

TRANSMITTAL No. **13-0434-004-00015**

PROJECT : 13-0434-004 Hornepayne Yard 2013 Environmental Services Program

TO : Mr. Kirk Crosson
Ministry of the Environment
70 Foster Drive
Suite 110
Sault Ste. Marie ON P6A 6V4

FROM : Nick Tropea
KGS Group

DATE : March 21, 2014

SUBJECT : Hornepayne 2013 Env. Services Program Final RPT

SUBMITTED FOR : ☐ Approval ☒ Your Use
☐ As Requested ☐ Review and Comment

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MINISTRY OF ENVIRONMENT

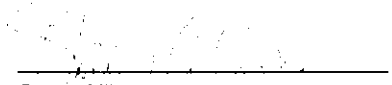
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REMARKS : As per the request of Nick Tropea, 1 hard copy of the Final Report regarding CN Hornepayne Yard 2013 Environmental Program will be sent to you via Purolator.

Regards,


Stacy Allison
Document Control

COPIES TO :

KGS Group
Tony Gallo

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SAULT STE. MARIE
MINISTRY OF ENVIRONMENT

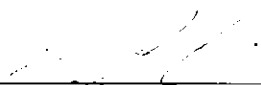
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2013 Environmental Program
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March 2014**

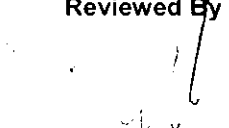
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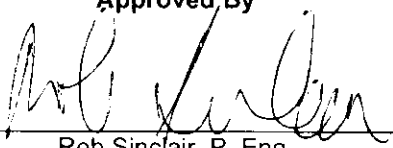
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March 20, 2014

File No. 13-0434-004

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ATTENTION: Mr. Aaron Stadnyk, P. Eng
Environmental Officer – Ontario

RE: CN Hornepayne Yard – 2013 Final Report for the Ministry of Environment
2013 Environmental Program – Hornepayne, Ontario

Dear Mr. Stadnyk:

Please find enclosed two (2) hard copies of the 2013 Environmental Activities Program Final Report, prepared for the Ministry of Environment for the above noted site. A copy of this Final Report has been uploaded to ENFOS. Also, for your convenience, one (1) hard copy of the Final Report has been forwarded to Mr. Kirk Crosson of the Ministry of Environment.

KGS Group sincerely appreciates the opportunity to have been of service on this project. If you have any further questions regarding this report, please contact Mr. Nick Tropea or the undersigned.

Yours truly,

A handwritten signature in black ink, appearing to read 'Tony Gallo', written over a faint, larger signature.

Tony Gallo, M.Sc.
Project Manger

TG/sla
/Enclosure

cc: Ms. Carolyn David, P. Eng., Environmental Coordinator
Mr. Kirk Crosson, Environmental Officer, Ministry of Environment

EXECUTIVE SUMMARY

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was retained by Canadian National (CN) to provide environmental and engineering services for the 2013 Environmental Program at the CN Hornepayne Yard, located in Hornepayne, Ontario. This report details the operation and maintenance activities associated with remedial activities at the Yard. The Hornepayne Yard operates under the Amended Certificate of Approval (C of A) No. 3528–83LQWT.

West End Diesel Recovery System

The West End Diesel Recovery System (DRS) continues to function as per design, passively collecting Light Non-Aqueous Phase Liquids (LNAPL) from the fuelling stand area and preventing the off-site migration of LNAPL. Approximately 1,300 L of LNAPL was collected during the 2013 operating year. Since commissioning in the fall of 1998, the system has recovered approximately 177,873 L.

In 2013, the DRS was inspected weekly from May to November, and monthly DRS effluent samples met all criteria outlined in the C of A.

East End Environmental Protection System

Lagoon No.2 Containment System

The Lagoon No.2 Containment System continued to prevent the off-site migration of LNAPL from the Lagoon No.2 and Former Pump House areas to the Little Jackfish River.

The horizontal extent of the LNAPL plume has not changed from previous years, although the measured LNAPL thickness in monitoring wells fluctuates between years. The Lagoon No.2 Containment System recovered approximately 1,443 L of LNAPL in 2013. Since 1998, approximately 25,677 L of LNAPL has been collected from this area.

Effluent sampled from the Lagoon No.2 outlet met all criteria outlined in the C of A. Lagoon No.2 continues to adequately attenuate impacted effluent from various Yard operations.

Former Shop Track Fuelling Area Diesel Recovery System

The Former Shop Track Fuelling (FSTF) area DRS did not operate in 2013, as CN could not place a tanker car at the Waste Oil Transfer Facility (WOTF). Although this does not impact the environment or any of the down gradient users, the operation of the full system in this area would provide economic benefit to CN, as collected fluids would be processed on-site, rather than taken off-site for processing.

The skimmer unit was operated for the majority of the 2013 operating year (May to October). In total, 1,274 L of LNAPL was collected from this area between the operation of the skimmer unit and the collection of LNAPL from Yard operations by both KGS Group and local CN personnel. Since 2004, approximately 13,562 L of LNAPL / waste oil has been collected from this area.

Waste Oil Transfer Facility

The WOTF did not operate in 2013, as a tanker car could not be placed at the site. A total of 3,500 L of total fluids, collected by KGS Group led operations, were taken directly off-site for processing.

Surface Water

The surface water program continues to show that Yard effluent/surface water discharge has no visual evidence of PHC sheen.

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1.0 INTRODUCTION

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was retained by Canadian National (CN) to provide environmental and engineering services for the 2013 Environmental Program at the CN Hornepayne Yard, located in Hornepayne, Ontario (Figure 1). This report details the operation and maintenance activities associated with both the West End Fuelling Stand System and East End Environmental Protection Systems (PIN # 1000/ONPR/100586, PIN # 1000/ONPR/100587, and PIN # 1000/ONPR/100591), and also details the results of the groundwater and surface water monitoring and sampling program conducted during the 2013 operating year. The East and West End systems operate under the Amended Certificate of Approval (C of A) No. 3528–83LQWT, which was issued on April 29, 2010 (Appendix A).

1.1 SYSTEM DESCRIPTIONS

1.1.1 West End Fuelling Stand System

The location of the West End Diesel Recovery System (DRS) (PIN # 1000/ONPR/100587) within the Hornepayne Yard is shown on Figure 2, while the DRS components are shown on Figure 3. The DRS was originally constructed in 1998 and was composed of eleven (11) underdrains, each at various elevations within the subsurface. Only ten (10) underdrains remain. Underdrain No.7 was destroyed in 1998 during construction of the diesel recovery lagoon (DRL). The underdrains discharge total fluids into the DRL. A skimmer unit, located within the Skimmer Building at the west end of the DRL, collects LNAPL floating on the surface of the water within the DRL. Collected LNAPL is transferred by gravity to a 25,000 L waste oil recovery tank. Effluent from the DRL is discharged to a discharge trench. At the downstream end of the discharge trench is a concrete control structure, through which effluent is discharged to the Little Jackfish River. Flow through the structure is controlled using a manual butterfly valve.

1.1.2 East End Environmental Protection System

Lagoon No.2 Containment System

Figure 4 shows the location of the Lagoon No. 2 containment system relative to the Yard. The general components of the containment system are shown on Figure 5. The containment system consists of a bentonite cut-off wall, ten (10) recovery wells and a groundwater interception trench. Six (6) of the recovery wells were installed in 2006 as part of the containment system upgrade (PW-5 to PW-10). Pumping well PW-1 was damaged during the system upgrade. The exposed hole from the damaged pumping well created a safety hazard; therefore, this pumping well was backfilled to remove this hazard. Five (5), top loading, AP4 pneumatic pumps are utilized to collect total fluids from selected pumping wells. The pneumatic pumps are configured to pump total fluids to a 45 L per minute oil / water separator (OWS). The pneumatic pumps can be transferred between the pumping wells as dictated by both fluctuating water table and LNAPL levels, respectively. LNAPL collected in the OWS is gravity drained to a 4,560 L double walled waste oil tank. Effluent from the OWS gravity drains to Lagoon No.2, which ultimately, discharges to the Little Jackfish River.

A groundwater interception trench was installed in the former pump house area of the Yard, located west of Lagoon No.2. The interception trench is equipped with a Myers ½ horsepower sump pump, which transfers total fluids collected within the interception trench to the OWS, located at the Lagoon No.2 Containment System. LNAPL collected in the OWS is gravity drained to a 4,560 L double walled waste oil tank. Effluent from the OWS gravity drains to Lagoon No.2, which ultimately, discharges to the Little Jackfish River.

Former Shop Track Fuelling Area Diesel Recovery System

The location of the Former Shop Track Fuelling area (FSTF) (PIN # 1000/ONPR/100591) is shown on Figure 6, while the general FSTF components are shown on Figure 7. The FSTF DRS consists of a rock filled recovery trench, collection sump and a skimmer unit, located within the Skimmer Building. A Myers ½ horsepower sump pump is used to depress the water table within the sump. Groundwater is pumped directly to the 227 L per minute OWS, located at the Waste Oil Transfer Facility. Effluent from the OWS, gravity discharges to a manhole within the area of the system. Effluent from the manhole gravity discharges to Lagoon No.2 and

ultimately, to the Little Jackfish River. The skimmer belt collects LNAPL floating on the surface of the water within the sump. Collected LNAPL is then transferred by gravity to a 5,000 L waste oil recovery tank.

Waste Oil Transfer Facility

The location of the Waste Oil Transfer Facility (WOTF) (PIN # 1000/ONPR/100591) is shown on Figure 8. The WOTF system components are shown on Figure 9. Located to the south of the WOTF are drip trays, which drain to a collection sump, equipped with a Myers ½ horsepower sump pump. Any potential spills within the drip trays are pumped from the sump to the 227 L per minute OWS separator, situated within the WOTF. A 45,400 L holding tank is located to the west of the WOTF. All collected LNAPL is placed in the waste oil tank and processed through the OWS. Clean water is discharged to Lagoon No.2. Remaining LNAPL is transferred via a Loading Arm to a nearby Tanker car, stationed at the drip trays.

2.0 OPERATION AND MAINTENANCE

2.1 WEST END FUELLING STAND SYSTEM

2.1.1 Operations and Inspections

KGS Group personnel installed the skimmer belt on May 7, 2013; however, could not activate the skimmer unit as fluid within lagoon was frozen. Local personnel started the skimmer unit on May 22, 2013. Local personnel adjusted the skimmer belt and increased / decreased the blade tension on the skimmer belt on an as required basis during 2013. The skimmer unit was shut down and winterized on November 20, 2013 by KGS Group personnel.

In 2013, KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to assess the operation of the DRS, to measure the collection of LNAPL, and to visually inspect the final discharge location. KGS Group personnel also collected an effluent sample from the final discharge location on a monthly basis. Weekly inspection forms for the 2013 operating year can be provided upon request.

2.1.2 Operation and Maintenance Issues

In 2013, the skimmer unit operated from May to November, experiencing a few minor operational interruptions. On May 28, 2013, KGS Group personnel observed a minor crack on one of the 90° elbows on the LNAPL discharge line, running from the skimmer unit decanter to the waste oil tank. LNAPL leaking from the broken elbow was contained within the DRL. The skimmer unit was manually shutdown and measurements of the discharge line and elbow were collected. On June 10, 2013, KGS Group personnel repaired the damaged elbow on the discharge line and activated the skimmer unit.

On June 11, 2013, KGS Group personnel observed a leak from the discharge line. Further inspection revealed that the leak had originated from the final two (2) foot section of the LNAPL discharge line, at the union between the galvanized steel pipe from the waste oil tank and the polypropylene line. The skimmer unit was manually shutdown and measurements of the damaged discharge line were collected. On June 17, 2013, KGS Group personnel repaired the

damaged section of the discharge line and activated the skimmer unit. No further maintenance issues were observed throughout the year.

2.1.3 Collected LNAPL

The West End DRS recovered a total of approximately **1,300 L** of LNAPL during the 2013 operating year (Figure 10). Since the commissioning of the system in the spring of 1998, the West End DRS has collected approximately **177,873 L** of LNAPL (Figure 11).

2.2 EAST END ENVIRONMENTAL PROTECTION SYSTEM

2.2.1 Lagoon No.2 Containment System Operations and Inspections

The installation of a new air compressor was required prior to the start of operation of the Lagoon No.2 Containment System in 2013. KGS Group utilized the existing storage shed and converted it into the compressor building, complete with an electrical panel to supply electricity to the building. All electrical components were connected and completed on May 29, 2013. The new compressor was commissioned on May 29, 2013.

KGS Group personnel installed the pneumatic pumps and the associated system components on May 30, 2013 and started system operation. In 2013, KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to assess the operation of the Lagoon No.2 Containment System, to measure the collection of LNAPL, and to visually inspect the final discharge location. KGS Group personnel also collected an effluent sample from the final discharge location on a monthly basis. Weekly inspection forms for the 2013 operating year can be provided upon request.

The recovery trench submersible pump operated within normal parameters throughout the 2013 operating year. The pneumatic pumps were rotated between five (5) of the recovery wells in 2013 (PW-2, PW-3, PW-7, PW-8, and PW-9). Pumping Wells PW-4, PW-5, PW-6, and PW-10 were not utilized due to insignificant thickness of LNAPL present and fluctuating water table levels. LNAPL from within these four (4) pumping wells was manually bailed during each inspection, when present.

2.2.2 Lagoon No.2 Containment System Operation and Maintenance Issues

Operation of the Lagoon No.2 Containment System began on May 30, 2013, with five (5) pumps operated in pumping wells PW-2, PW-3, PW-7, PW-8 and PW-9, as well as the interception trench submersible pump. On June 10, 2013, the system experienced an automatic shut down due to a full waste oil recovery tank; however, the float within the waste oil tank did not activate the automatic shut down of the system operation. KGS Group personnel manually shutdown system operations until the float switch was inspected. Green for Life of Thunder Bay, Ontario removed the contents of the waste oil tank and the transfer drum on June 11, 2013. KGS Group personnel, along with Commercial Electric Ltd. of Thunder Bay, Ontario, replaced the magnetic float, located within the waste oil tank, and activated the system on June 17, 2013.

2.2.3 Lagoon No.2 Collected LNAPL

The Lagoon No.2 Containment System recovered a total of approximately 1,443 L of LNAPL during the 2013 operating year (Figure 12). Since LNAPL recovery began in the spring of 1998, the Lagoon No.2 Containment System, in its various forms, has collected approximately 25,677 L of LNAPL (Figure 13).

2.2.4 Former Shop Track Fuelling Area Diesel Recovery System Operations and Inspections

As there was no tanker car placed at the WOTF in 2013, which is a requirement for operating both the Former Shop Track Fuelling area DRS and the WOTF, the remedial system, with the exception of the skimmer unit, was not operated in 2013. Although this does not impact the environment or any of the down gradient users, the operation of the full system in this area would provide economic benefit to CN, as collected fluids would be processed on-site, rather than taken off-site for processing.

KGS Group personnel installed the skimmer belt and started the skimmer unit on May 8, 2013. Local personnel adjusted the skimmer belt and increased / decreased the blade tension on the skimmer belt on an as required basis during 2013. The skimmer unit was manually shut down on October 17, 2013 due to the low water table level within the collection sump (water table

below the end of the skimmer belt). The skimmer unit was winterized on November 20, 2013 by KGS Group personnel.

Although the remedial system did not operate in 2013 as per its original design, system components, namely the waste oil tank and skimmer unit, were inspected on a monthly basis, as KGS Group and local CN personnel still use the tank to store waste oil from Yard activities, and the skimmer unit was functioning for the majority of the operating year.

In 2013, KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to measure the collection of LNAPL placed in the waste oil tank, and inspect the skimmer unit. Weekly inspection forms for the 2013 operating year can be provided upon request.

2.2.5 Former Shop Track Fuelling Area Diesel Recovery System Operation and Maintenance Issues

There were no operation or maintenance issues to report for the FSTF area DRS in 2013.

2.2.6 Former Shop Track Fuelling Area Diesel Recovery System Collected LNAPL

In total, 1,274 L of LNAPL was recovered / collected from this area in 2013. The FSTF area skimmer unit operated from May until October 2013, while both KGS Group and local CN personnel placed waste oil, from various Yard operations, in the waste oil tank. A summary of LNAPL collection for 2013 can be found on Figure 14. Since its commissioning in the spring of 2004, system and manual collection of waste oil has recovered approximately 13,562 L of LNAPL / waste oil. A summary of historical collection can be found on Figure 15.

2.2.7 Waste Oil Transfer Facility Operations and Inspections

As there was no tanker car placed at the WOTF in 2013, which is a requirement for operating both the FSTF area DRS and the WOTF, the transfer system was not operated in 2013. Although this does not impact the environment or any of the down gradient users, the operation of the full system in this area would provide economic benefit to CN, as collected fluids would be processed on-site, rather than taken off-site for processing.

Although the WOTF system did not operate in 2013, the system components, namely the waste oil holding tank, were inspected on a monthly basis as part of the monthly tank and outfall inspections. Level measurements were also recorded as KGS Group and local CN personnel used the holding tank to store waste oil generated from Yard activities.

KGS Group personnel conducted monthly inspections from May to November, while local personnel conducted weekly inspections during the same time period. Inspections were conducted to measure the collection of LNAPL placed in the waste oil holding tank. Weekly inspection forms for the 2013 operating year can be provided upon request.

2.2.8 Waste Oil Transfer Facility Operation and Maintenance Issues

There were no operation or maintenance issues to report for the WOTF in 2013.

2.2.9 Waste Oil Transfer Facility Collected LNAPL

The WOTF did not operate in 2013; therefore, 0 L of total fluids was processed through the WOTF. Green for Life of Thunder Bay, Ontario removed approximately 3,500 L of total fluids (collected from various LNAPL collection systems in the Yard) from the waste oil holding tank, located adjacent to the Waste Oil Transfer Facility, for off-site processing / disposal. Waste Manifest Forms are provided in Appendix B.

3.0 EFFLUENT SAMPLING

3.1 WEST END FUELLING STAND SYSTEM

As per the requirements of the C of A, effluent samples were collected from the outlet to the Little Jackfish River (Hor-013-05) from May through November 2013. The effluent sampling location is shown on Figure 16. KGS Group personnel collected effluent samples during each monthly inspection visit or as part of the surface water-sampling program. Effluent samples were submitted to Maxxam Analytics Inc. in Mississauga, Ontario for the laboratory analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total purgeable hydrocarbons (TPH), total extractable hydrocarbons (TEH), petroleum hydrocarbon fractions (PHC) F1 to F4, methyl-t-butyl-Ether (MTBE), pH, alkalinity, hardness, and lead. The effluent samples were submitted to the laboratory accompanied with completed chain of custody (COC) forms supplied by CN via the SAP program.

Laboratory results show that BTEX, MTBE, lead and pH in the effluent samples were below the applicable C of A criterion. PHC fractions, where analysed, were below applicable C of A criteria. Surface water quality analysis results are presented in Table 1. Laboratory certificates of analysis can be provided upon request.

3.2 EAST END ENVIRONMENTAL PROTECTION SYSTEM

Effluent samples from the Lagoon No.2 discharge to the Little Jackfish River (Hor-002-05) were taken on a monthly basis from June to November 2013. The effluent sampling location is presented on Figure 16. KGS Group personnel collected effluent samples during each monthly inspection visit or as part of the surface water-sampling program. Effluent samples were submitted to Maxxam Analytics Inc. in Mississauga, Ontario for the laboratory analysis of BTEX, TPH, TEH, PHC fractions F1 to F4, MTBE, pH, alkalinity, hardness, and lead. The effluent samples were submitted to the laboratory accompanied with completed COC forms supplied by CN via the SAP program.

Laboratory results show that BTEX, MTBE, lead and pH were below the applicable C of A criterion. Where PHC fractions F1 to F4 were analysed, the concentrations were below applicable C of A criteria. Surface water quality analysis results for parameters sampled during

2013 operating year are presented in Table 1. Laboratory certificates of analysis can be provided upon request.

3.3 EFFLUENT FLOW

3.3.1 Effluent Flow Estimation

In May 2013, transducers were installed in the west end (discharge trench) and east end (Lagoon No.2) to measure and record the height of the water column in order to calculate the effluent flow rate from both locations. In the west end, the transducer was installed in the discharge trench, up gradient of the final effluent discharge point to the Little Jackfish River, while in the east end, the transducer was installed in the northeast corner of Lagoon No.2, up gradient of the final effluent discharge point to the Little Jackfish River (Figures 3 and 5).

Each logger was placed within a protective “pipe and block” assembly to ensure that the logger was protected, and that the logger maintained its vertical position for accurate measurement of water depth. A continuous monitoring barometric pressure logger was installed in the west end in conjunction with the depth loggers to calibrate the water depth measurements, which are impacted by changes in atmospheric pressure. The loggers were pre-set to obtain water depth readings on an hourly basis. Data from each logger was manually downloaded on a monthly basis to ensure that the loggers were functioning as required, and to minimize data loss due to equipment malfunction or other issues.

Pressure transducers measure ambient pressure, which in conjunction with a local datum (the top of the pipe), allows for the calculation of the height of the water over the transducer. This was completed by subtracting the datum (distance from the top of the pipe to the top of the transducer) from the elevation of the top of pipe and adding the recorded height of water above the transducer. As the transducers measure absolute pressure (water pressure + atmospheric pressure), the atmospheric pressure, recorded by the barometric pressure logger, was subtracted to compensate for the influence of changing barometric pressures on the water level readings. This compensated reading is the height of the water column within the lagoon/trench. A level survey was conducted to establish reference elevations at each discharge location. Elevations of required variables, top and bottom of lagoon discharge pipe and the top and bottom of the pipe and block transducer housing, were surveyed with level loops closed within

an acceptable level of error. Survey benchmarks included the top of the inlet culvert at the east end lagoon and the top of the cement control structure at the west end. These reference elevations in addition to the ambient pressure data points, corrected for atmospheric pressure, allow for the determination of the height of water in relation to the discharge pipes at each location. As the compensated height of water was known and the discharge pipe size and slope was measured a flow rate can be calculated using Manning's Equation, presented below.

$$Q = VA = \left(\frac{K_n}{n} \right) AR^{\frac{2}{3}} \sqrt{S}$$

where: n = the interior surface of the pipe, in this case PVC which uses the constant 0.012
 S = the slope of the water, in this case 0.001 %
 K_n = Manning's Equation Conversion Factor (for Metric calculations $K_n = 1/\text{sec}$)
 A = the area (in meters²) of water within the pipe determined by:

$$A = \frac{[\theta - \sin(\theta)](D)^2}{8}$$

R = The Hydraulic Radius (in meters) is determined by:

$$R = \left[\frac{(\theta - \sin \theta)}{\theta} \right] \left[\frac{D}{4} \right]$$

D = Diameter of the pipe (m)

$$\theta = \pi + 2(\sin^{-1}) \left[\left(\frac{(2)(h_2)}{D} \right) - 1 \right]$$

h_2 = h_1 - height (in meters) of pipe base

h_1 = Initial transducer height (in meters) below water line + compensated height of water above transducer

Measurements from both effluent streams were collected from May 2013 to November 2013. Recorded water depths and barometric pressure were transferred to an excel spreadsheet, which was used to calculate flows at each location based on the specific flow formulae developed for each location. The median was used to describe the central tendency of flow data due to the skewed nature (non normal distribution) of flow. The median was chosen over the mean because the median is not impacted by extreme values in the data sets. The daily, weekly, and monthly statistical values summarizing the median, 25th percentiles, and 75th percentiles are presented in Tables 2 to 5. Percentiles were used for comparisons of the

spread between data sets, as it is less affected by extreme values in the data sets compared to the range.

3.3.2 West End

Daily, weekly and monthly flow rates calculated at the west end are presented in Tables 2 and 3, respectively. Median flow rates ranged from 0 L/sec in July to 0.71 L/sec in June. Flow was not measured in July due to beaver activity in the area, which resulted in a plugged discharge pipe.

3.3.3 East End

Daily, weekly and monthly flow rates calculated at the east end are presented in Tables 4 and 5, respectively. Median flow rates ranged from 0.05 L/sec in August to 0.32 L/sec in October. Flow was not measured in July due to beaver activity in the area, which resulted in a plugged discharge pipe.

3.3.4 Calibration

The calibration of flow data will commence in May 2014. Calibration will consist of taking physical measurements of flow by using a calibrated twenty (20) L pail. Five (5) separate measurements will be collected and the median value will be taken as the flow rate. This value will then be compared to calculated flow and used to ensure that the calculated flow is within 20% of the actual flow rate.

4.0 GEOLOGY AND HYDROGEOLOGY

4.1 GEOLOGY

4.1.1 West End

Native soils within the West End are generally silty sands with traces of clay. The shallow soils are typically brown turning to grey-blue at the saturation zone, which is typical of a stable water table. Localized peat layers are also found within this area. Layers of surficial imported fill, where present, range in thickness from 0 to 4 m. Historical drill logs are provided in Appendix C, while stratigraphic cross sections for the West End are presented in Appendix D (Figure D1 and D2, respectively).

4.1.2 East End

The geology of the East End typically consists of fill overtop layers of peat and silty sands. Parallel to the Little Jackfish River, the geology shifts to more coarse granular materials, sands, gravel, cobbles and boulders. Historical drill logs are provided in Appendix C, while stratigraphic cross sections for the East End are presented in Appendix D (Figures D3 and D4, respectively).

4.2 HYDROGEOLOGY

4.2.1 West End

Groundwater monitoring data for this section of the Yard is presented in Table 6. Representative contours for the spring and fall monitoring events are shown on Figures 17 and 18, respectively.

Groundwater elevations ranged from an elevation of 323.64 m (IMW-4) to 326.39 (MW-120) in the spring, and from 323.37 (IMW-4) to 325.86 m (MW-120) in the fall.

Interpreted groundwater flow direction was to the north/northeast, with local flow varying in the area of the DRS due to the influence of the underground drains and the recovery lagoon.

The average hydraulic gradient in the spring was 0.02 m/m, with local variations ranging from 0.01 to 0.03 m/m in the spring, while the average hydraulic gradient in the fall was 0.02 m/m, with local variations ranging from 0.01 to 0.04 m/m. Based on an estimated hydraulic conductivity of 10^{-8} m/s for silty clay, and an effective porosity of 0.25, the estimated groundwater velocity, local to the DRS in 2013 ranged from 0.01 to 0.05 m/year.

4.2.2 East End

Groundwater monitoring data for this section of the Yard is presented in Table 6. Representative contours for the spring and fall monitoring events are shown on Figures 19 and 20, respectively.

Former Pump House Area

Groundwater elevations in the Former Pump House area ranged from an elevation of 322.30 m (MW-43) to 324.36 m (MW-108) in the spring and from 321.69 m (MW-43) to 323.89 m (MW-108) in the fall.

Interpreted groundwater flow direction was to the north / northeast, generally towards the Little Jackfish River. Hydraulic gradients were variable and the estimated groundwater velocities through the silty sands ranged between 1 m/year to 3 m/year.

LNAPL was measured in one (1) monitoring well in the Former Pump House area in 2013. Monitoring well MW-106 showed an LNAPL thickness of 0.12 m in the spring, and 0.06 m in the fall, respectively. Detailed results are presented in Table 8.

Lagoon No.2 Area

Groundwater elevations in the Lagoon No.2 area ranged from an elevation of 321.52 m (OW5-3) to 322.30 (MW-40) in the spring, and from 320.72 (OW 5-1) to 321.48 m (MW-40) in the fall.

Interpreted groundwater flow direction was to the north / northeast, with local flow varying in the area of Lagoon No.2 due to the influence of underground infrastructure. The average hydraulic gradient in the spring was 0.026 m/m, with local variations ranging from 0.019 to 0.04 m/m in

the spring, while the average hydraulic gradient in the fall was 0.023 m/m, with local variations ranging from 0.018 to 0.03 m/m. Based on an estimated hydraulic conductivity of 10^{-6} m/s for silt and silty sands, and an effective porosity of 0.30, the estimated groundwater velocity local to Lagoon No.2 in 2013 ranged from 1.99 to 4.21 m/year in the spring and from 1.89 to 3.15 m/year in the fall.

In 2013, LNAPL was measured in four (4) monitoring wells (MW-21 – 0.52 m, MW-101 – 0.59 m, MW-102 – 0.02 m, and OW 5-2 – 0.21 m). Detailed results are presented in Table 8.

Former Shop Track Fuelling Area

Groundwater elevations ranged from an elevation of 322.63 m (MW-114) to 324.66 m (MW-126) in the spring and from 322.07 m (MW-114) to 324.19 m (MW-126) in the fall.

Interpreted groundwater flow direction was to the north/northeast towards Lagoon No.2 and the Little Jackfish River. Groundwater flow is locally influenced by underground infrastructure. The average hydraulic gradients in the spring and fall were variable, with local variations ranging from 0.01 m/m to 0.025 m/m. Based on an estimated hydraulic conductivity of 10^{-6} m/s for silty sands and an effective porosity of 0.30, the estimated groundwater velocity local to the FSTF area in 2012 ranged from 1 to 3 m/year in the spring and fall.

In 2013, LNAPL was measured in three (3) monitoring wells in 2013 (MW-109 – 0.28 m, MW-126 – 0.48 m, and OW 3-2 – 0.01 m). Detailed results are presented in Table 8.

Roundhouse Area

Representative contours for the spring and fall monitoring events are shown on Figures 19 and 20, respectively. Groundwater flow was to the north/northwest. Groundwater gradients were variable, with an estimated groundwater velocity of 1 to 3 m/year through the sandy silts/silts.

LNAPL was not measured within the Roundhouse area in 2013. Detailed results are presented in Table 8.

5.0 GROUNDWATER SAMPLING

5.1 METHODOLOGY

5.1.1 Groundwater Sampling

Groundwater sampling events were conducted on June 12 (spring) and October 8 and 9 (fall), 2013. Groundwater samples were obtained using dedicated polyethylene tubing and foot valves. Each monitoring well was purged dry to ensure a representative sample was obtained from the aquifer. Groundwater samples were collected when 40% to 50% of the initial volume had recharged. Each sample was then placed into the appropriate sample bottle and shipped in cooler chests with ice to Maxxam Analytics Inc., an accredited analytical testing facility, in Mississauga, Ontario.

Groundwater samples from monitoring wells located within 30 m of the Little Jackfish River were submitted for the laboratory analysis of BTEX, and PHC fractions F1 to F4 as part of the spring sampling event. Groundwaters sampled from these wells were submitted for the laboratory analysis of PHC fractions F2 to F4 as part of the fall sampling event. All other groundwater samples were submitted for the laboratory analysis of PHC fractions F2 to F4 in October.

5.1.2 Assessment Criteria

Groundwater sampling results were compared to the Ontario Ministry of Environment (MOE) "Soil, Groundwater and Sediment Standards for us under XV.1 of the Environmental Protection Act, dated April 15, 2011. Groundwater results for monitoring wells located within 30 m of the Little Jackfish River were assessed using Table 9 Site Conditions Standards, while results from monitoring wells outside of the 30 m from the Little Jackfish River were assessed using the Table 3 Site Condition Standards.

5.2 GROUNDWATER SAMPLING RESULTS

Figure 21 highlights the monitoring wells which were sampled during the 2013 groundwater monitoring and sampling program, as per C of A requirements. Laboratory results for samples collected during the groundwater monitoring and sampling program are presented on Table 7,

while general groundwater field chemistry results are presented on Table 8. Laboratory certificates of analysis can be provided upon request.

5.2.1 Former Pump House Area

Within 30 m of Little Jackfish River – Groundwater was sampled from three (3) monitoring wells (MW-20, MW-43, and MW-46) within 30 m of the Little Jackfish River in 2013. BTEX and PHC fraction F1 to F4 concentrations were non-detectable, or at concentrations below MOE Table 9 Site Condition Standards. BTEX results were generally similar to results from previous years (2010 to 2012), with concentrations being non-detectable or at levels below MOE Table 9 Site Condition Standards. PHC fraction concentrations which exceeded MOE Table 9 Site Condition Standards are as follows:

- **MW-20** – PHC fractions F2 and F3 exceeded in both June and October, with concentrations being similar to results from 2012, and slightly elevated when compared to results from 2010 and 2011.
- **MW-43** – PHC fraction F2 exceeded in both June and October, with concentrations being slightly elevated when compared to the range of results from previous years (2010 to 2012).
- **MW-46** – PHC fraction F2 exceeded in both June and October, and PHC fraction F3 exceeded in October. These concentrations were similar to results from 2012, and slightly elevated when compared to results from 2010 and 2011.

Outside 30 m from Little Jackfish River – Three (3) monitoring wells (MW-106, MW-107, and MW-108) were sampled from outside the 30 m limit from the Little Jackfish River in 2013. PHC fraction F4 concentrations were non-detectable; therefore, below MOE Table 3 Site Condition Standards. PHC fraction concentrations which exceeded MOE Table 3 Site Condition Standards are as follows:

- **MW-106, MW-107, and MW-108** – PHC fractions F2 and F3 exceeded in 2013, with concentrations generally being within the range of previous results (2010 to 2012), with the exception of PHC fraction F3, which was slightly lower within this same range of results.

Field Chemistry – Groundwater sampled from all wells within the FPH area was impacted to some degree, making comparisons for trends in field chemistry difficult. However, the data continues to generally show that DO concentrations are slightly lower, and more reduced

conditions exist in wells at this location, compared to other locations in the Yard where groundwater is not impacted. These results indicate increased biological activity is occurring within the FPH area.

5.2.2 Lagoon No.2 Area

Within 30 m of Little Jackfish River – Groundwater was sampled from five (5) monitoring wells (MW-40, MW-52, OW5-1, OW5-2, and OW5-3) that are located within 30 m of the Little Jackfish River in June and October 2013. BTEX concentrations were either non-detectable, or at concentrations below Table 9 Site Condition Standards in all groundwater samples. PHC fractions F1 to F4 were non-detectable or below MOE Table 9 Site Condition Standards with the exception of the following:

- **MW-40** – The concentration of PHC fraction F2 in both June and October exceeded MOE Table 9 Site Condition Standards. Previous results for this location showed these parameters to be non-detectable, with the exception of the results from October 2011 and October 2012, respectively.
- **MW-52** – PHC fractions F2 and F3 concentrations in 2013 exceeded MOE Table 9 Site Condition Standards and were within the range of results when compared to previous results from this location (2010 to 2012).
- **OW5-1** – PHC fraction F2 concentrations and F3 concentrations in October exceeded MOE Table 9 Site Condition Standards in both June and October 2013. Concentrations of PHC fraction F2 in both June and October were within the range of previous results for this location (2010 to 2012).
- **OW5-2** – PHC fraction F1 to F4 concentrations in groundwater exceeded MOE Table 9 Site Condition Standards in 2013, with results generally being within the range of results from this location.
- **OW5-3** – PHC fractions F1 to F4 exceeded MOE Table 9 Site Condition Standards in both June and October 2013, and were within range of results when compared to previous results from this location (2010 to 2012).

Outside 30 m from Little Jackfish River – Groundwater samples were collected from six (6) monitoring wells (MW-21, MW-51, MW-101, MW-102, MW-103, and MW-104) from outside of the 30 m limit from the Little Jackfish River, in October 2013. PHC Fraction F2 to F4 concentrations in groundwater generally exceeded MOE Table 3 Site Condition Standards at all sampling locations as follows:

- **MW-21** – Concentrations of PHC fractions F2 to F4 exceeded Table 3 Site Condition Standards, and were lower than previous results from this location (2010 to 2012).
- **MW-51** – Concentrations of PHC fractions F2 to F4 exceeded Table 3 Site Condition Standards, and were within the range of previous results from this location (2010 to 2012).
- **MW-101** – Concentrations of PHC fractions F2 to F4 exceeded Table 3 Site Condition Standards, and were lower than previous results from this location (2010 to 2012).
- **MW-102 and MW-103** – Concentrations of PHC fractions F2 and F3 exceeded Table 3 Site Condition Standards at both of these locations, and were elevated when compared to previous results (2010 to 2012). PHC fraction F4 was non-detectable at MW-102, which is similar to previous results. PHC fraction F4 was detected at MW-103, but was below Table 3 Site Condition Standards.
- **MW-104** – Concentrations of PHC fractions F2 to F3 exceeded Table 3 Site Condition Standards, and were within the range of previous results from this location (2010 to 2012). PHC fraction F4 was detected, but was lower than previous results, and was below Table 3 Site Condition Standards.

Field Chemistry – Field chemistry results show a definite trend of low dissolved oxygen and increased reducing conditions in groundwater from impacted wells as compared to non-impacted wells. The data suggests that there is increased biological activity within impacted areas

5.2.3 Former Shop Track Fuelling Area

Groundwater samples were collected from six (6) monitoring wells in the FSTF area in October 2013 (MW-49, MW-109, MW-114, MW-115, MW-126, and OW 3-2). PHC Fraction F2 to F4 concentrations in groundwater exceeded MOE Table 3 Site Condition Standards as follows:

- **MW-49** – Concentrations of PHC fractions F2 to F3 exceeded MOE Table 3 Site Condition Standards, and were within the range of previous results from this location (2010 to 2012).
- **MW-109 and MW-114** – Concentrations of PHC fractions F2 to F4 exceeded MOE Table 3 Site Condition Standards, and were elevated at both locations when compared to previous results (2010 to 2012).
- **MW-115** – Concentrations of PHC fraction F2 exceeded Table 3 Site Condition Standards; however, was within the range of previous results (2010 to 2012).

- **MW-126** – Concentrations of PHC fractions F2 to F4 exceeded MOE Table 3 Site Condition Standards, and was lower when compared to previous results (2010 to 2012).
- **OW3-2** – Concentrations of PHC fractions F2 to F4 exceeded MOE Table 3 Site Condition Standards, and were within the range of previous results from this location (2010 to 2012).

Field Chemistry – Field chemistry results show lower dissolved oxygen concentrations and more reduced conditions in groundwater sampled from impacted areas versus non-impacted areas. The data suggest increased biological activity in impacted areas.

5.2.4 Roundhouse Area

Groundwater was sampled from one (1) monitoring well, MW-24, in October 2013. Concentrations of PHC fractions F2 to F4 were non-detectable.

6.0 CONCLUSIONS

The following conclusions are made based on the 2013-operating year:

6.1 WEST END

- The West End DRS continues to function as per design, passively collecting LNAPL from the fuelling stand area and preventing the off-site migration of LNAPL.
- The skimmer unit operated from May to November in the 2013-operating year. Two (2) minor maintenance related interruptions led to the manual shutdown of the system for a total of eighteen (18) days. LNAPL was removed as required from the DRL.
- Weekly inspections were conducted throughout the 2013-operating year, which lasted from May 7, 2013 to November 20, 2013.
- Approximately 1,300 L of LNAPL was collected during the 2013-operating year. Since commissioning in the fall of 1998, the system has recovered approximately 177,873 L.
- Target parameter concentrations in monthly effluent samples were below their applicable C of A criterion.

6.2 EAST END

6.2.1 Lagoon No.2 Containment System Operation and Maintenance

- The Lagoon No.2 containment system continues to prevent the off-site migration of LNAPL from the Lagoon No.2 area to the Little Jackfish River.
- The Lagoon No.2 containment system operated from May to November in the 2013-operating year. One (1) minor interruption led to the automatic shutdown of the system for a total of seven (7) days.
- Weekly inspections were conducted throughout the 2013-operating year, which lasted from May 30, 2013 to November 20, 2013.
- A total of 1,443 L of LNAPL was collected in 2013. Since 1998, approximately 25,677 L of LNAPL has been collected.
- Target parameter concentrations in monthly effluent samples were below their applicable C of A criterion.

- LNAPL was measured in four (4) monitoring wells in 2013 (MW-21 – 0.52 m, MW-101 – 0.59 m, MW-102 – 0.02 m, and OW 5-2 – 0.21) m.
- Groundwater from this area was sampled in 2013 and analyzed based on the C of A Criterion. Laboratory analysis showed the continued presence of target parameters in exceedance of applicable MOE Criteria.
- Field chemistry results show a trend of low dissolved oxygen and increased reducing conditions in groundwater from impacted wells as compared to non-impacted wells. The data continues to suggest that there is increased biological activity within impacted areas.

6.2.2 Former Shop Track Fuelling Area

- The FSTF DRS, with the exception of the skimmer unit, did not operate in 2013.
- The skimmer unit operated from May 8, 2013 to October 17, 2013, when it was manually shut down due to low water table levels within the collection sump.
- Approximately 1,274 L of LNAPL was collected by the skimmer unit and from Yard operations and maintenance by both CN and KGS Group personnel in 2013. Since 2004, approximately 13,562 L of LNAPL has been collected.

6.2.3 Waste Oil Transfer Facility

- Enviro-West of Thunder Bay processed 3,500 L of total fluids, collected from various Yard LNAPL recovery systems, off-site due to the non-operation of the WOTF.

6.2.4 Surface Water

- No PHC sheen was observed on any of the surface water samples taken in 2013. The 2013 data showed that the Yard activities are not having any measurable or visible effects on the surface water quality of the Little Jackfish River.

6.2.5 Effluent Flow Calibration

- The calibration of effluent flow from the West End and East End (Lagoon No.2) will commence in May 2014.

7.0 THIRD PARTY USE AND STATEMENT OF LIMITATIONS

7.1 THIRD PARTY USE OF REPORT

This report has been prepared for Canadian National Railway and any use by a third party of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. KGS Group accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions undertaken based on this report.

7.2 STATEMENT OF LIMITATIONS

KGS Group prepared the environmental conclusions and recommendations for this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. As the report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

TABLES

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																		Comments
		Benzene	Toluene	Ethyl- benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	T.P.H. (<C ₁₀)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness	Lead	
HOR 001 05 (Lagoon No.1 Outlet)	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.2	250	250	<0.05	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.10	<0.5	8.2	210	220	<0.05	(4)
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.80	<0.5	8.0	190	220	<0.05	(4)
	Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Aug-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.80	<0.5	8.1	200	210	<0.05	(4)
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	<0.1	-	-	<0.1	<0.1	<0.5	<0.5	8.3	164	170	<0.05	(4)
	Aug-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	196	200	<0.05	
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.2	213	220	<0.05	
	Aug-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	161	150	<0.05	
Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	<0.1	0.90	<0.5	8.2	180	170	<0.05		
HOR 002 05 (Lagoon No.2)	Nov-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	0.18	0.29	<0.2	<0.1	0.35	1.80	<0.5	7.9	370	380	<0.05	
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	0.51	0.24	<0.2	<0.1	0.73	<0.5	<0.5	7.9	400	420	<0.05	
	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	1.00	0.51	<0.2	<0.1	1.50	0.60	<0.5	7.7	380	440	<0.05	(4)
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	0.65	0.29	<0.2	<0.1	0.82	2.00	<0.5	7.7	380	450	<0.05	(4)
	Jul-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	2.10	0.61	<0.2	<0.1	2.60	2.30	0.80	7.7	380	410	<0.05	(3)
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.26	<0.2	<0.2	<0.1	0.38	<0.5	<0.5	7.7	320	360	<0.05	(4)
	Nov-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.5	7.5	280	340	<0.05	(4)
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.1	-	0.20	<0.1	<0.1	<0.1	0.29	<0.5	<0.5	8.2	260	290	<0.05	(4)
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	-	-	-	-	-	-	-	-	-	-	-	-	-	Lab Dup.
	Sep-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.33	0.18	<0.1	<0.1	0.46	3.2	0.7	7.9	430	460	<0.05	
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	1.20	0.38	<0.1	<0.1	1.50	<0.5	<0.5	7.7	420	410	<0.05	
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	-	-	-	<0.1	0.52	1.7	<0.5	7.8	320	380	<0.05	(4)
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	1.00	0.50	<0.1	<0.1	2.50	<0.5	<0.5	7.7	300	350	<0.05	(4)
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	1.60	0.78	<0.1	<0.1	2.50	<0.5	<0.5	7.8	433	410	<0.05	(4)
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	-	-	-	<0.1	1.00	0.9	<0.5	7.9	327	330	<0.05	(3)
	Sep-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	1.50	0.42	<0.1	<0.1	1.90	<0.5	<0.5	7.9	432	430	<0.05	(4)
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	1.60	0.82	<0.1	<0.1	2.40	<0.5	<0.5	8.0	441	430	<0.05	(4)
	Jul-11	0.0008	<0.0002	0.0004	0.0004	<0.0004	<0.001	-	-	-	-	0.32	8.50	<0.5	<0.5	7.6	400	410	<0.05	(3)
	Jun-11	0.0006	<0.0002	0.0004	<0.0002	0.0015	<0.002	-	-	-	-	<0.1	3.70	<0.5	<0.5	7.8	288	300	<0.05	(3)
	May-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.12	0.12	<0.1	<0.1	0.24	<0.5	<0.5	8.0	-	250	<0.05	(4)
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	0.54	<0.5	<0.5	7.9	-	380	<0.05	(4)
	Oct-10	0.0003	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	0.45	<0.5	<0.5	8.1	362	400	<0.05	(4)
	Sep-10	0.0003	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	<0.1	0.37	<0.5	<0.5	8.0	366	390	<0.05	(4)
	Aug-10	<0.0002	0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	-	-	-	<0.1	0.39	1.2	<0.5	7.9	272	250	<0.05	(4)
	Jul-10	<0.0002	0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	-	-	-	<0.1	1.50	1.9	<0.5	7.8	363	330	<0.05	(3)
	Jun-10	0.0006	<0.0002	0.0002	<0.0002	<0.0004	<0.0004	-	-	-	-	0.15	4.80	4.3	<0.5	7.6	382	360	<0.05	(3)
	May-10	<0.0005	<0.01	<0.0005	<0.0005	<0.0005	<0.01	-	-	-	-	<0.1	1.80	<0.5	<0.5	7.8	393	410	<0.05	(3)
HOR 004 05 (Jackfish River, Down Stream)	Nov-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	97	100	<0.05	
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	100	110	<0.05	(4)
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.80	<0.5	8.2	100	110	<0.05	Field Dup.
	Oct-13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.1	100	-	-	Lab Dup.

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																		Comments	
		Benzene	Toluene	Ethyl- benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	T.P.H. ($<C_{10}$)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness	Lead		
HOR 004 05 (Jackfish River, Down Stream) (con't)	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.8	86	100	<0.05	⁽⁴⁾	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0001	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.60	<0.5	8.0	81	92	<0.05	⁽⁴⁾	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	-	-	-	-	-	<100	-	-	-	-	-	-	-	Lab Dup.	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.10	<0.5	8.0	81	89	<0.05	Field Dup.	
	Jul-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.10	<0.5	7.8	85	95	<0.05		
	Jun-13	<0.00025	<0.0005	<0.00025	<0.00025	<0.00025	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.4	75	83	<0.05	⁽⁴⁾	
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.90	<0.5	7.7	76	89	<0.05	Field Dup.	
	May-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.60	<0.5	7.7	59	68	<0.05		
	Nov-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.5	6.8	100	110	<0.05		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.4	180	190	<0.05		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.4	179	190	<0.05	Field Dup.	
	Sep-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.8	170	180	<0.05		
	Sep-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.8	170	-	<0.05	Lab Dup.	
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	2.6	<0.5	7.9	140	150	<0.05		
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.5	7.7	140	160	<0.05	Field Dup.	
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	100	100	<0.05	⁽⁴⁾	
	Jul-12	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Lab Dup.
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	1.2	<0.5	8.0	88	96	<0.05	
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	-	-	<0.5	<0.5	7.9	87	96	<0.05	Field Dup.	
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.7	89	94	<0.05		
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	129	130	<0.05	
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	127	130	<0.05	
	Oct-11	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	Lab Dup.
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	-	-	<0.5	<0.5	8.0	127	130	<0.05	Field Dup.
	Sep-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.2	160	160	<0.05	
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	127	130	<0.05	
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	127	130	<0.05	Field Dup.
	Aug-11	-	-	-	-	-	-	-	-	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	Lab Dup.
	Jul-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	101	100	<0.05	
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	91	100	<0.05	
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	-	-	-	-	-	-	Lab Dup.
	Jun-11	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.1	291	300	<0.05	Field Dup.
	May-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.9	-	63	<0.05	
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	-	100	<0.005	
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	0.90	<0.5	8.0	98	110	<0.005	
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	102	110	<0.005	Field Dup.
Sep-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.7	98	100	<0.005		
Aug-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	121	120	<0.005	Field Dup.	
Aug-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	122	120	<0.005		
Jul-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	0.80	<0.5	7.9	123	130	<0.005		
Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.9	109	110	<0.005	Field Dup.	
Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	0.80	<0.5	7.9	107	110	<0.005		
May-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	98	100	<0.005		

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																		Comments	
		Benzene	Toluene	Ethyl- benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	T.P.H. ($<C_{10}$)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness	Lead		
HOR 005 05 (Jackfish River, Mid-Stream)	Nov-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	8.0	98	100	<0.05	⁽⁴⁾	
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.9	99	110	<0.05	⁽⁴⁾	
	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.70	<0.5	7.9	85	98	<0.05	⁽⁴⁾	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.40	<0.5	8.0	80	84	<0.05	⁽⁴⁾	
	Jul-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.90	<0.5	7.7	86	95	<0.05		
	Jun-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.7	75	87	<0.05		
	May-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	<0.5	<0.5	7.7	58	67	<0.05		
	Nov-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.1	<0.5	6.8	100	110	<0.05		
	Oct-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.4	160	160	<0.05	⁽⁴⁾	
	Sep-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.2	<0.5	7.8	150	170	<0.05		
	Aug-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	1.3	<0.5	7.3	130	150	<0.05		
	Aug-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.05	Lab Dup.
	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.9	99	100	<0.05	⁽⁴⁾	
	Jul-12	-	-	-	-	-	<0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	Lab Dup.
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	0.24	<0.5	<0.5	7.9	86	95	<0.05	
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.7	89	93	<0.05		
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	126	120	<0.05	
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	125	130	<0.05	
	Sep-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.8	156	150	<0.05	
	Aug-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	128	130	<0.05	
	Aug-11	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	Lab Dup.
	Jul-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	99	100	<0.05	
	Jul-11	-	-	-	-	-	-	-	-	-	-	-	-	<0.1	-	-	-	-	-	-	Lab Dup.
	Jun-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	8.0	91	96	<0.05		
	Jun-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.0	91	-	-	Lab Dup.
	May-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	7.9	-	66	<0.05		
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.8	-	110	<0.005	
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	0.70	<0.5	7.9	102	110	<0.005	
	Sep-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	7.8	98	100	<0.005	
	Aug-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.0	122	120	<0.005	
	Jul-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	1.10	<0.5	7.9	123	120	<0.005	
	Jun-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	-	-	-	-	<0.1	<0.1	0.70	<0.5	7.8	107	110	<0.005	
	May-10	<0.0002	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	-	<0.1	<0.1	<0.5	<0.5	8.1	102	110	<0.005	
HOR 013 05 (West End)	Nov-13	0.0008	<0.0002	0.0008	<0.0002	<0.0004	<0.0005	-	0.41	0.48	<0.2	<0.1	0.89	<0.5	<0.5	7.9	390	400	<0.05	⁽³⁾	
	Oct-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	0.25	0.40	<0.2	<0.1	0.63	1.70	<0.5	8.1	310	340	<0.05	⁽⁴⁾	
	Sep-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	0.25	0.38	<0.2	<0.1	0.60	1.60	<0.5	8.1	300	350	<0.05	⁽⁴⁾	
	Aug-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	<0.1	<0.2	<0.2	<0.1	<0.2	1.00	<0.5	7.9	300	320	<0.05	⁽⁴⁾	
	Jul-13	<0.001	<0.002	<0.001	<0.001	0.0011	<0.002	-	0.50	0.47	<0.2	<0.1	0.97	2.40	<0.5	7.6	350	370	<0.05	⁽⁴⁾	
	Jun-13	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	0.42	0.40	<0.2	<0.1	0.81	1.80	<0.5	7.7	290	310	<0.05	⁽⁴⁾	
	May-13	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	<0.1	<0.2	<0.2	<0.1	<0.2	0.70	<0.5	7.7	58	63	<0.05	⁽⁴⁾	
	Nov-12	0.0004	<0.0002	0.0005	<0.0002	0.0005	<0.002	-	0.19	0.32	<0.1	<0.1	0.48	1.3	<0.5	7.2	250	270	<0.05	⁽⁴⁾	
	Oct-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Sep-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
Aug-12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry	

TABLE 1
SURFACE WATER QUALITY ANALYSIS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Sample ⁽¹⁾	Date	Parameter (mg/L)																		Comments
		Benzene	Toluene	Ethyl- benzene	Xylene (-o)	Xylenes (-m,-p)	MTBE	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	T.P.H. ($<C_{10}$)	T.E.H. (C ₁₀ -C ₂₄)	Oil & Grease	Mineral Oil & Grease	pH	Alkalinity	Hardness	Lead	
HOR 013 05 (West End) (con't)	Jul-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0005	-	0.13	0.17	<0.1	<0.1	0.27	<0.5	<0.5	8.1	270	280	<0.05	⁽⁴⁾
	Jun-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	-	-	-	<0.1	0.73	1.1	<0.5	8.0	330	360	<0.05	⁽⁴⁾
	May-12	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	0.28	0.30	<0.1	<0.1	0.58	3.30	<0.5	7.9	330	380	<0.05	
	Nov-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0002	-	<0.1	0.11	<0.1	<0.1	0.24	<0.5	<0.5	8.2	239	240	<0.05	
	Oct-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.0004	-	-	-	-	<0.1	0.24	<0.5	<0.5	8.2	184	200	<0.05	
	Aug-11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jul-11	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.002	-	-	-	-	<0.1	0.22	<0.5	<0.5	8.0	267	290	<0.05	⁽⁴⁾
	Jun-11	0.0005	<0.0002	0.0004	<0.0002	0.0005	<0.001	-	-	-	-	<0.1	0.58	<0.5	<0.5	8.0	312	330	<0.05	⁽⁴⁾
	May-11	0.0003	<0.0002	0.0005	<0.0002	0.0006	<0.0005	-	0.18	0.20	<0.1	<0.1	0.36	<0.5	<0.5	7.8	-	130	<0.05	
	Nov-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.004	-	-	-	-	<0.1	0.34	<0.5	<0.5	7.9	-	350	<0.005	
	Oct-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.001	-	-	-	-	<0.1	0.28	2.60	<0.5	8.0	278	310	<0.005	
	Sep-10	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	<0.005	-	-	-	-	<0.1	0.23	3.40	<0.5	8.1	229	250	<0.005	
	Aug-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jul-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
	Jun-10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Dry
May-10	<0.0001	<0.0002	<0.0001	<0.0001	<0.0001	<0.0002	-	-	-	-	<0.1	0.50	<0.5	<0.5	8.1	238	260	<0.005	⁽⁴⁾	
Certificate of Approval ⁽¹⁾																				
C of A Criteria		5	0.8	2	40	32	200	1,000		1,000		-	-	-	-	6.5-8.5	-	-	⁽²⁾	-

Notes:
"- " = No Data
T.P.H. = Total Purgeable Hydrocarbons
T.E.H. = Total Extractable Hydrocarbons
MTBE = Methyl-t-butyl-Ether

1. Certificate of Approval No. 3528-83LQWT issued for the sets the effluent criteria as listed above.
2. The limit for Lead shall be determined based on the hardness of water. If the hardness is less than 30 mg/L, then the limit is 1 ug/L. If the hardness is between 30 mg/L and 80 mg/L, then the limit is 3 ug/L. When hardness is greater than 80 mg/L, then the limit is 5 ug/L.
3. Due to the level of petroleum hydrocarbon compounds beyond the appropriate range, the sample required dilution. Detection limits were adjusted accordingly.
4. Due to foaming, the sample required dilution. Detection limits were adjusted accordingly.

BOLD - Exceedance of C of A Criteria

TABLE 2
WEST END DAILY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Day	Median (L/Sec)	25th Percentile	75th Percentile
26-May-13	0.425	0.200	0.699
27-May-13	0.140	0.114	0.171
28-May-13	0.120	0.090	0.121
29-May-13	0.084	0.060	0.090
30-May-13	0.161	0.090	0.200
31-May-13	0.280	0.241	0.344
1-Jun-13	0.257	0.192	0.333
2-Jun-13	0.239	0.200	0.280
3-Jun-13	0.234	0.226	0.243
4-Jun-13	0.192	0.159	0.200
5-Jun-13	0.161	0.154	0.192
6-Jun-13	0.234	0.198	0.243
7-Jun-13	0.243	0.234	0.280
8-Jun-13	0.200	0.192	0.234
9-Jun-13	0.161	0.154	0.194
10-Jun-13	0.192	0.154	0.200
11-Jun-13	1.032	0.794	1.116
12-Jun-13	1.398	1.308	1.398
13-Jun-13	1.788	1.600	1.883
14-Jun-13	2.226	1.554	2.376
15-Jun-13	1.050	0.735	1.220
16-Jun-13	0.341	0.278	0.927
17-Jun-13	2.074	1.765	2.197
18-Jun-13	2.782	2.561	2.989
19-Jun-13	2.515	2.145	2.651
20-Jun-13	3.036	2.514	3.082
21-Jun-13	3.225	3.082	3.404
22-Jun-13	3.082	2.909	3.225
23-Jun-13	2.282	1.955	2.651
24-Jun-13	1.600	1.416	1.694
25-Jun-13	1.326	1.326	1.416
26-Jun-13	1.694	1.694	1.812
27-Jun-13	1.416	1.394	1.416
28-Jun-13	1.694	1.508	1.694
29-Jun-13	2.376	2.074	2.469
30-Jun-13	3.155	2.969	3.241
1-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
2-Jul-13	3.338	2.245	3.415
3-Jul-13	2.263	2.045	2.376
4-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾

Notes:

L/Sec = Litres per second

NF = No Flow. Do to the following

- the height of the water within the lagoon is less than the height of the bottom of the pipe
- organic debris is plugging the discharge pipe

The Flow Rate (Q) has been calculated using the equation

$$Q = VA = \left(\frac{K_m}{n} \right) AR^{\frac{2}{3}} \sqrt{S}$$

where: n = the interior surface of the pipe. In this case PVC which uses the constant 0.012

S = the slope of the water. In this case 0.001 %

K_m = **Mannings Equation** Conversion Factor (for Metric calculations $K_m = 1.49$)

A = the area (in meters²) of water within the pipe determined by

$$A = \frac{(\theta - \sin(\theta)) R^3}{8}$$

R = The Hydraulic Radius (in meters) is determined by

$$R = \frac{(\theta - \sin(\theta)) R^3}{8A}$$

D = Diameter of the pipe (m)

$$\theta = \pi + 2 \sin^{-1} \left(\left(\frac{(2K_m h_1)}{D} \right)^{\frac{3}{2}} \right)$$

h_1 = h_2 - height (in meters) of pipe base

h_2 = Initial transducer height (in meters) below water line + compensated height of water above transducer

Day	Median (L/Sec)	25th Percentile	75th Percentile
5-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
6-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
7-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
8-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
9-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
10-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
11-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
12-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
13-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
14-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
15-Jul-13	NF ⁽³⁾	0.000	0.005
16-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
17-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
18-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
19-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
20-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
21-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
22-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
23-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
24-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
25-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
26-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
27-Jul-13	NF ⁽⁴⁾	NF ⁽⁴⁾	NF ⁽⁴⁾
28-Jul-13	NF ⁽⁵⁾	NF ⁽⁵⁾	NF ⁽⁵⁾
29-Jul-13	1.485	1.194	1.812
30-Jul-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
31-Jul-13	NF ⁽⁶⁾	NF ⁽⁶⁾	3.544
1-Aug-13	3.395	3.331	3.501
2-Aug-13	0.575	0.384	0.951
3-Aug-13	NF ⁽⁷⁾	NF ⁽⁷⁾	NF ⁽⁷⁾
4-Aug-13	NF ⁽⁷⁾	NF ⁽⁷⁾	NF ⁽⁷⁾
5-Aug-13	NF ⁽⁷⁾	NF ⁽⁷⁾	NF ⁽⁷⁾
6-Aug-13	NF ⁽⁸⁾	NF ⁽⁸⁾	0.128
7-Aug-13	0.154	0.154	0.192
8-Aug-13	0.140	0.125	0.161
9-Aug-13	0.173	0.120	0.341
10-Aug-13	0.154	0.120	0.246
11-Aug-13	0.120	0.120	0.156
12-Aug-13	0.285	0.241	0.454
13-Aug-13	0.243	0.190	0.341

Day	Median (L/Sec)	25th Percentile	75th Percentile
14-Aug-13	0.140	0.120	0.154
15-Aug-13	0.154	0.120	0.154
16-Aug-13	0.096	0.068	0.126
17-Aug-13	0.090	0.064	0.096
18-Aug-13	0.064	0.064	0.090
19-Aug-13	0.090	0.064	0.090
20-Aug-13	0.064	0.064	0.090
21-Aug-13	0.243	0.090	0.293
22-Aug-13	0.126	0.114	0.154
23-Aug-13	0.064	0.064	0.090
24-Aug-13	0.064	0.043	0.064
25-Aug-13	0.105	0.064	0.154
26-Aug-13	0.043	0.026	0.061
27-Aug-13	0.039	0.026	0.060
28-Aug-13	0.043	0.026	0.043
29-Aug-13	0.026	0.026	0.031
30-Aug-13	0.120	0.090	0.154
31-Aug-13	0.090	0.064	0.090
1-Sep-13	0.390	0.288	0.739
2-Sep-13	0.581	0.396	0.871
3-Sep-13	0.120	0.120	0.192
4-Sep-13	0.120	0.120	0.126
5-Sep-13	0.736	0.439	0.987
6-Sep-13	1.453	1.398	1.582
7-Sep-13	1.978	1.845	2.074
8-Sep-13	2.357	2.357	2.451
9-Sep-13	2.542	1.113	2.633
10-Sep-13	0.043	0.026	0.071
11-Sep-13	0.009	0.005	0.014
12-Sep-13	0.014	0.012	0.014
13-Sep-13	0.014	0.012	0.014
14-Sep-13	0.004	0.001	0.014
15-Sep-13	0.023	0.012	0.031
16-Sep-13	0.010	0.001	0.026
17-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	0.014
18-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	0.005
19-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
20-Sep-13	0.004	0.004	0.012
21-Sep-13	0.012	0.005	0.014
22-Sep-13	0.005	0.001	0.005

Notes regarding No Flow (NF):

- A limited amount of effluent flow was recorded from 12:00am to 1:00am. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- Effluent flow did not occur at any time in 24hrs. Pipe was plugged with organic debris (sticks, leaves, grasses).
- A limited amount of effluent flow was recorded from 6:00am to 12:00pm. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- A limited amount of effluent flow was recorded from 5:00am to 8:00am. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- A limited amount of effluent flow was recorded from 12:00am to 7:00am. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- A limited amount of effluent flow was recorded from 2:00pm to 12:00am. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- A limited amount of effluent flow was recorded from 12:00am to 4:00am. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- A limited amount of effluent flow was recorded from 5:00pm to 12:00pm. The remainder of the day the pipe was plugged with organic debris and flow could not occur.
- Limited effluent flow occurred intermittently throughout the day. The pipe was plugged with organic debris.

Day	Median (L/Sec)	25th Percentile	75th Percentile
23-Sep-13	0.004	0.000	0.012
24-Sep-13	0.005	0.000	0.012
25-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
26-Sep-13	0.002	0.000	0.005
27-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
28-Sep-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
29-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
30-Sep-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
1-Oct-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
2-Oct-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
3-Oct-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
4-Oct-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
5-Oct-13	NF ⁽⁹⁾	NF ⁽⁹⁾	NF ⁽⁹⁾
6-Oct-13	0.003	0.000	0.007
7-Oct-13	0.012	0.004	0.097
8-Oct-13	0.067	0.064	0.120
9-Oct-13	0.064	0.043	0.064
10-Oct-13	0.090	0.043	0.091
11-Oct-13	0.064	0.043	0.097
12-Oct-13	0.064	0.043	0.090
13-Oct-13	0.090	0.068	0.102
14-Oct-13	0.093	0.064	0.096
15-Oct-13	0.090	0.064	0.096
16-Oct-13	0.120	0.090	0.154
17-Oct-13	0.084	0.064	0.084
18-Oct-13	0.120	0.090	0.128
19-Oct-13	0.090	0.090	0.090
20-Oct-13	0.084	0.064	0.090
21-Oct-13	0.154	0.118	0.192
22-Oct-13	0.120	0.120	0.148
23-Oct-13	0.120	0.090	0.120
24-Oct-13	0.120	0.090	0.120
25-Oct-13	0.090	0.089	0.090
26-Oct-13	0.120	0.120	0.147
27-Oct-13	0.120	0.120	0.120
28-Oct-13	0.120	0.120	0.126
29-Oct-13	0.120	0.096	0.121
30-Oct-13	0.093	0.084	0.120
31-Oct-13	0.113	0.084	0.120
1-Nov-13	0.113	0.090	0.115

Day	Median (L/Sec)	25th Percentile	75th Percentile
2-Nov-13	0.090	0.090	0.096
3-Nov-13	0.096	0.085	0.102
4-Nov-13	0.090	0.090	0.096
5-Nov-13	0.090	0.064	0.090
6-Nov-13	0.104	0.090	0.120
7-Nov-13	0.090	0.090	0.115
8-Nov-13	0.090	0.090	0.090
9-Nov-13	0.102	0.090	0.113
10-Nov-13	0.120	0.120	0.120
11-Nov-13	0.120	0.120	0.154
12-Nov-13	0.120	0.090	0.126
13-Nov-13	0.084	0.064	0.090
14-Nov-13	0.084	0.084	0.090
15-Nov-13	0.064	0.064	0.090
16-Nov-13	0.074	0.064	0.090
17-Nov-13	0.113	0.084	0.147

TABLE 3
WEST END WEEKLY AND MONTHLY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Week	Median (L/Sec)	25th Percentile	75th Percentile
13/05/26 to 13/06/01	0.161	0.090	0.280
13/06/02 to 13/06/08	0.200	0.192	0.243
13/06/09 to 13/06/15	1.220	0.200	1.489
13/06/16 to 13/06/22	2.651	2.074	3.082
13/06/23 to 13/06/29	1.694	1.416	1.907
13/06/30 to 13/07/06	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
13/07/07 to 13/07/13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
13/07/14 to 13/07/20	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
13/07/21 to 13/07/27	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
13/07/28 to 13/08/03	0.305	0.000	1.582
13/08/04 to 13/08/10	0.120	0.000	0.161
13/08/11 to 13/08/17	0.140	0.096	0.209
13/08/18 to 13/08/24	0.090	0.064	0.090
13/08/25 to 13/08/31	0.043	0.026	0.090
13/09/01 to 13/09/07	0.581	0.159	1.398
13/09/08 to 13/09/14	0.025	0.010	0.901
13/09/15 to 13/09/21	0.005	0.001	0.014
13/09/22 to 13/09/28	0.001	0.000	0.005
13/09/29 to 13/10/05	0.000	0.000	0.001
13/10/06 to 13/10/12	0.064	0.026	0.090
13/10/13 to 13/10/19	0.090	0.069	0.120
13/10/20 to 13/10/26	0.120	0.090	0.120
13/10/27 to 13/11/02	0.113	0.090	0.120
13/11/03 to 13/11/09	0.090	0.090	0.113
13/11/10 to 13/11/16	0.090	0.069	0.120

Month	Median (L/Sec)	25th Percentile	75th Percentile
June	0.708	0.122	1.141
July	0.000	0.000	0.000
August	0.045	0.022	0.077
September	0.006	0.000	0.063
October	0.045	0.022	0.060

Notes:

L/Sec = Litres per second

NF = No Flow due to the following:

- The height of the water within the lagoon was below the height of the invert of the pipe.
- Organic debris is plugging the discharge pipe.

1. Limited or no flow was calculated during week. A daily explanation is described in Table 2.

The Flow Rate (Q) has been calculated using the equation:

$$Q = VA = \left(\frac{k_n}{n} \right) AR^{\frac{2}{3}} \sqrt{S}$$

where: n = the interior surface of the pipe, in this case PVC which uses the constant 0.012

S = the slope of the water, in this case 0.001 %

K_n = Mannings Equation Conversion Factor (for Metric calculations $K_n = 1/\text{sec}$)

A = the area (in meters²) of water within the pipe determined by:

$$A = \frac{[\theta - \sin(\theta)] D^3}{8}$$

R = The Hydraulic Radius (in meters) is determined by:

$$R = \left[\frac{(\theta - \sin \theta)}{\theta} \right] \left[\frac{D}{4} \right]$$

D = Diameter of the pipe (m)

$$\theta = \pi + 2 \left(\sin^{-1} \left[\left(\frac{(2)(h_2)}{D} \right) - 1 \right] \right)$$

h_2 = h_1 - height (in meters) of pipe base

h_1 = Initial transducer height (in meters) below water line + compensated height of water above transducer

TABLE 4
LAGOON NO 2 DAILY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Day	Median (L/Sec)	25th Percentile	75th Percentile
15-May-13	0.818	0.759	0.822
16-May-13	0.774	0.759	0.789
17-May-13	0.716	0.716	0.789
18-May-13	0.716	0.647	0.738
19-May-13	0.634	0.634	0.647
20-May-13	0.647	0.647	0.789
21-May-13	0.738	0.702	0.807
22-May-13	0.789	0.713	0.869
23-May-13	0.789	0.730	0.803
24-May-13	0.730	0.730	0.803
25-May-13	0.661	0.661	0.730
26-May-13	0.594	0.566	0.661
27-May-13	0.519	0.449	0.581
28-May-13	0.444	0.384	0.507
29-May-13	0.324	0.278	0.344
30-May-13	0.501	0.334	0.585
31-May-13	0.620	0.556	0.655
1-Jun-13	0.556	0.495	0.556
2-Jun-13	0.634	0.620	0.688
3-Jun-13	0.702	0.634	0.702
4-Jun-13	0.647	0.647	0.716
5-Jun-13	0.647	0.566	0.661
6-Jun-13	0.550	0.493	0.598
7-Jun-13	0.395	0.384	0.408
8-Jun-13	0.334	0.334	0.384
9-Jun-13	0.344	0.344	0.395
10-Jun-13	0.344	0.287	0.354
11-Jun-13	0.359	0.285	0.637
12-Jun-13	0.146	0.130	0.197
13-Jun-13	0.136	0.130	0.163
14-Jun-13	0.232	0.012	0.344
15-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
16-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
17-Jun-13	0.002	0.000	0.006
18-Jun-13	0.136	0.076	0.222
19-Jun-13	0.033	0.000	0.065
20-Jun-13	0.121	0.020	0.168
21-Jun-13	0.168	0.136	0.344

Day	Median (L/Sec)	25th Percentile	75th Percentile
22-Jun-13	0.060	0.037	0.107
23-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
24-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
25-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
26-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
27-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
28-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
29-Jun-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
30-Jun-13	NF ⁽²⁾	NF ⁽²⁾	NF ⁽²⁾
1-Jul-13	0.344	0.285	0.449
2-Jul-13	0.027	0.015	0.042
3-Jul-13	0.060	0.060	0.077
4-Jul-13	0.067	0.038	0.102
5-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
6-Jul-13	NF ⁽⁴⁾	NF ⁽⁴⁾	NF ⁽⁴⁾
7-Jul-13	0.175	0.077	0.449
8-Jul-13	0.033	0.005	0.060
9-Jul-13	NF ⁽⁵⁾	NF ⁽⁵⁾	NF ⁽⁵⁾
10-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
11-Jul-13	0.024	0.012	0.060
12-Jul-13	0.033	0.024	0.042
13-Jul-13	0.060	0.037	0.107
14-Jul-13	0.296	0.242	0.356
15-Jul-13	0.716	0.631	0.734
16-Jul-13	0.320	0.082	0.581
17-Jul-13	0.121	0.082	0.212
18-Jul-13	0.004	0.000	0.107
19-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
20-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
21-Jul-13	NF ⁽⁶⁾	NF ⁽⁶⁾	0.024
22-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
23-Jul-13	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
24-Jul-13	NF ⁽⁷⁾	NF ⁽⁷⁾	NF ⁽⁷⁾
25-Jul-13	0.071	0.012	0.107
26-Jul-13	0.287	0.287	0.395
27-Jul-13	0.359	0.334	0.572
28-Jul-13	0.834	0.745	1.098
29-Jul-13	0.569	0.507	0.634

Day	Median (L/Sec)	25th Percentile	75th Percentile
30-Jul-13	0.449	0.395	0.507
31-Jul-13	0.287	0.244	0.299
1-Aug-13	0.236	0.236	0.236
2-Aug-13	0.162	0.130	0.207
3-Aug-13	0.236	0.204	0.244
4-Aug-13	0.212	0.204	0.252
5-Aug-13	0.204	0.190	0.204
6-Aug-13	0.162	0.123	0.162
7-Aug-13	0.075	0.056	0.097
8-Aug-13	0.077	0.038	0.102
9-Aug-13	0.045	0.035	0.060
10-Aug-13	0.038	0.024	0.056
11-Aug-13	0.077	0.072	0.102
12-Aug-13	0.130	0.077	0.168
13-Aug-13	0.107	0.082	0.107
14-Aug-13	0.107	0.102	0.107
15-Aug-13	0.102	0.102	0.107
16-Aug-13	0.082	0.060	0.107
17-Aug-13	0.082	0.060	0.082
18-Aug-13	0.056	0.038	0.057
19-Aug-13	0.045	0.035	0.056
20-Aug-13	0.022	0.022	0.035
21-Aug-13	0.035	0.032	0.052
22-Aug-13	0.038	0.038	0.042
23-Aug-13	0.027	0.027	0.027
24-Aug-13	0.027	0.014	0.042
25-Aug-13	0.022	0.012	0.036
26-Aug-13	0.005	0.005	0.007
27-Aug-13	0.005	0.004	0.012
28-Aug-13	0.005	0.004	0.012
29-Aug-13	0.002	0.001	0.006
30-Aug-13	0.014	0.012	0.016
31-Aug-13	0.005	0.005	0.012
1-Sep-13	0.257	0.102	0.376
2-Sep-13	0.287	0.242	0.495
3-Sep-13	0.236	0.204	0.244
4-Sep-13	0.212	0.204	0.252
5-Sep-13	0.204	0.190	0.204

Day	Median (L/Sec)	25th Percentile	75th Percentile
6-Sep-13	0.162	0.123	0.162
7-Sep-13	0.075	0.056	0.097
8-Sep-13	0.077	0.038	0.102
9-Sep-13	0.102	0.102	0.136
10-Sep-13	0.162	0.154	0.253
11-Sep-13	0.130	0.102	0.138
12-Sep-13	0.136	0.136	0.136
13-Sep-13	0.175	0.142	0.206
14-Sep-13	0.162	0.130	0.204
15-Sep-13	0.212	0.175	0.244
16-Sep-13	0.216	0.169	0.230
17-Sep-13	0.175	0.142	0.212
18-Sep-13	0.168	0.162	0.204
19-Sep-13	0.130	0.130	0.162
20-Sep-13	0.190	0.190	0.191
21-Sep-13	0.197	0.197	0.212
22-Sep-13	0.168	0.168	0.204
23-Sep-13	0.204	0.168	0.252
24-Sep-13	0.208	0.168	0.252
25-Sep-13	0.186	0.136	0.244
26-Sep-13	0.190	0.113	0.220
27-Sep-13	0.168	0.107	0.212
28-Sep-13	0.107	0.102	0.136
29-Sep-13	0.124	0.102	0.130
30-Sep-13	0.102	0.097	0.130
1-Oct-13	0.097	0.068	0.097
2-Oct-13	0.097	0.077	0.111
3-Oct-13	0.107	0.082	0.107
4-Oct-13	0.113	0.107	0.142
5-Oct-13	0.175	0.142	0.175
6-Oct-13	0.204	0.197	0.269
7-Oct-13	0.278	0.261	0.324
8-Oct-13	0.244	0.204	0.299
9-Oct-13	0.168	0.136	0.204
10-Oct-13	0.204	0.168	0.220
11-Oct-13	0.204	0.162	0.252
12-Oct-13	0.197	0.162	0.244
13-Oct-13	0.204	0.191	0.212

Day	Median (L/Sec)	25th Percentile	75th Percentile
14-Oct-13	0.216	0.182	0.261
15-Oct-13	0.252	0.244	0.296
16-Oct-13	0.374	0.324	0.427
17-Oct-13	0.324	0.278	0.324
18-Oct-13	0.427	0.324	0.438
19-Oct-13	0.427	0.374	0.427
20-Oct-13	0.427	0.384	0.427
21-Oct-13	0.607	0.544	0.674
22-Oct-13	0.556	0.544	0.607
23-Oct-13	0.556	0.544	0.556
24-Oct-13	0.556	0.507	0.569
25-Oct-13	0.507	0.507	0.569
26-Oct-13	0.607	0.594	0.620
27-Oct-13	0.620	0.620	0.620
28-Oct-13	0.661	0.657	0.661
29-Oct-13	0.661	0.647	0.730
30-Oct-13	0.634	0.620	0.702
31-Oct-13	0.745	0.720	0.803
1-Nov-13	0.716	0.674	0.730
2-Nov-13	0.688	0.634	0.702
3-Nov-13	0.716	0.661	0.730
4-Nov-13	0.681	0.647	0.716
5-Nov-13	0.634	0.634	0.634
6-Nov-13	0.688	0.634	0.688
7-Nov-13	0.695	0.634	0.702
8-Nov-13	0.634	0.569	0.634
9-Nov-13	0.556	0.544	0.559
10-Nov-13	0.569	0.556	0.578
11-Nov-13	0.620	0.578	0.634
12-Nov-13	0.621	0.581	0.661
13-Nov-13	0.569	0.541	0.607
14-Nov-13	0.544	0.544	0.544
15-Nov-13	0.544	0.495	0.556
16-Nov-13	0.607	0.556	0.620
17-Nov-13	0.803	0.661	0.964

Notes:

L/Sec – Litres per second

NF = No Flow. The data recorded from the transducer suggests that the height of water within the lagoon was below the height of the invert of the discharge culvert.

The Flow Rate (Q) has been calculated using the equation:

$$Q = 1.49 \left(\frac{K_n}{n} \right) A R^{2/3} \sqrt{S}$$

where: n = the interior surface of the culvert, in this case corrugated steel which uses the constant 0.024

S = the slope of the water, in this case 0.001 %

K_n = Mannings Equation Conversion Factor (for Metric calculations K_n = 1/sec)

A = the area (in meters²) of water within the culvert determined by:

$$A = \frac{[\theta - \sin(\theta)] D^3}{8}$$

R = The hydraulic Radius (in meters) is determined by:

$$R = \left[\frac{(\theta - \sin(\theta))}{\theta} \right] \left[\frac{D}{4} \right]$$

D = Diameter of the culvert (m)

$$\theta = \pi + 2 \left(\sin^{-1} \left[\left(\frac{2 h_2}{D} \right) - 1 \right] \right)$$

h₁ = h₂ = height (in meters) of culvert base

h₂ = pit at transducer height (in meters) below water line + compensated height of water above transducer

Notes regarding No Flow (NF):

- Effluent flow was not recorded at any time in 24hrs
- A limited amount of effluent flow was recorded from 8:00am to 12:00pm. For the remainder of the day no flow was calculated.
- A limited amount of effluent flow was recorded from 7:00pm to 12:00pm. For the remainder of the day no flow was calculated.
- A limited amount of effluent flow was recorded from 7:00pm to 12:00pm. For the remainder of the day no flow was calculated.
- A limited amount of effluent flow was recorded from 2:00pm to 12:00pm. For the remainder of the day no flow was calculated.

TABLE 5
LAGOON NO 2 WEEKLY AND MONTHLY EFFLUENT FLOW RATES
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

13/05/16 to 13/05/22	0.142	0.042	0.296
13/05/26 to 13/06/01	0.513	0.384	0.581
13/06/02 to 13/06/08	0.620	0.395	0.661
13/06/09 to 13/06/15	0.236	0.107	0.344
13/06/16 to 13/06/22	0.060	0.002	0.136
13/06/23 to 13/06/29	NF ⁽¹⁾	NF ⁽¹⁾	NF ⁽¹⁾
13/06/30 to 13/07/06	0.020	0.000	0.077
13/07/07 to 13/07/13	0.024	0.000	0.060
13/07/14 to 13/07/20	0.107	0.000	0.344
13/07/21 to 13/07/27	0.006	0.000	0.287
13/07/28 to 13/08/03	0.287	0.236	0.507
13/08/04 to 13/08/10	0.102	0.052	0.197
13/08/11 to 13/08/17	0.102	0.077	0.107
13/08/18 to 13/08/24	0.038	0.027	0.052
13/08/25 to 13/08/31	0.006	0.005	0.014
13/09/01 to 13/09/07	0.197	0.130	0.244
13/09/08 to 13/09/14	0.136	0.130	0.170
13/09/15 to 13/09/21	0.190	0.160	0.212
13/09/22 to 13/09/28	0.168	0.136	0.212
13/09/29 to 13/10/05	0.107	0.097	0.136
13/10/06 to 13/10/12	0.204	0.168	0.252
13/10/13 to 13/10/19	0.324	0.244	0.384
13/10/20 to 13/10/26	0.556	0.495	0.607
13/10/27 to 13/11/02	0.661	0.634	0.716
13/11/03 to 13/11/09	0.634	0.630	0.702
13/11/10 to 13/11/16	0.569	0.544	0.611

June	0.130	0.000	0.395
July	0.060	0.000	0.287
August	0.056	0.022	0.107
September	0.168	0.130	0.206
October	0.324	0.188	0.556

Notes:

L/Sec = Litres per second

NF = No Flow. The data recorded from the transducer suggests that the height of water within the lagoon is below the height of the invert of the discharge culvert.

1. Limited or no flow was calculated during week. A daily explanation is described in Table 4.

The Flow Rate (Q) has been calculated using the equation:

$$Q = 1.49 \left(\frac{K_n}{n} \right) A R^{2/3} \sqrt{S}$$

where: n = the interior surface of the culvert, in this case corrugated steel which uses the constant 0.024

S = the slope of the water, in this case 0.001 %

K_n = Mannings Equation Conversion Factor (for Metric calculations K_n = 1/sec)

A = the area (in meters²) of water within the culvert determined by:

$$A = \frac{[\theta - \sin(\theta)] D^3}{8}$$

R = The Hydraulic Radius (in meters) is determined by:

$$R = \left[\frac{(\theta - \sin \theta)}{\theta} \right] \left[\frac{D}{4} \right]$$

D = Diameter of the culvert (m)

$$\theta = \pi + 2 \left(\sin^{-1} \left[\left(\frac{2(h_2)}{D} \right) - 1 \right] \right)$$

h₂ = h_c -height (in meters) of culvert base

h₁ = Initial transducer height (in meters) below water line + compensated height of water above transducer

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
IMW-3	7-Oct-13	326.504	1.758	-	-	324.746	-	
	11-Jun-13	326.504	1.497	-	-	325.007	-	
	2-Oct-12	326.504	1.934	-	-	324.570	-	
	5-Jun-12	326.504	1.486	-	-	325.018	-	
	4-Oct-11	326.504	1.793	-	-	324.711	-	
	27-Jun-11	326.504	1.799	-	-	324.705	-	
	4-Oct-10	326.504	1.674	-	-	324.830	-	
	22-Jun-10	326.504	1.863	-	-	324.641	-	
IMW-4	7-Oct-13	324.406	1.035	-	-	323.371	-	
	11-Jun-13	324.406	0.769	-	-	323.637	-	
	2-Oct-12	324.406	1.350	-	-	323.056	-	
	5-Jun-12	324.406	0.824	-	-	323.582	-	
	4-Oct-11	324.406	1.196	-	-	323.210	-	
	27-Jun-11	324.406	1.129	-	-	323.277	-	
	4-Oct-10	324.406	1.014	-	-	323.392	-	
	22-Jun-10	324.406	1.290	-	-	323.116	-	
IMW-8	7-Oct-13	325.553	1.811	-	-	323.742	-	
	11-Jun-13	325.553	1.472	-	-	324.081	-	
	2-Oct-12	325.553	-	-	-	-	-	Dry, DTB - 2.163 m
	5-Jun-12	325.553	1.641	-	-	323.912	-	
	4-Oct-11	325.553	2.170	-	-	323.383	-	
	27-Jun-11	325.553	1.842	-	-	323.711	-	
	4-Oct-10	325.553	1.992	-	-	323.561	-	
	22-Jun-10	325.553	2.138	-	-	323.415	-	
MW-10	7-Oct-13	326.842	2.789	-	-	324.053	-	(2)
	11-Jun-13	326.842	2.627	-	-	324.215	-	(2)
	2-Oct-12	327.075	3.454	-	-	323.621	-	
	5-Jun-12	327.075	2.888	-	-	324.187	-	
	4-Oct-11	327.075	3.165	-	-	323.910	-	
	27-Jun-11	327.283	3.055	-	-	324.228	-	
	4-Oct-10	327.283	3.086	-	-	324.197	-	
	22-Jun-10	327.283	3.335	-	-	323.948	-	
MW-11	7-Oct-13	327.035	-	-	-	-	-	CNL
	11-Jun-13	327.035	4.001	2.963	1.038	323.034	324.072	
	2-Oct-12	327.035	4.376	3.440	0.936	322.659	323.595	
	5-Jun-12	327.035	4.324	2.810	1.514	322.711	324.225	
	4-Oct-11	327.035	4.282	3.212	1.070	322.753	323.823	
	27-Jun-11	327.035	4.227	3.017	1.210	322.808	324.018	
	4-Oct-10	327.035	4.320	2.986	1.334	322.715	324.049	
	22-Jun-10	327.035	4.407	3.196	1.211	322.628	323.839	
MW-12	7-Oct-13	326.875	2.542	-	-	324.333	-	
	11-Jun-13	326.875	2.255	-	-	324.620	-	
	2-Oct-12	326.875	3.000	-	-	323.875	-	
	5-Jun-12	326.875	2.238	-	-	324.637	-	
	4-Oct-11	326.875	2.605	-	-	324.270	-	
	27-Jun-11	326.875	2.478	-	-	324.397	-	
	4-Oct-10	326.875	2.428	-	-	324.447	-	
	22-Jun-10	326.875	2.652	-	-	324.223	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
MW-16	8-Oct-13	-	1.802	-	-	-	-	
	11-Jun-13	-	1.034	-	-	-	-	
	2-Oct-12	-	2.697	-	-	-	-	
	5-Jun-12	-	1.543	-	-	-	-	
	4-Oct-11	-	2.619	-	-	-	-	
	27-Jun-11	-	0.865	-	-	-	-	
	4-Oct-10	-	2.367	-	-	-	-	
	22-Jun-10	-	2.443	-	-	-	-	
MW-17	8-Oct-13	-	0.538	-	-	-	-	
	11-Jun-13	-	0.045	-	-	-	-	
	2-Oct-12	-	-	-	-	-	-	Dry, DTB - 2.180 m
	5-Jun-12	-	0.150	-	-	-	-	
	4-Oct-11	-	1.782	-	-	-	-	
	27-Jun-11	-	1.784	-	-	-	-	
	4-Oct-10	-	1.283	-	-	-	-	
	22-Jun-10	-	1.605	-	-	-	-	
MW-119	7-Oct-13	327.641	3.358	-	-	324.283	-	
	11-Jun-13	327.641	3.176	-	-	324.465	-	
	2-Oct-12	327.641	3.735	-	-	323.906	-	
	5-Jun-12	327.641	3.230	-	-	324.411	-	
	4-Oct-11	327.641	3.520	-	-	324.121	-	
	27-Jun-11	327.641	3.400	-	-	324.241	-	
	4-Oct-10	327.641	3.381	-	-	324.260	-	
	22-Jun-10	327.641	3.519	-	-	324.122	-	
MW-120	7-Oct-13	327.331	1.474	-	-	325.857	-	
	11-Jun-13	327.331	0.941	-	-	326.390	-	
	2-Oct-12	327.331	2.060	-	-	325.271	-	
	5-Jun-12	327.331	0.960	-	-	326.371	-	
	4-Oct-11	327.331	1.595	-	-	325.736	-	
	27-Jun-11	327.331	1.119	-	-	326.212	-	
	4-Oct-10	327.331	1.144	-	-	326.187	-	
	22-Jun-10	327.331	1.213	-	-	326.118	-	
MW-122	7-Oct-13	327.344	2.759	2.757	0.002	324.585	324.587	
	11-Jun-13	327.344	2.179	-	-	325.165	-	
	2-Oct-12	327.344	3.174	3.167	0.007	324.170	324.177	
	5-Jun-12	327.344	2.455	2.436	0.019	324.889	324.908	
	4-Oct-11	327.344	2.940	2.897	0.043	324.404	324.447	
	27-Jun-11	327.344	2.734	2.695	0.039	324.610	324.649	
	4-Oct-10	327.344	2.760	2.702	0.058	324.584	324.642	
	22-Jun-10	327.344	2.938	2.896	0.042	324.406	324.448	
OW 8-1	7-Oct-13	327.506	3.304	-	-	324.202	-	
	11-Jun-13	327.506	2.823	-	-	324.683	-	
	2-Oct-12	327.506	3.766	-	-	323.740	-	
	5-Jun-12	327.506	2.830	-	-	324.676	-	
	4-Oct-11	327.506	3.313	-	-	324.193	-	
	27-Jun-11	327.506	3.335	-	-	324.171	-	
	4-Oct-10	327.506	3.221	-	-	324.285	-	
	22-Jun-10	327.506	3.438	-	-	324.068	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
WEST END								
OW 8-2	7-Oct-13	327.474	1.841	-	-	325.633	-	
	11-Jun-13	327.474	2.765	-	-	324.709	-	
	2-Oct-12	327.474	3.632	-	-	323.842	-	
	5-Jun-12	327.474	2.811	-	-	324.663	-	
	4-Oct-11	327.474	3.374	-	-	324.100	-	
	27-Jun-11	327.474	3.193	-	-	324.281	-	
	4-Oct-10	327.474	3.145	-	-	324.329	-	
	22-Jun-10	327.474	3.384	-	-	324.090	-	
OW 8-3	7-Oct-13	327.669	3.566	3.555	0.011	324.103	324.114	
	11-Jun-13	327.669	3.303	-	-	324.366	-	
	2-Oct-12	327.669	3.997	3.960	0.037	323.672	323.709	
	5-Jun-12	327.669	3.380	3.378	0.002	324.289	324.291	
	4-Oct-11	327.669	3.775	-	-	323.894	-	
	27-Jun-11	327.669	3.552	3.548	0.004	324.117	324.121	
	4-Oct-10	327.669	3.564	-	-	324.105	-	
	22-Jun-10	327.669	3.727	3.722	0.005	323.942	323.947	
OW 9-3	7-Oct-13	325.520	0.908	-	-	324.612	-	
	11-Jun-13	325.520	0.479	-	-	325.041	-	
	2-Oct-12	325.520	1.475	-	-	324.045	-	
	5-Jun-12	325.520	0.570	-	-	324.950	-	
	4-Oct-11	325.520	1.198	-	-	324.322	-	
	27-Jun-11	325.520	0.964	-	-	324.556	-	
	4-Oct-10	325.520	0.985	-	-	324.535	-	
	22-Jun-10	325.520	1.219	-	-	324.301	-	
EAST END								
MW-20	8-Oct-13	324.575	1.652	-	-	322.923	-	
	11-Jun-13	324.575	1.374	-	-	323.201	-	
	2-Oct-12	324.575	2.410	-	-	322.165	-	
	5-Jun-12	324.575	1.435	-	-	323.140	-	
	4-Oct-11	324.575	2.147	-	-	322.428	-	
	28-Jun-11	324.575	1.690	-	-	322.885	-	
	5-Oct-10	324.575	1.752	-	-	322.823	-	
	22-Jun-10	324.575	2.179	-	-	322.396	-	
MW-21	8-Oct-13	325.243	4.560	4.198	0.362	320.683	321.045	
	11-Jun-13	325.243	4.154	3.634	0.520	321.089	321.609	
	2-Oct-12	325.243	4.816	4.504	0.312	320.427	320.739	
	5-Jun-12	324.475	4.226	3.412	0.814	320.249	321.063	
	4-Oct-11	325.243	4.625	4.335	0.290	320.618	320.908	
	28-Jun-11	324.475	3.701	3.316	0.385	320.774	321.159	
	5-Oct-10	324.475	3.705	3.193	0.512	320.770	321.282	
	22-Jun-10	324.475	3.822	3.435	0.387	320.653	321.040	
MW-24	8-Oct-13	325.870	1.893	-	-	323.977	-	
	11-Jun-13	325.870	1.551	-	-	324.319	-	
	2-Oct-12	325.870	4.321	-	-	321.549	-	
	5-Jun-12	325.870	1.644	-	-	324.226	-	
	4-Oct-11	325.870	2.770	-	-	323.100	-	
	28-Jun-11	325.870	2.049	-	-	323.821	-	
	5-Oct-10	325.870	1.838	-	-	324.032	-	
	22-Jun-10	325.870	2.295	-	-	323.575	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-40	8-Oct-13	324.140	2.660	-	-	321.480	-	
	11-Jun-13	324.140	1.843	-	-	322.297	-	
	2-Oct-12	324.140	3.287	-	-	320.853	-	
	5-Jun-12	324.140	1.823	-	-	322.317	-	
	4-Oct-11	324.140	2.965	-	-	321.175	-	
	28-Jun-11	324.140	2.756	-	-	321.384	-	
	5-Oct-10	324.140	2.336	-	-	321.804	-	
	22-Jun-10	324.140	2.961	-	-	321.179	-	
MW-43	8-Oct-13	323.695	2.002	-	-	321.693	-	
	11-Jun-13	323.695	1.542	-	-	322.153	-	
	2-Oct-12	323.695	2.550	-	-	321.145	-	
	5-Jun-12	323.695	1.474	-	-	322.221	-	
	4-Oct-11	323.695	2.239	-	-	321.456	-	
	28-Jun-11	323.695	1.937	-	-	321.758	-	
	5-Oct-10	323.695	1.929	-	-	321.766	-	
	22-Jun-10	323.695	2.225	-	-	321.470	-	
MW-46	8-Oct-13	324.385	1.955	-	-	322.430	-	
	11-Jun-13	324.385	1.795	-	-	322.590	-	
	2-Oct-12	324.385	2.571	-	-	321.814	-	
	5-Jun-12	324.385	1.795	-	-	322.590	-	
	4-Oct-11	324.385	2.316	-	-	322.069	-	
	28-Jun-11	324.385	2.028	-	-	322.357	-	
	5-Oct-10	324.385	2.022	-	-	322.363	-	
	22-Jun-10	324.385	2.366	-	-	322.019	-	
MW-49	8-Oct-13	325.260	1.168	-	-	324.092	-	
	11-Jun-13	325.260	0.765	-	-	324.495	-	
	2-Oct-12	325.260	2.695	-	-	322.565	-	
	5-Jun-12	325.260	0.980	-	-	324.280	-	
	4-Oct-11	325.260	2.338	-	-	322.922	-	
	28-Jun-11	325.260	1.161	-	-	324.099	-	
	5-Oct-10	325.260	1.664	-	-	323.596	-	
	22-Jun-10	325.260	2.370	-	-	322.890	-	
MW-51	8-Oct-13	324.235	3.095	-	-	321.140	-	
	11-Jun-13	324.235	2.469	-	-	321.766	-	
	2-Oct-12	324.235	3.567	3.476	0.091	320.668	320.759	
	5-Jun-12	324.235	2.374	-	-	321.861	-	
	4-Oct-11	324.235	3.310	3.290	0.020	320.925	320.945	
	28-Jun-11	324.235	3.016	-	-	321.219	-	
	5-Oct-10	324.235	2.903	2.865	0.038	321.332	321.370	
	22-Jun-10	324.235	3.171	3.165	0.006	321.064	321.070	
MW-52	8-Oct-13	323.575	2.125	-	-	321.450	-	
	11-Jun-13	323.575	1.468	-	-	322.107	-	
	2-Oct-12	323.575	2.720	2.661	0.059	320.855	320.914	
	5-Jun-12	323.575	1.615	-	-	321.960	-	
	4-Oct-11	323.575	2.514	-	-	321.061	-	
	28-Jun-11	323.575	2.022	-	-	321.553	-	
	5-Oct-10	323.575	2.050	-	-	321.525	-	
	22-Jun-10	323.575	2.345	-	-	321.230	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-101	8-Oct-13	324.120	3.150	2.915	0.235	320.970	321.205	
	11-Jun-13	324.120	2.845	2.255	0.590	321.275	321.865	
	2-Oct-12	324.120	3.590	3.256	0.334	320.530	320.864	
	5-Jun-12	324.120	2.209	-	-	321.911	-	
	4-Oct-11	324.120	3.367	3.072	0.295	320.753	321.048	
	28-Jun-11	324.120	3.098	2.835	0.263	321.022	321.285	
	5-Oct-10	324.120	2.879	2.697	0.182	321.241	321.423	
	22-Jun-10	324.120	3.242	2.957	0.285	320.878	321.163	
MW-102	8-Oct-13	324.160	2.950	-	-	321.210	-	
	11-Jun-13	324.160	2.366	2.350	0.016	321.794	321.810	
	2-Oct-12	324.160	3.364	3.350	0.014	320.796	320.810	
	5-Jun-12	324.160	2.270	-	-	321.890	-	
	4-Oct-11	324.160	3.160	-	-	321.000	-	
	28-Jun-11	324.160	2.892	-	-	321.268	-	
	5-Oct-10	324.160	2.730	-	-	321.430	-	
	22-Jun-10	324.160	3.024	-	-	321.136	-	
MW-103	8-Oct-13	323.570	2.431	-	-	321.139	-	
	11-Jun-13	323.570	1.852	-	-	321.718	-	
	2-Oct-12	323.570	2.975	-	-	320.595	-	
	5-Jun-12	323.570	1.717	-	-	321.853	-	
	4-Oct-11	323.570	2.607	-	-	320.963	-	
	28-Jun-11	323.570	2.397	-	-	321.173	-	
	5-Oct-10	323.570	2.150	-	-	321.420	-	
	22-Jun-10	323.570	2.645	-	-	320.925	-	
MW-104	8-Oct-13	323.910	2.645	-	-	321.265	-	
	11-Jun-13	323.910	1.970	-	-	321.940	-	
	2-Oct-12	323.910	3.490	3.020	0.470	320.420	320.890	
	5-Jun-12	323.910	2.042	-	-	321.868	-	
	4-Oct-11	323.910	3.026	2.898	0.128	320.884	321.012	
	28-Jun-11	323.910	2.508	-	-	321.402	-	
	5-Oct-10	323.910	2.490	-	-	321.420	-	
	22-Jun-10	323.910	2.761	-	-	321.149	-	
MW-106	8-Oct-13	323.900	2.010	1.953	0.057	321.890	321.947	
	11-Jun-13	323.900	1.457	1.339	0.118	322.443	322.561	
	2-Oct-12	323.900	3.292	2.728	0.564	320.608	321.172	
	5-Jun-12	323.900	1.610	1.582	0.028	322.290	322.318	
	4-Oct-11	323.900	2.703	2.581	0.122	321.197	321.319	
	28-Jun-11	323.900	1.874	-	-	322.026	-	
	5-Oct-10	323.900	2.035	-	-	321.865	-	
	22-Jun-10	323.900	2.426	-	-	321.474	-	
MW-107	8-Oct-13	324.010	1.644	-	-	322.366	-	
	11-Jun-13	324.010	1.122	-	-	322.888	-	
	2-Oct-12	324.010	2.727	2.720	0.007	321.283	321.290	
	5-Jun-12	324.010	1.329	-	-	322.681	-	
	4-Oct-11	324.010	2.482	-	-	321.528	-	
	28-Jun-11	324.010	1.572	-	-	322.438	-	
	5-Oct-10	324.010	1.863	-	-	322.147	-	
	22-Jun-10	324.010	2.322	-	-	321.688	-	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
MW-108	8-Oct-13	324.870	0.977	-	-	323.893	-	
	11-Jun-13	324.870	0.514	-	-	324.356	-	
	2-Oct-12	324.870	2.403	-	-	322.467	-	
	5-Jun-12	324.870	0.711	-	-	324.159	-	
	4-Oct-11	324.870	2.042	-	-	322.828	-	
	28-Jun-11	324.870	0.995	-	-	323.875	-	
	5-Oct-10	324.870	1.088	-	-	323.782	-	
	22-Jun-10	324.870	2.374	-	-	322.496	-	
MW-109	8-Oct-13	325.480	2.144	1.867	0.277	323.336	323.613	
	11-Jun-13	325.480	1.553	1.405	0.148	323.927	324.075	
	2-Oct-12	325.480	3.170	3.137	0.033	322.310	322.343	
	5-Jun-12	325.480	2.006	1.798	0.208	323.474	323.682	
	4-Oct-11	325.480	2.932	2.890	0.042	322.548	322.590	
	28-Jun-11	325.480	2.210	1.889	0.321	323.270	323.591	
	5-Oct-10	325.480	2.498	-	-	322.982	-	
	22-Jun-10	325.480	2.935	-	-	322.545	-	
MW-114	8-Oct-13	325.410	3.343	-	-	322.067	-	
	11-Jun-13	325.410	2.785	-	-	322.625	-	
	2-Oct-12	325.410	-	-	-	-	-	Dry
	5-Jun-12	325.410	2.867	-	-	322.543	-	
	4-Oct-11	325.410	3.619	-	-	321.791	-	
	28-Jun-11	325.410	3.341	-	-	322.069	-	
	5-Oct-10	325.410	3.171	-	-	322.239	-	
	22-Jun-10	325.410	3.577	-	-	321.833	-	
MW-115	8-Oct-13	325.910	2.733	-	-	323.177	-	
	11-Jun-13	325.910	2.195	-	-	323.715	-	
	2-Oct-12	325.910	3.375	-	-	322.535	-	
	5-Jun-12	325.910	2.210	-	-	323.700	-	
	4-Oct-11	325.910	3.037	-	-	322.873	-	
	28-Jun-11	325.910	2.769	-	-	323.141	-	
	5-Oct-10	325.910	2.530	-	-	323.380	-	
	22-Jun-10	325.910	3.037	-	-	322.873	-	
MW-126	8-Oct-13	325.815	2.104	1.627	0.477	323.711	324.188	
	11-Jun-13	325.815	1.166	1.158	0.008	324.649	324.657	
	2-Oct-12	325.815	3.377	3.320	0.057	322.438	322.495	
	5-Jun-12	325.815	1.244	1.170	0.074	324.571	324.645	
	4-Oct-11	325.815	3.631	2.833	0.798	322.184	322.982	
	28-Jun-11	325.815	1.919	1.629	0.290	323.896	324.186	
	5-Oct-10	325.815	2.840	1.997	0.843	322.975	323.818	
	22-Jun-10	325.815	4.188	2.850	1.338	321.627	322.965	
OW 3-2	8-Oct-13	325.340	1.360	1.353	0.007	323.980	323.987	
	11-Jun-13	325.340	0.870	-	-	324.470	-	
	2-Oct-12	325.340	3.142	3.071	0.071	322.198	322.269	
	5-Jun-12	325.340	0.954	-	-	324.386	-	
	4-Oct-11	325.340	2.874	2.802	0.072	322.466	322.538	
	28-Jun-11	325.340	1.457	-	-	323.883	-	
	5-Oct-10	325.340	2.255	2.108	0.147	323.085	323.232	
	22-Jun-10	325.340	2.938	2.835	0.103	322.402	322.505	

TABLE 6
GROUNDWATER MONITORING DATA
CN HORNEPAYNE, HORNEPAYNE, ONTARIO

Well No.	Date	Top of Pipe Elev. (m)	Depth to Water (m)	Depth to LNAPL (m)	LNAPL Thickness (m)	GW Elev. (m)	Corrected GW Elev. ⁽¹⁾ (m)	Comments
EAST END								
OW 5-1	8-Oct-13	324.365	3.646	-	-	320.719	-	
	11-Jun-13	324.365	2.924	-	-	321.441	-	
	2-Oct-12	324.365	4.280	-	-	320.085	-	
	5-Jun-12	324.365	3.085	-	-	321.280	-	
	4-Oct-11	324.365	4.096	-	-	320.269	-	
	28-Jun-11	324.365	2.919	-	-	321.446	-	
	5-Oct-10	324.365	2.766	-	-	321.599	-	
	22-Jun-10	324.365	3.258	-	-	321.107	-	
OW 5-2	8-Oct-13	323.600	2.568	2.355	0.213	321.032	321.245	
	11-Jun-13	323.600	1.910	1.829	0.081	321.690	321.771	
	2-Oct-12	323.600	2.758	2.663	0.095	320.842	320.937	
	5-Jun-12	323.600	1.634	1.603	0.031	321.966	321.997	
	4-Oct-11	323.600	2.548	2.470	0.078	321.052	321.130	
	28-Jun-11	323.600	2.607	2.215	0.392	320.993	321.385	
	5-Oct-10	323.600	2.138	-	-	321.462	-	
	22-Jun-10	323.600	2.405	2.374	0.031	321.195	321.226	
OW 5-3	8-Oct-13	323.675	2.680	-	-	320.995	-	
	11-Jun-13	323.675	2.153	-	-	321.522	-	
	2-Oct-12	323.675	3.983	-	-	319.692	-	
	5-Jun-12	323.675	1.964	-	-	321.711	-	
	4-Oct-11	323.675	2.817	-	-	320.858	-	
	28-Jun-11	323.675	2.580	-	-	321.095	-	
	5-Oct-10	323.675	2.477	-	-	321.198	-	
	22-Jun-10	323.675	2.708	-	-	320.967	-	

Notes:

"-" = No Data

1. Density correction applied to groundwater elevation for wells where free product exists.
2. Well casing was damaged by snow removal operations. Casing was adjusted in 2013 and re-surveyed.

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o-,m-,p)	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 9 (Within 30 m of the Little Jackfish River)										
MW-20	8-Oct-13	-	-	-	-	-	3,900	2,000	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	89	10,000	5,500	<200	
	3-Oct-12	-	-	-	-	-	13,000	7,500	<100	
	6-Jun-12	0.60	<0.2	0.46	0.9	39	5,800	3,300	180	
	5-Oct-11	-	-	-	-	-	2,900	1,500	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	2,200	920	<100	
	7-Oct-10	-	-	-	-	-	3,600	1,700	<100	
	22-Jun-10	0.50	<0.2	0.9	2.7	110	2,600	1,100	<100	
MW-40	9-Oct-13	-	-	-	-	-	480	310	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	520	250	<200	
	3-Oct-12	-	-	-	-	-	410	280	<100	
	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	<100	<100	<100	
	5-Oct-11	-	-	-	-	-	930	630	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
MW-43	8-Oct-13	-	-	-	-	-	1,100	450	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	640	<200	<200	
	3-Oct-12	-	-	-	-	-	270	<100	<100	(5)
	6-Jun-12	<0.2	<0.2	<0.2	0.4	<25	230	<100	<100	(5)
	5-Oct-11	-	-	-	-	-	300	110	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	830	300	<100	
	7-Oct-10	-	-	-	-	-	660	170	<100	
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	740	400	<100	
MW-46	8-Oct-13	-	-	-	-	-	3,400	1,800	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	450	210	<200	
	3-Oct-12	-	-	-	-	-	1,400	2,000	550	(5)
	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
	5-Oct-11	-	-	-	-	-	620	350	<100	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	Field Dup.
22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100		

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o-,m-,p)	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 9 (Within 30 m of the Little Jackfish River)										
MW-52	9-Oct-13	-	-	-	-	-	130,000	36,000	<200	
	9-Oct-13	-	-	-	-	-	51,000	13,000	<200	Field Dup.
	9-Oct-13	-	-	-	-	-	52,000	13,000	<200	Lab Dup.
	12-Jun-13	0.76	<0.2	4	6.6	140	37,000	11,000	<200	
	12-Jun-13	0.59	<0.2	3	5.8	280	65,000	20,000	<200	Field Dup.
	3-Oct-12	-	-	-	-	-	190,000	50,000	170	⁽⁵⁾
	6-Jun-12	<0.2	<0.2	6.1	6.8	390	54,000	16,000	120	
	6-Jun-12	<0.2	<0.2	3.1	2.4	560	38,000	11,000	120	Field Dup.
	5-Oct-11	-	-	-	-	-	33,000	10,000	<100	
	5-Oct-11	-	-	-	-	-	9,700	2,800	<100	Lab Dup.
	5-Oct-11	-	-	-	-	-	17,000	4,800	<100	Field Dup.
	29-Jun-11	6.40	<0.2	52	2.8	280	5,500	1,400	<100	
	29-Jun-11	6.10	<0.2	51	2.3	300	8,900	2,700	<100	Field Dup.
	7-Oct-10	-	-	-	-	-	600	150	<100	
22-Jun-10	2.90	0.40	24	2.0	<100	670	<100	<100	Field Dup.	
22-Jun-10	2.60	0.30	22	2.1	<100	560	<100	<100		
OW 5-1	9-Oct-13	-	-	-	-	-	850	520	<200	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	<25	770	470	<200	
	3-Oct-12	-	-	-	-	-	6,000	3,300	<100	
	3-Oct-12	-	-	-	-	-	8,400	4,400	<100	⁽⁵⁾ , Field Dup.
	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	330	160	<100	
	5-Oct-11	-	-	-	-	-	3,100	1,800	120	
	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	210	120	<100	
	7-Oct-10	-	-	-	-	-	860	590	<100	
	22-Jun-10	-	-	-	-	-	1,800	1,000	<100	Lab Dup.
22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	1,800	870	<100		
OW 5-2	9-Oct-13	-	-	-	-	-	1,100,000	470,000	17,000	
	12-Jun-13	1.00	0.24	1.2	42.0	770	1,300,000	620,000	24,000	
	3-Oct-12	-	-	-	-	-	470,000	210,000	7,700	
	6-Jun-12	-	-	-	-	-	-	-	-	Dry
	5-Oct-11	-	-	-	-	-	700,000	340,000	13,000	
	29-Jun-11	4.40	0.50	4.6	73.0	3,100	390,000	160,000	6,700	
	7-Oct-10	-	-	-	-	-	720,000	290,000	<10,000	⁽⁴⁾
	22-Jun-10	<0.2	<0.2	<0.2	<0.4	18,000	3,000,000	1,300,000	33,000	⁽⁴⁾

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o,m,p)	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 9 (Within 30 m of the Little Jackfish River)										
OW 5-3	9-Oct-13	-	-	-	-	-	20,000	12,000	770	
	12-Jun-13	<0.2	<0.2	<0.2	<0.4	240	63,000	38,000	1,600	
	3-Oct-12	-	-	-	-	-	15,000	9,500	690	
	6-Jun-12	<0.2	0.78	<0.2	<0.4	<25	15,000	8,100	440	
	5-Oct-11	-	-	-	-	-	11,000	7,000	540	
	29-Jun-11	4.00	<0.2	<0.2	<0.4	480	5,900	3,100	190	
	7-Oct-10	-	-	-	-	-	3,300	1,900	<100	
22-Jun-10	0.60	<0.2	<0.2	<0.4	<100	10,000	4,400	<100		
EAST END - TABLE 3 (Outside 30 m of the Little Jackfish River)										
MW-21	9-Oct-13	-	-	-	-	-	380,000	140,000	730	(4)
	3-Oct-12	-	-	-	-	-	560,000	240,000	8,800	(5)
	5-Oct-11	-	-	-	-	-	1,600,000	680,000	26,000	
	7-Oct-10	-	-	-	-	-	1,600,000	610,000	11,000	(4)
MW-24	8-Oct-13	-	-	-	-	-	<100	<200	<200	
	3-Oct-12	-	-	-	-	-	1,100	480	<100	(5)
	5-Oct-11	-	-	-	-	-	290	120	<100	
	5-Oct-11	-	-	-	-	-	270	110	<100	Lab Dup.
	7-Oct-10	-	-	-	-	-	<100	<100	<100	
MW-49	9-Oct-13	-	-	-	-	-	8,400	3,400	<200	
	3-Oct-12	-	-	-	-	-	3,300	4,500	510	
	5-Oct-11	-	-	-	-	-	120,000	130,000	14,000	
	7-Oct-10	-	-	-	-	-	1,500	1,200	<100	
MW-51	9-Oct-13	-	-	-	-	-	1,200,000	580,000	41,000	
	3-Oct-12	-	-	-	-	-	600,000	310,000	21,000	
	5-Oct-11	-	-	-	-	-	3,000,000	1,600,000	100,000	
	7-Oct-10	-	-	-	-	-	230,000	96,000	5,500	(4)
MW-101	9-Oct-13	-	-	-	-	-	280,000	120,000	4,900	(4)
	3-Oct-12	-	-	-	-	-	380,000	160,000	6,500	(5)
	5-Oct-11	-	-	-	-	-	2,300,000	1,000,000	44,000	
	7-Oct-10	-	-	-	-	-	1,800,000	620,000	13,000	(4)
MW-102	9-Oct-13	-	-	-	-	-	3,100	1,900	<200	
	3-Oct-12	-	-	-	-	-	1,500	690	<100	(5)
	5-Oct-11	-	-	-	-	-	1,800	840	<100	
	7-Oct-10	-	-	-	-	-	1,700	760	<100	

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o,-m,-p)	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 3 (Outside 30 m of the Little Jackfish River)										
MW-103	9-Oct-13	-	-	-	-	-	40,000	15,000	460	
	3-Oct-12	-	-	-	-	-	570	470	<100	(5)
	5-Oct-11	-	-	-	-	-	2,100	1,200	<100	
	5-Oct-11	-	-	-	-	-	1,200	580	<100	Lab Dup.
	7-Oct-10	-	-	-	-	-	100	190	<100	
MW-104	9-Oct-13	-	-	-	-	-	150,000	45,000	380	
	3-Oct-12	-	-	-	-	-	1,400,000	420,000	1,700	(5)
	5-Oct-11	-	-	-	-	-	1,100,000	340,000	3,200	
	7-Oct-10	-	-	-	-	-	17,000	4,600	<100	
MW-106	8-Oct-13	-	-	-	-	-	220,000	69,000	<200	
	6-Oct-12	-	-	-	-	-	280,000	90,000	630	
	5-Oct-11	-	-	-	-	-	4,900,000	1,700,000	<100	
	7-Oct-10	-	-	-	-	-	220,000	79,000	210	
MW-107	8-Oct-13	-	-	-	-	-	27,000	12,000	<200	
	6-Oct-12	-	-	-	-	-	170,000	69,000	340	
	5-Oct-11	-	-	-	-	-	65,000	31,000	170	
	7-Oct-10	-	-	-	-	-	43,000	19,000	<100	
MW-108	8-Oct-13	-	-	-	-	-	3,200	1,600	<200	
	6-Oct-12	-	-	-	-	-	1,400	690	<100	
	5-Oct-11	-	-	-	-	-	4,500	2,200	140	
	7-Oct-10	-	-	-	-	-	1,600	400	<100	
MW-109	8-Oct-13	-	-	-	-	-	2,000,000	850,000	77,000	
	3-Oct-12	-	-	-	-	-	560,000	210,000	6,400	
	5-Oct-11	-	-	-	-	-	150,000	58,000	1,300	
	7-Oct-10	-	-	-	-	-	42,000	14,000	<100	
MW-114	8-Oct-13	-	-	-	-	-	100,000	61,000	1,400	
	3-Oct-12	-	-	-	-	-	-	-	-	Dry
	5-Oct-11	-	-	-	-	-	77,000	44,000	1,100	
	7-Oct-10	-	-	-	-	-	87,000	37,000	1,100	
MW-115	8-Oct-13	-	-	-	-	-	380	220	<200	
	3-Oct-12	-	-	-	-	-	3,900	1,500	<100	
	3-Oct-12	-	-	-	-	-	3,300	1,300	<100	Lab Dup.
	5-Oct-11	-	-	-	-	-	410	130	<100	
	7-Oct-10	-	-	-	-	-	<100	<100	<100	

TABLE 7
EAST END GROUNDWATER LABORATORY RESULTS
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	Parameter ⁽¹⁾								Comments
		Benzene	Toluene	Ethyl- benzene	Xylenes (o-,m-,p)	F1 (C ₆ -C ₁₀)	F2 (C ₁₀ -C ₁₆)	F3 (C ₁₆ -C ₃₄)	F4 (C ₃₄ -C ₅₀)	
EAST END - TABLE 3 (Outside 30 m of the Little Jackfish River)										
MW-126	8-Oct-13	-	-	-	-	-	420,000	150,000	5,000	14.
	3-Oct-12	-	-	-	-	-	1,000,000	440,000	32,000	
	5-Oct-11	-	-	-	-	-	1,300,000	520,000	45,000	
	7-Oct-10	-	-	-	-	-	690,000	260,000	21,000	
OW 3-2	8-Oct-13	-	-	-	-	-	1,100,000	430,000	15,000	
	3-Oct-12	-	-	-	-	-	190,000	81,000	1,900	
	5-Oct-11	-	-	-	-	-	3,000,000	1,200,000	30,000	
	7-Oct-10	-	-	-	-	-	1,000,000	390,000	11,000	
QA / QC										
Method Blank	3-Oct-12	-	-	-	-	-	<100	<100	<100	
Method Blank	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	-	-	-	
Method Blank	5-Oct-11	-	-	-	-	-	<100	<100	<100	
Method Blank	29-Jun-11	<0.2	<0.2	<0.2	<0.4	-	-	-	-	
Travel Blank	3-Oct-12	-	-	-	-	-	<100	<100	<100	
Travel Blank	6-Jun-12	<0.2	<0.2	<0.2	<0.4	<25	<100	<100	<100	
Travel Blank	5-Oct-11	-	-	-	-	-	<100	<100	<100	
Travel Blank	29-Jun-11	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
Travel Blank	7-Oct-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
Travel Blank	22-Jun-10	<0.2	<0.2	<0.2	<0.4	<100	<100	<100	<100	
MOE										
Table 3 ⁽²⁾		(430) 44	(18,000) 18,000	(2,300) 2,300	(4,200) 4,200	(750) 750	(150) 150	(500) 500	(500) 500	-
Table 9 ⁽³⁾		44	14,000	1,800	3,300	420	150	500	500	-

Notes:

"-" = No Data

1. All concentrations in micrograms per litre (µg/L).
2. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property) Table 3 - Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition () - Criterion value in brackets applies to medium and fine textured soils.
3. MOE 2011 - Ontario Ministry of Environment. Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (All Types of Property) Table 9 - Non-Potable Groundwater
4. Due to the high concentration of target analytes, the sample required dilution. The reporting limits were adjusted accordingly.
5. The sample bottle contained visible sediment, which was included in the analysis as per the Protocol for Analytical Methods Use in the Assessment of Properties, under part XV.1 of the Environmental Protection Act.

BOLD = Parameter exceeds MOE Table 9 Criteria

BOLD

= Parameter exceeds MOE Table 3 Criteria

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-20	8-Oct-13	7.10	935.0	3.94	12.0	-107	light grey	turbid	h/c sheen	h/c odour	
	12-Jun-13	6.80	879.0	1.95	7.4	-115	dark grey	turbid	slight	h/c odour	
	3-Oct-12	7.10	883.0	2.08	13.3	-123	dark grey	turbid	none	none	
	6-Jun-12	7.03	811.0	3.19	17.3	-59	beige	turbid	none	h/c odour	
	5-Oct-11	7.01	665.0	2.30	11.7	-123	beige	turbid	none	h/c odour	
	29-Jun-11	6.55	851.0	3.24	13.4	-98	beige	slightly turbid	none	h/c odour	
	7-Oct-10	6.88	827.0	2.93	15.8	-84	yellow	turbid	none	h/c odour	
	22-Jun-10	6.86	569.0	4.91	9.4	-76	black	turbid	none	h/c odour	
MW-21	9-Oct-13	7.20	884.0	2.23	10.7	-137	clear	clear	h/c sheen	h/c odour	
	3-Oct-12	7.40	592.0	2.05	13.0	-121	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.95	352.0	4.35	11.1	-48	clear	clear	h/c sheen	h/c odour	
	7-Oct-10	7.29	590.0	1.51	16.7	under range	clear	clear	h/c sheen	h/c odour	
MW-24	8-Oct-13	8.00	659.0	3.80	9.8	5	clear	clear	none	none	
	3-Oct-12	7.20	733.0	3.85	10.2	-50	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.39	411.0	4.71	9.2	60	beige	turbid	none	none	
	7-Oct-10	7.45	690.0	4.63	15.7	-20	clear	clear	none	none	
MW-40	9-Oct-13	7.00	891.0	1.90	10.6	-80	light grey	turbid	none	h/c odour	
	12-Jun-13	7.40	652.0	3.14	6.9	-7	white	slightly turbid	none	none	
	3-Oct-12	7.30	763.0	2.94	11.6	-36	light grey	turbid	none	none	
	6-Jun-12	7.71	716.0	3.82	14.0	33	beige	turbid	none	none	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-40 (con't)	5-Oct-11	7.13	496.0	3.42	11.3	-13	light yellow	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.78	754.0	7.95	13.3	-54	beige	turbid	none	none	
	7-Oct-10	7.09	914.0	2.58	15.1	-45	white	turbid	none	none	
	22-Jun-10	7.07	504.0	7.49	10.6	115	beige	slightly turbid	none	h/c odour	
MW-43	8-Oct-13	7.80	814.0	2.30	10.5	-65	grey	turbid	none	none	
	12-Jun-13	7.10	761.0	2.20	6.3	-77	light grey	turbid	none	none	
	3-Oct-12	7.00	854.0	1.19	11.4	-137	light grey	turbid	none	none	
	6-Jun-12	7.50	690.0	2.67	13.4	-65	beige	turbid	none	none	
	5-Oct-11	7.25	360.0	1.06	11.2	-123	beige	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.59	568.0	6.89	12.1	-74	beige	turbid	none	none	
	7-Oct-10	7.21	807.0	2.15	14.0	-76	beige	turbid	h/c sheen	h/c odour	
	22-Jun-10	7.08	430.0	3.22	8.6	-51	beige	turbid	none	none	
MW-46	8-Oct-13	7.40	828.0	2.91	11.0	-71	light grey	turbid	h/c sheen	h/c odour	
	12-Jun-13	7.10	803.0	3.21	7.7	-74	light grey	turbid	none	none	
	3-Oct-12	6.90	830.0	2.96	12.3	-83	light grey	turbid	none	none	
	6-Jun-12	7.08	892.0	3.06	15.7	-52	beige	turbid	none	none	
	5-Oct-11	7.09	589.0	2.98	10.6	-62	beige	turbid	none	none	
	29-Jun-11	6.41	945.0	3.62	10.6	-78	beige	turbid	none	none	
	7-Oct-10	7.23	901.0	3.39	14.9	-77	beige	turbid	none	none	
	22-Jun-10	6.92	561.0	7.48	12.5	-25	grey	turbid	none	none	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-49	8-Oct-13	7.10	867.0	2.82	12.0	-73	light grey	turbid	none	h/c odour	
	3-Oct-12	-	-	-	-	-	-	-	-	-	Insufficient Sample
	5-Oct-11	-	-	-	-	-	-	-	-	-	Insufficient Sample
	7-Oct-10	6.87	984.0	2.36	15.7	14	yellow	clear	h/c sheen	h/c odour	
MW-51	9-Oct-13	7.60	892.0	4.22	12.5	-77	grey	turbid	none	none	
	3-Oct-12	7.40	534.0	2.27	11.5	-116	dark grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.97	579.0	1.48	10.3	-69	beige	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.94	1,113.0	1.40	15.6	-28	light grey	turbid	h/c sheen	h/c odour	
MW-52	9-Oct-13	7.30	902.0	2.58	9.2	-117	clear	slightly turbid	h/c sheen	h/c odour	
	12-Jun-13	7.50	406.0	2.42	6.9	-119	light grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	6.90	975.0	2.03	10.9	-140	light grey	turbid	h/c sheen	h/c odour	
	6-Jun-12	7.46	479.0	2.68	14.4	-61	beige	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.94	810.0	2.41	9.4	-91	clear	turbid	none	none	
	29-Jun-11	6.81	904.0	3.30	11.6	-72	clear	turbid	none	h/c odour	
	7-Oct-10	6.95	929.0	1.72	14.6	-74	beigr	turbid	none	h/c odour	
	22-Jun-10	6.96	258.0	6.22	9.9	-93	clear	slightly turbid	none	h/c odour	
MW-101	9-Oct-13	7.10	828.0	2.59	11.2	-72	clear	clear	h/c sheen	h/c odour	
	3-Oct-12	7.30	984.0	1.91	10.9	-114	clear	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.41	491.0	3.06	10.2	-88	clear	turbid	h/c sheen	h/c odour	
	7-Oct-10	7.02	1,203.0	0.93	15.8	-88	clear	clear	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. ($\mu\text{S}/\text{cm}$)	D.O. (mg/L)	Temp. ($^{\circ}\text{C}$)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-102	9-Oct-13	7.90	962.0	2.22	8.9	-119	black	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.30	717.0	1.80	12.6	-111	dark grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.22	800.0	1.30	9.6	-100	dark grey	turbid	h/c sheen	h/c odour	
	7-Oct-10	7.15	1,085.0	1.65	13.7	-45	dark grey	turbid	h/c sheen	h/c odour	
MW-103	9-Oct-13	7.70	934.0	3.11	10.1	-88	clear	clear	none	none	
	3-Oct-12	7.20	1,020.0	1.31	11.0	-33	clear	clear	none	none	
	5-Oct-11	7.07	548.0	6.27	10.7	71	clear	turbid	none	none	
	7-Oct-10	6.91	1,046.0	1.65	15.6	-42	clear	slightly turbid	none	none	
MW-104	9-Oct-13	7.20	898.0	2.24	12.1	-73	yellow	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.10	112.0	1.99	11.8	-144	orange/brown	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.69	384.0	9.26	12.0	-53	yellow	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.81	994.0	2.71	16.2	-32	yellow	turbid	h/c sheen	h/c odour	
MW-106	8-Oct-13	6.90	753.0	2.44	11.0	-111	light grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	6.80	852.0	3.16	11.8	-137	yellow	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.98	840.0	2.04	10.8	-80	beige	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.84	945.0	1.39	14.7	-64	clear	turbid	h/c sheen	h/c odour	
MW-107	8-Oct-13	7.00	1,076.0	2.93	10.8	-106	clear	slightly turbid	h/c sheen	h/c odour	
	3-Oct-12	7.00	1,198.0	1.96	12.8	-141	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.94	704.0	2.43	10.7	-73	beige	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.91	900.0	2.74	14.9	-49	light grey	turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
MW-108	8-Oct-13	7.10	816.0	2.56	10.5	-105	dark grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	6.80	1,070.0	1.39	12.6	-124	dark grey	turbid	none	none	
	5-Oct-11	6.82	850.0	1.91	11.4	-106	beige	turbid	none	none	
	7-Oct-10	6.53	1,575.0	1.98	15.1	-31	grey	turbid	h/c sheen	h/c odour	
MW-109	8-Oct-13	7.20	872.0	2.01	9.8	-82	clear	clear	h/c sheen	h/c odour	
	3-Oct-12	6.80	1,049.0	2.15	11.2	-96	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	6.79	774.0	1.29	9.9	-75	light grey	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.88	1,073.0	1.86	13.9	-65	clear	clear	h/c sheen	h/c odour	
MW-114	8-Oct-13	7.40	928.0	2.98	9.5	-120	dark grey	turbid	h/c sheen	h/c odour	
	3-Oct-12	-	-	-	-	-	-	-	-	-	Insufficient Sample
	5-Oct-11	7.62	562.0	3.90	10.8	-44	dark grey	turbid	h/c sheen	h/c odour	
	7-Oct-10	7.22	990.0	2.60	15.4	-81	dark grey	turbid	h/c sheen	h/c odour	
MW-115	8-Oct-13	7.10	1,762.0	2.58	10.9	35	light yellow	slight turbidity	none	none	
	3-Oct-12	6.80	2,360.0	4.45	11.6	-21	beige	turbid	none	none	
	5-Oct-11	6.79	652.0	3.21	11.2	144	clear	slight turbidity	none	none	
	7-Oct-10	6.74	1,926.0	3.48	17.2	40	yellow	turbid	h/c sheen	h/c odour	
MW-126	8-Oct-13	7.00	748.0	2.91	12.5	-100	light yellow	clear	h/c sheen	h/c odour	
	3-Oct-12	7.10	712.0	1.46	12.6	-70	clear	turbid	h/c sheen	h/c odour	
	5-Oct-11	-	-	-	-	-	-	-	-	-	Insufficient Sample
	7-Oct-10	6.86	874.0	2.33	16.6	-54	clear	clear	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. ($\mu\text{S}/\text{cm}$)	D.O. (mg/L)	Temp. ($^{\circ}\text{C}$)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
OW 3-2	8-Oct-13	7.00	682.0	4.28	12.1	-93	light brown	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.00	814.0	2.03	12.3	-97	light grey	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.90	465.0	2.40	10.5	-108	clear	turbid	h/c sheen	h/c odour	
	7-Oct-10	6.83	993.0	2.26	16.9	-53	clear	clear	h/c sheen	h/c odour	
OW 5-1	9-Oct-13	7.10	825.0	2.11	10.0	-92	orange	turbid	none	none	
	12-Jun-13	7.30	575.0	2.94	6.6	-66	light brown	turbid	none	none	
	3-Oct-12	7.40	662.0	1.40	11.2	-64	yellow/orange	turbid	none	none	
	6-Jun-12	7.71	756.0	1.80	12.3	17	orange/brown	turbid	none	none	
	5-Oct-11	7.19	418.0	3.08	9.1	5	beige	turbid	none	h/c odour	
	29-Jun-11	6.46	924.0	2.24	12.5	-14	light brown	turbid	none	none	
	7-Oct-10	7.21	837.0	2.11	13.4	-82	yellow	turbid	none	none	
	22-Jun-10	7.26	459.0	3.66	9.9	-46	beige	slightly turbid	h/c sheen	h/c odour	
OW 5-2	9-Oct-13	7.20	774.0	3.47	11.1	-88	clear	clear	h/c sheen	h/c odour	
	12-Jun-13	6.90	823.0	2.02	7.3	-103	light yellow	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.20	625.0	1.65	11.9	-104	clear	clear	none	none	
	5-Oct-11	7.23	537.0	3.44	10.2	-80	beige	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.77	805.0	1.88	14.4	-79	clear	slightly turbid	h/c sheen	h/c odour	
	7-Oct-10	6.82	1,030.0	1.57	15.5	61	clear	clear	none	none	
	22-Jun-10	7.52	617.0	3.09	11.1	-118	beige	slightly turbid	h/c sheen	h/c odour	

TABLE 8
EAST END GENERAL GROUNDWATER FIELD CHEMISTRY
CN HORNEPAYNE YARD, HORNEPAYNE, ONTARIO

Well No.	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	Temp. (°C)	O.R.P. (mV)	Colour	Turbidity	Sheen	Odour	Comments
EAST END											
OW 5-3	9-Oct-13	7.60	824.0	1.79	9.9	-84	grey	turbid	none	h/c odour	
	12-Jun-13	7.30	458.0	3.02	11.2	-14	yellow	turbid	h/c sheen	h/c odour	
	3-Oct-12	7.30	1,108.0	1.64	11.4	-137	dark grey	turbid	h/c sheen	h/c odour	
	6-Jun-12	7.66	583.0	1.89	14.4	-63	yellow/brown	turbid	h/c sheen	h/c odour	
	5-Oct-11	7.07	643.0	2.89	9.9	-102	grey	turbid	h/c sheen	h/c odour	
	29-Jun-11	6.40	954.0	0.46	12.2	-66	beige	turbid	none	h/c odour	
	7-Oct-10	7.14	836.0	1.51	14.4	-52	dark grey	turbid	h/c sheen	h/c odour	
	22-Jun-10	6.97	629.0	5.52	9.8	-73	beige	turbid	none	none	

Notes:

"-" = No Data

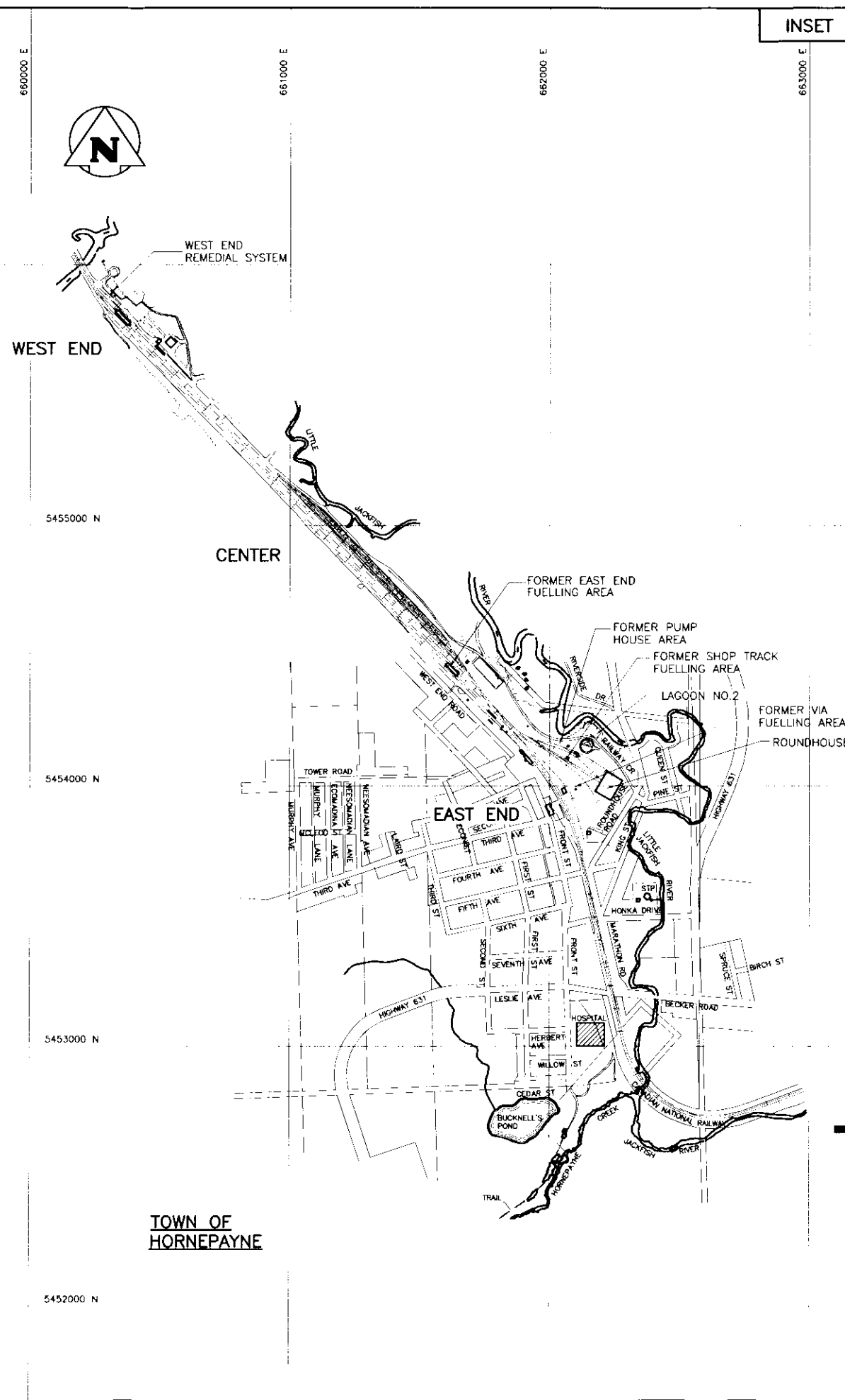
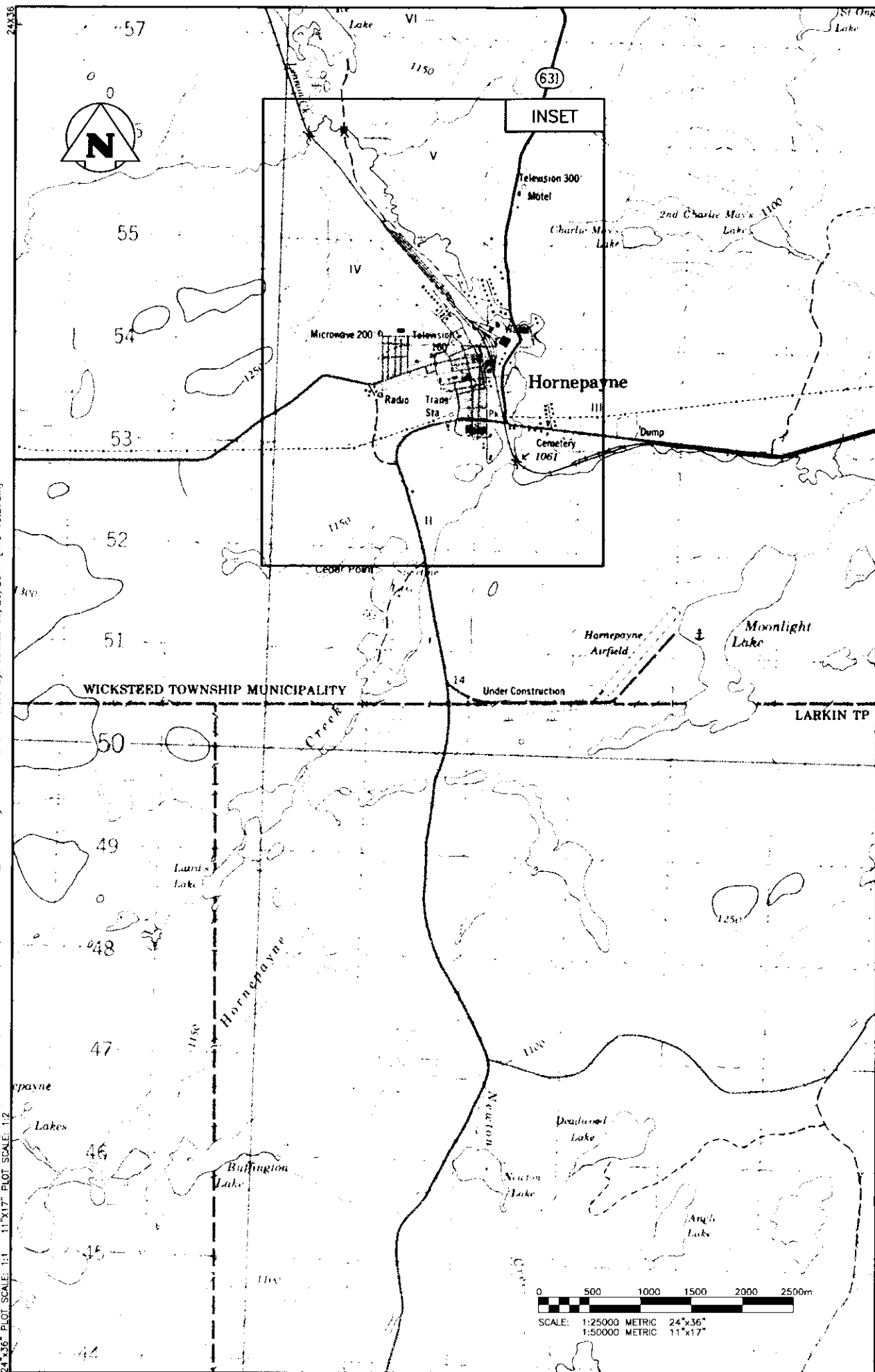
D.O. = Dissolved Oxygen

E.C. = Electrical Conductivity

O.R.P. = Oxidation Reduction Potential

FIGURES

File Name: P:\Projects\2013\13-0434-004\dwg\MOE Reports\MOE Draft Report\13-0434-004_FIG 01.dwg - Tab: FIG 01 Plotted By: JChilids 03/20/2014 [Thu 10:27am]
24"x36" PLOT SCALE: 1:11"x17" PLOT SCALE: 1:2



INSET

KEY PLAN

0 200 400km
APPROXIMATE SCALE

NOTES:

1. LOCATION OF INSET-PLAN IN RELATION TO COORDINATES IS APPROXIMATE

REFERENCE:

BASE MAP: 1:50,000 NTS MAP 42 F/2 (HORNEPAYNE), NAD 1927, EDITION 2, PUBLISHED 1979

0 200 400 600 800 1000m

SCALE: 1:10000 METRIC 24"x36"
1:20000 METRIC 11"x17"

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REVISIONS / ISSUE			

KGS GROUP **CANADIAN NATIONAL**

CONSULTING ENGINEERS

2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100586, 100587
& 100591 - HORNEPAYNE YARD, ON

SITE LOCATION PLAN

MARCH 2014	FIGURE 01	REV 0
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File Name: P:\Projects\2013\13-0434-004\dwg\MOE Reports\MOE Draft Report\13-0434-004_F G 02.dwg - Tab: FIG 02 Plotted By: JChids 03/20/2014 [Thu 10:28am]
24"x36" PLOT SCALE: 1:11'x17" PLOT SCALE: 1:2

24x36



5456000 N

660000 E

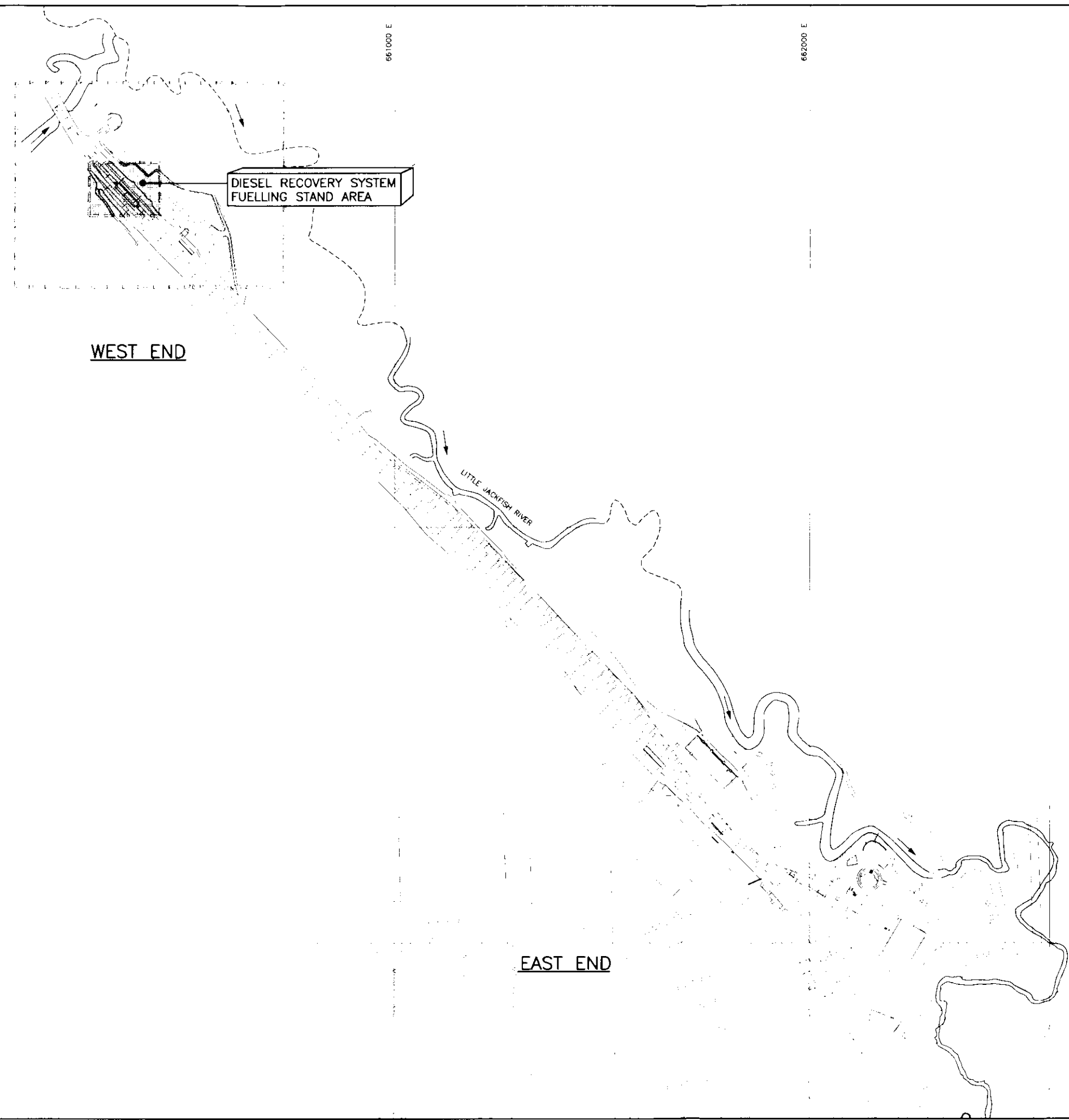
661000 E

662000 E

663000 E

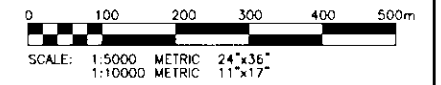
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5454000 N



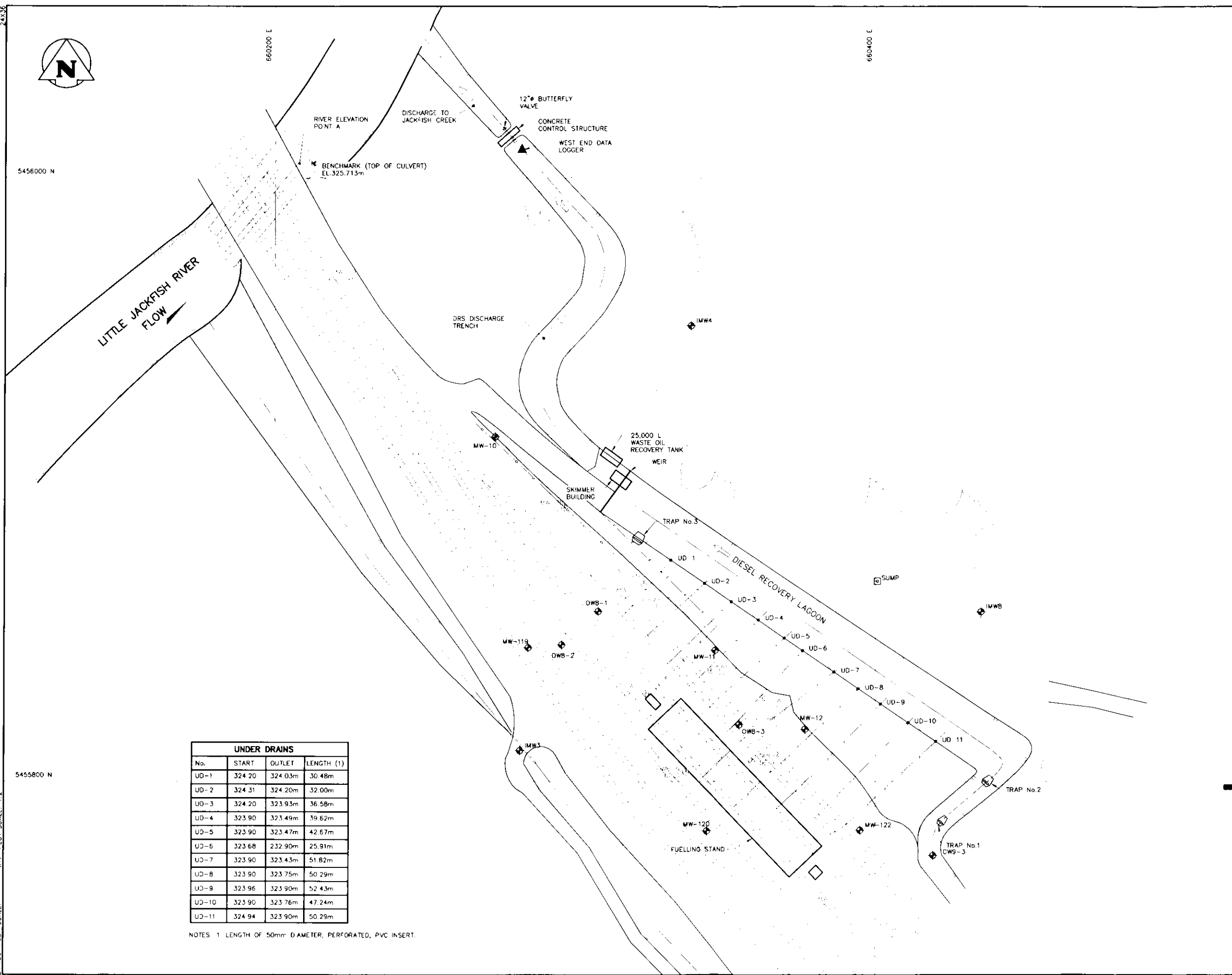
LEGEND

- PLAN LIMITS
- DIESEL RECOVERY SYSTEM DETAIL PLANS
- RIVER FLOW DIRECTION



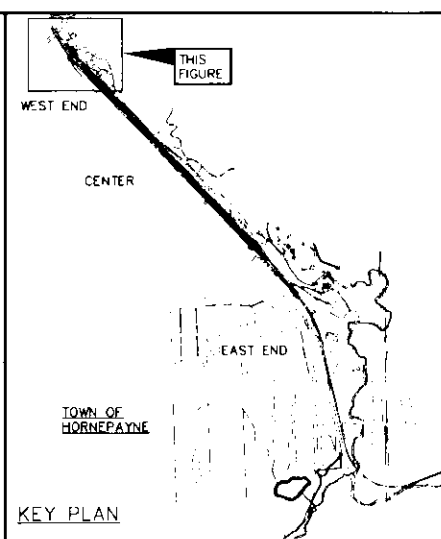
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NO	15/04/20	DESCRIPTION	PR
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KGS GROUP CANADIAN NATIONAL CONSULTING ENGINEERS			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON			
WEST END YARD PLAN			
MARCH 2014		FIGURE 02	0

File Name: P:\Projects\2013\13-0434-004\dwg\env\MOE_Reports\MOE Draft Report\13-0434-004_FIG 03.dwg - Tab: FIG A2 Plotted By: JChids 03/20/2014 [Thu 10:29am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

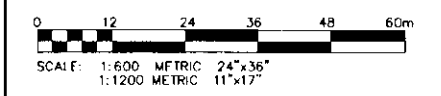
NOTES 1 LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.



- LEGEND:**
- BERM
 - CENTERLINE OF DITCH
 - FENCE
 - BURIED ELECTRICAL CABLE
 - BENCHMARK
 - MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - RWB-1 RECOVERY WELL
 - SUMP SUMP WELL
 - RAILROAD TRACKS
 - UNDERGROUND DRAIN
 - DESTROYED
 - FLOW MONITORING DATA LOGGER LOCATION

NOTES:

1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN



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2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON		
WEST END SITE PLAN AND DIESEL RECOVERY SYSTEM COMPONENTS		
MARCH 2014	FIGURE 03	0

File Name: P:\Projects\2013\13-0434-004\dwg\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 04.dwg - Tab: FIG D1 Plotted By: JChids 03/20/2014 [Thu 10:31am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2

24X36



5456000 N

660000 E

WEST END

5455000 N

661000 E

UTILE JACKFISH RIVER

662000 E

663000 E

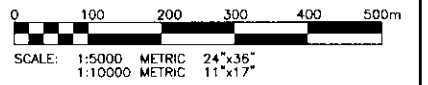
5454000 N

EAST END

LAGOON NO. 2 CONTAINMENT
SYSTEM

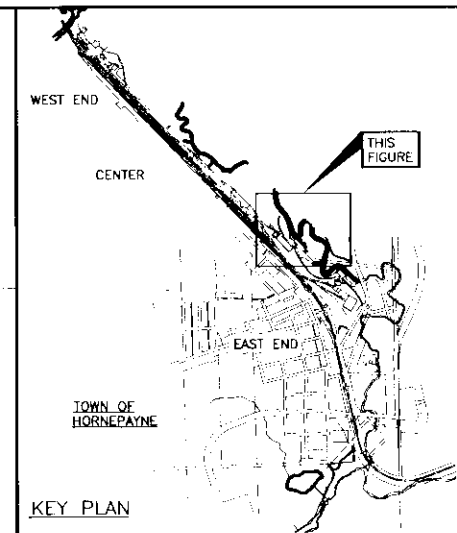
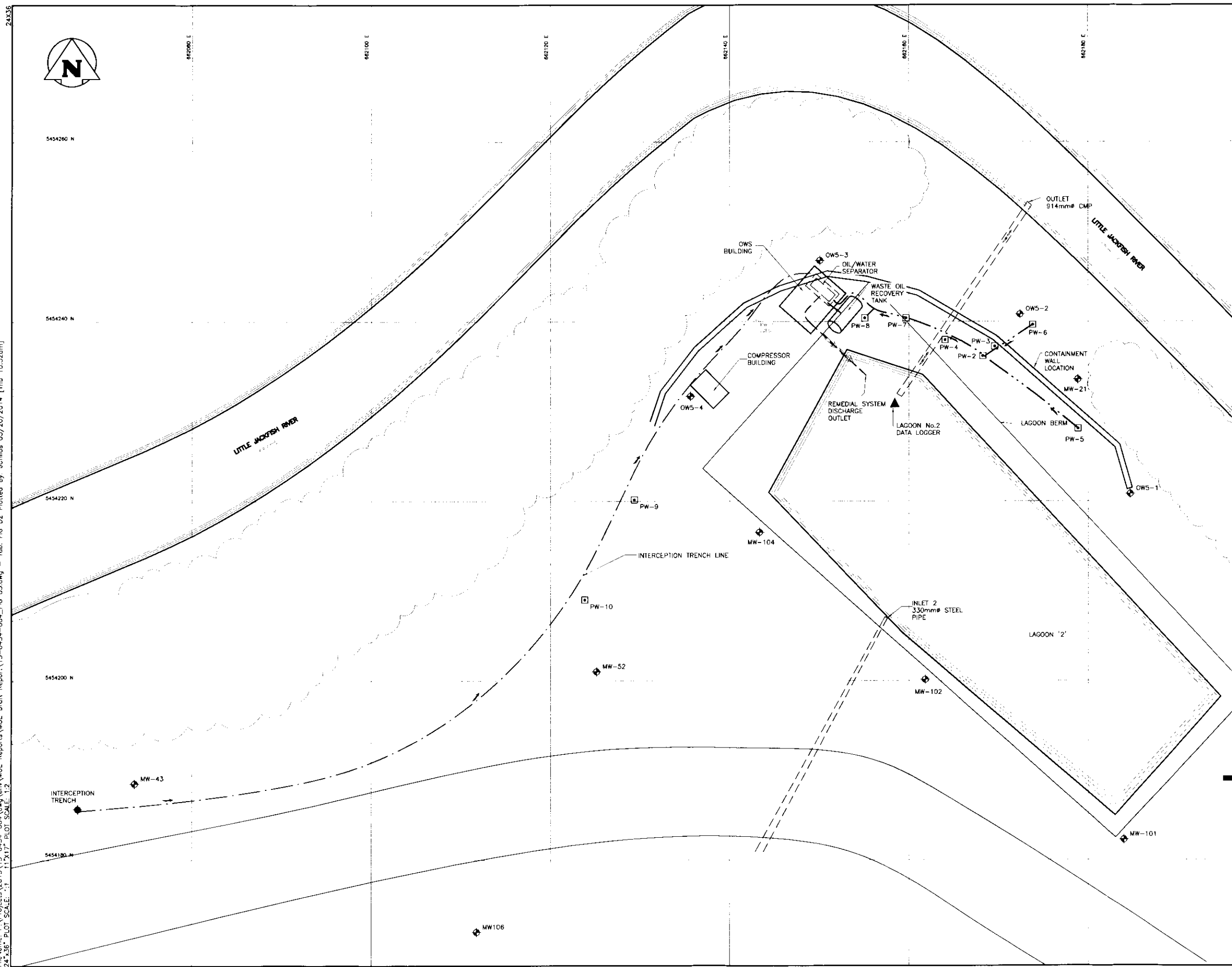
LEGEND

- PLAN LIMITS
- DIESEL RECOVERY SYSTEM DETAIL PLANS
- RIVER FLOW DIRECTION



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2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100591 HORNEPAYNE YARD, ON			
LAGOON No.2 SITE PLAN			
MARCH 2014		FIGURE 04	REV 0

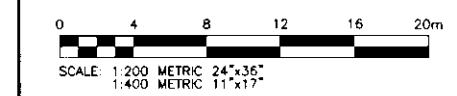
File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 05.dwg - Tab: FIG 02 Plotted By: JChida 03/20/2014 [Thu 10:32am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



- LEGEND**
- APPROXIMATED LIMITS OF TREED AREA
 - EDGE OF WATER
 - CULVERT
 - DISCHARGE LINE
 - INTERCEPTION TRENCH LINE
 - MW-104 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-52 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - INTERCEPTION TRENCH
 - PW-2 PUMPING WELL
 - TOTAL FLUIDS FLOW DIRECTION
 - LPH FLOW DIRECTION
 - WATER FLOW DIRECTION
 - SURFACE WATER FLOW DIRECTION
 - DESTROYED
 - FLOW MONITORING DATA LOGGER LOCATION

NOTES:

1. DRAWING BASED ON BIOGENIE ENVIRONMENTAL ON AUTO CAD FILE.

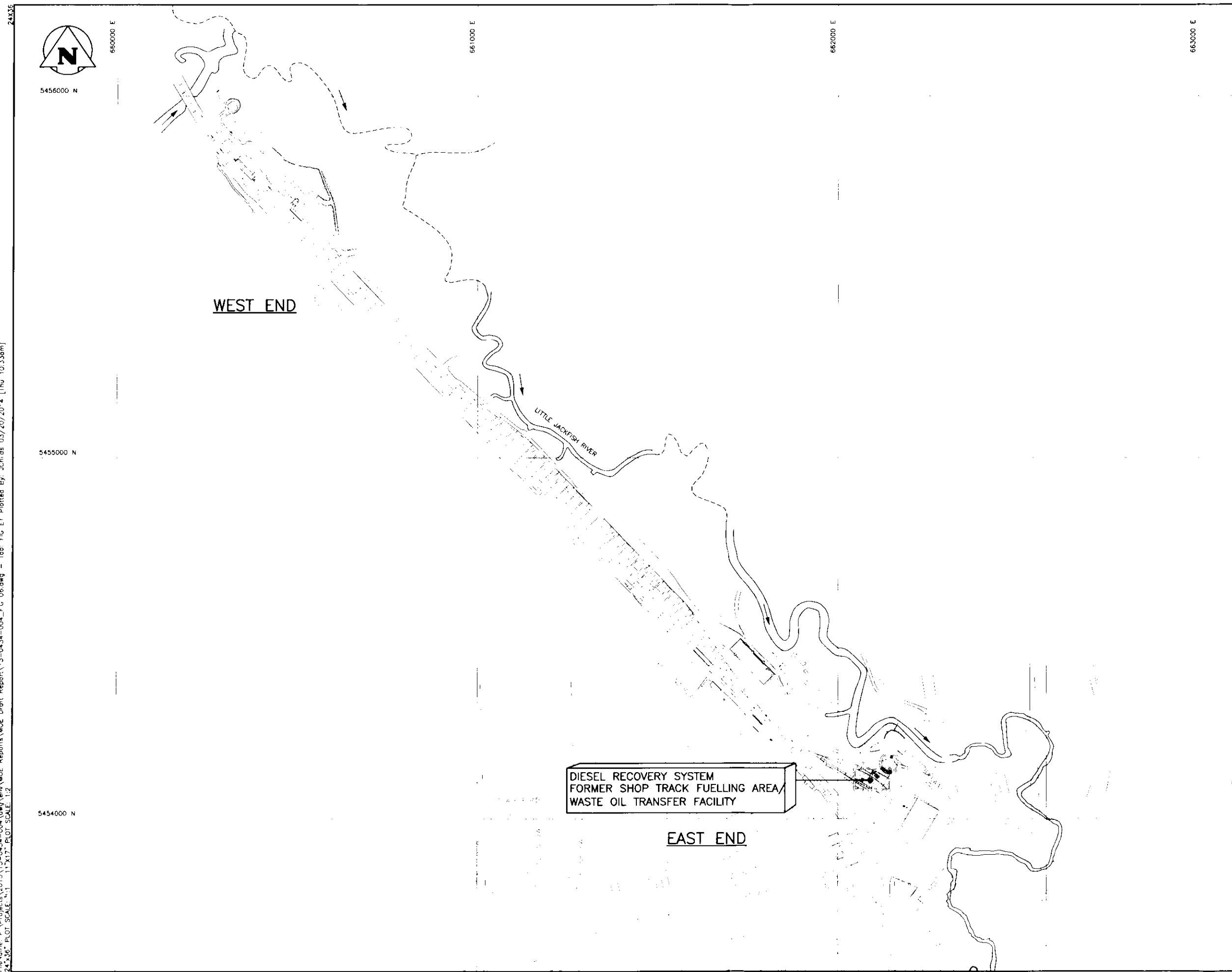


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CN CANADIAN NATIONAL			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100591 HORNEPAYNE YARD, ON			
LAGOON NO.2 CONTAINMENT SYSTEM COMPONENTS			
MARCH 2014		FIGURE 05	0

File Name: P:\Projects\2013\13-0434-004\dwg\env\MOE Reports\MOE Draft Report\13-0434-004_FG 06.dwg - Tab: FIG E1 Plotted By: JCH:ds 03/20/2014 [Thu 10:33am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2

24x36

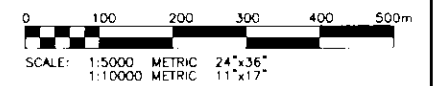
001054



LEGEND

--- DIESEL RECOVERY SYSTEM DETAIL PLANS
--- SITE PLAN

→ RIVER FLOW DIRECTION

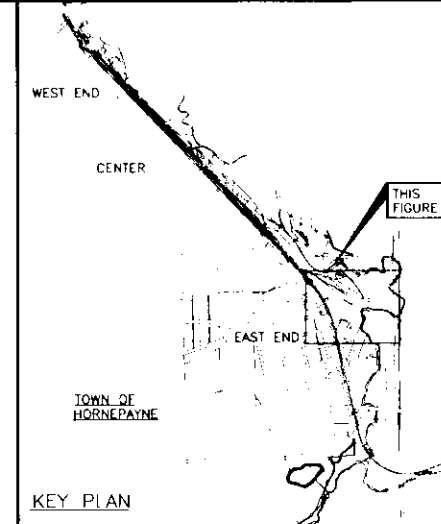
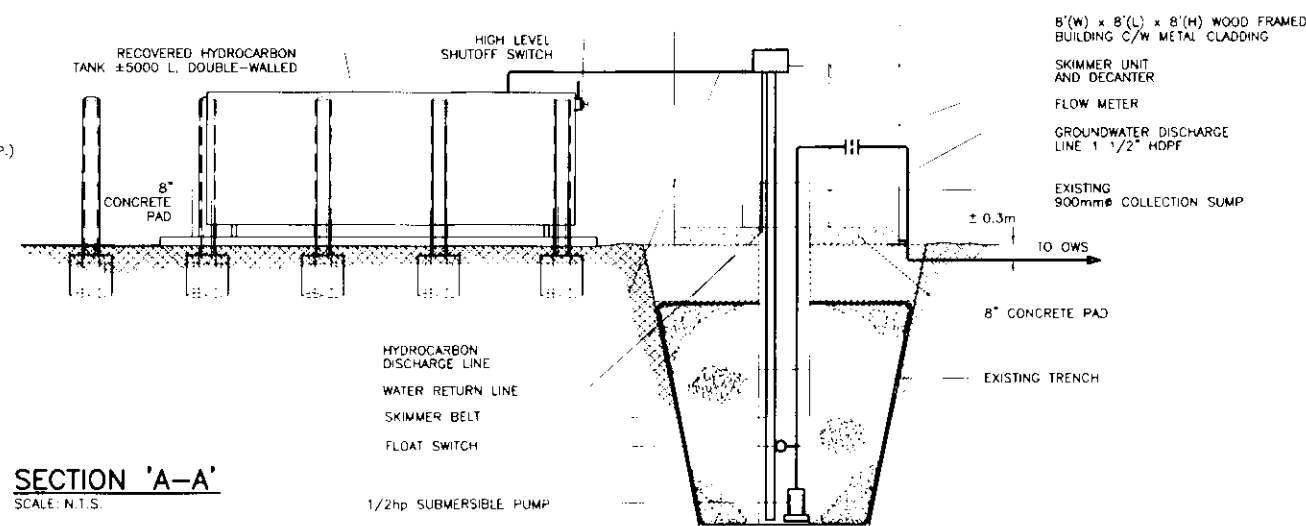
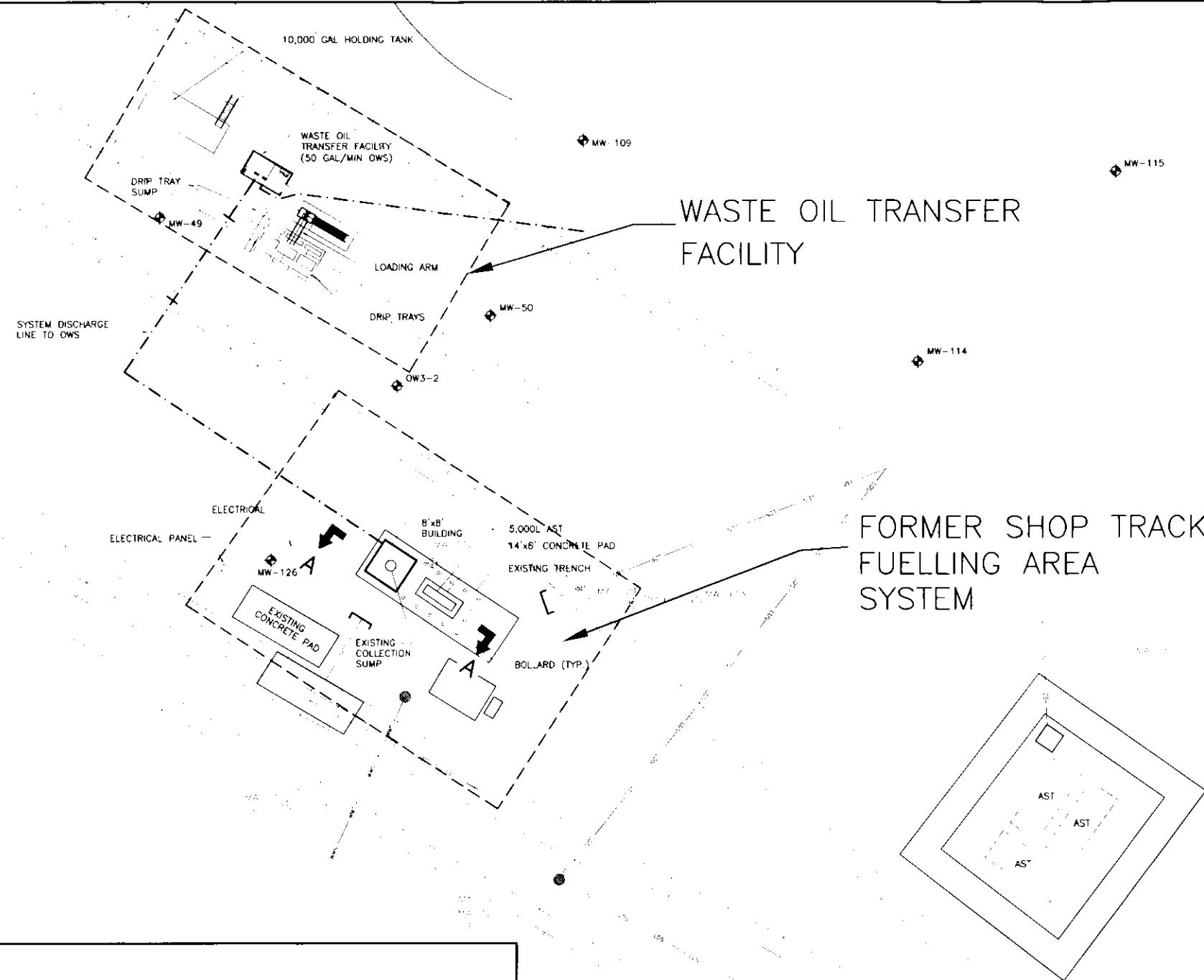


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CN CANADIAN NATIONAL			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100591 HORNEPAYNE YARD, ON FORMER SHOP TRACK FUELLING AREA SITE PLAN			
MARCH 2014		FIGURE 06	0

File Name: P:\Projects\2013\13-0434-004.dwg;env\MOE Reports\MOE Draft Report\13-0434-004_FIG 07.dwg - Tab: FIG E2 Plotted By: JChids 03/20/2014 [Thu 10:34am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2

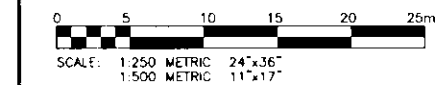


PARTIAL SITE PLAN
SCALE: 1:250



LEGEND

- RAILROAD TRACK
- SANITARY SEWER
- STORM SEWER
- DISCHARGE LINE
- MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
- MW-50 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
- DESTROYED
- MANHOLES



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NO	11/12/2016	DATE OF REVISION	REV
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KGS GROUP **CN CANADIAN NATIONAL**
CONSULTING ENGINEERS

2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100591
HORNEPAYNE YARD, ON
FORMER SHOP TRACK FUELLING
AREA SYSTEM COMPONENTS

MARCH 2014	FIGURE 07	0
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File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 08.dwg -- Tab: FIG F1 Plotted By: JChilds 03/20/2014 [Thu 10:36am]
24x36 PLOT SCALE: 1:1 11x17 PLOT SCALE: 1:2

24x36



650000 E

661000 E

662000 E

663000 E

5455000 N

5454000 N

WEST END

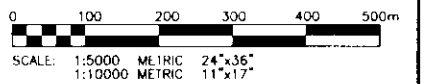
LITTLE JACKFISH RIVER

DIESEL RECOVERY SYSTEM
FORMER SHOP TRACK FUELLING AREA/
WASTE OIL TRANSFER FACILITY

EAST END

LEGEND

- PLAN LIMITS
- DIESEL RECOVERY SYSTEM DETAIL PLANS
- RIVER FLOW DIRECTION



0	14/03/20	ISSUED WITH MOE FINAL REPORT	TG
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REVISIONS / ISSUE



2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100591
HORNEPAYNE YARD, ON

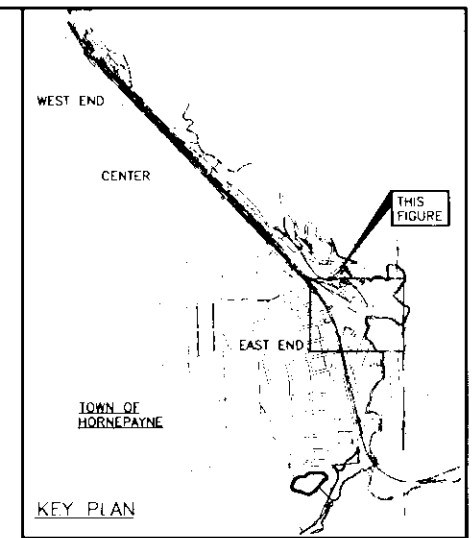
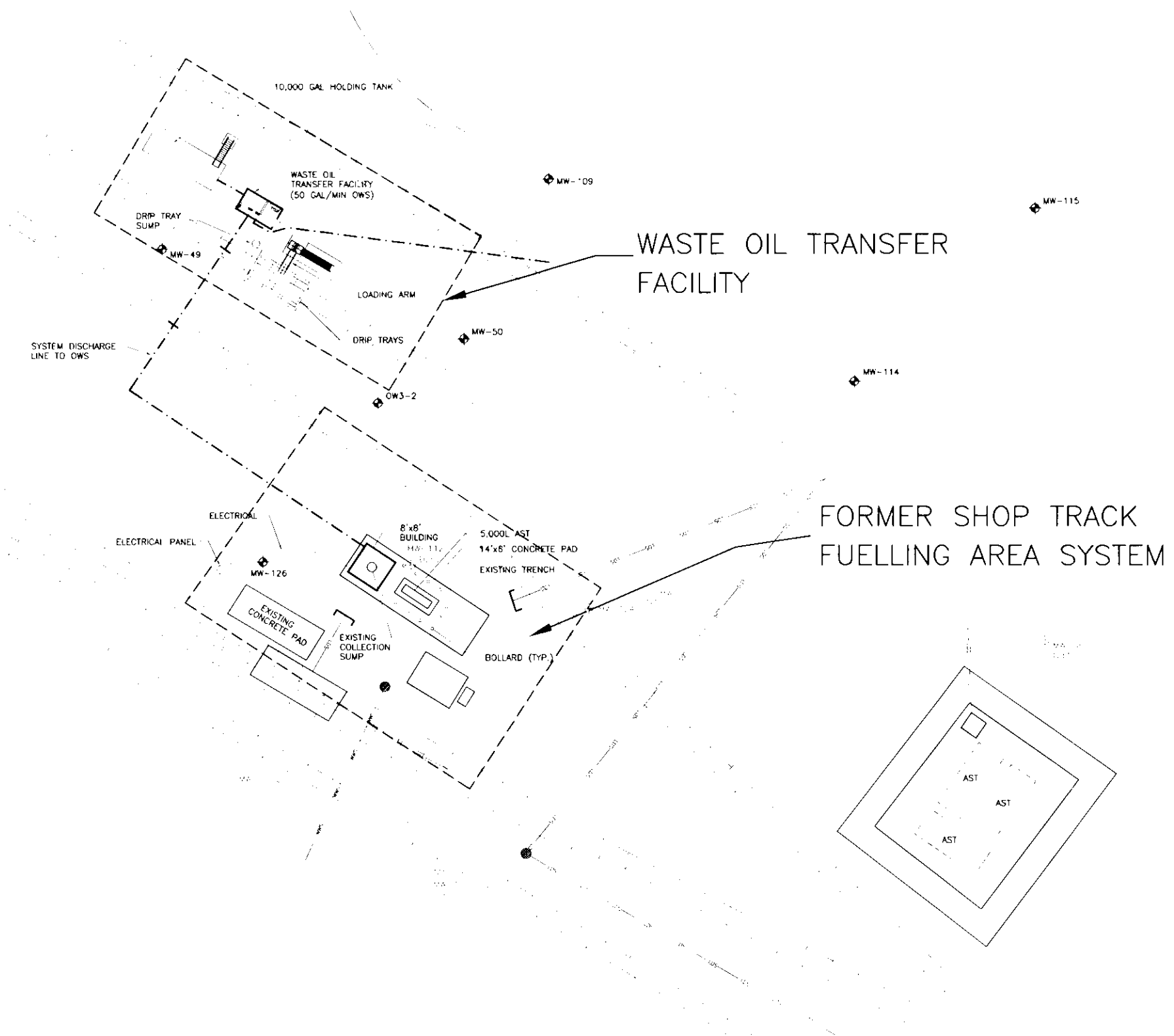
WASTE OIL TRANSFER FACILITY
SITE PLAN

MARCH 2014	FIGURE 08	0
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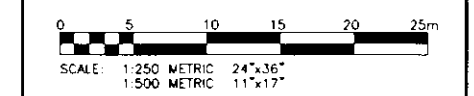
File Name: P:\Projects\2013\13-0434-004\dwg\env\MOE Draft Report\13-0434-004_FG 09.dwg - Tab: FIG F2 Plotted By: JChids 03/20/2014 [Thu 10:37am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



PARTIAL SITE PLAN
SCALE: 1:250



- LEGEND**
- RAILROAD TRACK
 - SANITARY SEWER
 - STORM SEWER
 - DISCHARGE LINE
 - MW-126 MONITORING WELL (INSTALLED BY KGS)
(MW101-MW133, MW140-MW147)
 - MW-50 MONITORING WELL (INSTALLED BY OTHERS)
(ALL OTHER WELLS)
 - DESTROYED
 - MANHOLES



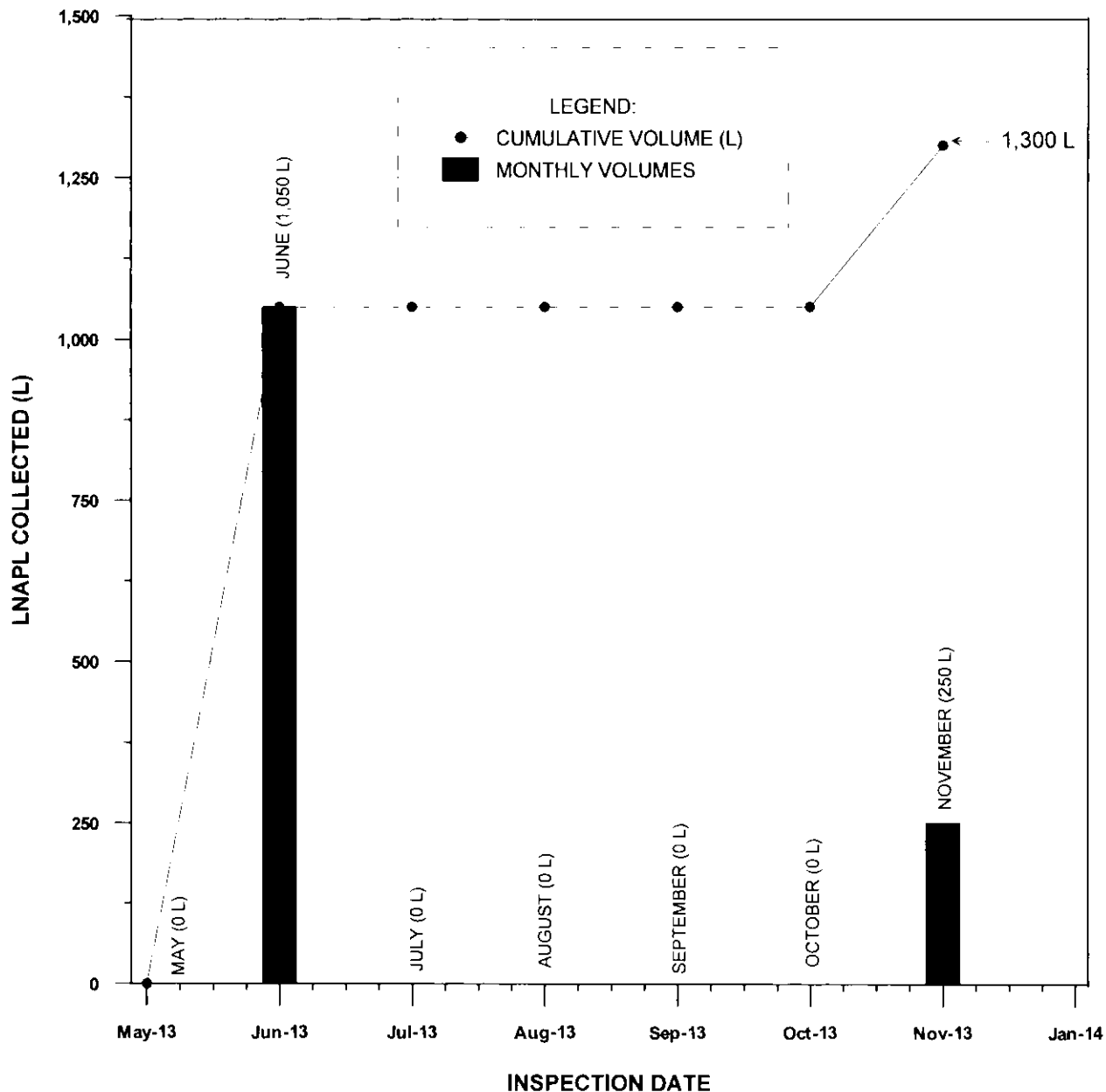
0	14/03/20	ISSUED WITH MOE FINAL REPORT	TG
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2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100591
HORNEPAYNE YARD, ON
WASTE OIL TRANSFER FACILITY
SYSTEM COMPONENTS

MARCH 2014	FIGURE 09	0
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NOTES: 1,300 L OF LNAPL WAS COLLECTED AT THE WEST END IN 2013

May

- Skimmer belt was installed on May 17; however the lagoon was frozen.
- Skimmer unit activated on May 22.
- Skimmer unit manually shutdown on May 28 due to a crack in the LNAPL discharge line.

June

- Skimmer unit discharge line was fixed and the unit was activated on June 10.
- Skimmer unit manually shutdown on June 11 due to a crack in the LNAPL discharge line.
- Skimmer unit was activated on June 17 and operated within normal parameters.
- GFL removed approximately 1,050 L of LNAPL from Lagoon No. 5.

July

- Skimmer unit operated within normal parameters.
- 0 L of LNAPL was collected.

August

- Skimmer unit operated within normal parameters.
- 0 L of LNAPL was collected.

September

- Skimmer unit operated within normal parameters.
- 0 L of LNAPL was collected.

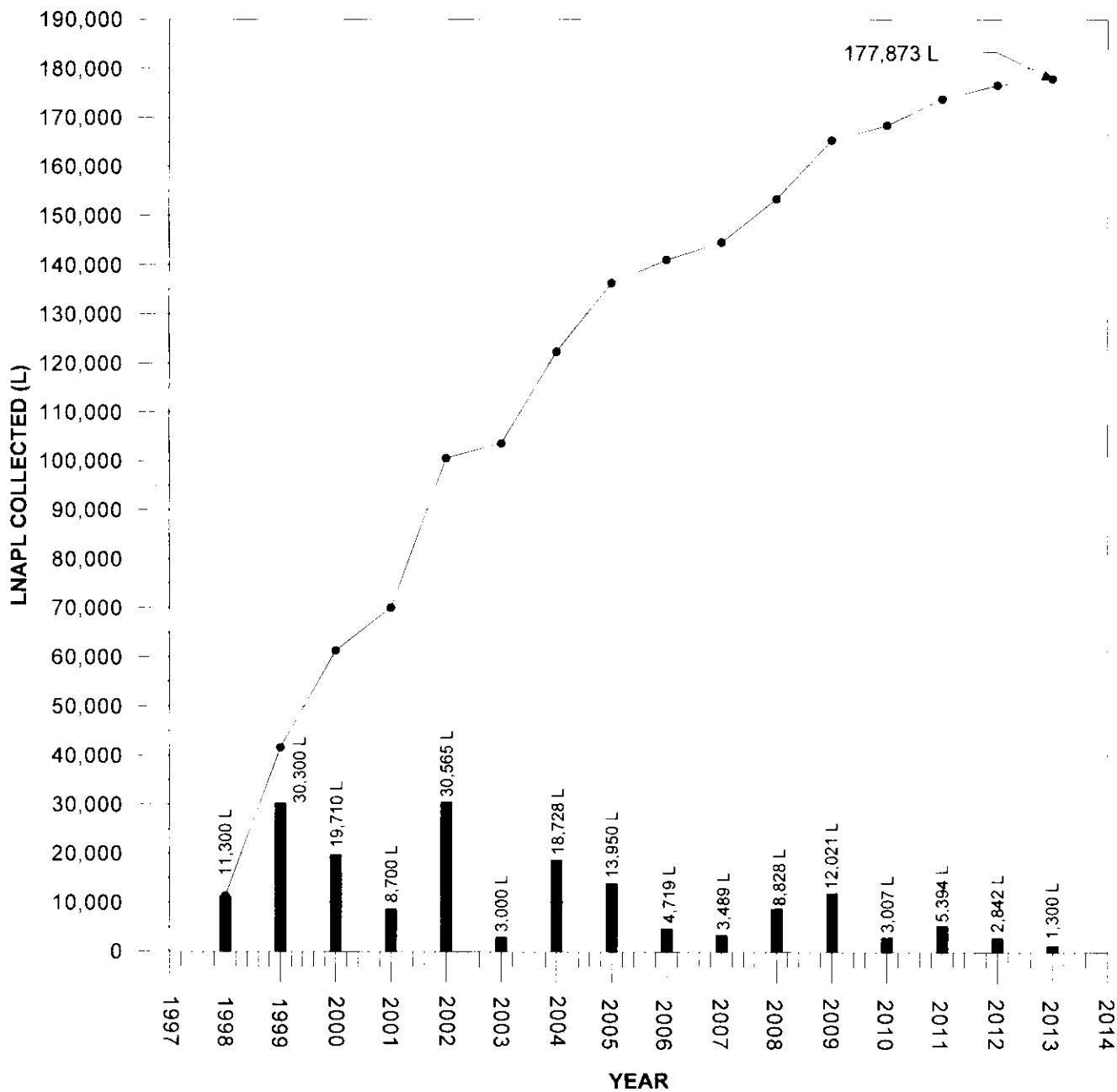
October

- Skimmer unit operated within normal parameters.
- 0 L of LNAPL was collected.

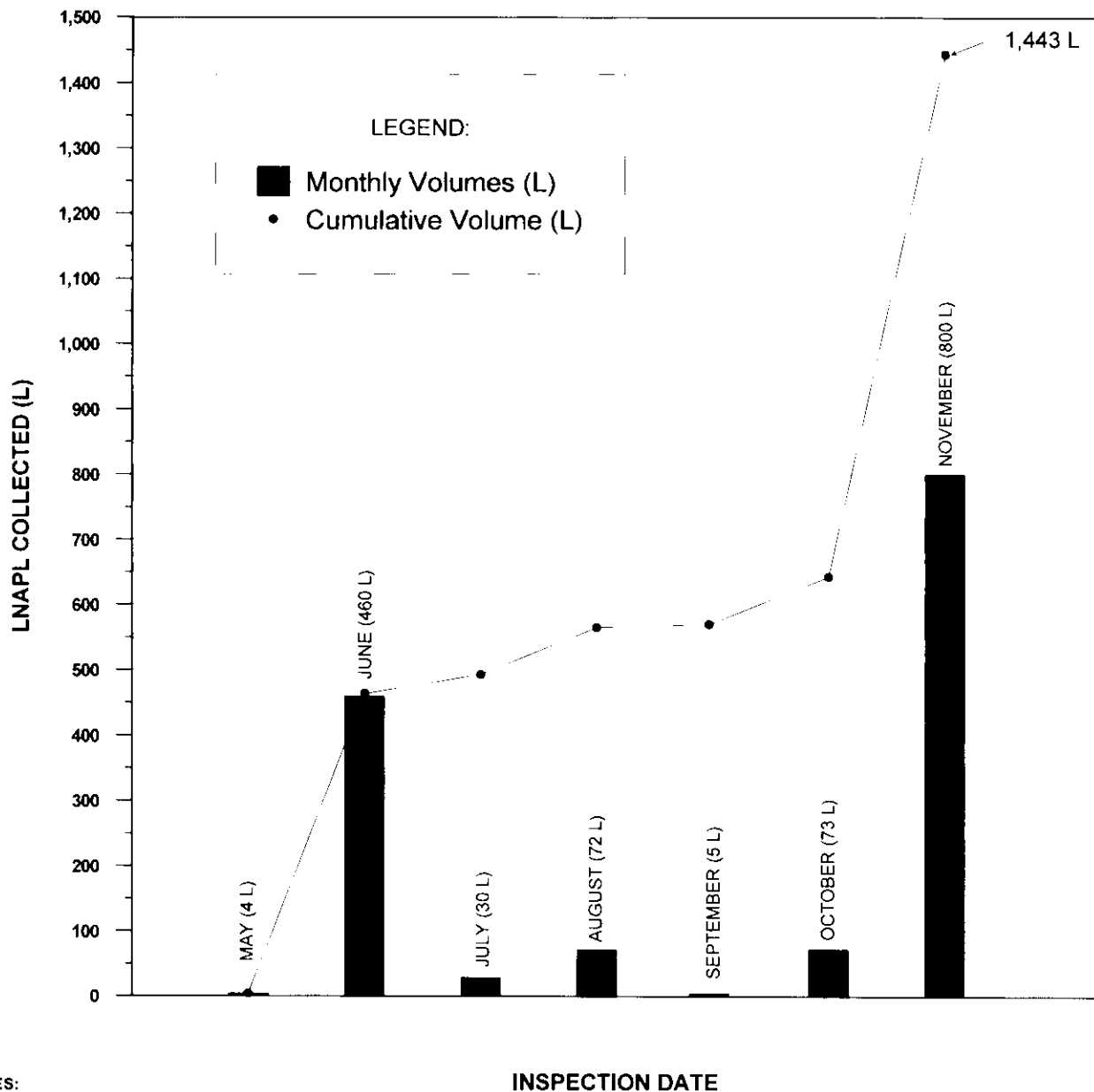
November

- GFL removed approximately 250 L of LNAPL from Lagoon No. 5
- Skimmer unit shutdown and winterized.

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NO	MANUAL	DESCRIPTION	BY
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KGS GROUP		CN	
CONSULTING ENGINEERS		CANADIAN NATIONAL	
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
2013 LNAPL COLLECTION DATA WEST END			
MARCH 2014		FIGURE 10	
		0	



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KGS GROUP	CANADIAN NATIONAL
CONSULTING ENGINEERS	
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.	
HISTORICAL LNAPL COLLECTION DATA WEST END	
MARCH 2014	FIGURE 11



NOTES:

In 2013, 1,443 L of LNAPL was collected at Lagoon No. 2.

May 2013

- Construction completed for the installation of the new compressor.
- New compressor commissioned on May 30 and the system was activated.
- 4 L of LNAPL was collected.

June 2013

- System manually shutdown on June 10 due to a problem with the high level shutdown, located inside the waste oil tank.
- The float within the waste oil tank was replaced on June 17 and the system was activated.
- GFL removed approximately 460L of LNAPL from the OWS and transfer drum.

July 2013

- System operated within normal parameters
- 29 L of LNAPL was collected.

August 2013

- System operated within normal parameters.
- 72 L of LNAPL collected

September 2013

- System operated within normal parameters.
- 5 L of LNAPL was collected.

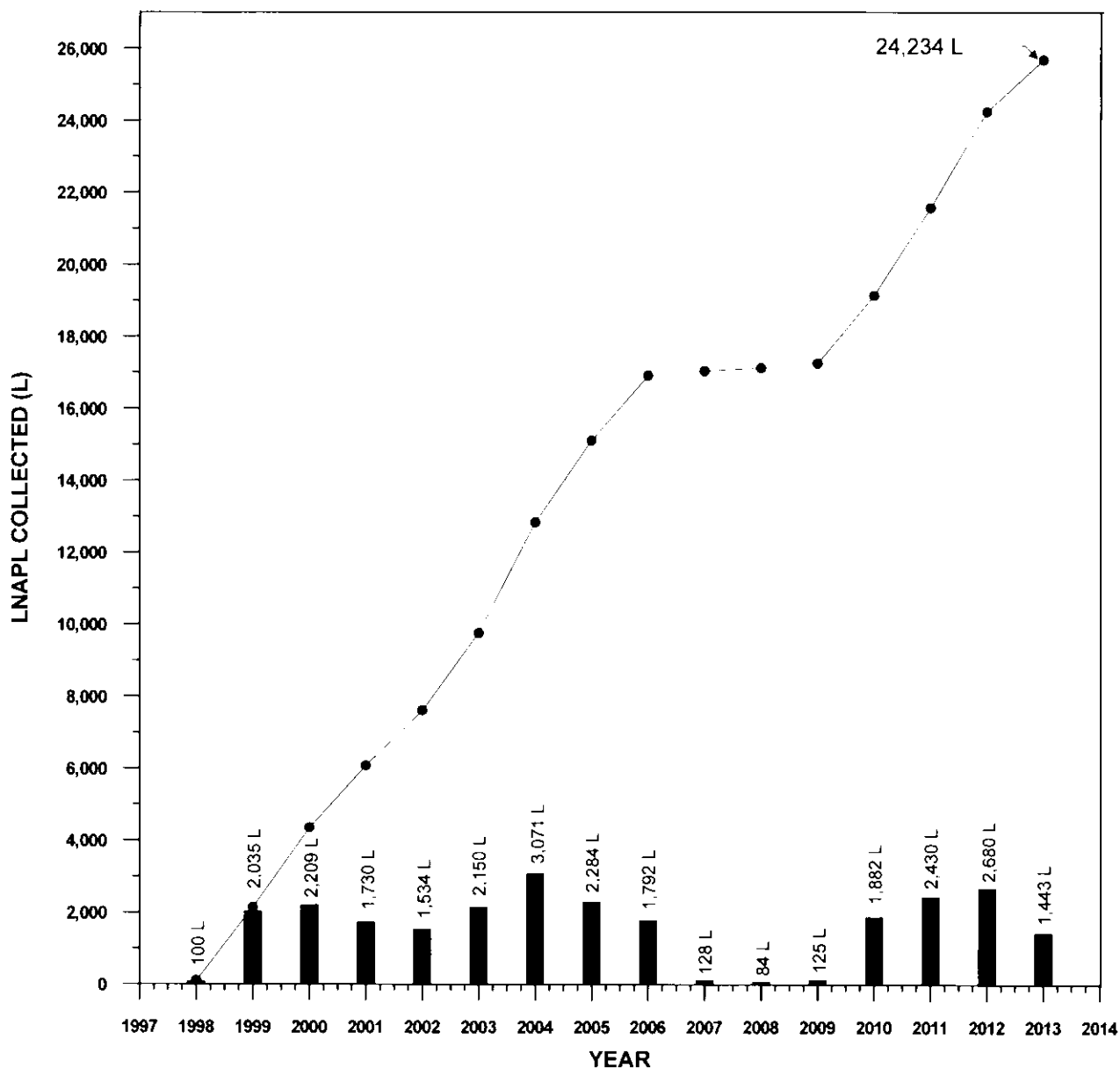
October 2013

- System operated within normal parameters.
- 73 L of LNAPL was collected.

November 2013

- System manually shut down and winterized on November 20.
- GFL removed approximately 800 L of total fluids from the system components.

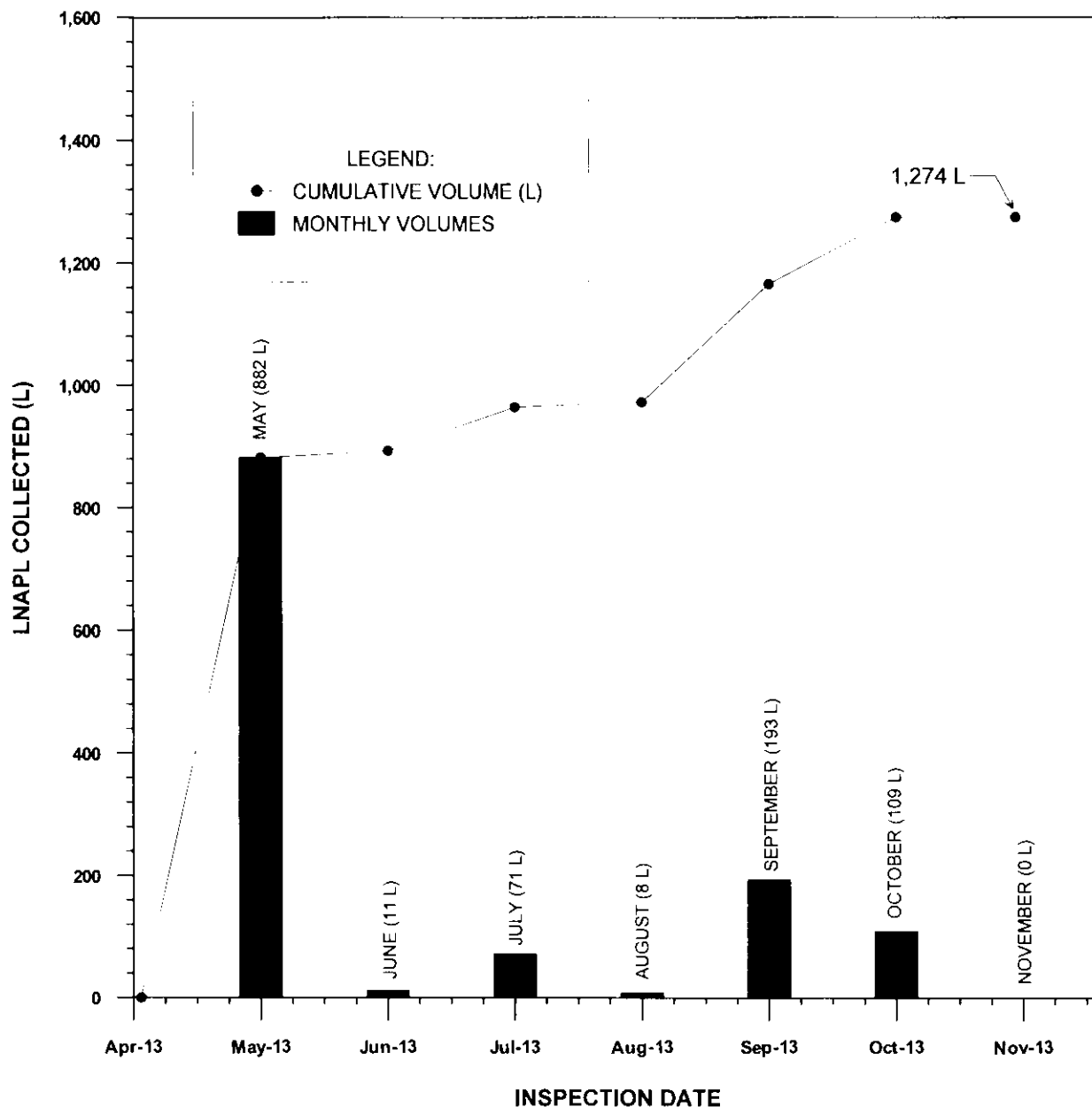
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NO	FINANCED	REVISIONS / ISSUE	BY
KGS GROUP		CANADIAN NATIONAL	
CONSULTING ENGINEERS			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
2013 LNAPL COLLECTION DATA LAGOON No. 2			
MARCH 2014		FIGURE 12	
		0	



LEGEND:

- CUMULATIVE VOLUME (L)
- YEARLY VOLUMES

0	14/03/20	ISSUED WITH MOE FINAL REPORT	To
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CONSULTING ENGINEERS			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
HISTORICAL LNAPL COLLECTION DATA LAGOON No. 2			
MARCH 2014		FIGURE 13	
		REV 0	



NOTES: - 1,274 L of LNAPL was manually collected by KGS Group and local CN personnel at the Former Shop Track Fuelling Area in 2013.
 - The Shop Track DRS (skimmer unit) operated from May to October 2013.
 - The Waste Oil Transfer Facility did not operate in 2013.

May
 - Skimmer belt was installed on May 8.
 - 882L of LNAPL was collected by CN forces from January to May 2013.

June
 - Skimmer unit operated within normal parameters.
 - 11 L of LNAPL was collected.

July
 - Skimmer unit operated within normal parameters.
 - 71 L of LNAPL was collected.

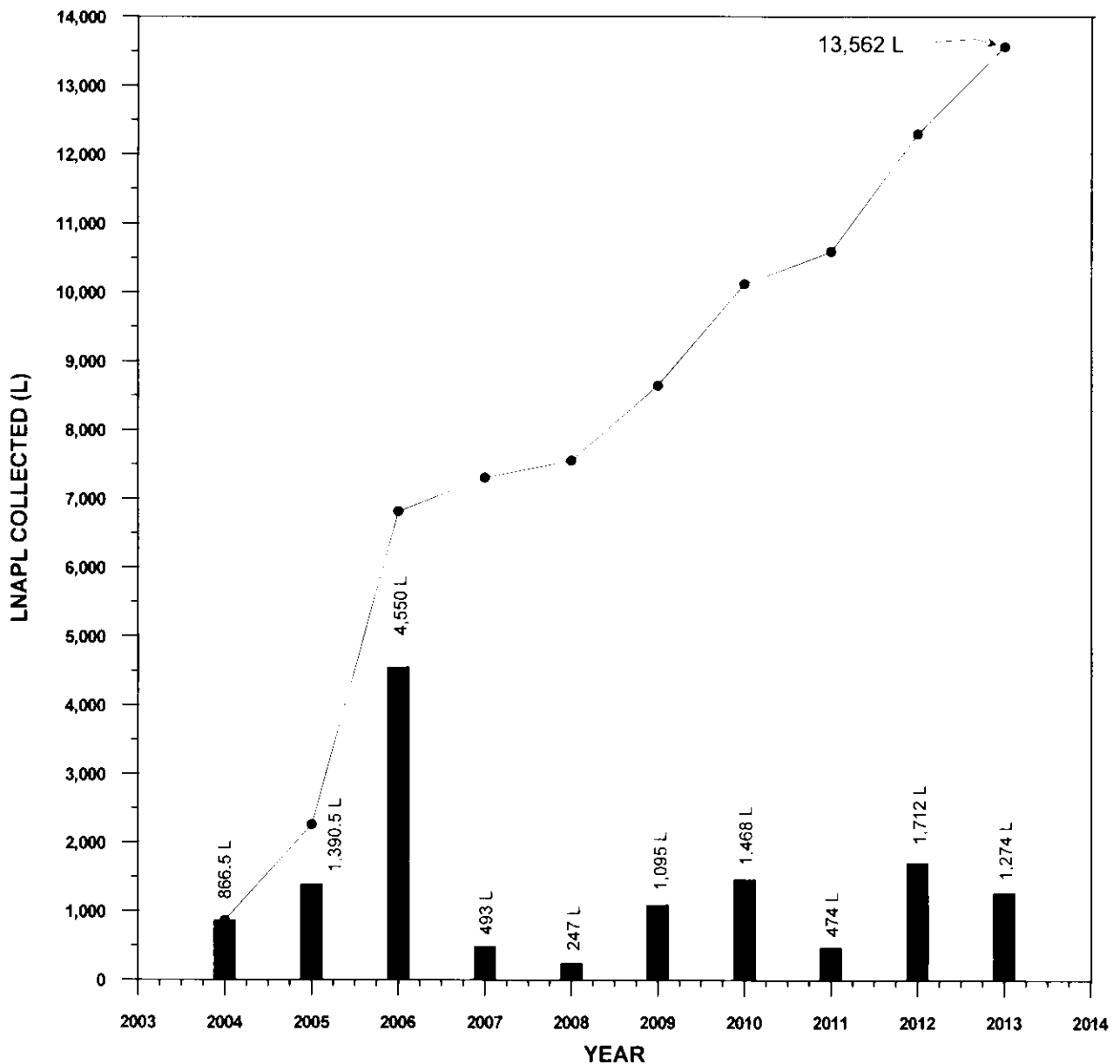
August
 - Skimmer unit operated within normal parameters.
 - 8 L of LNAPL was collected.

September
 - Skimmer unit operated under normal parameters.
 - 193 L of LNAPL was collected.

October
 - Skimmer unit operated under normal parameters until October 17, when the skimmer unit was manually shutdown due to the low water table within the Shop Track collection sump.

November
 - System winterized

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KGS GROUP CONSULTING ENGINEERS		CN CANADIAN NATIONAL	
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON.			
2013 LNAPL COLLECTION DATA FORMER SHOP TRACK FUELLING AREA			
MARCH 2014		FIGURE 14	
			0



● CUMULATIVE VOLUME (L)
 ■ YEARLY VOLUMES

14/03/20

ISSUED WITH MOE FINAL REPORT

NO CHANGE

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KGS

GROUP

CONSULTING ENGINEERS

CN

CANADIAN NATIONAL

2013 REMEDIAL OPERATIONS

PIN# 1000/ONPR/100587, 100586

AND 100591 HORNEPAYNE YARD, ON.

HISTORICAL LNAPL COLLECTION DATA

FORMER SHOP TRACK FUELLING AREA

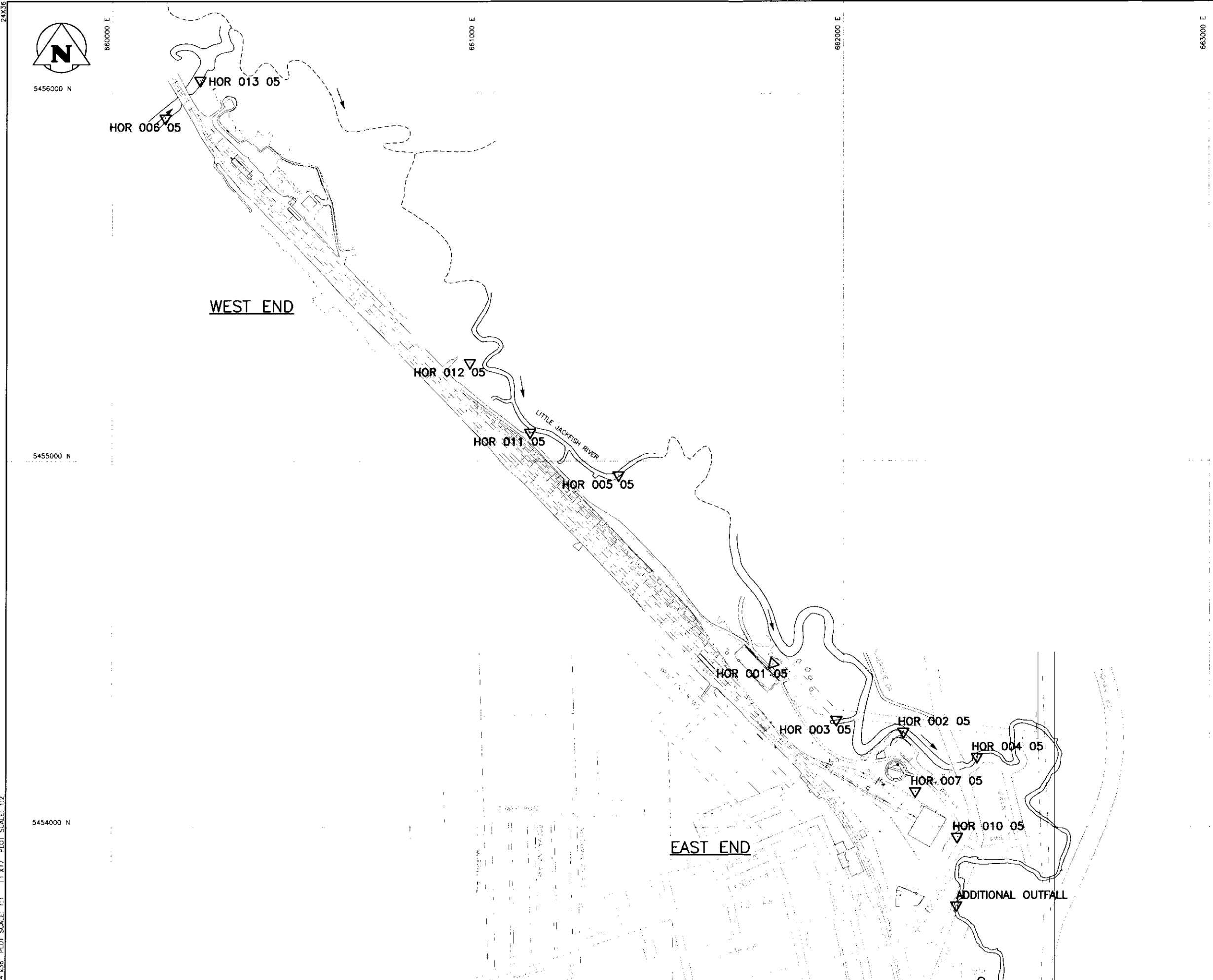
MARCH 2014

FIGURE 15

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File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 16.dwg -- Tab: FIG 17 Plotted By: JChilde 03/20/2014 [Thu 10:38am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2

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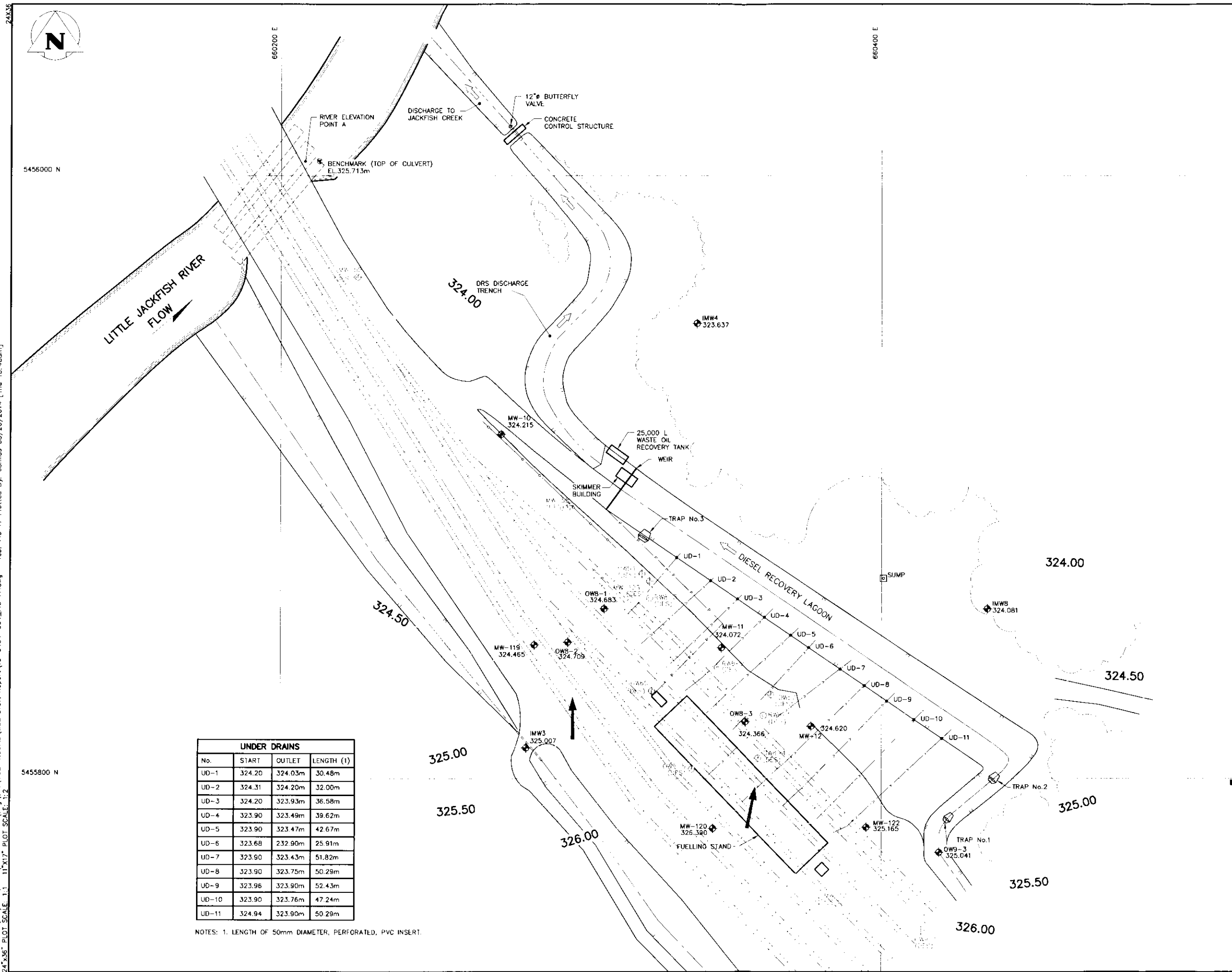


LEGEND
▽ SURFACE WATER SAMPLING LOCATION
HOR 013 05
→ RIVER FLOW DIRECTION



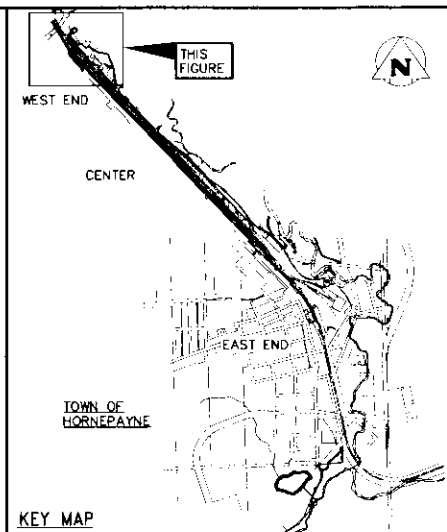
0 14/03/20		ISSUED WITH MOE FINAL REPORT	TG
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REVISIONS / ISSUE			
KGS GROUP  CANADIAN NATIONAL			
CONSULTING ENGINEERS			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587, 100586 AND 100591 HORNEPAYNE YARD, ON			
SURFACE WATER SAMPLING LOCATIONS			
MARCH 2014		FIGURE 16	REV 0

File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 17.dwg - Tab: FIG 17 Plotted By: JChids 03/20/2014 [Thu 10:40am]
24x36 PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



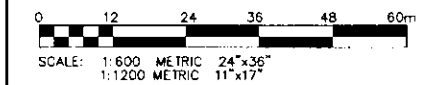
UNDER DRAINS			
No.	START	OUTLET	LENGTH (I)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

NOTES: 1. LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.



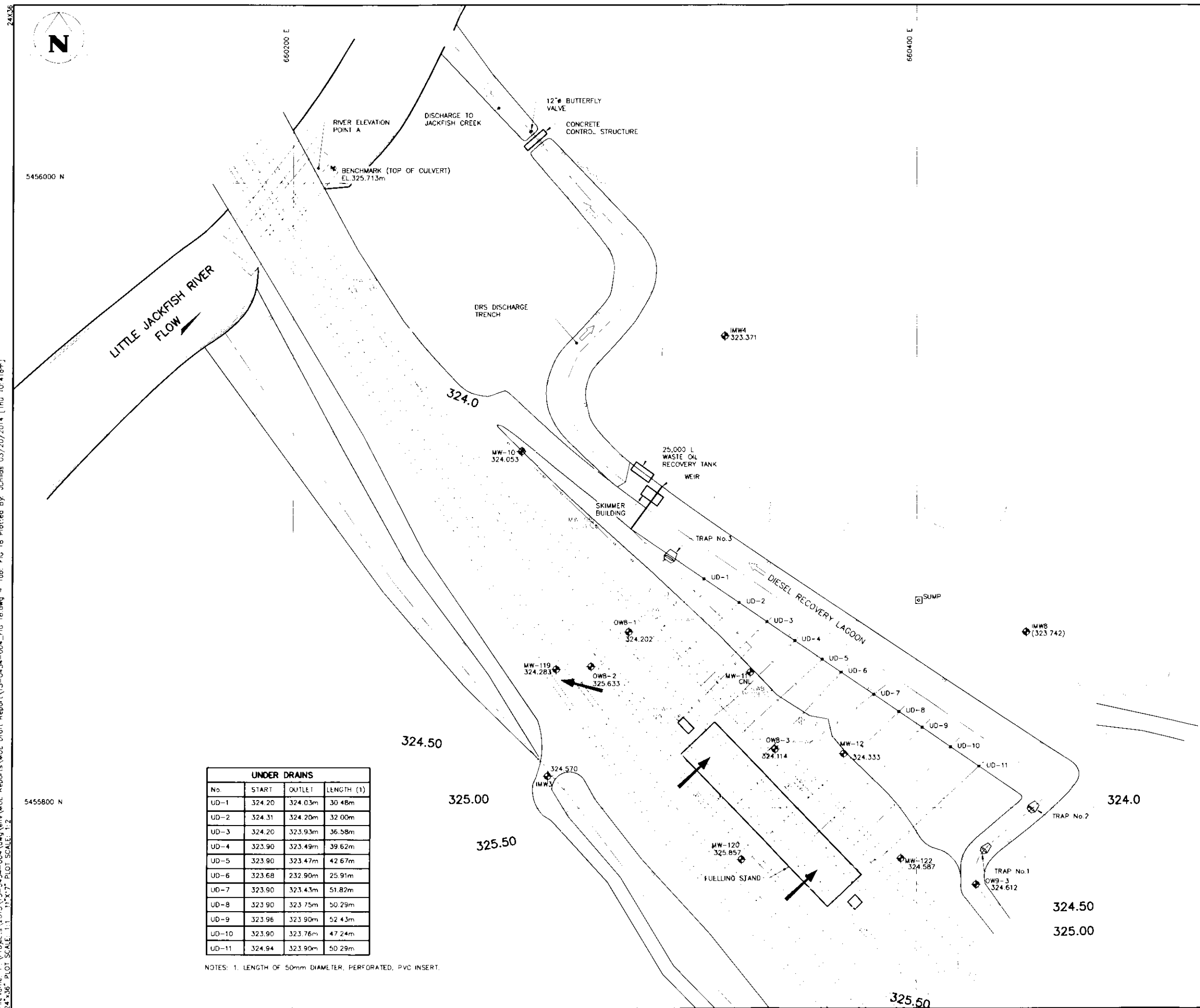
- LEGEND:**
- BERM
 - CENTERLINE OF DITCH
 - FENCE
 - BURIED ELECTRICAL CABLE
 - BENCHMARK
 - MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - RWB-1 RECOVERY WELL
 - SUMP SUMP WELL
 - RAILROAD TRACKS
 - UNDERGROUND DRAIN
 - DESTROYED
 - GEODETIC GROUNDWATER CONTOUR (m)
 - GROUNDWATER FLOW DIRECTION

NOTES:
1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN.



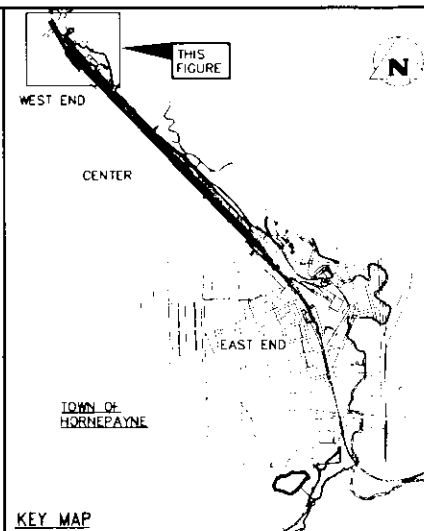
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KGS GROUP CN CANADIAN NATIONAL CONSULTING ENGINEERS			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON GROUNDWATER SURFACE CONTOURS WEST END - SPRING 2013			
MARCH 2014		FIGURE 17	0

File Name: P:\Projects\2013\13-04-004\dwg\env\WOE Reports\WOE Draft Report\13-04-004-004_FIG 18.dwg ~ Top: FIG 18 Plotted By: JChilde 03/20/2014 [Thu 10:41am]
24"x36" PLOT SCALE: 1:1 11"x7" PLOT SCALE: 1:2



UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

NOTES: 1. LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.



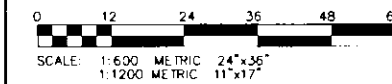
KEY MAP

LEGEND:

- BERM
- CENTERLINE OF DITCH
- FENCE
- BURIED ELECTRICAL CABLE
- BENCHMARK
- MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
- MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
- RWB-1 RECOVERY WELL
- SUMP SUMP WELL
- RAILROAD TRACKS
- UNDERGROUND DRAIN
- DESTROYED
- GEODEIC GROUNDWATER CONTOUR (m)
- GROUNDWATER FLOW DIRECTION

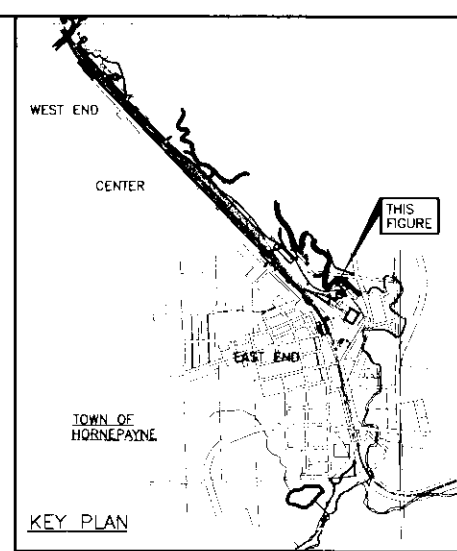
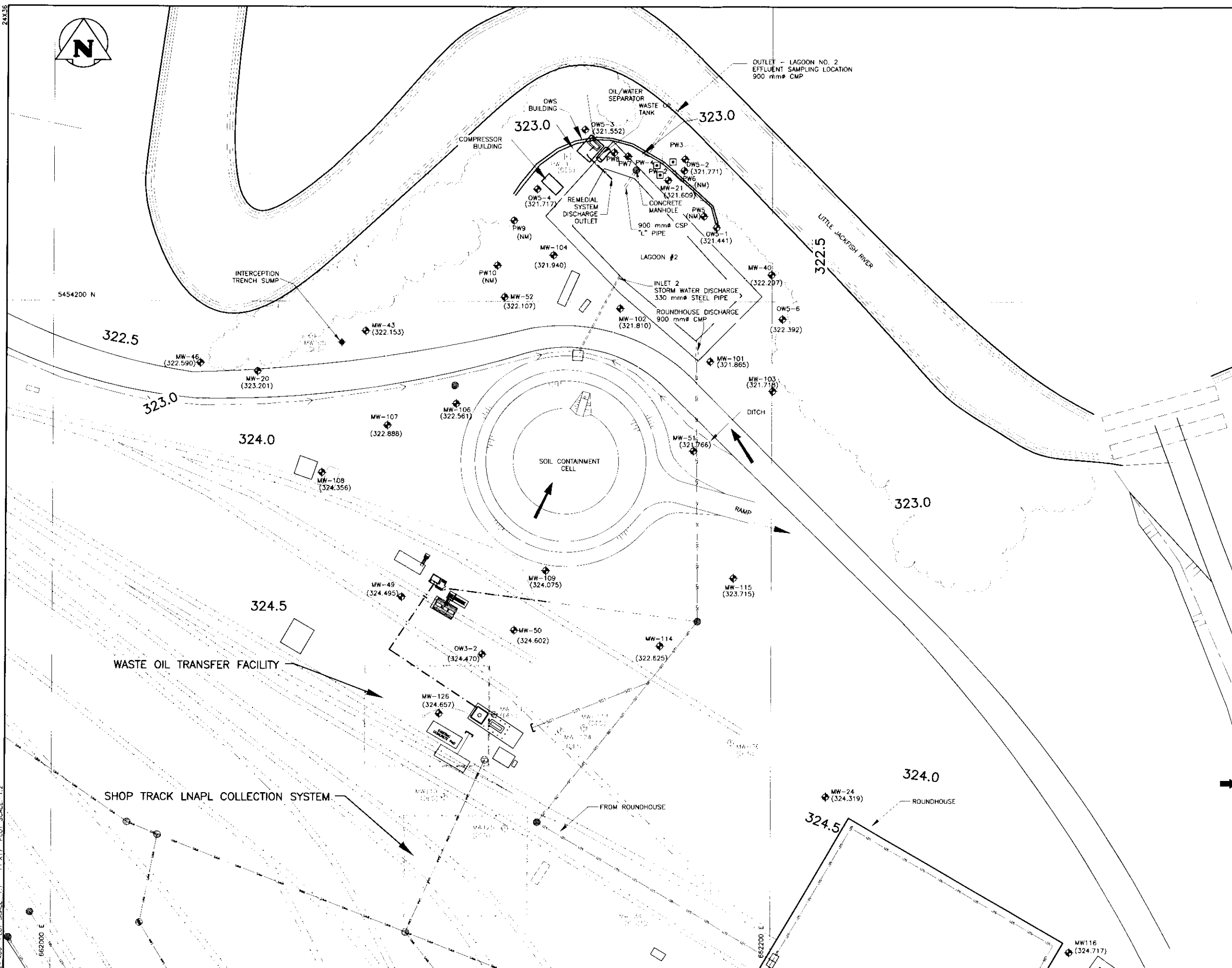
NOTES:

1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN.

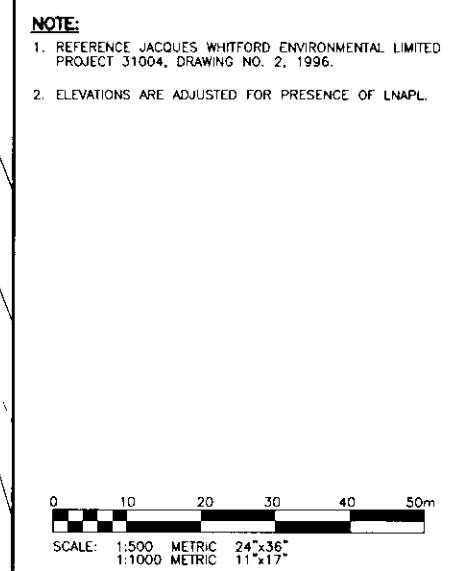


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KGS GROUP CN CANADIAN NATIONAL CONSULTING ENGINEERS			
2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 WEST END, HORNEPAYNE YARD, ON GROUNDWATER SURFACE CONTOURS WEST END - FALL 2013			
MARCH 2014		FIGURE 18	0

File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 19.dwg - Tab: FIG 19 Plotted By: JChids 03/20/2014 [Thu 10:51am]
24"x36" PLOT SCALE: 1:11171" PLOT SCALE: 1:2



- LEGEND**
- RAILROAD TRACK
 - CULVERT
 - CENTERLINE OF DITCH
 - SANITARY SEWER
 - STORM SEWER
 - FENCE
 - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-52 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - PW-1 PUMPING WELL
 - 323.00 GEODETIC GROUNDWATER CONTOUR (m)
 - GROUNDWATER FLOW DIRECTION
 - (323.715) GROUNDWATER ELEVATION AT WELL
 - DESTROYED
 - (NM) NOT MONITORED
- NOTE:**
- REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1996.
 - ELEVATIONS ARE ADJUSTED FOR PRESENCE OF LNAPL.



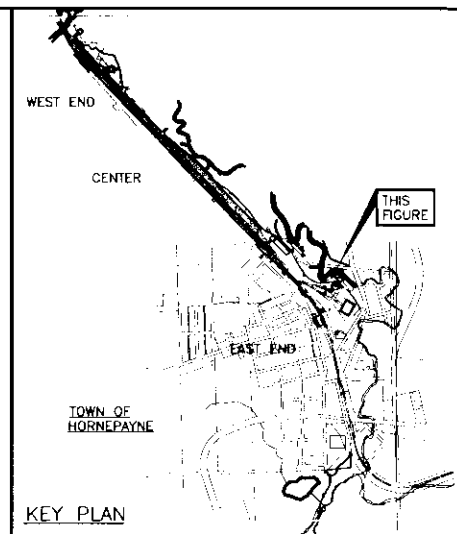
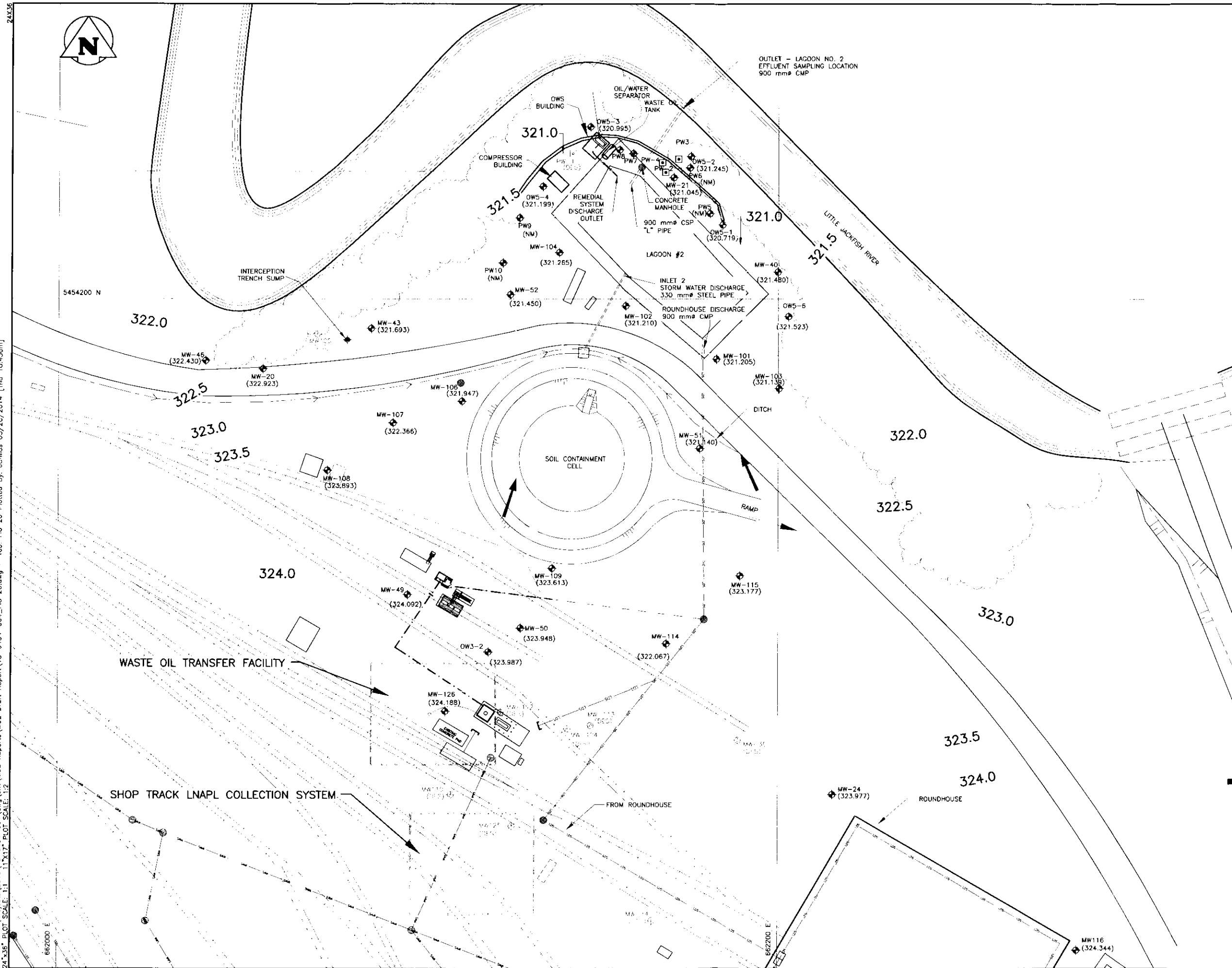
KGS GROUP
CONSULTING ENGINEERS

CN CANADIAN NATIONAL

2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100591
HORNEPAYNE YARD, ON
GROUNDWATER SURFACE CONTOURS
EAST END - SPRING 2013

MARCH 2014	FIGURE 19	0
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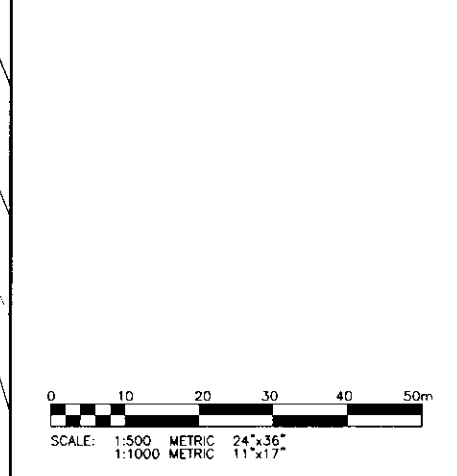
File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG 20.dwg - Tab: FIG 20 Plotted By: JChids 03/20/2014 [Thu 10:43am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



- KEY PLAN**
- LEGEND**
- RAILROAD TRACK
 - CULVERT
 - CENTERLINE OF DITCH
 - SANITARY SEWER
 - STORM SEWER
 - FENCE
 - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-52 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - PW-1 PUMPING WELL
 - 323.00 GEODETIC GROUNDWATER CONTOUR (m)
 - GROUNDWATER FLOW DIRECTION
 - (323.177) GROUNDWATER ELEVATION AT WELL
 - DESTROYED
 - (NM) NOT MONITORED

NOTE:

- REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1996.
- ELEVATIONS ARE ADJUSTED FOR PRESENCE OF LNAPL.



KGS GROUP
CONSULTING ENGINEERS

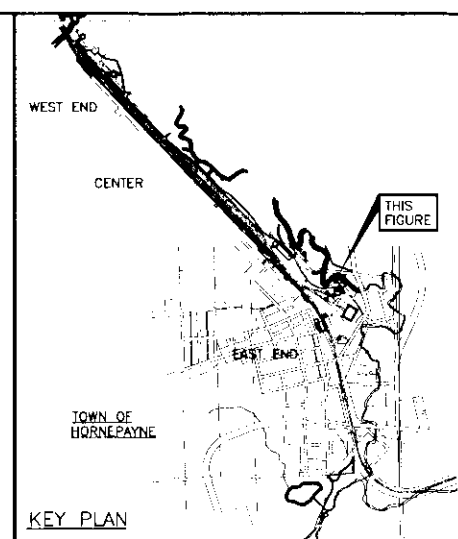
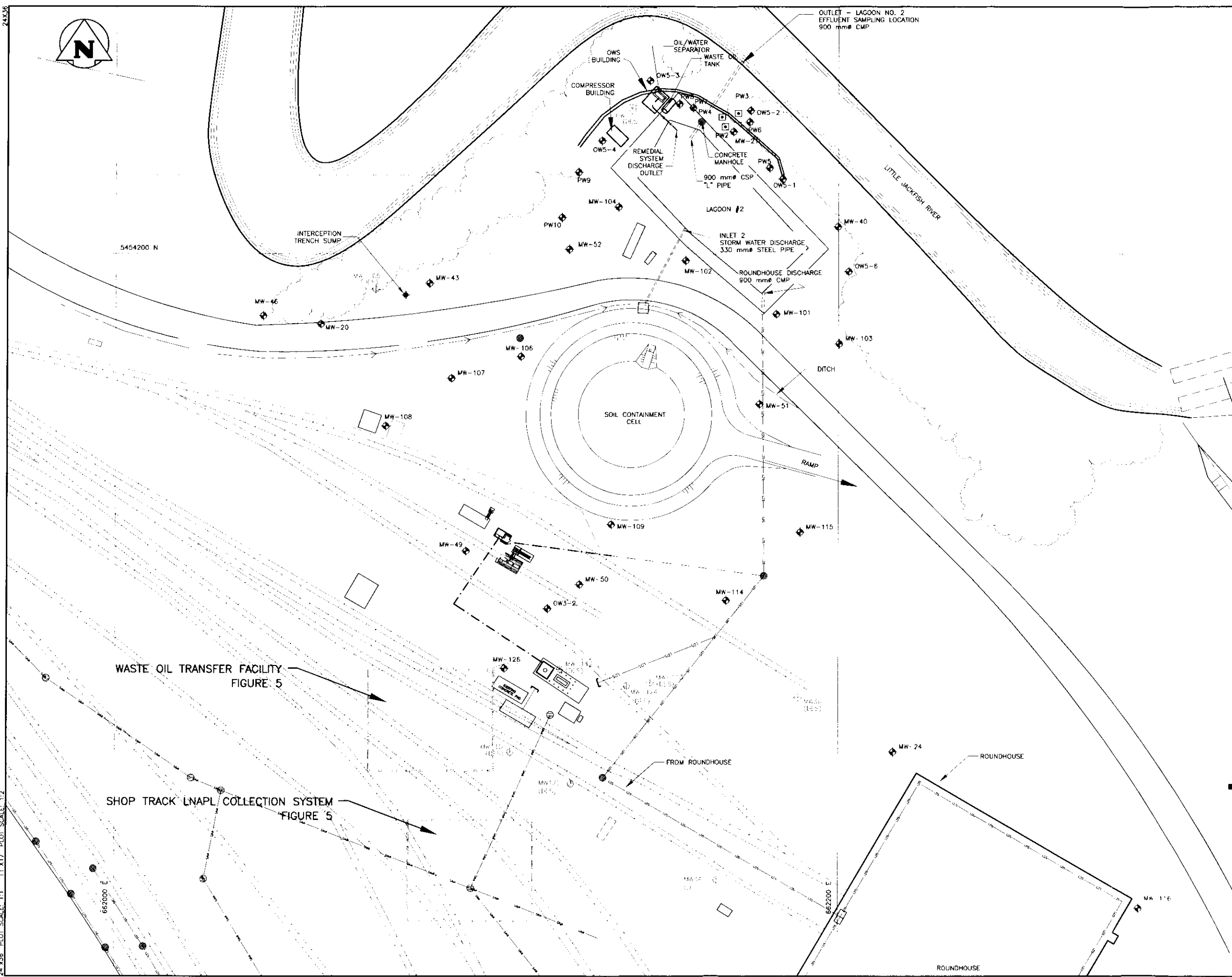
CN CANADIAN NATIONAL

2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100591
HORNEPAYNE YARD, ON
GROUNDWATER SURFACE CONTOURS
EAST END - FALL 2013

MARCH 2014 FIGURE 20 0

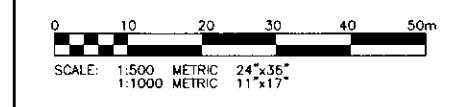
File Name: P:\Projects\2013\13-0434-004.dwg Env\MOE Reports\MOE Draft Report\13-0434-004_FIG 21.dwg - Tab: FIG D5 Plotted By: JChids 03/20/2014 [Thu 10:45am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2

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- LEGEND**
- RAILROAD TRACK
 - CULVERT
 - CENTERLINE OF DITCH
 - SANITARY SEWER
 - STORM SEWER
 - FENCE
 - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - MW-126 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-50 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - PW-1 PUMPING WELL
 - MW20 MONITORING WELLS SAMPLED IN 2013
 - DESTROYED

NOTE:
1. REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1996.



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NO	DESCRIPTION	BY

KGS GROUP CONSULTING ENGINEERS **CN CANADIAN NATIONAL**

2013 REMEDIAL OPERATIONS
PIN# 1000/ONPR/100591
HORNEPAYNE YARD, ON
GROUNDWATER MONITORING WELL
SAMPLING LOCATIONS

APPENDICES

APPENDIX A

**CERTIFICATE OF APPROVAL
No. 3528-83LQWT**

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 3528-83LQWT
Issue Date: April 29, 2010

Canadian National Railway Company
1 Administration Road
PO Box, No. 1000, Concord, Ontario L4K 1B9

Site Location: 58 Front Street - Hornepayne Yard
East and West End Systems
Hornepayne Township, District of Algoma, ON P0M 1Z0

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of sewage works for the collection, transmission, treatment and disposal of stormwater, contact stormwater runoff from the CN Hornepayne Yard and industrial sewage generated from the Lagoon Light Non-Aqueous Phase Liquid (LNAPL) Containment System, the Shop Track LNAPL Recovery System, the Waste Oil Transfer Facility and melt water/seepage from the soil contaminated cell, discharging to Little Jackfish River, consisting of the following:

EAST END ENVIRONMENTAL PROTECTION SYSTEM

- A Lagoon System to provide quantity and quality controls for both stormwater runoff, off-site discharge of petroleum hydrocarbon spills and industrial sewage. The lagoon consists of:
 - a rectangular lagoon with an impermeable liner for a total capacity of approximately 1,936 m³, discharging to a 600 mm diameter corrugated steel pipe with an outlet at an elevation of 322.74 m, equipped with a 900 mm diameter concrete manhole acting as a settling basin for hydrocarbon and suspended solids.
 - an increase in the lagoon berm height by 0.8 m, including 0.3 m of freeboard, to increase the volumetric capacity 835 m³ for a total capacity of 2,771 m³, and slopes changes from 3:1 to 4:1.
- A Containment Recovery and Collection System to contain and recover local subsurface LNAPL identified in the area, consisting of:
 - A bentonite / concrete cut-off wall at the northwest corner of the lagoon to prevent the off-site migration of LNAPL into the Little Jackfish River, equipped with ten (10) pumping wells and an interception trench with 4.5 m depth, width of 0.6 to 1.1 m and 78.5 m in length, all located between the former Pump House area and the Little Jackfish River (upgradient and downgradient from the cut-off wall), and discharging into

the oil/water separator.

- An oil/water separator (fiberglass Parkson Model SRM6 OWS, or approved equivalent) located at the Pollution Control Building and discharging into the lagoon, equipped with:
- A transfer tank with a total capacity of 171 L, a transfer pump directing sewage from the transfer tank to a 4,560 L double walled waste oil tank located adjacent to the Pollution Control Building, prior to treatment at the Oil Transfer Facility.
- A Shop Track LNAPL Recovery System to contain and recover local subsurface LNAPL identified in the area, consisting of:
 - An oil skimmer, Abinaki Model 8 Oil Grabber, used to collect LNAPL draining to the Recovery Trench.
 - A rock filled Recovery Trench (20 m long, 5 m wide and 5 m depth) with a non woven geotextile to collect groundwater and LNAPL to be pumped through a 38 mm diameter HDPE discharge line to the oil water separator located at the waste oil transfer facility. This System is equipped with a collection sump located within the Pollution Control Building, transferring collected LNAPL, by gravity, to the oil recovery tank.
 - An oil recovery tank, double walled with a capacity of 5,000 L.
- A Waste Oil Transfer Facility to process petroleum hydrocarbons collected from all LNAPL collection systems within the Yard, as well as waste oil generated from both Yard and remote site operations, consisting of a waste oil holding tank of 38 m³ double walled discharging to the oil water separator and an oil water separator.
- A Soil Containment Cell to contain hydrocarbon impacted soils generated from former and future spills within the Yard and at remote rail locations, consisting of a circular cell with a non permeable liner with a holding capacity of 13,600 m³, equipped with a rubber tire excavator to treat top soil at 0.3 to 0.5 m depth.

All other controls, electrical equipment, instrumentation, piping, pumps, valves and appurtenances essential for the proper operation of the aforementioned sewage works.

WEST END FUELLING STAND SYSTEM

These works include the West End Fuelling Stand at the Hornepayne Yard and included in Certificate 5146-7F2H6J issued on June 17, 2008, consisting of the following:

- Approximately eleven (11) 50 mm diameter perforated pipe underdrains installed under the trackage adjacent to the West End Fuelling Platform and the contaminated soil stockpile, discharging to the retention lagoon;
- One (1) retention lagoon with a storage capacity of approximately 960 m³ (at the maximum operating water elevation of 324.4 m), including a sheet pile weir and belt oil skimmer seasonally operated

(normally April to November) with product recovery storage tank, discharging to the lined drainage ditch;

- One (1) polyvinyl chloride lined drainage ditch extending from the retention pond to the Little Jackfish River, including the relocation of the existing concrete discharge control structure;

All other controls, electrical equipment, instrumentation, piping, valves and appurtenances essential for the proper operation of the aforementioned sewage works

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Alexandre Borges, CN Environment Officer of Canadian National Railway Company dated August 4, 2009;
2. Application's appendix A to H prepared by KGS Group Consulting Engineers, dated August 10, 2009.
3. Application for the Approval of Industrial Sewage Works submitted by Mr. Erwin Waldinsperger dated January 1998 and attachments and associated drawings, all prepared by KGS Group Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"Certificate" means this entire certificate of approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act* , and includes any schedules;

"Director" means any Ministry employee appointed by the Minister pursuant to section 5 of the *Ontario Water Resources Act* ;

"District Manager" means the District Manager of the Thunder Bay District Office of the Ministry;

"Ministry" means the Ontario Ministry of the Environment;

"Regional Director" means the Regional Director of the Northern Region of the Ministry;

"Source Protection Plan" means a drinking water source protection plan prepared under the *Clean Water Act, 2006* ;

"Owner" means Canadian National Railway Company and includes its successors and assignees; and

"works" means the sewage works described in the Owner's application, this certificate and in the supporting documentation referred to herein, to the extent approved by this certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL CONDITION

(1) Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

(2) Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within 30 days of the change occurring:

(a) change of Owner or operating authority, or both;

(b) change of address of Owner or operating authority or address of new owner or operating authority;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Partnerships Registration Act* ;

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the most current "Initial Notice or Notice of Change" (Form 1, 2 or 3 of O. Reg. 189, R.R.O. 1980, as amended from time to time), filed under the *Corporations Information Act* shall be included in the notification to the District Manager;

(2) In the event of any change in ownership of the works, the Owner shall notify in writing the succeeding owner of the existence of this certificate, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition will refer to this certificate's number.

3. CHANGES IN PROCESSES OR PROCESS MATERIALS

The Owner shall give written notice to the District Manager of any plans to change the processes or process materials in the Owner's enterprise serviced by the works where the change may significantly

alter the quantity or quality of the influent to or effluent from the works, and no such change(s) shall be made unless with the written concurrence or approval of the District Manager.

4. OPERATIONS MANUAL

(1) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

- (a) operating procedures for routine operation of the works;
- (b) inspection programs, including frequency of inspection, for the works and the methods or tests employed to detect when maintenance is necessary;
- (c) repair and maintenance programs, including the frequency of repair/maintenance;
- (d) contingency plans and procedures for dealing with potential spill, bypasses and any other abnormal situations and for notifying the District Manager; and
- (e) complaint procedures for receiving and responding to public complaints.

(2) The Owner shall maintain the operations manual up to date through revisions undertaken from time to time and retain a copy at the location of the sewage works. Upon request, the Owner shall make the manual available for inspection and copying by Ministry personnel.

5. EFFLUENT LIMITS

(1) The Owner shall design, construct and operate the works that discharge to the Little Jackfish River such that the concentrations of the materials named below as effluent parameters are not exceeded in the effluent from the works.

Table 2 - Effluent Limits	
Effluent Parameter	Concentration Limit (mg/L)
Column 1	Column 2
Petroleum Hydrocarbons (F1+F2)	1000
Petroleum Hydrocarbons (F3+F4)	1000
Benzene	5
Toluene	0.8
Ethylbenzene	2.4
m&p-Xylene	32
o-Xylene	40
Methyl-t-butyl-Ether (MTBE)	200
Lead	See subsection 2
pH of the effluent maintained between 6.5 to 8.5, inclusive, at all times	

(2) The limit for Lead shall be determined based on the hardness of the water. If the hardness is less than 30 mg/L, the limit is 1 µg/L. If the hardness is between 30 mg/L and 80 mg/L, inclusive, the limit is 3 µg/L. If the hardness is greater than 80 mg/L, the limit is 5 µg/L.

(3) For the purposes of determining compliance with and enforcing subsection (1):

(a) non-compliance with respect to a Concentration Limit is deemed to have occurred when any single sample analyzed for a parameter named in Column 1 of subsection (1) is greater than the corresponding maximum concentration set out in Column 2 of subsection (1);

(b) non-compliance with respect to pH is deemed to have occurred when any single measurement is outside of the indicated range.

6. EFFLUENT - VISUAL OBSERVATIONS

Notwithstanding any other condition in this certificate, the Owner shall ensure that the effluent from the works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters.

7. EFFLUENT MONITORING - SURFACE WATER

(1) All samples and measurements taken for the purposes of this certificate are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

(2) Samples shall be collected and analyzed at the following sampling point(s), at the sampling frequencies and using the sample type specified for each parameter listed:

Table 3 - Effluent Monitoring - Surface Water	
Sample Points: To be established to the satisfaction of the District Manager prior to commencement of operations of the works. Sampling includes estimated flows. Sampling locations at a minimum to include (as per Drawing No. 09-0434-01 III, Rev. A, Appendix H of the Application package dated August 2009, prepared by KGS Group):	
1. Effluent from Discharge Control Gate;	
2. Little Jackfish River: HOR 005 05 (mid stream); and HOR 004 05 (down stream)	
3. Yard discharge: HOR 002 05 (Lagoon No.2), at the end of the discharge culvert.	
Frequency	Once each month (April to November) in ice-free conditions
Sample Type	Grab
Parameters	Petroleum Hydrocarbons (F1+F2), Petroleum Hydrocarbons (F3+F4), Benzene, Toluene, Ethylbenzene, m&p-Xylene, o-Xylene, Methyl-t-butyl-Ether (MTBE), Lead, pH, hardness, alkalinity, Total Purgeable Hydrocarbons, Total Extractable Hydrocarbons, Total Oil and Grease, and Mineral Oil and Grease

(3) The Owner shall supplement the monitoring program in subsection (1) with visual inspections which shall include, but not be limited to the following:

- (a) A weekly inspection (April to November) of the effluent from the Discharge Control Gate and the river during discharge of treated wastewater for any visible oil sheens, colour and odours; and
- (b) A weekly inspection (April to November) of the level of material in the recovered product storage tank.

(4) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

- (a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;
- (b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and
- (c) the Environment Canada publications "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Rainbow Trout" (July 1990) and "Biological Test Method: Reference Method for Determining Acute Lethality of Effluents to Daphnia magna" (July 1990);

(5) The measurement frequencies specified in subsection (2) in respect of any parameter are minimum requirements which may, after twelve (12) months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

(6) A continuous flow measuring device(s) or an alternate method approved by the District Manager shall be installed and maintained to measure the flowrate of the effluent from the sewage works, with an accuracy to within plus or minus twenty per cent (20%) of the actual flowrate for the entire design range of the flow measuring device and the Owner shall measure, record and calculate the flowrate for each effluent stream on each day of sampling.

8. EFFLUENT MONITORING - GROUNDWATER

(1) All samples and measurements taken for the purposes of this certificate are to be taken at a time and in a location characteristic of the quality and quantity of the groundwater over the time period being monitored.

(2) Samples shall be collected and analyzed at the following sampling point(s), at the sampling frequencies, including groundwater levels and thickness of any light non-aqueous phase liquids (LNAPLs) using an interface probe (IP) at all monitoring wells:

Table 3 - Effluent Monitoring - Groundwater		
Sample Points: Sampling locations as per Drawing No. 09-0434-01 G1, Rev. A. Appendix G of the Application package dated August 2009, prepared by KGS Group).		
Effluent Parameter	Frequency	Sample Location
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), and Hydrocarbon fraction F1	Monitored and sampled once per year	Wells: MW-20, MW-40, MW-43, MW-46, MW-52, OW 5-1, OW 5-2 and OW 5-3
Hydrocarbon fraction F2 to F4	Monitored twice per year (Spring and Fall) and Sampled once per year	Wells: MW-21, MW-24, MW-49, MW-51, MW-52, MW-101, MW-102, MW-103, MW-104, MW-106, MW-107, MW-108, MW-109, MW-114, MW-115, MW-126, and OW 3-2
Hydrocarbon fraction F2 to F4	Monitored and sampled twice per year (Spring and Fall)	Wells: MW-20, MW-40, MW-43, MW-46, MW-52, OW 5-1, OW 5-2 and OW 5-3

Note: Duplicate groundwater samples shall be taken for field monitoring of Dissolved Oxygen, pH, Conductivity, Temperature and Oxidation-reduction potential.

(3) The methods and protocols for sampling, analysis, toxicity testing, and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions.

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions.

(5) The measurement frequencies specified in subsection (2) in respect of any parameter are minimum requirements which may, after twelve (12) months of monitoring in accordance with this Condition, be modified by the District Manager in writing from time to time.

9. REPORTING

(1) The Owner shall report to the District Manager or designate, any exceedance of any parameter specified in Condition 6 orally, as soon as reasonably possible, and in writing within seven (7) days of the exceedance.

(2) In addition to the obligations under Part X of the *Environmental Protection Act*, the Owner shall, within 10 working days of the occurrence of any reportable spill as defined in Ontario Regulation 675/98, bypass or loss of any product, by-product, intermediate product, oil, solvent, waste material or any other polluting substance into the environment, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill or loss, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation.

(4) The Owner shall prepare and submit a performance report to the District Manager on an annual basis within thirty (30) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

- (a) a summary and interpretation of all monitoring data and a comparison to the effluent limits outlined in Condition 5, including an overview of the success and adequacy of the sewage works;
- (b) a description of any operating problems encountered and corrective actions taken;
- (c) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the sewage works;
- (d) a summary of any effluent quality assurance or control measures undertaken in the reporting period;
- (e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
- (f) a site plan illustrating the location of all site infrastructure, environmental protection system components, monitoring wells and surface water monitoring stations;
- (g) a location map illustrating the site relative to nearby potentially sensitive groundwater/surface water features (i.e., lakes, streams, wells);
- (h) a water level contour map for each monitoring event carried out during the previous year;
- (i) stratigraphic cross-sections which clearly illustrate the subsurface distribution of geological materials;
- (j) boreholes logs for all monitoring wells;
- (k) tables illustrating historical chemistry and water level data;
- (l) graphs illustrating historical water quality trends for hydrocarbon parameters at key monitoring wells;

- (m) an assessment of monitoring data to evaluate system effectiveness and compliance with the applicable water quality protection criteria;
- (n) recommendations for future monitoring and/or further remedial actions;
- (o) a section detailing the field sampling protocols and QA/QC measures;
- (p) a copy of the Certificate of Approval and any amendments;
- (q) copies of laboratory reports for all sampling events in that year; and
- (r) all monitoring and sampling data should also be submitted in an electronic format (i.e. a Microsoft Excel spreadsheet).

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the works are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.
2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved works and to ensure that subsequent owners of the works are made aware of the certificate and continue to operate the works in compliance with it.
3. Condition 3 is included to ensure that the works is operated in accordance with the information submitted by the owner relating to the process and materials which are served by the works, and to ensure that any contemplated changes in them which could potentially affect the characteristics of effluent from the works will be properly reviewed and approved.
4. Condition 4 is included to ensure that a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry. Such a manual is an integral part of the operation of the works. Its compilation and use should assist the owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the owner's operation of the work.
5. Conditions 5 and 6 are imposed to ensure that the effluent discharged from the works to the Little Jackfish River meets the Ministry's effluent quality requirements thus minimizing environmental impact on the receiver.
6. Conditions 7 and 8 are included to require the owner to demonstrate on a continual basis that the quality and quantity of the effluent from the approved works is consistent with the design and effluent limits specified in the certificate and that the approved works does not cause any impairment to the receiving

watercourse.

7. Condition 9 is included to provide a performance record for future references and to ensure that the Ministry is made aware of problems as they arise, so that the Ministry can work with the Owner in resolving the problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 5146-7F2H6J issued on June 17, 2008.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

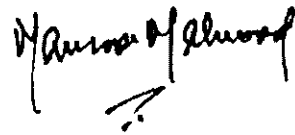
AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

* Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 29th day of April, 2010



Mansoor Mahmood, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

ET/

c: District Manager, MOE Sault Ste. Marie Area Office
Tony Gallo, Kontzamanis Graumann Smith MacMillan Inc.

APPENDIX B
WASTE MANIFEST FORMS

MOVEMENT DOCUMENT / MANIFEST DOCUMENT DE MOUVEMENT / MANIFESTE

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

2520714-3

Movement Document / Manifest Reference No.
N° de référence du document de mouvement/manifeste

A Generator / consigneur Producteur / expéditeur Registration No. / Provincial ID No. N° d'immatriculation - d'id. provincial		B Carrier Transporteur Registration No. / Provincial ID No. N° d'immatriculation - d'id. provincial		Reference No. of other movement documents (manifests) used: N° de référence des autres documents de mouvement/manifestes utilisés																																																																		
Company name / Nom de l'entreprise Mailing address / Adresse postale City / Ville Province Postal code / Code postal E-mail / Courriel électronique Tel. No. / N° de tél.		Company name / Nom de l'entreprise Mailing address / Adresse postale City / Ville Province Postal code / Code postal E-mail / Courriel électronique Tel. No. / N° de tél.		C Receiver / consignee Réceptionnaire / destinataire Registration No. / Provincial ID No. N° d'immatriculation - d'id. provincial Receiver / consignee information same as in Part A Les renseignements du réceptionnaire / destinataire est le même que la Partie A ☐ Yes / Oui ☐ No, complete the box below / Non, remplir la case ci-dessous																																																																		
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Intended Receiver / consignee Réceptionnaire / destinataire prévu Mailing address / Adresse postale City / Ville Province Postal code / Code postal E-mail / Courriel électronique Tel. No. / N° de tél.		Port of entry / Point d'entrée Port of exit / Point de sortie Carrier Certification: I certify that I have received waste or recyclable material from the generator / consigneur for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct. Attestation du transporteur: J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.		Company name / Nom de l'entreprise Mailing address / Adresse postale City / Ville Province Postal code / Code postal E-mail / Courriel électronique Tel. No. / N° de tél. Receiving site address / Adresse du lieu de destination Date received / Date de réception Year / Année Month / Mois Day / Jour Time / Heure ☐ AM ☐ PM																																																																		
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001085

MOE 04-1917 (07-07)

Retained by Consignor (Generator) - Gardée par l'expéditeur

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APPENDIX C
DRILL LOGS



Environmental
Services
Inc.

Log of Well MW-10
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 327.385m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 10/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 10/94

Borehole Diameter: 15.2 cm

Water Level T.O.P.: 3.53m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
					SAND AND GRAVEL:sand and gravel fill, occasional cobbles	Cement
SS1		<1	1			Fill
						5cm Ø Sch.40 Blank PVC
SS2	5/18 27/27	<1	2		SILTY SAND:medium brown grey with stone and cobbles, dry to moist, no odour	
					grey, densely packed, gravel, dry	
SS3	13/41 58	<1	3			Bentonite Pellet Seal
SS4	8/23 32/24	<1	4		SAND:densely packed coarse and fine grained sand, moist, no odour	
						11/10/94
SS5	3/1 3/4	<1	5		dark red brown peat, moist, no odour	
						Silica Sand
SS6	5/1 11/9	<1	6		SILTY SAND:grey, moist to wet, no odour	
SS7	3/5 7/5	<1			COARSE SAND:grey, fine gravel, saturated, no odour	5cm Ø Sch.40 Slotted PVC (1mm)
					END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-11
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94580

G.S. Elevation: 327.384m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 11/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 11/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.82m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: sand and gravel fill	Protective cover
					medium brown sand and gravel, dry, no odour	Cement
SS1		15	1		dark grey sand and gravel, no odour	Fill
					grey sand and gravel fill, boulders and cobbles	5cm Ø Sch.40 Blank PVC
SS2	refusal	2	2			Bentonite Pellet Seal
SS3	refusal	140	3			
					grey stained coarse sand with gravel, odours	11/11/94 (free product)
SS4	17/27 15/7	90	4		moist	Silica Sand
SS5	11/2 21/18	58	5			5cm Ø Sch.40 Slotted PVC (1mm)
SS6	6/12 12/11	135	6		FINE SAND: grey stained, odorous, saturated, free product in split spoon	
					END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-12
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94580

G.S. Elevation: 328.965m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 11/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 11/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.28m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: medium brown sand and gravel, dry, no odours	Protective cover
					odourous	Cement
SS1		80	1			Fill
						5cm Ø Sch.40 Blank PVC
SS2	4/4 8/11	18	2			
					occasional rocks, cobbles and boulders	Bentonite Pellet Seal
SS3	14/19 11/12	8	3			11/11/94
					grey, coarse sand and fine gravel, wet, odourous	
SS4	3/9 4/4	11				
					red brown peat and bits of wood	
					coarse sand and gravel, grey with traces of silt, odourous, wet to saturated	
SS5	4/7 9/8	30	4			
					red grey oily sand with gravel, odourous	
					saturated	Silica Sand
SS8	22 refusal	30/40	5			
SS7	20/8 5/8	40	6		SILTY SAND grey, slight odour	5cm Ø Sch.40 Slotted PVC (1mm)
					END OF BOREHOLE	



Environmental
Services
Inc.

Log of Well MW-16
PHASE 2
CN
FORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.474m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 11/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 11/94

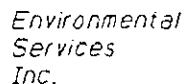
Borehole Diameter: 15.2 cm

Water Level T.O.P: 1.3m

Logged By: P. M.

Checked By: O. P. L.

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SILTY SAND: light brown, moist, no odour	Protective cover
SS1		1.3	1			Cement
						Bentonite
						Pellet
						Seal
						5cm Ø
						Sch.40
						Blank PVC
SS2	8/13 14/7	2	2		wet to saturated, some iron staining in fractures	11/11/94
						Silica
						Sand
						5cm Ø
						Sch.40
						Slotted
						PVC (3mm)
SS3	4 spoon refusal	2	3		END OF BOREHOLE (refusal on bedrock)	
			4			
			5			
			6			



Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.481m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date _____

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 10/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 10/94

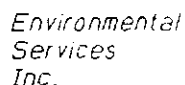
Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.3m

Logged By: P. M.

Checked By: O. P. L.

001091



Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 324.676m

Driller: SOART LONGYEAR DRILLING INC.

Drilling

Date _____

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 12/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 12/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 1.992m

Logged By: D. G. W.

Checked By: O. P. L.

001092



Environmental
Services
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Log of Well MW-21
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 324.549m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 12/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 12/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 3.335m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
						Cement
SS1		3	1		SAND AND GRAVEL: light brown grey brown	Fill
						5cm Ø Sch.40 Blank PVC
SS2	3/4 4/4	30	2		sand and gravel fill, red brick, loosely packed, slight hydrocarbon odour	Bentonite Pellet Seal
SS3	1/2 4/10	95	3		SILTY SAND: dark brown black, topsoil, slight odour light brown, grey staining, slight odour	
					moist, slight staining and odour	Silica Sand
SS4	12/18 17/12	80				11/12/94 (free product)
SS5	11/12 10/10	75	4		SAND AND GRAVEL: coarse, grey staining, saturated, slight odour	5cm Ø Sch.40 Slotted PVC (1mm)
					END OF BOREHOLE	
			5			
			6			



Environmental
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Log of Well MW-24
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.959m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 12/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 12/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 3.795m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	H-Nu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					FILL:slag ballast	Protective cover
					pieces of iron	Cement
SS1		0	1		SILTY SANDlight brown, dry to moist	5cm Ø Sch.40 Blank PVC Fill
					light brown grey, moist to wet, no odour	
SS2	8/10 11/10	0	2			Bentonite Pellet Seal
SS3	5/8 5/8	0	3			Silica Sand
SS4	11/12 15/8	0	4		wet to saturated	5cm Ø Sch.40 Slotted PVC (1mm)
SS5	4/7 7/8	0	5		saturated	
SS6	4/8 5/10	0	6		END OF BOREHOLE	



Environmental
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Log of Well MW-32
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 326.718m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 14/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 14/94

Borehole Diameter: 15.2 cm

Water Level T.O.P.: 3.08m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: coarse, dry	Protective cover
SS1		2	1			Cement
					light brown, fine sand and gravel, dry	5cm Ø Sch.40 Blank PVC
SS2	4/8 5/4	<1	2			Fill
					wet, slight odour	Bentonite Pellet Seal
SS3	1/0.5 0.5/1	5.5	3			
					SILTY SAND: light brown grey, moist	
SS4	8/9 8/4	85	4		light brown grey with black grey staining in fractures, slight odour	11/14/94
					grey stained, heavy staining in fractures, wet to saturated, odourous	Silica Sand
SS5	4/7 4/8	45	5			5cm Ø Sch.40 Slotted PVC (1mm)
			6		END OF BOREHOLE	



Environmental
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Log of Well MW-33
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94580

G.S. Elevation: 326.730m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 14/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 14/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.94m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: light brown, dry to moist	Protective cover
					TOPSOIL: dark brown, silty clay, moist, slight odour	Cement
SS1		25				5cm Ø Sch.40 Blank PVC
						Fill
SS2	4/8 5/4	2	2		SILTY CLAY: light brown grey, moist, no odour	Bentonite Pellet Seal
					slight grey staining, wet, no odour	
SS3	1/2 4/9	8.5	3		red brown, peat, soft, no odour	
					light brown grey green, dry	
SS4	3/7 10/9	45			slight dark, grey staining in silt fractures, slight odour	11/14/94
					black grey staining in fracture, odourous	Silica Sand
SS5	5/8 7/5	25	4		grey, saturated, slight odour	5cm Ø Sch.40 Slotted PVC (1mm)
SS8	3/4 4/5	3	5			
			6		END OF BOREHOLE	



Environmental
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Log of Well MW-34
PHASE 2
CN
FORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 94560

G.S. Elevation: 325.787m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 14/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 14/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 3.85m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: medium brown, crushed stone	Protective cover
					SAND: black slag sand, dry	Cement
SS1		2	1		SILTY SAND: light brown, moist	5cm Ø Sch.40 Blank PVC
SS2	8/8 8/8	1	2		SAND AND GRAVEL: light brown, fine grain, moist	Fill
SS3	4/7 11/9	23	3		grey, moist, slight odour	Bentonite Pellet Seal
SS4	4/10 15/10	120	4		black grey stained, fine gravel chips, oily odours	
SS5	5/10 14/10	130	5		SAND: fine sand, grey stained, odourous	11/14/94 (free product)
SS6	4/7 18/17	130	6		layered black grey stained sand	Silica Sand
SS7	15/25 23/23	70			SAND AND GRAVEL: densely packed sand and coarse gravel	5cm Ø Sch.40 Slotted PVC (1mm)
SS8	8/11 25/21	55			END OF BOREHOLE (SILTY SAND: grey, slight odour)	



Environmental
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Log of Well MW-38
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 2

Job Number: 94580

G.S. Elevation: 325.912m

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: AD-2 TRACK MOUNTED

Started

NOVEMBER 14/94

Sample Method: STANDARD SPLIT SPOON

Finished

NOVEMBER 14/94

Borehole Diameter: 15.2 cm

Water Level T.O.P: 3.95m

Logged By: D. G. W.

Checked By: O. P. L.

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND AND GRAVEL: light brown	Protective cover
					SILTY SAND: light brown, moist	Cement
SS1		1	1			5cm Ø Sch.40 Blank PVC Fill
SS2		<1	2			
SS3		1	3		wet	Bentonite Pellet Seal
SS4		<1	4			
SS5		0	5			11/14/94
SS6		<1	6		grey, saturated	Silica Sand
SS7		<1	7			5cm Ø Sch.40 Slotted PVC Filter



Environmental
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Log of Well MW-36
PHASE 2
CN
HORNEPAYNE, ONTARIO

Sheet 2 of 2

Job Number: 94580

G.S. Elevation: 325.912m

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					END OF BOREHOLE	
			8			
			9			
			10			
			11			
			12			
			13			
			14			



Environmental
Services
Inc.

Log of Well MW-40
PHASE 3
3N
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 324.34

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 7/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 7/95

Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.45

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
					SAND: medium to coarse, brown colour, trace of gravel, moist	Cement 5cm Ø Sch.40 Blank PVC Bentonite Pellet Seal
SS1	7/2 3/1	33	1			
SS2	1/8 8/8	34	2		SANDY SILT: fine grained, tan colour, trace of clay and gravel, no odours	
SS3	4/5 8/5	52	3			18/9/95
					saturated at 2.89 metres below ground surface	
SS4	4/4 4/3	23				Silica Sand 5cm Ø Sch.40 Slotted PVC (1mm)
SS5	2/3 4/3	29	4			
			5		END OF BOREHOLE	
			6			



Environmental
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Log of Well MW-43
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 323.88

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 8/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 8/95

Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.16

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HN ₁	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective Cover
					SAND: fine to medium, grey brown colour, trace of gravel, moist	Cement
SS1	4/5 7/4	300	1			5cm Ø Sch.40 Blank PVC
					saturated at 1.88 metres below ground surface	
SS2	5/8 1/7	53	2			18/9/95
					SANDY SILT: fine grained, grey colour, trace of clay, slight HC odour	Bentonite Pellet Seal
SS3	5/7 8/8	148	3			Silica Sand
SS4	4/4 4/4	83				5cm Ø Sch.40 Slotted PVC (1mm)
SS5	3/3 5/3	92	4			
SS6	1/1 2/1	57	5			
SS7	1/3 4/3	102	6			
					END OF BOREHOLE	



Environmental
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Log of Well MW-48
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 324.86

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 8/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 8/95

Borehole Diameter: 15.2 cm

Water Level T.O.P: 2.17

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HNu	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND: medium dark brown colour, trace of gravel, no odour trace of organic material, becoming coarser with depth	Protective cover Cement 5cm Ø Sch.40 Blank PVC Bentonite Pellet Seal
SS1	5/5 3/5	45	2			
SS2	1/1 1/1	48	3			18/9/95
SS3	1/8 7/8	28	4		SANDY SILT: fine grained, grey mottled, trace of clay, saturated no odour	Silica Sand 5cm Ø Sch.40 Slotted PVC (1mm)
SS4	1/4 4/5	38	5		END OF BOREHOLE	
			6			



Environmental
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Log of Well MW-48
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 325.63

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 8/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 8/95

Borehole Diameter: 15.2 cm

Water Level T.O.P: 1.72

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
					SAND: medium, tan colour, trace of gravel and cobbles, no HC odour	Cement 5cm Ø Sch.40 Blank PVC Bentonite Pellet Seal
SS1	8/5 4/2	10	1			
SS2	8/3 3/3	11	2			18/9/95
SS3	4/2 2/1	38	3		becoming finer	
SS4	4/3 2/2	11	4		SANDY SILT: fine grained grey colour, trace of clay and gravel, slight HC odour, saturated	Silica Sand 5cm Ø Sch.40 Slotted PVC (1mm)
SS5	1/1 1/1	18	5		END OF BOREHOLE	
			6			



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Log of Well MW/PW-50
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 325.81

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 9/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 9/95

Borehole Diameter: 38 cm

Water Level T.O.P: 1.98

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	H ₂ O	Depth (meters)	Graphic Log	Materials Description	Well Completion
						Protective cover
					SAND: medium to coarse, grey black colour, trace of gravel, moist no odour	Cement 10cm Ø Sch.40 Blank PVC Bentonite Pellet Seal
SS1	2/2/2	15	1			
SS2	2/8/8	88	2		SANDY SILT: fine grained, grey colour, trace of clay, slight HC odour, saturated. HC odour increases with depth	18/9/95
SS3	3/8/7	87	3			Silica Sand
SS4	8/5/5	39				10cm Ø Sch.40 Slotted PVC (mm)
			4			
SS6	4/3/3	11	5			
SS7	2/3/2	28				
			6		END OF BOREHOLE	



Environmental
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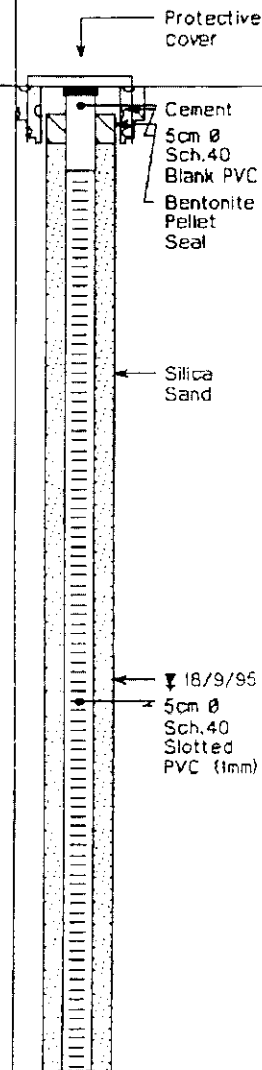
Log of Well MW-51
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 324.26

Driller: BOART LONGYEAR DRILLING INC.	Drilling	Date	Time
Drill Method: Track Mounted CME 75	Started	September 9/95	
Sample Method: STANDARD SPLIT SPOON	Finished	September 9/95	
Borehole Diameter: 15.2 cm	Water Level T.O.P: 3.09	Logged By: TMM	Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
						
SS1	no recovery		1		SAND: fine, medium and coarse, brown/black colour with slight HC odour	
SS2	3/2 2/2	29	2			
SS3	3/4 4/7	33	3			
SS4	3/3 7/4	42	4		saturated at 3.04 metres below ground surface.	
SS5	3/2 2/2	15	5			
SS8	5/4 3/2	38	6		END OF BOREHOLE	



Environmental
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Log of Well MW/PW-52
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-02

G.S. Elevation: 323.91

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mounted CME 75

Started

September 9/95

Sample Method: STANDARD SPLIT SPOON

Finished

September 9/95

Borehole Diameter: 38 cm

Water Level T.O.P: 2.17

Logged By: TMM

Checked By: OPL

Sample No.	Blow Counts	HNU	Depth (meters)	Graphic Log	Materials Description	Well Completion
					SAND: fine, tan grey colour trace of gravel, moist no odour	Protective cover Cement Bentonite Pellet Seal 10cm Ø Sch.40 Blank PVC 18/9/95
SS1	2/4/5	54	2			
			3		FINE SAND AND SILT: saturated at 3.04 mbgs	Silice Sand 10cm Ø Sch.40 Slotted PVC (1mm)
SS2	3/5/3	19	4		becoming finer with depth	
SS3	1/1/1	21	5			
SS4	no recovery		6		END OF BOREHOLE	



Environmental
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Log of Well MW-58
PHASE 3
CN
HCRNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-04

Ground Elevation: 327.63 masl

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mount Hollow Stem Auger, CME 75

Started

May 14, 1996

NA

Sample Method: STANDARD SPLIT SPOON

Finished

May 14, 1996

NA

Borehole Diameter: 38 cm

Water Level:

Logged By: TMM

Checked By: KMM

SAMPLE NO.	BLOW COUNTS	MINIRAE (ppm)	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1					FILL -Coarse grained sand and gravel.	Protective cover
SS2	20/50	5.5	1		SAND -Grey/green sand and silt, fine grained with pebbles and trace of gravel (till like), moist to wet (partially frozen), dense. -As above, with more fine grained sand, uniform, no odour.	Bentonite Seal
SS3	20/50	14.9	2		-As above, no odour.	Silica Sand
SS4	5/50	8.5	3		No sample recovery in this interval.	05/30/96 water table
SS5	7/9 14/8	7.7	4		SAND AND GRAVEL -Coarse grained, moderately saturated, faint hydrocarbon odour. -Moist to wet.	Well screen 5cm. Sch.40 Slotted PVC (TMM)
SS6	4/6 7/9	5.3	5		PEAT SAND AND GRAVEL	
SS7	5/9 8/12	6.7	6		SAND -Tan/grey fine grained, uniform, saturated.	
					End of borehole at 6.10 m.b.g.s.	



Environmental
Services
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Log of Well MW-59
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-04

Ground Elevation: 327.58 masl

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: Track Mount Hollow Stem Auger, CME 75

Started

May 15, 1998

NA

Sample Method: STANDARD SPLIT SPOON

Finished

May 15, 1996

NA

Borehole Diameter: 38 cm

Water Level:

Logged By: TMM

Checked By: KMM

SAMPLE NO.	BLOW COUNTS	MINRAE (ppm)	Depth (meters)	Graphic Log	Materials Description	Well Completion
SS1					FILL - Sand and gravel. - Brown to tan sand and silt, fine grained, with gravel, some pebbles, dense, frozen.	Protective cover
SS2	10/25 35/50	5.5	1			Backfill
SS3	30/50	4.8	2		SAND AND GRAVEL - Coarse grained sand, moist with some saturated zones. - Dry to moist.	
SS4	3/5 50	21.3				
SS5	50/17 21/20	6.4	3			05/30/96 water table
SS6	15/17 14/10	8.2	4		SAND - Fine to medium grained, trace gravel. SAND AND GRAVEL - Tan to brown medium and coarse grained sand.	Bentonite seal
SS7	4/5 8/72	7.5	5		PEAT - Dark brown peat layer, moist, musty odour, soft.	Silica sand
SS8	11/22 24/20	9.1				Well screen 5cm. Sch. 40 Slotted PVC (1MM)
SS9	3/5 4/2	9.3	6		SAND - Grey, fine grained, uniform, saturated. End of borehole at 6.9 m.b.g.s.	



Environmental
Services
Inc.

Log of Well MW-66
PHASE 3
CN
HORNEPAYNE, ONTARIO

Sheet 1 of 1

Job Number: 4057-02-04

Ground Elevation: 326.84 masl

Driller: BOART LONGYEAR DRILLING INC.

Drilling

Date

Time

Drill Method: TRACK MOUNT HOLLOW STEM AUGER, CME 75

Started

May 16, 1996

NA

Sample Method: Standard Split Spoon

Finished

May 16, 1996

NA

Borehole Diameter: 38 cm

Water Level:

Logged By: TMM

Checked By: KMM

SAMPLE NO.

BLOW COUNTS

MINIRAE (ppm)

Depth
(meters)

Graphic Log

Materials Description

Well Completion

Protective casing

Straight auger to 6.10 m.b.g.s.

Backfill

Bentonite seal

05/30/96
water
table AND
Free
Product

Well
screen
5cm.
5cm.40
Slotted
PVC (1mm)

Silica
sand

End of borehole at 6.10 m.b.g.s.

BOREHOLE LOG

BOREHOLE #: **OW3-2**
SHEET: **1** OF **1**
FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **28-09-96** COMPLT. DATE: **28-09-96**
LOCATION: **AREA OF PLUME 3** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS				
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	COLOR		VISUAL		
0	0.00	325.51		Steel Cap								No Soil Description	O	W	P	N	R
			Cap Cement														
			Bentonite														
1			PVC Tubing														
2	2.13	323.38															
			Silica Sand									End of Borehole at a Depth of 5.15 m					
3																	
			Screen, Opening 0.05 cm														
4																	
5	5.15	320.36															
			Cap														
6																	
7																	
8																	
9																	

STATE OF SAMPLE: ☒ INTACT ☐ DISTURBED ☐ LOST ☐ CORE SAMPLE

TYPE OF SAMPLE: SS - SPLIT SPOON SAMPLER, FW - THIN WALL SAMPLER, CS - CORE SAMPLER

OBSERVATIONS: O - DRINESS, W - WEAK, I - INTERMEDIATE, P - PERSISTENT, NE - NON EXISTENT, SC - SCATTERED, SA - SATURATED

Σ = WATER TABLE, ** = FIELD DUPLICATE, * = ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap** ELEVATION: **---**

SURFACE SEALANT: **Cement/Bentonite** REFERENCE LEVEL: **Real**

SEALANT DEPTH: **1.00 m** BEDROCK LEVEL: **---**

SCREEN LENGTH: **4.00 m** GROUND LEVEL: **325.51 m**

TUBING LENGTH: **1.15 m** WATER TABLE LEVEL: **---**

48 HOUR(s) AFTER DRILLING: **323.38**



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BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW5-1**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **01-10-96** COMPLT. DATE: **01-10-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE 'AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00 324.47			Steel Cap								Light Brown Sand and Gravel, Dry		
0.60	323.87			Cap Cement								Medium Brown Fine Sand with Traces of Gravel, Dry		
1				Bentonite										
				PVC Tubing										
2														
2.40	322.07											Dark Brown Sandy Silt with Traces of Gravel, Dry		
3				Silice Sand								Light Brown Sandy Silt with Traces of Gravel, Humid		
3.10	321.37													
3.27	321.20													
4														
5				Screen, Opening 0.05 cm										
6												Grey Clayey Silt, Humid		
6.00	318.47													
7														
8														
8.68	315.79			Cap								End of Borehole at a Depth 8.68 m		
9														

STATE OF SAMPLE: OBSERVATIONS ∇ = WATER TABLE

INTACT DISTURBED LOST CODE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPOON SAMPLER
IW - THIN WALL SAMPLER
CS - CORE SAMPLER

O - ODDLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Bentonite**

SEALANT DEPTH: **0.90 m**

SCREEN LENGTH: **7.48 m**

TUBING LENGTH: **1.20 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **324.47 m**

WATER TABLE LEVEL:

24 HOUR(s) AFTER DRILLING: **321.20**

BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW5-2**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **01-10-96** COMPLT. DATE: **01-10-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø: **60 mm** TUBING Ø: **60 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE						GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	COLOR	VISUAL
0	0.00 323.69			Steel Cap								Light Brown Sand and Gravel, Dry		
1														
2	1.80 321.69											Greyish Clayey Silt		
	2.40 321.29											Brown Clayey Silt		
3	2.89 320.80											Grey Sandy Silt, Saturated		
	3.00 320.69													
4	4.00 319.69											End of Borehole at a Depth of 4.00 m		
5												NOTE: 0.22 m of Free-phase product observed on 02-10-96		
6												0.51 m Top Section of Observation Well Installed Aboveground. Elevation of 323.69 m Taken at Ground Level. Water Elevation Measurements Taken from Protective Casing at an Elevation of 324.20 m		
7														
8														
9														

STATE OF SAMPLE:
INTACT UNDISTURBED LOST CORE SAMPLE
TYPE OF SAMPLE:
SS - SPLIT SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER
O - OILLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED
= FIELD
= ANALYZED SAMPLE
SURFACE PROTECTION: **Steel Cap**
SURFACE SEALANT: **Bentonite**
SEALANT DEPTH: **0.90 m**
SCREEN LENGTH: **3.10 m**
TUBING LENGTH: **1.20 m**
ELEVATION: **Real**
REFERENCE LEVEL: **---**
BEDROCK LEVEL: **---**
GROUND LEVEL: **323.69 m**
WATER TABLE LEVEL: **24** HOUR(s) AFTER DRILLING **320.80**

BOREHOLE LOG

BOREHOLE #: **OW5-3**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **28-09-96** COMPLT. DATE: **28-09-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Hollow Stem Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	
0	0.00 323.75			Steel Cap								
				Cap		SS1	75	N=6	---	---		Fine to Coarse Sand with Traces of Gravel, Loose, Dry
				Bentonite		SS2	100	N=8	---	---		
				PVC Tubing		SS3	100	N=15	---	---		
1.60	322.15											Dark Brown Organic Matter with Traces of Glass
						SS4	50	N=8	---	---		
2.20	321.55											Brown Clayey Silt, Dry
						SS5	100	N=8	---	---		
2.74	321.01											-Presence of Pieces of Wood
						SS6	18	N=16	---	---		
3.50	320.25											Black Fine to Coarse Sand, Dense, Saturated
						SS7	25	N=17	---	---		
4.26	319.60			Silice Sand								Ligth Brown Coarse Sand, Medium to Very Dense, Saturated, Presence of Gravel
						SS8	50	N=32	---	---		
						SS9	50	N=57	---	---		
				Screen, Opening 0.05 cm								
						SS10	16	N=21	---	---		
						SS11	50	N=15	---	---		
						SS12	16	N=36	---	---		
7.20	316.55			Cap								End of Borehole at a Depth of 7.20 m
8												
9												

STATE OF SAMPLE:

IMPACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS

O - ODORLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

Σ = WATER TABLE

** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Bentonite**

SEALANT DEPTH: **0.80 m**

SCREEN LENGTH: **6.00 m**

TUBING LENGTH: **1.20 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **323.75 m**

WATER TABLE LEVEL:

48 HOUR(s) AFTER DRILLING **321.01**



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BOREHOLE LOG

BOREHOLE #: **OW5-4**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **28-09-96** COMPT. DATE: **28-09-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Hollow Stem Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouelletta**

LEVELING		MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	
0	0.00 324.46		Steel Cap	Cap		SS1	79	N=13	---	---	Light Brown Fine to Coarse Sand with Traces of Gravel, Medium Dense, Dry
1			Bentonite			SS2	100	N=13	---	---	
			PVC Tubing			SS3	100	N=20	---	---	
1.90	322.56					SS4	100	N=17	---	---	Gray Fine Sand with Traces of Silt, Medium Dense, Dry to Humid
2						SS5	100	N=12	---	---	
						SS6	100	N=7	---	---	
3.68	320.78					SS7	75	N=13	---	---	-Becoming Loose and Saturated, Sheen of the Water
3.80	320.66					SS8	100	N=8	---	---	
4.25	320.21			Silica Sand		SS9	75	N=12	---	---	
						SS10	60	N=15	---	---	Gray Medium to Coarse Sand with Little Gravel, Loose, Saturated
						SS11	25	N=13	---	---	
						SS12	0	N=24	---	---	
7.20	317.26		Screen, Opening 0.05 cm								Light Brown Coarse Sand with Some Gravel, Medium Dense, Saturated
			Cap								End of Borehole at a Depth 7.20 m
											NOTE: 0.29 m of Free-phase product observed on 08-10-96

STATE OF SAMPLE:

INTACT UNDISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPOON SAMPLER
1W - THIN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS

0 - DRY/LESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

√ = WATER TABLE

** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Bentonite**

SEALANT DEPTH: **0.80 m**

SCREEN LENGTH: **6.00 m**

TUBING LENGTH: **1.20 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **324.46 m**

WATER TABLE LEVEL:

24 HOUR(s) AFTER DRILLING: **320.78**

BOREHOLE LOG

BOREHOLE #: **OW5-6**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **28-09-96** COMPLT. DATE: **28-09-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **60 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Hollow Stem Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING		MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION
0	0.00 324.30			Steel Cap		SS1	4	N=12	---	---		Light Brown Fine to Coarse Sand, Traces of Silt, Loose, Dry
1				Bentonite		SS2	4	N=4	---	---		
1.50	322.80			PVC Tubing		SS3	100	N=12	---	---		Light Brown Clayey Silt with Traces of Sand, Stiff, Humid
2						SS4	100	N=15	---	---		
2.80	321.50					SS5	75	N=18	---	---		
3						SS6	76	N=8	---	---		
4				Silica Sand		SS7	91	N=11	---	---		
4.80	319.50					SS8	79	N=3	---	---		
5						SS9	100	N=3	---	---		Light Brown Fine Sand to Sandy Silt, Very Loose, Saturated
6	6.00 318.30			Screen, Opening 0.05 cm		SS10	100	N=5	---	---		
7				Cap		SS11	25	N=7	---	---		Light Brown Medium to Coarse Sand, with Traces of Gravel, Loose, Saturated
7.20	317.10					SS12		N=8	---	---		End of Borehole at a Depth of 7.20 m
8												
9												

STATE OF SAMPLE:

☒ INTACT
☐ DISTURBED
☐ LOST
☐ CORE SAMPLE

TYPE OF SAMPLE:

SS — SPLIT SPOON SAMPLER
 TW — TURN WALL SAMPLER
 CS — CORE SAMPLER

OBSERVATIONS

O — ODORLESS
 W — WEAK
 I — INTERMEDIATE
 P — PERSISTENT
 NE — NON EXISTENT
 SC — SCATTERED
 SA — SATURATED

Σ = WATER TABLE

** = FIELD
 * = ANALYZED
 = SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Bentonite**

SEALANT DEPTH: **0.80 m**

SCREEN LENGTH: **6.00 m**

TUBING LENGTH: **0.70 m**

ELEVATION: **---**

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **324.30 m**

WATER TABLE LEVEL: **---**

48 HOUR(s) AFTER DRILLING: **321.50**

BOREHOLE LOG

BOREHOLE #: **OW6-1**
SHEET: **1** OF **1**
FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **30-09-96** COMPT. DATE: **30-09-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Oullette**

LEVELING			MONITORING WELL		SAMPLE						GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	COLOR	VISUAL
0	0.00	326.91		Steel Cap								Black Sandy Silt with Traces of Coal Residues		
			Cap											
			Cement											
			Bentonite											
1	1.20	325.71												
			PVC Tubing									Light Brown Clayey Silt, Humid		
2	2.26	324.65												
3				Silice Sand										
4														
5				Screen, Opening 0.05 cm										
6	6.00	320.91		Cap								End of Borehole at a Depth of 6.00 m		
7														
8														
9														

STATE OF SAMPLE: OBSERVATIONS: = WATER TABLE

INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE: SS - SPLIT SPOON SAMPLER TW - THIN WALL SAMPLER CS - CORE SAMPLER

0 - ODORLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

** = FIELD DUPLICATE
* = ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap** ELEVATION: **---**
SURFACE SEALANT: **Cement/Bentonite** REFERENCE LEVEL: **Real**
SEALANT DEPTH: **0.90 m** BEDROCK LEVEL: **---**
SCREEN LENGTH: **4.40 m** GROUND LEVEL: **326.91 m**
TUBING LENGTH: **1.60 m** WATER TABLE LEVEL: **24** HOUR(s) AFTER DRILLING: **324.65**

BOREHOLE LOG

BOREHOLE #: **OW6-3**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **30-09-96** COMPLT. DATE: **30-09-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Oullette**

LEVELING		MONITORING WELL			SAMPLE						GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD [PPM]	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00 326.61			Steel Cap								Black Silt, Presence of Coal Residues, Dry		
1														
2														
2.45	324.16													
2.64	323.97													
3												Light Brown Sandy Silt, Dry		
4														
5														
6	5.00 320.61											Presence of Much Gravel from a Depth of 4.50 m		
7														
8														
9														
												End of Borehole at a Depth of 6.00 m		

STATE OF SAMPLE: ☒ INTACT ☐ DISTURBED ☐ LOST ☐ CORE SAMPLE

TYPE OF SAMPLE:
SS - SPLIT SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS:
O - ODORLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

WATER TABLE: ☒ = WATER TABLE
** = FIELD
* = ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap** ELEVATION: **---**
SURFACE SEALANT: **Cement/Bentonite** REFERENCE LEVEL: **Real**
SEALANT DEPTH: **1.20 m** BEDROCK LEVEL: **---**
SCREEN LENGTH: **4.50 m** GROUND LEVEL: **326.61**
TUBING LENGTH: **1.50 m** WATER TABLE LEVEL: **---**
24 HOUR(s) AFTER DRILLING: **323.97**



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BOREHOLE LOG

BOREHOLE #: **OW6-4**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **30-09-96** COMPLT. DATE: **30-09-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullan** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Oullette**

LEVELING			MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	OTHER	VISUAL
0	0.00 327.26			Steel Cap								Light Brown Sand and Gravel, Dry		
0.60	326.66			Cement								Brown Silt, with Traces of Gravel, Dry		
1	1.20 328.08			Bentonite								Black Sandy Silt with Traces of Gravel, Humid		
2	2.21 325.05			PVC Tubing								Grey-Brown Clayey Silt, Humid		
2.45	324.81													
3				Silica Sand										
4														
4.60	322.66			Screen, Opening 0.05 cm										
5														
6	6.00 321.26			Cap								End of Borehole at a Depth of 6.00 m		
7														
8														
9														

STATE OF SAMPLE: OBSERVATIONS ∇ = WATER TABLE

INFACT UNDISTURBED LOSE CORE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER

0 - DIRTLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.80 m**

SCREEN LENGTH: **4.60 m**

TUBING LENGTH: **1.40 m**

ELEVATION:

REFERENCE LEVEL: **Rent**

BEDROCK LEVEL: **---**

GROUND LEVEL: **327.26 m**

WATER TABLE LEVEL:

24 HOUR(s) AFTER DRILLING: **325.05**



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BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW8-1**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **27-09-96** COMPLT. DATE: **27-09-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE						GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	OBSERVATIONS		
													ODOR	VISUAL	
0	0.00	327.67		Steel Cap								Light Brown to Grey Fine to Coarse Sand with Traces of Gravel, Dry			
				Cap											
				Cement											
				Bentonite											
1				PVC Tubing											
2															
3				Silica Sand											
3.70	323.97														
4															
4.30	323.37												Grey Clayey to Sandy Silt, Dry		
5															
5.80	321.87			Screen, Opening 0.05 cm											
6													Brown Clayey Silt, Dry		
6.35	321.32														
7													Grey Clayey Silt, Saturated		
8	8.00	319.67		Cap									End of Borehole at a Depth of 8.00 m		

STATE OF SAMPLE: OBSERVATIONS ☒ = WATER TABLE

INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPONG SAMPLER
IW - THIN WALL SAMPLER
CS - CORE SAMPLER

O - OIL-LESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.75 m**

SCREEN LENGTH: **6.80 m**

TUBING LENGTH: **1.20 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **327.67 m**

WATER TABLE LEVEL:

48 HOUR(s) AFTER DRILLING: **323.97**



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BOREHOLE LOG

BOREHOLE #: **OW8-2**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **27-09-96** COMPLT. DATE: **27-09-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE						GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00 327.56			Steel Cap								Light Brown Sand, Dry		
				Cap Cement Bentonite PVC Tubing										
3	3.00 324.56			Silice Sand								Light Brown Clayey Silt, Dry		
	3.60 323.96											Dark Brown Clayey Silt, Dry		
	3.82 323.69													
5	4.90 322.66			Screen, Opening 0.05 cm								Grey Clayey Silt, Saturated		
8	7.90 319.66			Cap								End of Borehole at a Depth of 7.90 m		
												NOTE: 0.34 m of Free-phase product observed on 29-09-96		

STATE OF SAMPLE:



INTACT (DISTURBED) LOST CORE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS

O - OILLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON-EXISTENT
SC - SCATTERED
SA - SATURATED

Σ = WATER TABLE

** = FIELD
DUPLICATE
ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.75 m**

SCREEN LENGTH: **6.70 m**

TUBING LENGTH: **1.20 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **327.66 m**

WATER TABLE LEVEL:

48 HOUR(s) AFTER DRILLING: **323.69**



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BOREHOLE LOG

BOREHOLE #: **OW8-3**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **27-09-96** COMPT. DATE: **27-09-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 76** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE						GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00	327.79		Steel Cap								Light Brown Fine Sand, Dry		
				Cap Cement Bentonite										
1				PVC Tubing										
2														
3	3.00	324.79		Silice Sand								Gray Sand and Gravel with Traces of Silt, Dry		
4														
5	4.75	323.04		Screen, Opening 0.05 cm										
6	6.80	321.99										Gray Clayey Silt, Saturated		
7														
8	7.90	319.89		Cap								End of Borehole at a Depth of 7.90 m		
9												NOTE: 2.22 m of Free-phase product observed on 29-09-96		

STATE OF SAMPLE: OBSERVATIONS ∇ = WATER TABLE



INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS — SPLIT SPOON SAMPLER
TW — THIN WALL SAMPLER
CS — CORE SAMPLER
D — FIRMNESS
W — WEAK
I — INTERMEDIATE
P — PERSISTENT
NE — NON-EXISTENT
SC — SCATTERED
SA — SATURATED
** = FIELD DUPLICATE
* = ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap** ELEVATION: **---**
SURFACE SEALANT: **Cement/Bentonite** REFERENCE LEVEL: **Real**
SEALANT DEPTH: **0.60 m** BEDROCK LEVEL: **---**
SCREEN LENGTH: **6.70 m** GROUND LEVEL: **327.79 m**
TUBING LENGTH: **1.20 m** WATER TABLE LEVEL: **48** HOUR(S) AFTER DRILLING: **323.04**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT:	HORNEPAYNE CN	STARTING DATE:	27-09-96	COMPLT. DATE:	27-09-96
LOCATION:	AREA OF PLUME B	SLOTTED PIPE Ø :	50 mm	TUBING Ø :	50 mm
CONTRACTOR:	Boart Longyear Drilling Inc	DRILL TYPE:	CME 75	CORE SAMPLER Ø :	---
OPERATOR:	C. Pullen	METHOD (SOIL):	Auger	METHOD (ROCK):	---
TYPE OF TUBING:	PVC	DRILLING FLUID:	---	COMPILED BY:	P. Ouellette

[illegible]

STATE OF SAMPLE:

UNACT. INSHURED LOSE COINS

TYPE OF SAMPLE:

SS — SPLIT SPOON SAMPLER
TW — THIN WALL SAMPLER
CS — CORE SAMPLER

OBSERVATIONS

O — OXYLESS
W — WEAK
I — INTERMEDIATE
P — PERSISTENT
NE — NON-EXISTENT
SC — SCATTERED
SA — SATURATED

 = WATER TABLE

" IS FIELD
DUPLICATE
" IS ANALYZED
SAMPLE

SURFACE PROTECTION: Steel Cap

SURFACE SEALANT: Cement/Benton

SEALANT DEPTH: 0.60 m

SCREEN LENGTH: 6.70 m

TUBING LENGTH: 1.20 m

ELEVATION:

REFERENCE LEVEL: Real

BEDROCK LEVEL: _____

GROUND LEVEL: 327.45 m

WATER TABLE LEVEL:

48 HOUR(E) AFTER DRILLING: 322.74



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BOREHOLE LOG

BOREHOLE #: **OW8-5**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **27-09-96** COMPLT. DATE: **27-09-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pufen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	
0	0.00	327.60		Steel Cap								Grey Sand and Gravel, Dry	
			Cap Cement										
			Bentonite										
1			PVC Tubing										
2												Grey Silt with Clay, Saturated	
3			Silica Sand										
4	3.75	323.65											
5	4.60	323.00											
6			Screen, Opening 0.06 cm									End of Borehole at a Depth of 8.00 m	
7													
8	8.00	319.60											
9			Cap										

STATE OF SAMPLE: ☒ INTACT ☐ DISTURBED ☐ LOST ☐ CORE SAMPLE

TYPE OF SAMPLE: SS - SPLIT SPOON SAMPLER TW - THIN WALL SAMPLER CS - CORE SAMPLER

OBSERVATIONS: Q - QUIET W - WEAK I - INTERMEDIATE P - PERSISTENT NE - NON-EXISTENT SC - SCATTERED SA - SATURATED

WATER TABLE: ☒ SURFACE PROTECTION: **Steel Cap** SURFACE SEALANT: **Cement/Bentonite** SEALANT DEPTH: **0.90 m** SCREEN LENGTH: **6.80 m** TUBING LENGTH: **1.20 m**

ELEVATION: **Real** REFERENCE LEVEL: **---** BEDROCK LEVEL: **---** GROUND LEVEL: **327.60 m** WATER TABLE LEVEL: **48** HOUR(s) AFTER DRILLING: **323.85**

BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW9-1**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **27-09-96** COMPLT. DATE: **27-09-96**
LOCATION: **AREA OF PLUME 9** SLOTTED PIPE Ø : **60 mm** TUBING Ø : **60 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	DATE	TIME
0	0.00 327.35			Steel Cap Cap Cement/Bentonite PVC Tubing Screen, Opening 0.05 cm Cap							Light Brown Sand and Gravel, Dry			
1														
2														
2.40	324.95													
2.50	324.85											Grey Clayey Silt, Dry to Humid		
3				Silica Sand										
4														
5														
6														
7	2.00 320.35											End of Borehole at a Depth of 7.00 m		
8														
9														

STATE OF SAMPLE: ☒ INTACT ☐ DISTURBED ☐ LOST ☐ CORE SAMPLE

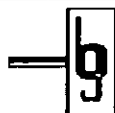
TYPE OF SAMPLE: SS -- SPLIT SPOON SAMPLER TW -- TRENCH WALL SAMPLER CS -- CORE SAMPLER

OBSERVATIONS: O -- OILY W -- WAX I -- INTERMEDIATE P -- PERSISTENT NE -- NON EXISTENT SC -- SCATTERED SA -- SATURATED

✓ = WATER TABLE ** = FIELD * = ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap** SURFACE SEALANT: **Cement/Bentonite** SEALANT DEPTH: **0.45 m** SCREEN LENGTH: **6.40 m** TUBING LENGTH: **0.60 m**

ELEVATION: **---** REFERENCE LEVEL: **Real** BEDROCK LEVEL: **---** GROUND LEVEL: **327.35 m** WATER TABLE LEVEL: **48** HOUR(S) AFTER DRILLING: **324.85**



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BOREHOLE LOG

BOREHOLE #: **OW9-3**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **29-09-96** COMPLT. DATE: **29-09-96**
LOCATION: **AREA OF PLUME 9** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	
0	0.00	325.52	Cap	Steel Cap								Light Brown Clayey Silt, Saturated	
1	1.18	324.34	Bentonite										
2			PVC Tubing										
3			Silica Sand									Greyish Clayey Silt, Saturated	
4	3.60	321.92											
5			Screen, Opening 0.05 cm										
6	6.10	319.42	Cap									Refusal of Auger to Penetration at a Depth of 6.10 m	
7													
8													
9													

STATE OF SAMPLE:

INTACT DISBURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS — SPLIT SPOON SAMPLER
TW — THIN WALL SAMPLER
CS — CORE SAMPLER

OBSERVATIONS

O — ODDLESS
W — WEAK
I — INTERMEDIATE
P — PERSISTENT
NE — NON EXISTENT
SC — SCATTERED
SA — SATURATED

STATE OF SAMPLE:

** = FIELD
DI — DIAPHRAGM
AN — ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.70 m**

SCREEN LENGTH: **4.60 m**

TUBING LENGTH: **1.50 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **325.52 m**

WATER TABLE LEVEL:

72 HOUR(s) AFTER DRILLING: **324.34**



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BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW53**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **03-10-96** COMPLT. DATE: **03-10-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 76** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouallette**

LEVELING			MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	
0	0.00	327.09	Steel Cap	Cap								No Soil Description, Evidences of Hydrocarbons During Drilling
1				Cement								
2				Bentonite								
3				PVC Tubing								
4												
5				Silice Sand								
6												
7				Screen, Opening 0.05 cm								
8	5.62	321.27										
9	7.90	319.19		Cap								End of Borehole at a Depth of 7.90 m

NOTE: 2.97 m of Free-phase product observed on 12-10-96

STATE OF SAMPLE: **INTACT** **DISTURBED** **LOST** **CORE SAMPLE**
TYPE OF SAMPLE: **SS** - SPLIT SPIN SAMP
TW - THIN WALL SAMP
CS - CORE SAMP
OBSERVATIONS: **D** - DIBBLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED
WATER TABLE: **Δ** - FIELD
****** - DUPLICATE
U - ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap**
SURFACE SEALANT: **Bentonite**
SEALANT DEPTH: **0.70 m**
SCREEN LENGTH: **6.70 m**
TUBING LENGTH: **1.20 m**
ELEVATION: **Real**
BEDROCK LEVEL: **---**
GROUND LEVEL: **327.09 m**
WATER TABLE LEVEL: **> 96 HOUR(s) AFTER DRILLING: 321.27**

BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW57**
SHEET: **1** OF **1**
FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **03-10-96** COMPLT. DATE: **03-10-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø: **50 mm** TUBING Ø: **50 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Quéllette**

LEVELING			MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	
0	0.00	327.09		Steel Cap								No Soil Description
				Cap Cement								
				Bentonite								
1				PVC Tubing								
2												
3				Silice Sand								
4												
5												
6	5.37	321.72		Screen, Opening 0.05 cm								End of Borehole at a Depth of 7.90 m NOTE: 2.80 m of Free-phase product observed on 12-10-96
7												
8	7.90	319.19		Cap								
9												

STATE OF SAMPLE: ☒ INTACT ☐ DISTURBED ☐ LOST ☐ CORE SAMPLE

TYPE OF SAMPLE:
SS - SPLIT SPOON SAMPLER
TW - TURN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS
O - (BORERLESS)
W - WEAK
I - INTERMEDIATE
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

WATER TABLE
= FIELD
= ANALYZED
= SAMPLE

SURFACE PROTECTION: **Steel Cap**
SURFACE SEALANT: **Bentonite**
SEALANT DEPTH: **0.80 m**
SCREEN LENGTH: **6.70 m**
TUBING LENGTH: **1.20 m**

ELEVATION:
REFERENCE LEVEL: **Real**
BEDROCK LEVEL: **---**
GROUND LEVEL: **328.96 m**
WATER TABLE LEVEL: **> 96 HOUR(s) AFTER DRILLING: 321.72**



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BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **OW60**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **03-10-96** COMPT. DATE: **03-10-96**
 LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø : **50 mm** TUBING Ø : **50 mm**
 CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
 OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
 TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Oullette**

LEVELING			MONITORING WELL			SAMPLE					GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00	327.82		Steel Cap								Medium Brown Sand and Gravel with Traces of Silt, Dry		
				Cap Cement										
				Bentonite										
1				PVC Tubing										
2														
2.35	325.47													
3				Silica Sand								Gray Fine to Medium Sand with Traces of Gravel, Humid		
4														
4.60	323.22			Screen, Opening 0.05 cm										
5												Brown Silt, Dry		
5.44	322.38													
6	6.05	321.77										Grey Clayey Silt, Saturated		
7														
7.90	319.92			Cap								End of Borehole at a Depth of 7.90 m		
												NOTE: 2.29 m of Free-phase product observed on 12-10-96		
9														

STATE OF SAMPLE:

INTACT (DISTURBED) LOST CORE SAMPLE

TYPE OF SAMPLE:

SS — SPLIT SHOWN SAMPLER
 IW — THIN WALL SAMPLER
 CS — CORE SAMPLER

OBSERVATIONS

O — ODOURLESS
 W — WEAK
 I — INTERMEDIATE
 P — PERSISTENT
 NE — NON EXISTENT
 SC — SCATTERED
 SA — SATURATED

= WATER TABLE
 ** = FIELD
 = ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.60 m**

SCREEN LENGTH: **6.70 m**

TUBING LENGTH: **1.20 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **327.61 m**

WATER TABLE LEVEL:

> 90 HOUR(s) AFTER DRILLING: **322.38**



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BOREHOLE LOG

CONFIDENTIAL AND PRIVILEGED DOCUMENT

BOREHOLE #: **RW6-1**

SHEET: **1** OF **1**

FILE #: **CN-6089**

PROJECT: **HORNEPAYNE CN** STARTING DATE: **03-10-96** COMPLT. DATE: **03-10-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø : **100 mm** TUBING Ø : **100 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE					GEOLOGY		OBSERVATIONS		
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	OTHER	VISUAL
0	0.00	326.70		Steel Cap								Black Silt, with Coal Residues		
			Cap Cement Bentonite PVC Tubing											
1.50	326.20											Light Brown Clayey Silt with Traces of Gravel, Humid		
3				Silica Sand										
3.25	323.45													
3.40	323.30											Gray Clayey Silt, Saturated		
4														
6				Screen, Opening 0.05 cm										
7	7.00	319.70		Cap								End of Borehole at a Depth of 7.00 m		
8												NOTE: 0.09 m of Free-phase product observed on 06-10-96		
9														

STATE OF SAMPLE:

INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS - SPLIT SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS

O - OILLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

Σ = WATER TABLE

.. = FIELD
= DUPLICATE
= ANALYZED SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.95 m**

SCREEN LENGTH: **5.50 m**

TUBING LENGTH: **1.50 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **326.70 m**

WATER TABLE LEVEL:

72 HOUR(s) AFTER DRILLING: **323.30**

BOREHOLE LOG

BOREHOLE #: **RW8-1**
SHEET: **1** OF **1**
FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **02-10-96** COMPLT. DATE: **02-10-96**
LOCATION: **AREA OF PLUME B** SLOTTED PIPE Ø: **100 mm** TUBING Ø: **100 mm**
CONTRACTOR: **Boart Longyear Drilling Inc.** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING		MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	
0	0.00 327.24		Steel Cap	Cap Cement Bentonite							Light Brown Fine Sand with Traces of Coarse Sand, Dry
1			PVC Tubing								
2											
3	3.00 324.24			Silica Sand							Black Clayey Silt with Traces of Gravel
4	3.95 323.29										
5											Grey Sandy Silt, Humid
6	5.41 321.83										
7											Grey Sandy Silt, Saturated, Presence of Free Phase Hydrocarbons
8	6.05 321.19			Screen, Opening 0.05 cm							
9				Cap							End of Borehole at a Depth of 8.23 m NOTE: 2.59 m of Free-phase product observed on 12-10-96
10	8.23 319.01										

STATE OF SAMPLE: **INTACT** **DISTURBED** **LOST** **CORE SAMPLE**
OBSERVATIONS: **0** - DIORLESS **W** - WEAK **1** - IMMEDIATE **P** - PERSISTENT **NE** - NON EXISTENT **SC** - SCATTERED **SA** - SATURATED
SURFACE PROTECTION: **Steel Cap** ELEVATION: **---**
SURFACE SEALANT: **Cement/Bentonite** REFERENCE LEVEL: **Real**
SEALANT DEPTH: **0.80 m** BEDROCK LEVEL: **---**
SCREEN LENGTH: **6.73 m** GROUND LEVEL: **327.24 m**
TUBING LENGTH: **1.50 m** WATER TABLE LEVEL: **> 96** HOUR(s) AFTER DRILLING: **321.83**



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BOREHOLE LOG

BOREHOLE #: **RW8-2**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **02-10-96** COMPLT. DATE: **02-10-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø: **100 mm** TUBING Ø: **100 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø: **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL			SAMPLE				GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY		
0	0.00 327.33		Steel Cap										
			Cap Cement										
			Bentonite										
1			PVC Tubing										
2													
3	3.00 324.33		Silica Sand										
4	3.90 323.43												
5	4.68 322.65												
6			Screer, Opening 0.05 cm										
7	7.00 320.33		Cap										
8													
9													

STATE OF SAMPLE:



INTACT DISTURBED LOST CORE SAMPLE

TYPE OF SAMPLE:

SS - SPIN SPOON SAMPLER
TW - THIN WALL SAMPLER
CS - CORE SAMPLER

OBSERVATIONS

O - OORLESS
W - WEAK
I - INTERMEDIATE
P - PERSISTENT
NE - NON EXISTENT
SC - SCATTERED
SA - SATURATED

▽ = WATER TABLE

** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap**

SURFACE SEALANT: **Cement/Bentonite**

SEALANT DEPTH: **0.70 m**

SCREEN LENGTH: **6.60 m**

TUBING LENGTH: **1.50 m**

ELEVATION:

REFERENCE LEVEL: **Real**

BEDROCK LEVEL: **---**

GROUND LEVEL: **327.33 m**

WATER TABLE LEVEL:

> 96 HOURS AFTER DRILLING: **322.65**

End of Borehole at a Depth of 7.00 m

NOTE: more than 1.83 m of Free-phase product observed on 12-10-96



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BOREHOLE LOG

BOREHOLE #: **RW8-3**

SHEET: **1** OF **1**

FILE #: **CN-6089**

CONFIDENTIAL AND PRIVILEGED DOCUMENT

PROJECT: **HORNEPAYNE CN** STARTING DATE: **02-10-96** COMPLT. DATE: **02-10-96**
LOCATION: **AREA OF PLUME 8** SLOTTED PIPE Ø : **100 mm** TUBING Ø : **100 mm**
CONTRACTOR: **Boart Longyear Drilling Inc** DRILL TYPE: **CME 75** CORE SAMPLER Ø : **---**
OPERATOR: **C. Pullen** METHOD (SOIL): **Auger** METHOD (ROCK): **---**
TYPE OF TUBING: **PVC** DRILLING FLUID: **---** COMPILED BY: **P. Ouellette**

LEVELING			MONITORING WELL		SAMPLE						GEOLOGY		OBSERVATIONS	
DEPTH (meters)	ELEVATION (meters)	WATER TABLE	WELL DESIGN	NOTES	SAMPLE STATE	SAMPLE TYPE AND NUMBER	RECOVERY %	N VALUE	ANALYZED PARAMETERS	VOLATILE HYDROCARBON RECORD (PPM)	STRATIGRAPHY	SOIL/ROCK DESCRIPTION	ODOR	VISUAL
0	0.00	327.29		Steel Cap								Light Brown Fine Sand with Traces of Gravel, Dry		
				Cap Cement										
				Bentonite										
				PVC Tubing										
1.50	325.79											Gray Silty Fine Sand with Traces of Gravel		
2														
				Silica Sand								Presence of Gravel		
3.90	323.39											Gray Coarse Sand with Little Gravel, Humid		
4														
	4.56	322.63												
5														
	5.50	321.79										Brown Silt, Humid		
6														
				Screen, Opening 0.05 cm										
7	7.00	320.29		Cap								End of Borehole at a Depth of 7.00 m		
												NOTE: 1.51 m of Free-phase product observed on 12-10-96		
8														
9														

STATE OF SAMPLE:
INTACT DISTURBED LOST CORE SAMPLE
TYPE OF SAMPLE:
SS — SPLIT SPOON SAMPLER
TW — THIN WALL SAMPLER
CS — CORE SAMPLER
O — OILLESS
W — WEAK
I — INTERMEDIATE
P — PERSISTENT
NE — NON EXISTENT
SC — SCATTERED
SA — SATURATED
▽ = WATER TABLE
** = FIELD
DUPLICATE
* = ANALYZED
SAMPLE

SURFACE PROTECTION: **Steel Cap** ELEVATION: **---**
SURFACE SEALANT: **Cement/Bentonite** REFERENCE LEVEL: **Real**
SEALANT DEPTH: **0.70 m** BEDROCK LEVEL: **---**
SCREEN LENGTH: **6.60 m** GROUND LEVEL: **327.29 m**
TUBING LENGTH: **1.60 m** WATER TABLE LEVEL: **>96 HOUR(s) AFTER DRILLING: 322.63**

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 1.5 m East of Southeast Corner of Railing at Lagoon 2
DRILLING METHOD 105 mm ϕ Hollow Stem Auger, 25 mm ϕ Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 324.14 m, Geodetic
TOP OF PVC ELEV. 324.12 m
WATER ELEV. 321.46 m, 26/05/00
DATE DRILLED 09/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	FIELD HEADSPACE TEST Photolonizable Vapours (ppm)
					0.02				500 1000 1500 2000
323.38			SAND FILL - Brown, damp, loose, poorly graded, fine grained, some fine grained, subangular gravel, trace silt. -slight petroleum hydrocarbon odour		0.77		1		
	1.0		SAND - Grey, damp, loose, poorly graded, fine grained, some fine grained, subangular gravel. -petroleum hydrocarbon odour -dense, strong petroleum hydrocarbon odour below 1.5 m -saturated below 2.3 m -dark grey petroleum hydrocarbon staining at 2.6 m		1.07		2	25	
	2.0						3	40	
	3.0						4	60	
321.09			GRAVEL - Grey, saturated, well graded, fine to coarse grained, trace silt. -strong petroleum hydrocarbon odour -dark grey petroleum hydrocarbon staining at 3.35 m -sand lense (50 mm thick), dark grey, saturated, dense, poorly graded, fine grained, with oily sheen at 3.81 m				5	40	
	4.0						6	20	
	5.0						7	20	
318.81			SAND - Grey, saturated, dense, poorly graded, fine grained, trace silt. -slight petroleum hydrocarbon odour -lense of coarse grained gravel (25 mm ϕ) and cobbles at 5.5 m		5.57		8	30	
318.04	6.0		END OF HOLE @ 6.1 m Note: 1. Well flush mounted to grade.		6.10				

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd. INSPECTOR T. GALLO

APPROVED

DATE

19/06/001133

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 220°, 1.5 m from East to North running Barrier

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

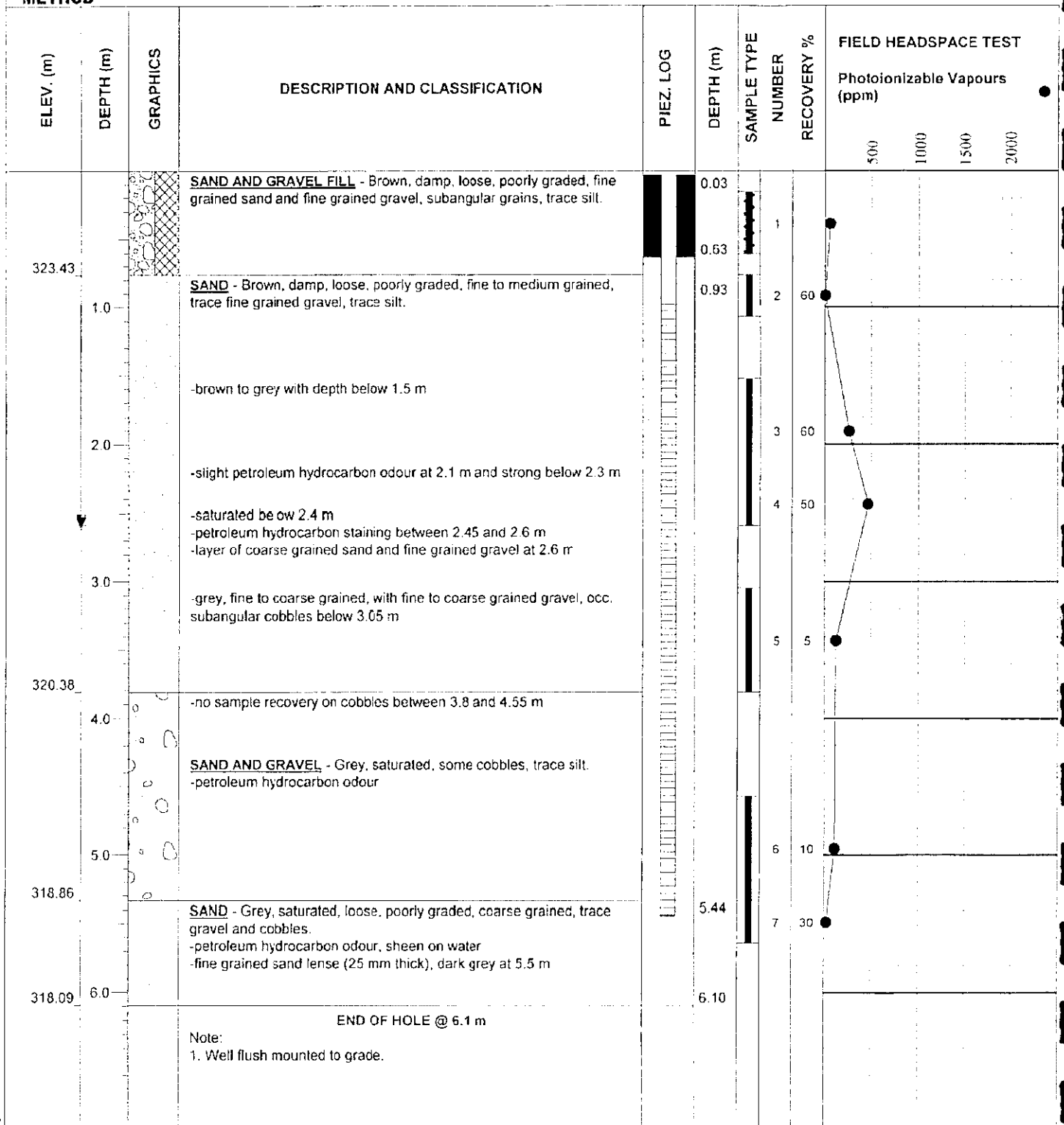
JOB NO. 00-434-08

GROUND ELEV. 324.19 m, Geodetic

TOP OF PVC ELEV. 324.16 m

WATER ELEV. 321.59 m, 26/05/00

DATE DRILLED 09/05/00



SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR T. GALLO

APPROVED

DATE 19/06/01

001134

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 154°, 20 m from East-West running Barrier of Lagoon #2
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 323.66 m, Geodetic
TOP OF PVC ELEV. 323.57 m
WATER ELEV. 321.57 m, 26/05/00
DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER RECOVERY %	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)
							500 1000 1500 2000
			SILT AND SAND - Dark brown, moist, soft, non plastic, and fine to medium grained sand, trace fine grained gravel.		0.09 0.12 0.37		
	1.0		-light brown below 0.75 m -damp between 0.75 and 1.5 m		0.67	1	
						2	
	2.0		-saturated, silt and fine grained sand, trace oxidation below 1.5 m			3	70
						4	80
	3.0						
	4.0						
319.09					4.57		
	5.0		END OF HOLE @ 4.57 m				
			Note: 1. Well flush mounted just above grade. Flush mount was built up with cuttings to elev. 323.86 m.				
	6.0						

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 220°, 8 m from East-West running Barrier of Lagoon #2

JOB NO. 00-434-08
GROUND ELEV. 323.99 m, Geodetic
TOP OF PVC ELEV. 323.91 m
WATER ELEV. 321.72 m, 26/05/00
DATE DRILLED 10/05/00

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
									Photoionizable Vapours (ppm)			
									500	1000	1500	2000
322.47			SAND FILL - Brown to grey, damp, loose, poorly graded, fine to medium grained, some fine grained gravel, trace silt.		0.08		1					
					0.13							
					0.23							
					0.53							
	1.0		-brown below 0.75 m				2					
							3	50				
	2.0		SAND - Grey, damp, loose, poorly graded, fine grained. -strong petroleum hydrocarbon odour				4	70				
							5	100				
	3.0		-saturated below 2.3 m									
	4.0				4.13							
319.42					4.57							
	5.0		END OF HOLE @ 4.57 m Note: 1. Well flush mounted to grade.									
	6.0											

SAMPLE TYPE ☒ AUGER GRAB ☐ SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 12/06/00

001136

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 173°, 12 m from an exposed rock located 3 m from Jackfish River

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

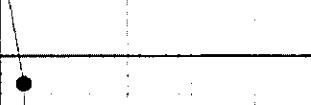
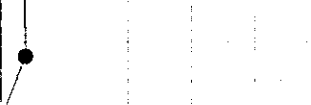
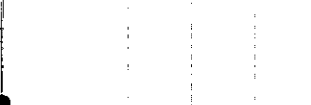
JOB NO. 00-434-08

GROUND ELEV. 323.56 m, Geodetic

TOP OF PVC ELEV. 323.43 m

WATER ELEV. 322.58 m, 26/05/00

DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
								Photoionizable Vapours (ppm)			
								500	1000	1500	2000
321.73	1.0		<u>SAND</u> - Brown, damp, loose, poorly graded, fine grained, trace silt.		0.13		1	60			
			-grey, saturated, strong petroleum hydrocarbon odour below 0.75 m		0.16						
			-petroleum hydrocarbon staining between 1.5 and 1.8 m		0.23						
			<u>SILT</u> - Grey, wet, firm, non plastic to low plasticity, trace clay.		0.37						
			-trace fine grained sand below 2.3 m								
318.99	2.0						2	60			
	3.0						3	60			
	4.0						4	60			
	5.0						5	80			
	6.0										
			END OF HOLE @ 4.57 m								
			Note: 1. Well flush mounted to grade.								

SAMPLE TYPE  AUGER GRAB  SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLC

APPROVED

DATE 19/06/001137

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 250°, 3.5 m from a hydro pole

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08

GROUND ELEV. 323.95 m, Geodetic

TOP OF PVC ELEV. 323.90 m

WATER ELEV. 322.18 m, 26/05/00

DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER RECOVERY %	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)
							500 1000 1500 2000
323.19			SAND FILL - Dark brown, damp, loose, poorly graded, fine to medium grained, and silt. -petroleum hydrocarbon odour		0.05 0.08 0.11 0.40	1	
	1.0		SAND AND SILT - Dark grey, moist, loose, poorly graded, fine grained, and silt. -petroleum hydrocarbon odour -wet below 1.2 m			2	
322.43			SILT AND SAND - Grey, saturated, firm, non plastic, and fine grained sand. -petroleum hydrocarbon staining at 1.5 m -sand lense (50 mm thick), fine grained, stained with petroleum hydrocarbons at 1.83 m			3 60	
	2.0					4	
321.66			SAND AND SILT - Grey, saturated, dense, poorly graded, fine grained, and silt. -petroleum hydrocarbon staining and odour at 2.44 m			5 70	
	3.0		-with silt below 3.05 m			6 60	
	4.0						
319.38			END OF HOLE @ 4.57 m		4.45 4.57		
	5.0		Note: 1. Well flush mounted to grade.				
	6.0						

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd. **INSPECTOR** T. GALLO

APPROVED _____ **DATE** 19/06/00 **001138**

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 226°, 14 m from a yellow painted metal well, and 1.5 m from Road

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

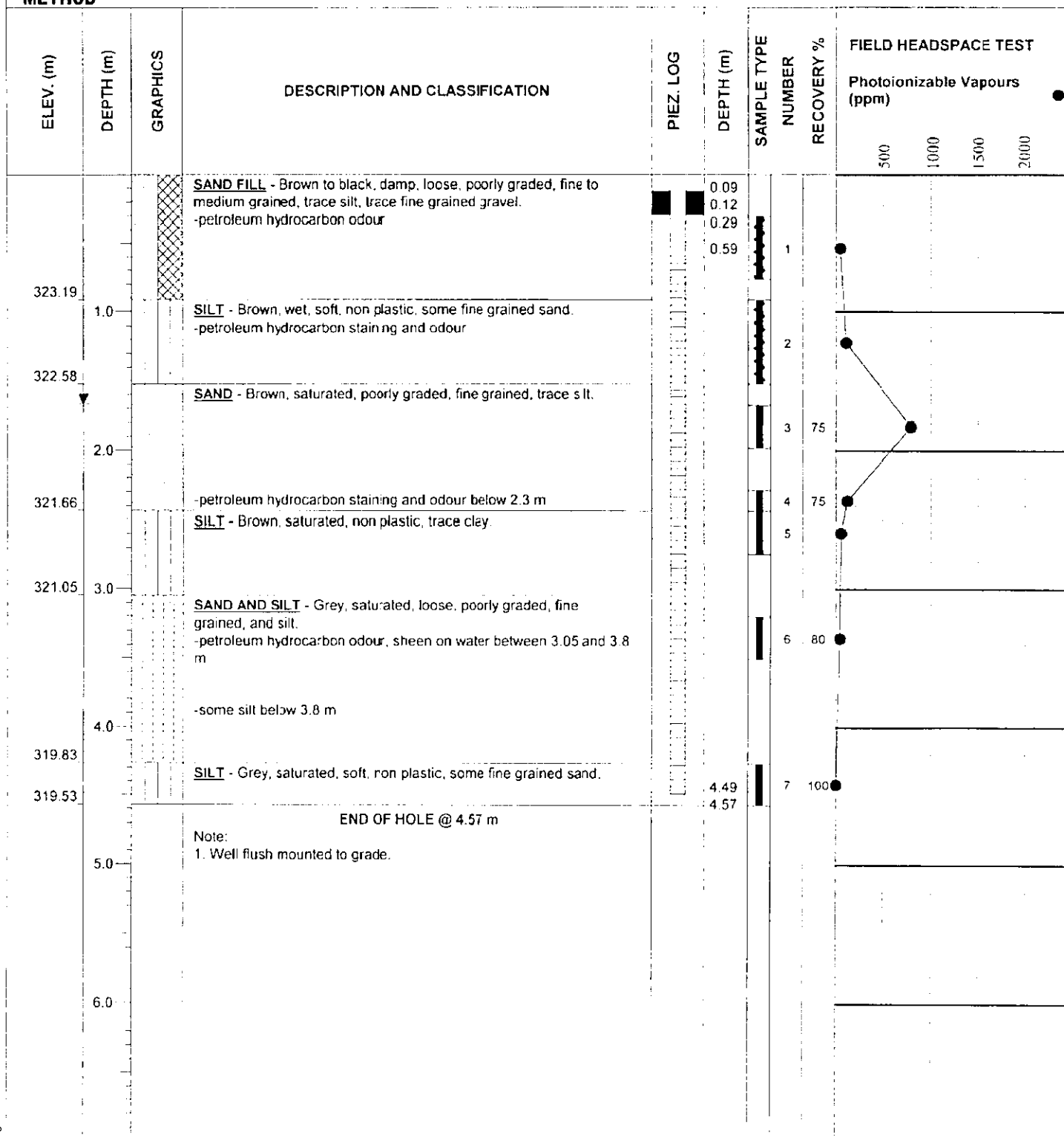
JOB NO. 00-434-08

GROUND ELEV. 324.10 m, Geodetic

TOP OF PVC ELEV. 324.01 m

WATER ELEV. 322.43 m, 26/05/00

DATE DRILLED 10/05/00



SAMPLE TYPE AUGER GRAB

SPLIT BARREL

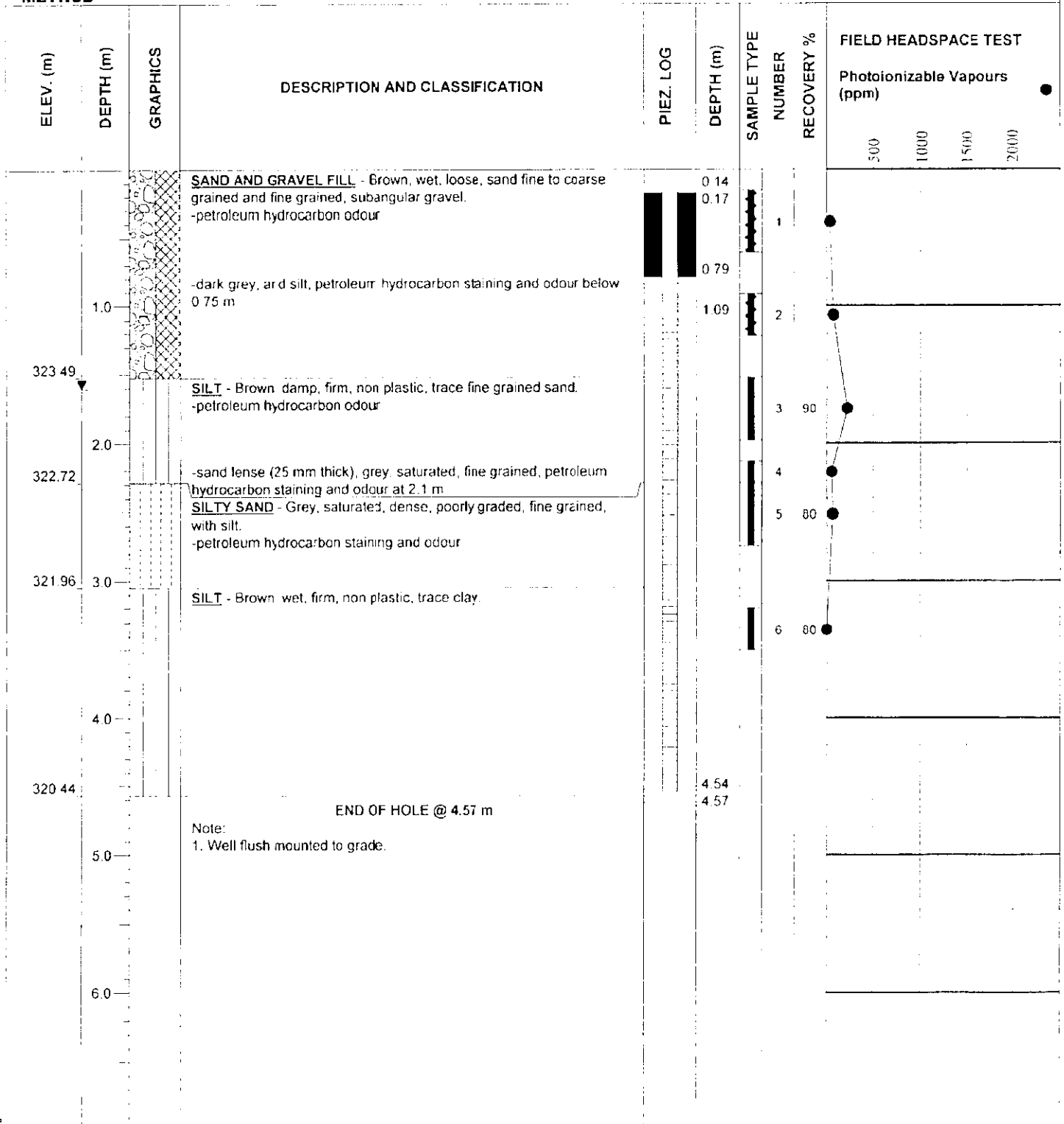
CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
T. GALLO

APPROVED

DATE 19/06/001139

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 1.5 m from concrete conduite running West from Roundhouse
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.01 m, Geodetic
TOP OF PVC ELEV. 324.87 m
WATER ELEV. 323.40 m, 26/05/00
DATE DRILLED 10/05/00



SAMPLE TYPE ☒ AUGER GRAB ☐ SPLIT BARREL
CONTRACTOR Paddock Drilling Ltd.
INSPECTOR T. GALLO

APPROVED:

DATE 19 06 001140

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 90°, 20 m from hydro pole, and 14°, 24 m from Waste Oil/Water Separator Building
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.62 m, Geodetic
TOP OF PVC ELEV. 325.48 m
WATER ELEV. 323.08 m, 26/05/00
DATE DRILLED 10/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)
325.01			<u>SAND AND GRAVEL FILL</u> - Brown, damp, loose, with red brick fragments. -petroleum hydrocarbon odour		0.14 0.17	1		
	1.0		<u>SAND</u> - Brown, wet, loose, poorly graded, fine grained, trace to some silt. -petroleum hydrocarbon staining and odour		0.92			
324.10			<u>SAND AND SILT</u> - Grey, wet, loose, fine grained sand and silt.		1.23	2		>2,000
323.33	2.0		<u>SAND</u> - Grey, moist, loose, poorly graded, fine grained, trace silt.			3	80	
	3.0		-saturated, strong petroleum hydrocarbon odour and staining between 3.05 and 3.35 m			4	60	
322.27			<u>SILT</u> - Brown, saturated, firm, non plastic, trace fine grained sand, trace clay.			5	70	
	4.0					6		
	5.0					7	60	
319.52	6.0		END OF HOLE @ 6.1 m		6.03 6.10			

Note:
1. Well flush mounted to grade.

SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

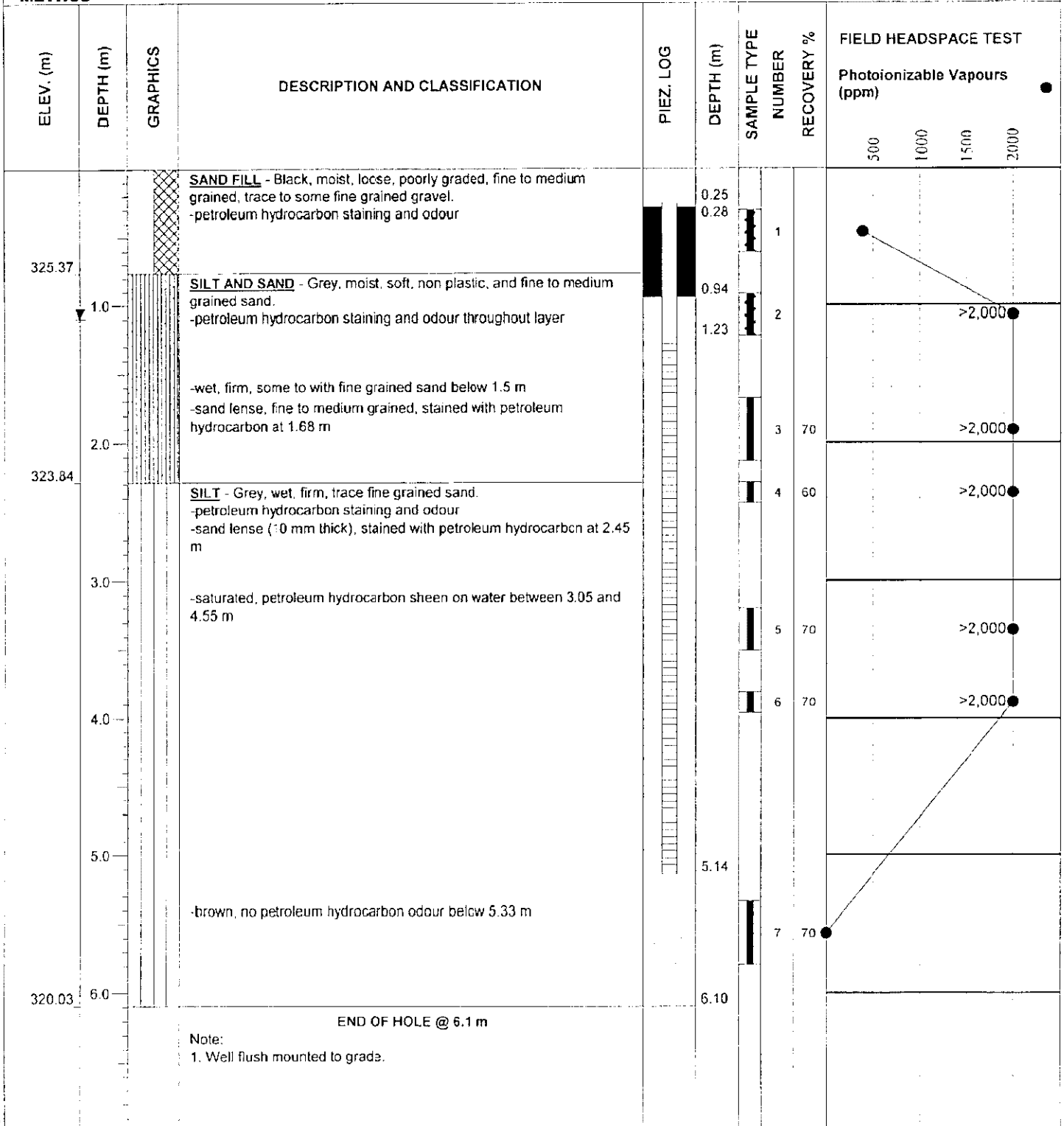
INSPECTOR
T. GALLO

APPROVED

DATE 19/06/001141

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 236°, 1.5 m from track entering South-West train door in Roundhouse
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 326.13 m, Geodetic
TOP OF PVC ELEV. 325.88 m
WATER ELEV. 325.04 m, 26/05/00
DATE DRILLED 11/05/00



SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 19/06/00 **001142**

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 60°, 3 m from mark on track that holds emergency derailment supply and bunk/cook cars
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 326.63 m, Geodetic
TOP OF PVC ELEV. 326.47 m
WATER ELEV. 324.58 m, 26/05/00
DATE DRILLED 11/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	FIELD HEADSPACE TEST
									Photoionizable Vapours (ppm)
									500 1000 1500 2000
			<u>SAND AND GRAVEL</u> - Brown to black, wet, loose, poorly graded, fine to medium grained sand, and fine grained, subangular gravel, and silt.		0.16 0.19		1		
					0.91 1.20		2		
325.11			<u>SILT</u> - Brown, moist to wet, firm, non plastic.				3	70	
	2.0		-organic lense (10 mm thick) at 1.8 m -grey to brown, wet below 1.8 m				4	75	
	3.0						5	70	
	4.0		-trace clay, trace oxidation below 3.05 m						
322.06					4.50 4.57				
	5.0		END OF HOLE @ 4.57 m						
	6.0		Note: 1. Well flush mounted to grade.						

SAMPLE TYPE ☒ AUGER GRAB ☐ SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

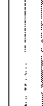
INSPECTOR
T. GALLO

APPROVED

DATE 19/06/001143

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 335°, 2 m from yellow post marking concrete underground Oil/Water Separator
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.88 m, Geodetic
TOP OF PVC ELEV. 325.81 m
WATER ELEV. 323.12 m, 26/05/00
DATE DRILLED 11/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
									Photoionizable Vapours (ppm)			
									500	1000	1500	2000
325.27			SAND FILL - Brown, damp, loose, poorly graded, fine to medium grained, some fine to medium grained gravel, trace silt.		0.07 0.10		1					
	1.0		SILT - Grey, moist, soft, non plastic, trace clay, trace fine grained sand. -petroleum hydrocarbon staining and odour		0.86							
			-no sample recovery between 1.52 and 2.29 m		1.16		2					
323.59			SAND - Grey, saturated, dense, poorly graded, fine grained, some silt. -petroleum hydrocarbon staining and odour -silt content decreased with depth									
	2.0											
			-trace silt below 3.05 m				3	80				
322.71			SILT - Brown to grey, wet, firm, non plastic. -clay lense (10 mm thick) at 3.35 m				4	80				
	3.0											
			-light brown at bottom of hole		4.46 4.57		5	80				
321.31			END OF HOLE @ 4.57 m									
	4.0		Note: 1. Well flush mounted to grade.									
	5.0											
	6.0											

SAMPLE TYPE  AUGER GRAB  SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 29/06/00 **001144**

CLIENT CN ENGINEERING LINE OPERATION EAST
PROJECT CN HORNEPAYNE YARD DRILLING
SITE CN HORNEPAYNE YARD, EAST END
LOCATION 46°, 5.5 m from furthest Northeast track running into Roundhouse
DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08
GROUND ELEV. 325.93 m, Geodetic
TOP OF PVC ELEV. 325.77 m
WATER ELEV. 324.18 m, 26/05/00
DATE DRILLED 11/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)
								500 1000 1500 2000
325.32			SAND FILL - Black, wet, loose, poorly graded, fine to medium grained, trace fine grained gravel, trace silt, oily.		0.16 0.19 0.36 0.66	1		
	1.0		SAND - Brown, saturated, loose, poorly graded, fine grained, trace to some silt.			2		
324.41			SILT - Brown, wet, firm, non plastic, trace oxidation. -sand lense (25 mm thick), grey, fine grained, stained with petroleum hydrocarbon at 1.68 m			3	60	
	2.0		-grey below 2.3 m -sand lense (13 mm thick), grey, fine grained, stained with petroleum hydrocarbon at 2.44 m -sand lense (50 mm thick), grey, fine grained, stained with petroleum hydrocarbon at 2.6 m			4	70	
	3.0					5	75	
	4.0							
321.36			END OF HOLE @ 4.57 m		4.56 4.57			
	5.0		Note: 1. Well flush mounted to grade.					
	6.0							

XXX 0043408 GPJ

SAMPLE TYPE  AUGER GRAB  SPLIT BARRELCONTRACTOR
Paddock Drilling Ltd.INSPECTOR
T. GALLO

APPROVED

DATE 19/06/001145

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 223°, 18 m from concrete lid on Manhole #1

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

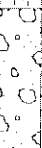
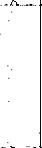
JOB NO. 00-434-08

GROUND ELEV. 325.45 m, Geodetic

TOP OF PVC ELEV. 325.41 m

WATER ELEV. 322.41 m, 26/05/00

DATE DRILLED 12/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)			
								500	1000	1500	2000
324.54	1.0		<u>SAND FILL</u> - Black, moist, loose, poorly graded, fine to medium grained, and fine grained, subangular gravel.		0.04 0.07 0.24 0.54	1	•				
323.93	2.0		<u>SILTY SAND</u> - Grey, moist, loose, poorly graded, fine grained, and silt, with oxidation.			2	•				
323.16	3.0		<u>GRAVEL AND SAND</u> - Grey, damp to moist, fine to coarse grained gravel and fine to medium grained sand.			3	40 •				
322.40	4.0		<u>SAND</u> - Grey to brown, moist, loose, poorly graded, fine grained. -sand and fine grained gravel below 2.45 m			4	40 •				
321.18	5.0		<u>GRAVEL</u> - Saturated, petroleum hydrocarbon staining and odour, with oily sheen on water. -some cobbles below 3.8 m		4.15 4.27	5	30 •				
	6.0		<u>AUGER REFUSAL ON POSSIBLE BOULDER @ 4.27 m</u> Note: 1. Well flush mounted to grade.			6	10 •				

SAMPLE TYPE  AUGER GRAB  SPLIT BARREL

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE

19/06/001146

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 56°, 14 m from Manhole #1

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

JOB NO. 00-434-08

GROUND ELEV. 325.97 m, Geodetic

TOP OF PVC ELEV. 325.91 m

WATER ELEV. 323.54 m, 26/05/00

DATE DRILLED 12/05/00

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	FIELD HEADSPACE TEST			
								Photoionizable Vapours (ppm)			
								500	1000	1500	2000
			<u>SILT</u> - Brown, dry to damp, friable, non plastic, trace clay, trace fine grained sand.		0.06 0.09 0.36 0.66	1					
	1.0										
			-olive colour, no sand below 1.5 m -moist to wet between 1.5 and 2.3 m			2					
	2.0										
			-saturated below 2.3 m -silt and fine grained sand lense (50 mm thick) at 2.45 m			3	75				
	3.0										
322.92			<u>SILT AND SAND</u> - Olive colour, saturated, and fine grained sand, with oxidation.			4	70				
322.16			<u>SAND</u> - Brown, saturated, loose, poorly graded, fine to medium grained.			5	70				
	4.0										
						6	70				
321.40					4.41 4.57						
			END OF HOLE @ 4.57 m								
	5.0		Note: 1. Well flush mounted to grade.								
	6.0										

SAMPLE TYPE ☒ AUGER GRAB ☐ SPLIT BARREL

CONTRACTOR

Paddock Drilling Ltd.

INSPECTOR

T. GALLC

APPROVED

DATE

19/06/00 **001147**



SUMMARY LOG

HOLE NO.

MW-116

SHEET 1 of 1

CLIENT CN ENGINEERING LINE OPERATION EAST

PROJECT CN HORNEPAYNE YARD DRILLING

SITE CN HORNEPAYNE YARD, EAST END

LOCATION 120°, 3 m from concrete wall on Northeast corner of Roundhouse

DRILLING METHOD 105 mm ø Hollow Stem Auger, 25 mm ø Split Spoon, ACKER SX

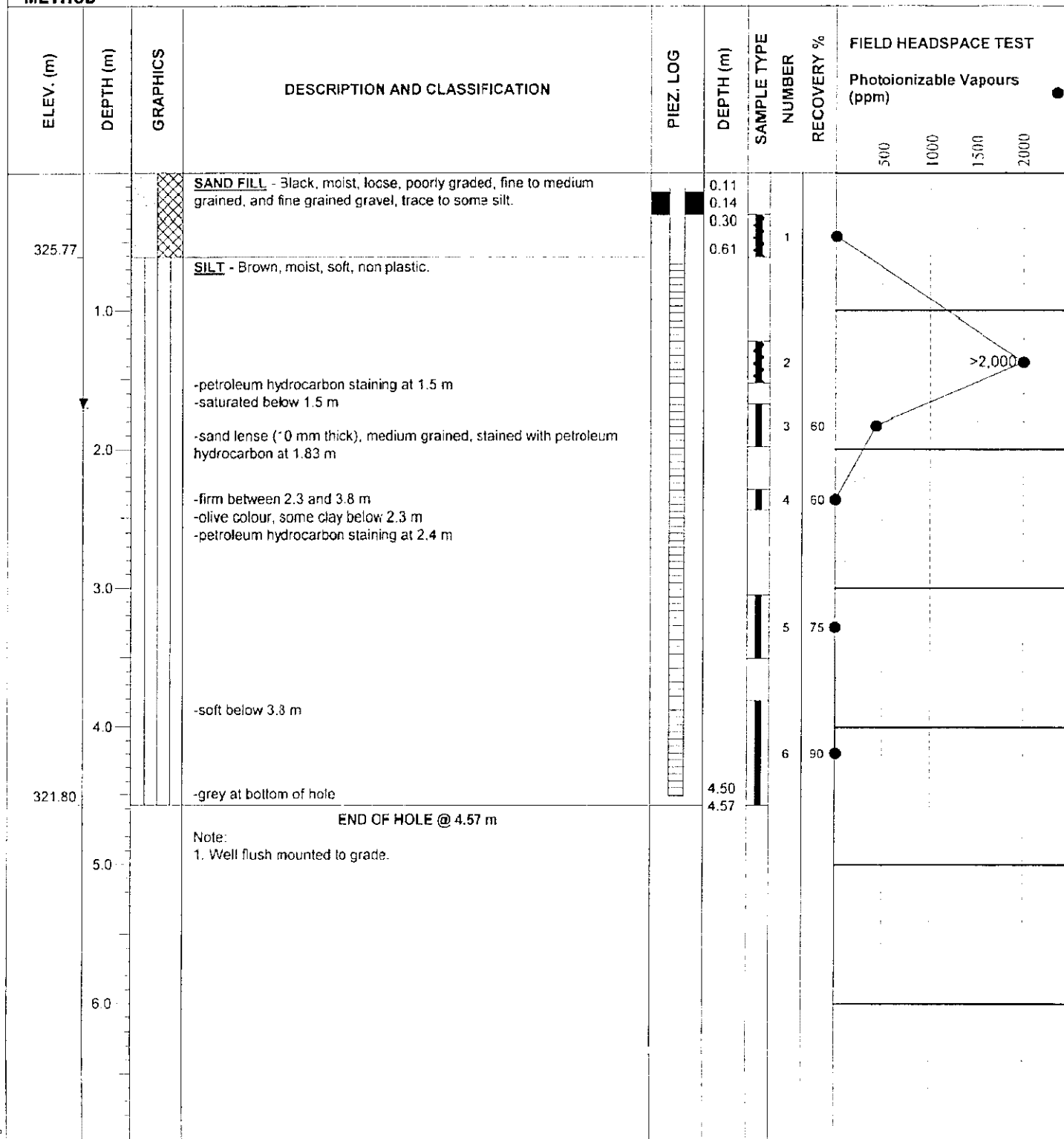
JOB NO. 00-434-08

GROUND ELEV. 326.38 m, Geodetic

TOP OF PVC ELEV. 326.27 m

WATER ELEV. 324.67 m, 26/05/00

DATE DRILLED 12/05/00



SAMPLE TYPE AUGER GRAB SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR T. GALLO

APPROVED

DATE 19/06/00

001148

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION 4m S of Tracks and 3 m W of MW66

DRILLING METHOD 110 mm Ø Hollow Stem Auger, ACKER SX Drill Rig

JOB NO. 01-434-07

GROUND ELEV. 326.18 m, Geodetic

TOP OF PVC ELEV. 326.42 m

WATER ELEV. 323.93 m, 09/10/01

DATE DRILLED 25/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm)				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm)			
							500	1000	1500	2000	1000	2000	3000	4000
325.88	0.5		<u>SAND AND GRAVEL FILL</u> - Black, damp, compact, poorly graded, fine to medium grained sand, and fine grained, subangular gravel. <u>CINDER FILL</u> - Black, moist to wet, compact.			1								
324.66	1.5		<u>SAND</u> - Light brown, damp, loose, poorly graded, fine grained. -moist to wet, fine to medium grained, trace organics below 1.85 m		1.07 1.22	2								
324.05	2.0		<u>PEAT</u> - Black, wet, soft, some wood fragments.			3								
323.82	2.5		<u>SILT</u> - Grey, wet, compact, non plastic.			4								
	3.0					5								
	3.5		-trace fine grained gravel below 3.35 m -trace petroleum hydrocarbon sheen at 3.35 m -compact to dense below 3.5 m -grey petroleum hydrocarbon staining at 3.5 m -sand lense (10 mm thick), fine to medium grained, black petroleum hydrocarbon staining and sheen at 3.95 m -stained grey from 4.0 to 4.55 m -no staining below 4.55 m			6								
	4.0					7								
	4.5					8								
320.70	5.5		END OF HOLE @ 5.49 m		5.49									
	6.0		Note: 1. Well flush mounted to grade.											
	6.5													
	7.0													
	7.5													
	8.0													
	8.5													
	9.0													
	9.5													

SAMPLE TYPE SPLIT BARREL

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR D. B. KAGUR

APPROVED _____ DATE 16/05/02

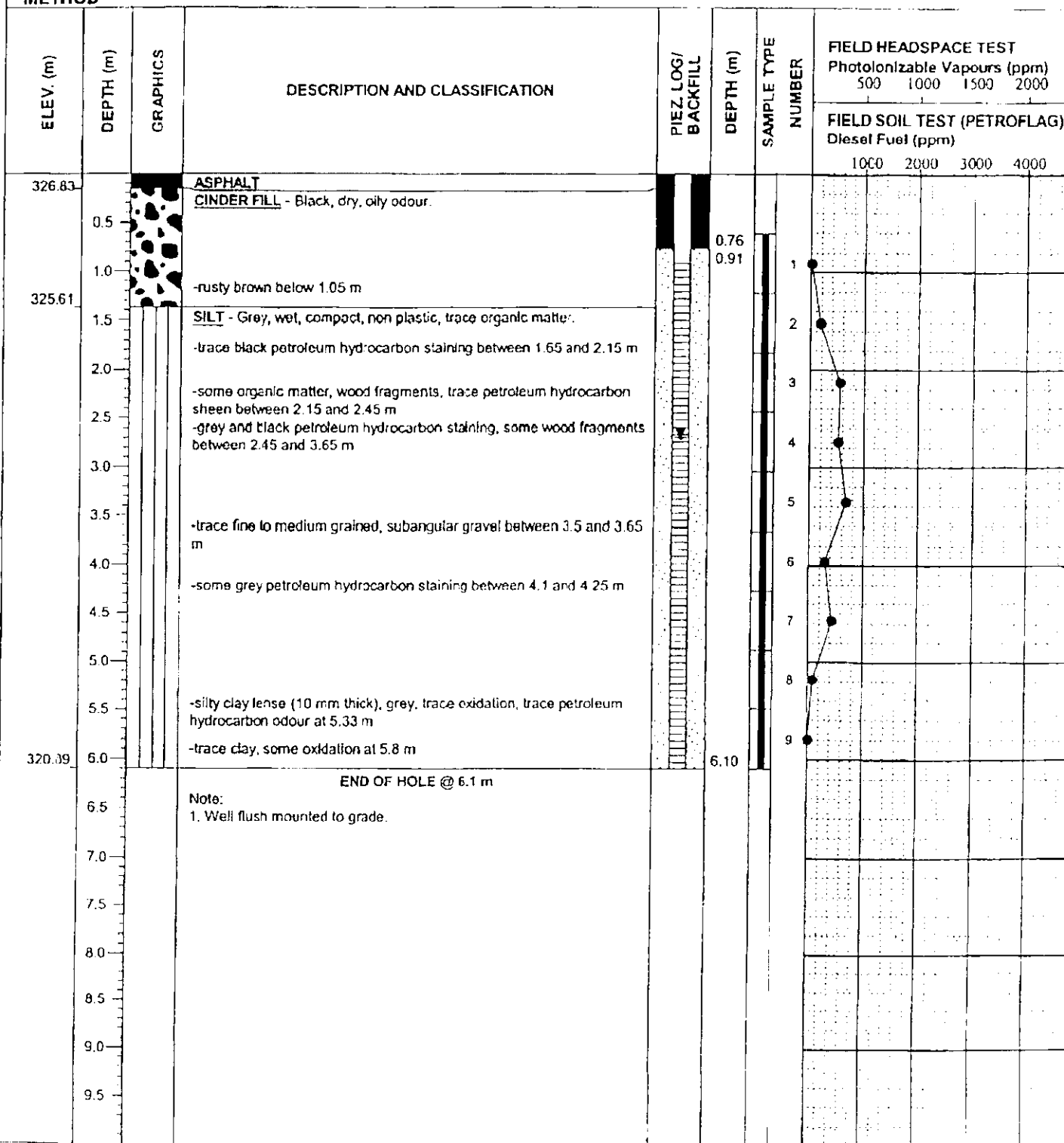
001149

**KGS
GROUP****SUMMARY LOG**

HOLE NO

MW118

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST**PROJECT** ENVIRONMENTAL INVESTIGATION**SITE** HORNEPAYNE YARD**LOCATION** 3 m W of MW33 between Rails**DRILLING METHOD** 110 mm Ø Hollow Stem Auger, ACKER SX Drill Rig**JOB NO.** 01-434-07**GROUND ELEV.** 326.98 m, Geodetic**TOP OF PVC ELEV.** 327.11 m**WATER ELEV.** 324.29 m, 09/10/01**DATE DRILLED** 25/07/01**SAMPLE TYPE** **SPLIT BARREL****CONTRACTOR**
Paddock Drilling Ltd.**INSPECTOR**
D. D. KASUR**APPROVED****DATE** 16/05/02 **001150**

**KGS
GROUP****SUMMARY LOG**

HOLE NO.

MW119

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST**PROJECT** ENVIRONMENTAL INVESTIGATION**SITE** HORNEPAYNE YARD**LOCATION** 7.5 m S of OW8-2 and 3.5 m W of OW8-2**DRILLING METHOD** 125 mm ø Solid Stem Auger, Acker SX Drill Rig**JOB NO.** 01-434-07**GROUND ELEV.** 327.76 m, Geodetic**TOP OF PVC ELEV.** 327.64 m**WATER ELEV.** 323.72 m, 22/08/01**DATE DRILLED** 26/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
								500	1000	1500	2000	1000	2000	3000	4000
326.85	0.5		SAND AND GRAVEL FILL - Brown, damp, loose, poorly graded, fine grained sand, and fine to coarse grained, subangular gravel.				1								
326.09	1.0		SILTY SAND - Brown, moist to wet, loose, poorly graded, fine to medium grained, some silt, trace fine to coarse grained, subangular gravel.		1.22		2								
	1.5		-occ. cobbles at 1.2 m		1.52										
325.33	2.0		SILT - Grey, damp, dense, non plastic, trace fine grained sand and fine grained, subangular gravel.				3								
	2.5		SILTY SAND - Grey, damp, dense, poorly graded, fine grained, some fine grained gravel.				4								
324.72	3.0		PEAT - Black, moist to wet, compact, some wood fragments.												
324.56	3.5		SILTY SAND - Grey, moist to wet, dense, poorly graded, medium to coarse grained, some silt, some fine to medium grained gravel.				5								
	4.0		-trace clay between 3.35 and 3.8 m		3.96										
323.50	4.5		SILT - Grey, wet, dense, non plastic, trace fine grained sand.				6								
	5.0														
	5.5				5.49		7								
321.67	6.0				6.10		8								
	6.5		END OF HOLE @ 6.1 m												
	7.0		Note: 1. Well flush mounted to grade.												
	7.5														
	8.0														
	8.5														
	9.0														
	9.5														

SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
D. B. KASUR

APPROVED _____

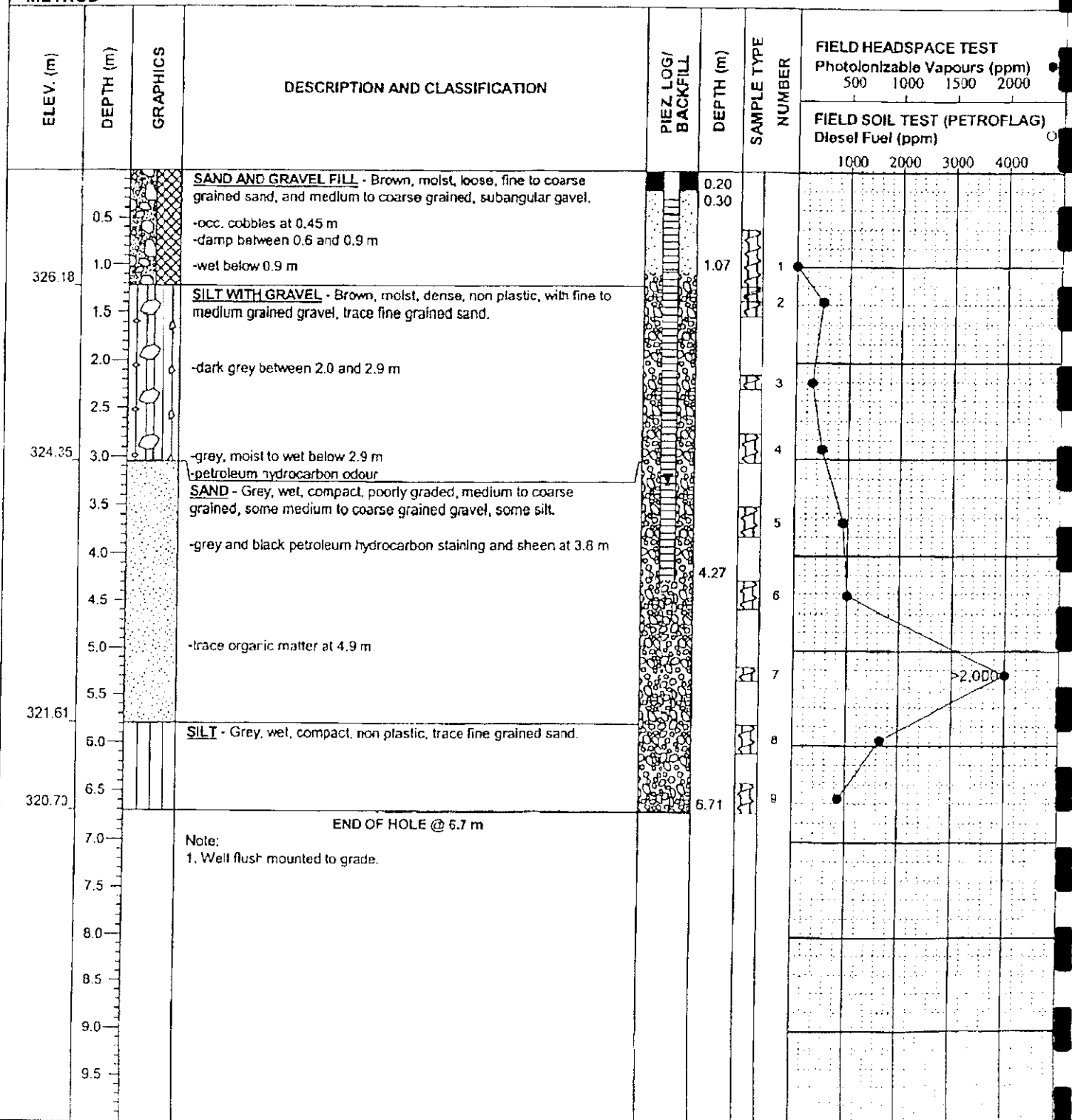
DATE 16/05/001151

**KGS
GROUP****SUMMARY LOG**

HOLE NO.

MW120

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST**PROJECT** ENVIRONMENTAL INVESTIGATION**SITE** HORNEPAYNE YARD**LOCATION** Halfway between Ends of Concrete Pad, 2 Tracks South of Fuelling Stand**DRILLING METHOD** 125 mm ø Solid Stem Auger, Acker SX Drill Rig**JOB NO.** 01-434-07**GROUND ELEV.** 327.40 m, Geodetic**TOP OF PVC ELEV.** 327.33 m**WATER ELEV.** 324.14 m, 22/08/01**DATE DRILLED** 26/07/01

SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
D. B. KASUR

APPROVED

DATE 16/05/001152

**KGS
GROUP****SUMMARY LOG**

HOLE NO.

MW121

SHEET 1 of 1

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 1.5 m S and 20 m E of SE Corner of Fuelling Stand Concrete Pad
DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

JOB NO. 01-434-07
GROUND ELEV. 327.45 m, Geodetic
TOP OF PVC ELEV. 327.31 m
WATER ELEV. 323.31 m, 22/08/01
DATE DRILLED 26/07/01

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ● 500 1000 1500 2000	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○ 1000 2000 3000 4000
326.08	0.5		SAND AND GRAVEL FILL - Brown, damp, compact, poorly graded, fine to medium grained sand, and medium to coarse grained, subangular gavel, some silt, trace cobbles.		0.46 0.61	1		
	1.0		-moist to wet, petroleum hydrocarbon odour at 0.9 m			2		
	1.5		SILT - Grey, moist, dense, non plastic, some fine grained sand and gravel.			3		
	2.0		-brown, damp between 1.5 and 2.45 m			4		
	2.5		-very dense below 1.5 m			5		
324.25	3.0		-grey, moist to wet, petroleum hydrocarbon odour below 2.45 m			6		
323.79	3.5		PEAT - Dark brown, wet, dense, some wood fragments.			7		
	4.0		INTERLAYERED SILTY SAND AND SANDY SILT - Grey, moist to wet, compact, interlayered sandy silt and medium to coarse grained sand, with fine to coarse grained gravel, layers 50-125 mm thick.			8		
323.03	4.5		PEAT - Dark brown, wet, dense, some wood fragments.			9		
322.88	5.0		SILT - Grey, wet, dense, non plastic, trace fine grained sand, traces of clay.			10		
322.27	5.5		SILTY SAND - Grey, wet, loose, poorly graded, medium to coarse grained, some silt, trace fine to medium grained gravel.		5.18	11		
321.35	6.0		END OF HOLE @ 6.1 m		6.10	12		
	6.5		Note: 1. Well flush mounted to grade.					
	7.0							
	7.5							
	8.0							
	8.5							
	9.0							
	9.5							

SAMPLE TYPE AUGER GRAB

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 D. B. KASUR

APPROVED

DATE 16/05/02 **001153**

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION 1.5 m N of N Track and 1.25 m W of SE Corner of Concrete Pad Fuelling
Stand

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

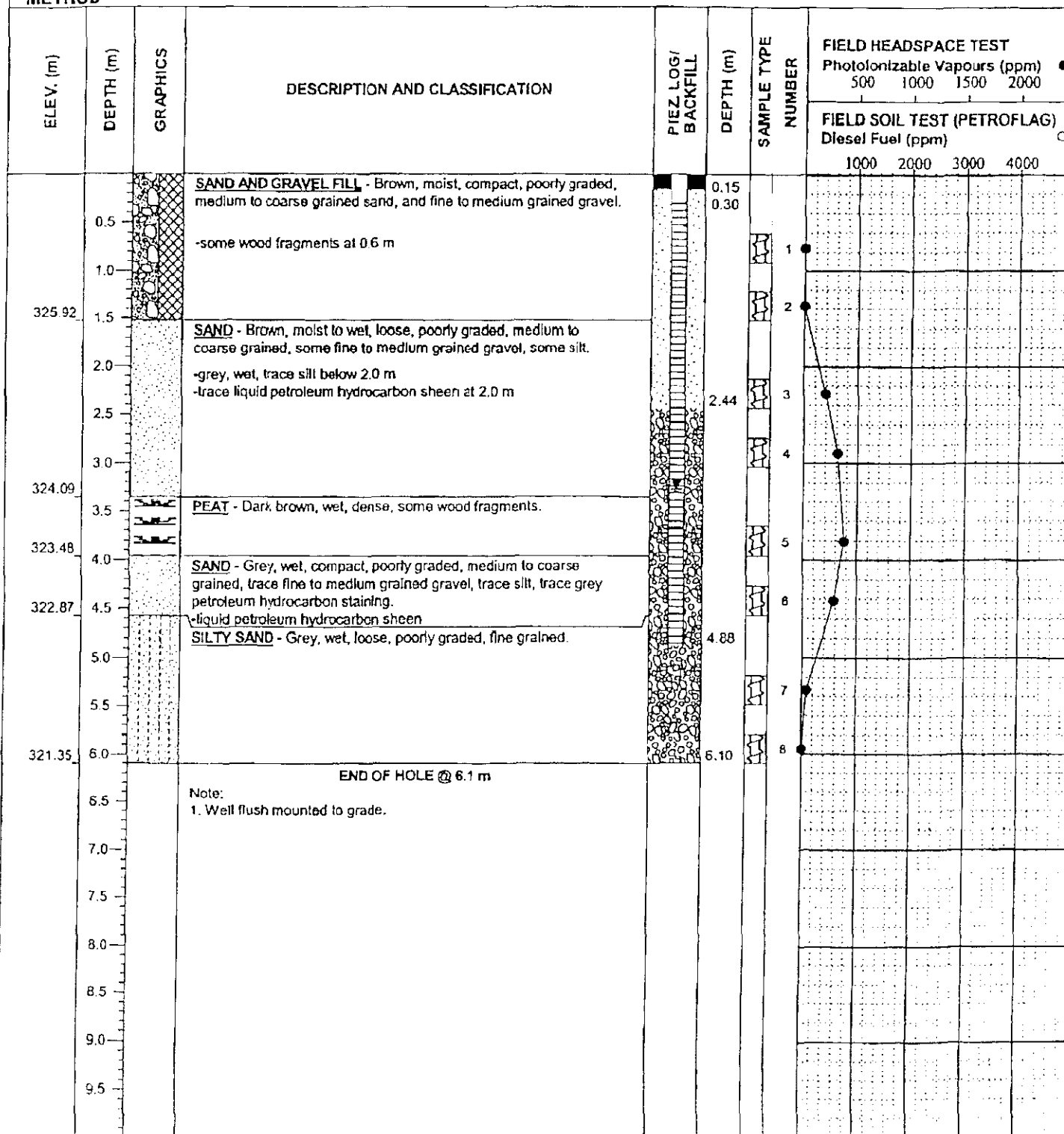
JOB NO. 01-434-07

GROUND ELEV. 327.45 m, Geodetic

TOP OF PVC ELEV. 327.34 m

WATER ELEV. 324.17 m, 22/08/01

DATE DRILLED 26/07/01



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
D. B. KASUR

APPROVED

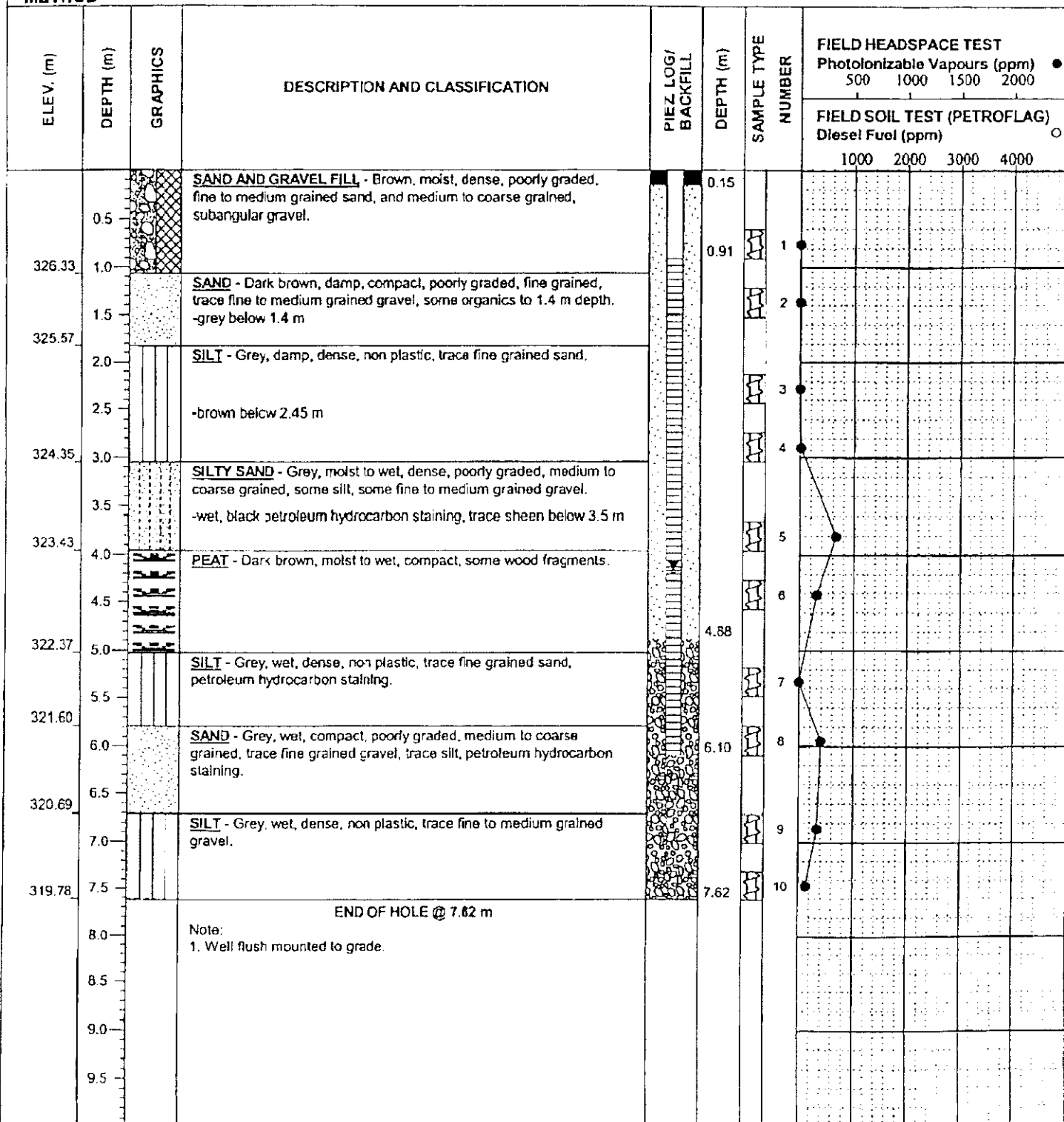
DATE 16/05/02

001154

CLIENT CN CORPORATE ENVIRONMENT EAST
PROJECT ENVIRONMENTAL INVESTIGATION
SITE HORNEPAYNE YARD
LOCATION 1.5 m S of 2nd Post on Fence and 0.5 m E of OW8-1

JOB NO. 01-434-07
GROUND ELEV. 327.40 m, Geodetic
TOP OF PVC ELEV. 327.31 m
WATER ELEV. 323.23 m, 22/08/01
DATE DRILLED 26/07/01

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
D. B. KASUR

APPROVED

DATE 16/07/01 001155

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION 41 m E of OW3-2, 23.5 m E of small Hydro Post and Light, 0.5 m from Rail

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

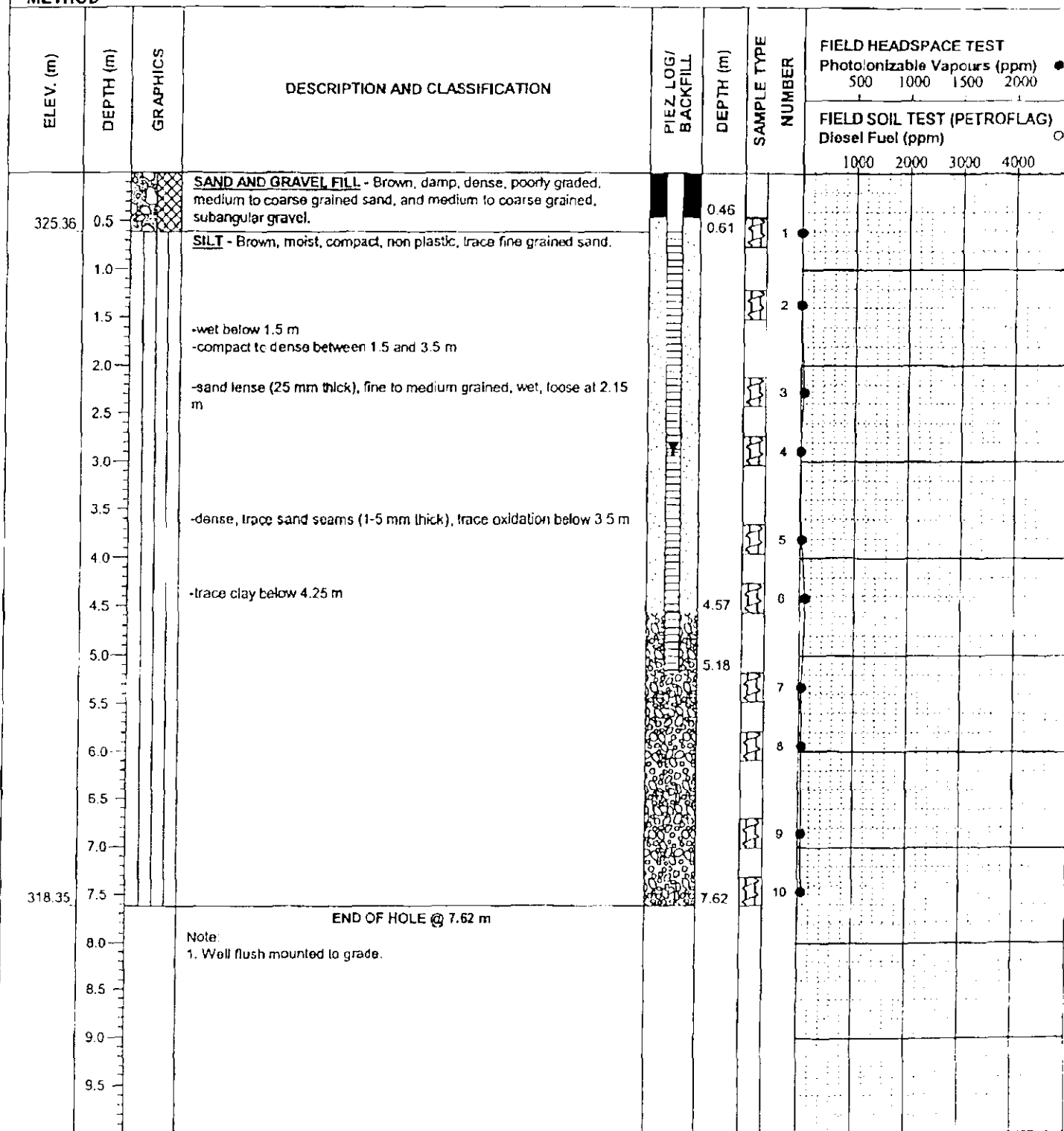
JOB NO. 01-434-07

GROUND ELEV. 325.97 m, Geodetic

TOP OF PVC ELEV. 325.79 m

WATER ELEV. 323.06 m, 09/10/01

DATE DRILLED 27/07/01



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
D. B. KASUR

APPROVED

DATE 16/05/01 001156

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION 10 m E of MW110, 3.5 m S of Rail

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

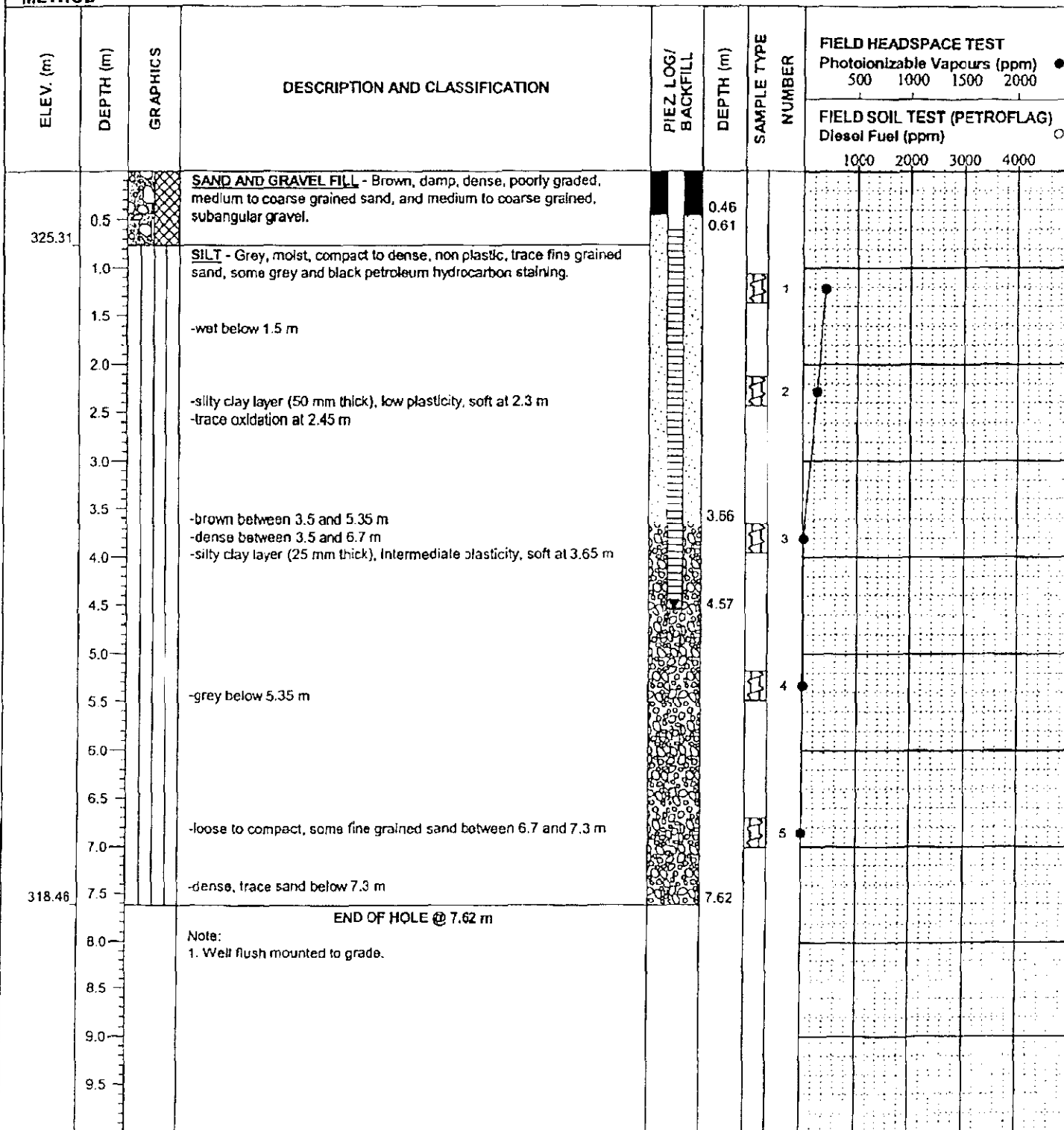
JOB NO. 01-434-07

GROUND ELEV. 326.08 m, Geodetic

TOP OF PVC ELEV. 325.86 m

WATER ELEV. 321.52 m, 09/10/01

DATE DRILLED 27/07/01



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
D. B. KASUR

APPROVED

DATE 16/05/03

001157

CLIENT CN CORPORATE ENVIRONMENT EAST

PROJECT ENVIRONMENTAL INVESTIGATION

SITE HORNEPAYNE YARD

LOCATION 2 m North of NW Corner of Concrete Pad

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

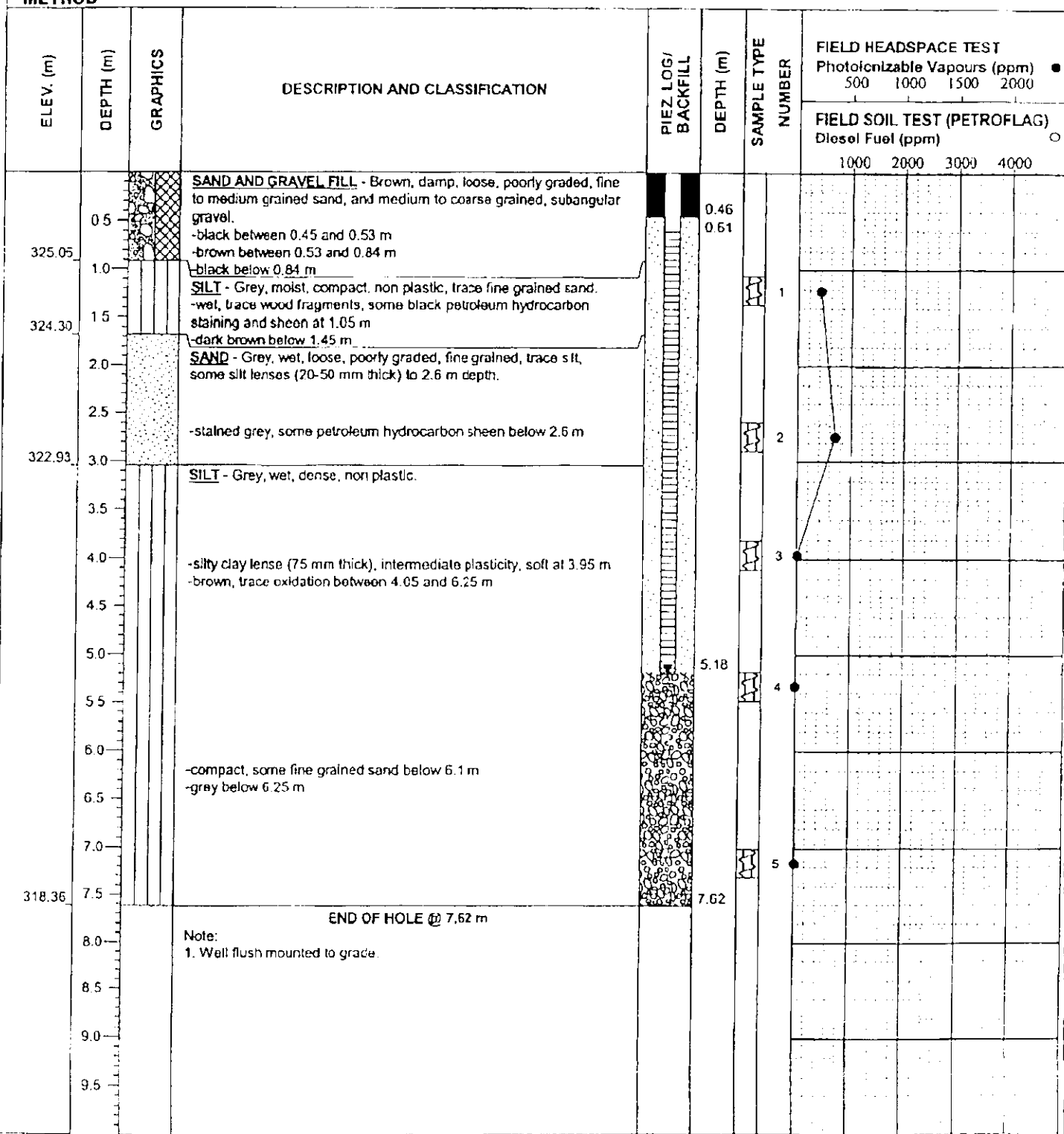
JOB NO. 01-434-07

GROUND ELEV. 325.98 m, Geodetic

TOP OF PVC ELEV. 325.82 m

WATER ELEV. 320.77 m, 09/10/01

DATE DRILLED 27/07/01



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
D. B. KASUR

APPROVED

DATE 16/05/01 001158

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.30 m, Geodetic
TOP OF PVC ELEV. 327.20 m
WATER ELEV. 325.97 m, 16/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

DATE DRILLED 01/08/02

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
								500	1000	1500	2000	1000	2000	3000	4000
	0.5		<u>SAND AND GRAVEL FILL</u> - Brown, moist, well graded, fine grained sand to coarse grained gravel. -dark grey, wet below 0.45 m		0.40		1	0							
326.08	1.0		<u>SAND FILL</u> - Grey, moist, well graded, fine to coarse grained, trace fine grained gravel, trace silt, trace organic matter.				2	0							
325.93	1.5		<u>PEAT</u> - Dark brown, moist.				3	0							
325.47	2.0		<u>SILT</u> - Olive grey, moist, some clay.		1.83		4	0							
	2.5		<u>SANDY SILT</u> - Olive grey, moist, some sand, trace fine to coarse grained gravel, trace clay.		2.59		5	0							
324.71	3.0		-light grey, some clay between 3.0 and 4.0 m				6	0							
	3.5		-light brown, trace clay, trace fine grained gravel below 4.0 m				7	0							
	4.0						8	0							
322.73	4.5		END OF HOLE @ 4.57 m		4.57										
	5.0		Note: 1. Well flush mounted to grade.												
	5.5														
	6.0														
	6.5														

SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

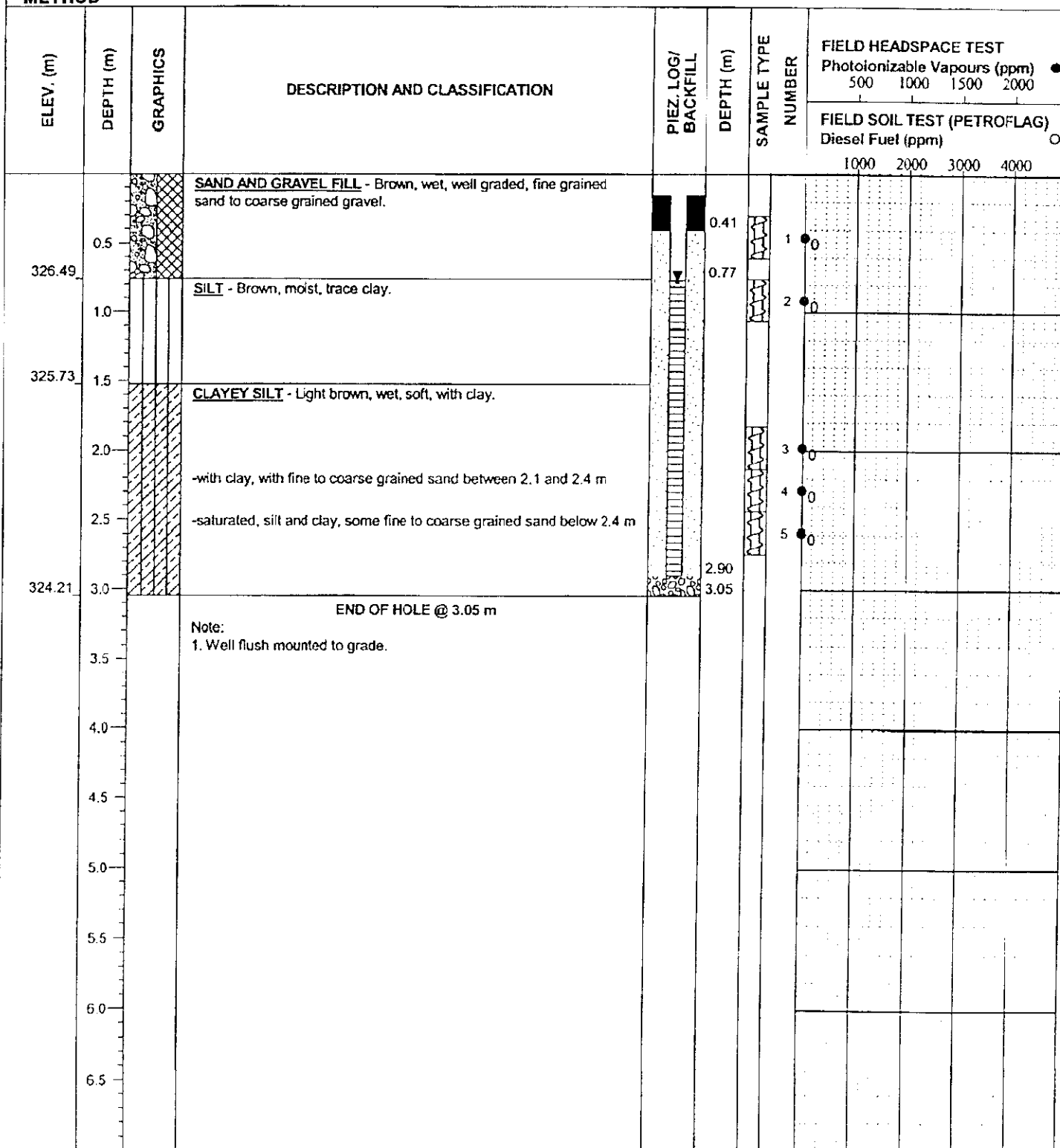
APPROVED

DATE 06/03/03 001159

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.25 m, Geodetic
TOP OF PVC ELEV. 327.10 m
WATER ELEV. 326.48 m, 16/08/02
DATE DRILLED 01/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 25/02/03

001160

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.26 m, Geodetic
TOP OF PVC ELEV. 327.18 m
WATER ELEV. 326.47 m, 16/08/02
DATE DRILLED 01/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
							500	1000	1500	2000	1000	2000	3000	4000
326.50	0.5		<u>SAND AND GRAVEL FILL</u> - Dark brown, moist, well graded, fine grained sand to coarse grained gravel.		0.61	1 ●	0							
	1.0		<u>SILT</u> - Grey to brown, moist.		0.77	2 ●	0							
	1.5		-oxidized between 1.2 and 1.5 m			3 ●	0							
	2.0		-light grey, wet, trace clay below 1.5 m			4 ●	0							
	2.5					5 ●	0							
324.21	3.0		END OF HOLE @ 3.05 m		2.90 3.05									
	3.5		Note: 1. Well flush mounted to grade.											
	4.0													
	4.5													
	5.0													
	5.5													
	6.0													
	6.5													

SAMPLE TYPE  AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 25/02/02

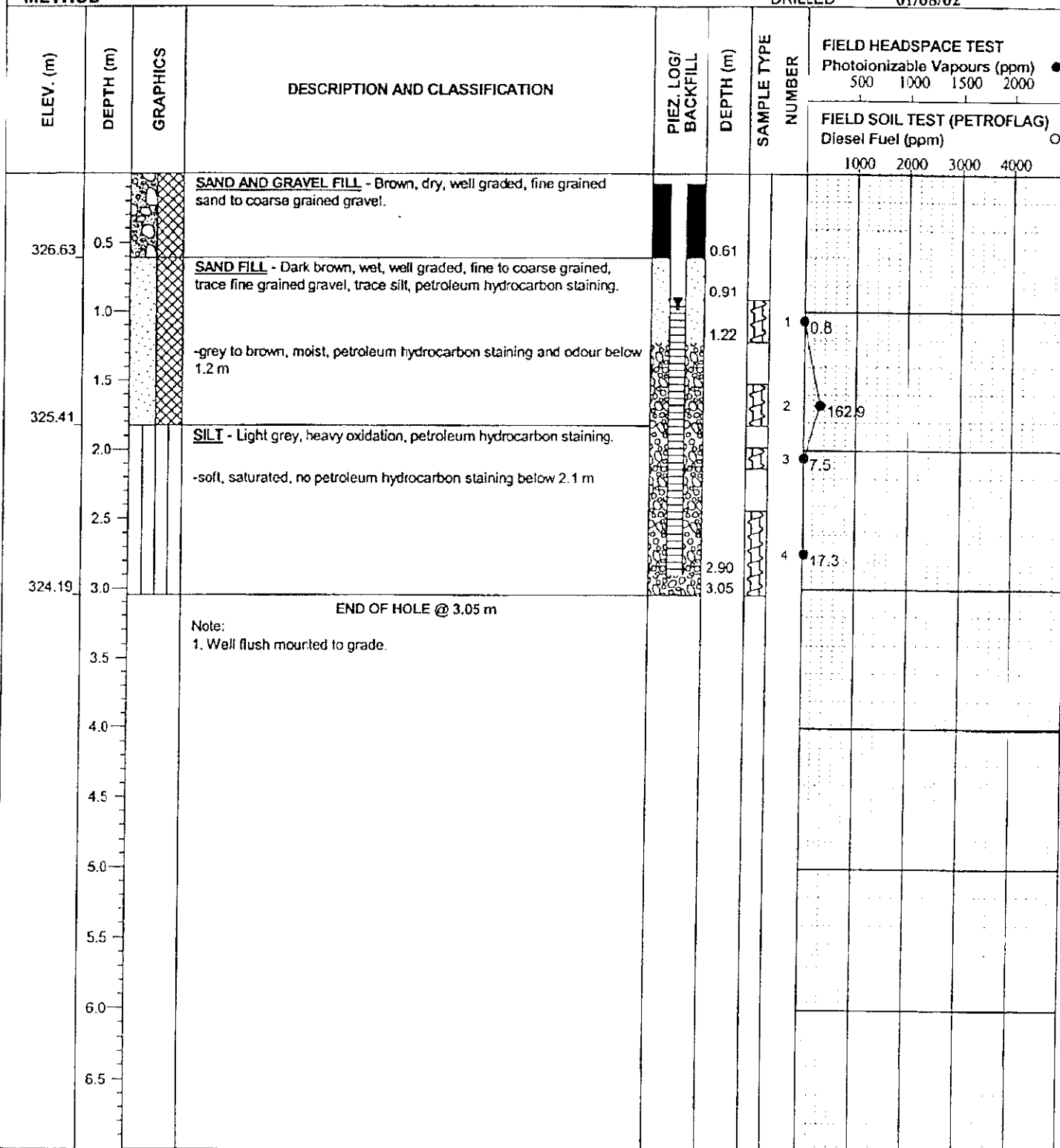
001161

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.24 m, Geodetic
TOP OF PVC ELEV. 327.17 m
WATER ELEV. 326.27 m, 16/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

DATE DRILLED 01/08/02



SAMPLE TYPE  AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 06/03/03

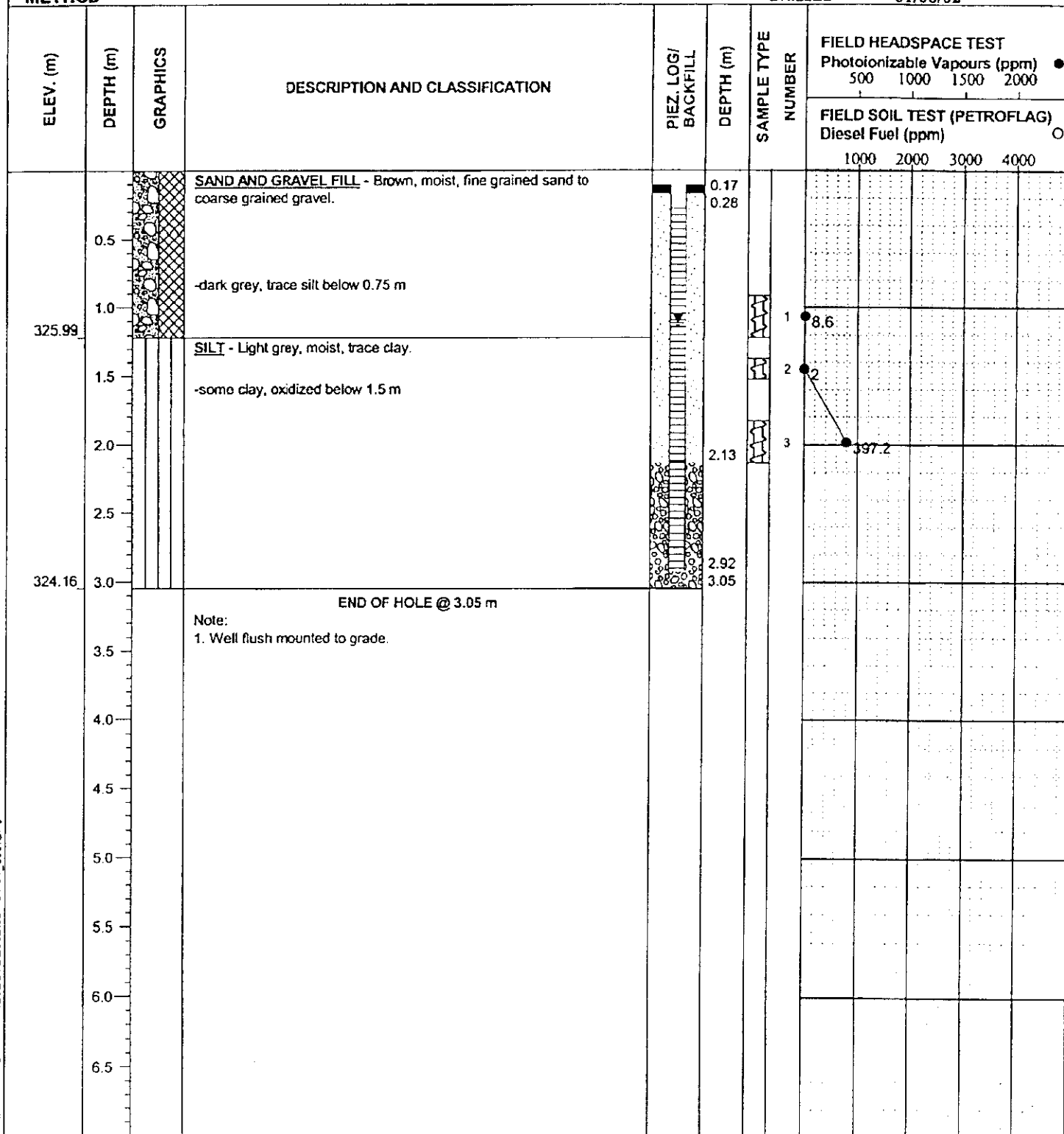
001162

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.21 m, Geodetic
TOP OF PVC ELEV. 327.10 m
WATER ELEV. 326.09 m, 16/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig

DATE DRILLED 01/08/02



SAMPLE TYPE  AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

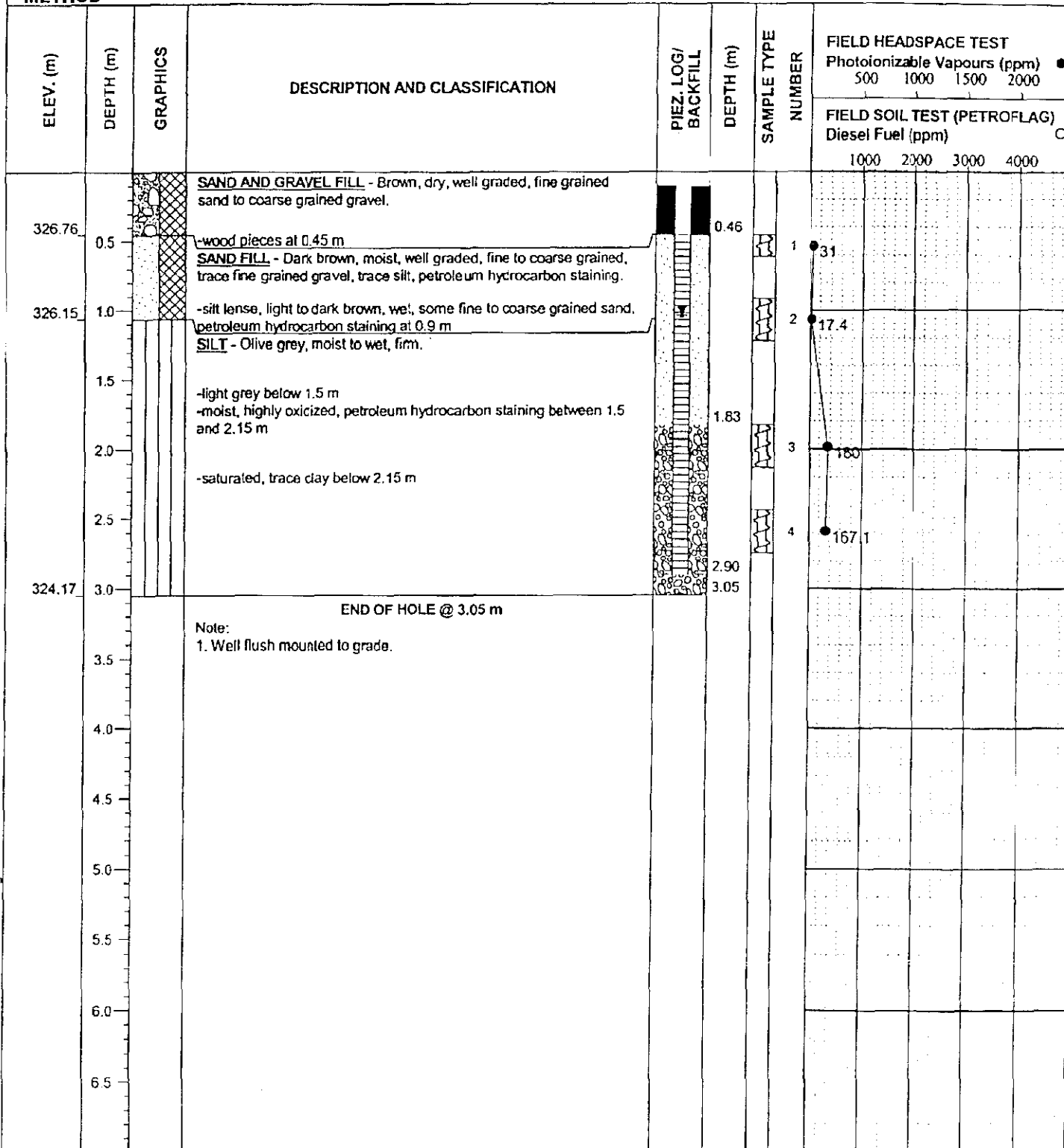
APPROVED

DATE 06/03/001163

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.22 m, Geodetic
TOP OF PVC ELEV. 327.12 m
WATER ELEV. 326.18 m, 16/08/02
DATE DRILLED 01/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig



SAMPLE TYPE AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

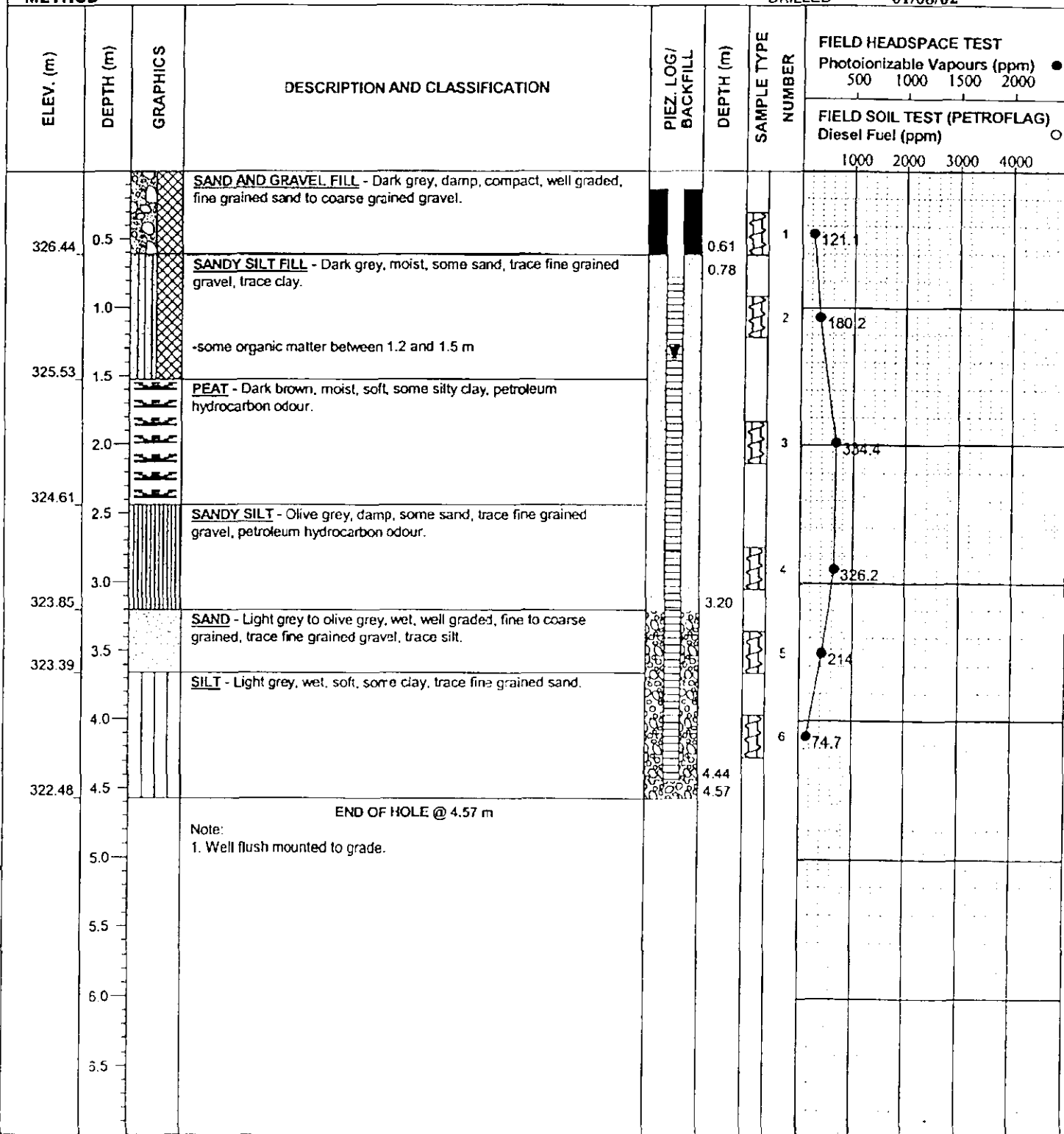
DATE 25/02/03

001164

CLIENT CANADIAN NATIONAL
PROJECT CN HORNEPAYNE YARD - EAST END DRILLING
SITE HORNEPAYNE YARD
LOCATION See Site Plan

JOB NO. 02-434-04.600
GROUND ELEV. 327.05 m, Geodetic
TOP OF PVC ELEV. 326.91 m
WATER ELEV. 325.68 m, 16/08/02
PRODUCT ELEV. 325.70 m, 16/08/02
DATE DRILLED 01/08/02

DRILLING METHOD 125 mm ø Solid Stem Auger, Acker SX Drill Rig



SAMPLE TYPE  AUGER GRAB

CONTRACTOR
Paddock Drilling Ltd.

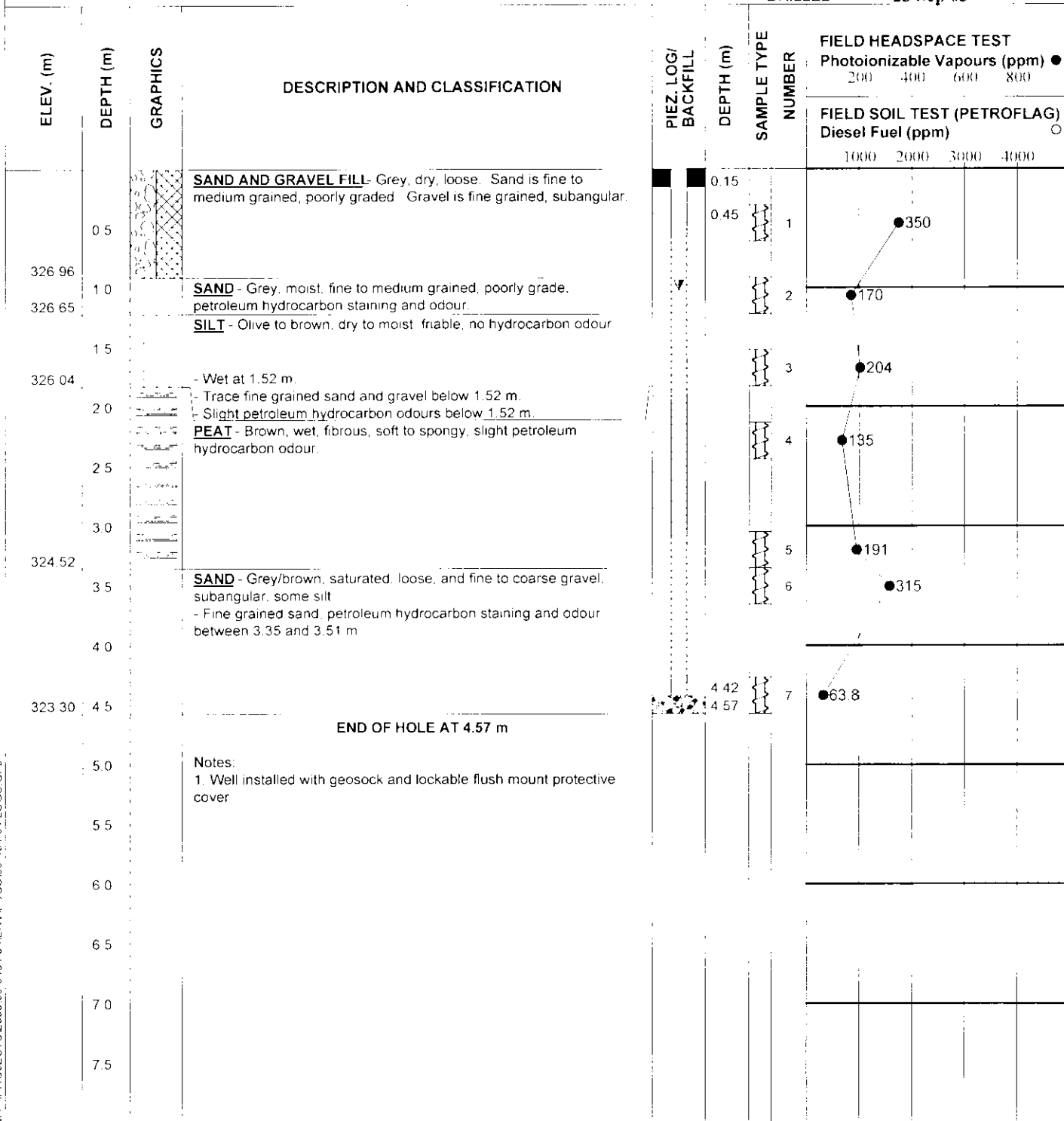
INSPECTOR
T. GALLO

APPROVED

DATE 06/03/03

CLIENT CANADIAN NATIONAL
PROJECT HORNEPAYNE YARD RAP
SITE HORNEPAYNE, ONTARIO
LOCATION FORMER EAST END FUELLING STAND AREA
DRILLING METHOD 100 mm ø Solid Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 03-434-04
GROUND ELEV. 327.87 m, Geodetic
TOP OF PVC ELEV. 327.84 m
WATER ELEV. 326.80 m (25-Sep-03)
PRODUCT ELEV. 326.85 m (25-Sep-03)
DATE DRILLED 23 Sep 03



SAMPLE TYPE Auger Grab

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED _____ **DATE** 22.01.04

VAPOURS_FT_M.P:\PROJECTS\03-04\34-04\MW140\KGS\03-434-04 LOGS.GPJ

CLIENT CANADIAN NATIONAL
PROJECT HORNEPAYNE YARD RAP
SITE HORNEPAYNE, ONTARIO
LOCATION FORMER EAST END FUELLING STAND AREA
DRILLING METHOD 100 mm ø Solid Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 03-434-04
GROUND ELEV. 327.90 m, Geodetic
TOP OF PVC ELEV. 327.83 m
WATER ELEV. 326.89 m (25-Sep-03)
PRODUCT ELEV.
DATE DRILLED 23 Sep 03

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ● 200 400 600 800	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○ 1000 2000 3000 4000
	0.5		SAND AND GRAVEL FILL - Brown to grey with depth, dry to wet with depth, loose. Sand is fine to medium grained and poorly graded. Gravel is fine grained and subangular. Petroleum hydrocarbon staining and odour with depth.		0.15 0.23	1	55.3	
326.38	1.5		SAND - Brown, saturated, loose, fine to medium grained, poorly graded, dark grey petroleum hydrocarbon staining and odour.			2	170	
325.77	2.0		SILT - Olive to grey, wet, soft, <1.0 cm fine sand lenses throughout, petroleum hydrocarbon staining within sand lenses.			3	162	
325.00	2.5		PEAT - Brown, wet, fibrous to decomposed.			4	239	
	3.0					5	49.9	
	3.5							
	4.0							
323.33	4.5				4.20 4.57			
	5.0		Notes 1. Well installed with geosock and lockable flush mount protective cover					
	5.5							
	6.0							
	6.5							
	7.0							
	7.5							

SAMPLE TYPE Auger Grab

CONTRACTOR
Paddock Drilling Ltd.

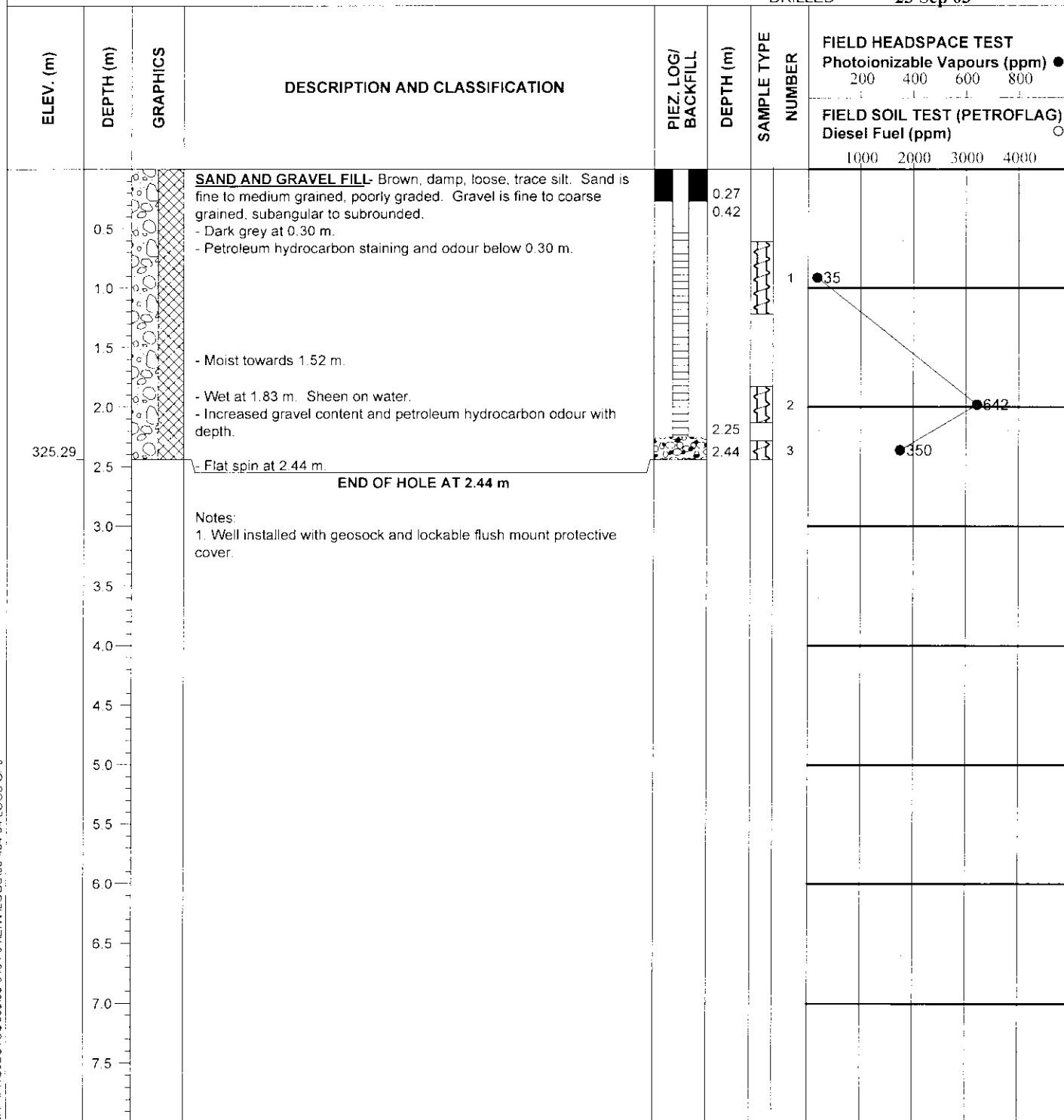
INSPECTOR
T. GALLO

APPROVED _____ **DATE** 22/01/04

VAPOURS_FT_M.P. (PROJECTS)200303-0434-04ENV\LOGS03-434-04 LOGS.GPJ

CLIENT CANADIAN NATIONAL
PROJECT HORNEPAYNE YARD RAP
SITE HORNEPAYNE, ONTARIO
LOCATION FORMER EAST END FUELLING STAND AREA
DRILLING METHOD 100 mm ø Solid Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 03-434-04
GROUND ELEV. 327.73 m, Geodetic
TOP OF PVC ELEV. 327.66 m
WATER ELEV. 326.83 m (25-Sep-03)
PRODUCT ELEV.
DATE DRILLED 23 Sep 03



SAMPLE TYPE Auger Grab

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED

DATE 22/01/04

CLIENT CANADIAN NATIONAL
PROJECT HORNEPAYNE YARD RAP
SITE HORNEPAYNE, ONTARIO
LOCATION FORMER EAST END FUELLING STAND AREA
DRILLING METHOD 100 mm ø Solid Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 03-434-04
GROUND ELEV. 327.74 m, Geodetic
TOP OF PVC ELEV. 327.66 m
WATER ELEV. 326.69 m (25-Sep-03)
PRODUCT ELEV.
DATE DRILLED 23 Sep 03

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
							200	400	600	800	1000	2000	3000	4000
326.21	0.5		SAND AND GRAVEL FILL - Brown, dry, loose. Sand is fine to medium grained, poorly graded. Gravel is fine to coarse grained, poorly graded. - Grey petroleum hydrocarbon staining and odour from 0.46 to 1.22 m.		0.35									
	1.0				0.65	1	89.3							
	1.5		- Wet at 1.37 m.			2	294							
325.60	2.0		- Fine grained sand seam (1 cm thickness) at 1.83 m. Petroleum hydrocarbon staining within sand seam.			3	291							
	2.5		PEAT - Brown, wet, fibrous to decomposed.											
	3.0					4	40							
324.38	3.5		SILT - Beige, wet, soft, trace to some fine grained sand, trace clay.											
	4.0					5	24.9							
	4.5		- Grey below 4.27 m.											
323.16	4.57		END OF HOLE AT 4.57 m		4.57									
	5.0		Notes: 1. Well installed with geosock and lockable flush mount protective cover.											
	5.5													
	6.0													
	6.5													
	7.0													
	7.5													

SAMPLE TYPE  Auger GrabCONTRACTOR
Paddock Drilling Ltd.INSPECTOR
T. GALLO

APPROVED _____ DATE 22/01/04

CLIENT CANADIAN NATIONAL
PROJECT HORNEPAYNE YARD RAP
SITE HORNEPAYNE, ONTARIO
LOCATION FORMER EAST END FUELLING STAND AREA
DRILLING METHOD 100 mm ø Solid Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 03-434-04
GROUND ELEV. 327.68 m, Geodetic
TOP OF PVC ELEV. 327.59 m
WATER ELEV. 326.53 m (25-Sep-03)
PRODUCT ELEV. 326.54 m (25-Sep-03)
DATE DRILLED 23 Sep 03

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ● 200 400 600 800	FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○ 1000 2000 3000 4000
325.70	0.5		SAND AND GRAVEL FILL - Brown, damp, loose, trace silt. Sand is fine to medium grained, poorly graded. Gravel is fine grained, subangular.		0.33	1	47.7	
325.39	1.0				0.63			
	1.5		- Wet at 1.37 m. - Purple colour between 1.37 to 1.52 m - Saturated below 1.52 m - Petroleum hydrocarbon odours between 1.52 and 1.83 m.			2	112	
	2.0		PEAT - Brown, wet, soft, decomposed to organic.			3	131	
	2.5		SILT - Grey/olive, wet, firm, trace fine to coarse grained sand. Increased moisture content with depth. Decreased sand and gravel content with depth. Increase clay content with depth.			4	46.3	
	3.0					5	43.4	
	3.5		- Saturated below 3.05 m.					
	4.0							
323.11	4.5				4.57			
	5.0		Notes: 1 Well installed with geosock and lockable flush mount protective cover					
	5.5							
	6.0							
	6.5							
	7.0							
	7.5							

END OF HOLE AT 4.57 m

SAMPLE TYPE  Auger Grab

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
T. GALLO

APPROVED _____ DATE 22/01/04

CLIENT CANADIAN NATIONAL
PROJECT HORNEPAYNE YARD RAP
SITE HORNEPAYNE, ONTARIO
LOCATION FORMER EAST END FUELLING STAND AREA
DRILLING METHOD 100 mm ø Solid Stem Auger, Acker SX Skidder Mounted Rig

JOB NO. 03-434-04
GROUND ELEV. 326.68 m, Geodetic
TOP OF PVC ELEV. 326.60 m
WATER ELEV. 323.89 m (25-Sep-03)
PRODUCT ELEV.
DATE DRILLED 23 Sep 03

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	FIELD HEADSPACE TEST Photoionizable Vapours (ppm) ●				FIELD SOIL TEST (PETROFLAG) Diesel Fuel (ppm) ○			
							200	400	600	800	1000	2000	3000	4000
	0.5		SAND AND GRAVEL FILL - Brown, dry, loose, trace silt. Sand is fine to medium grained, poorly graded. Gravel is fine grained, subangular. Mottled grey/dark brown with depth.			1	32.9							
	1.0		- Brown, damp, soft silt layer from 0.76 to 0.84 m.		1.01									
325.30	1.5		SILT - Brown, moist, soft, trace clay, trace fine grained sand.		1.31	2	12.9							
324.85	2.0		CINDERS - Black, dry, loose.			3	46.3							
324.54	2.5		SAND - Brown, damp to moist, loose, fine to coarse grained, poorly graded, trace fine to coarse grained gravel.			4	21.6							
	3.0		- Wet towards 3.05 m.			5	23.7							
323.32	3.5		PEAT - Brown, damp, fibrous to decomposed.											
323.17	4.0		SILT - Black, moist, firm, trace clay. Trace to some oxidation with depth. Increase clay content with depth. - Olive to beige below 3.58 m.			6	220							
	4.5		- Sand seam (1-2 cm thick) at 4.50 m. Fine grained, uniform sand, petroleum hydrocarbon staining and odour within the seam.											
	5.0													
	5.5													
320.58	6.0		END OF HOLE AT 6.1 m		5.89	7	18.6							
	6.10				6.10									
	6.5		Notes: 1. Well installed with geosock and lockable flush mount protective cover.											
	7.0													
	7.5													

SAMPLE TYPE Auger Grab

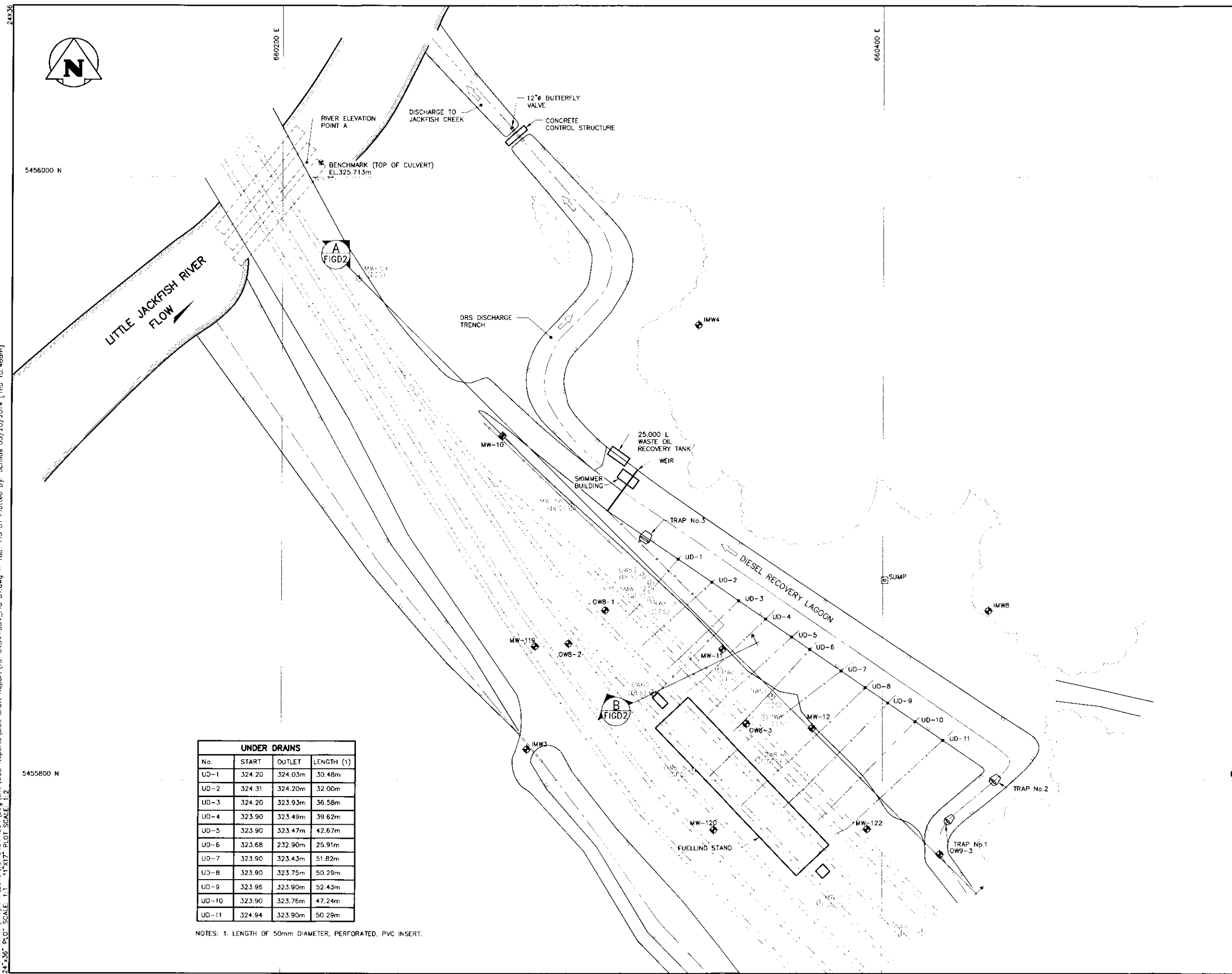
CONTRACTOR
Paddock Drilling Ltd.INSPECTOR
T. GALLO

APPROVED

DATE 22/01/04

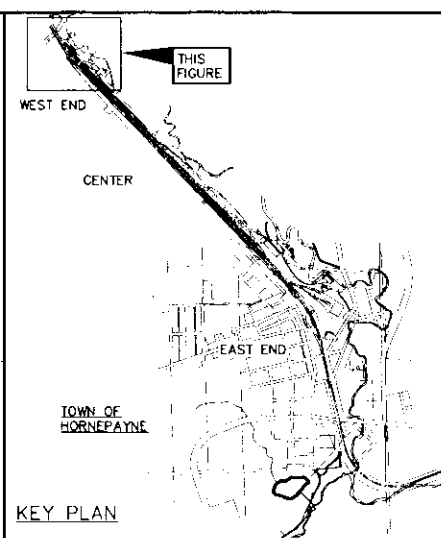
APPENDIX D
STRATIGRAPHIC CROSS SECTIONS

File Name: P:\Projects\2013\13-0434-004\env\MOE Reports\MOE Draft Report\13-0434-004_FIG D1.dwg - Tab: FIG D1 Plotted By: J.Childs 03/20/2014 [Thu 10:46am]
24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



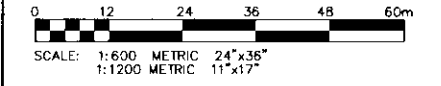
UNDER DRAINS			
No.	START	OUTLET	LENGTH (1)
UD-1	324.20	324.03m	30.48m
UD-2	324.31	324.20m	32.00m
UD-3	324.20	323.93m	36.58m
UD-4	323.90	323.49m	39.62m
UD-5	323.90	323.47m	42.67m
UD-6	323.68	232.90m	25.91m
UD-7	323.90	323.43m	51.82m
UD-8	323.90	323.75m	50.29m
UD-9	323.96	323.90m	52.43m
UD-10	323.90	323.76m	47.24m
UD-11	324.94	323.90m	50.29m

NOTES: 1. LENGTH OF 50mm DIAMETER, PERFORATED, PVC INSERT.

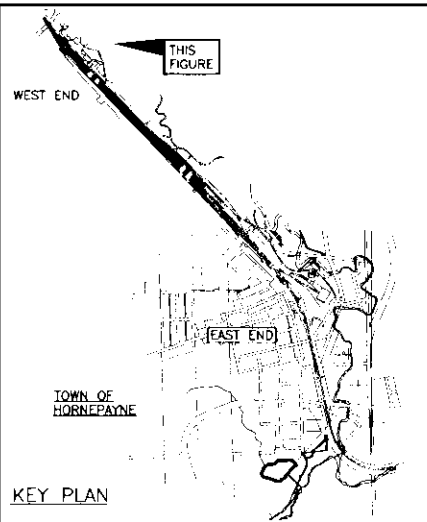
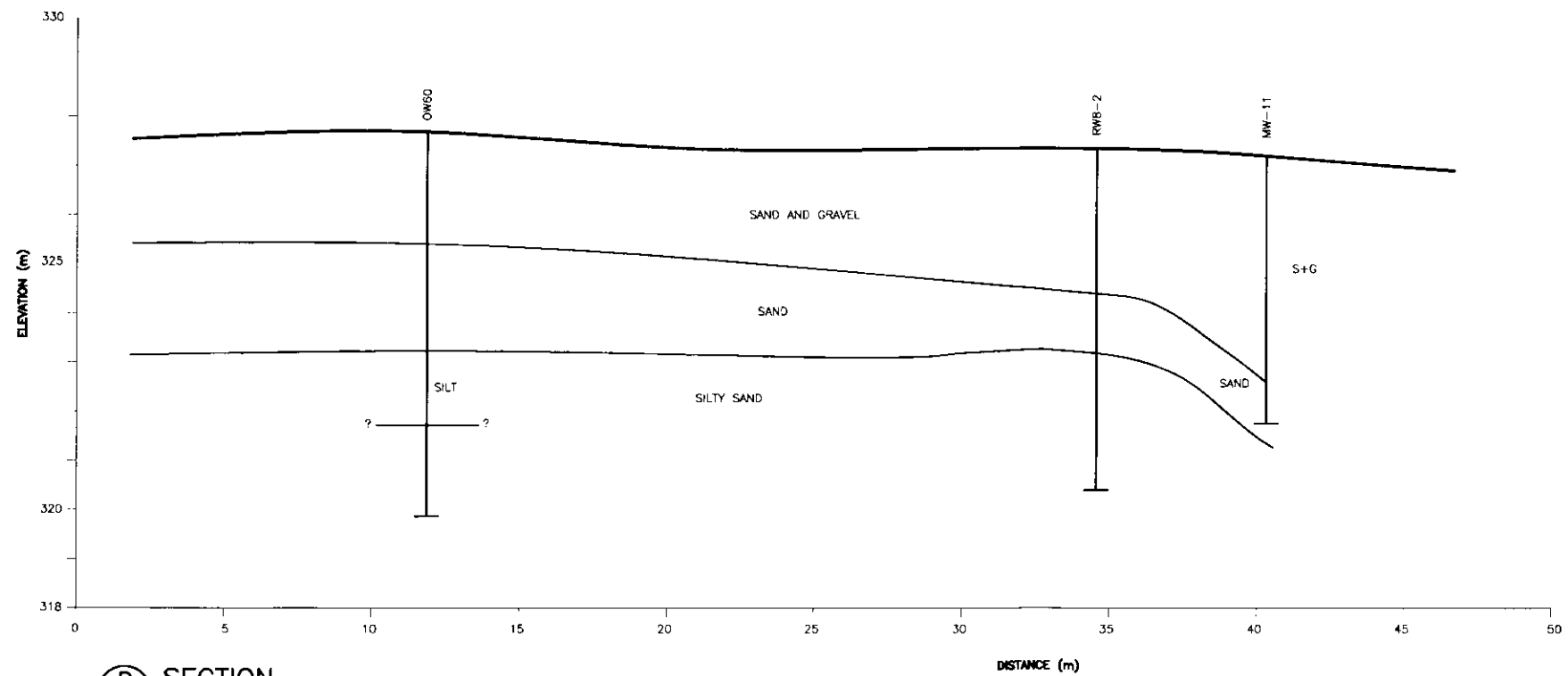
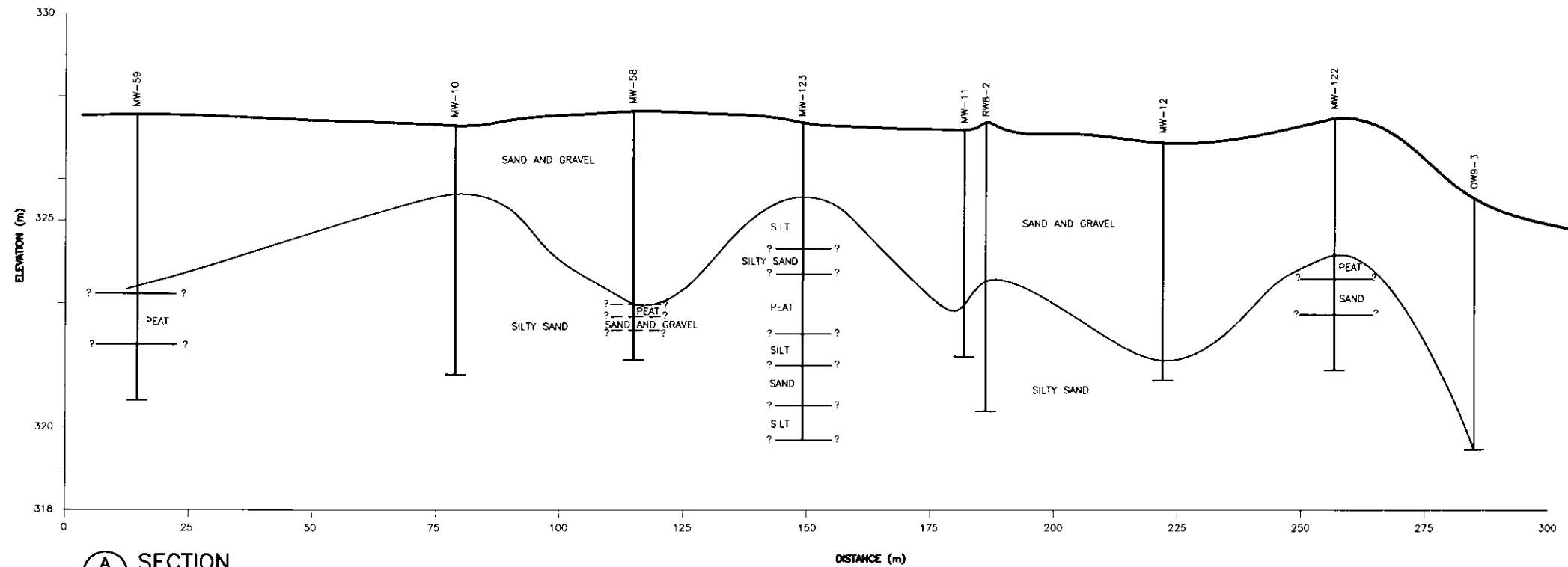


- LEGEND:**
- BERM
 - CENTERLINE OF DITCH
 - FENCE
 - BURIED ELECTRICAL CABLE
 - BENCHMARK
 - MW-119 MONITORING WELL (INSTALLED BY KGS) (MW101-MW133, MW140-MW147)
 - MW-10 MONITORING WELL (INSTALLED BY OTHERS) (ALL OTHER WELLS)
 - RWB-1 RECOVERY WELL
 - SUMP SUMP WELL
 - RAILROAD TRACKS
 - UNDERGROUND DRAIN
 - DESTROYED
 - CROSS SECTION LOCATION AND REFERENCE

NOTES:
1. SITE PLAN BASED ON AUTOCAD FILE PROVIDED BY CN.



0 14/03/20		ISSUED WITH MOE FINAL REPORT		TG
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2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON				
STRATIGRAPHIC CROSS SECTION REFERENCE - WEST END				
MARCH 2014		FIGURE D1	0	



LEGEND:

MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION A:

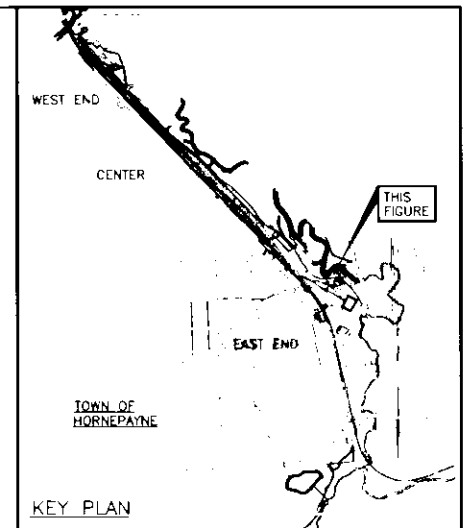
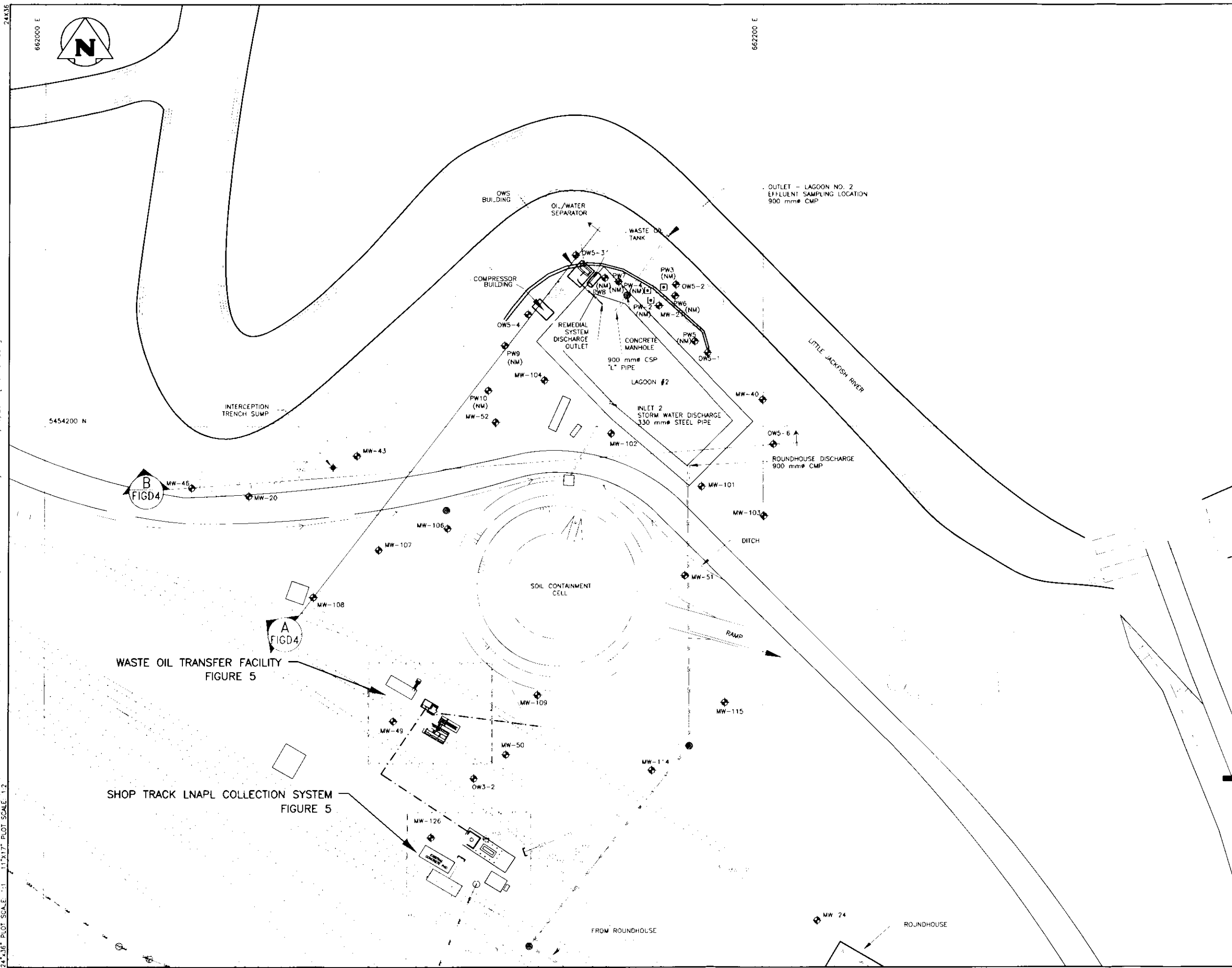
MW-59 = 0.0m
MW-10 = 3.5m WEST
MW-58 = 3.8m WEST
MW-123 = 3.0m WEST
MW-11 = 2.0m EAST
RWB-2 = 7.0m WEST
MW-12 = 0.0m
MW-122 = 10.7m WEST
OWB-3 = 0.0m

MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION B:

OWB-2 = 0.0m
RWB-2 = 3.2 m SOUTH
MW-11 = 3.2m NORTH

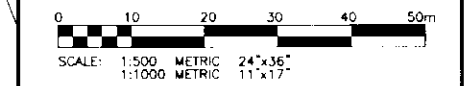
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2013 REMEDIAL OPERATIONS PIN# 1000/ONPR/100587 HORNEPAYNE YARD, ON			
STRATIGRAPHIC CROSS SECTIONS WEST END			
MARCH 2014		FIGURE D2	0

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24"x36" PLOT SCALE: 1:1 11"x17" PLOT SCALE: 1:2



- LEGEND**
- RAILROAD TRACK
 - CULVERT
 - CENTERLINE OF DITCH
 - SANITARY SEWER
 - STORM SEWER
 - FENCE
 - DISCHARGE LINE
 - TREES/ SHRUBS
 - MANHOLES
 - SURFACE WATER FLOW DIRECTION
 - MW-52 MONITORING WELL (INSTALLED BY KGS)
(MW101-MW133, MW140-MW147)
 - MW-20 MONITORING WELL (INSTALLED BY OTHERS)
(ALL OTHER WELLS)
 - PW-1 PUMPING WELL
 - DESTROYED
 - CROSS SECTION LOCATION AND REFERENCE

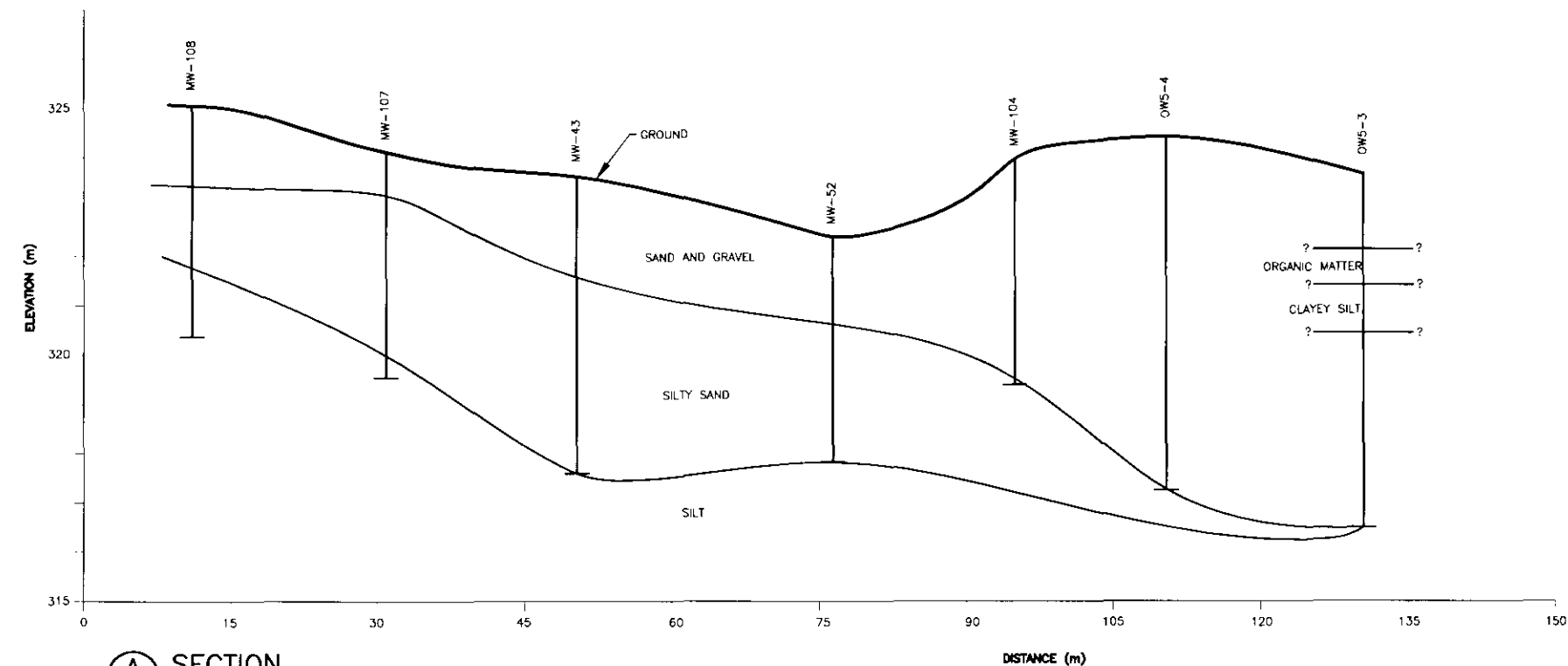
NOTE:
1. REFERENCE JACQUES WHITFORD ENVIRONMENTAL LIMITED PROJECT 31004, DRAWING NO. 2, 1996.



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STRATIGRAPHIC CROSS SECTION REFERENCE - LAGOON 2		
MARCH 2014	FIGURE D3	0

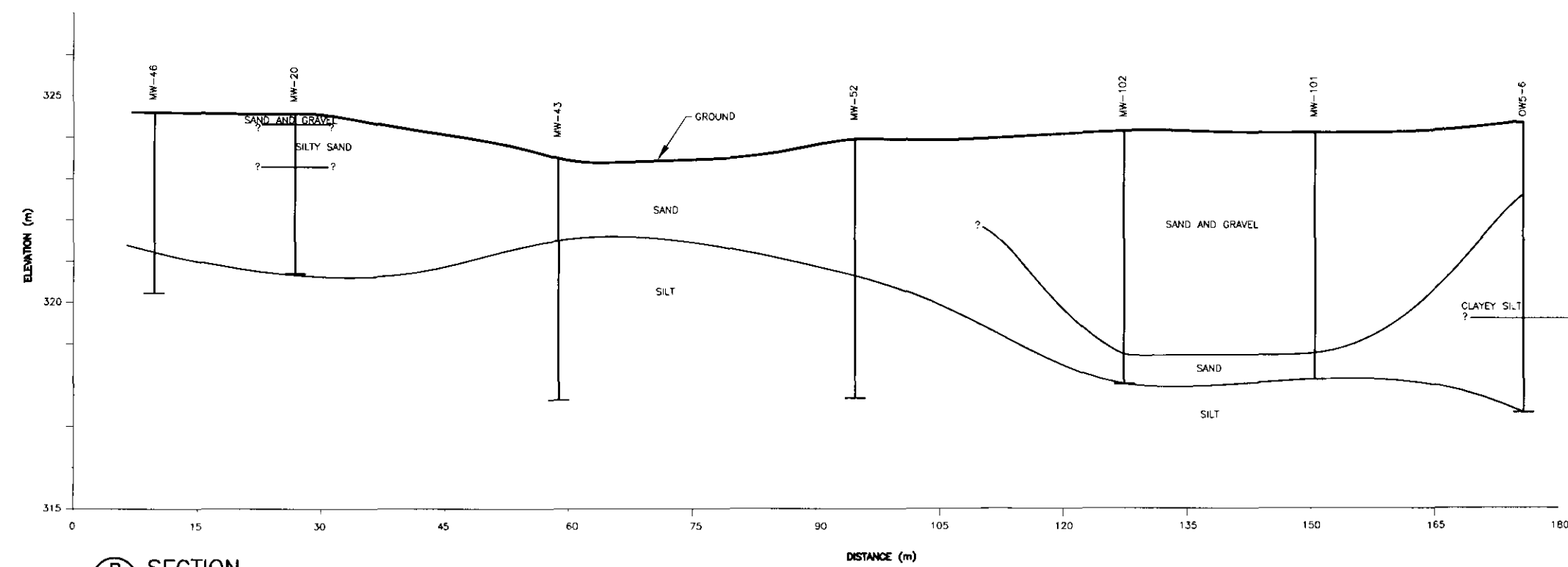
File Name: P:\Projects\2013\13-0434-004\dwg\env\MOE Reports\MOE Draft Report\13-0434-004_FIG D4.dwg - Tab: FIG D4 Plotted By: J.Childs 03/20/2014 [Thu 10:50am]
24"x36" PLOT SCALE: 1:1

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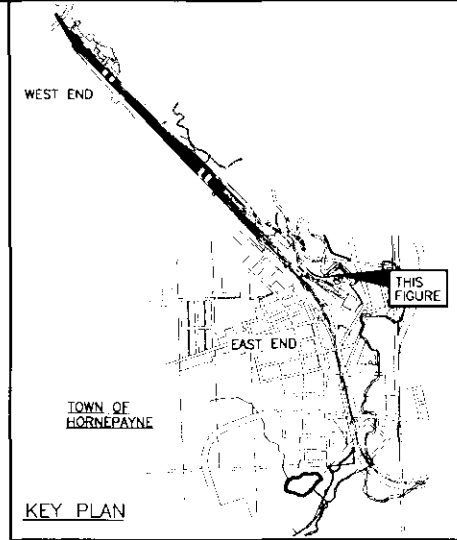
A
SECTION

SECTION A - CROSS SECTION (NORTH TO SOUTH)



B
SECTION

SECTION B - CROSS SECTION (WEST TO EAST)



KEY PLAN

LEGEND:

- MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION A:
- MW-108 = 0.0m
 - MW-107 = 7.4m EAST
 - MW-43 = 16.7m WEST
 - MW-52 = 10m EAST
 - MW-104 = 12.6m EAST
 - OWS-4 = 0.0m
 - OWS-3 = 0.0m
- MONITORING WELL OFFSET DISTANCE FROM CROSS SECTION B:
- MW-46 = 0.0m
 - MW-20 = 3.6m SOUTH
 - MW-43 = 5.0m NORTH
 - MW-52 = 11.0m NORTH
 - MW-102 = 6.6m NORTH
 - MW-101 = 10.3m SOUTH
 - OWS-6 = 0.0m

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STRATIGRAPHIC CROSS SECTIONS LAGOON 2			
MARCH 2014		FIGURE D4	0