.9	1.00	2.160	3%	11.88	0.05	3.91	3%	1000	0%	-164	18.87	2500	100	70	2000	Single fluorescein reading taken at the end of run due to high drill fluid viscosity.
09-Aug-19	07:00	81	193.57	196.60	-184	55	-	-	66.34	-4%	15.55	9.9	1.00	2.030	-6%	11.66	-0.22	4.12	5%	1000	0%	-158	30.00	2500	75	70	2000	Single fluorescein reading taken at the end of run due to high drill fluid viscosity.
09-Aug-19	10:40	82	196.60	199.61	-250	66	-	-	66.85	1%	17.20	10	1.00	2.050	1%	11.60	-0.06	4.83	17%	1000	0%	-162	10.07	2400	100	60	1500	Single fluorescein reading taken at the end of run due to high drill fluid viscosity.
09-Aug-19	11:55	83	199.61	202.09	-363	113	Artificial loss - incorrect calibration factor applied to small totalizer.	-	62.03	-7%	17.45	10	1.00	2.010	-2%	11.79	0.19	7.80	61%	1000	0%	-132	13.47	2700	150	68	1500	Single fluorescein reading taken at the end of run due to high drill fluid viscosity.
10-Aug-19	01:49	84	202.09	202.62	-191	-171	Drill fluid viscosity modified during run with addition of mud; readings unreliable	117	111.50	-5%	17.09	9.9	1.00	0.251	-88%	10.77	-1.02	3.85	-51%	1000	0%	-56	37.46	2500	100	70	2000	Initial run after adding fresh traced water to drill fluid.
10-Aug-19	03:39	85	202.62	205.62	-41	-151	-	107.2	107.00	0%	16.77	9.8	1.00	0.242	-4%	10.71	-0.06	3.92	2%	1000	0%	-61	23.67	2500	75	70	1800	-
10-Aug-19	05:01	86	205.62	208.60	-97	56	-	103.2	101.80	-1%	16.85	9.7	1.00	0.244	1%	10.68	-0.03	4.78	22%	1000	0%	-77	21.28	2500	75	70	1600	-
10-Aug-19	11:45	87	208.60	211.57	0	-97	-	107.7	86.69	-20%	18.54	9.4	1.00	0.229	-6%	10.54	-0.14	5.02	5%	1000	0%	-75	13.42	2500	175	68	1750	-
10-Aug-19	13:30	88	211.57	214.64	-182	182	Water losses observed at surface accounting for loss	-	88.81	2%	19.93	9.5	1.00	0.229	0%	10.49	-0.05	8.87	77%	1000	0%	-82	11.63	2000	150	61	1500	Fluorescein % change now compared to previous run using single measurement at end of run, consistent with other parameter readings.
10-Aug-19	14:35	89	214.64	217.64	48	-231	-	-	96.21	8%	19.55	9	1.01	0.230	0%	10.47	-0.02	8.97	1%	1000	0%	-112	11.48	2300	200	68	1500	-
10-Aug-19	16:05	90	217.64	220.60	68	-19	-	-	92.09	-4%	21.30	8.8	1.01	0.231	0%	10.35	-0.12	4.62	-48%	1000	0%	-91	11.86	2500	175	68	1500	-
10-Aug-19	17:00	91	220.60	223.58	47	20	-	-	91.79	0%	22.26	8.5	1.01	0.233	1%	10.30	-0.05	3.80	-18%	1000	0%	-103	8.28	2500	200	64	1300	-
10-Aug-19	22:45	92	223.58	226.59	94	-47	-	-	104.70	14%	22.74	8.4	1.01	0.243	4%	10.22	-0.08	2.36	-38%	1000	0%	-87	21.26	2600	100	45	1600	-
11-Aug-19	00:42	93	226.59	229.64	-12	106	-	-	95.05	-9%	22.74	8.7	1.01	0.243	0%	10.23	0.01	3.44	46%	1000	0%	-103	29.24	2500	75	47	1750	-
11-Aug-19	02:44	94	229.64	232.59	-23	12	-	-	98.65	4%	22.70	8.4	1.01	0.242	0%	10.17	-0.06	2.80	-19%	1000	0%	-97	24.75	2000	100	44	2250	-
11-Aug-19	04:30	95	232.59	235.61	45	-68	-	-	109.50	11%	22.59	8.3	1.01	0.243	0%	10.15	-0.02	2.54	-9%	1000	0%	-119	15.05	2500	175	57	1750	-
11-Aug-19	07:05	96	235.61	238.62	97	-53	-	-	103.50	-5%	21.85	8.5	1.01	0.237	-2%	10.15	0.00	8.55	237%	1000	0%	-198	31.67	2500	175	64	1500	-
11-Aug-19	09:35	97	238.62	241.63	-48	145	-	-	96.24	-7%	22.74	8	1.01	0.231	-3%	10.07	-0.08	8.30	-3%	1000	0%	-102	13.33	2500	225	76	1500	-
11-Aug-19	10:15	98	241.63	244.64	55	-103	-	-	96.28	0%	22.05	7.8	1.02	0.240	4%	10.04	-0.03	3.01	-64%	1000	0%	-125	15.15	2500	400	68	1500	-
11-Aug-19	18:15	99	244.64	247.63	21	34	-	-	98.63	2%	24.11	7.6	1.02	0.245	2%	9.84	-0.20	4.39	46%	1000	0%	-65	7.50	2500	250	64	1500	-
11-Aug-19	21:03	100	247.63	250.63	99	-77	-	-	109.00	11%	22.57	8.3	1.01	0.245	0%	9.92	0.08	2.26	-49%	1000	0%	-82	15.67	2500	225	54	1750	-
11-Aug-19	22:27	101	250.63	253.63	113	-14	No features in core to indicate water loss	-	109.60	1%	22.51	7.9	1.02	0.245	0%	9.88	-0.04	1.20	-47%	1000	0%	-92	20.47	2500	225	51	1750	-
12-Aug-19	00:58	102	253.63	254.62	146	-33	No features in core to indicate water loss	-	104.70	-4%	21.73	7.8	1.02	0.250	2%	9.80	-0.08	1.85	54%	1000	0%	-99	35.97	2750	200	48	1750	-
12-Aug-19	03:14	103	254.62	256.62	65	81	-	-	104.80	0%	22.58	7.8	1.02	0.273	9%	9.69	-0.11	1.65	-11%	1000	0%	-139	35.12	2500	200	55	2000	-
12-Aug-19	05:58	104	256.62	259.62	90	-25	-	-	102.20	-2%	22.68	7.7	1.02	0.279	2%	9.64	-0.05	1.46	-12%	1000	0%	-147	43.19	2500	200	51	1600	-
12-Aug-19	09:25	105	259.62	262.60	52	38	-	-	101.90	0%	22.05	7	1.02	0.275	-1%	9.67	0.03	2.97	103%	1000	0%	-86	10.00	2700	300	64	1000	-
12-Aug-19	10:25	106	262.60	265.63	40	12	-	-	94.79	-7%	22.80	6.8	1.02	0.281	2%	9.54	-0.13	2.31	-22%	1000	0%	-95	10.03	2700	300	70	1200	-
12-Aug-19	11:50	107	265.63	268.62	25	15	-	-	96.57	2%	23.32	6.5	1.03	0.287	2%	9.58	0.04	2.32	0%	1000	0%	-111	10.10	2700	300	70	1200	-
12-Aug-19	13:00	108	268.62	271.63	57	-32	-	-	94.77	-2%	23.44	6.2	1.03	0.297	3%	9.57	-0.01	1.84	-21%	1000	0%	-85	9.97	2700	325	64	1000	-
12-Aug-19	14:10	109	271.63	274.63	-65	122	-	-	92.25	-3%	24.41	5.9	1.03	0.309	4%	9.52	-0.05	1.74	-5%	1000	0%	-105	10.00	2800	400	64	1500	-
12-Aug-19	15:20	110	274.63	277.62	37	-102	-	-	98.79	7%	23.76	5.5	1.03	0.321	4%	9.46	-0.06	0.88	-49%	1000	0%	-114	9.97	2900	350	68	1300	-
12-Aug-19	16:15	111	277.62	280.59	12	25	-	-	107.80	9%	24.46	5.8	1.03	0.217	-32%	9.46	0.00	1.27	44%	1000	0%	-159	10.17	2800	300	68	1100	-
12-Aug-19	20:29	112	280.59	295.64	186	-174	No features in core to indicate water loss	-	105.40	-2%	20.75	9.1	1.01	0.104	-52%	9.10	-0.36	4.62	264%	1000	0%	-15	20.13	2500	225	56	1600	-
13-Aug-19	06:02	113	295.64	298.61	13	173	-	-	110.80	5%	18.88	8.4	1.01	0.191	84%	9.09	-0.01	3.11	-33%	1000	0%	-142	17.51	3000	250	54	1750	-
13-Aug-19	08:45	114	298.61	301.61	69	-56	-	-	123.90	12%	21.19	6.7	1.02	0.209	9%	9.45	0.36	4.16	34%	1000	0%	-107	8.66	2900	250	66	1100	-
13-Aug-19	09:54	115	301.61	304.63	137	-68	No features in core to indicate water loss	-	109.30	-12%	20.48	7.6	1.02	0.203	-3%	9.23	-0.22	6.81	64%	1000	0%	-1	13.00	3200	450	66	1000	-
13-Aug-19	10:58	116	304.63	307.62	2	134	-	-	112.50	3%	20.22	6.8	1.02	0.244	20%	9.33	0.10	8.63	27%	1000	0%	-87	10.00	2000	500	65	1500	-
13-Aug-19	20:32	117	307.62	310.66	182	-180	No features in core to indicate water loss	-	108.90	-3%	19.71	7.8	1.02	0.246	1%	9.15	-0.18	0.00	-100%	1000	0%	-412	17.43	2000	275	55	2000	-
13-Aug-19	22:00	118	310.66	313.63	119	63	No features in core to indicate water loss	-	110.40	1%	21.45	8.2	1.01	0.236	-4%	9.11	-0.04	2.84	283900%	1000	0%	-70	16.84	2000	300	56	2200	-
13-Aug-19	23:34	119	313.63	316.64	71	49	-	-	104.40	-5%	19.54	8.4	1.01	0.253	7%	9.18	0.07	8.51	200%	1000	0%	-179	20.27	2100	350	56	1800	-
14-Aug-19	01:18	120	316.64	319.64	44	26	-	-	104.80	0%	20.04	8.2	1.01	0.263	4%	9.12	-0.06	1.20	-86%	1000	0%	-290	22.00	2300	350	57	2000	-
14-Aug-19	02:37	121	319.64	322.66	-34	79	-	-	104.00	-1%	19.15	7.4	1.02	0.287	9%	9.16	0.04	8.34	595%	1000	0%	-238	15.89	2400	300	60	1600	-
14-Aug-19	03:50	122	322.66	325.63	-89	55	-	-	102.70	-1%	19.02	6.7	1.02	0.331	15%	9.32	0.16	8.10	-3%	1000	0%	-8	11.78	2100	500	62	2000	-
14-Aug-19	05:06	123	325.63	328.64	-75	-14	-	-	94.04	-8%	19.01	6.5	1.03	0.316	-5%	9.38	0.06	7.36	-9%	1000	0%	-18	11.30	2000	375	57	2000	-
14-Aug-19	06:24	124	328.64	331.62	-93	18	-	-	106.90	14%	18.04	6.9	1.02	0.342	8%	9.13	-0.25	8.20	11%	1000	0%	-209	15.10	2200	450	57	1800	-
14-Aug-19	08:54	125	331.62	334.64	-47	-45	-	-	126.40	18%	22.51	6.1	1.03	0.294	-14%	9.35	0.22	4.96	-40%	1000	0%	-13	9.33	2200	500	77	2000	Initial run after bit change.
14-Aug-19	14:27	126	334.64	337.61	35	-83	-	-	113.40	-10%	20.91	5.7	1.03	0.342	16%	9.13	-0.22	0.38	-92%	1000	0%	-432	6.33	2500	400	73	1400	-
14-Aug-19	15:29	127	337.61	340.64	-84	119	-	-	90.93	-20%	20.95	5.5	1.03	0.364	6%	9.24	0.11	6.33	1566%	1000	0%	-84	8.33	2500	400	73	1500	-

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
14-Aug-19	16:27	128	340.64	343.63	-38	-46	-	-	109.00	20%	21.06	5.8	1.03	0.366	1%	9.21	-0.03	5.91	-7%	1000	0%	-49	10.00	2200	400	73	1800	-
14-Aug-19	20:50	129	343.63	346.66	82	-120	-	-	84.85	-22%	19.65	9	1.01	0.137	-63%	9.13	-0.08	2.79	-53%	1000	0%	-192	18.48	2000	400	62	2000	Initial run after adding fresh traced water to drill fluid.
14-Aug-19	22:08	130	346.66	349.65	-148	230	Solid core	-	90.92	7%	19.78	8.3	1.01	0.237	73%	9.24	0.11	3.85	38%	1000	0%	-449	16.72	2000	450	62	1700	-
14-Aug-19	23:24	131	349.65	352.62	-39	-110	~15L fluid sample collected/purged during run	-	88.46	-3%	20.31	8	1.01	0.255	8%	9.40	0.16	4.41	15%	1000	0%	-36	14.14	2100	400	55	1700	-
15-Aug-19	01:14	132	352.62	355.66	43	-82	-	-	84.58	-4%	20.10	7.5	1.02	0.224	-12%	9.23	-0.17	1.84	-58%	1000	0%	-492	16.78	2100	450	59	2000	-
15-Aug-19	02:29	133	355.66	358.61	34	9	-	-	80.50	-5%	19.65	7.8	1.02	0.245	9%	9.31	0.08	7.82	325%	1000	0%	-144	14.92	2200	400	62	1800	-
15-Aug-19	03:54	134	358.61	361.66	70	-35	-	-	97.83	22%	19.31	7.4	1.02	0.261	7%	9.30	-0.01	4.23	-46%	1000	0%	-334	16.07	2200	450	56	2000	-
15-Aug-19	05:08	135	361.66	364.65	-7	77	-	-	93.47	-4%	18.89	7.1	1.02	0.289	11%	9.47	0.17	5.87	39%	1000	0%	-66	12.37	2500	475	54	1600	-
15-Aug-19	06:23	136	364.65	367.61	47	-54	-	-	87.84	-6%	18.55	7.1	1.02	0.278	-4%	9.44	-0.03	3.29	-44%	1000	0%	-139	14.19	2100	500	53	1500	-
15-Aug-19	08:57	137	367.61	370.56	57	-10	-	-	83.49	-5%	21.22	7	1.02	0.260	-6%	9.28	-0.16	1.78	-46%	1000	0%	-236	10.33	2500	500	69	1500	-
15-Aug-19	10:55	138	370.56	373.48	55	2	-	-	99.60	19%	20.26	6.5	1.03	0.289	11%	9.40	0.12	9.38	427%	1000	0%	-41	12.67	1800	500	68	2300	-
15-Aug-19	11:47	139	373.48	373.63	-7	62	-	-	80.86	-19%	18.81	6.3	1.03	0.253	-12%	8.91	-0.49	1.43	-85%	1000	0%	-34	13.33	1600	600	70	2300	Short run.
15-Aug-19	12:51	140	373.63	376.64	-9	2	-	-	100.50	24%	19.70	6.4	1.03	0.299	18%	9.47	0.56	7.32	412%	1000	0%	95	9.67	1700	600	70	2400	-
15-Aug-19	15:39	141	376.64	379.62	99	-108	-	-	102.00	1%	19.14	7.3	1.02	0.277	-7%	9.12	-0.35	2.56	-65%	1000	0%	-45	11.00	2000	600	72	1950	-
15-Aug-19	22:57	142	379.62	382.64	164	-65	Solid core	-	95.65	-6%	17.21	7.5	1.02	0.297	7%	9.15	0.03	1.66	-35%	1000	0%	-224	20.86	1600	450	57	2100	-
16-Aug-19	00:44	143	382.64	385.61	116	49	Solid core	-	91.52	-4%	17.17	7.7	1.02	0.300	1%	9.12	-0.03	6.79	309%	1000	0%	-351	23.91	1600	500	55	2000	-
16-Aug-19	02:29	144	385.61	388.65	166	-50	Solid core	-	96.71	6%	17.24	7.7	1.02	0.303	1%	9.13	0.01	1.17	-83%	1000	0%	-313	23.36	1700	450	56	2000	-
16-Aug-19	05:07	145	388.65	391.63	270	-104	Long duration run; no features in core to indicate water loss	-	97.11	0%	17.18	7.7	1.02	0.314	4%	9.12	-0.01	1.22	4%	1000	0%	-360	37.92	1800	550	57	2000	-
16-Aug-19	13:33	146	391.63	394.60	70	200	-	-	82.90	-15%	17.20	7.8	1.02	0.173	-45%	9.53	0.41	7.39	506%	1000	0%	88	9.67	2400	500	76	2000	-
16-Aug-19	14:41	147	394.60	397.61	24	47	-	-	86.30	4%	17.45	8	1.01	0.180	4%	9.46	-0.07	5.42	-27%	1000	0%	69	12.67	2500	500	68	2000	-
16-Aug-19	16:26	148	397.61	400.65	-51	74	-	-	75.86	-12%	17.81	7.7	1.02	0.198	10%	9.58	0.12	7.90	46%	1000	0%	162	10.86	2500	600	70	2000	-
16-Aug-19	17:27	149	400.65	403.64	83	-134	-	-	82.87	9%	17.83	7.6	1.02	0.204	3%	9.55	-0.03	6.57	-17%	1000	0%	59	10.33	1600	550	68	1500	-
16-Aug-19	20:43	150	403.64	406.61	98	-15	-	-	78.57	-5%	18.29	8.5	1.01	0.206	1%	9.13	-0.42	1.17	-82%	1000	0%	-132	21.21	2400	500	61	1300	-
16-Aug-19	22:13	151	406.61	409.64	38	60	-	-	77.79	-1%	17.87	7.7	1.02	0.255	24%	9.56	0.43	2.39	104%	1000	0%	119	15.84	1800	550	55	1300	-
17-Aug-19	00:06	152	409.64	412.63	99	-62	-	-	82.26	6%	17.60	8.2	1.01	0.255	0%	9.36	-0.20	1.20	-50%	1000	0%	-117	23.08	2000	550	51	1300	-
17-Aug-19	01:48	153	412.63	414.77	92	7	-	-	97.64	19%	17.18	7.7	1.02	0.276	8%	9.41	0.05	2.21	84%	1000	0%	-25	26.64	2000	500	53	1300	Core tube blocked, short run.
17-Aug-19	02:50	154	414.77	415.61	6	86	-	-	98.99	1%	17.45	6.6	1.02	0.267	-3%	9.36	-0.05	2.65	20%	1000	0%	-157	20.24	1300	500	57	1100	-
17-Aug-19	04:33	155	415.61	418.62	-49	55	-	-	101.50	3%	16.87	7.8	1.02	0.319	19%	9.21	-0.15	4.85	83%	1000	0%	-615	17.28	1800	550	61	1400	-
17-Aug-19	06:03	156	418.62	421.64	135	-184	Solid core	-	87.25	-14%	17.02	7.5	1.02	0.285	-11%	9.32	0.11	0.62	-87%	1000	0%	-119	17.55	1900	500	59	1600	-
17-Aug-19	09:25	157	421.64	424.64	72	63	-	-	81.35	-7%	20.18	7.5	1.02	0.268	-6%	9.35	0.03	4.59	640%	1000	0%	91	15.33	1500	500	63	1250	Final run using settling tank drill fluid system.
18-Aug-19	17:37	158	424.64	427.63	79	-7	-	-	76.83	-6%	16.97	9.1	1.01	0.205	-24%	9.18	-0.17	6.39	39%	1000	0%	235	11.33	1900	500	62	1500	Initial run using AMC SRU centrifuge drill fluid recycling system.
18-Aug-19	20:24	159	427.63	430.63	127	-48	Solid core	-	95.12	24%	16.02	8.9	1.01	0.246	20%	9.42	0.24	7.35	15%	1000	0%	203	14.67	2000	450	57	1400	Fluorescein added to drill fluid.
18-Aug-19	22:00	160	430.63	433.62	163	-36	Solid core	-	95.04	0%	15.82	8.8	1.01	0.256	4%	9.27	-0.15	7.44	1%	1000	0%	111	19.40	1900	500	57	1500	-
18-Aug-19	23:39	161	433.62	436.64	91	72	-	-	95.99	1%	15.76	8.8	1.01	0.277	8%	9.23	-0.04	7.48	1%	1000	0%	99	20.20	1900	500	57	1500	Core tube blocked at end of run, bit change.
19-Aug-19	16:05	162	436.64	439.61	41	49	-	-	96.07	0%	17.90	8.8	1.01	0.303	9%	8.61	-0.62	6.90	-8%	1000	0%	220	11.00	2000	500	64	1250	-
19-Aug-19	17:16	163	439.61	442.65	71	-30	-	-	102.30	6%	18.62	8.8	1.01	0.307	1%	8.73	0.12	7.80	13%	1000	0%	237	9.33	2200	425	63	1400	-
19-Aug-19	23:33	164	442.65	445.66	95	-23	-	-	81.60	-20%	15.87	8.3	1.01	0.356	16%	8.86	0.13	8.25	6%	1000	0%	138	10.30	2000	450	63	1400	Run split over shift change due to centrifuge repair.
20-Aug-19	00:53	165	445.66	448.63	53	42	-	-	89.21	9%	17.16	8.1	1.01	0.400	12%	9.01	0.15	7.41	-10%	1000	0%	155	13.13	2000	400	52	1300	-
20-Aug-19	02:44	166	448.63	451.61	91	-39	-	-	96.93	9%	16.89	8.4	1.01	0.404	1%	8.90	-0.11	7.83	6%	1000	0%	187	21.48	1800	500	55	1300	-
20-Aug-19	04:41	167	451.61	454.63	71	21	-	-	95.09	-2%	17.40	8.2	1.01	0.437	8%	9.04	0.14	7.97	2%	1000	0%	208	12.58	2100	450	61	1100	-
20-Aug-19	12:24	168	454.63	457.64	-38	108	-	-	104.40	10%	18.60	8.3	1.01	0.359	-18%	8.71	-0.33	4.84	-39%	1000	0%	206	10.00	1900	440	66	1050	-
20-Aug-19	13:33	169	457.64	460.65	22	-59	-	-	106.60	2%	18.39	8.3	1.01	0.373	4%	8.88	0.17	5.14	6%	1000	0%	176	9.67	2350	430	61	1200	-
20-Aug-19	15:13	170	460.65	463.62	40	-18	-	-	114.00	7%	17.79	8.2	1.01	0.396	6%	8.84	-0.04	5.60	9%	1000	0%	236	9.67	2000	560	65	1500	-
20-Aug-19	16:35	171	463.62	466.64	-41	81	-	-	99.19	-13%	18.27	7.9	1.02	0.403	2%	8.78	-0.06	4.63	-17%	1000	0%	174	10.33	2000	600	64	1400	-
20-Aug-19	21:41	172	466.64	469.62	93	-133	-	-	92.44	-7%	16.84	8.1	1.01	0.442	10%	8.83	0.05	7.88	70%	1000	0%	154	15.44	2400	500	57	1600	-
20-Aug-19	23:24	173	469.62	472.61	39	53	-	-	91.05	-2%	16.70	7.6	1.02	0.459	4%	8.79	-0.04	7.56	-4%	1000	0%	138	15.38	2500	550	57	1700	-
21-Aug-19	08:37	174	472.61	475.65	69	-30	-	-	101.30	11%	19.74	7.7	1.02	0.388	-15%	8.72	-0.07	5.68	-25%	1000	0%	176	11.18	1700	600	59	1050	-
21-Aug-19	10:34	175	475.65	478.62	-66	135	-	-	114.20	13%	17.66	7.6	1.02	0.414	7%	8.72	0.00	7.92	39%	1000	0%	194	12.08	1650	500	62	1400	-
21-Aug-19	11:48	176	478.62	481.63	99	-165	-	-	92.34	-19%	17.25	7.4	1.02	0.424	2%	8.61	-0.11	7.31	-8%	1000	0%	147	12.67	1700	500	62	1400	-
21-Aug-19	13:31	177	481.63	484.60	-31	130	-	-	110.20	19%	16.92	7.5	1.02	0.493	16%	8.65	0.04	7.60	4%	1000	0%	193	13.47	1800	520	59	1400	-
21-Aug-19	14:44	178	484.60	487.62	86	-117	-	-	109.90	0%	16.78	7.3	1.02	0.446	-10%	8.70	0.05	7.91	4%	1000	0%	193	12.00	1700	520	61	1500	-
21-Aug-19	16:01	179	487.62	490.59	68	18	-	-	97.12	-12%	17.20	7.1	1.02	0.466	4%	8.70	0.00	7.04	-11%	1000	0%	186	11.45	1950	500	61	1100	-
21-Aug-19	21:24	180	490.59	493.66	107	-39	No features in core to indicate water loss	-	89.00	-8%	15.62	7	1.02	0.498	7%	8.74	0.04	7.10	1%	1000	0%	123	11.73	2100	550	53	600	-
21-Aug-19	23:14	181	493.66	496.64	6	101	-	-	99.33	12%	15.47	6.6	1.02	0.538	8%	8.94	0.20	8.91	25%	1000	0%	190	14.43	1900	550	57	100	-
22-Aug-19	00:48	182	496.64	499.63	30	-24	-	-	96.65	-3%	15.46	6.7	1.02	0.534	-1%	8.77	-0.17	8.66	-3%	1000	0%	161	13.38	2200	600	57	1600	-
22-Aug-19	02:15	183	499.63	502.63	17	13	-	-	111.40	15%	15.38	7.7	1.02	0.411	-23%	8.89	0.12	9.00	4%	1000	0%	150	15.33	2300	550	55	2100	Initial run after adding fresh traced water to drill fluid.
22-Aug-19	04:22	184	502.63	505.63	23	-5	-	-	105.10	-6%	15.52	7.2	1.02	0.517	26%	8.80	-0.09	8.30	-8%	1000	0%	108	15.67	2000	550	53	1800	-
22-Aug-19	14:18	185	505.63	508.62	55	-33	-	-	105.40	0%	18.20	7.4	1.02	0.483	-7%	8.80	0.00	7.66	-8%	1000	0%	176	14.67	1750	600	61	1400	-
22-Aug-19	15:51	186	508.62	511.60	-39	94	-	-	109.60	4%	17.73	7	1.02	0.492	2%	8.76	-0.04	7.79	2%	1000	0%	186	14.77	1600	580	61	1400	-
22-Aug-19	22:02	187	511.60	514.64	85	-124	-	-	100.40	-8%	14.97	7.5	1.02	0.533	8%	8.75	-0.01	8.81	13%	1000	0%	144	16.78	2100	600	53	2100	-
22-Aug-19	23:39	188	514.64	516.97	44	41	-	-	101.30	1%	14.95	7.7	1.02	0.555	4%	8.69	-0.06	9.05	3%	1000	0%	164	22.75	2500	750	53	1900	Short run, bit change.

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
23-Aug-19	15:14	189	516.97	517.60	-2	46	-	-	101.60	0%	15.68	7.5	1.02	0.578	4%	8.36	-0.33	8.78	-3%	1000	0%	213	14.29	1700	600	61	1500	-
23-Aug-19	17:23	190	517.60	520.59	36	-39	-	-	108.60	7%	18.70	7	1.02	0.616	7%	8.37	0.01	7.60	-13%	1000	0%	179	11.00	1700	540	61	1500	-
23-Aug-19	20:40	191	520.59	523.63	83	-47	-	-	96.96	-11%	18.53	7.6	1.02	0.627	2%	8.57	0.20	7.69	1%	1000	0%	163	16.45	2500	450	55	1400	-
23-Aug-19	22:40	192	523.63	526.66	82	1	-	-	93.79	-3%	19.55	7.2	1.02	0.649	4%	8.61	0.04	6.99	-9%	1000	0%	185	22.11	2500	500	53	1400	-
24-Aug-19	00:39	193	526.66	529.64	66	17	-	-	93.08	-1%	19.73	7.5	1.02	0.668	3%	8.56	-0.05	7.36	5%	1000	0%	184	24.50	2500	500	53	1400	-
24-Aug-19	02:25	194	529.64	532.63	53	13	-	-	95.65	3%	18.82	7.1	1.02	0.675	1%	8.60	0.04	6.88	-7%	1000	0%	168	16.72	2400	500	55	1600	-
24-Aug-19	04:07	195	532.63	535.63	60	-8	-	-	93.97	-2%	18.23	7.3	1.02	0.684	1%	8.62	0.02	7.26	6%	1000	0%	157	17.67	2400	550	53	1700	-
24-Aug-19	05:10	196	535.63	536.64	54	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.85	2500	500	53	1200	Run ended abruptly due to equipment failure; no drill fluid sample collected.
24-Aug-19	22:37	197	536.64	538.64	52	2	-	-	100.90	7%	17.31	7.2	1.02	0.627	-8%	8.69	0.07	6.85	-6%	1000	0%	163	16.50	2100	550	53	2000	Initial run after break for repairs and addition of fresh traced water to drill fluid.
25-Aug-19	00:31	198	538.64	541.62	56	-4	-	-	98.42	-2%	18.30	8.4	1.01	0.310	-51%	8.91	0.22	6.24	-9%	1000	0%	118	20.47	2000	550	55	1900	Fresh traced water circulating in system.
25-Aug-19	02:06	199	541.62	544.63	11	45	-	-	95.16	-3%	18.55	7.7	1.02	0.549	77%	8.77	-0.14	6.78	9%	1000	0%	147	13.95	2400	500	55	1800	-
25-Aug-19	03:47	200	544.63	547.64	44	-33	-	-	102.60	8%	18.83	7.8	1.02	0.435	-21%	8.82	0.05	6.39	-6%	1000	0%	150	18.27	2000	550	53	2000	-
25-Aug-19	05:17	201	547.64	550.65	41	3	-	-	99.30	-3%	18.62	7.3	1.02	0.537	23%	9.03	0.21	6.64	4%	1000	0%	138	12.96	2300	550	53	2000	-
25-Aug-19	13:41	202	550.65	553.62	-92	132	-	-	103.20	4%	22.01	7.5	1.02	0.509	-5%	8.96	-0.07	3.11	-53%	1000	0%	108	11.11	1750	600	61	1900	-
25-Aug-19	16:01	203	553.62	556.62	76	-168	-	-	112.00	9%	21.45	7.5	1.02	0.523	3%	8.80	-0.16	5.54	78%	1000	0%	164	11.00	1600	620	61	1500	-
25-Aug-19	21:34	204	556.62	559.64	181	-105	No features in core to indicate water loss	-	104.80	-6%	17.51	6.9	1.02	0.554	6%	8.71	-0.09	3.15	-43%	1000	0%	65	12.91	2200	550	53	2100	-
25-Aug-19	23:03	205	559.64	562.65	76	105	-	-	105.60	1%	19.09	7	1.02	0.535	-3%	8.80	0.09	6.31	100%	1000	0%	153	13.29	2100	500	53	2100	-
26-Aug-19	00:28	206	562.65	565.64	89	-13	-	-	100.30	-5%	19.51	7	1.02	0.571	7%	8.78	-0.02	4.60	-27%	1000	0%	131	13.38	2200	500	53	2000	-
26-Aug-19	01:59	207	565.64	568.64	55	34	-	-	100.80	0%	19.53	6.7	1.02	0.578	1%	8.65	-0.13	2.65	-42%	1000	0%	-2	14.33	2000	550	53	2100	-
26-Aug-19	03:29	208	568.64	571.64	65	-10	-	-	105.10	4%	19.13	6.6	1.02	0.595	3%	8.72	0.07	2.30	-13%	1000	0%	147	14.67	2000	500	53	2100	-
26-Aug-19	11:42	209	571.64	574.61	51	14	-	-	105.10	0%	22.65	6.8	1.02	0.582	-2%	8.51	-0.21	4.72	105%	1000	0%	105	14.48	1600	700	61	1600	-
26-Aug-19	13:02	210	574.61	577.62	42	9	-	-	113.70	8%	21.88	6.7	1.02	0.575	-1%	8.41	-0.10	3.47	-26%	1000	0%	108	13.67	1750	700	61	1800	-
26-Aug-19	15:27	211	577.62	580.61	13	29	-	-	103.00	-9%	20.30	7.7	1.02	0.597	4%	8.45	0.04	3.54	2%	1000	0%	156	14.67	1500	620	61	1900	-
26-Aug-19	17:20	212	580.61	583.60	64	-51	-	-	105.30	2%	19.78	6.8	1.02	0.599	0%	8.44	-0.01	3.76	6%	1000	0%	207	15.00	1750	600	61	1600	-
26-Aug-19	22:03	213	583.60	586.63	113	-48	No features in core to indicate water loss	-	101.80	-3%	17.85	7.4	1.02	0.627	5%	8.56	0.12	7.04	87%	1000	0%	82	17.16	2500	500	53	2000	-
26-Aug-19	23:35	214	586.63	589.63	101	12	No features in core to indicate water loss	-	105.00	3%	18.47	6.4	1.03	0.615	-2%	8.55	-0.01	6.95	-1%	1000	0%	148	15.33	2500	550	53	2000	-
27-Aug-19	01:24	215	589.63	591.98	83	18	-	-	103.80	-1%	19.07	7.7	1.02	0.648	5%	8.48	-0.07	7.52	8%	1000	0%	175	21.28	2250	600	53	2000	-
27-Aug-19	02:32	216	591.98	592.65	11	71	-	-	103.10	-1%	18.45	7.3	1.02	0.628	-3%	8.43	-0.05	6.50	-14%	1000	0%	182	16.42	2250	600	53	2500	-
27-Aug-19	04:05	217	592.65	595.63	98	-86	-	-	105.80	3%	18.72	6.7	1.02	0.652	4%	8.47	0.04	8.38	29%	1000	0%	196	16.50	2250	550	53	2400	-
27-Aug-19	05:41	218	595.63	598.62	90	7	-	-	104.90	-1%	18.71	7.7	1.02	0.677	4%	8.43	-0.04	7.10	-15%	1000	0%	159	16.39	2500	600	61	2500	-
27-Aug-19	10:47	219	598.62	601.62	43	47	-	-	99.37	-5%	17.20	6.9	1.02	0.688	2%	8.17	-0.26	4.02	-43%	1000	0%	196	19.67	1700	670	61	2000	Initial run after adding fresh traced water to drill fluid.
27-Aug-19	12:21	220	601.62	604.60	77	-34	-	-	102.50	3%	17.95	6.9	1.02	0.614	-11%	8.19	0.02	4.68	16%	1000	0%	266	16.44	1600	700	61	1800	-
27-Aug-19	14:13	221	604.60	607.58	52	25	-	-	107.10	4%	18.72	6.8	1.02	0.632	3%	8.17	-0.02	5.05	8%	1000	0%	284	17.11	1600	670	61	2000	-
27-Aug-19	15:40	222	607.58	610.61	-40	92	-	-	102.20	-5%	19.00	6.6	1.02	0.681	8%	8.30	0.13	4.67	-8%	1000	0%	199	17.17	1600	690	61	2400	-
27-Aug-19	17:54	223	610.61	613.62	132	-171	No features in core to indicate water loss	-	105.00	3%	18.24	6.5	1.03	0.678	0%	8.27	-0.03	4.14	-11%	1000	0%	244	18.67	1750	600	61	2100	-
27-Aug-19	20:49	224	613.62	616.63	140	-8	No features in core to indicate water loss	-	90.38	-14%	19.86	8.9	1.01	0.674	-1%	8.34	0.07	6.50	57%	1000	0%	137	18.27	2250	600	53	2100	-
27-Aug-19	22:18	225	616.63	619.64	112	28	No features in core to indicate water loss	-	107.30	19%	19.00	7.7	1.02	0.671	0%	8.29	-0.05	5.74	-12%	1000	0%	143	14.62	2500	600	53	2000	-
27-Aug-19	23:23	226	619.64	620.65	41	71	-	-	104.10	-3%	17.86	7.7	1.02	0.713	6%	8.28	-0.01	6.59	15%	1000	0%	171	21.78	2500	650	53	2000	-
28-Aug-19	10:52	227	620.65	622.59	74	-34	-	-	99.45	-4%	13.71	6.9	1.02	0.653	-8%	8.30	0.02	5.70	-14%	1000	0%	131	17.01	1750	650	57	2200	-
28-Aug-19	12:33	228	622.59	625.61	49	25	-	-	109.80	10%	14.81	6.5	1.03	0.589	-10%	8.42	0.12	5.93	4%	1000	0%	140	18.12	1700	600	59	1700	-
28-Aug-19	14:29	229	625.61	628.61	75	-26	-	-	117.90	7%	16.70	6.6	1.02	0.609	3%	8.46	0.04	9.43	59%	1000	0%	145	17.67	1700	600	57	1700	-
28-Aug-19	16:02	230	628.61	631.61	89	-14	-	-	99.76	-15%	17.32	6.5	1.03	0.635	4%	8.39	-0.07	7.80	-17%	1000	0%	152	15.33	2000	600	61	1500	-
28-Aug-19	17:24	231	631.61	634.61	96	-7	-	-	95.43	-4%	17.85	6.6	1.02	0.641	1%	8.45	0.06	9.04	16%	1000	0%	134	12.67	2000	600	57	1500	-
28-Aug-19	20:32	232	634.61	637.62	135	-38	No features in core to indicate water loss	-	104.60	10%	17.04	8.7	1.01	0.628	-2%	8.58	0.13	10.37	15%	1000	0%	113	18.27	2600	500	53	1500	-
28-Aug-19	22:08	233	637.62	640.62	120	15	No features in core to indicate water loss	-	105.30	1%	18.28	8.4	1.01	0.606	-4%	8.59	0.01	10.33	0%	1000	0%	105	17.33	2600	500	53	1600	-
28-Aug-19	23:41	234	640.62	643.62	108	12	No features in core to indicate water loss	-	106.80	1%	18.50	8.3	1.01	0.662	9%	8.70	0.11	9.81	-5%	1000	0%	100	15.67	2500	550	53	2750	-
29-Aug-19	02:18	235	643.62	646.64	95	13	-	-	112.80	6%	16.94	6.5	1.03	0.643	-3%	8.63	-0.07	9.48	-3%	1000	0%	116	13.58	2250	650	53	2000	-
29-Aug-19	03:54	236	646.64	649.64	103	-8	No features in core to indicate water loss	-	110.60	-2%	17.84	6.3	1.03	0.680	6%	8.45	-0.18	7.76	-18%	1000	0%	52	16.00	2500	600	53	2500	-
29-Aug-19	05:25	237	649.64	652.64	97	6	-	-	113.00	2%	17.44	6.5	1.03	0.681	0%	8.58	0.13	7.73	0%	1000	0%	82	15.33	2500	650	53	2400	-
29-Aug-19	06:47	238	652.64	655.63	86	12	-	-	117.20	4%	17.68	7.2	1.02	0.598	-12%	8.64	0.06	8.84	14%	1000	0%	88	13.04	2500	650	53	2500	-
29-Aug-19	10:21	239	655.63	658.62	2	84	-	-	108.70	-7%	17.78	6.6	1.02	0.653	9%	8.26	-0.38	10.51	19%	1000	0%	251	13.67	1700	700	57	2100	-
29-Aug-19	11:54	240	658.62	661.61	110	-108	No features in core to indicate water loss	-	112.40	3%	18.17	6.8	1.02	0.649	-1%	8.37	0.11	7.86	-25%	1000	0%	164	15.33	1700	600	57	2200	-
29-Aug-19	15:09	241	661.61	664.60	123	-13	No features in core to indicate water loss	-	107.40	-4%	17.72	6.6	1.02	0.663	2%	8.28	-0.09	6.44	-18%	1000	0%	157	14.38	1750	600	57	1800	-
29-Aug-19	17:24	242	664.60	667.62	104	19	No features in core to indicate water loss	-	105.50	-2%	18.38	6.5	1.03	0.670	1%	8.22	-0.06	6.57	2%	1000	0%	164	19.21	1700	600	57	2000	-
29-Aug-19	21:26	243	667.62	670.65	130	-26	No features in core to indicate water loss	-	113.00	7%	17.19	7.5	1.02	0.686	2%	8.48	0.26	15.68	139%	1000	0%	316	15.18	2750	550	53	1750	-
29-Aug-19	22:55	244	670.65	673.67	103	27	No features in core to indicate water loss	-	117.70	4%	17.63	6.1	1.03	0.674	-2%	8.38	-0.10	14.21	-9%	1000	0%	307	14.57	2500	600	53	2500	-

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
30-Aug-19	00:26	245	673.67	676.63	93	10	-	-	97.65	-17%	18.43	6.6	1.02	0.675	0%	8.37	-0.01	13.03	-8%	1000	0%	238	16.55	2500	650	55	2500	-
30-Aug-19	02:05	246	676.63	679.64	44	49	-	-	116.40	19%	18.26	6	1.03	0.715	6%	8.41	0.04	13.70	5%	1000	0%	184	17.28	2500	650	53	2500	-
30-Aug-19	03:40	247	679.64	682.63	72	-28	-	-	107.70	-7%	18.20	6.4	1.03	0.723	1%	8.35	-0.06	12.82	-6%	1000	0%	170	16.39	2250	650	53	2500	-
30-Aug-19	12:12	248	682.63	685.63	58	14	-	-	95.12	-12%	16.10	6.4	1.03	0.729	1%	8.15	-0.20	11.94	-7%	1000	0%	324	16.67	1750	700	57	2000	-
30-Aug-19	13:50	249	685.63	688.63	100	-42	No features in core to indicate water loss	-	106.30	12%	16.98	6.2	1.03	0.757	4%	8.19	0.04	9.94	-17%	1000	0%	214	17.33	1750	700	57	2100	-
30-Aug-19	15:44	250	688.63	691.62	55	45	-	-	105.70	-1%	17.49	6.1	1.03	0.759	0%	8.13	-0.06	9.82	-1%	1000	0%	214	19.06	1750	750	64	1900	-
30-Aug-19	17:25	251	691.62	694.59	116	-61	No features in core to indicate water loss	-	114.50	8%	18.58	6.8	1.02	0.760	0%	8.14	0.01	10.24	4%	1000	0%	200	19.87	1800	700	61	1750	-
30-Aug-19	20:31	252	694.59	697.63	120	-5	No features in core to indicate water loss	-	106.60	-7%	18.38	6.4	1.03	0.743	-2%	8.25	0.11	8.84	-14%	1000	0%	353	16.45	2750	650	53	1750	-
30-Aug-19	22:00	253	697.63	700.63	86	34	-	-	114.90	8%	18.25	5.6	1.03	0.746	0%	8.12	-0.13	7.49	-15%	1000	0%	348	13.33	2750	650	53	2500	-
30-Aug-19	23:32	254	700.63	703.62	61	25	-	-	111.00	-3%	17.70	5.7	1.03	0.783	5%	8.09	-0.03	5.17	-31%	1000	0%	229	14.05	2500	700	53	2500	-
31-Aug-19	01:10	255	703.62	706.63	88	-27	-	-	117.90	6%	17.63	6	1.03	0.778	-1%	8.18	0.09	7.89	53%	1000	0%	198	16.28	2500	700	53	2500	-
31-Aug-19	02:41	256	706.63	709.61	71	17	-	-	101.80	-14%	17.06	6.1	1.03	0.779	0%	8.09	-0.09	7.72	-2%	1000	0%	173	15.77	2500	700	53	2250	-
31-Aug-19	04:14	257	709.61	712.63	-873	944	Solid core (lost water at surface due to malfunction in secondary sump /	-	112.40	10%	16.34	6.6	1.02	0.801	3%	8.18	0.09	7.42	-4%	1000	0%	203	15.23	2500	700	53	2500	-
31-Aug-19	06:08	258	712.63	715.62	55	-927	-	-	107.20	-5%	15.24	5.4	1.03	0.807	1%	8.10	-0.08	5.54	-25%	1000	0%	186	16.05	2500	700	53	2400	-
31-Aug-19	09:43	259	715.62	718.62	137	-83	-	-	97.04	-9%	15.07	6.8	1.02	0.586	-27%	8.21	0.11	8.21	48%	1000	0%	285	13.33	1750	700	57	1750	-
31-Aug-19	11:19	260	718.62	721.59	54	83	-	-	112.10	16%	16.02	6	1.03	0.741	26%	8.12	-0.09	7.90	-4%	1000	0%	211	15.82	1750	750	61	1900	-
31-Aug-19	13:05	261	721.59	722.64	28	26	-	-	94.47	-16%	18.03	6.8	1.02	0.710	-4%	8.15	0.03	7.72	-2%	1000	0%	179	17.14	1750	700	61	2400	-
01-Sep-19	01:03	262	722.64	724.64	83	-55	-	-	104.40	11%	17.73	6.8	1.02	0.714	1%	8.20	0.05	9.33	21%	1000	0%	361	20.50	2500	600	53	2600	-
01-Sep-19	02:31	263	724.64	727.64	73	10	-	-	111.90	7%	18.37	6.5	1.03	0.726	2%	8.41	0.21	8.70	-7%	1000	0%	343	13.33	2500	600	55	2250	-
01-Sep-19	03:57	264	727.64	730.63	12	61	-	-	118.70	6%	18.50	6.3	1.03	0.734	1%	8.13	-0.28	8.12	-7%	1000	0%	331	11.71	2500	650	53	2000	-
01-Sep-19	05:31	265	730.63	733.63	73	-61	-	-	106.70	-10%	18.83	6.2	1.03	0.727	-1%	8.15	0.02	5.12	-37%	1000	0%	223	13.67	2500	650	53	2100	-
01-Sep-19	09:46	266	733.63	736.61	54	19	-	-	101.90	-4%	17.39	5.7	1.03	0.756	4%	8.31	0.16	6.80	33%	1000	0%	231	13.09	1900	800	57	1950	-
01-Sep-19	11:23	267	736.61	739.58	75	-21	-	-	114.50	12%	17.43	5.7	1.03	0.759	0%	8.21	-0.10	8.65	27%	1000	0%	182	16.16	1900	750	57	1600	-
01-Sep-19	13:22	268	739.58	742.60	48	27	-	-	97.17	-15%	17.27	5.6	1.03	0.776	2%	8.19	-0.02	6.00	-31%	1000	0%	188	16.56	2000	700	57	1500	-
01-Sep-19	15:00	269	742.60	745.61	118	-70	No features in core to indicate water loss	-	114.10	17%	17.56	5.7	1.03	0.768	-1%	8.20	0.01	8.20	37%	1000	0%	191	17.61	2000	700	57	1700	-
01-Sep-19	16:39	270	745.61	748.62	127	-10	No features in core to indicate water loss	-	96.69	-15%	17.90	5.7	1.03	0.786	2%	8.20	0.00	8.08	-1%	1000	0%	185	18.60	2000	700	57	1750	-
01-Sep-19	18:13	271	748.62	751.60	117	10	No features in core to indicate water loss	-	112.20	16%	18.47	6.2	1.03	0.787	0%	8.24	0.04	8.70	8%	1000	0%	187	16.78	2300	700	57	2100	-
01-Sep-19	20:28	272	751.60	754.63	107	11	No features in core to indicate water loss	-	111.00	-1%	18.39	6.2	1.03	0.787	0%	8.21	-0.03	6.39	-27%	1000	0%	355	15.84	2500	700	53	2100	-
01-Sep-19	21:58	273	754.63	757.64	60	47	-	-	104.00	-6%	18.57	6.1	1.03	0.789	0%	8.19	-0.02	7.63	19%	1000	0%	269	14.95	2500	650	53	2500	-
01-Sep-19	22:34	274	757.64	760.65	87	-27	-	-	104.60	1%	18.73	5.8	1.03	0.829	5%	8.17	-0.02	5.80	-24%	1000	0%	213	16.61	2500	700	53	2250	-
02-Sep-19	01:17	275	760.65	763.64	91	-4	-	-	113.70	9%	18.67	-	-	0.825	0%	8.17	0.00	5.95	3%	1000	0%	212	16.39	2500	700	53	2250	Hydrometer broken.
02-Sep-19	02:58	276	763.64	766.65	91	0	-	-	103.70	-9%	18.66	-	-	0.835	1%	8.18	0.01	6.66	12%	1000	0%	181	17.28	2500	650	53	2400	Hydrometer broken.
02-Sep-19	04:45	277	766.65	769.20	83	8	-	-	120.40	16%	17.41	-	-	0.820	-2%	8.22	0.04	6.20	-7%	1000	0%	210	20.78	2250	700	55	2500	Hydrometer broken.
02-Sep-19	05:49	278	769.20	769.64	6	77	-	-	101.80	-15%	16.97	-	-	0.814	-1%	8.14	-0.08	6.73	9%	1000	0%	194	20.45	2250	700	55	2500	Hydrometer broken.
02-Sep-19	11:52	279	769.64	772.59	97	-91	-	-	93.93	-8%	15.17	-	1.02	0.642	-21%	8.26	0.12	10.50	56%	1000	0%	285	18.98	2000	700	57	2500	Drill fluid density measured from mass of 100 ml for remainder of borehole.
02-Sep-19	14:30	280	772.59	775.58	145	-48	Identified for potential WP06 testing interval, core is altered with clay seams and sheared amphibolite	-	104.90	12%	16.36	-	0.98	0.801	25%	8.41	0.15	11.21	7%	1000	0%	183	18.73	1900	750	57	2500	-
02-Sep-19	18:15	281	775.58	778.65	151	-6	No features in core to indicate water loss	-	102.90	-2%	16.39	-	0.98	0.832	4%	8.24	-0.17	10.64	-5%	1000	0%	245	14.98	2000	750	57	2000	-
04-Sep-19	20:56	282	778.65	781.64	173	-22	-	-	118.50	15%	16.65	-	0.98	0.823	-1%	8.29	0.05	9.08	-15%	1000	0%	190	17.73	2500	650	53	2600	-
04-Sep-19	22:37	283	781.64	784.65	84	89	-	-	115.60	-2%	17.68	-	1.00	0.825	0%	8.14	-0.15	8.86	-2%	1000	0%	191	17.28	2250	700	53	2250	-
05-Sep-19	00:11	284	784.65	787.65	48	35	-	-	117.10	1%	17.72	-	1.00	0.833	1%	8.25	0.11	8.85	0%	1000	0%	180	14.67	2500	700	53	2250	-
05-Sep-19	01:52	285	787.65	790.65	66	-18	-	-	112.50	-4%	17.98	-	1.00	0.875	5%	8.14	-0.11	7.16	-19%	1000	0%	151	17.67	2000	700	53	2250	-
05-Sep-19	03:36	286	790.65	793.63	71	-5	-	-	114.80	2%	17.84	-	0.98	0.850	-3%	8.19	0.05	7.06	-1%	1000	0%	204	18.46	2000	750	53	2250	-
05-Sep-19	05:18	287	793.63	796.63	91	-20	-	-	112.20	-2%	17.92	-	1.02	0.890	5%	8.13	-0.06	6.39	-9%	1000	0%	149	17.67	2250	750	53	2250	-
05-Sep-19	10:43	288	796.63	799.63	267	-177	No features in core to indicate water loss	-	107.50	-4%	16.36	-	1.02	0.990	11%	8.17	0.04	9.33	46%	1000	0%	220	27.67	2150	800	57	2300	-
05-Sep-19	13:28	289	799.63	802.57	200	68	-	-	100.30	-7%	19.14	-	0.98	1.090	10%	8.19	0.02	9.15	-2%	1000	0%	199	39.46	2400	750	57	2100	-
05-Sep-19	21:20	290	802.57	805.64	199	0	FIRST RUN, manual readings of tanks = 298 L	-	105.50	5%	17.02	-	0.98	1.000	-8%	8.18	-0.01	6.12	-33%	1000	0%	181	22.48	2500	650	53	2500	-
05-Sep-19	23:45	291	805.64	808.63	106	94	Manual readings of tanks = 387 L; lots of stops to run down sump box to prevent overflowing	-	106.00	0%	17.26	-	1.00	0.989	-1%	8.20	0.02	5.29	-14%	1000	0%	157	18.06	2750	750	53	2000	-
06-Sep-19	01:37	292	808.63	811.63	120	-14	Manual readings of tanks = 14L	-	108.50	2%	17.29	-	1.02	1.110	12%	8.25	0.05	4.84	-9%	1000	0%	193	17.67	2500	700	53	2500	-
06-Sep-19	03:26	293	811.63	814.63	112	8	Manual readings of tanks = -47L	-	107.20	-1%	17.33	-	1.02	0.942	-15%	8.14	-0.11	6.11	26%	1000	0%	193	17.00	2500	650	53	2500	-
06-Sep-19	10:06	294	814.63	817.66	184	-72	Manual readings of tanks = 176L; no features in core to indicate water loss	-	105.90	-1%	16.68	-	0.98	0.866	-8%	8.17	0.03	14.48	137%	1000	0%	250	19.80	2900	650	45	2700	-
06-Sep-19	13:42	295	817.66	820.66	185	-1	Manual readings of tanks = -128L; no features in core to indicate water loss	-	106.30	0%	17.87	-	1.00	0.899	4%	8.07	-0.10	6.60	-54%	1000	0%	160	26.67	2600	700	57	2700	-

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
06-Sep-19	15:50	296	820.66	823.62	72	113	Manual readings of tanks = -108L; no features in core to indicate water loss	-	97.57	-8%	18.24	-	0.98	0.909	1%	8.10	0.03	3.07	-53%	1000	0%	186	22.64	2700	600	57	2900	-
06-Sep-19	18:40	297	823.62	826.63	83	-11	Manual readings of tanks = -68L	-	108.20	11%	19.29	-	1.08	0.905	0%	8.06	-0.04	1.22	-60%	1000	0%	209	28.24	2750	500	57	3100	-
06-Sep-19	21:47	298	826.63	829.66	125	-42	Manual readings of tanks = -47L	-	105.50	-2%	17.80	-	1.00	0.914	1%	8.13	0.07	8.26	577%	1000	0%	212	22.11	2400	500	53	2500	-
06-Sep-19	23:45	299	829.66	832.65	114	11	Manual readings of tanks = -11L	-	105.80	0%	17.89	-	1.02	0.895	-2%	8.09	-0.04	7.30	-12%	1000	0%	179	16.39	2400	500	53	2500	-
07-Sep-19	01:37	300	832.65	835.65	106	7	Manual readings of tanks = -27L	-	106.50	1%	17.35	-	1.02	0.922	3%	8.12	0.03	9.33	28%	1000	0%	212	18.00	2500	500	53	2250	-
07-Sep-19	03:31	301	835.65	838.65	104	2	Manual readings of tanks = -19L	-	105.10	-1%	16.96	-	0.98	0.901	-2%	8.06	-0.06	9.38	1%	1000	0%	199	18.67	2400	500	53	2500	-
07-Sep-19	05:32	302	838.65	841.63	124	-19	Manual readings of tanks = -11L	-	101.20	-4%	16.86	-	1.00	0.904	0%	8.10	0.04	9.11	-3%	1000	0%	210	17.11	2500	550	53	2500	-
08-Sep-19	21:32	303	841.63	844.63	214	-90	First run after standby, not true gain, manual readings of tanks = 110L	-	108.40	7%	14.51	-	0.98	1.090	21%	8.09	-0.01	8.88	-3%	1000	0%	233	26.67	2500	500	53	2750	-
08-Sep-19	23:23	304	844.63	847.64	105	108	Manual readings of tanks = -81L	-	101.90	-6%	16.74	-	1.02	1.020	-6%	7.89	-0.20	6.82	-23%	1000	0%	153	17.61	2500	600	53	2750	-
09-Sep-19	01:04	305	847.64	850.63	122	-17	Manual readings of tanks = -90L	-	105.70	4%	16.63	-	1.00	1.120	10%	8.07	0.18	8.89	30%	1000	0%	177	16.39	2750	500	55	2500	-
09-Sep-19	02:57	306	850.63	853.65	108	15	Manual readings of tanks = -47L	-	102.10	-3%	17.61	-	1.02	1.060	-5%	7.91	-0.16	7.43	-16%	1000	0%	180	19.54	2500	600	55	2750	-
09-Sep-19	04:04	307	853.65	854.02	21	87	Manual readings of tanks = -10L	-	104.20	2%	16.40	-	1.00	1.110	5%	7.94	0.03	8.01	8%	1000	0%	210	32.43	3000	600	55	2000	-
09-Sep-19	21:40	308	854.02	856.63	110	-89	Manual readings of tanks = 682L - fresh fluoroscein water added to centrifuge	-	102.30	-2%	15.42	-	1.02	1.010	-9%	8.18	0.24	7.31	-9%	1000	0%	185	20.31	2500	500	55	2500	-
09-Sep-19	23:26	309	856.63	859.63	125	-15	Manual readings of tanks = -67L	-	107.20	5%	15.69	-	1.00	0.730	-28%	8.17	-0.01	7.00	-4%	1000	0%	201	17.67	2500	450	55	2000	-
10-Sep-19	01:28	310	859.63	862.48	118	7	Manual readings of tanks = -108L; no features in core to indicate water loss	-	100.30	-6%	15.58	-	1.02	0.984	35%	8.15	-0.02	7.12	2%	1000	0%	230	18.95	2500	500	55	2000	-
10-Sep-19	05:11	311	862.48	865.64	109	9	Manual readings of tanks = 75L	-	102.60	2%	15.86	-	1.00	0.867	-12%	8.15	0.00	7.57	6%	1000	0%	219	23.73	2500	450	55	1750	-
10-Sep-19	10:34	312	865.64	868.64	262	-152	Manual readings of tanks = -67L	-	111.60	9%	15.51	-	1.00	1.020	18%	8.14	-0.01	8.94	18%	1000	0%	224	17.00	2500	450	45	2000	-
10-Sep-19	13:15	313	868.64	871.65	-4	265	Manual readings of tanks = -47L, borehole is pressurized (Water level = 3.5mags)	-	113.10	1%	15.43	-	1.02	1.070	5%	8.07	-0.07	9.19	3%	1000	0%	207	14.95	2400	600	45	2000	-
10-Sep-19	17:33	314	871.65	874.60	52	-56	Manual readings of tanks = -130L	-	103.40	-9%	15.04	-	0.98	1.010	-6%	8.09	0.02	9.88	8%	1000	0%	260	14.58	2500	500	45	2000	-
10-Sep-19	22:28	315	874.60	877.64	96	-44	Manual readings of tanks = -106L	-	103.40	0%	15.05	-	1.00	1.040	3%	8.14	0.05	10.22	3%	1000	0%	229	16.12	2300	500	53	2400	-
11-Sep-19	00:49	316	877.64	880.65	84	12	Manual readings of tanks = -111L	-	112.00	8%	16.04	-	1.00	1.040	0%	7.95	-0.19	9.67	-5%	1000	0%	173	13.95	2500	500	53	2400	-
11-Sep-19	05:14	317	880.65	883.65	102	-18	Manual readings of tanks = +6L	-	105.60	-6%	15.13	-	1.00	1.040	0%	8.10	0.15	11.11	15%	1000	0%	235	15.00	2700	500	53	2000	-
11-Sep-19	11:01	318	883.65	886.65	88	14	Manual readings of tanks = +56L	-	108.50	3%	16.82	-	1.02	1.040	0%	7.96	-0.14	9.93	-11%	1000	0%	180	17.33	2750	500	45	2150	-
11-Sep-19	12:51	319	886.65	889.65	90	-2	Manual readings of tanks = -86L, solid rock core, silicification around healed intact shear zones	-	116.90	8%	16.78	-	1.00	1.100	6%	8.06	0.10	9.62	-3%	1000	0%	172	17.00	2500	500	45	2500	-
11-Sep-19	14:41	320	889.65	892.64	160	-71	Manual readings of tanks = -70L; added 636L of fresh fluorescein water to centrifuge tank	-	104.60	-11%	16.96	-	1.02	1.190	8%	7.99	-0.07	10.65	11%	1000	0%	151	18.00	3000	500	45	2400	-
11-Sep-19	16:56	321	892.64	895.62	151	10	Manual readings of tanks = -20L	-	122.20	17%	17.61	-	1.00	1.240	4%	8.05	0.06	10.88	2%	1000	0%	183	28.00	2600	500	57	2600	-
11-Sep-19	20:34	322	895.62	898.64	68	83	Manual readings of tanks = -168L	-	113.20	-7%	16.47	-	0.98	0.981	-21%	7.85	-0.20	9.33	-14%	1000	0%	267	16.56	2800	500	57	2400	-
11-Sep-19	22:16	323	898.64	901.66	103	-35	Manual readings of tanks = -31L	-	122.70	8%	15.56	-	1.00	1.120	14%	7.97	0.12	10.98	18%	1000	0%	186	14.29	2500	500	57	2400	-
12-Sep-19	23:50	324	901.66	904.64	99	3	Manual readings of tanks = -89L	-	84.15	-31%	15.53	-	0.98	0.984	-12%	7.98	0.01	11.70	7%	1000	0%	184	14.09	3000	500	57	2400	-
12-Sep-19	01:36	325	904.64	907.64	74	25	Manual readings of tanks = -15L	-	105.70	26%	16.01	-	1.02	1.100	12%	8.03	0.05	12.29	5%	1000	0%	200	15.33	2500	600	57	2400	-
12-Sep-19	03:19	326	907.64	910.65	100	-26	Manual readings of tanks = -69L	-	112.90	7%	16.12	-	0.98	1.100	0%	7.94	-0.09	12.19	-1%	1000	0%	231	15.95	2500	700	57	2000	-
12-Sep-19	05:55	327	910.65	913.63	111	-12	Manual readings of tanks = -69L	-	110.90	-2%	16.09	-	1.00	1.060	-4%	8.05	0.11	12.73	4%	1000	0%	221	20.81	3000	700	49	1800	-
12-Sep-19	11:04	328	913.63	916.53	184	-73	Manual readings of tanks = 0L	-	98.63	-11%	20.61	-	1.00	1.250	18%	8.05	0.00	9.97	-22%	1000	0%	208	46.33	3000	700	53	2000	-
13-Sep-19	00:35	329	916.53	919.62	45	139	Manual readings of tanks = -167L; small overflow to lower sump causing elevated loss	-	115.60	17%	15.47	-	1.00	1.140	-9%	8.23	0.18	11.10	11%	1000	0%	354	18.77	2500	600	53	2200	-
13-Sep-19	02:39	330	919.62	922.63	124	-79	Manual readings of tanks = -14L	-	112.10	-3%	16.33	-	1.00	1.100	-4%	8.15	-0.08	12.11	9%	1000	0%	261	19.60	2600	500	53	2100	-
13-Sep-19	04:41	331	922.63	925.62	111	13	Manual readings of tanks = -110L	-	112.20	0%	16.01	-	1.02	1.130	3%	8.20	0.05	11.92	-2%	1000	0%	224	21.40	2600	500	53	1800	-
13-Sep-19	06:25	332	925.62	928.64	94	17	Manual readings of tanks = -23L	-	114.70	2%	16.92	-	1.02	1.230	9%	8.18	-0.02	11.15	-6%	1000	0%	212	14.90	2750	600	53	2000	-
13-Sep-19	10:01	333	928.64	931.64	91	3	Manual readings of tanks = +56L	-	112.80	-2%	17.11	-	1.00	1.170	-5%	8.10	-0.08	8.86	-21%	1000	0%	336	25.67	2800	500	53	2250	-
13-Sep-19	11:49	334	931.64	934.61	82	9	Manual readings of tanks = -33L	-	109.60	-3%	18.89	-	1.04	1.310	12%	8.12	0.02	7.53	-15%	1000	0%	196	18.00	2900	500	53	2250	-
13-Sep-19	14:05	335	934.61	937.65	188	-105	Manual readings of tanks = -15L	-	109.30	0%	18.89	-	1.02	1.320	1%	8.04	-0.08	6.32	-16%	1000	0%	184	26.00	3000	500	53	2250	-
13-Sep-19	16:00	336	937.65	940.65	223	-35	Manual readings of tanks = -69L	-	107.40	-2%	17.63	-	1.00	1.310	-1%	8.22	0.18	8.22	30%	1000	0%	182	16.67	3100	500	53	2250	-
13-Sep-19	18:36	337	940.65	943.61	176	46	Manual readings of tanks = +48L	-	107.70	0%	17.33	-	1.00	1.320	1%	8.08	-0.14	5.04	-39%	1000	0%	190	23.33	2800	500	53	2300	-
13-Sep-19	22:13	338	943.61	946.60	-68	245	Manual readings of tanks = -132L	-	105.40	-2%	16.20	-	1.00	1.170	-11%	8.15	0.07	7.23	43%	1000	0%	213	19.69	2750	550	53	2300	-
14-Sep-19	00:05	339	946.60	949.62	105	-174	Manual readings of tanks = -133L	-	83.20	-21%	16.30	-	1.00	1.210	3%	8.11	-0.04	4.97	-31%	1000	0%	190	17.88	2600	500	49	2000	-
14-Sep-19	02:59	340	949.62	952.64	99	7	Manual readings of tanks = -20L	-	101.40	22%	15.30	-	1.02	1.270	5%	8.18	0.07	10.41	109%	1000	0%	238	15.23	2500	550	53	2400	-
14-Sep-19	04:44	341	952.64	955.64	91	7	Manual readings of tanks = +100L	-	103.90	2%	15.59	-	1.00	1.080	-15%	8.09	-0.09	9.48	-9%	1000	0%	242	14.67	2800	550	53	2900	-
14-Sep-19	06:27	342	955.64	958.62	83	8	Manual readings of tanks = -10L	-	102.80	-1%	16.24	-	0.98	1.060	-2%	8.21	0.12	9.45	0%	1000	0%	223	15.77	2800	500	53	2600	-
14-Sep-19	23:58	343	958.62	961.63	101	-18	Manual readings of tanks = -98L; no features in core to indicate water loss	-	98.22	-4%	16.41	-	1.00	1.330	25%	8.14	-0.07	14.80	57%	1000	0%	225	22.26	2900	500	53	2800	-
15-Sep-19	02:04	344	961.63	964.64	28	73	Manual readings of tanks = -125L; large volume overtopping rods (inflating loss)	-	101.40	3%	16.63	-	1.00	1.270	-5%	8.16	0.02	15.97	8%	1000	0%	190	18.60	2500	500	53	2600	-
15-Sep-19	04:02	345	964.64	967.63	64	-35	Manual readings of tanks = -52L	-	106.90	5%	17.06	-	1.00	1.900	50%	7.98	-0.18	15.26	-4%	1000	0%	192	19.40	2750	500	53	2750	-

Table A-2: IG_BH03 Drilling and Drill Fluid Parameters

Date (End of Run)	Time (End of Run)	Run #	Top of Run	Bottom of Run	Drill Fluid Volume Change (L)	Drill Fluid Volume Change (L)	Vol. observations and comments	Fluorescein Concentration			Temp	Density		Elec. Cond.		pH		Dissolved Oxygen		Turbidity		ORP	ROP	Torque	Thrust Pressure (Down-pressure)	Fluid Injection (pump) Pressure	Return Flow Rate	Comments
								Inlet	Outlet	Change				Reading	Change	Reading	Change	Reading	Change	Reading	Change							
dd-mmm-yy	hh:mm	-	(mbgs)	(mbgs)	>100 L	>100 L vs prev. run	-	(ppb)	(ppb)	>20% change	(°C)	API Gravity	SG	(mS/cm)	>10% change	-	>0.5 Change	(mg/L)	>10% Change	(NTU)	>10% Change	(mV)	min/m	psi	psi	psi	L/min	
15-Sep-19	06:04	346	967.63	970.63	57	6	Manual readings of tanks = -73L	-	105.60	-1%	17.26	-	1.02	1.740	-8%	8.03	0.05	15.21	0%	1000	0%	196	18.67	2600	550	53	2400	-
15-Sep-19	10:00	347	970.63	973.64	55	2	Manual readings of tanks = -44L	-	104.40	-1%	21.60	-	1.00	2.660	53%	7.91	-0.12	7.15	-53%	1000	0%	170	24.00	2700	500	53	3000	-
15-Sep-19	12:17	348	973.64	976.66	43	13	Manual readings of tanks = +14L	-	100.30	-4%	20.45	-	1.04	2.280	-14%	7.83	-0.08	6.92	-3%	1000	0%	148	22.33	2700	500	53	2800	-
15-Sep-19	14:27	349	976.66	979.64	38	4	Manual readings of tanks = +11L	-	98.02	-2%	19.67	-	1.02	2.990	31%	7.91	0.08	7.40	7%	1000	0%	170	22.00	3000	500	53	2600	-
15-Sep-19	17:06	350	979.64	982.64	129	-91	Manual readings of tanks = +5L	-	95.46	-3%	20.15	-	1.02	3.360	12%	7.94	0.03	7.30	-1%	1000	0%	196	27.33	2900	500	53	2700	-
15-Sep-19	21:14	351	982.64	985.66	85	44	No manual reading due to tank refill	-	81.62	-14%	20.27	-	1.00	3.140	-7%	7.88	-0.06	8.23	13%	1000	0%	200	28.15	3200	500	53	2500	-
15-Sep-19	23:17	352	985.66	988.65	162	-77	Manual readings of tanks = +96L	-	94.53	16%	19.27	-	0.98	3.140	0%	7.79	-0.09	9.10	11%	1000	0%	224	20.40	3000	500	53	3000	-
16-Sep-19	01:30	353	988.65	991.63	43	119	Manual readings of tanks = -231L	-	97.01	3%	18.24	-	1.02	3.310	5%	7.74	-0.05	9.21	1%	1000	0%	181	15.44	2500	600	53	3000	-
16-Sep-19	03:19	354	991.63	994.64	28	14	Manual readings of tanks = -68L	-	99.93	3%	18.05	-	1.00	3.310	0%	7.77	0.03	9.27	1%	1000	0%	237	15.95	2750	650	53	3000	-
16-Sep-19	06:00	355	994.64	997.63	23	5	Manual readings of tanks = -2L	-	102.80	3%	17.24	-	0.98	3.580	8%	7.74	-0.03	9.52	3%	1000	0%	242	18.06	2500	700	53	2800	-
16-Sep-19	10:32	356	997.63	1000.61	84	-61	Manual readings of tanks = +92L	-	99.91	-3%	20.27	-	1.00	3.830	7%	7.81	0.07	8.71	-9%	1000	0%	272	41.00	2550	700	53	2500	-

DocuSign Envelope ID: EC63D399-4A9E-461F-9774-7BE3D15FB09D

Sample ID	From	To	Date	Fluorescein	Density	Temp	EC	pH	DO	ORP	Turbidity
-	mbgs	mbgs	dd-mmm-yy	ppb	g/cm^3	°C	mS/cm	-	mg/L	mV	NTU
IG_BH03_DW003	49.59	52.62	20-Jul-19	102.2	1.00	31.28	0.172	10.22	5.78	-79	>1000
IG_BH03_DW004	97.62	100.58	22-Jul-19	91.5	1.01	28.31	0.255	10.03	6.31	-30	>1000
IG_BH03_DW006	150.58	151.63	01-Aug-19	80.2	1.02	21.64	0.233	9.66	4.65	-131	>1000
IG_BH03_DW010	166.60	169.63	06-Aug-19	-	1.00	19.71	0.135	8.63	0.77	-50	>1000
IG_BH03_DW011	199.61	202.09	09-Aug-19	70.4	1.00	16.81	2.100	11.83	3.80	-149	>1000
IG_BH03_DW015	247.63	250.64	11-Aug-19	103.5	1.01	21.85	0.237	10.15	8.55	-198	>1000
IG_BH03_DW016	298.61	301.61	13-Aug-19	123.9	1.02	21.19	0.209	9.45	4.16	-107	>1000
IG_BH03_DW017	349.65	352.62	14-Aug-19	88.5	1.01	20.31	0.255	9.4	4.41	-36	>1000
IG_BH03_DW021	397.63	400.65	16-Aug-19	75.9	1.02	17.81	0.198	9.58	7.90	162	>1000
IG_BH03_DW022	448.63	451.61	20-Aug-19	96.9	1.01	16.89	0.404	8.9	7.83	187	>1000
IG_BH03_DW023	499.63	502.63	22-Aug-19	111.4	1.02	15.38	0.411	8.89	9.00	150	>1000
IG_BH03_DW027	547.64	550.65	25-Aug-19	99.3	1.02	18.62	0.537	9.03	6.64	138	>1000
IG_BH03_DW028	598.62	601.62	27-Aug-19	99.4	1.02	17.20	0.688	8.17	4.02	196	>1000
IG_BH03_DW029	649.64	652.64	29-Aug-19	110.8	1.02	17.63	0.485	8.51	1.52	89	>1000
IG_BH03_DW030	697.63	700.63	30-Aug-19	104.2	1.03	19.20	0.764	8.01	0.82	336	>1000
IG_BH03_DW031	751.60	754.63	01-Sep-19	112.2	1.03	19.40	0.809	7.98	0.00	376	>1000
IG_BH03_DW032	799.63	802.57	05-Sep-19	100.2	0.98	20.26	1.120	8.1	1.00	86	>1000
IG_BH03_DW033	850.63	853.65	09-Sep-19	105.5	0.98	17.60	1.14	7.91	2.73	244	>1000
IG_BH03_DW034	898.64	901.66	11-Sep-19	122.7	1.00	15.56	1.12	7.97	10.98	186	>1000
IG_BH03_DW035	949.62	952.64	14-Sep-19	101.4	1.02	15.30	1.27	8.18	10.41	238	>1000
IG_BH03_DW036	997.63	1000.61	16-Sep-19	99.9	1.00	20.27	3.83	7.81	8.71	272	>1000

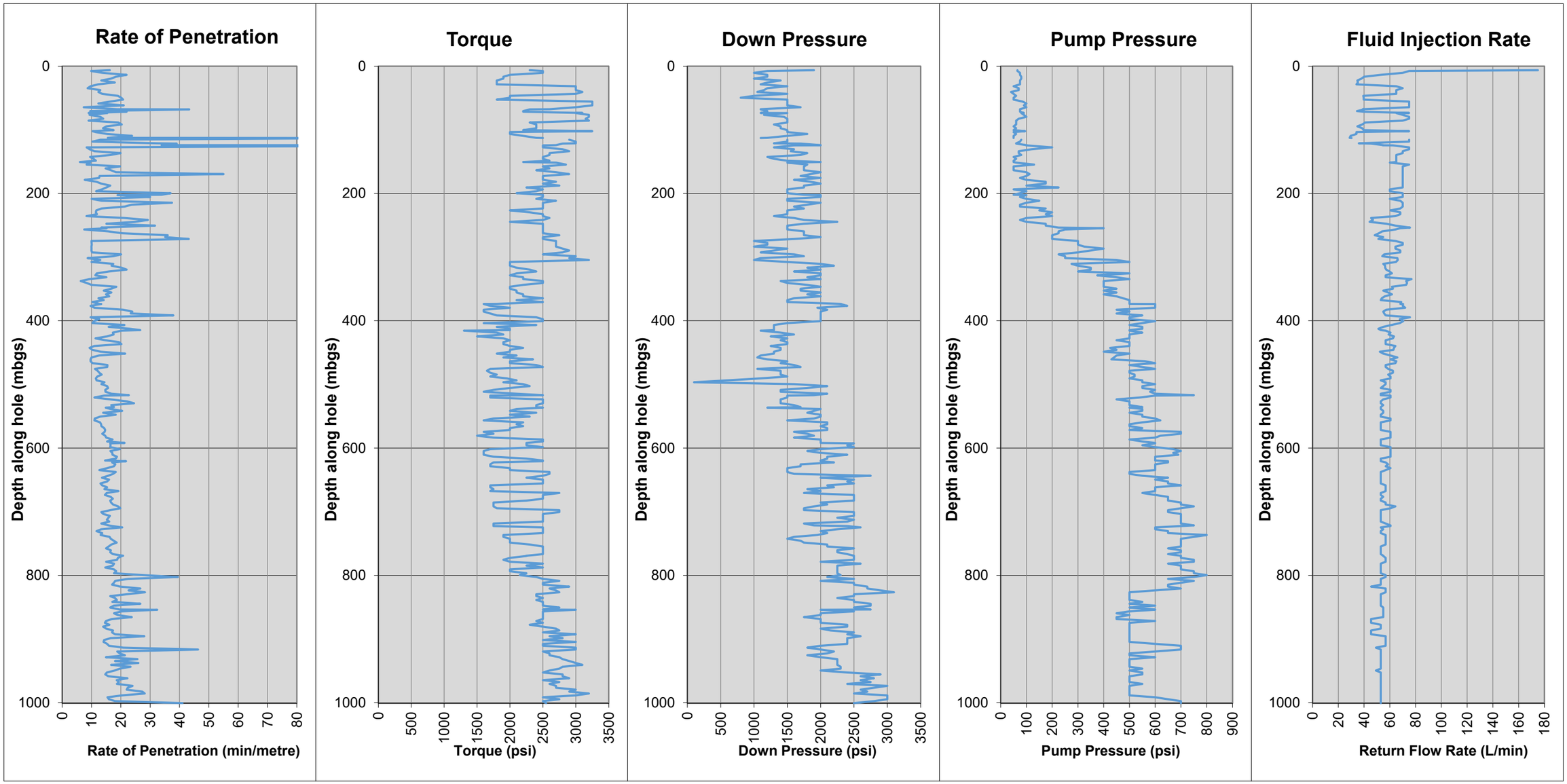
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APPENDIX B

IG_BH03 Drilling and Drill Fluid Parameter Figures

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NOTES

1. Gaps in data appear where readings were not available.

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NWMO Ignace Drilling IG_BH03

TITLE
Figure B-1: Drilling Parameters

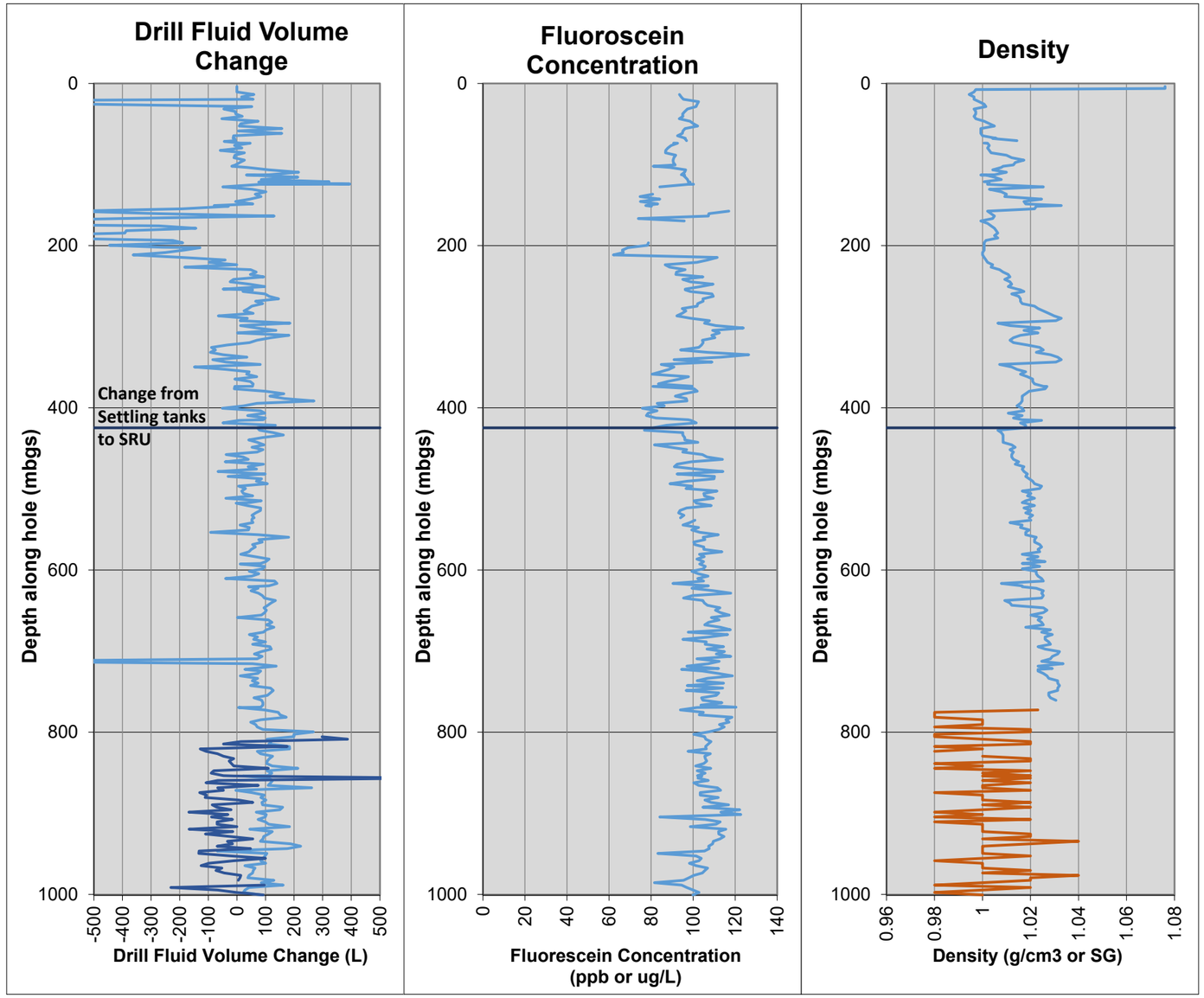
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https://golderassociates.sharepoint.com/sites/13226g/Technical%20Work/WP2%20Drilling%20and%20Coring/Reporting/R0/Appendix%20D/Drill%20Parameters_R0.pptx

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NOTES

1. Gaps in data appear where readings were not available.
2. — Indicates manual drill fluid measurements.
3. — Indicates where density was estimated using analytical scale.

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TITLE
Figure B-2: Drill Fluid Parameters

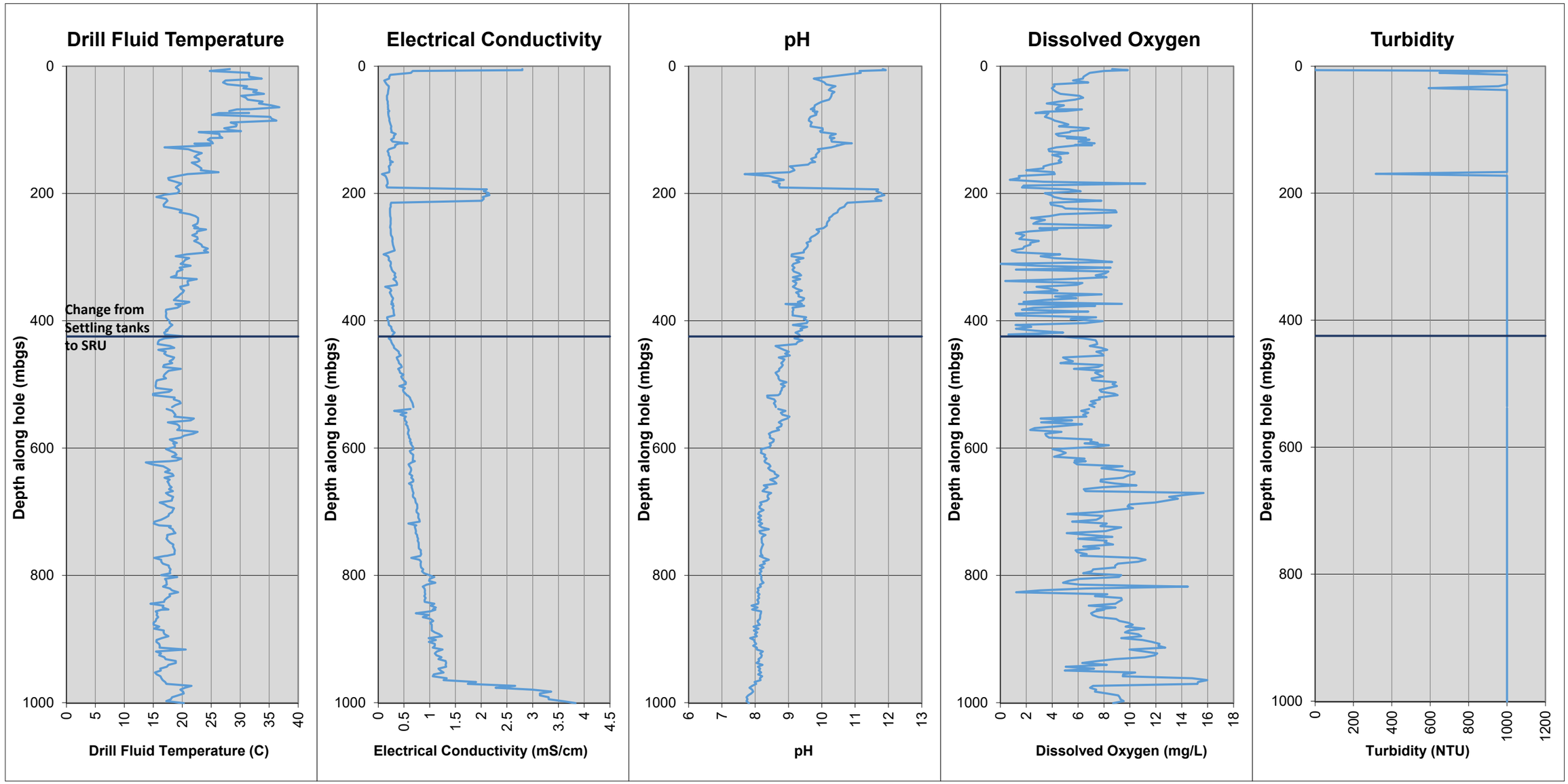
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DRAWN/REV
NAS / JLC

PROJECT NO.
1671632 (2201)

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NOTES

1. Gaps in data appear where readings were not available.

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NWMO Ignace Drilling IG_BH03

TITLE
Figure B-3: Drill Fluid Parameters

DATE
2020-01-16

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1671632 (2201)

https://golderassociates.sharepoint.com/sites/13226g/Technical%20Work/WP2%20Drilling%20and%20Coring/Reporting/R0/Appendix%20D/Drill%20Parameters_R0.pptx

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APPENDIX C

Final IG_BH03 Flushing Data

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Table C-1: Water Quality Parameters collected during final IG_BH03 Flushing 1671632 (2201)

Flush Sequence	Date / Time	Elapsed Time (hours)	Approx. Volume (L)	Fluorescein (ppb)	Temperature (°C)	pH	ORP (mV)	Conducivity (mS/cm)	Turbidity (NTU)	DO[1] (mg/L)
1	16-Sep-19 / 20:20	0.00	0	101.2	17.23	7.65	145	0.086	145	5.40
	16-Sep-19 / 20:50	0.50	2135	89.90	16.25	7.51	138	3.56	1000	9.44
	16-Sep-19 / 21:22	1.03	3877	68.25	16.57	7.61	140	3.52	1000	8.23
	16-Sep-19 / 21:50	1.50	5659	81.33	15.90	7.54	89	3.50	1000	7.77
	16-Sep-19 / 22:20	2.00	7800	97.78	16.38	8.53	182	0.116	1000	0.56
	16-Sep-19 / 22:50	2.50	9018	104.5	16.38	8.53	240	0.113	1000	4.60
	16-Sep-19 / 23:17	2.95	9687	116.7	15.92	8.08	141	0.445	1000	5.60
	16-Sep-19 / 23:52	3.53	10192	114.4	16.48	8.33	53	0.224	1000	7.80
	17-Sep-19 / 00:21	4.02	10720	110.2	16.46	8.08	32	0.325	1000	2.63
	17-Sep-19 / 00:53	4.55	11604	110.4	16.67	8.35	109	0.126	773	1.49
	17-Sep-19 / 01:21	5.02	12437	114.3	16.64	8.45	113	0.107	694	2.07
	17-Sep-19 / 11:00	5.02	12437		21.89	7.40	327	0.045	7.7	9.86
	17-Sep-19 / 11:32	5.55	13804	99.46	17.57	8.47	148	0.112	899	1.30
	17-Sep-19 / 12:00	6.02	14831	101.0	17.55	7.78	39	0.577	163	4.52
	17-Sep-19 / 12:30	6.52	15875	89.26	17.13	8.27	177	0.110	140	2.65
	17-Sep-19 / 13:00	7.02	16868	92.17	17.50	8.31	225	0.081	146	4.46
	17-Sep-19 / 13:30	7.52	17840	100.8	17.76	8.49	119	0.082	973	1.82
	17-Sep-19 / 14:00	8.02	18851	106.5	17.53	8.46	144	0.080	290	10.33
	17-Sep-19 / 14:30	8.52	19818	107.8	17.79	8.45	89	0.076	168	2.20

Note:

Indicates baseline readings for water source

Blanks appears where a reading was not collected

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Table C-1: Water Quality Parameters collected during final IG_BH03 Flushing 1671632 (2201)

Flush Sequence	Date / Time	Elapsed Time (hours)	Approx. Volume (L)	Fluorescein (ppb)	Temperature (°C)	pH	ORP (mV)	Conducivity (mS/cm)	Turbidity (NTU)	DO[1] (mg/L)
2	17-Sep-19 / 14:45	9.02	21270	106.4	18.87	7.48	323	0.046	7.2	6.87
	17-Sep-19 / 15:00	9.02	21270	106.5	17.75	8.41	124	0.074	149	0.00
	17-Sep-19 / 15:30	9.52	22911	104.3	17.82	8.34	163	0.073	151	5.22
	17-Sep-19 / 16:00	10.02	24570	99.30	18.04	8.37	228	0.058	79.9	7.30
	17-Sep-19 / 16:30	10.52	26138	97.44	17.51	8.36	107	0.087	19.3	0.05
	17-Sep-19 / 17:00	11.02	27296	97.31	17.48	8.48	162	0.051	15.1	2.05
	17-Sep-19 / 17:15	11.27	27631	99.21	17.38	8.27	82	0.098	14	1.86
	17-Sep-19 / 17:30	11.52	27967	94.05	17.07	8.37	112	0.061	9.4	1.20
	17-Sep-19 / 18:00	12.02	28651	94.28	17.16	8.31	98	0.071	3.6	1.87
	17-Sep-19 / 18:15	12.27	29011	94.46	17.30	8.36	78	0.062	75.6	1.10
	17-Sep-19 / 18:30	12.52	29380	95.40	17.01	8.42	32	0.063	50.1	3.26
	17-Sep-19 / 19:35	12.60	29699	96.14	19.15	8.42	40	0.057	42	0.63
	17-Sep-19 / 20:00	13.02	30632	98.48	18.64	7.99	0	0.180	4.6	1.97
	17-Sep-19 / 20:30	13.52	31892	92.68	19.10	8.33	119	0.052	14.2	2.77
	17-Sep-19 / 21:00	14.02	33150	91.75	17.87	8.40	97	0.049	24	10.69
	17-Sep-19 / 21:30	14.52	34621	100.1	18.65	8.39	138	0.048	20	3.01
	17-Sep-19 / 22:00	15.02	35284	105.1	18.12	8.39	105	0.048	13.1	7.13
	17-Sep-19 / 22:30	15.52	36425	106.1	18.04	8.24	87	0.062	11.4	1.43
	17-Sep-19 / 23:00	16.02	37654	100.3	17.50	8.32	104	0.048	6.2	8.89
	17-Sep-19 / 23:30	16.52	38792	97.90	17.94	8.26	127	0.048	19.6	1.96
	18-Sep-19 / 00:00	17.02	40126	95.68	17.79	8.07	80	0.067	11.4	9.56
	18-Sep-19 / 00:30	17.52	41547	90.61	17.24	8.30	186	0.047	36.3	9.54
	18-Sep-19 / 00:55	17.93	42693	89.59	17.39	8.11	122	0.048	12.2	9.51

Note:
Indicates baseline readings for water source
Blanks appears where a reading was not collected

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