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Manitoba Hydro
Environmental Licensing & Protection
P.O. Box 815 Station Main
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ATTENTION: Mr. Bob Gill

RE: Sutherland Avenue Facility
Investigation of Red River Hydrocarbon Sheen Final Rev.0

Dear Mr. Gill:

Kontzamanis Graumann Smith MacMillan Inc. is pleased to submit one (1) electronic (PDF) copy of the letter report on the Investigation of Hydrocarbon Sheen on the Red River adjacent to the Manitoba Hydro Sutherland Avenue Facility. The Scope of Work included a background review of historic documents, a surface water sampling program and a bathymetric survey.

1.0 INTRODUCTION

On August 21, 2017 Manitoba Hydro contacted KGS Group regarding the presence of a sheen observed "bubbling" from the Red River adjacent to the Sutherland Avenue Facility. The sheen and bubbles were located approximately 20 m off-shore on either side of the Disraeli Pedestrian Bridge roughly in the area noted as surface water sample location SW3 on Figure 1, and directly upstream. Manitoba Hydro conducted observations at the bridge daily to determine the frequency and extent of the bubbling and sheen. Manitoba Hydro reported that the bubbling became less frequent in later September and was last seen on September 28, 2017. The details of these observations are available from Manitoba Hydro and are not reported here. The current Pedestrian Bridge is the site of the former Disraeli Bridge.

2.0 BACKGROUND REVIEW OF HISTORIC DOCUMENTS

Previous Observation of Sheen

Hydrocarbon sheen on the Red River was observed previously in August and late fall 1998 and 1999 by Agassiz North while conducting sediment sampling in the Red River for 1998 and 1999 investigations (Appendix A). The sheen was observed just upstream of the former Disraeli Bridge and downstream for 400 m. The cause of the sheen was attributed to continued erosion of sediments scoured from the 1997 flood. The sheen was observed in August and noted to decrease in September and October and be absent in November 1988. Subsequent sediment

sampling programs were conducted in the winter through the ice. The issue of sheen on the water did not appear again in the subsequent summary reports for the project (Comprehensive Environmental Management Plan). KGS Group did not find any mention of the currently observed transport of hydrocarbons by bubbling.

Location of Previous Drilling Programs

Historic sediment sampling locations are shown in Appendix A (Wardrop Figure 6.8 Disraeli Bridges Project). Sediment sampling transects as required by the Long Term Remedial Monitoring Program do not include sampling beneath the former Disraeli Bridge. The closes transects to the observed bubbling included the following:

- Upstream of Pedestrian Bridge Transect T-1
- Downstream of new Disraeli Bridge Transect T-3
- One location beneath the new Disraeli Bridge
  - KGS Group 2013 T-3-A-2 Sediment 0 to 20 cm
  - KGS Group 2014 T-3-A-2 Sediment 0 to 20 cm

Previous Drilling Programs at Former Disraeli Bridge

The only drilling program directly in the area of hydrocarbon sheen investigation was in 2001 by Morrow Environmental Consultants Inc. Morrow conducted drilling through the ice in winter (February - March 2001). The report and logs noted both liquid and “plastic” coal tar in various borings. Liquid coal tar was observed in borehole BH1-05 (Appendix A- Morrow Borehole Log 01-05) in the area downstream of the former Disraeli Bridge. Locations further downstream also showed liquid coal tar in sediments including boreholes BH1-12, BH 1-10 and BH1-28 (Appendix A- (Morrow Site Plan Dwg. W1801B-003).

Utilities

A natural gas pipeline is present upstream of the Pedestrian Bridge shown in Appendix A (Morrow Site Plan Dwg. W1801B-003). Manitoba Hydro indicated that they received information that there is no leak in the gas line.

Area sewers are described in various reports as outlined below:

- A storm sewer outfall is present on the downstream side of the new Disraeli Bridge as shown by plans in the Environmental Impact Statement (EIA) completed by Wardrop for the new bridge (Appendix A- Figure 6.8).

- A Centra Gas Closure Report (November 2000) by AMEC described the sewer Inspection by CH2MHill in 1995. They reported that no significant impacts were apparent on either sewer water or gas quality in the sewers immediately surrounding the former gas plant and that there was little potential for migration along the sewers to off-site receptors.

- Agassiz North 1998 report noted an abandoned 150 mm diameter culvert under the (former) Disraeli Bridge (new Pedestrian Bridge) that terminates under Rover Avenue.

- An AECOM Supplemental Seep Investigation (2010) of the 300 mm diameter drain pipe and outfall beneath the former Disraeli Bridge included Video Surveillance which confirmed that the pipe was an isolated segment of LDS pipe originating at a catch basin

beneath the Disraeli Freeway on Gladstone Avenue, with an outfall to the Red River. The primary purpose of the LDS is to direct storm run-off water from the Disraeli Freeway to the Red River.

- The May 2006 Comprehensive Environmental Management Plan indicated that effluent water from the plant was discharged to the sewer on Gladstone Avenue. Surface water and associated residues from the site were collected into a stormwater collection system with local discharge to the Red River. The report noted that some of the original utility lines may still remain on-site.

- The Historic Layout Plan of Site Operations (Appendix A- UMA Plan Dwg. 02) shows a surface drainage system with river discharge along Gladstone Avenue, a 300 mm diameter vitreous pipe sewer connected to the pump house, and two 100 mm diameter river water intake pipes connected to the pump house. All of these lines would have been upstream of the former Disraeli Bridge.

Recent Potential Disturbances

Recent potential disturbances to the area include construction of the new Disraeli Bridge and construction of the Pedestrian Bridge. The Disraeli Bridge EIA plan shows the extent of the cofferdam west temporary work bridge, composed of limestone, and notes that the limestone was to be removed except for bottom layer of 0.45 to 0.65 m of cobble sized rock (150 mm dia.) to be left in place. The limestone on the EIA plan extends upstream toward the Pedestrian bridge, but not adjacent to the bridge. The actual construction may vary and as-builts should be requested from the City of Winnipeg. The new Disraeli Bridge opened in October 2012; therefore, disturbance from construction would have occurred 5 years ago. The Pedestrian Bridge was built on the existing piers of the old Disraeli Bridge. KGS Group does not have information regarding construction activities. The Pedestrian Bridge opened on October 2013.

3.0 SURFACE WATER SAMPLING PROGRAM

KGS Group was contacted by Manitoba Hydro on August 21, 2017 to conduct a surface water sampling program in the vicinity of the observed sheen. KGS Group conducted the surface water sampling program on August 22, 2017. The team met with Mr. Bob Gill of Manitoba Hydro on the Pedestrian Bridge to identify the locations where the sheen was frequently observed.

Methodology

Surface water samples were collected approximately 20 to 40 m from the shoreline at the following four sites (in order):

1) Upstream sample taken in area with no visible sheen between Annabella and McFarlane Street (SW1);
2) Downstream sample taken in area with no visible sheen downstream of Disraeli Bridge (SW2);
3) Source sample taken at location observed to be “bubbling” (SW3); and
4) A second source sample taken at location observed to be “bubbling”(SW4).

Samples at each site were collected from three depths within the water column: surface, 2.5 meters (midway) and 5 meters (near river bottom), plus one field duplicate, for a total of 13 samples (Table 1). Surface water sampling locations are illustrated on Figure 1. Photographs

are included in Appendix B. Surface water samples were collected by hand with bottles filled from the bow of the boat on the upstream side of the boat. Samples collected midway in the water column and near the bottom of the river were collected with a Kemmerer water sampler. Attempts were made to collect samples with sheen; however, windy conditions and choppy water made this difficult. Field parameter monitoring included the simultaneous measurement of dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, temperature, and electrical conductivity (EC) using a YSI Pro Multi-Parameter Meter. All samples were submitted to ALS Laboratory for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbon (PHC) fractions F1-F4, and polycyclic aromatic hydrocarbons (PAH) parameters.

Laboratory Results

The field and laboratory results are summarized in Tables 2 to 4. A total of four surface water samples, from three locations, were found to contain detectable concentrations of at least one of the measured parameters. All four of the samples that contained detectable concentrations were collected at surface and summarized as follows:

- SW2A: benzo(a)anthracene (0.013 µg/L), benzo(a)pyrene (0.0098 µg/L), benzo (b&j) flouranthene (0.011 µg/L), fluoranthene (0.031 µg/L), pyrene (0.025 µg/L);
- SW3A: toluene (1 µg/L), xylenes (0.73 µg/L), benzo(a)anthracene (0.011 µg/L), benzo(a)pyrene (0.0073 µg/L), fluoranthene (0.039 µg/L), phenanthrene 0.076 µg/L), pyrene (0.030 µg/L);
- SW4A: xylenes (0.71 µg/L);
- SW-100 (field duplicate for SW-4A): toluene (6.20 µg/L), ethylbenzene (1.24 µg/L), xylenes (9.15 µg/L).

The pyrene concentration identified in sample SW3A and the toluene concentration identified in SW-100 were above the CCME Fresh Water Aquatic Life guidelines (0.025 µg/L and 2 µg/L, respectively). All other parameters were below the CCME Fresh Water Aquatic Life guidelines. Concentrations of BTEX, PHC fractions F1 to F4 and PAH parameters were below laboratory detection limits in the remaining nine samples. Laboratory Certificates of Analyses are included in Appendix C. The variability between SW4A and SW-100 is attributed to variation in grab samples taken in or close to the sheen area, which was disturbed by windy conditions.

4.0 BATHYMETRIC SURVEY

Methodology

KGS Group conducted a bathymetric survey on the Red River on September 9, 2017. The purpose of this survey was to capture existing river bathymetry to compare to historical river bottom geometry adjacent to the Sutherland Avenue Facility. The length of the survey was approximately 1.6 km between the Redwood Bridge and the Louise Bridge.

KGS Group conducted a hydrographic survey with a multi-beam sonar (sound navigation and ranging). Sonar uses sound waves to find and identify objects or river bottom in the water and determine the water depth. The data captured by the multi-beam sonar forms the basis for bathymetric contouring and any cross sections or profiles required for the study. The river bottom can be determined to an accuracy of 0.1m depth. The sonar sensor position is

determined every one second using a GPS survey grade survey unit (Geodetic co-ordinates) and then used to incorporate the sonar data.

In areas of water where it was too shallow to properly capture data using a side scanner and multi-beam sonar, KGS Group in filled using conventional GPS (horizontal accuracy of 0.01 m, vertical accuracy of 0.02 m vertical).

The equipment used included Topcon Survey Grade GPS and an Advanced Sonar Unit. The sonar survey was conducted at 30 to 40 meter sections to adequately capture changes in the river bottom. The final discrete bathymetric survey data results in a sonar point captured every 1 to 2 meters along the 30 to 40 meter sections. This enabled the survey of the aquatic bottom to be very accurate and to create a proper profile of the bottom depth. This data forms the basis for bathymetric contouring and any cross sections or profiles required for the study. Along with the bathymetry data, water elevations were captured onsite. Field proofing was done to verify the resolution of the sonar survey, by using a survey rod to determine firm bottom.

KGS Group used an existing boat launch located southeast of the Louise Bridge to launch the boat. Prior to the commencement of any field investigations, KGS Group conducted an on-site safety meeting and assessed the current flow of the river to ensure that the proposed work could be completed safely.

Results

The results of the September 2017 survey are shown in Appendix D on Figures 1 to 4. Figure 1 illustrates the bathymetry over the entire river section surveyed. The image has been placed on top of the bridge structures so that the topography can be seen. The survey shows a typical river profile with the greatest depth in the centre of the channel in three areas. Elevations are higher in two locations: upstream of the Disraeli Bridge, with the greatest depth on the north side of the river; and downstream of the Disraeli Bridge, with the greatest depth on the south side of the river. A detail of the September 2017 at the Disraeli Bridge and Pedestrian Bridge is shown in Figure 2, along with the surface water sampling locations. River bed elevations drop toward the northeast with no noticeable irregular features in the area of observed sheen.

The change in the Red River bottom elevation between the KGS Group 2015 and 2017 bathymetric survey is shown in Figure 3. Between 2015 and 2017 the river bottom showed a negligible change in elevation (-0.5 to +0.5 m) in most of the area as shown by the yellow colour. Few areas of scour (orange - red colour ramp) were found, and those were primarily located on the west side of the river towards the shoreline where present. Areas of deposition (green colour ramp) were found downstream of the Redwood Bridge and sporadically downstream of the Disraeli Bridge.

The area beneath the Disraeli Bridge was not able to be captured in the 2015 KGS Group bathymetric survey; therefore, the 2003 bathymetric survey conducted by North/South Consultants (NSC) was used for comparison with 2017 conditions as shown in Figure 4. The limestone placement from construction activities around the bridge piers and at the bridge abutments is evident as shown by the dark green colour ramp with deposition increases up to 4.3 m. A small scour area of 0.5 to 1 m scour was found northeast of the sheen area (SW3). This scour is more developed beneath the Disraeli Bridge and immediately downstream. Similar scour areas are present on both sides of the Bridge pier to the northeast.

The comparative survey is approximate since comparison is being made of two interpolated surfaces. Also, since scour and deposition events can occur within the same year, or even the same event, some areas showing no net increase or decrease may have actually experienced both scour and infill.

5.0 CONCLUSIONS

1. The presence of sheen in the area of the old Disraeli Bridge (new Pedestrian Bridge) has been documented in the past (1998 and 1999) and may be the same phenomenon. It is possible that sheen may have been generated during this time, but not noticed, since sediment and surface water sampling has been in the winter except for the 2012 surface water sampling. Sheen may also be more readily observed by foot traffic on the low Pedestrian Bridge, than from prior vehicular traffic.

2. In both the late 1990's and in 2017 observations of sheen occurred in the warm summer months of August and effects dissipated in the fall when temperatures cooled. This indicates a strong temperature related effect. Warmer summer temperatures in 2017 may have contributed to the sheen's presence.

3. Surface water samples confirmed the presence of petroleum hydrocarbons and PAHs consistent with coal tar product. Two surface water samples contained concentrations above the CCME Fresh Water Aquatic Life guideline (SW3A – pyrene and SW100 – toluene) and a total of four samples contained detectable concentrations of the parameters analyzed (SW2A, SW3A, SW4A, and SW100). These samples were all collected from the surface water of the Red River in the vicinity of the observed sheen.

4. No new major scour features were observed close to the sheen area between 2003 and 2017 based on the comparison of the bathymetric surveys.

5. No obvious scour was observed from the 2017 bathymetric survey. In addition, no large change in scour/ deposition was observed in the bathymetric surveys between 2003 and 2017 in the area of sheen, or between 2015 and 2017 in the rest of the survey area.

6. The bathymetric survey confirms that scouring and accumulation of sediment are active processes that have the potential to move contaminated sediments within the river system. Measurement of scour features is difficult, since scour and re-deposition of sediment may occur in the same event. Periodic surveys may, however, identify any longer lasting features.

6.0 RECOMMENDATIONS

KGS Group recommends that this report be submitted to Manitoba Sustainable Development. Additionally, the information summarized in this report should be considered when designing any future investigation programs.

7.0 STATEMENT OF LIMITATIONS AND CONDITIONS

7.1 THIRD PARTY USE OF REPORT

This report has been prepared for the Manitoba Hydro to whom this report has been addressed and any use a third party makes 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 GEO-ENVIRONMENTAL STATEMENT OF LIMITATIONS

KGS Group prepared the geo-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. The information contained in this report is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of the Manitoba Hydro. 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.

KGS Group appreciates the opportunity to work with you on this Project. Please contact the undersigned if you require anything further.

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MFH/jr

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TABLE 1
SAMPLE SITE LOCATIONS
FORMER SUTHERLAND AVENUE MANUFACTURED GAS PLANT SITE

Station ID	UTM Zone	Easting (m)	Northing (m)	Description
SW1	14U	0635050	5529992	Upstream of pedestrian bridge approx. 160 m; in line with McFarlane St. N
SW2	14U	0634869	5530148	Downstream of Disraeli Bridge by approx. 20 m; directly downstream from source location
SW3	14U	0634915	5530109	Source location; downstream of pedestrian bridge approx. 5 m; near light standard located midway between pier 1 and pier 2 from south shore
SW4	14U	0634913	5530102	Source location; downstream of pedestrian bridge approx. 2 m; near light standard located midway between pier 1 and pier 2 from south shore; 5 m south-west of SW3
SW100	14U	0634913	5530102	Replicate of SW4

TABLE 2
GENERAL SURFACE WATER CHEMISTRY
FORMER SUTHERLAND AVENUE MANUFACTURED GAS PLANT SITE

Station ID	Location	Site Depth (m)	Depth	Date	pH (units)	E.C. (µS/cm)	D.O. (mg/L)	O.R.P.	Temp. (°C)
SW1A	**Upstream**	**5.8**	**Surface**	22-Aug-17	7.70	1,045	7.02	28.3	21.7
SW1B	**Upstream**	**5.8**	**Middle (3.0 m)**	22-Aug-17	7.93	1,038	6.04	9.9	20.7
SW1C	**Upstream**	**5.8**	**Bottom (5.5 m)**	22-Aug-17	7.48	1,049	5.36	17.3	21.1
SW2A	**Downstream**	**5.3**	**Surface**	22-Aug-17	7.10	1,056	5.06	28.7	21.1
SW2B	**Downstream**	**5.3**	**Middle (2.5 m)**	22-Aug-17	7.30	1,052	4.90	8.8	21.4
SW2C	**Downstream**	**5.3**	**Bottom (5.0 m)**	22-Aug-17	7.04	1,065	4.80	9.6	21.1
SW3A	**Source**	**5.2**	**Surface**	22-Aug-17	6.65	1,068	5.60	9.0	21.2
SW3B	**Source**	**5.2**	**Middle (2.5 m)**	22-Aug-17	8.22	1,045	4.91	-18.7	21.0
SW3C	**Source**	**5.2**	**Bottom (4.9 m)**	22-Aug-17	7.89	1,050	4.89	-17.4	21.0
SW4A	**Source**	**4.8**	**Surface**	22-Aug-17	8.37	1,038	4.72	-17.5	20.6
SW4B	**Source**	**4.8**	**Middle (2.5 m)**	22-Aug-17	7.76	1,060	5.30	-17.2	20.9
SW4C	**Source**	**4.8**	**Bottom (4.5 m)**	22-Aug-17	8.42	1,044	4.72	-17.9	20.8

Notes:

"-" = No Data

D.O. = Dissolved Oxygen

E.C. = Electrical Conductivity

O.R.P. = Oxidation-Reduction Potential

TABLE 3
PETROLEUM HYDROCARBONS IN WATER
FORMER SUTHERLAND AVENUE MANUFACTURED GAS PLANT SITE

Sample Number	Date	Parameter [1]								
		Benzene	Toluene [3a, 3b]	Ethyl-benzene (4a, 4b)	Xylenes (-o,-m,-p) (5a, 5b)	F1 (C6 - C10)	F2 (C10 - C16)	F3 (C16 - C34)	F4 (C34 - C50)	Total Hydrocarbons (C6 - C50)
SW1A	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW1B	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW1C	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW2A	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW2B	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW2C	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW3A	22/Aug/17	<0.50	1.0	<0.50	0.73	<100	<100	<250	<250	<380
SW3B	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW3C	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW4A	22/Aug/17	<0.50	<1.0	<0.50	0.71	<100	<100	<250	<250	<380
SW4B	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW4C	22/Aug/17	<0.50	<1.0	<0.50	<0.71	<100	<100	<250	<250	<380
SW100 (dup of SW4A)	22/Aug/17	<0.50	**6.20**	1.24	9.15	<100	<100	<250	<250	<380
EQL		*0.50*	*1.0*	*0.50*	*0.71*	*100*	*100*	*250*	*250*	*380*
CCME [2]										
Canadian Water Quality Guidelines for the Protection of Aquatic Life										
Freshwater Aquatic Life		370	2	90	-	-	-	-	-	-

Notes:

EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence.

"-" = No Data

1. All concentrations in micrograms per litre (µg/L) unless otherwise specified.
2. CCME - Canadian Council of Ministers of the Environment. Canadian Environmental Quality Guidelines 1999. Updated February 6, 2014.
   a. Canadian Water Quality Guidelines for the Protection of Aquatic Life
3. Toluene
   a. Health basis of MAC: Adverse neurological effects, including vibration thresholds, colour discrimination, auditory thresholds, attention, memory and psychomotor functions.
   b. Other Health Considerations: Insufficient information to determine whether toluene is carcinogenic to humans.
4. Ethylbenzene
   a. Health basis of MAC: Effects on the liver and pituitary gland.
   b. Other Health Considerations: Tumour formation at various sites in animals, including kidney, lung, liver and testes.
5. Xylenes
   a. Health basis of MAC: Adverse neuromuscular effects.
   b. Other Health Considerations: Insufficient information to determine whether xylenes are carcinogenic to humans.

BOLD - Exceedance of CCME Criteria

TABLE 4
POLYCYCLIC AROMATIC HYDROCARBONS IN WATER
FORMER SUTHERLAND AVENUE MANUFACTURED GAS PLANT SITE

Sample No.	Date	Parameter [1]																		
		Ace-naphthene	Ace-naphthylene	Acridine	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b&j) fluoranthene	Benzo(g,h,i) perylene	Benzo(k) fluoranthene	Chrysene	Dibenzo(a,h) anthracene	Fluoranthene	Fluorene	Indeno (1,2,3-c,d) pyrene	1-Methyl-naphthalene	2-Methyl-naphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline
SW1A	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW1B	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW1C	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW2A	22/Aug/17	<0.020	<0.020	<0.020	<0.010	0.013	0.0098	0.011	<0.020	<0.010	<0.020	<0.0050	0.031	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	0.025	<0.020
SW2B	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW2C	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW3A	22/Aug/17	<0.020	<0.020	<0.020	<0.010	0.011	0.0073	<0.010	<0.020	<0.010	<0.020	<0.0050	0.039	<0.020	<0.010	<0.020	<0.020	<0.050	0.076	**0.030**	<0.020
SW3B	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW3C	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW4A	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW4B	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW4C	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
SW100 (Dup of SW4A)	22/Aug/17	<0.020	<0.020	<0.020	<0.010	<0.010	<0.0050	<0.010	<0.020	<0.010	<0.020	<0.0050	<0.020	<0.020	<0.010	<0.020	<0.020	<0.050	<0.050	<0.010	<0.020
EQL		*0.020*	*0.020*	*0.020*	*0.010*	*0.010*	*0.0050*	*0.010*	*0.020*	*0.010*	*0.020*	*0.0050*	*0.020*	*0.020*	*0.010*	*0.020*	*0.020*	*0.050*	*0.050*	*0.010*	*0.020*
CCME [2]																					
Canadian Water Quality Guidelines for the Protection of Aquatic Life																					
Freshwater Aquatic Life		5.8	-	4.4	0.012	0.018	0.015	-	-	-	-	-	0.04	3.0	-	-	-	1.1	0.4	0.025	3.4

Notes:

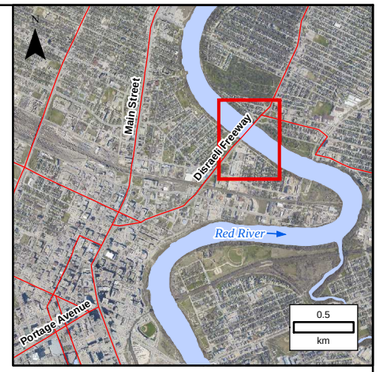
EQL = Estimated Quantitation Limit = Lowest level of the parameter that can be quantified with confidence.

"-" = No Data

1. All values are expressed in milligrams per litre (µg/L) unless otherwise specified.
2. CCME - Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines, 1999. Updated February 6, 2014.
Canadian Water Quality Guidelines for the Protection of Aquatic Life

BOLD - Exceedance of CCME Criteria

FIGURES



LEGEND:

⊕ Water Sampling Location

NOTES:
1. Water Sampling completed by KGS Group on August 22, 2017.
2. Imagery: WorldView03 from DigitalGlobe, Inc. Date: May 20, 2015.
3. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL), CGVD28.

20 0 20 40 60 80
Metres

SCALE: 1:2,000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	17/10/31	ISSUED WITH LETTER REPORT	MFH	BMH

REVISIONS / ISSUE

KGS GROUP CONSULTING ENGINEERS

Manitoba Hydro

2017 SURFACE WATER SAMPLING
FORMER SUTHERLAND AVE.
MGP PLANT SITE

SITE PLAN AND SAMPLING LOCATIONS

OCTOBER 2017 | FIGURE 01 | REV: 0

FileName: P:\Projects\2015\15-0038-006\Dwg\GIS\MXDs\2017_Surface_Water_Sampling_Report\Rev0\15-0038-006_Fig01_Rev0.mxd
11"x17" PLOT SCALE 1:1

APPENDIX A

HISTORICAL INFORMATION

CLIENT: AGASSIZ NORTH ASSOCIATES LIMITED

DRILLING CONTRACTOR: MAPLE LEAF DRILLING

PROJECT No.: W1801B

LOCATION: CENTRA GAS, RED RIVER, WINNIPEG, MANITOBA

DRILLING METHOD: HOLLOW/SOLID STEM AUGER

DIAMETER: 200/100 mm

BOREHOLE No.: 01-05

BOREHOLE LOG

PLOTTED:

CAD FILE No.:

SAMPLE TYPE: CORE | SPLIT SPOON | SHELBY | DISTURBED | NO RECOVERY

DEPTH (m)	SOIL DESCRIPTION	STRATIGRAPHY PLOT	SAMPLE TYPE	SAMPLE NUMBER	SOIL VAPOUR CONCENTRATION (ppm) 100 1000 10000	WATER LEVEL	MONITORING WELL INSTALLATION
0	**ICE**						
	WATER						
1							
2							
3							
4	**SAND AND SILT** – fine grained sand, clayey, trace organics, poorly graded, laminated, grey, wet, black staining, sheen, strong mothball odour, visible LPH to 5.6m			01-5-1			
5				*01-5-2			
	SAND – fine grained, trace silt, poorly graded, grey, wet			01-5-3			
6	**SILT (TILL)** – gravelly (fine to coarse grained), some sand, some clay, light brown, firm, low plasticity – stiffer with depth below 6.2m – hard below 6.9m			*01-5-4			
7				01-5-5			
	End of borehole at 3.7m below river bottom.						
8							
9							

LEGEND: bentonite grout

* submitted for laboratory analysis

MORROW ENVIRONMENTAL CONSULTANTS INC.

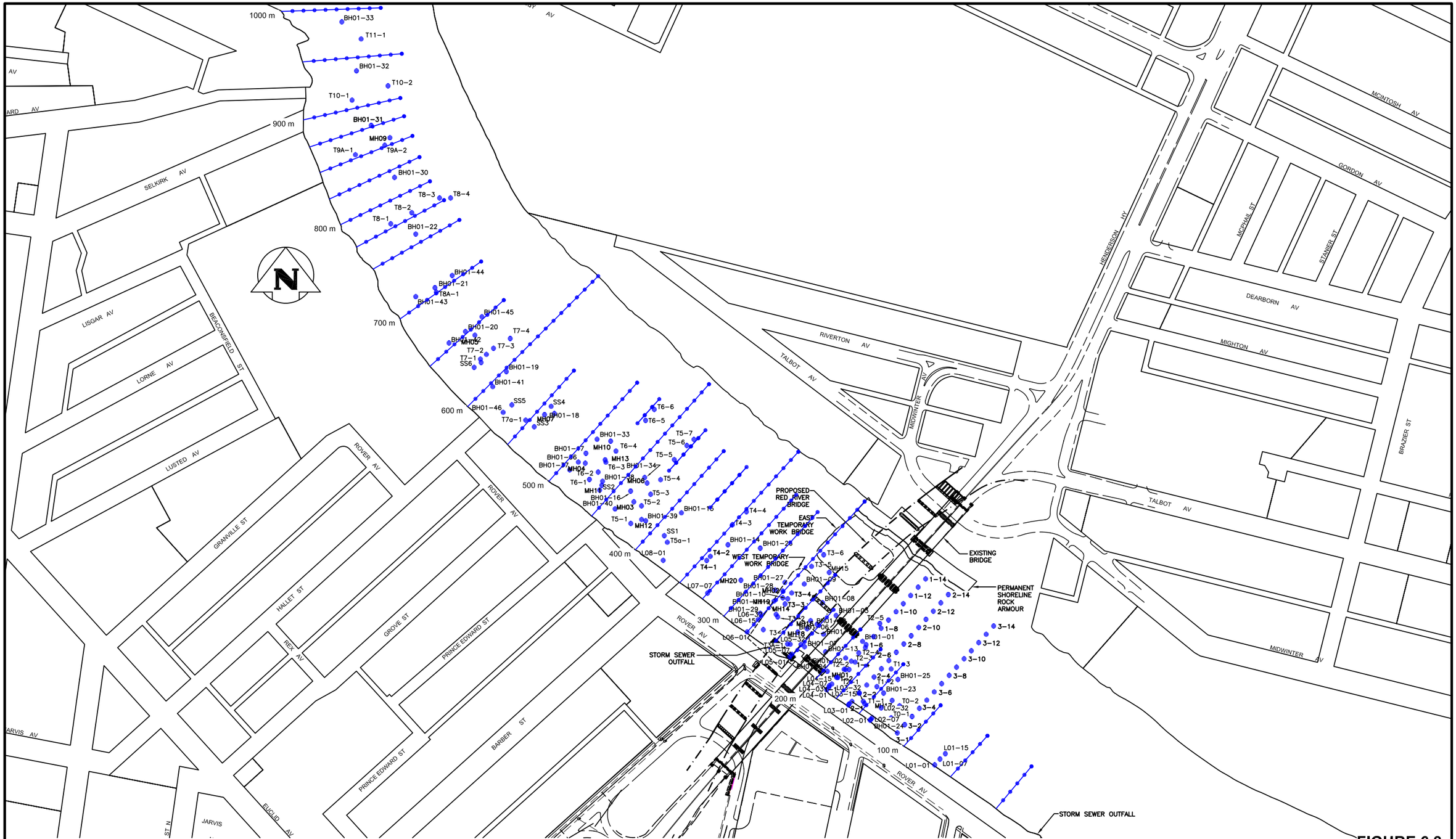
ICE SURFACE ELEVATION (m): 222.250

RIVER BOTTOM ELEVATION (m): 218.440

DATE DRILLED: 2001 02 26

OBSERVED WATER LEVEL: N/A

LOGGED BY: AGM



WARDROP
A TETRA TECH COMPANY

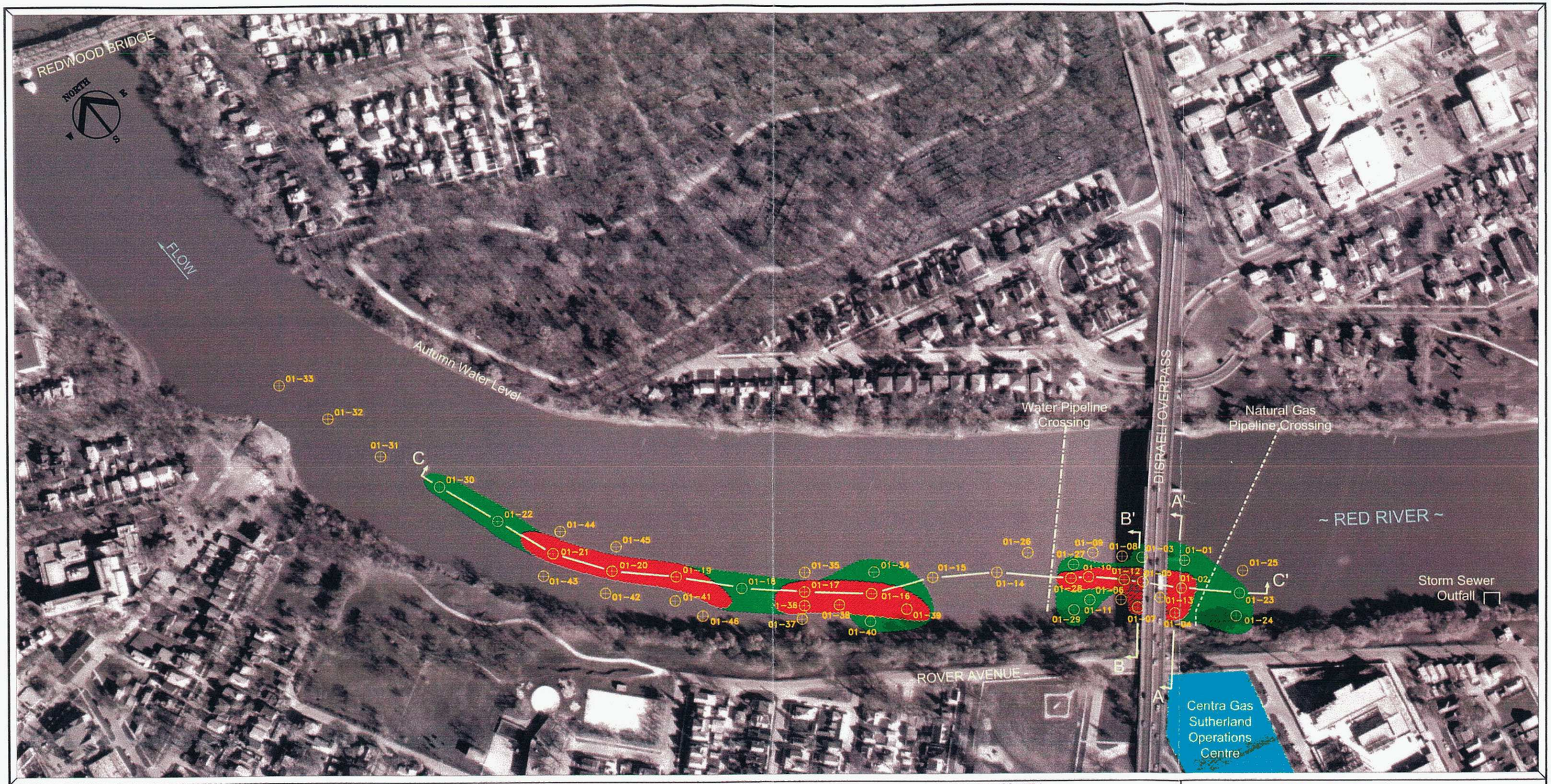
PEOPLE, PASSION, PERFORMANCE, TRUSTED GLOBALLY

LEGEND:

- SEDIMENT SAMPLE
- TRANSECTS SAMPLED BY AGASSIZ 2000

FIGURE 6.8
DISRAELI BRIDGES PROJECT
HISTORIC SEDIMENT SAMPLE LOCATIONS

1000070301-SKT-V0058-A



LEGEND

10 50 100 150 METRES

- ⊕ BOREHOLE LOCATION
- ESTIMATED EXTENT OF SEDIMENTS CONTAINING VISIBLE IMPACT
- ESTIMATED EXTENT OF SEDIMENTS CONTAINING TRACE IMPACT

NOTES

1. DRAWING WAS DERIVED FROM SITE PLAN PROVIDED BY AGASSIZ NORTH ASSOCIATES LIMITED.

REVISIONS

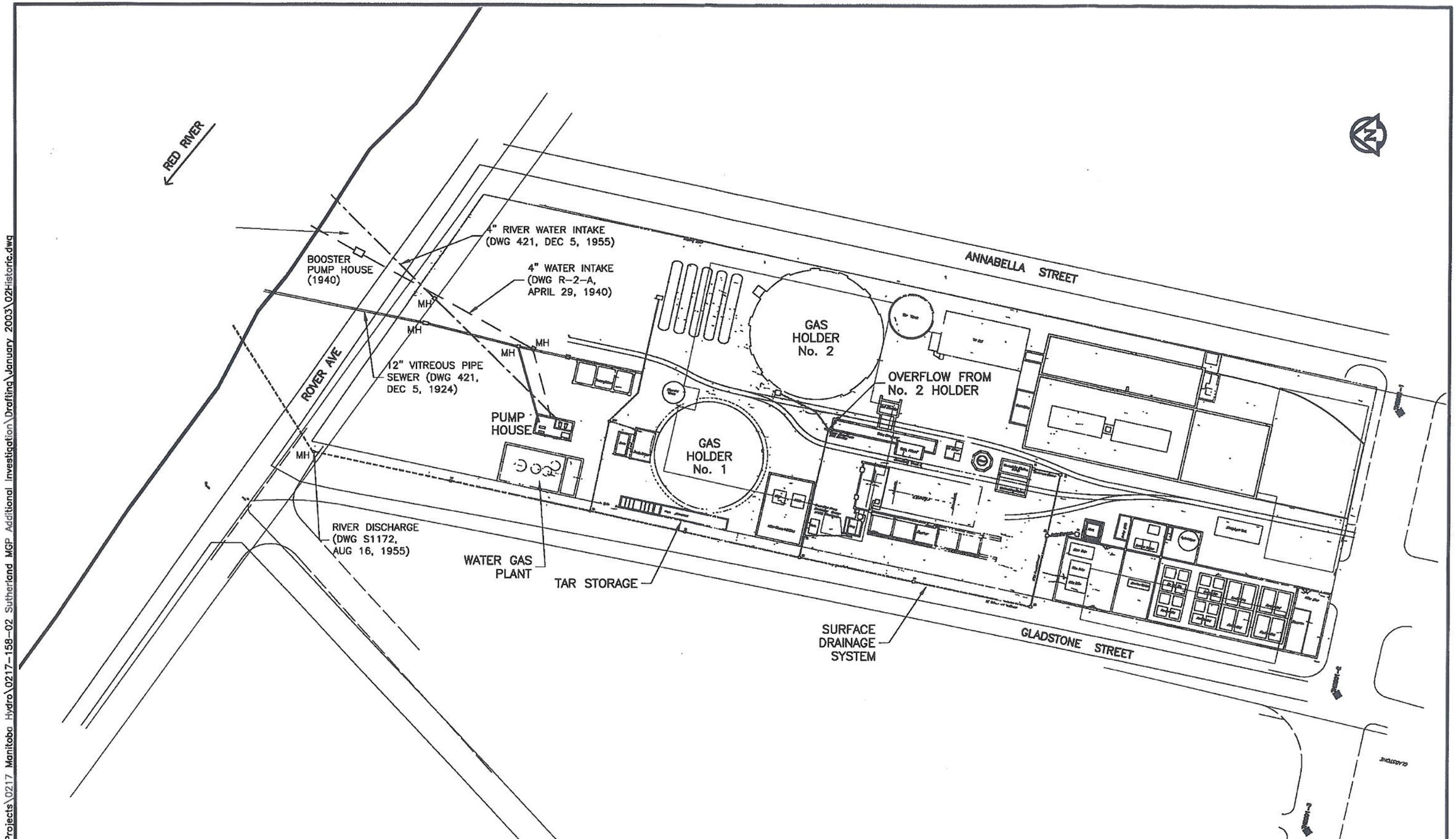
REV.	DATE	DESCRIPTION	BY	CHK

MORROW ENVIRONMENTAL CONSULTANTS INC.

SCALE: 1:3000	APPROVED BY: MECI:	CLIENT:	DRAWN BY: CDC
DATE: 2001 09 17			CHECKED: AGM
CLIENT NAME: CENTRA GAS SUTHERLAND OPERATIONS CENTRE	PROJECT LOCATION: 35 SUTHERLAND AVENUE WINNIPEG, MANITOBA		

SITE PLAN

CADFILE: 1801R000 | DRAWING NUMBER: W1801B-003 | REV.: 0



UMA Engineering Ltd.

• Consulting • Engineering • Construction • Management Services

MANITOBA HYDRO
35 SUTHERLAND AVENUE

TITLE:	HISTORIC LAYOUT OF SITE OPERATIONS (1924)		
JOB No.	0217-158-02	DATE:	DECEMBER 2003
SCALE:	1:1,000	DWG. No.	02
CHECKED:	LB		

MAY 08, 2003
Plot Scale: 1:1 ps
L:\Earth & Water\Projects\0217 Manitoba Hydro\0217-158-02 Sutherland MGP Additional Investigation\Drafting\January 2003\02Historic.dwg

APPENDIX B

PHOTOS

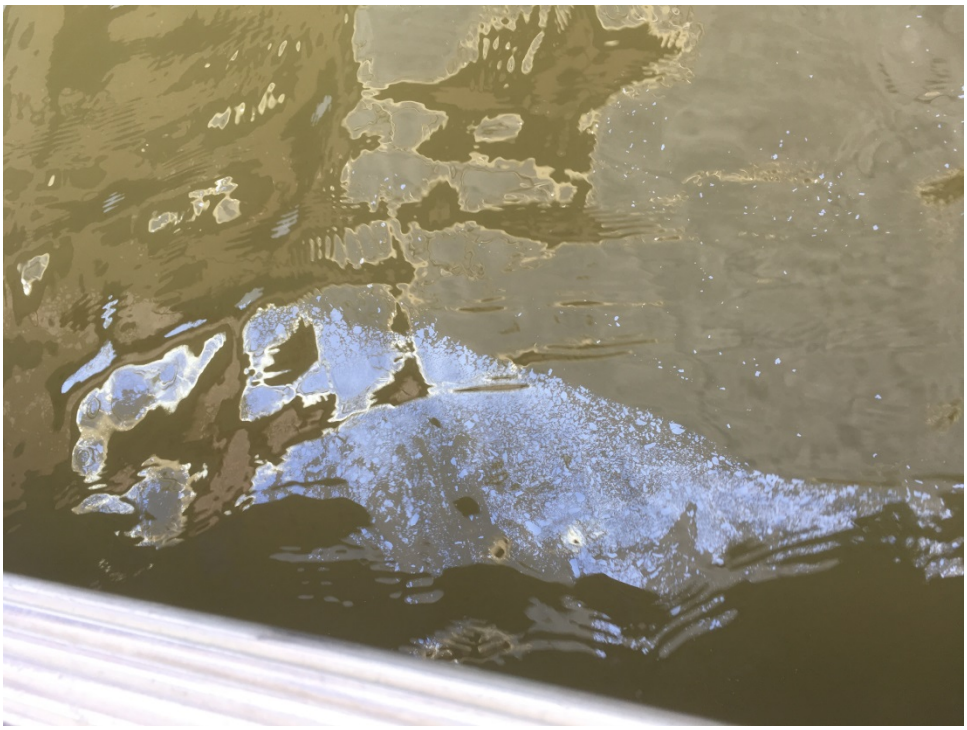


Photo 1 – Sheen observed on surface water.

Photo 2 – Sheen observed on surface water.

Photo 3 – Location of highest frequency of sheen – beneath light standard located midway between pier 1 and pier 2, approximately 5 m downstream (photo looking north).

APPENDIX C

LABORATORY CERTIFICATES OF ANALYSIS

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW1A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-1
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	97.1		%			23-AUG-17
Surr: Acridine d9	108.9		%			23-AUG-17
Surr: Chrysene d12	97.2		%			23-AUG-17
Surr: Naphthalene d8	92.1		%			23-AUG-17
Surr: Phenanthrene d10	95.9		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	95.5		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		23-AUG-17
Toluene	<1.0		ug/L	60	24	23-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	23-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW1A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-1
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					23-AUG-17
	m+p-Xylenes	<0.50		ug/L			23-AUG-17
	F1 (C6-C10)	<100		ug/L			23-AUG-17
Surr:	4-Bromofluorobenzene (SS)	102.0		%			23-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit.
* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
- A blank entry designates no known limit.
- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW1B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-2
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	86.2		%			23-AUG-17
Surr: Acridine d9	105.2		%			23-AUG-17
Surr: Chrysene d12	96.9		%			23-AUG-17
Surr: Naphthalene d8	80.1		%			23-AUG-17
Surr: Phenanthrene d10	91.1		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	104.4		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		23-AUG-17
Toluene	<1.0		ug/L	60	24	23-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	23-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW1B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-2
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					23-AUG-17
	m+p-Xylenes	<0.50		ug/L			23-AUG-17
	F1 (C6-C10)	<100		ug/L			23-AUG-17
Surr:	4-Bromofluorobenzene (SS)	100.0		%			23-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit.
* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
- A blank entry designates no known limit.
- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW1C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-3
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	89.7		%			23-AUG-17
Surr: Acridine d9	109.9		%			23-AUG-17
Surr: Chrysene d12	94.1		%			23-AUG-17
Surr: Naphthalene d8	79.5		%			23-AUG-17
Surr: Phenanthrene d10	94.7		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	94.7		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW1C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-3
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	99.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit.
* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
- A blank entry designates no known limit.
- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW2A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-4
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	0.013		ug/L			23-AUG-17
Benzo(a)pyrene	0.0098		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	0.011		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	0.031		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	0.025		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	89.1		%			23-AUG-17
Surr: Acridine d9	103.2		%			23-AUG-17
Surr: Chrysene d12	90.4		%			23-AUG-17
Surr: Naphthalene d8	82.7		%			23-AUG-17
Surr: Phenanthrene d10	88.9		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	83.4		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW2A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-4
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	98.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

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* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
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- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW2B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-5
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	88.8		%			23-AUG-17
Surr: Acridine d9	105.1		%			23-AUG-17
Surr: Chrysene d12	89.7		%			23-AUG-17
Surr: Naphthalene d8	101.2		%			23-AUG-17
Surr: Phenanthrene d10	91.7		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	98.8		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW2B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-5
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	97.0		%			24-AUG-17

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Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW2C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-6
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	83.2		%			23-AUG-17
Surr: Acridine d9	102.4		%			23-AUG-17
Surr: Chrysene d12	88.7		%			23-AUG-17
Surr: Naphthalene d8	79.0		%			23-AUG-17
Surr: Phenanthrene d10	88.0		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	101.6		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW2C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-6
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	98.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

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Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW3A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-7
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	0.73		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	0.011		ug/L			23-AUG-17
Benzo(a)pyrene	0.0073		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	0.039		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	0.076		ug/L			23-AUG-17
Pyrene	0.030		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	84.0		%			23-AUG-17
Surr: Acridine d9	86.5		%			23-AUG-17
Surr: Chrysene d12	87.8		%			23-AUG-17
Surr: Naphthalene d8	82.1		%			23-AUG-17
Surr: Phenanthrene d10	80.0		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	93.2		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW3A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-7
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	0.73		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	97.0		%			24-AUG-17

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Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW3B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-8
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	88.7		%			23-AUG-17
Surr: Acridine d9	99.7		%			23-AUG-17
Surr: Chrysene d12	77.9		%			23-AUG-17
Surr: Naphthalene d8	87.2		%			23-AUG-17
Surr: Phenanthrene d10	85.2		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	99.9		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW3B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-8
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	96.0		%			24-AUG-17

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Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW3C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-9
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
	Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)							
	1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
	2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
	Acenaphthene	<0.020		ug/L			23-AUG-17
	Acenaphthylene	<0.020		ug/L			23-AUG-17
	Anthracene	<0.010		ug/L			23-AUG-17
	Acridine	<0.020		ug/L			23-AUG-17
	Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
	Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
	Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
	Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
	Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
	Chrysene	<0.020		ug/L			23-AUG-17
	Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
	Fluoranthene	<0.020		ug/L			23-AUG-17
	Fluorene	<0.020		ug/L			23-AUG-17
	Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
	Naphthalene	<0.050		ug/L			23-AUG-17
	Phenanthrene	<0.050		ug/L			23-AUG-17
	Pyrene	<0.010		ug/L			23-AUG-17
	Quinoline	<0.020		ug/L			23-AUG-17
	B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr:	Acenaphthene d10	87.4		%			23-AUG-17
Surr:	Acridine d9	104.5		%			23-AUG-17
Surr:	Chrysene d12	96.8		%			23-AUG-17
Surr:	Naphthalene d8	86.1		%			23-AUG-17
Surr:	Phenanthrene d10	90.9		%			23-AUG-17
CCME Total Hydrocarbons ug/L							
	F1-BTEX	<100		ug/L			24-AUG-17
	F2-Naphth	<100		ug/L			24-AUG-17
	F3-PAH	<250		ug/L			24-AUG-17
	Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L							
	F2 (C10-C16)	<100		ug/L			24-AUG-17
	F3 (C16-C34)	<250		ug/L			24-AUG-17
	F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr:	2-Bromobenzotrifluoride	88.4		%			24-AUG-17
BTX plus F1 by GCMS ug/L							
	Benzene	<0.50		ug/L	5		24-AUG-17
	Toluene	<1.0		ug/L	60	24	24-AUG-17
	Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
				ug/L			

KGS Group Consultants (Winnipeg)
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Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW3C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-9
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	101.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit.
* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
- A blank entry designates no known limit.
- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW4A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-10
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	88.4		%			23-AUG-17
Surr: Acridine d9	109.2		%			23-AUG-17
Surr: Chrysene d12	96.1		%			23-AUG-17
Surr: Naphthalene d8	87.4		%			23-AUG-17
Surr: Phenanthrene d10	90.9		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	104.7		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

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ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW4A
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-10
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	0.71		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	99.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

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- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW4B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-11
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	60.1		%			23-AUG-17
Surr: Acridine d9	71.2		%			23-AUG-17
Surr: Chrysene d12	74.2		%			23-AUG-17
Surr: Naphthalene d8	59.4		%			23-AUG-17
Surr: Phenanthrene d10	62.9		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	86.8		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

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865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW4B
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-11
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	99.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

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* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
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- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW4C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-12
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	<0.71		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	97.1		%			23-AUG-17
Surr: Acridine d9	115.1		%			23-AUG-17
Surr: Chrysene d12	104.4		%			23-AUG-17
Surr: Naphthalene d8	98.2		%			23-AUG-17
Surr: Phenanthrene d10	99.9		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	109.9		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	<1.0		ug/L	60	24	24-AUG-17
Ethyl benzene	<0.50		ug/L	140	1.6	24-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW4C
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-12
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	<0.50					24-AUG-17
	m+p-Xylenes	<0.50		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	98.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

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* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
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- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW100
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-13
Matrix: SW

Test Description	Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
Xylenes (Total)	9.15		ug/L	90	20	24-AUG-17
Polyaromatic Hydrocarbons (PAHs)						
1-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
2-Methyl Naphthalene	<0.020		ug/L			23-AUG-17
Acenaphthene	<0.020		ug/L			23-AUG-17
Acenaphthylene	<0.020		ug/L			23-AUG-17
Anthracene	<0.010		ug/L			23-AUG-17
Acridine	<0.020		ug/L			23-AUG-17
Benzo(a)anthracene	<0.010		ug/L			23-AUG-17
Benzo(a)pyrene	<0.0050		ug/L	0.01		23-AUG-17
Benzo(b&j)fluoranthene	<0.010		ug/L			23-AUG-17
Benzo(g,h,i)perylene	<0.020		ug/L			23-AUG-17
Benzo(k)fluoranthene	<0.010		ug/L			23-AUG-17
Chrysene	<0.020		ug/L			23-AUG-17
Dibenzo(a,h)anthracene	<0.0050		ug/L			23-AUG-17
Fluoranthene	<0.020		ug/L			23-AUG-17
Fluorene	<0.020		ug/L			23-AUG-17
Indeno(1,2,3-cd)pyrene	<0.010		ug/L			23-AUG-17
Naphthalene	<0.050		ug/L			23-AUG-17
Phenanthrene	<0.050		ug/L			23-AUG-17
Pyrene	<0.010		ug/L			23-AUG-17
Quinoline	<0.020		ug/L			23-AUG-17
B(a)P Total Potency Equivalent	<0.030		ug/L			23-AUG-17
Surr: Acenaphthene d10	94.1		%			23-AUG-17
Surr: Acridine d9	119.4		%			23-AUG-17
Surr: Chrysene d12	106.9		%			23-AUG-17
Surr: Naphthalene d8	95.2		%			23-AUG-17
Surr: Phenanthrene d10	99.6		%			23-AUG-17
CCME Total Hydrocarbons ug/L						
F1-BTEX	<100		ug/L			24-AUG-17
F2-Naphth	<100		ug/L			24-AUG-17
F3-PAH	<250		ug/L			24-AUG-17
Total Hydrocarbons (C6-C50)	<380		ug/L			24-AUG-17
CCME PHC F2-F4 in Water in ug/L						
F2 (C10-C16)	<100		ug/L			24-AUG-17
F3 (C16-C34)	<250		ug/L			24-AUG-17
F4 (C34-C50)	<250		ug/L			24-AUG-17
Surr: 2-Bromobenzotrifluoride	98.2		%			24-AUG-17
BTX plus F1 by GCMS ug/L						
Benzene	<0.50		ug/L	5		24-AUG-17
Toluene	6.2		ug/L	60	24	24-AUG-17
Ethyl benzene	1.24		ug/L	140	1.6	24-AUG-17
			ug/L			

KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
ATTN: Marci Friedman Hamm

Date: 24-AUG-17
PO No.: SUTHERLAND
WO No.: L1979191
Project Ref: 15-0038-006.1011
Sample ID: SW100
Sampled By: DL + RP
Date Collected: 22-AUG-17
Lab Sample ID: L1979191-13
Matrix: SW

Test Description		Result	Qualifier	Units of Measure	CDWQG MAC	Aesthetic Objective	Date Analyzed
BTX plus F1 by GCMS ug/L							
	o-Xylene	3.04					24-AUG-17
	m+p-Xylenes	6.11		ug/L			24-AUG-17
	F1 (C6-C10)	<100		ug/L			24-AUG-17
Surr:	4-Bromofluorobenzene (SS)	93.0		%			24-AUG-17

CDWQG = Health Canada Guideline Limits updated DECEMBER 2015

* CDWQG for Nitrate+Nitrite-N is the limit for nitrate only. If present as Nitrate then the limit is 10mg/L < or N.D. = less than detection limit.
* Turbidity guideline based on membrane filtration. For guidelines on conventional treatment and slow sand or diatomaceous earth filtration please see Summary Table of Guidelines for Canadian Drinking Water Quality
- A blank entry designates no known limit.
- A shaded value in the Results column exceeds CDWQG MAC and/ or Aesthetic Objective.

Approved by

Judy Dalmaijer
Account Manager

Guidelines & Objectives

Health Canada MAC Health Related Criteria Limits

Nitrate/Nitrite-N*	Criteria limit is 10 mg/L (1.0 mg/L if present as all Nitrite-N). High concentrations may contribute to blue baby syndrome in infants.
Lead*	A cumulative body poison, uncommon in naturally occurring hard waters.
Fluoride*	Present in fluoridated water supplies at 0.8 mg/L to reduce dental caries. Elevated levels causes fluorosis (mottling of teeth).
Total Coliforms*	Criteria is 0 CFU/100mL. Adverse health effects.
E. Coli*	Criteria is 0 CFU/100 mL. Certain E. Coli bacteria can be life threatening.

*Health Canada Canadian Drinking Water Quality Guidelines (MAC limit)

Aesthetic Objective Concentration Levels

Alkalinity	Acid neutralizing capacity. Usually a measure of carbonate and bicarbonates and calculated and reported as calcium carbonate.
Balance	Quality control parameter ratioing cations to anions
Bicarbonate	See Alkalinity. Report as the anion HCO3-1
Carbonate	See Alkalinity. Reported at the anion CO3-2
Calcium	See Hardness. Common major cation of water chemistry.
Chloride	Common major anion of water chemistry.
Conductance	Physical test measuring water salinity (dissolved ions or solids)
Hardness	Classical measure or capacity of water to precipitate soap (chiefly calcium and magnesium ions). Causes scaling tendency in water if carbonates/bicarbonates are present (if >200 mg/L). For drinking water purposes waters with results <200 mg/L are considered acceptable, results >200 mg/L are considered poor but can be tolerated. Results >500 mg/L are unacceptable.
Hydroxide	See alkalinity
Magnesium	See hardness. Common major cation of water chemistry. Elevated levels (>125 mg/L) may exert a cathartic or diuretic action.
pH	Measure of water acidity/alkalinity. Normal range is 7.0-8.5.
Potassium	Common major cation of water chemistry.
Sodium	Common major cation of water chemistry. Measure of salinity (saltiness).The aesthetic objective (not related to health) for sodium in drinking water is 200 mg/L. However, where sodium concentration of the drinking water exceeds 20 mg/L, it is recommended that any person on a sodium restricted diet consult with his/her physician or Medical Officer of Health concerning the use of that water.
Sulphate	Common major anion of water chemistry. Elevated levels may exert a cathartic or diuretic action.
Total Dissolved Solids	A measure of water salinity.
Iron	Causes staining to laundry and porcelain and astringent taste. Oxidizes to red-brown precipitate on exposure to air.
Manganese	Elevated levels may cause staining of laundry and porcelain.
Heterotrophic Plate Count	Criteria is 500 cfu/mL Measure of heterotrophic bacteria present.

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: KGS Group Consultants (Winnipeg)
865 Waverly Street - 3rd Floor
Winnipeg MB R3T 5P4
Contact: Marci Friedman Hamm

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEX+F1-UG/L-HSMS-WP	**Water**							
Batch R3808464								
WG2599547-10 LCS								
Benzene			105.4		%		70-130	23-AUG-17
Toluene			99.7		%		70-130	23-AUG-17
Ethyl benzene			102.4		%		70-130	23-AUG-17
o-Xylene			105.8		%		70-130	23-AUG-17
m+p-Xylenes			102.5		%		70-130	23-AUG-17
WG2599547-11 LCS								
F1 (C6-C10)			88.6		%		70-130	23-AUG-17
WG2599547-9 MB								
Benzene			<0.50		ug/L		0.5	23-AUG-17
Toluene			<1.0		ug/L		1	23-AUG-17
Ethyl benzene			<0.50		ug/L		0.5	23-AUG-17
o-Xylene			<0.50		ug/L		0.5	23-AUG-17
m+p-Xylenes			<0.50		ug/L		0.5	23-AUG-17
F1 (C6-C10)			<100		ug/L		100	23-AUG-17
Surrogate: 4-Bromofluorobenzene (SS)			98.0		%		70-130	23-AUG-17
F2-F4-UG/L-FID-WP	**Water**							
Batch R3808401								
WG2599040-2 LCS								
F2 (C10-C16)			103.5		%		70-130	24-AUG-17
F3 (C16-C34)			98.4		%		70-130	24-AUG-17
F4 (C34-C50)			112.4		%		70-130	24-AUG-17
WG2599040-1 MB								
F2 (C10-C16)			<100		ug/L		100	24-AUG-17
F3 (C16-C34)			<250		ug/L		250	24-AUG-17
F4 (C34-C50)			<250		ug/L		250	24-AUG-17
Surrogate: 2-Bromobenzotrifluoride			60.2		%		60-140	24-AUG-17
PAH,PANH-UG/L-WP	**Water**							
Batch R3808450								
WG2599551-2 LCS								
1-Methyl Naphthalene			99.9		%		60-130	23-AUG-17
2-Methyl Naphthalene			98.4		%		60-130	23-AUG-17
Acenaphthene			103.4		%		60-130	23-AUG-17
Acenaphthylene			105.4		%		60-130	23-AUG-17
Anthracene			98.2		%		60-130	23-AUG-17
Acridine			111.7		%		60-130	23-AUG-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-UG/L-WP	**Water**							
Batch R3808450								
WG2599551-2 LCS								
Benzo(a)anthracene			110.4		%		60-130	23-AUG-17
Benzo(a)pyrene			109.1		%		60-130	23-AUG-17
Benzo(b&j)fluoranthene			113.7		%		60-130	23-AUG-17
Benzo(g,h,i)perylene			112.6		%		60-130	23-AUG-17
Benzo(k)fluoranthene			106.4		%		60-130	23-AUG-17
Chrysene			110.8		%		60-130	23-AUG-17
Dibenzo(a,h)anthracene			113.0		%		60-130	23-AUG-17
Fluoranthene			109.1		%		60-130	23-AUG-17
Fluorene			107.2		%		60-130	23-AUG-17
Indeno(1,2,3-cd)pyrene			113.2		%		60-130	23-AUG-17
Naphthalene			110.3		%		50-130	23-AUG-17
Phenanthrene			108.7		%		60-130	23-AUG-17
Pyrene			110.4		%		60-130	23-AUG-17
Quinoline			105.9		%		60-130	23-AUG-17
WG2599551-1 MB								
1-Methyl Naphthalene			<0.020		ug/L		0.02	23-AUG-17
2-Methyl Naphthalene			<0.020		ug/L		0.02	23-AUG-17
Acenaphthene			<0.020		ug/L		0.02	23-AUG-17
Acenaphthylene			<0.020		ug/L		0.02	23-AUG-17
Anthracene			<0.010		ug/L		0.01	23-AUG-17
Acridine			<0.020		ug/L		0.02	23-AUG-17
Benzo(a)anthracene			<0.010		ug/L		0.01	23-AUG-17
Benzo(a)pyrene			<0.0050		ug/L		0.005	23-AUG-17
Benzo(b&j)fluoranthene			<0.010		ug/L		0.01	23-AUG-17
Benzo(g,h,i)perylene			<0.020		ug/L		0.02	23-AUG-17
Benzo(k)fluoranthene			<0.010		ug/L		0.01	23-AUG-17
Chrysene			<0.020		ug/L		0.02	23-AUG-17
Dibenzo(a,h)anthracene			<0.0050		ug/L		0.005	23-AUG-17
Fluoranthene			<0.020		ug/L		0.02	23-AUG-17
Fluorene			<0.020		ug/L		0.02	23-AUG-17
Indeno(1,2,3-cd)pyrene			<0.010		ug/L		0.01	23-AUG-17
Naphthalene			<0.050		ug/L		0.05	23-AUG-17
Phenanthrene			<0.050		ug/L		0.05	23-AUG-17
Pyrene			<0.010		ug/L		0.01	23-AUG-17

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-UG/L-WP	**Water**							
Batch R3808450								
WG2599551-1 MB								
Quinoline			<0.020		ug/L		0.02	23-AUG-17
Surrogate: Acenaphthene d10			72.9		%		40-130	23-AUG-17
Surrogate: Acridine d9			85.6		%		40-130	23-AUG-17
Surrogate: Chrysene d12			88.0		%		40-130	23-AUG-17
Surrogate: Naphthalene d8			69.5		%		40-130	23-AUG-17
Surrogate: Phenanthrene d10			75.9		%		40-130	23-AUG-17

Quality Control Report

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

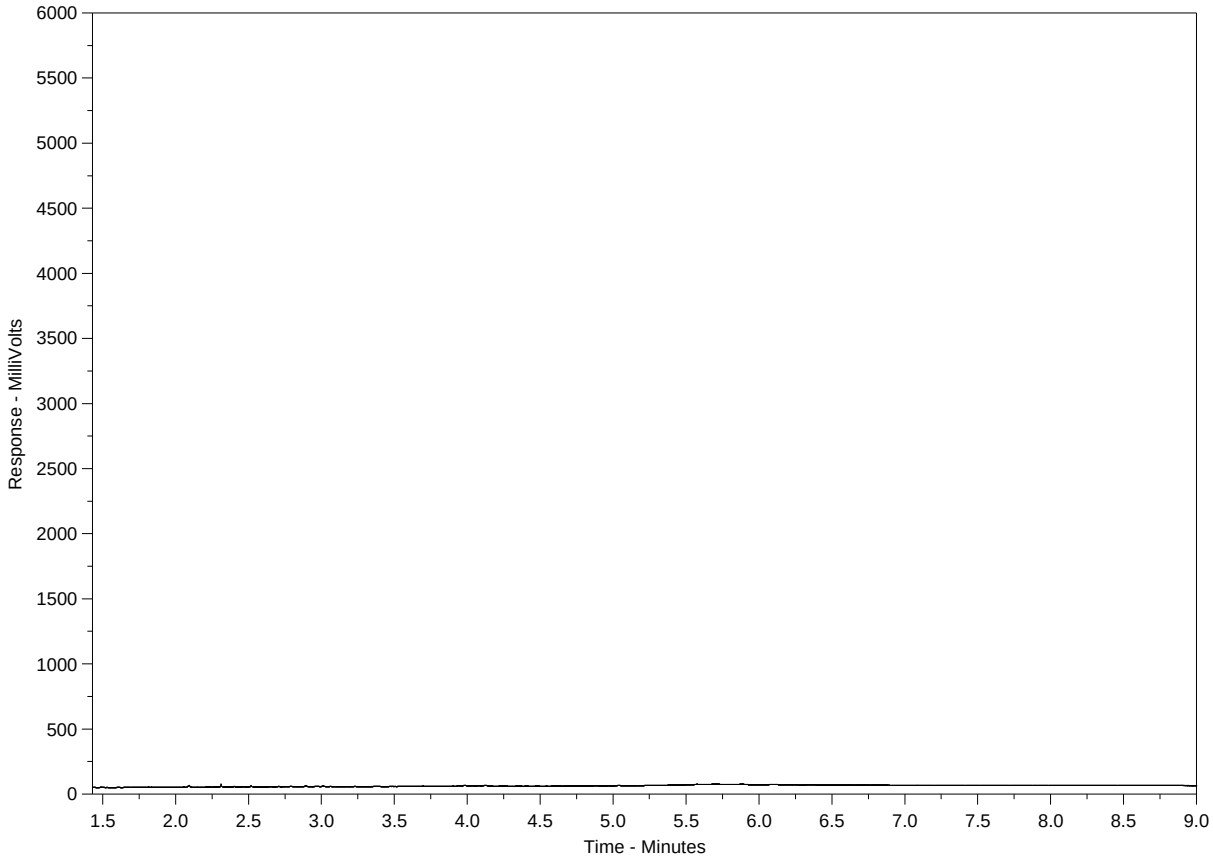
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

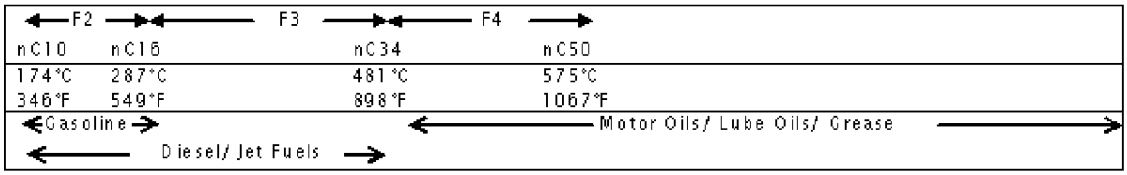
The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-1
Client Sample ID: SW1A





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

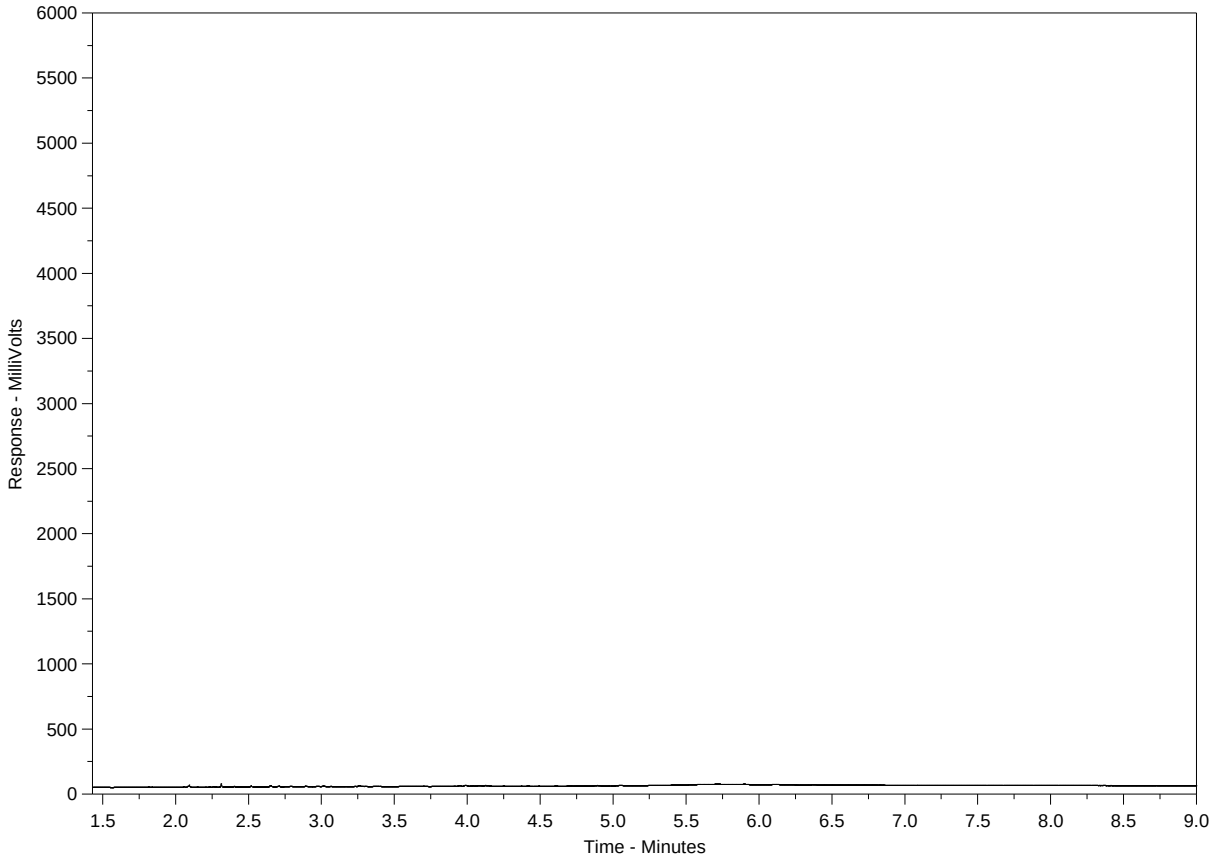
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

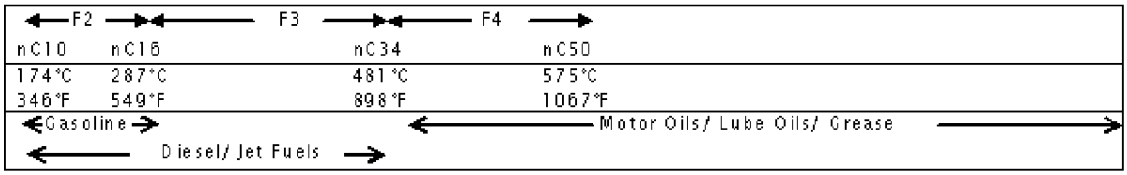
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-2
Client Sample ID: SW1B





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

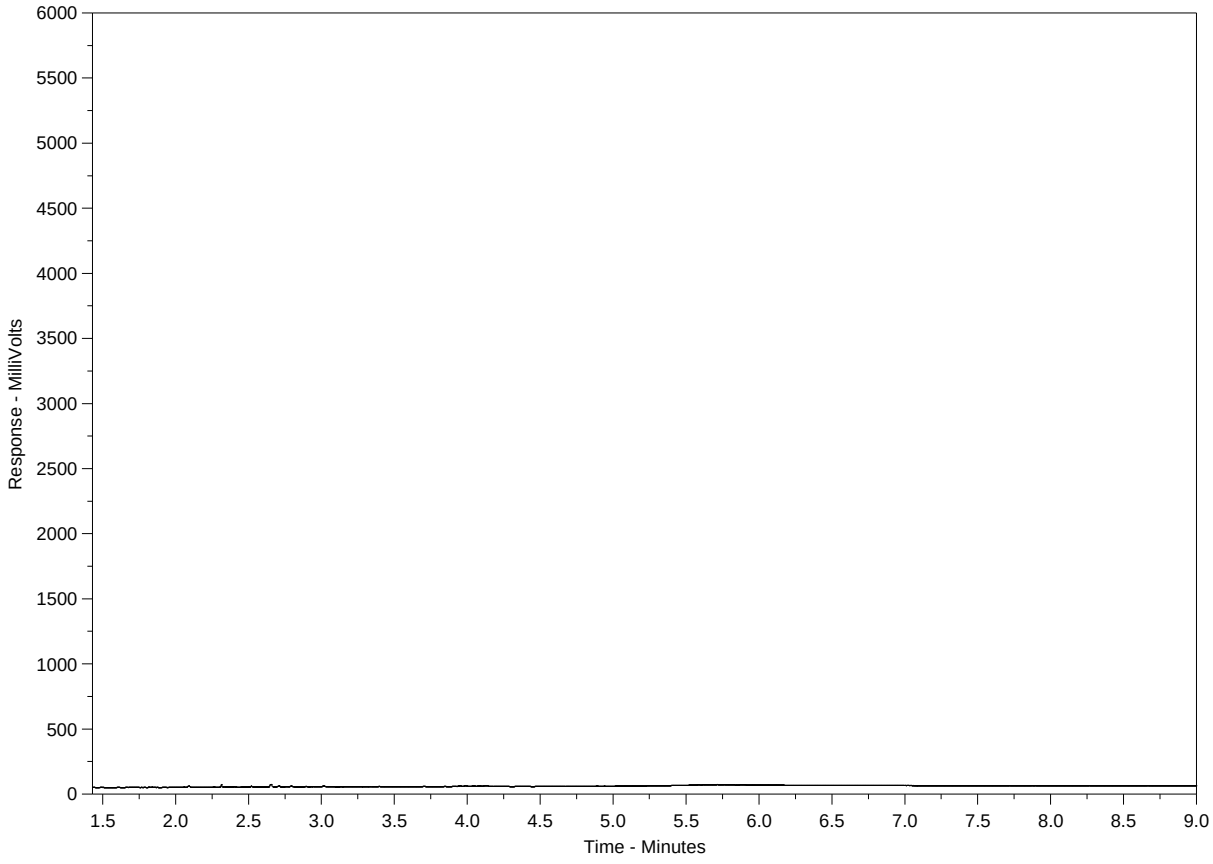
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

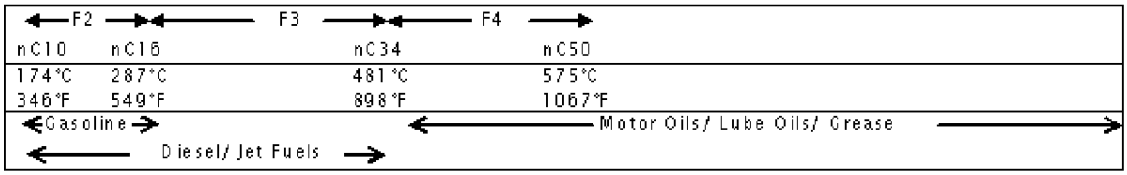
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-3
Client Sample ID: SW1C





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

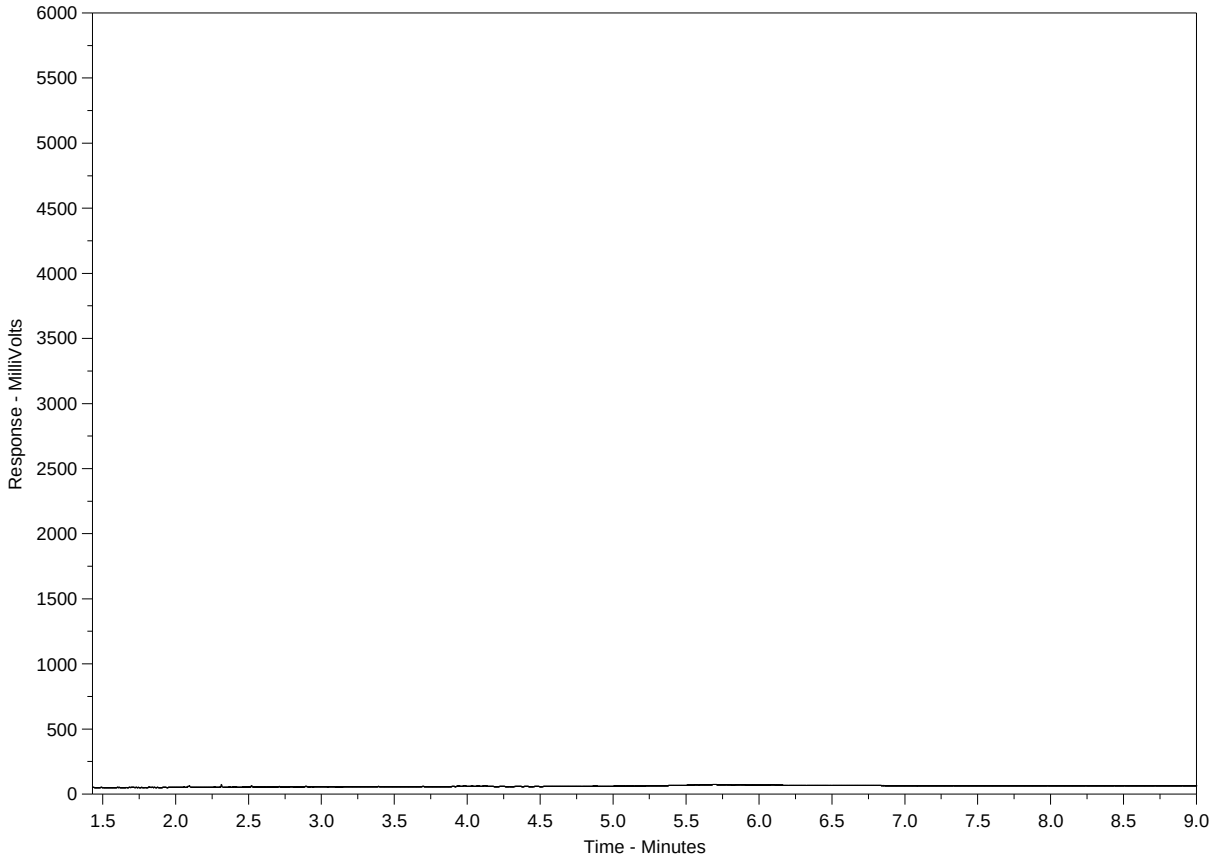
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

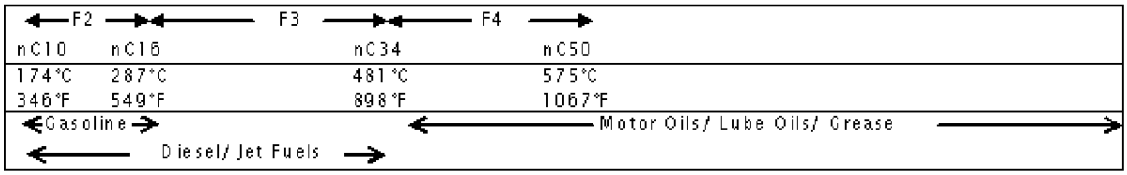
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-4
Client Sample ID: SW2A





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

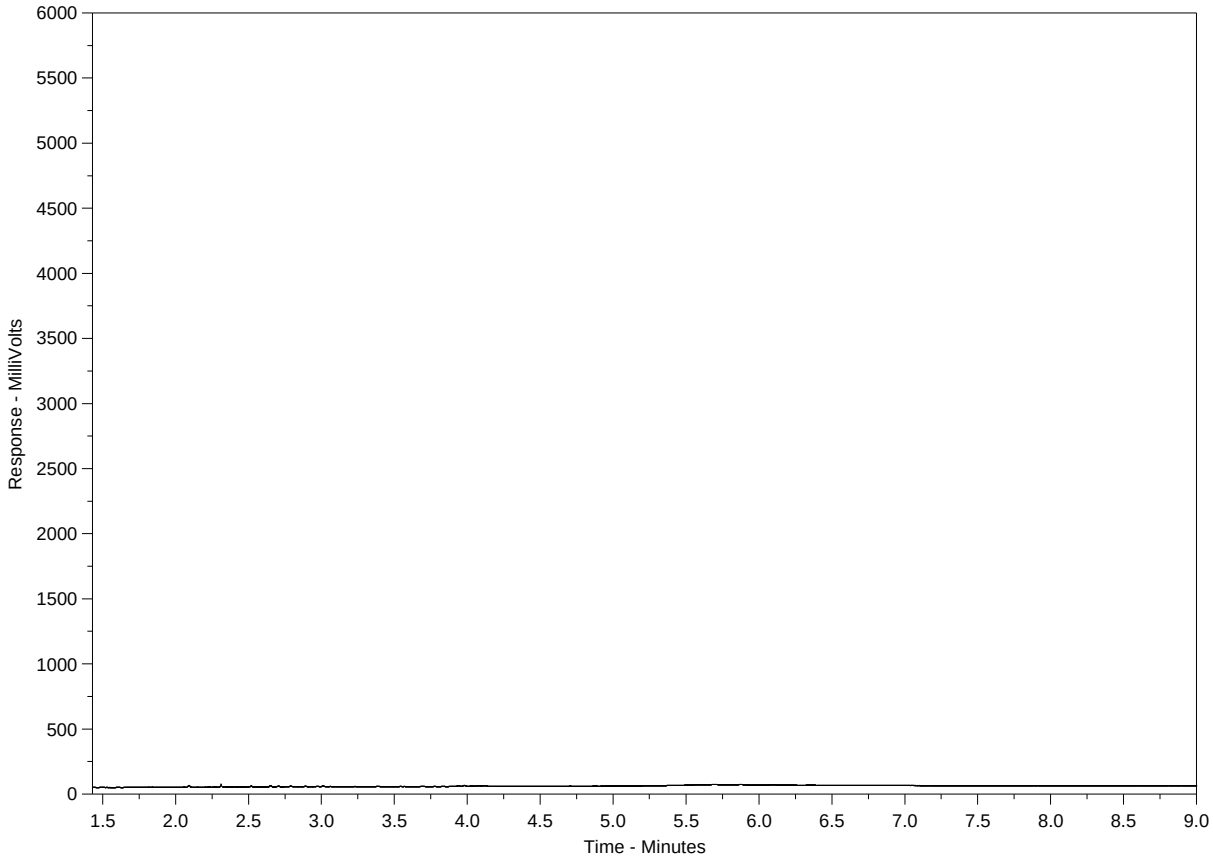
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

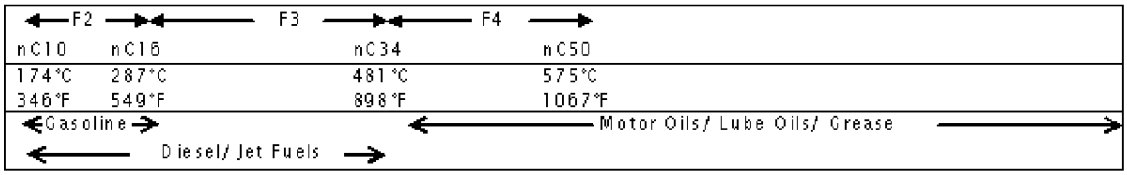
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-5
Client Sample ID: SW2B





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

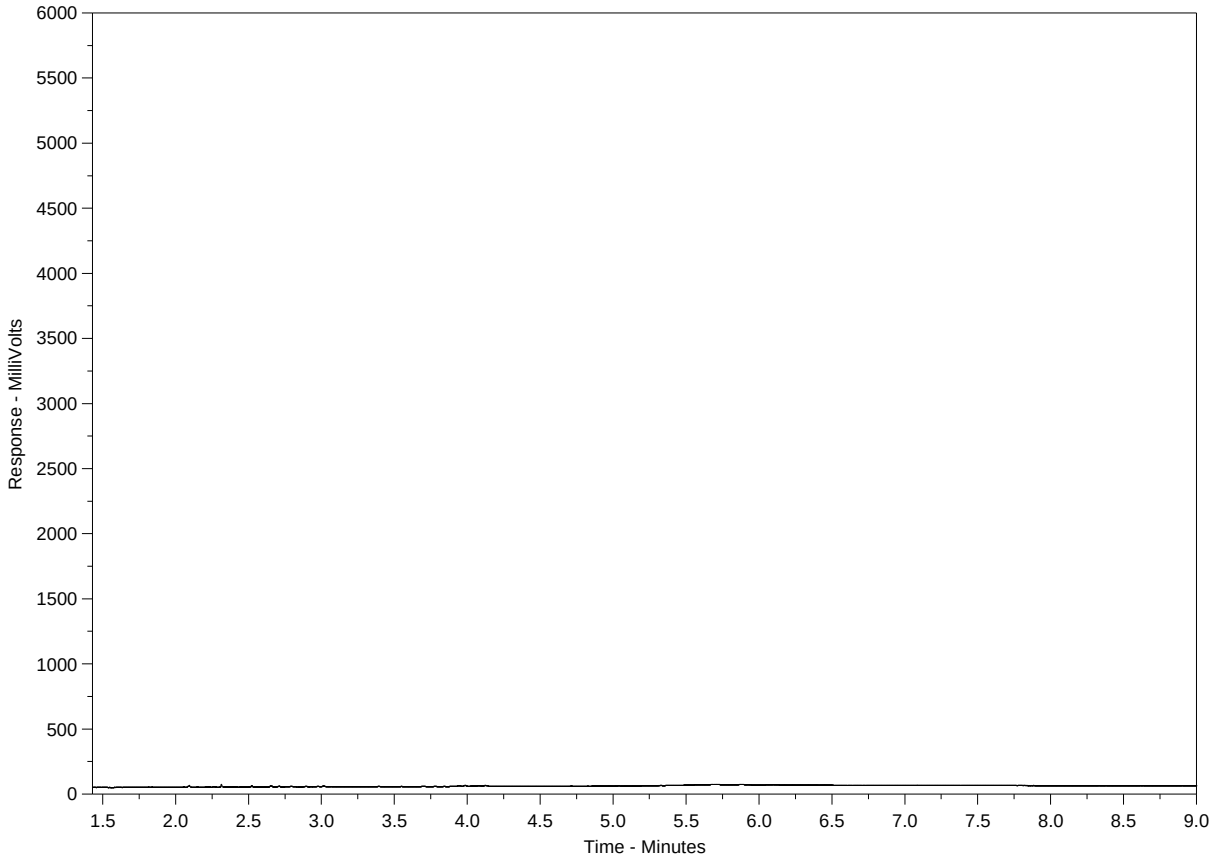
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

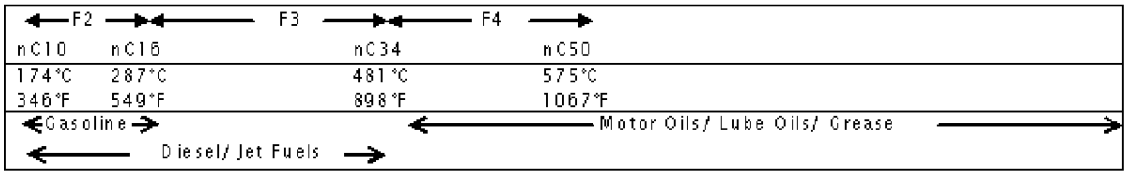
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-6
Client Sample ID: SW2C





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

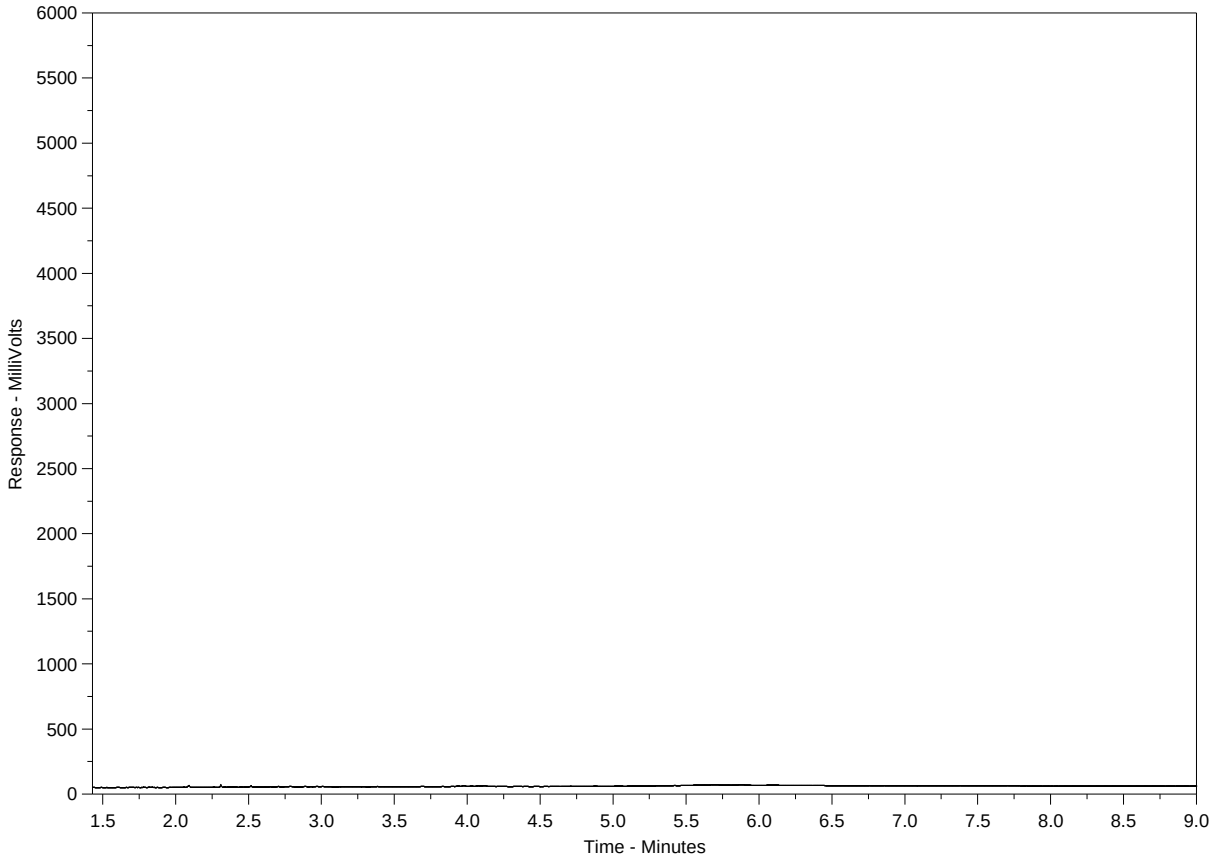
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

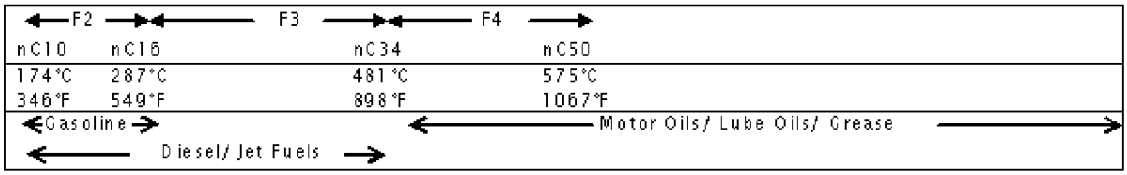
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-7
Client Sample ID: SW3A





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

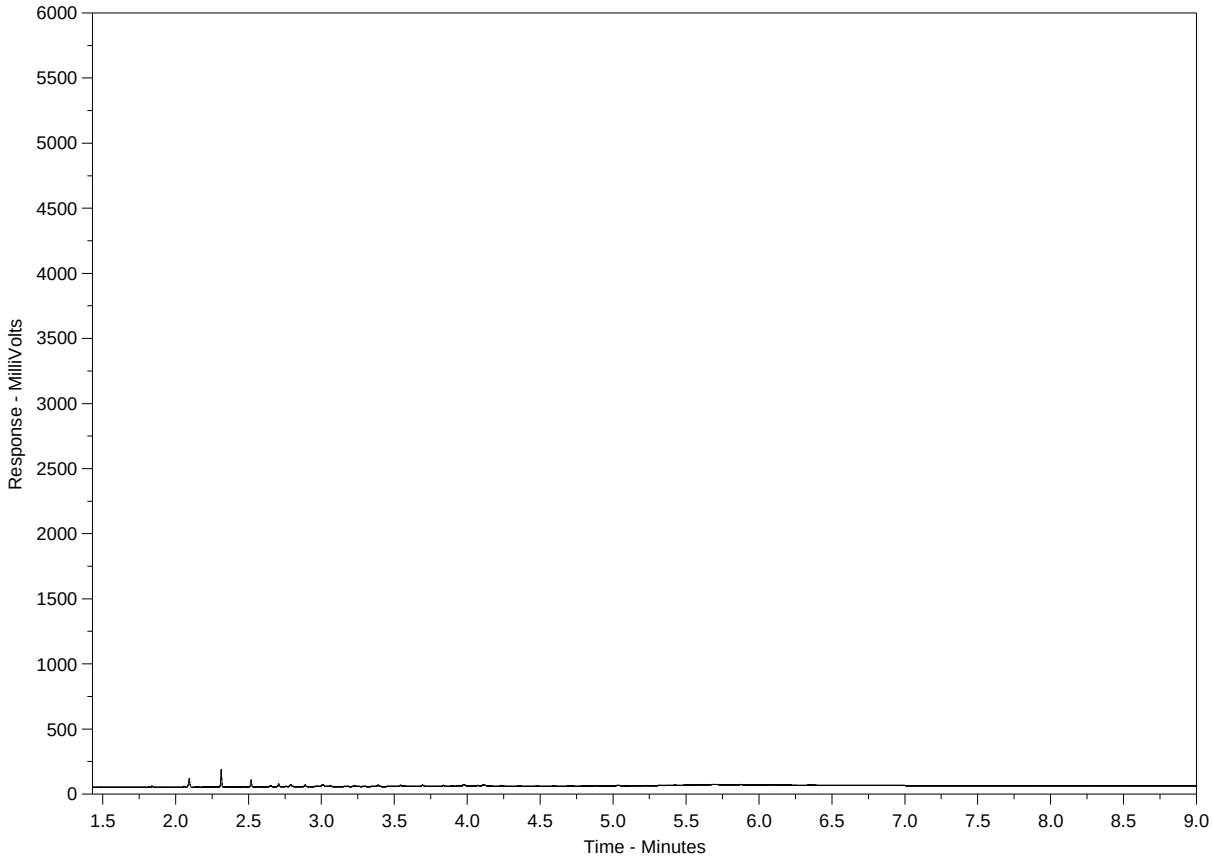
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

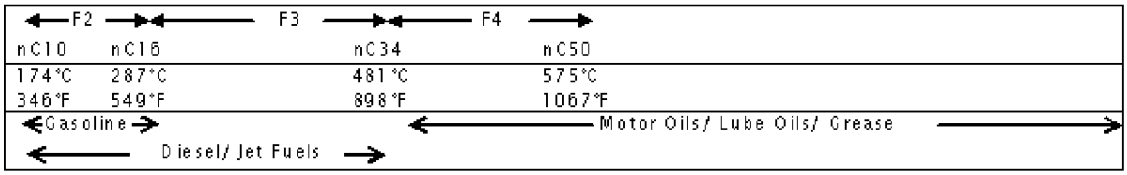
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-8
Client Sample ID: SW3B





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

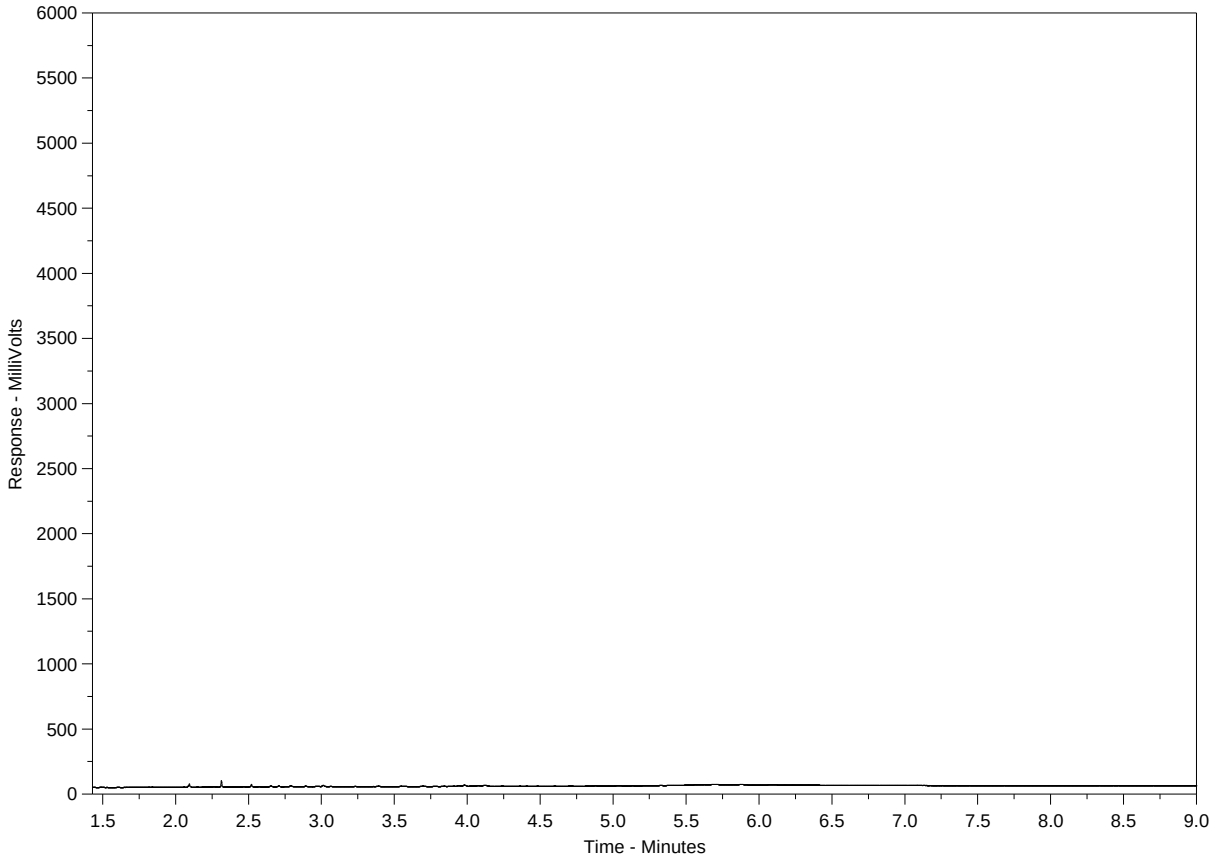
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

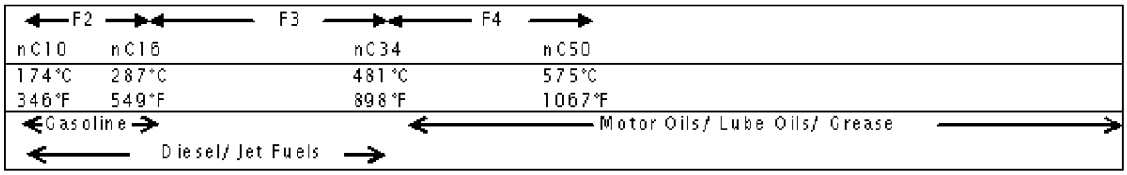
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-9
Client Sample ID: SW3C





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

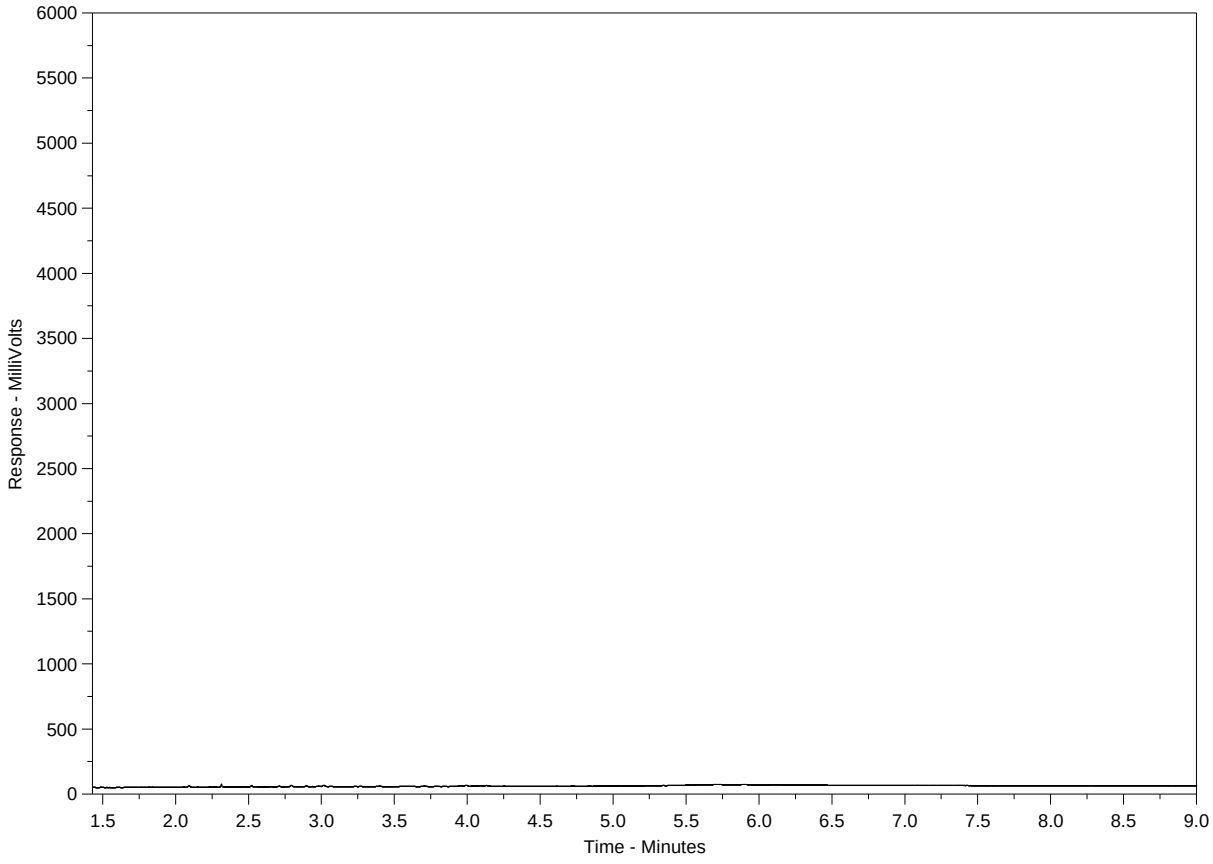
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

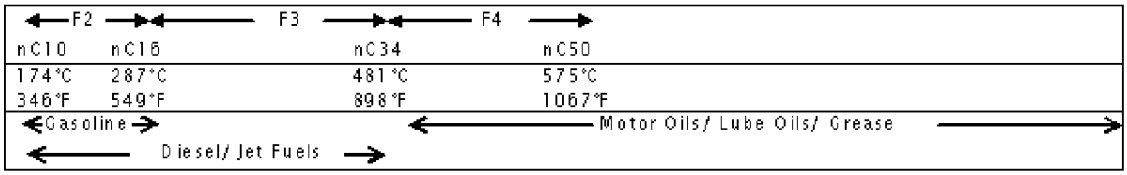
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-10
Client Sample ID: SW4A





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

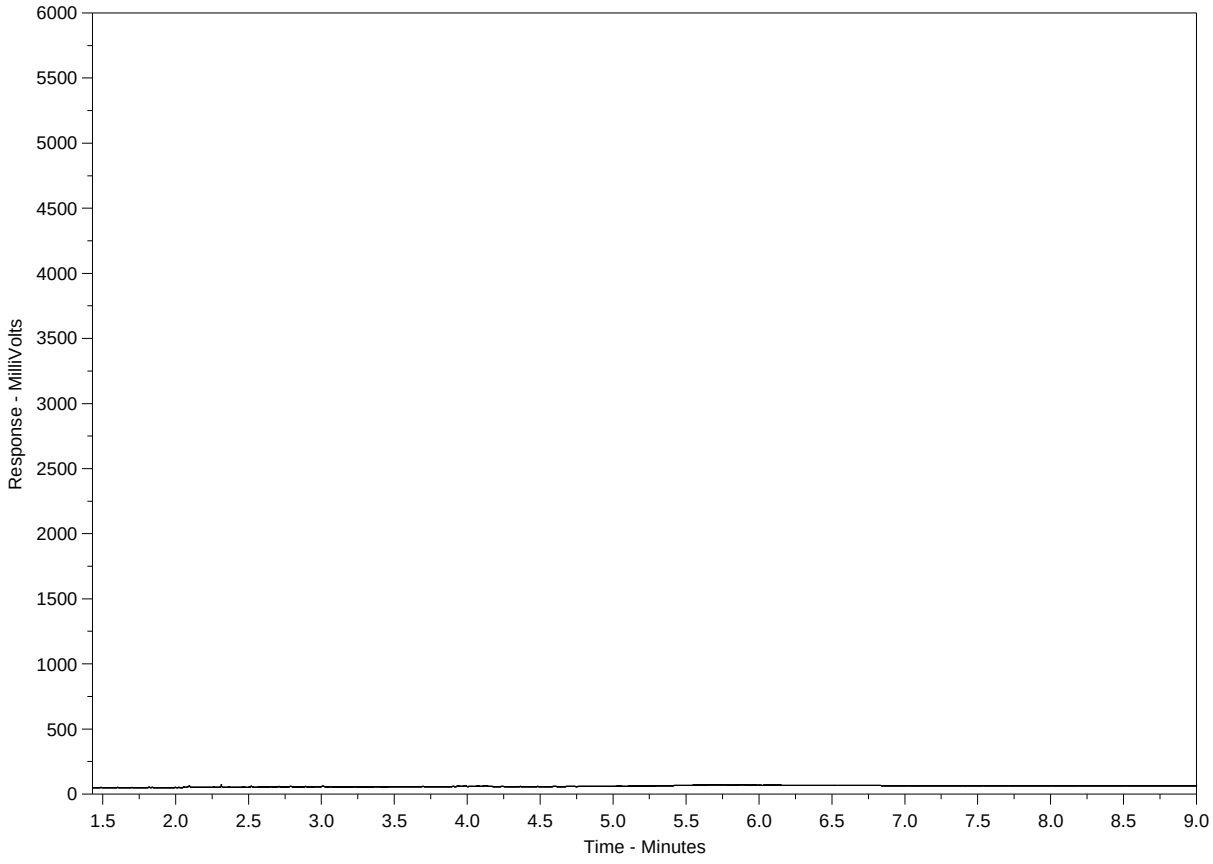
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

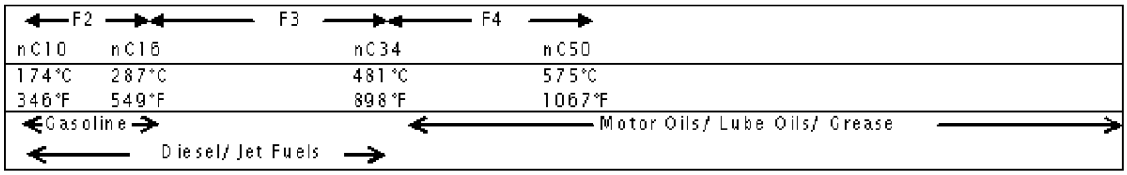
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-11
Client Sample ID: SW4B





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

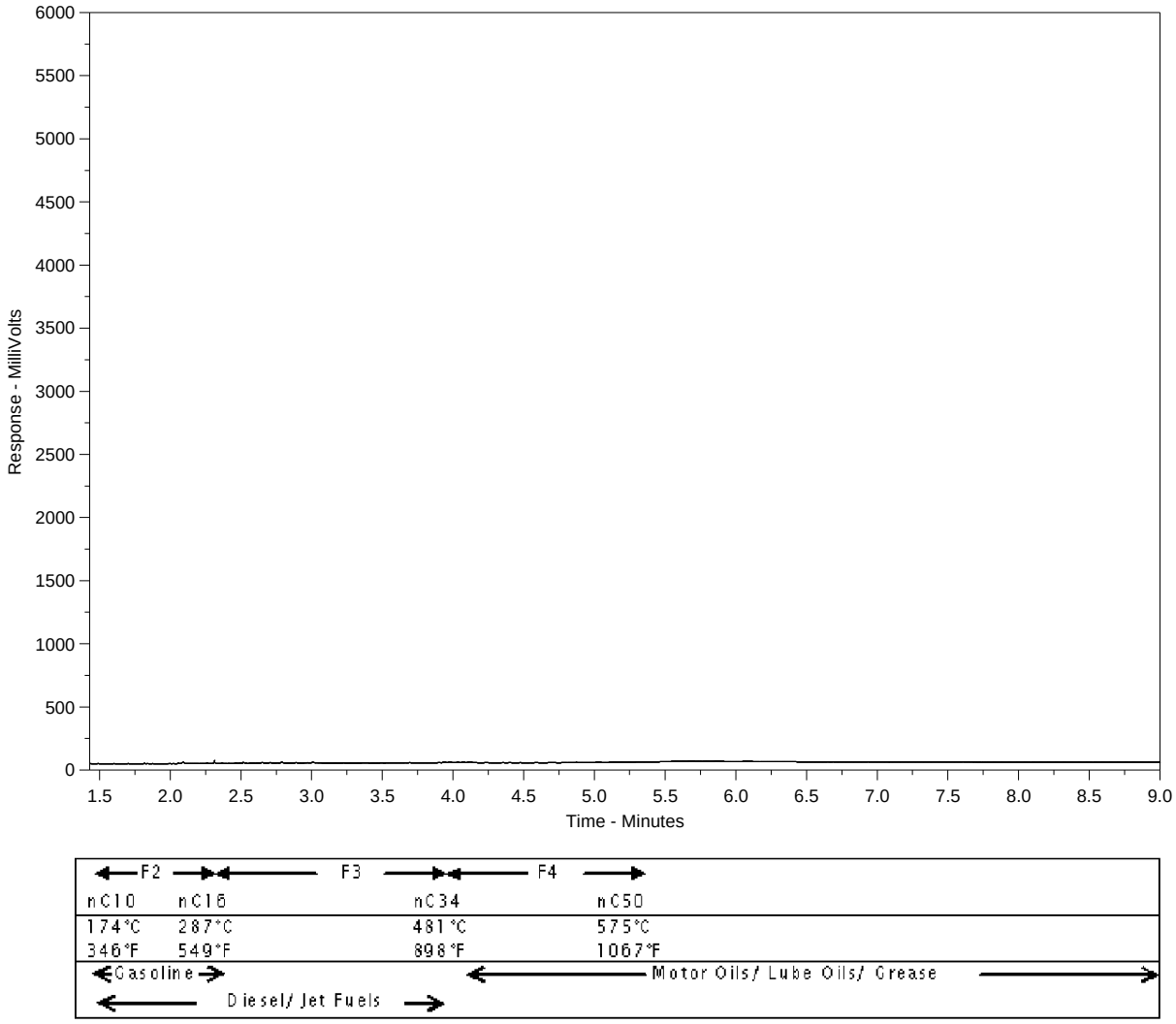
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-12
Client Sample ID: SW4C



The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

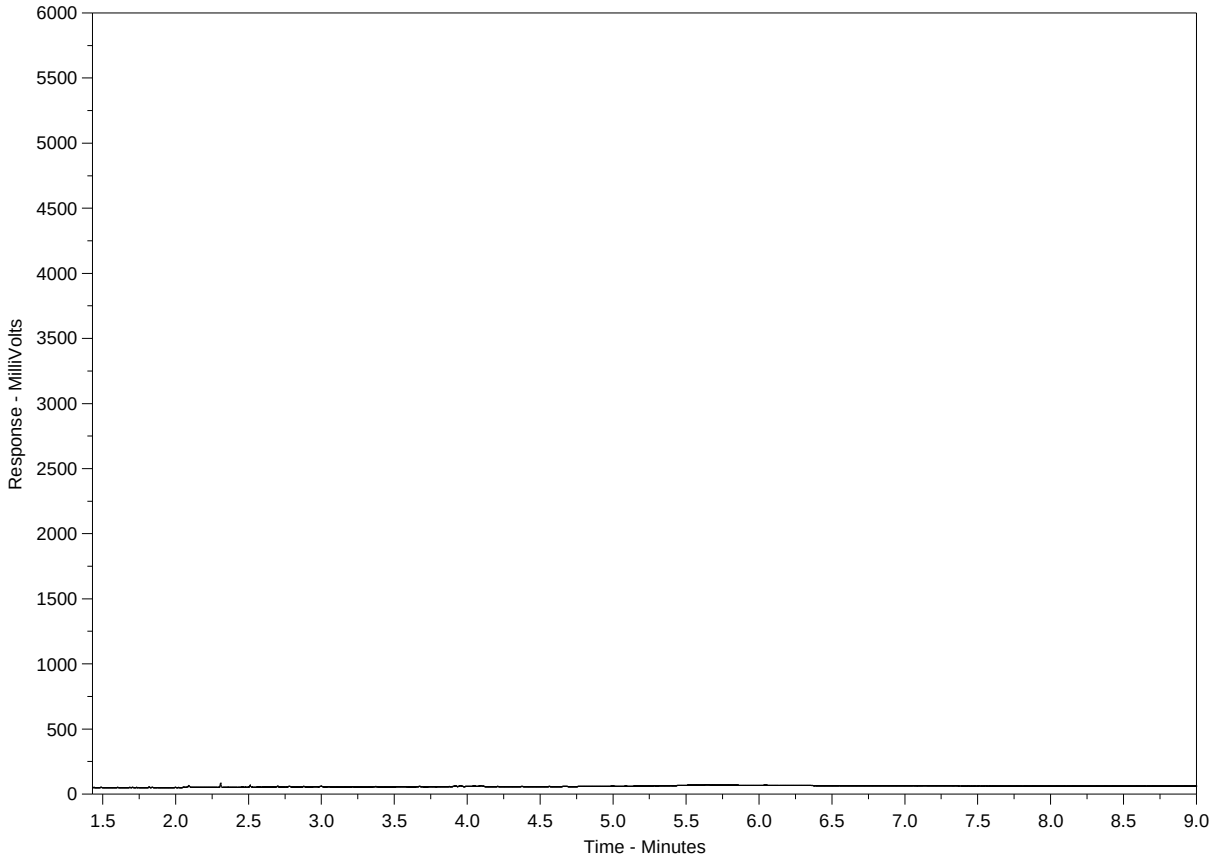
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

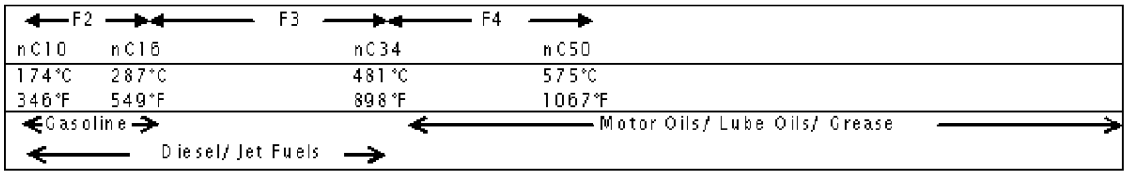
Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1979191-13
Client Sample ID: SW100





The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor, and the scale at left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR library can be found at www.alsglobal.com.

ALS Environmental

L1979191-COFC

10-225411

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Report To	
Company:	KGS Group
Contact:	Marc Friedman Hamm
Address:	865 Waverley St. - 3rd floor Winnipeg MB
Phone:	204-896-1209 Fax: 204-
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)
	Copy of Invoice with Report? (circle) Yes or No
Company:	
Contact:	Bill Macquarrie (wmacquarrie@kgsgroup.com)
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	L1979191

Report Format / Distribution	
Standard: ✓ Other (specify):	
Select: PDF ✓ Excel ✓ Digital Fax	
Email 1: mfhamm@kgsgroup.com	
Email 2: bhuffersetz@kgsgroup.com	
Client / Project Information	
Job #:	15-0038-006.1011
PO / AFE:	Sutherland
LSD:	
Quote #:	48273
ALS Contact:	Judy
Sampler:	DL + RP

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)

- Regular (Standard Turnaround Times - Business Days)
- Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
- ✓ Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
- Same Day or Weekend Emergency - Contact ALS to confirm TAT

Analysis Request

(Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX / F1	F2-F4	PAHs	Number of Containers
1	SW1A	22-Aug-17	16:30	SW	↓	↓	↓	7
2	SW1B		17:00					7
3	SW1C		16:45					7
4	SW2A		18:15					7
5	SW2B		18:40					7
6	SW2C		18:30					7
7	SW3A		19:00					7
8	SW3B		19:30					7
9	SW3C		19:15					7
10	SW4A		19:45					7
11	SW4B		20:15					7
12	SW4C	↓	20:00	↓				7

RUSH

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

C1 = 2.1 C2 = 4.2

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	22-Aug-17	21:20	DKT	23-8-17	8:00	°C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

10-225412

ALS Environmental

L1979191-COFC

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Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company:	KGS Group	Standard: ✓ Other (specify):		Regular (Standard Turnaround Times - Business Days)
Contact:	Marci Friedman Hamm	Select: PDF ✓ Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	865 Waverley St Winnipeg, MB	Email 1: mfhamm@kgsgroup.com		✓ Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2: bhuffman@kgsgroup.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	204-896-1209 Fax:			
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**		**Analysis Request**
	Copy of Invoice with Report? (circle) Yes or No	Job #:	15-0038-pdb. 1011	(Indicate Filtered or Preserved, F/P)
Company:		PO / AFE:	Sutherland	
Contact:	mmacgwarrie@kgsgroup.com	LSD:		
Address:				
Phone:	Fax:	Quote #:	78273	
Lab Work Order # (lab use only)	1979191	**ALS Contact:**	Judy	**Sampler:** DL + RP

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX / F1	F2-F4	PAHs	Number of Containers
13	SW100	22-Aug-17	20:25	SW	X	X	X	1

RUSH

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

C1 = 2.1 C2 = 4.2

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

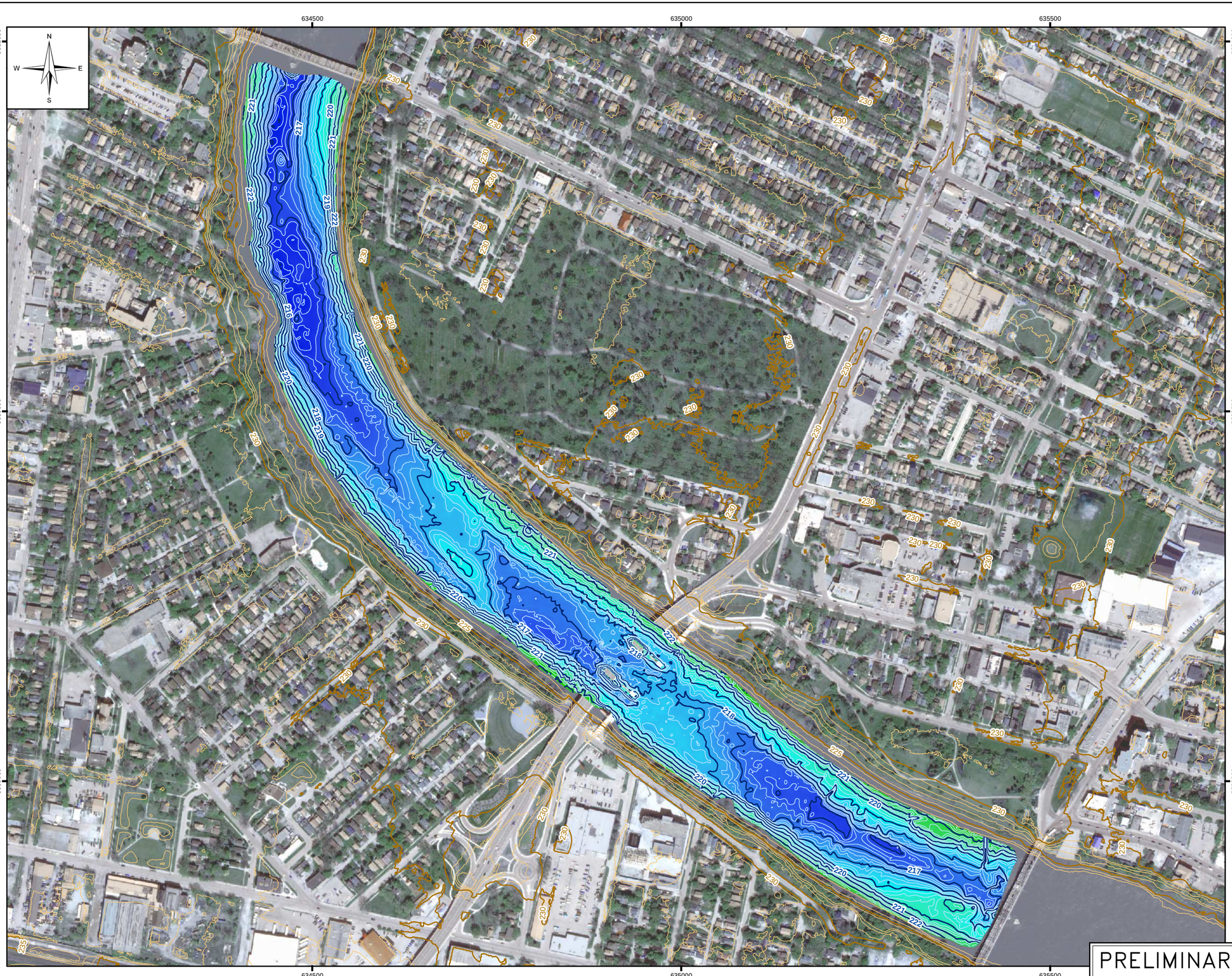
By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

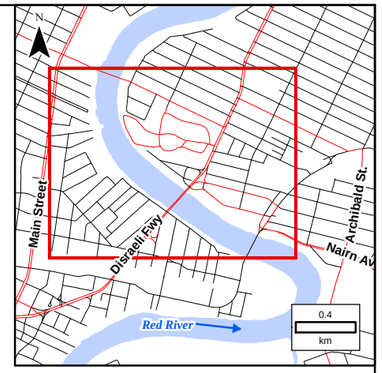
SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	22-Aug-17	21:20	DAT	23-Aug-17	9:00	°C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

APPENDIX D

BATHYMETRY





LEGEND:

- 5m Index LiDAR Contour
- 1m LiDAR Contour
- 1m Index Bathymetry
- 0.25m Bathymetry

Bathymetry (m)
High : 225.2
Low : 214.8

NOTES:
1. Imagery is World View 3 and dated May 20, 2015 and supplied by DigitalGlobe.
2. 2017 Survey completed by KGS Group using Survey Grade GPS and Survey Grade Sonar. Survey completed September 9, 2017.
3. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).

50 0 50 100 150 200
Metres

SCALE: 1:40,000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	17/10/31	ISSUED WITH LETTER REPORT	MFH	BAT

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Manitoba Hydro

FORMER SUTHERLAND AVE.
MGP PLANT SITE

2017 BATHYMETRY OVERVIEW

OCTOBER 2017 | FIGURE 01 | REV: 0

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: P:\Projects\2015\15-0038-006\Dwg\GIS\MXDs\2017_Bathy\Rev0\15-0038-006_Fig01_2017_Bathymetry_Rev0.mxd
11"x17" PLOT SCALE 1:1

634900 635000

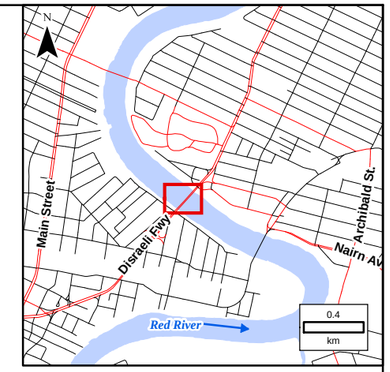
5530200 5530100

WL: 223.8

SW2 SW3 SW4

SEE INSET

INSET



LEGEND:

- Water Sampling Location
- Control Point
- WL
- 5m Index LiDAR Contour
- 1m LiDAR Contour
- 1m Index Bathymetry
- 0.25m Bathymetry
- Bridge/ Pier Outline

Bathymetry (m)
High : 225.2
Low : 214.8

NOTES:
1. Imagery is World View 3 and dated May 20, 2015 and supplied by DigitalGlobe.
2. 2017 Survey completed by KGS Group using Survey Grade GPS and Survey Grade Sonar. Survey completed September 9, 2017.
3. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).

10 0 10 20 30
Metres

SCALE: 1:750 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	17/10/31	ISSUED WITH LETTER REPORT	MFH	BAT

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2017 BATHYMETRY – SITE PLAN

PRELIMINARY
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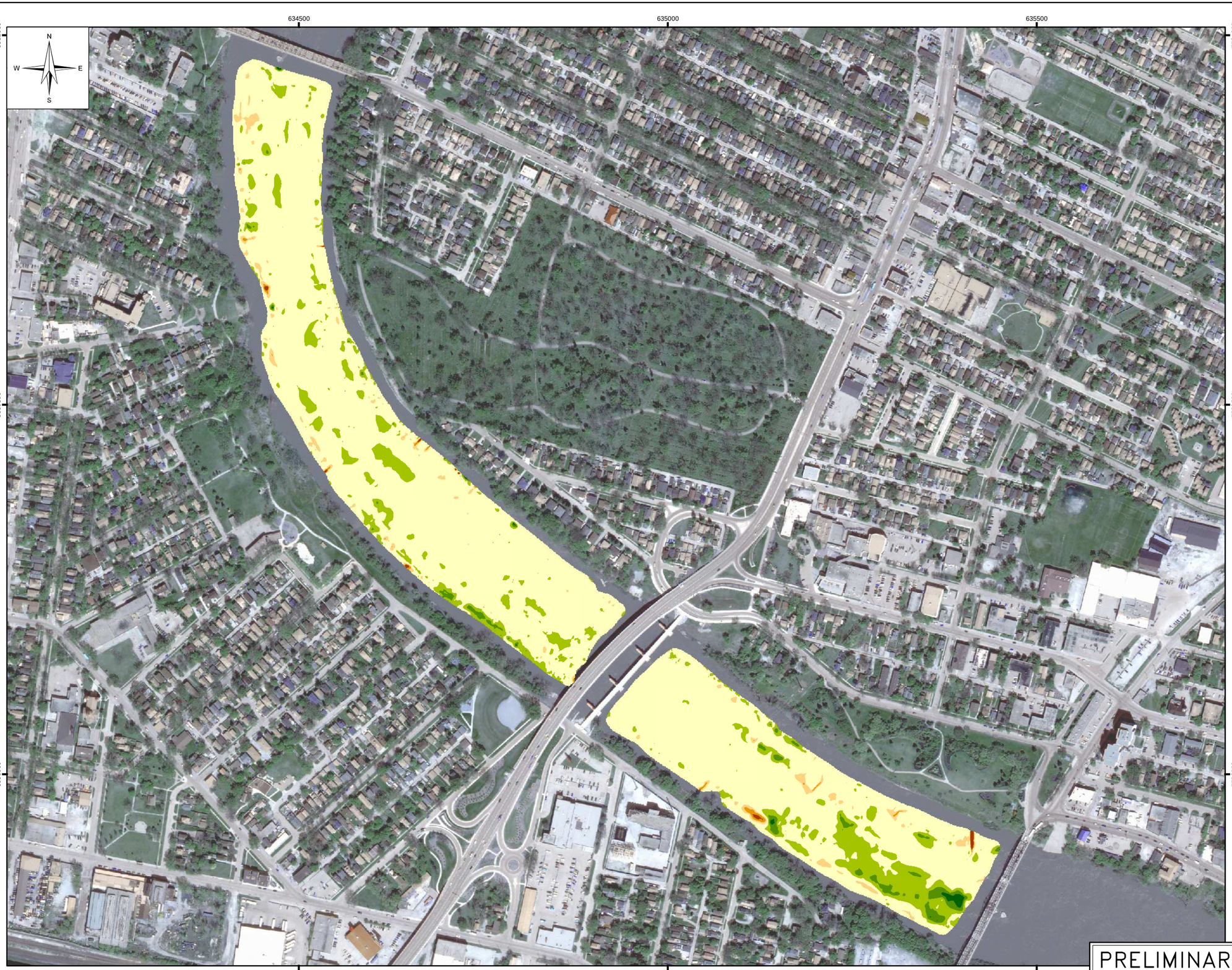
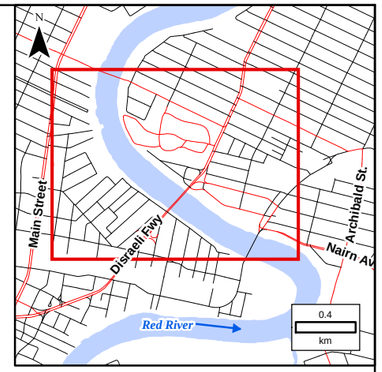
OCTOBER 2017 | FIGURE 02 | REV: 0

FileName: P:\Projects\2015\15-0038-006\Dwg\GIS\MXDs\2017_Bathy\Rev0\15-0038-006_Fig02_2017_Bathymetry_Rev0.mxd
11"x17" PLOT SCALE 1:1





LEGEND:

Change in Elevation (m) 2015 to 2017

	−4.34 – −1.5
	−1.5 – −1
	−1 – −0.5
	−0.5 – 0.5
	0.5 – 1
	1. – 1.5
	1.5 – 2.65

Negative Values – Scour
Positive Values – Deposition

NOTES:

1. 2015 Survey completed by KGS Group using Survey Grade GPS and Survey Grade Sonar. Survey completed May 6, 2015.
2. 2017 Survey completed by KGS Group using Survey Grade GPS and Survey Grade Sonar. Survey completed September 9, 2017.
3. Imagery is World View 3 and dated May 20, 2015 and supplied by DigitalGlobe.
4. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).

50 0 50 100 150 200
Metres

SCALE: 1:5,000 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	17/10/31	ISSUED WITH LETTER REPORT	MFH	BAT

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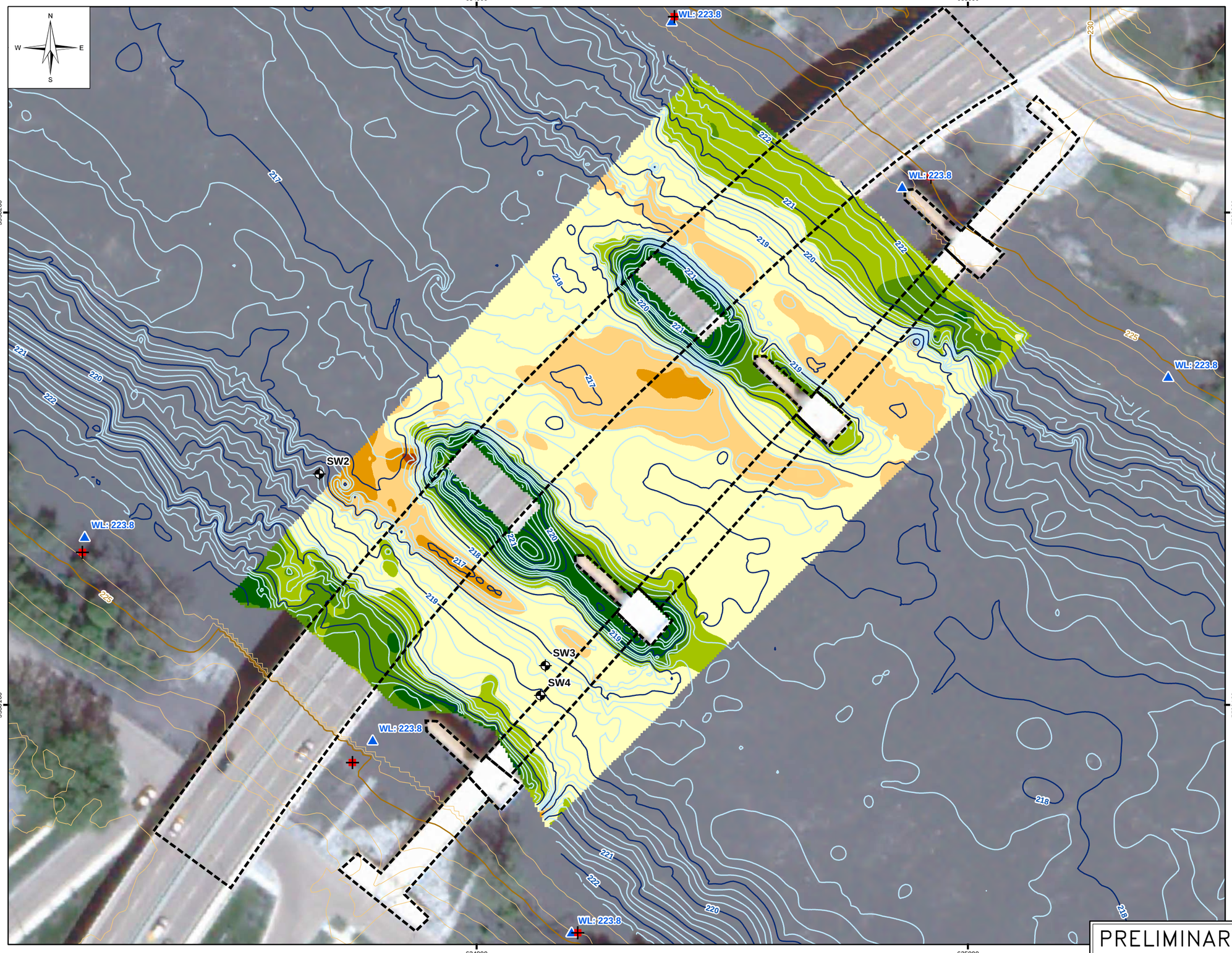
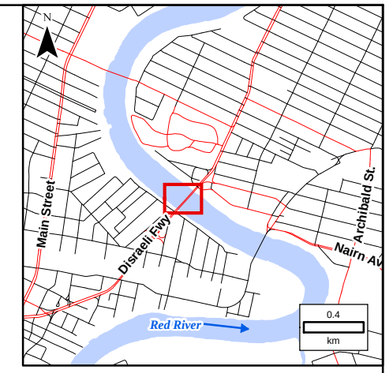
CHANGE IN RED RIVER BOTTOM ELEVATION 2015 TO 2017

OCTOBER 2017 | FIGURE 03 | REV: 0

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: P:\Projects\2015\15-0038-006\Dwg\GIS\MXDs\2017_Bathy\Rev0\15-0038-006_Fig03_2017_Bathymetry_Rev0.mxd
11"x17" PLOT SCALE 1:1





LEGEND:

- Water Sampling Location
- Control Point
- WL
- 5m Index LiDAR Contour
- 1m LiDAR Contour
- 1m Index Bathymetry
- 0.25m Bathymetry
- Bridge/ Pier Outline

Change in Elevation (m) 2003 to 2017

- −2.14 – −1.5
- −1.5 – −1
- −1.0 – −0.5
- −0.5 – 0.5
- 0.5 – 1
- 1..0 – 1.5
- 1.5 – 4.26

Negative Values – Scour
Positive Values – Deposition

NOTES:

1. Imagery is World View 3 and dated May 20, 2015 and supplied by DigitalGlobe.
2. 2003 Survey by North/South Consultants.
3. 2017 Survey completed by KGS Group using Survey Grade GPS and Survey Grade Sonar. Survey completed September 9, 2017.
4. All units are metric and in metres unless otherwise specified. Transverse Mercator Projection, NAD 1983, Zone 14. Elevations are in metres above sea level (MSL).

10 0 10 20 30
Metres

SCALE: 1:750 METRIC 11"x17"

NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	17/10/31	ISSUED WITH LETTER REPORT	MFH	BAT

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KGS GROUP CONSULTING ENGINEERS

Manitoba Hydro

FORMER SUTHERLAND AVE.
MGP PLANT SITE

CHANGE IN RED RIVER BOTTOM ELEVATION 2003 TO 2017

OCTOBER 2017 | FIGURE 04 | REV: 0

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

FileName: P:\Projects\2015\15-0038-006\Dwg\GIS\MXDs\2017_Bathy\Rev0\15-0038-006_Fig04_2017_Bathymetry_Rev0.mxd
11"x17" PLOT SCALE 1:1