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Manitoba Hydro
360 Portage Avenue
Winnipeg, Manitoba
R3C 0G8

ATTENTION: Ms. Shauna Zahariuk

RE: 2013 Monitoring Well Installation Program
Sutherland Avenue Former MGP, Winnipeg, Manitoba
Final Report

Dear Ms. Zahariuk:

KGS Group is pleased to submit one (1) copy of the final report on the 2013 monitoring well installation program along Rover Avenue at the Sutherland Avenue former MGP site in Winnipeg, Manitoba. The program consisted of testhole drilling, monitoring well installation, and soil sampling. The purpose of the monitoring well installation was to replace five of the Sutherland Avenue former MGP site monitoring wells (MW-23A/B/C/D and MW-48) which had been destroyed during the construction of the Disraeli pedestrian bridge in 2013. It was determined that three monitoring wells would be installed to replace the former monitoring wells MW-23A/B/C/D. One lower well would be installed within the till formation and two upper wells would be installed; one screened in the upper sand seam and the second screened within the lower sand seam. The reinstallation of monitoring well MW-48 did not occur at this time because rip rap was encountered underneath the re-landscaping of the Disraeli pedestrian bridge during all attempts made to install the monitoring well at various locations up the slope.

1.0 METHODOLOGY

1.1 MONITORING WELL INSTALLATION

A total of three boreholes were advanced along Rover Avenue with a Mobile B59 truck mounted rig using hollow stem augers and split spoon sampler on November 12 to 15, 2013. The rig is owned and operated by Paddock Drilling Ltd of Brandon, Manitoba. Monitoring well construction consisted of threaded, 50 mm diameter, No. 20 slotted screen and solid threaded Schedule 40 PVC pipe. End plugs and top caps were friction-fit to the ends of each monitoring well. No glues or solvents were used in the construction of monitoring wells. All monitoring well materials and installation techniques conformed to the American Standards Testing and Materials (ASTM) Standard D 5092-90.

Stratigraphic logs of subsurface conditions and monitoring well construction were recorded at the time of borehole drilling and monitoring well installation and are included in Appendix A. The UTM coordinates were also recorded for each borehole and included on the stratigraphic logs. All borehole locations are shown on Figure 2.

Based on the available historic drilling logs for monitoring well MW-23, areas of free product were identified within the sand zones and sand seams within the clay to a depth of 11 m prior to drilling. In order to reduce the risk of contamination to the till well, the deeper of the upper two wells (MW-23C-R) was first advanced with 95 mm ID diameter hollow stem augers to 12.95 m, then past the lower sand seam and into the clay past the impacted soil. The lower sand seam monitoring well was then installed with a screened interval of 0.76 m at a depth 11.89 m. The final upper well (MW-23E) was installed using the same process as MW-23C-R to a depth of 7.16 m with a screened interval of 3.05 m.

In order to protect against potential contamination of the till monitoring well (MW-23A-R) by free-product within the upper sand seams, KGS Group determined that this well should be advanced through a temporary steel casing. This casing was installed under the direction of KGS Group on November 13, 2013 and the monitoring well was installed on November 14, 2013.

A pilot hole was drilled to a depth of 12.2 m prior to installation of the casing. This pilot hole was advanced using a combination of 125 mm and 150 mm diameter solid stem augers, as a limited number of lengths of each were available. The lead 4.58 m of the string consisted of 150 mm diameter augers, with the upper 7.62 m of the string being comprised of 125 mm diameter augers.

Once the desired depth of 12.2 m had been reached, the string of solid stem augers was tripped out of the pilot hole, and the temporary steel casing was installed. It was determined that a smaller diameter casing would be advanced to just above the till layer through a larger diameter casing, so as to prevent advancing the lead of the smaller diameter (deeper) casing through upper contaminated zones and potentially smearing free-product from the upper highly contaminated zones into cleaner subsurface material just above the till layer. If this smearing were allowed to occur, any contaminated material smeared into the deeper zones could provide the potential for cross-contamination of the till zone, as well as the till monitoring well.

The initial 127 mm inside diameter (ID) PWT steel casing was installed within the pilot hole to a depth of 8.83 m, with the bottom of the casing set into low-permeability clay material. This casing was then grouted in place using tremie grouting methodology. This initial length of casing was intended to cut off a highly contaminated zone expected to be present from approximately 4.5 m to 7 m below ground surface, based on historical testhole logs. A 101.6 mm ID HWT steel casing was then advanced through the PWT casing from surface to a depth of 12.8 m. This casing was then tremie grouted in place and allowed to set over night.

On November 14, 2013, 76.2 mm ID NW casing advancer was advanced within the HWT casing to the maximum depth of 12.8 m, and the inside of the casing was flushed with clean water. All water and grout brought to surface was directed into a container and then pumped into a tote for storage and eventual off-site disposal. The NW casing advancer was then tripped out of the hole, and 95 mm ID hollow stem augers were used to extend the borehole from a depth of 12.8 m to the final depth of 16.5 m. A 50 mm diameter split spoon sampler was advanced ahead of the augers so as to collect continuous representative samples of the till material. The sampler was advanced to a depth of 16.2 m, at which depth it could no longer be advanced (refusal).

Monitoring well MW-23A-R was then installed within the hollow stem augers to the maximum depth of 16.5 m. The screened interval of the well was set within the till material from a depth of 16.5 m to a depth of 14.9 m, and consisted of No. 70 slotted screen. The remainder of the well was brought to surface with 50 mm diameter PVC riser pipe. The annulus of the borehole was filled with silica sand from a depth of 14.6 m to a depth of 12.2 m, with the remainder of the annulus filled by the grout that had been placed outside of the casing. Once the well had been installed, the temporary steel casing was removed from the borehole. The well was then protected with a flush-mounted steel lid.

Soil samples were recovered directly from the solid stem augers at intervals of 0.76 m, at stratigraphic changes, and/or at the discretion of KGS personnel. Soil samples were placed into heavy polyethylene bags, and tested for volatile hydrocarbon vapour concentrations using a Photovac Photo-Ionization Detector (PID), calibrated with an isobutylene standard. A PetroFLAG TPH analyzer system, calibrated to a response factor for diesel fuel (rC value = 5) was also used for samples from testholes MW-23A-R and MW-23C-R. Soil samples were placed in CCME approved sample containers, and stored in a cooler chest. Soil samples were then selected for laboratory analysis based on the highest PID value and highest PetroFLAG reading. These samples were then transported to Maxxam Analytics in Winnipeg, Manitoba, and submitted for analysis of Benzene, Toluene, Ethyl-benzene and Xylenes (BTEX), Petroleum Hydrocarbon (PHC) Fractions F1-F4, Volatile Organic Compounds (VOCs), and/or metals. A total of eight soil samples, one from each borehole, were submitted for laboratory analysis. Soil sample results are located in Tables 1 to 3.

In order to reduce cross-contamination between testholes, QA/QC measures included steam cleaning of the augers and split spoon samplers between the testholes by Paddock Drilling. Rinsate samples were collected from the augers or split spoon samplers between each testhole. Rinsate sample results are located in Tables 4 and 5. Split spoon samplers were also washed between samples and potable water was used for all washing and drilling activities. All water used for drilling and washing was contained in 1000 L totes and all soil cuttings were contained in soil bags. Water was disposed of with Miller Environmental and soil cuttings were disposed of with Tervita, both licensed hazardous waste handling companies.

1.2 SOIL ASSESSMENT CRITERIA

The Province of Manitoba has adopted guidelines published by the Canadian Council of Ministers of the Environment (CCME) for the assessment of contaminated sites in Manitoba. For this project, federal criteria from the CCME *Canadian Environmental Quality Guidelines* (CEQG) for *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health* (1999, Updated 2007, 2013) were used to assess BTEX and PAH concentrations in soil.

The CCME *Canada-Wide Standards (CWS) for Petroleum Hydrocarbons in Soil* (January 2001; updated January 2008) were used to assess concentrations of PHC fraction F1. The CCME guidelines were established to protect various receptors (human and environment) based on potential pathways and typical land uses that include agricultural, residential/parkland, commercial and industrial. These environment factors in conjunction with the appropriate risk management models were used to establish appropriate generic remediation criteria.

Land use at the site north of Rover Avenue is considered to be residential/parkland. For application of criteria to this study, residential/parkland land use Tier I Site Specific Criteria from the CCME guidelines were used to assess BTEX and PHC Fraction F1 parameter concentrations in soil. The Tier I criteria are further divided based on the texture of the soil (fine

and coarse-grained) and the depth at which soil samples were retrieved (surface and subsurface soil). The soils beneath the site are predominantly fine-grained soil (clays and silts). Surface soil criteria are applied to those soil samples obtained at less than 1.5 m depth and subsurface soil criteria are applied to those soil samples obtained at a depth greater than 1.5 m. All soil samples taken during the monitoring well installation were below 1.5 m depth.

The CCME CWS guidelines were used to assess both BTEX, PHC Fraction F1, and PAH concentrations at the site and were updated in January 2008 based on improved research methods and new toxicity data gathered since the original CCME CWS was published in 2001. In this update, a new Management Limit guideline has been developed for use where criterion values do not exist for a specific pathway or depth, and as warranted by site-specific conditions.

The applicable BTEX Site-Specific pathways for the site included the following: Soil Contact site-specific pathway, Groundwater Check (aquatic life) site-specific pathway, and Management Limit site-specific pathway. The Soil Ingestion Guideline, Soil Dermal Contact Guideline, Soil Inhalation Guideline, and Direct Contact (Ingestion+Dermal Contact) guidelines do not apply as all samples were taken below 1.5 m depth and therefore are not accessible to people and animals. The Inhalation of Indoor Air Check (basement) and Inhalation of Indoor Air Check (slab on grade) guidelines are not applicable as there are no residential buildings within 100 m of the testholes. The Groundwater Check (drinking water) guideline is not applicable as the City of Winnipeg provides potable water for the area via Shoal Lake. The Produce, Meat and Milk Check, Soil and Food Ingestion Guideline, Nutrient and Energy Cycling Check, and Groundwater Check guidelines do not apply as the land is not used for agricultural purposes. Additionally, the Off-site migration Check guideline is not applicable as the areas surrounding the testhole locations have land classifications equal to the residential classification or are less sensitive in classification.

The applicable PAH site specific pathways for the site include the following: Soil Quality Guideline for Environmental Health, Soil Quality Guideline for soil contact by soil dependent organisms, Soil Quality Guidelines for the protection of freshwater life, and Interim Soil quality Criteria (CCME 1991). The Soil and Food Ingestion guideline is not applicable as the land use in the area of the testholes is not agricultural in use.

2.0 RESULTS

2.1 FIELD OBSERVATIONS

Evidence of hydrocarbon impacts were identified in the form of hydrocarbon sheen, hydrocarbon staining and hydrocarbon odour in monitoring well MW-23C-R and as hydrocarbon staining and hydrocarbon odour in monitoring well MW-23E. No impacts were evident in the soil samples taken from below the casing in monitoring well MW-23A-R and free product was not observed in any of the testholes. The visual observations and the results of the hydrocarbon vapour screening conducted on the soil samples collected during drilling activities are summarized on the testhole logs provided in Appendix A.

2.2 SOIL LABORATORY RESULTS

Petroleum hydrocarbon (PHC) concentrations for one or more of the parameters of benzene toluene, ethylbenzene, and/or xylenes were above the Tier I Generic Criteria for select soil samples from testholes MW-23C-R and MW-23E. All soil samples selected from below the casing depth in testhole MW-23A-R had BTEX and PHC Fraction F1 concentrations below

laboratory detection limits. All samples had BTEX and PHC fraction F1 concentrations below the applicable Tier I Site-Specific Criteria. Laboratory results for PHCs are located in Table 1.

Polycyclic Aromatic hydrocarbon (PAH) concentrations for one or more of the parameters fluorene, naphthalene, and/or phenanthrene were above the Environmental Health Guidelines for samples MW-23C-R-S11, MW-23C-R-S17, MW-23E-S8, and MW-23E-S11. Soil samples collected from testhole MW-23A-R had concentrations of all PAH parameters below laboratory detection limits. Laboratory results for Environmental Health PAHs are located in Table 2.

Select PAH concentrations were also compared to the Human Health Guideline Check for incremental lifetime cancer risks. Sample MW-23E-S11 located at a depth of 7.5 m was determined to have a greater than $1x10^{-6}$ incremental lifetime cancer risk based on the concentrations of select PAH parameters within the sample. All other samples had risk below the acceptable threshold for both $1x10^{-6}$ and $1x10^{-5}$ incremental lifetime cancer risk values. Results of the Human Health assessment of PAHs are located in Table 3.

The Laboratory Certificate of Analysis is included in Appendix B.

2.3 RINSATE RESULTS

Rinsate samples were collected from the auger or split spoon sampler between each testhole drilling and monitoring well installation, with the exception of Rinsate G, which was taken directly from the distilled water used as rinsate material. All samples were submitted to the laboratory for analysis of BTEX, PHC Fraction F1, and PAHs. All rinsate samples for BTEX and PHC Fraction F1 were below laboratory detection limits. Detectable concentrations of PAH parameters were found in the following rinsate samples:

- Rinsate B (MW-23A-R second set of spoons): 2-methlylnaphthalene (0.000026 mg/L), naphthalene (0.000078 mg/L), and pyrene (0.00027 mg/L)
- Rinsate C (rinse of spoons before MW-23E: phenanthrene (0.000057 mg/L) and pyrene (0.000018 mg/L)
- Rinsate D (rinse of auger before MW-23E): acenaphthylene (0.000021 mg/L), anthracene (0.000018 mg/L), benzo(a)anthracene (0.00002 mg/L), benzo(a)pyrene (0.0000213 mg/L), benzo(b&j)fluoranthene (0.000022 mg/L), benzo(g,h,i)perylene (0.000028 mg/L), benzo(k)fluoranthene (0.000028 mg/L), fluoranthene (0.000036 mg/L), fluorene (0.000021 mg/L), indeno(1,2,3-c,d)pyrene (0.000022 mg/L), 1-methylnaphthalene (0.000059 mg/L), 2-methylnephthelene (0.000051 mg/L), naphthalene (0.00023 mg/L), phenanthrene (0.000104 mg/L), and pyrene (0.000049 mg/L)
- Rinsate G (distilled water blank): quinoline (0.000032 mg/L)

All other PAH parameters for rinsate samples were below the laboratory detection limits.

3.0 SUMMARY AND CONCLUSIONS

KGS Group completed the installation of three replacement monitoring wells from November 12 to 15, 2014. Three testholes were advanced by Paddock Drilling to a maximum depth of 16.46 m and monitoring wells were installed in each testhole. Selected soil samples were submitted from each testhole for analysis of BTEX, PHC fractions F1, and PAHs. Visual and olfactory evidence of hydrocarbon impacts were identified in MW-23C-R and MW-23E, however, no

visible or olfactory evidence of hydrocarbon impacts was identified within the soil samples taken from below 12.8 m depth (past set casing) in MW-23A-R. Laboratory analysis of soil samples from MW-23A-R support the visual and olfactory observations as all sample concentrations were below laboratory detection limits for BTEX, PHC fraction F1, and PAHs.

Soil sample concentrations above CCME Protection of Freshwater Life and/or Interim Soil Quality Criteria for PAHs were identified in sample MW-23C-R-S11 (naphthalene), MW-23C-R-S17 (naphthalene), MW-23E-S8 (fluorene, naphthalene, and phenanthrene), and MW-23E-S11 (fluorene, naphthalene, and phenanthrene). These exceedences are consistent with historically identified hydrocarbon impacts within the silty clay and clay layers at the site at depths ranging from 5.6 m to 12.2 m below ground surface.

Detectable concentrations of multiple PAH parameters were identified in the rinsate samples taken from both the augers and split spoon samplers; however, the concentrations were less than twice the detection limit of each of the PAH parameters and therefore it is not likely that any residual concentrations affected the monitoring well installations.

4.0 STATEMENT OF LIMITATIONS AND CONDITIONS

Third Party Use of Report

This report has been prepared for 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 a third party as a result of decisions made or actions undertaken based on this report.

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 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 have been of service for this project. We will finalize the letter report upon receipt of your comments. Should you have any questions or concerns, please do not hesitate to contact Ms. Bonnie Hoffensetz.

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NH/kp
Enclosure

TABLES

TABLE 1
PETROLEUM HYDROCARBONS IN SOIL
MB HYDRO SUTHERLAND FORMER MGP SITE
WINNIPEG, MANITOBA

Sample No. [1]	Date	Depth (m)	Soil Type	Moisture Content (%)	Field Vapour Reading (ppm)	Parameter [1]				
						Benzene	Toluene	Ethylbenzene	Xylenes (o,-m,-p)	F1 (C_6 - C_{10})
MW-23C-R-S11	12-Nov-13	8.69-9.14	Silty clay	27	153	21.9	0.161	7.58	4.07	<50
MW-23C-R-S17	13-Nov-13	11.9-12.2	Clay	26	4.9	0.169	<0.050	0.041	<0.10	<10
MW-23A-R-S1	14-Nov-13	13.4-14.0	Clay	46	0.7	<0.0050	<0.050	<0.015	<0.10	<10
MW-23A-R-S3	14-Nov-13	14.6-15.2	Silt till	7.3	0.1	<0.0050	<0.050	<0.015	<0.10	<10
MW-23A-R-S5	14-Nov-13	15.8-16.1	Silt till	8.2	0.3	<0.0050	<0.050	<0.015	<0.10	<10
MW-23E-S8	15-Nov-13	5.64-5.79	Silty clay	28	366	19.9	0.276	6.65	6.80	69
MW-23E-S11	15-Nov-13	7.47-7.62	Silty clay	28	360	19.5	0.681	10.10	15.80	55
Laboratory Detection Limits						*0.03*	*0.05*	*0.25/0.075*	*0.1/0.25*	*50/15*
CCME Guidelines [2,3] - Residential Land Use, Subsurface Soil (>1.5 m) - Fine Grained Soil Type										
TIER I GOVERNING OBJECTIVES GENERIC CRITERIA						**0.0068**	**0.08**	**0.018**	**2.4**	**170**
TIER I SITE SPECIFIC CRITERIA (For Pathways Applicable to Site)										
Soil Contact Guideline [a]						120	220	240	130	NA
Groundwater Check (aquatic life) [b]						NC	NC	NC	NC	NC
Management Limit [c]						-	-	-	-	800

Notes:

"-" = No Data

NA = Not Applicable. Calculated value exceeds 1,000,000 kg/mg or pathway excluded.

NC = Not calculated. Insufficient data to allow derivation.

1. All values are expressed in milligrams per kilogram (mg/kg).
2. CCME - Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines, 1999. Update 7.0 - 2007.
   Chapter 7 - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
3. CCME - Canadian Council of Ministers of the Environment. Canada-Wide Standards for Petroleum Hydrocarbons (PHCs) in Soil, May 2001 - revised January 2008. Updated July 2012.

a. For depths between 0 and 1.5 meters below ground level, the terrestrial ecological pathway must be applied.
   A management limit has been developed for PHC that must be applied at all depths if the ecological pathway is removed.
   CCME does not specify for depths between 1.5 and 3 meters bgl.

b. Assumes surface water body at 10 m from site.

c. Includes additional considerations such as free phase formation, explosive hazards, and buried infrastructure effects.

	- Exceedance of Tier I Generic Criteria
BOLD	- Exceedance of Tier I Site Specific Criteria

TABLE 2
POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL
ENVIRONMENTAL HEALTH
MB HYDRO SUTHERLAND FORMER MGP SITE
WINNIPEG, MANITOBA

Sample No.	Date	Depth (m)	Soil Type	Moisture Content (%)	Parameter [1]																				
					Acenaphthene	Acenaphthylene	Acridine	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo (b) fluoranthene	Benzo(k) fluoranthene	Benzo(b&j)-fluoranthene	Benzo(b+j+k)-fluoranthene	Benzo (g,h,i) perylene	Chrysene	Dibenzo (a,h) anthracene	Fluoran-thene	Fluorene	Indeno (1,2,3-c,d) pyrene	1-Methyl Naphthalene	2-Methyl Naphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline
MW-23C-R-S11	12-Nov-13	8.69-9.14	Silty clay	27	0.0063	<0.0050	<0.010	<0.0040	<0.010	<0.010	<0.010	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	0.029	0.035	**2.98**	<0.010	<0.010	<0.010
MW-23C-R-S17	13-Nov-13	11.9-12.2	Clay	26	<0.0050	<0.0050	<0.010	<0.0040	<0.010	<0.010	<0.010	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	**0.050**	<0.010	<0.010	<0.010
MW-23A-R-S1	14-Nov-13	13.4-14.0	Clay	46	<0.0050	<0.0050	<0.010	<0.0040	<0.010	<0.010	<0.010	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
MW-23A-R-S3	14-Nov-13	14.6-15.2	Silt till	7.3	<0.0050	<0.0050	<0.010	<0.0040	<0.010	<0.010	<0.010	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
MW-23A-R-S5	14-Nov-13	15.8-16.1	Silt till	8.2	<0.0050	<0.0050	<0.010	<0.0040	<0.010	<0.010	<0.010	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
MW-23E-S8	15-Nov-13	5.64-5.79	Silty clay	28	0.230	0.306	0.109	0.623	0.401	0.294	0.206	0.092	0.199	0.291	0.146	0.388	0.0168	0.846	**0.554**	0.159	2.82	2.72	**21.3**	**2.61**	1.23	<0.050
MW-23E-S11	15-Nov-13	7.47-7.62	Silty clay	28	0.110	1.20	0.017	0.452	0.428	0.471	0.360	0.147	0.330	0.477	0.237	0.352	0.0235	0.744	**0.406**	0.246	1.26	1.93	**12.7**	**1.58**	1.04	<0.050
Laboratory Detection Limits					*0.005*	*0.005*	*0.010*	*0.004*	*0.010*	*0.010*	*0.010*	*0.010*	*0.010*	*0.014*	*0.010*	*0.010*	*0.005*	*0.010*	*0.010*	*0.010*	*0.010*	*0.010*	*0.010*	*0.010*	*0.010*	*0.010*
CCME Guidelines [2] - Residential/ Parkland Use																										
SQG_E [3]					NC	NC	-	2.5 [7]	NC	20 [10]	NC	NC	NC	NC	NC	NC	NC	50 [7]	NC	NC	-	-	NC	NC	NC	-
Soil contact (SQG_{SC})					NC	NC	-	2.5	NC	20	NC	NC	NC	NC	NC	NC	NC	50	NC	NC	-	-	NC	NC	NC	-
Protection of freshwater life [4] (SQG_{FL})					0.28 [5]	320 [6]	-	NA [5,8]	NA [5,8]	8800 [5]	NA [6,8]	NA [6,8]	NA [6,8]	NA [6,8]	NA [6,8]	NA [6,8]	NA [6,8]	NA [5,8]	0.25 [5]	NA [6,8]	-	-	0.013 [5,11]	0.046 [5,11]	NA [5,8]	-
Interim Soil Quality Criteria (CCME 1991)					-	-	-	-	1 [9]	0.7	1 [9]	1 [9]	1 [9]	1 [9]	-	-	1 [9]	-	-	1 [9]	-	-	0.6 [12]	5 [13]	10 [14]	-

Notes:
'-' = No data
SQG_E = Soil Quality Guideline for Environmental Health
SQG_{SC} = Soil Quality Guideline for soil contact by soil-dependent organisms (e.g. plants and invertebrates)
SQG_{FL}= Soil Quality Guideline for protection of freshwater life
NA = Not Applicable
NC = Not Calculated

1. All values are expressed in milligrams per kilogram (mg/kg).
2. CCME - Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines, 2008, revised 2010.
Chapter 7 - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health.
3. The SQG_E is based on the lowest of the available environmental health guidelines (soil contact, soil and food ingestion, or protection of freshwater life).
For PAHs where a soil contact guideline was not available, an overall SQG_E was not calculated.
4. Modeling assumptions include the absence of biodegradation of PAHs in the subsurface environment, a highly conservative assumption.
5. SQG_{FL} for freshwater life protection back-calculated based on CCME (2006) protocol, using pre-existing CCME Water Quality Guidelines (Freshwater Life) (CCME 1999).
6. SQG_{FL} for freshwater life protection guideline back-calculated from theoretically derived freshwater life thresholds based on baseline (narcosis-type)
toxicity along with a Critical Body Residue (CBR) approach, assuming an internalized dose for aquatic life of 3.0 mmol PAH/kg lipid is a threshold for chronic, non-lethal toxicity.
7. The SQG_E is based on the soil contact guideline value.
8. A freshwater life protective guideline could not be calculated based on the assumed generic site/soil properties and the K_{OC} of the PAH, since the
concentration in the groundwater at the point of leaching would need to far exceed the solubility limit to account for a concentration that approaches
the toxicity threshold at a point 10 m down-gradient.
9. The interim soil quality criterion (CCME 1991) is retained as the environmental soil quality guideline for this land use because there was
insufficient/inadequate data to calculate an SQG_E or provisional SQG_E. Consult the human health guidelines/check values to assess the human
hazard of PAH mixtures containing this PAH.
10. The SQG_E is based on the soil contact guideline value. The 2008 benzo[a]pyrene SQG_E replaces the 1997 provisional benzo[a]pyrene SQG_E.
Consult the human health guidelines/check values to assess the human hazard of PAH mixtures containing this PAH.
11. Users may wish to consider the application, on a site-specific basis, of the Soil Quality Guideline for the Protection of Freshwater Life where
potential impacts on nearby surface water are a concern. This guideline value may be less than the common limit of detection in some
jurisdictions. Consult appropriate jurisdiction for further guidance.
12. Data were insufficient/inadequate to update the 1997 provisional SQG_E and no attempt was made to calculate a SQG_{HH} or provisional SQG_{HH},
therefore the 1997 provisional SQG_E is retained as the soil quality guideline for the protection of environmental health for this land use.
However, if there is concern for potential impacts to water bodies, the Soil Quality Guideline for the Protection of Freshwater Life (SQG_{FL}) should be
applied. Consult other jurisdictions for the protection of human health from naphthalene.
13. Data were insufficient / inadequate to calculate an SQG_E or provisional SQGE and no attempt was made to calculate a SQG_{HH} or provisional SQG_{HH},
therefore the interim soil criterion (CCME 1991) is retained as the environmental soil quality guideline for this land use. However, if there is concern for
potential impacts to water bodies, the Soil Quality Guideline for the Protection of Freshwater Life (SQGFL) should be applied. Consult other
jurisdictions for the protection of human health from phenanthrene.
14. Data were insufficient / inadequate to calculate an SQG_E or provisional SQGE and no attempt was made to calculate a SQG_{HH} or provisional SQG_{HH},
therefore the interim soil criterion (CCME 1991) is retained as the environmental soil quality guideline for this land use. Consult other jurisdictions for the
protection of human health from pyrene.

Bold - Exceedance of CCME Criteria

TABLE 3
POLYCYCLIC AROMATIC HYDROCARBONS IN SOIL
HUMAN HEALTH
MB HYDRO SUTHERLAND FORMER MGP SITE
WINNIPEG, MANITOBA

Sample No.	Date	Depth (m)	Soil Type	Moisture Content (%)	Parameters (mg/kg)[4]							CCME[1] - Human Health	
					Benzo(a) anthracene	Benzo(a) pyrene	Benzo (b+j+k) fluoranthene[5]	Chrysene	Benzo (g,h,i) perylene	Dibenzo (a,h) anthracene	Indeno (1,2,3-c,d) pyrene	Direct Contact[2] (SQG_{DH}) - ingestion, inhalation, and dermal exposures B[a]P TPE [3]	
												$1x10^{-6}$ incremental lifetime cancer risk	$1X10^{-5}$ incremental lifetime cancer risk
B[a]P Potency Equivalence Factors (PEFs)					0.1	1	0.1	0.01	0.01	1	0.1	0.6	5.3
MW-23C-R-S11	12-Nov-13	8.69-9.14	Silty clay	27	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	0.009300	0.009300
MW-23C-R-S17	13-Nov-13	11.9-12.2	Clay	26	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	0.009300	0.009300
MW-23A-R-S1	14-Nov-13	13.4-14.0	Clay	46	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	0.009300	0.009300
MW-23A-R-S3	14-Nov-13	14.6-15.2	Silt till	7.3	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	0.009300	0.009300
MW-23A-R-S5	14-Nov-13	15.8-16.1	Silt till	8.2	<0.010	<0.010	<0.014	<0.010	<0.010	<0.0050	<0.010	0.009300	0.009300
MW-23E-S8	15-Nov-13	5.64-5.79	Silty clay	28	0.401	0.294	0.291	0.388	0.146	0.0168	0.159	0.401240	0.401240
MW-23E-S11	15-Nov-13	7.47-7.62	Silty clay	28	0.428	0.471	0.477	0.352	0.237	0.0235	0.246	0.615490	0.615490
Laboratory Detection Limits					*0.010*	*0.010*	*0.010*	*0.010*	*0.010*	*0.0050*	*0.010*	-	-

Notes:
IACR = Index of Additive Cancer Risk
B[a]P TP = Benzo[a]pyrene Total Potency Equivalents
SQG_{DH} = human health-based soil quality guideline for direct contact
SQG_{PW} = soil quality guideline for the protection of potable water

1. CCME - Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines, 2008, revised 2010.
   Chapter 7 - Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health for all Land Uses.
2. Guideline values for toddler pica soil ingestion have been calculated for benzo[a]pyrene, acenaphthene, fluorene, anthracene and fluoranthene, but are several orders of magnitude higher than the direct contact guidelines.
   For more details on the pica guidelines, refer to section 7.1.4 of the scientific supporting document (CCME, 2008a).
3. B[a]P TPE = Benzo[a]pyrene Total Potency Equivalents, which is the sum of estimated cancer potency relative to B[a]p for all potentially carcinogenic unsubstituted PAHs.
   The B[a]P TPE for a soil sample is calculated by multiplying the concentration of each PAH in the sample by its B[a]P Potency Equivalence Factor (PEF) and summing these products.
   B[a]P PEFs are order of magnitude estimates of carcinogenic potential and are based on the World Health Organization (WHO/IPCS 1998).
4. If analysis returns non-detects, then 1/2 the detection limit used in the formulas.
5. If concentrations of benzo[b]fluoranthene, benzo[j]fluoranthene, and benzo[k]fluoranthene are reported separately, they should be summed together and expressed as a single value for benzo[b+j+k]fluoranthene.

-Exceedance of CCME Criteria

TABLE 4
PETROLEUM HYDROCARBONS IN GROUNDWATER
MB HYDRO SUTHERLAND FORMER MGP SITE
WINNIPEG, MANITOBA

Sample No.	Description	Date	Parameter (mg/L)				
			Benzene	Toluene	Ethyl-benzene	Xylenes (-o,-m,-p)	F1 (C6 - C10)
RINSATE A	During MW-23A-R from auger below 12.8 m	14-Nov-13	<0.00050	<0.0010	<0.00050	<0.0015	<0.10
RINSATE B	During MW-23A-R from second set of spoons	14-Nov-13	<0.00050	<0.0010	<0.00050	<0.0015	<0.10
RINSATE C	Rinse of spoons before MW-23E	14-Nov-13	<0.00050	<0.0010	<0.00050	<0.0015	<0.10
RINSATE D	Rinse of auger before MW-23E	14-Nov-13	<0.00050	<0.0010	<0.00050	<0.0015	<0.10
RINSATE G	Distilled water used for rinsate	15-Nov-13	<0.00050	<0.0010	<0.00050	<0.0015	<0.10
Laboratory Detection Limits			*0.0005*	*0.001*	*0.0005*	*0.0015*	*0.1*

TABLE 5
POLYCYCLIC AROMATIC HYDROCARBONS IN WATER
MB HYDRO SUTHERLAND FORMER MGP SITE
WINNIPEG, MANITOBA

Sample No.	Description	Date	Parameter (mg/L)										
			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
RINSATE A	During MW-23A-R from auger below 12.8 m	14-Nov-13	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000020	<0.000010	<0.000020	<0.0000050
RINSATE B	During MW-23A-R from second set of spoons	14-Nov-13	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000020	<0.000010	<0.000020	<0.0000050
RINSATE C	Rinse of spoons before MW-23E	14-Nov-13	<0.000020	<0.000020	<0.000030	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000020	<0.000010	<0.000020	<0.0000050
RINSATE D	Rinse of auger before MW-23E	14-Nov-13	<0.000020	**0.000021**	<0.000020	**0.000018**	**0.00002**	**0.0000213**	**0.000022**	**0.000028**	<0.000010	<0.000020	<0.0000050
RINSATE G	Distilled water used for rinsate	15-Nov-13	<0.000020	<0.000020	<0.000020	<0.000010	<0.000010	<0.0000050	<0.000010	<0.000020	<0.000010	<0.000020	<0.0000050
Laboratory Detection Limit			*0.00002*	*0.00002*	*0.00002*	*0.00001*	*0.00001*	*0.000005*	*0.00001*	*0.00002*	*0.00001*	*0.00002*	*0.000005*

Sample No.	Description	Date	Parameter (mg/L)									
			Fluoranthene	Fluorene	Indeno (1,2,3-c,d) pyrene	1-Methyl-naphthalene	2-Methyl-naphthalene	Naphthalene	Phenanthrene	Pyrene	Quinoline	B(a)P Total Potency Equivalent
RINSATE A	During MW-23A-R from auger below 12.8 m	14-Nov-13	<0.000020	<0.000020	<0.000010	<0.000020	<0.000020	<0.000050	<0.000050	<0.000010	<0.000020	<0.000030
RINSATE B	During MW-23A-R from second set of spoons	14-Nov-13	<0.000020	<0.000020	<0.000010	<0.000020	**0.000026**	**0.000078**	<0.000050	**0.000027**	<0.000020	<0.000030
RINSATE C	Rinse of spoons before MW-23E	14-Nov-13	<0.000020	<0.000020	<0.000010	<0.000020	<0.000020	<0.000050	**0.000057**	**0.000018**	<0.000020	<0.000030
RINSATE D	Rinse of auger before MW-23E	14-Nov-13	**0.000036**	**0.000021**	**0.000022**	**0.000059**	**0.000051**	**0.00023**	**0.000104**	**0.000049**	<0.000020	**0.000031**
RINSATE G	Distilled water used for rinsate	15-Nov-13	<0.000020	<0.000020	<0.000010	<0.000020	<0.000020	<0.000050	<0.000050	<0.000010	**0.000032**	<0.000030
Laboratory Detection Limit			*0.00002*	*0.00002*	*0.00001*	*0.00002*	*0.00002*	*0.00005*	*0.00005*	*0.00001*	*0.00002*	*0.00003*

BOLD - Parameter detected

APPENDICES

APPENDIX A

STRATIGRAPHIC LOGS

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23A-R**

CLIENT MANITOBA HYDRO

PROJECT 2013 Monitoring Well Installation

SITE MB Hydro Sutherland Ave Former Manufactured Gas Plant Site

LOCATION Approximately 1.0 m east of MW-23C-R

DRILLING METHOD 127 mm OD Solid Stem Auger, 152 mm OD Solid Stem Auger. 127.0 mm ID casing, 101.6 mm ID casing, 95 mm ID Hollow Stem Auger, Mobile B59

JOB NO. 12-0038-003
GROUND ELEV. 229.79 m
TOP OF CASING ELEV. 229.62 m
WATER ELEV. 223.73 m
DATE DRILLED 14/11/13
UTMs (NAD83) N 5,530,044 E 634,903

ELEV. (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	SPT (N) blows/0.15 m ▲ 20 40 60 80 / Field Headspace Test● PID (ppm) 10 100 1000 10000	Petroflag Field Test Diesel Fuel (ppm) ○ 10 100 1000 10000
229	0.5 / 1.0 / 1.5 — 5		Advanced by Solid Stem Auger - Casing installed to 12.8 m depth below ground surface.					
228	2.0 / 2.5							
227	3.0 — 10 / 3.5							
226	4.0 / 4.5 — 15							
225	5.0 / 5.5							
224 ▼	6.0 — 20 / 6.5							
223	7.0 / 7.5 — 25							
222	8.0 / 8.5							
221	9.0 — 30 / 9.5							
220								

SAMPLE TYPE ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	A. OLEKSYN	MFH	25/11/14

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Prepared By: NEH

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23A-R**

ELEV. (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	SPT (N) blows/0.15 m ▲ 20 40 60 80	Field Headspace Test PID (ppm) ● 10 100 1000 10000	Petroflag Field Test Diesel Fuel (ppm) ○ 10 100 1000 10000
219	10.5	35									
	11.0										
218	11.5										
	12.0										
217.6		40									
	12.5			**CLAY** - Grey, moist, firm, high plasticity, no odour or staining,							
217	13.0			- No recovery between 12.80 and 13.41 m. Seem to be pushing a stone.							
	13.5										
216		45						S1	0 7 6 9		12
	14.0										
215.5	14.5			**SILT TILL** - Light brown, damp, hard, intermediate plasticity, some coarse grained gravel.		14.63		S2	0 2 9 12 14		
215		50		- Medium grained sand lens from 14.55 to 14.58 m.		14.94		S3	0 1 17 12 15		
	15.0										
	15.5			- 100 mm coarse grained gravel seam at 15.44 m.				S4	0 2 13 28 28 31		
214				- 50 mm coarse grained gravel at 15.85 m.							
	16.0							S5	0 3 38 54		
213.6				- Spoon refusal at 16.15 m. Depth of hole extend using auger.		16.46					
	16.5			**END OF HOLE AT 16.46 m.**							
213		55									
	17.0			Notes: 1. Drilled with 150 mm OD solid stem auger to 12.2 m depth. 2. Installed 127 mm ID temporary casing to 8.83 m . 3. Installed 101.6 mm ID temporary casing to 12.8 m depth within 127 mm ID casing. 4. Drilled 12.8 m to 16.46 m depth with 95 mm ID hollow stem augers. 5. Installed 50 mm PVC riser with No. 70 slotted screened interval from a depth of 14.94 m to 16.46 m, backfilled with sand from 14.63 m to 16.46 m, then grouted with bentonite to surface. Installed flush mount protective cover. 6. Temporary casing removed during piezometer grouting. 7. Petroflag readings at S2, S3, S4 and S5 were at 0 ppm.						
212	17.5										
	18.0	60									
	18.5										
211											
	19.0										
	19.5										
210		65									
	20.0										
	20.5										
209											
	21.0										
		70									
	21.5										
208											

SAMPLE TYPE ⊠ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	A. OLEKSYN	MFH	25/11/14

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Prepared By: NRH

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23C-R**

CLIENT MANITOBA HYDRO

PROJECT 2013 Monitoring Well Installation

SITE MB Hydro Sutherland Ave Former Manufactured Gas Plant Site

LOCATION Approximately 10 m east of Disraeli pedestrian bridge along Rover Street

DRILLING METHOD 95 mm ID Hollow Stem Auger, Mobile B59

JOB NO. 12-0038-003
GROUND ELEV. 229.77 m
TOP OF CASING ELEV. 229.67 m
WATER ELEV. 225.80 m
DATE DRILLED 13/11/13
UTMs (NAD83) N 5,530,044 E 634,902

ELEV. (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE NUMBER	SPT (N) blows/0.15 m ▲ (20 40 60 80) / Field Headspace Test PID (ppm) ● (10 100 1000 10000)	Petroflag Field Test Diesel Fuel (ppm) ○ (10 100 1000 10000)
229	0.5			**FILL** **SILTY CLAY (0 to 1.52 m)** - Dark grey, dry, firm, intermediate plasticity.			S1	0 3	14
	1.0						S2	0 2	9
	1.5	5		- Coarse to fine grained gravel, loose from 1.37 to 1.42 m. - Black, dry, loose, with cinder, coal visible at 1.52 m. **(1.52 to 2.29 m)** - Dark brown, dry, trace cinders, trace gravel.					
228	2.0						S3	0 2	9
	2.5			**SILTY CLAY (2.29 to 2.74 m)** - Dark brown, dry, soft, low plasticity.			S4	0 2	18
227.0 227	3.0	10		**SAND** - Brown, soft, fine grained, with clay					
226.7	3.5			**SILTY CLAY** - Brown, damp, soft, intermediate plasticity, trace fine grained sand, trace oxidation, trace silt inclusions. - Firm below 3.51 m.			S5	0 2	20
226	4.0			- Soft below 3.81 m.					
225.7				**SILT** - Brown, saturated, very soft, intermediate, plasticity, trace fine grained sand.			S6	0 1	16
225.5	4.5			**SILTY CLAY** - Brown, moist, soft, high plasticity, trace fine grained sand.					
225.2		15		**SILT** - Grey, saturated, very soft, intermediate plasticity, hydrocarbon odour, trace fine grained sand.			S7	53 4	13
225									

SAMPLE TYPE ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	K. MILLER	MFH	25/11/14

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Prepared By: NEH

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23C-R**

ELEV. (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	SAMPLE NUMBER	SPT (N) blows/0.15 m ▲ (20 40 60 80) / Field Headspace Test PID (ppm) ● (10 100 1000 10000)	Petroflag Field Test Diesel Fuel (ppm) ○ (10 100 1000 10000)
224.7				**SILTY CLAY** - Grey, moist, soft, high plasticity, visible hydrocarbon staining, hydrocarbon odour, trace fine grained sand.						
	5.5			- Firm below 5.64 m.				S8	57.3	16
224										
223.8	6.0			**SILT** - Grey, saturated, very soft, intermediate plasticity, hydrocarbon staining, hydrocarbon odour, sheen.						
223.7		20		**SAND** - Grey, free water, loose, fine grained, poorly graded, hydrocarbon odour, sheen.				S9	23.2	8
223.2	6.5			**SILTY CLAY** - Grey, moist, soft, high plasticity, hydrocarbon odour, trace staining, fine grained sand.						
223								S10	35.4	
222.9				**SAND** - Grey, free water, loose, fine grained, poorly graded, hydrocarbon odour.						
222.8	7.0			**SILTY CLAY** - Grey, moist, soft, high plasticity, trace fine grained sand, hydrocarbon odour.						
	7.5			- Silt layer at 7.06 m.						
222.2		25		**SAND** - Grey, free water, loose, fine grained, poorly graded, hydrocarbon odour.						
222										
221.8	8.0			**SILTY CLAY** - Grey, moist, soft, high plasticity, hydrocarbon staining, hydrocarbon odour.				S11	153.0	11
	8.5									
221				- Damp, firm, hydrocarbon staining within silt inclusions below 8.69 m.				S12	235.0	18
	9.0	30		- 102 mm of fine grained sand layer below 9.14 m.						
	9.5							S13	157.0	45
220										
	10.0									
219.6				**SAND AND GRAVEL** - Grey, free water, very loose, well graded, coarse grained sand to coarse grained gravel, trace shells.						
	10.5	35		- Switched to 2" driven spoons due to low recovery at 10.67 m.						
219										
219.0									8.7	

SAMPLE TYPE ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	K. MILLER	MFH	25/11/14

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Prepared By: NEH

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23C-R**

ELEV. (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	SAMPLE NUMBER	SPT (N) blows/0.15 m ▲	Field Headspace Test PID (ppm) ●	Petroflag Field Test Diesel Fuel (ppm) ○
									20 40 60 80	10 100 1000 10000	10 100 1000 10000
	11.0			**CLAY** - Grey, moist, stiff, intermediate plasticity, silt inclusions, hydrocarbon staining, hydrocarbon odour.		10.97		S14			
				- 25 mm coarse gravel seam at 10.97 m.		11.13					
218.5				- 25 mm coarse gravel seam at 11.13 m.				S15	21.3		
				- Returned to original sampling method. 3.5" diameter spoons advance within 3.75" diameter hollow stem auger at 11.13 m.							
	11.5			**SAND** - Grey, free water, loose, fine grained, poorly graded, trace silt, hydrocarbon odour.				S16	140.0	2	
218				- Trace coarse grained gravel below 11.73 m.							
217.9						11.89					
	12.0			**CLAY** - Grey, damp, stiff, high plasticity, some silt inclusions, slight hydrocarbon odour, no visible staining.				S17	4.9	41	
		40						S18	0.3	5	
	12.5										
217				- Very slight hydrocarbon odour below 12.80 m.							
216.8	13.0					12.95		S19	1.3	1	
				END OF HOLE AT 12.95 m.							
	13.5	45									
216											
	14.0										
	14.5										
215											
	15.0	50									
	15.5										
214											
	16.0										
	16.5										
213		55									

Note:
1. Installed flush-mount monitoring well with screened interval from a depth of 11.13 m to 11.89 m, backfilled with bentonite chips from 12.95 m depth to 11.89 m, sand from 10.97 m to 11.89 m, then grouted with bentonite to surface.

SAMPLE TYPE ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	K. MILLER	MFH	25/11/14

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Prepared By: NRH

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23-E**

CLIENT MANITOBA HYDRO

PROJECT 2013 Monitoring Well Installation

SITE MB Hydro Sutherland Ave Former Manufactured Gas Plant Site

LOCATION Approximately 1.0 m east of MW-23A-R

DRILLING METHOD 95 mm ID Hollow Stem Auger, Mobile B59

JOB NO. 12-0038-003
GROUND ELEV. 229.76 m
TOP OF CASING ELEV. 241.79 m
WATER ELEV. 225.66 m
DATE DRILLED 15/11/13
UTMs (NAD83) N 5,530,043 E 634,904

ELEV. (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	NUMBER	SPT (N) blows/0.15 m ▲ (20 40 60 80) / Field Headspace Test PID (ppm) ● (10 100 1000 10000)	Petroflag Field Test Diesel Fuel (ppm) ○ (10 100 1000 10000)
229.6				**ORGANIC TOPSOIL**						
229.6				**CRUSHED LIMESTONE** - Road base.						
	0.5			**FILL** **SILTY CLAY FILL (0.18-1.37 m** - Brown to grey, damp, firm, high plasticity, trace organics, trace oxidation.				S1	0.1 ●	
229										
	1.0			- Some cinder, some coarse grained gravel below 1.22 m.				S2	0.1 ●	
	1.5	5		**SAND AND GRAVEL FILL (1.37-1.52 m)** - Brown, dry, loose, well graded, fine grained sand to fine grained gravel.						
228.2				**SILTY CLAY** - Brown, dry, firm, intermediate plasticity.						
228										
	2.0			- Wood at 2.01 m.				S3	0.2 ●	
	2.5			- Silt inclusions below 2.59 m.				S4	0.1 ●	
227										
	3.0	10		- Moist, soft below 3.05 m.				S5	0.2 ●	
	3.5									
226				- Wet below 3.81 m.		3.81				
	4.0					4.11				
225.5				**SILT** - Brown, saturated, very soft, intermediate plasticity, with fine grained sand, slight hydrocarbon odour.				S6	9.9 ●	
	4.5	15		- Strong hydrocarbon odour below 4.57 m.						
225										

SAMPLE TYPE ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	A. OLEKSYN	MFH	25/11/14

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Prepared By: NEH

KGS GROUP

SUMMARY LOG

HOLE NO. **MW-23-E**

ELEV. (m)	DEPTH (m)	DEPTH (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG/ BACKFILL	DEPTH (m)	SAMPLE TYPE	SAMPLE NUMBER	SPT (N) blows/0.15 m ▲	Field Headspace Test PID (ppm) ●	Petroflag Field Test Diesel Fuel (ppm) ○
				- Silt inclusions, visible hydrocarbon staining below 5.18 m. - Soft below 5.33 m.				S7		253.0	
224.1	5.5			**SILTY CLAY** - Brown, moist, soft, intermediate plasticity, silt inclusions, sheen, hydrocarbon staining, hydrocarbon odour.				S8		366.0	
224.0				**SILT** - Brown, wet, very soft, intermediate plasticity, trace fine grained sand, free product.							
223.8	6.0	20		**SILTY CLAY** - Brown, moist, soft, intermediate plasticity, silt inclusions, hydrocarbon staining, hydrocarbon odour.							
223.7				**SAND** - Brown, saturated, loose, fine grained sand, hydrocarbon odour, free product.							
223.5				**SILT** - Brown, wet, very soft, intermediate plasticity, trace fine grained sand, trace silt inclusions.				S9		180.0	
223.4	6.5			**SILTY CLAY** - Brown, moist, soft, intermediate plasticity, hydrocarbon staining, hydrocarbon odour, free product.							
223.1				**SAND** - Brown, saturated, loose, fine grained, hydrocarbon odour, free product. - Blow up at 6.86 m.				S10		231.0	
223	7.0			**SILTY CLAY** - Grey, moist soft, intermediate plasticity, trace fine grained sand, hydrocarbon odour, free product.		7.16					
222.6				- Firm, silt inclusions, hydrocarbon staining below 7.47 m.				S11		360.0	
222.1	7.5	25		**END OF HOLE AT 7.62 m.**		7.62					
222											
	8.0										
	8.5										
221											
	9.0	30									
	9.5										
220											
	10.0										
	10.5	35									
219											

Note:
1. Installed flush-mount monitoring well with screened interval from a depth of 4.11 m to 7.16 m, backfilled with bentonite chips from 7.62 m depth to 7.16 m, sand from 3.81 m to 7.16 m, then grouted with bentonite to surface.

SAMPLE TYPE ☒ Split Spoon

CONTRACTOR	INSPECTOR	APPROVED	DATE
Paddock Drilling Ltd.	A. OLEKSYN	MFH	25/11/14

SUTHERLAND TEMPLATE P:\PROJECTS2012\12-0038-003\DESIGN\ENVLOGS\MASTER GINT FILE.GPJ

Prepared By: NEH

APPENDIX B

LABORATORY CERTIFICATE OF ANALYSIS

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

Date Received: 18-NOV-13
Report Date: 28-NOV-13 15:45 (MT)
Version: FINAL

Client Phone: 204-896-1209

Certificate of Analysis

Lab Work Order #: L1392963

Project P.O. #: NOT SUBMITTED
Job Reference: 12-0038-003.1002.14
C of C Numbers:
Legal Site Desc:

Paul Nicolas
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-1 MW-23C(R) -S11 (28.5-30)							
Sampled By: NRH/KEM/AO on 12-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	21.9	DLA	0.025	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	0.161		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	7.58	DLA	0.25	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	2.24		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
m+p-Xylenes	1.83		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	4.07		0.10	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	<50	DLA	50	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	86.0		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							
F1-BTEX	<50		50	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	27		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.029		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
2-Methyl Naphthalene	0.035		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	0.0063		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	<0.0040		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)anthracene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(k)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Indeno(1,2,3-cd)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	2.98		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	<0.020		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	<0.15		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	<0.014		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	99.0		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	93.8		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	101.2		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	102.1		50-130	%	20-NOV-13	20-NOV-13	R2748096
L1392963-2 MW-23C(R) S517 (39-40)							
Sampled By: NRH/KEM/AO on 13-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	0.169		0.0050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	0.041		0.015	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-2 MW-23C(R) S517 (39-40)							
Sampled By: NRH/KEM/AO on 13-NOV-13							
Matrix: Soil							
BTX plus F1 by GCMS							
m+p-Xylenes	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	<0.10		0.10	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	<10		10	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	94.5		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	26		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
2-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	<0.0040		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)anthracene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(k)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Indeno(1,2,3-cd)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	0.050		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	<0.020		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	<0.15		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	<0.014		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	103.1		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	102.7		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	103.2		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	107.1		50-130	%	20-NOV-13	20-NOV-13	R2748096
L1392963-3 MW-23A(R) - S1 (44-46)							
Sampled By: NRH/KEM/AO on 14-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.0050		0.0050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	<0.015		0.015	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
m+p-Xylenes	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	<0.10		0.10	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	<10		10	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	95.5		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-3 MW-23A(R) - S1 (44-46)							
Sampled By: NRH/KEM/AO on 14-NOV-13							
Matrix: Soil							
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	46		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
2-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	<0.0040		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)anthracene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(k)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Indeno(1,2,3-cd)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	<0.020		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	<0.15		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	<0.014		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	70.2		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	97.8		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	59.7		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	92.4		50-130	%	20-NOV-13	20-NOV-13	R2748096
L1392963-4 MW-23A(R) - S3 (48-50)							
Sampled By: NRH/KEM/AO on 14-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.0050		0.0050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	<0.015		0.015	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
m+p-Xylenes	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	<0.10		0.10	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	<10		10	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	88.5		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	7.3		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-4 MW-23A(R) - S3 (48-50)							
Sampled By: NRH/KEM/AO on 14-NOV-13							
Matrix: Soil							
Polyaromatic Hydrocarbons (PAHs)							
2-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	<0.0040		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)anthracene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(k)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Indeno(1,2,3-cd)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	<0.020		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	<0.15		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	<0.014		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	95.0		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	92.2		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	94.9		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	97.9		50-130	%	20-NOV-13	20-NOV-13	R2748096
L1392963-5 MW-23A(R) - S5 (52-53)							
Sampled By: NRH/KEM/AO on 14-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.0050		0.0050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	<0.015		0.015	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
m+p-Xylenes	<0.050		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	<0.10		0.10	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	<10		10	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	87.5		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							
F1-BTEX	<10		10	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	8.2		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
2-Methyl Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	<0.0040		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-5 MW-23A(R) - S5 (52-53)							
Sampled By: NRH/KEM/AO on 14-NOV-13							
Matrix: Soil							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(a)anthracene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(k)fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	<0.0050		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Indeno(1,2,3-cd)pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.010		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	<0.020		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	<0.15		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	<0.014		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	97.5		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	95.1		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	99.4		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	100.7		50-130	%	20-NOV-13	20-NOV-13	R2748096
L1392963-6 MW-23E - S8 (18.5-19)							
Sampled By: NRH/KEM/AO on 15-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	19.9	DLA	0.025	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	0.276		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	6.65		0.015	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	2.86		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
m+p-Xylenes	3.94		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	6.80		0.10	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	103	DLA	50	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	98.0		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							
F1-BTEX	69		50	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	28		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	2.82		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
2-Methyl Naphthalene	2.72		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	0.230		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	0.306		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	0.109		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	0.623		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)anthracene	0.401		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	0.294		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	0.206		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	0.199		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	0.146		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-6 MW-23E - S8 (18.5-19)							
Sampled By: NRH/KEM/AO on 15-NOV-13							
Matrix: Soil							
Polyaromatic Hydrocarbons (PAHs)							
Benzo(k)fluoranthene	0.092		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	0.388		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	0.0168		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	0.846		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	0.554		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Indeno(1,2,3-cd)pyrene	0.159		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	21.3	DLA	0.10	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	2.61		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	1.23		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.050	DLM	0.050	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	0.402		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	4.21		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	0.291		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	96.8		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	102.7		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	93.3		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	104.4		50-130	%	20-NOV-13	20-NOV-13	R2748096
L1392963-7 MW-23E - S11 (24.5-25)							
Sampled By: NRH/KEM/AO on 15-NOV-13							
Matrix: Soil							
BTEX							
BTX plus F1 by GCMS							
Benzene	19.5	DLA	0.025	mg/kg	19-NOV-13	27-NOV-13	R2750440
Toluene	0.681		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
Ethyl benzene	10.1	DLA	0.075	mg/kg	19-NOV-13	27-NOV-13	R2750440
o-Xylene	5.22		0.050	mg/kg	19-NOV-13	27-NOV-13	R2750440
m+p-Xylenes	10.6	DLA	0.25	mg/kg	19-NOV-13	27-NOV-13	R2750440
Xylenes	15.8		0.25	mg/kg	19-NOV-13	27-NOV-13	R2750440
F1 (C6-C10)	101	DLA	50	mg/kg	19-NOV-13	27-NOV-13	R2750440
Surrogate: 4-Bromofluorobenzene (SS)	102.0		70-130	%	19-NOV-13	27-NOV-13	R2750440
CCME Total Hydrocarbons							
F1-BTEX	55		15	mg/kg		28-NOV-13	
Miscellaneous Parameters							
% Moisture	28		0.10	%	20-NOV-13	20-NOV-13	R2745547
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	1.26		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
2-Methyl Naphthalene	1.93		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthene	0.110		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acenaphthylene	1.20		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Acridine	0.017	EMPC	0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Anthracene	0.452		0.0040	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)anthracene	0.428		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(a)pyrene	0.471		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b)fluoranthene	0.360		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b&j)fluoranthene	0.330		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(g,h,i)perylene	0.237		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(k)fluoranthene	0.147		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Chrysene	0.352		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Dibenzo(a,h)anthracene	0.0235		0.0050	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluoranthene	0.744		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Fluorene	0.406		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392963-7 MW-23E - S11 (24.5-25)							
Sampled By: NRH/KEM/AO on 15-NOV-13							
Matrix: Soil							
Polyaromatic Hydrocarbons (PAHs)							
Indeno(1,2,3-cd)pyrene	0.246		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Naphthalene	12.7	DLA	0.10	mg/kg	20-NOV-13	20-NOV-13	R2748096
Phenanthrene	1.58		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Pyrene	1.04		0.010	mg/kg	20-NOV-13	20-NOV-13	R2748096
Quinoline	<0.050	DLM	0.050	mg/kg	20-NOV-13	20-NOV-13	R2748096
B(a)P Total Potency Equivalent	0.619		0.020	mg/kg	20-NOV-13	20-NOV-13	R2748096
IACR (CCME)	6.13		0.15	mg/kg	20-NOV-13	20-NOV-13	R2748096
Benzo(b+j+k)fluoranthene	0.477		0.014	mg/kg	20-NOV-13	20-NOV-13	R2748096
Surrogate: Acenaphthene d10	98.5		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Chrysene d12	100.9		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Naphthalene d8	99.4		50-130	%	20-NOV-13	20-NOV-13	R2748096
Surrogate: Phenanthrene d10	105.4		50-130	%	20-NOV-13	20-NOV-13	R2748096

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTEXS+F1-HSMS-WP	Soil	BTX plus F1 by GCMS	EPA SW846 8260B REV 2

The soil methanol extract is added to water and reagents, then heated in a sealed vial to equilibrium. The headspace from the vial is transferred into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

F1-F4-CALC-WP	Soil	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

PAH,PANH-WP	Soil	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS

Samples are mix with sodium sulfate and extracted with acetone/dichloromethane using a combination of high frequency sonication and shake using a platform shaker. After extract concentration, samples are analyzed by GC/MS.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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

Workorder: L1392963 Report Date: 28-NOV-13

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
BTEXS+F1-HSMS-WP	**Soil**							
Batch R2750440								
WG1791197-12 DUP		**L1392963-7**						
Benzene		19.5	12.5		mg/kg	44	50	27-NOV-13
Toluene		0.681	0.435		mg/kg	44	50	27-NOV-13
Ethyl benzene		10.1	5.37	DUP-H	mg/kg	62	50	27-NOV-13
o-Xylene		5.22	3.27		mg/kg	46	50	27-NOV-13
m+p-Xylenes		10.6	5.73	DUP-H	mg/kg	60	50	27-NOV-13
F1 (C6-C10)		101	66		mg/kg	42	50	27-NOV-13
WG1791197-10 LCS								
Benzene			97.6		%		70-130	26-NOV-13
Toluene			94.8		%		70-130	26-NOV-13
Ethyl benzene			99.2		%		70-130	26-NOV-13
o-Xylene			98.6		%		70-130	26-NOV-13
m+p-Xylenes			95.9		%		70-130	26-NOV-13
WG1791197-11 LCS								
F1 (C6-C10)			100.2		%		80-120	26-NOV-13
WG1791197-9 MB								
Benzene			<0.0050		mg/kg		0.005	26-NOV-13
Toluene			<0.050		mg/kg		0.05	26-NOV-13
Ethyl benzene			<0.015		mg/kg		0.015	26-NOV-13
o-Xylene			<0.050		mg/kg		0.05	26-NOV-13
m+p-Xylenes			<0.050		mg/kg		0.05	26-NOV-13
F1 (C6-C10)			<10		mg/kg		10	26-NOV-13
Surrogate: 4-Bromofluorobenzene (SS)			105.0		%		70-130	26-NOV-13
MOISTURE-WP	**Soil**							
Batch R2745547								
WG1791479-3 DUP		**L1392963-7**						
PAH,PANH-WP	**Soil**							
Batch R2748096								
WG1791861-20 LCS								
1-Methyl Naphthalene			90.1		%		60-130	20-NOV-13
2-Methyl Naphthalene			87.9		%		60-130	20-NOV-13
Acenaphthene			92.7		%		60-130	20-NOV-13
Acenaphthylene			91.6		%		60-130	20-NOV-13
Acridine			102.3		%		60-130	20-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Soil**							
Batch R2748096								
WG1791861-20 LCS								
Anthracene			100.2		%		60-130	20-NOV-13
Benzo(a)anthracene			111.0		%		60-130	20-NOV-13
Benzo(a)pyrene			105.2		%		60-130	20-NOV-13
Benzo(b)fluoranthene			101.8		%		60-130	20-NOV-13
Benzo(b&j)fluoranthene			95.4		%		60-130	20-NOV-13
Benzo(g,h,i)perylene			104.6		%		60-130	20-NOV-13
Benzo(k)fluoranthene			106.3		%		60-130	20-NOV-13
Chrysene			87.7		%		60-130	20-NOV-13
Dibenzo(a,h)anthracene			91.9		%		60-130	20-NOV-13
Fluoranthene			96.1		%		60-130	20-NOV-13
Fluorene			86.2		%		60-130	20-NOV-13
Indeno(1,2,3-cd)pyrene			98.3		%		60-130	20-NOV-13
Naphthalene			78.1		%		50-130	20-NOV-13
Phenanthrene			101.3		%		60-130	20-NOV-13
Pyrene			99.8		%		60-130	20-NOV-13
Quinoline			87.3		%		60-130	20-NOV-13
WG1792501-2 LCS								
1-Methyl Naphthalene			92.0		%		60-130	20-NOV-13
2-Methyl Naphthalene			88.0		%		60-130	20-NOV-13
Acenaphthene			96.2		%		60-130	20-NOV-13
Acenaphthylene			93.6		%		60-130	20-NOV-13
Acridine			101.0		%		60-130	20-NOV-13
Anthracene			102.1		%		60-130	20-NOV-13
Benzo(a)anthracene			111.4		%		60-130	20-NOV-13
Benzo(a)pyrene			106.3		%		60-130	20-NOV-13
Benzo(b)fluoranthene			109.5		%		60-130	20-NOV-13
Benzo(b&j)fluoranthene			102.9		%		60-130	20-NOV-13
Benzo(g,h,i)perylene			103.1		%		60-130	20-NOV-13
Benzo(k)fluoranthene			107.6		%		60-130	20-NOV-13
Chrysene			90.5		%		60-130	20-NOV-13
Dibenzo(a,h)anthracene			89.7		%		60-130	20-NOV-13
Fluoranthene			96.1		%		60-130	20-NOV-13
Fluorene			88.5		%		60-130	20-NOV-13
Indeno(1,2,3-cd)pyrene			95.4		%		60-130	20-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Soil**							
Batch R2748096								
WG1792501-2 LCS								
Naphthalene			81.0		%		50-130	20-NOV-13
Phenanthrene			102.6		%		60-130	20-NOV-13
Pyrene			99.0		%		60-130	20-NOV-13
Quinoline			88.9		%		60-130	20-NOV-13
WG1791861-19 MB								
1-Methyl Naphthalene			<0.010		mg/kg		0.01	20-NOV-13
2-Methyl Naphthalene			<0.010		mg/kg		0.01	20-NOV-13
Acenaphthene			<0.0050		mg/kg		0.005	20-NOV-13
Acenaphthylene			<0.0050		mg/kg		0.005	20-NOV-13
Acridine			<0.010		mg/kg		0.01	20-NOV-13
Anthracene			<0.0040		mg/kg		0.004	20-NOV-13
Benzo(a)anthracene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(a)pyrene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Chrysene			<0.010		mg/kg		0.01	20-NOV-13
Dibenzo(a,h)anthracene			<0.0050		mg/kg		0.005	20-NOV-13
Fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Fluorene			<0.010		mg/kg		0.01	20-NOV-13
Indeno(1,2,3-cd)pyrene			<0.010		mg/kg		0.01	20-NOV-13
Naphthalene			<0.010		mg/kg		0.01	20-NOV-13
Phenanthrene			<0.010		mg/kg		0.01	20-NOV-13
Pyrene			<0.010		mg/kg		0.01	20-NOV-13
Quinoline			<0.010		mg/kg		0.01	20-NOV-13
Surrogate: Acenaphthene d10			92.5		%		50-130	20-NOV-13
Surrogate: Chrysene d12			108.0		%		50-130	20-NOV-13
Surrogate: Naphthalene d8			89.1		%		50-130	20-NOV-13
Surrogate: Phenanthrene d10			108.1		%		50-130	20-NOV-13
WG1792501-1 MB								
1-Methyl Naphthalene			<0.010		mg/kg		0.01	20-NOV-13
2-Methyl Naphthalene			<0.010		mg/kg		0.01	20-NOV-13
Acenaphthene			<0.0050		mg/kg		0.005	20-NOV-13
Acenaphthylene			<0.0050		mg/kg		0.005	20-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Soil**							
Batch R2748096								
WG1792501-1 MB								
Acridine			<0.010		mg/kg		0.01	20-NOV-13
Anthracene			<0.0040		mg/kg		0.004	20-NOV-13
Benzo(a)anthracene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(a)pyrene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(b)fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(b&j)fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(g,h,i)perylene			<0.010		mg/kg		0.01	20-NOV-13
Benzo(k)fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Chrysene			<0.010		mg/kg		0.01	20-NOV-13
Dibenzo(a,h)anthracene			<0.0050		mg/kg		0.005	20-NOV-13
Fluoranthene			<0.010		mg/kg		0.01	20-NOV-13
Fluorene			<0.010		mg/kg		0.01	20-NOV-13
Indeno(1,2,3-cd)pyrene			<0.010		mg/kg		0.01	20-NOV-13
Naphthalene			<0.010		mg/kg		0.01	20-NOV-13
Phenanthrene			<0.010		mg/kg		0.01	20-NOV-13
Pyrene			<0.010		mg/kg		0.01	20-NOV-13
Quinoline			<0.010		mg/kg		0.01	20-NOV-13
Surrogate: Acenaphthene d10			84.8		%		50-130	20-NOV-13
Surrogate: Chrysene d12			95.4		%		50-130	20-NOV-13
Surrogate: Naphthalene d8			82.0		%		50-130	20-NOV-13
Surrogate: Phenanthrene d10			97.1		%		50-130	20-NOV-13

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1392963 were received on 18-NOV-13 15:46.

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.

10-309592

ALS Environmental

L1392963-COFC

Analytical Request Form
[...]ee: 1 800 668 9878
[...]sglobal.com

L1392963

Page 1 of 1

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	KGS Group	Standard: X Other (specify):		X	Regular (Standard Turnaround Times - Business Days)
Contact:	Marci Friedman-Hamm	Select: PDF X Excel X Digital Fax			Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	3rd Floor - 865 Waverley St.	Email 1:	pnguyen@kgsgroup.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Winnipeg, MB. R3T 5P4	Email 2:	nhanneson@kgsgroup.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: 204-896-1209	Fax: 204-896-0754		mfhamm@kgsgroup.com		

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	12-0038-003.1002.14
Company:		PO / AFE:	2
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	Q31594. Q31597-11
Lab Work Order # (lab use only)		ALS Contact: Gemma	Sampler: NCH/KCM/AD

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	PAHs	Number of Containers
1	MW-23C(R) - S11 (28.5-30)	Nov 12/13		Soil	X	X	2
2	MW-23C(R) - S17 (39-40)	Nov 12/13		Soil	X	X	2
3	MW-23A(R) - S1 (44-46)	Nov 13/13		Soil	X	X	1
4	MW-23A(R) - S3 (48-50)	Nov 13/13		Soil	X	X	2
5	MW-23A(R) - S5 (52-53)	Nov 13/13		Soil	X	X	1
6	MW-23E - S8 (18.5-19)	Nov 15/13		Soil	X	X	2
7	MW-23E - S11 (24.5-25)	Nov 15/13		Soil	X	X	2

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

'Meet CCME soil PHC guideline'

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: [signature]	Date: Nov 18/13	Time: 15:48	Received by: MB	Date: Nov 18/13	Time: 3:46	Temperature: 3.1 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

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

Date Received: 18-NOV-13
Report Date: 04-DEC-13 14:50 (MT)
Version: FINAL REV. 2

Client Phone: 204-896-1209

Certificate of Analysis

Lab Work Order #: L1392972

Project P.O. #: NOT SUBMITTED
Job Reference: 12-0038-003.1002.14
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 04-DEC-13 14:18
4-DEC-2013 Amended report includes results for calculated total xylenes.

Paul Nicolas
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392972-1 RINSEATE A							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 10:30							
Matrix: Water							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
Toluene	<0.0010		0.0010	mg/L		26-NOV-13	R2750418
Ethyl benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
o-Xylene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
m+p-Xylenes	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
F1 (C6-C10)	<0.10		0.10	mg/L		26-NOV-13	R2750418
Surrogate: 4-Bromofluorobenzene (SS)	101.8		70-130	%		26-NOV-13	R2750418
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-NOV-13	
Miscellaneous Parameters							
Xylenes (Total)	<0.0015		0.0015	mg/L		04-DEC-13	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Acridine	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Chrysene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluoranthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluorene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Naphthalene	<0.000050		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Phenanthrene	<0.000050		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Pyrene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Quinoline	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acenaphthene d10	72.6		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acridine d9	94.2		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Chrysene d12	80.7		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Naphthalene d8	72.6		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Phenanthrene d10	83.8		40-130	%	19-NOV-13	20-NOV-13	R2746984
L1392972-2 RINSEATE B							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 10:30							
Matrix: Water							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
Toluene	<0.0010		0.0010	mg/L		26-NOV-13	R2750418
Ethyl benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
o-Xylene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
m+p-Xylenes	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
F1 (C6-C10)	<0.10		0.10	mg/L		26-NOV-13	R2750418
Surrogate: 4-Bromofluorobenzene (SS)	102.0		70-130	%		26-NOV-13	R2750418

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392972-2 RINSEATE B							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 10:30							
Matrix: Water							
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-NOV-13	
Miscellaneous Parameters							
Xylenes (Total)	<0.0015		0.0015	mg/L		04-DEC-13	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
2-Methyl Naphthalene	0.000026		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Acridine	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Chrysene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluoranthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluorene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Naphthalene	0.000078		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Phenanthrene	<0.000050		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Pyrene	0.000027		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Quinoline	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acenaphthene d10	78.6		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acridine d9	100.7		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Chrysene d12	62.6		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Naphthalene d8	81.3		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Phenanthrene d10	82.7		40-130	%	19-NOV-13	20-NOV-13	R2746984
L1392972-3 RINSEATE C							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 14:00							
Matrix: Water							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
Toluene	<0.0010		0.0010	mg/L		26-NOV-13	R2750418
Ethyl benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
o-Xylene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
m+p-Xylenes	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
F1 (C6-C10)	<0.10		0.10	mg/L		26-NOV-13	R2750418
Surrogate: 4-Bromofluorobenzene (SS)	85.1		70-130	%		26-NOV-13	R2750418
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-NOV-13	
Miscellaneous Parameters							
Xylenes (Total)	<0.0015		0.0015	mg/L		04-DEC-13	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392972-3 RINSEATE C							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 14:00							
Matrix: Water							
Polyaromatic Hydrocarbons (PAHs)							
Anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Acridine	<0.000030	DLM	0.000030	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Chrysene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluoranthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluorene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Naphthalene	<0.000050		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Phenanthrene	0.000057		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Pyrene	0.000018		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Quinoline	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acenaphthene d10	83.9		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acridine d9	106.7		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Chrysene d12	89.7		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Naphthalene d8	75.3		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Phenanthrene d10	94.1		40-130	%	19-NOV-13	20-NOV-13	R2746984
L1392972-4 RINSEATE D							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 14:00							
Matrix: Water							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
Toluene	<0.0010		0.0010	mg/L		26-NOV-13	R2750418
Ethyl benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
o-Xylene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
m+p-Xylenes	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
F1 (C6-C10)	<0.10		0.10	mg/L		26-NOV-13	R2750418
Surrogate: 4-Bromofluorobenzene (SS)	97.8		70-130	%		26-NOV-13	R2750418
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-NOV-13	
Miscellaneous Parameters							
Xylenes (Total)	<0.0015		0.0015	mg/L		04-DEC-13	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	0.000059		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
2-Methyl Naphthalene	0.000051		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthylene	0.000021		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Anthracene	0.000018		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Acridine	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)anthracene	0.000020		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)pyrene	0.0000213		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(b&j)fluoranthene	0.000022	EMPC	0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(g,h,i)perylene	0.000028		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Chrysene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392972-4 RINSEATE D							
Sampled By: NH/KEM/AO on 14-NOV-13 @ 14:00							
Matrix: Water							
Polyaromatic Hydrocarbons (PAHs)							
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluoranthene	0.000036		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluorene	0.000021		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Indeno(1,2,3-cd)pyrene	0.000022		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Naphthalene	0.000230		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Phenanthrene	0.000104		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Pyrene	0.000049		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Quinoline	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
B(a)P Total Potency Equivalent	0.000031		0.000030	mg/L	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acenaphthene d10	85.5		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acridine d9	104.2		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Chrysene d12	85.7		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Naphthalene d8	76.3		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Phenanthrene d10	92.0		40-130	%	19-NOV-13	20-NOV-13	R2746984
L1392972-5 RINSEATE G							
Sampled By: NH/KEM/AO on 15-NOV-13 @ 15:00							
Matrix: Water							
BTEX							
BTX plus F1 by GCMS							
Benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
Toluene	<0.0010		0.0010	mg/L		26-NOV-13	R2750418
Ethyl benzene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
o-Xylene	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
m+p-Xylenes	<0.00050		0.00050	mg/L		26-NOV-13	R2750418
F1 (C6-C10)	<0.10		0.10	mg/L		26-NOV-13	R2750418
Surrogate: 4-Bromofluorobenzene (SS)	101.9		70-130	%		26-NOV-13	R2750418
CCME Total Hydrocarbons							
F1-BTEX	<0.10		0.10	mg/L		28-NOV-13	
Miscellaneous Parameters							
Xylenes (Total)	<0.0015		0.0015	mg/L		04-DEC-13	
Polyaromatic Hydrocarbons (PAHs)							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Acenaphthylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Acridine	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)anthracene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Chrysene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluoranthene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Fluorene	<0.000020		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Naphthalene	<0.000050		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Phenanthrene	<0.000050		0.000050	mg/L	19-NOV-13	20-NOV-13	R2746984
Pyrene	<0.000010		0.000010	mg/L	19-NOV-13	20-NOV-13	R2746984
Quinoline	0.000032		0.000020	mg/L	19-NOV-13	20-NOV-13	R2746984

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1392972-5 RINSEATE G							
Sampled By: NH/KEM/AO on 15-NOV-13 @ 15:00							
Matrix: Water							
Polyaromatic Hydrocarbons (PAHs)							
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acenaphthene d10	83.4		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Acridine d9	98.8		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Chrysene d12	89.6		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Naphthalene d8	75.9		40-130	%	19-NOV-13	20-NOV-13	R2746984
Surrogate: Phenanthrene d10	91.6		40-130	%	19-NOV-13	20-NOV-13	R2746984

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier Key:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
EMPC	Estimated Maximum Possible Concentration. Parameter detected but didn't meet all criteria for positive identification.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BTEXS+F1-HSMS-WP	Water	BTX plus F1 by GCMS	EPA SW846 8260B REV 2 SEPT 1994

The water sample, with added reagents, is heated in a sealed vial to equilibrium. The headspace from the vial is transfered into a gas chromatograph. Target compound concentrations are measured using mass spectrometry detection.

F1-F4-CALC-WP	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

PAH,PANH-WP	Water	Polyaromatic Hydrocarbons (PAHs)	EPA SW 846/8270-GC/MS

Water is spiked with a surrogate spike mix and extracted using solvent extraction techniques. Analysis is performed by GC/MS in the selected ion monitoring (SIM) mode.

XYLENES-SUM-CALC-WP	Water	Sum of Xylene Isomer Concentrations	CALCULATED RESULT

Total xylenes represents the sum of o-xylene and m&p-xylene.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

Chain of Custody Numbers:

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**

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
BTEXS+F1-HSMS-WP	**Water**							
Batch R2750418								
WG1795860-4 DUP		**L1392972-5**						
Benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-NOV-13
Toluene		<0.0010	<0.0010	RPD-NA	mg/L	N/A	30	27-NOV-13
Ethyl benzene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-NOV-13
o-Xylene		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-NOV-13
m+p-Xylenes		<0.00050	<0.00050	RPD-NA	mg/L	N/A	30	27-NOV-13
F1 (C6-C10)		<0.10	<0.10	RPD-NA	mg/L	N/A	30	27-NOV-13
WG1795860-2 LCS								
Benzene			103.0		%		70-130	26-NOV-13
Toluene			98.2		%		70-130	26-NOV-13
Ethyl benzene			96.3		%		70-130	26-NOV-13
o-Xylene			101.2		%		70-130	26-NOV-13
m+p-Xylenes			93.1		%		70-130	26-NOV-13
WG1795860-3 LCS								
F1 (C6-C10)			87.3		%		80-120	26-NOV-13
WG1795860-6 LCS								
Benzene			95.1		%		70-130	28-NOV-13
Toluene			96.4		%		70-130	28-NOV-13
Ethyl benzene			96.8		%		70-130	28-NOV-13
o-Xylene			97.7		%		70-130	28-NOV-13
m+p-Xylenes			94.5		%		70-130	28-NOV-13
WG1795860-9 LCS								
F1 (C6-C10)			87.1		%		80-120	28-NOV-13
WG1795860-1 MB								
Benzene			<0.00050		mg/L		0.0005	26-NOV-13
Toluene			<0.0010		mg/L		0.001	26-NOV-13
Ethyl benzene			<0.00050		mg/L		0.0005	26-NOV-13
o-Xylene			<0.00050		mg/L		0.0005	26-NOV-13
m+p-Xylenes			<0.00050		mg/L		0.0005	26-NOV-13
F1 (C6-C10)			<0.10		mg/L		0.1	26-NOV-13
Surrogate: 4-Bromofluorobenzene (SS)			98.4		%		70-130	26-NOV-13
WG1795860-5 MB								
Benzene			<0.00050		mg/L		0.0005	28-NOV-13
Toluene			<0.0010		mg/L		0.001	28-NOV-13
Ethyl benzene			<0.00050		mg/L		0.0005	28-NOV-13
o-Xylene			<0.00050		mg/L		0.0005	28-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BTEXS+F1-HSMS-WP	**Water**							
Batch R2750418								
WG1795860-5 MB								
m+p-Xylenes			<0.00050		mg/L		0.0005	28-NOV-13
F1 (C6-C10)			<0.10		mg/L		0.1	28-NOV-13
Surrogate: 4-Bromofluorobenzene (SS)			92.0		%		70-130	28-NOV-13
PAH,PANH-WP	**Water**							
Batch R2746984								
WG1792500-2 LCS								
1-Methyl Naphthalene			91.1		%		60-130	20-NOV-13
2-Methyl Naphthalene			87.5		%		60-130	20-NOV-13
Acenaphthene			94.2		%		60-130	20-NOV-13
Acenaphthylene			92.7		%		60-130	20-NOV-13
Anthracene			101.6		%		60-130	20-NOV-13
Acridine			108.8		%		60-130	20-NOV-13
Benzo(a)anthracene			108.7		%		60-130	20-NOV-13
Benzo(a)pyrene			106.5		%		60-130	20-NOV-13
Benzo(b&j)fluoranthene			107.2		%		60-130	20-NOV-13
Benzo(g,h,i)perylene			105.3		%		60-130	20-NOV-13
Benzo(k)fluoranthene			96.1		%		60-130	20-NOV-13
Chrysene			87.3		%		60-130	20-NOV-13
Dibenzo(a,h)anthracene			93.8		%		60-130	20-NOV-13
Fluoranthene			92.8		%		60-130	20-NOV-13
Fluorene			89.2		%		60-130	20-NOV-13
Indeno(1,2,3-cd)pyrene			109.2		%		60-130	20-NOV-13
Naphthalene			93.6		%		50-130	20-NOV-13
Phenanthrene			102.6		%		60-130	20-NOV-13
Pyrene			97.6		%		60-130	20-NOV-13
Quinoline			95.5		%		60-130	20-NOV-13
WG1792500-1 MB								
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	20-NOV-13
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	20-NOV-13
Acenaphthene			<0.000020		mg/L		0.00002	20-NOV-13
Acenaphthylene			<0.000020		mg/L		0.00002	20-NOV-13
Anthracene			<0.000010		mg/L		0.00001	20-NOV-13
Acridine			<0.000020		mg/L		0.00002	20-NOV-13
Benzo(a)anthracene			<0.000010		mg/L		0.00001	20-NOV-13

Quality Control Report

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH,PANH-WP	**Water**							
Batch R2746984								
WG1792500-1 MB								
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	20-NOV-13
Benzo(b&j)fluoranthene			<0.00001C		mg/L		0.00001	20-NOV-13
Benzo(g,h,i)perylene			<0.00002C		mg/L		0.00002	20-NOV-13
Benzo(k)fluoranthene			<0.00001C		mg/L		0.00001	20-NOV-13
Chrysene			<0.00002C		mg/L		0.00002	20-NOV-13
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	20-NOV-13
Fluoranthene			<0.00002C		mg/L		0.00002	20-NOV-13
Fluorene			<0.00002C		mg/L		0.00002	20-NOV-13
Indeno(1,2,3-cd)pyrene			<0.00001C		mg/L		0.00001	20-NOV-13
Naphthalene			<0.00005C		mg/L		0.00005	20-NOV-13
Phenanthrene			<0.00005C		mg/L		0.00005	20-NOV-13
Pyrene			<0.00001C		mg/L		0.00001	20-NOV-13
Quinoline			<0.00002C		mg/L		0.00002	20-NOV-13
Surrogate: Acenaphthene d10			81.4		%		40-130	20-NOV-13
Surrogate: Acridine d9			98.6		%		40-130	20-NOV-13
Surrogate: Chrysene d12			91.2		%		40-130	20-NOV-13
Surrogate: Naphthalene d8			77.8		%		40-130	20-NOV-13
Surrogate: Phenanthrene d10			91.3		%		40-130	20-NOV-13

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

Sample Parameter Qualifier Definitions:

Qualifier	Description
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

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.

10- 309594

ALS Environmental

L1392972-COFC

/ Analytical Request Form
Free: 1 800 668 9878
.alsglobal.com

L1392972

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Report To	Report Format / Distribution	Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company: KGS GROUP.	Standard: X Other (specify):	X Regular (Standard Turnaround Times - Business Days)
Contact: MARCI FRIEDMAN-HAMM	Select: PDF X Excel X Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 3RD FLOOR - 865 NAIRN ST. WINNIPEG, MB R3T 5P4	Email 1: pnguyen@kgsgroup.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Email 2: nhannesson@kgsgroup.com mfhamm@kgsgroup.com.	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone: Fax:		Analysis Request
Invoice To: Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #: 12-0038-003.1002.14	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #: Q31594 Q31597 AS	
Lab Work Order # (lab use only):	ALS Contact: CHRIS. Sampler: NM/KEM/AO	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BTEX, F	PAHs	Number of Containers
1	RINSEATE A	Nov 14	10:30	water	X	X	4
2	RINSATE B	Nov 14	10:30	water	X	X	4
3	RINSEATE C	Nov 14	14:00	water	X	X	4
4	RINSEATE D	Nov 14	14:00	water	X	X	4
5	RINSEATE G.	Nov 15	15:00	water	X	X	4

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

1. Meet FIMAG - Aquatic guidelines

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
	Nov 18	15:43	MB	Nov 18/13	3:40	4.4 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

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