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March 14, 2019

Mr. Don Labossiere  
Director Environmental Operations  
Manitoba Sustainable Development  
Red River Region  
1007 Century Street  
Winnipeg, Manitoba R3H 0W4

Subject: ***Director's Order D01-019  
2018 Annual Environmental Activities  
Domtar Transcona Former Creosote Site  
Winnipeg, Manitoba***

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Dear Mr. Labossiere:

In compliance with the above-mentioned Control Order, please find enclosed two (2) paper copies as well as (1) one electronic copy of the 2018 Annual Environmental Activities Report prepared by KGS Group Consulting Engineers.

If you require further information, please feel free to contact the undersigned.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Stéphane Digonnet'.

Stéphane Digonnet  
Senior Manager – Soil Rehabilitation  
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CC: Warren Rospad  
Mike Smith, KGS Group Inc.

Encls.

DOMTAR INC.

**2018 ANNUAL SITE SUMMARY REPORT  
DOMTAR TRANSCONA FORMER CREOSOTE SITE  
WINNIPEG, MANITOBA**

FINAL

KGS Group 18-0953-001  
March 2019

PREPARED BY:



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Michael P. Smith, M.Sc. P. Geo.  
Senior Hydrogeologist

APPROVED BY:



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Ed Collins, P. Eng., FEC  
Senior Environmental Engineer



March 14, 2019

File No. 18-0953-001

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ATTENTION: Mr. Stéphane Digonnet  
Senior Manager – Soil Rehabilitation

RE: 2018 Annual Site Summary Report  
Domtar Transcona Former Creosote Site  
Winnipeg, Manitoba – Final Report

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Dear Mr. Digonnet:

In accordance with Director's Order D1-109 Domtar Transcona Site Post Remediation Performance Monitoring Plan and updated 2014 Long Term Remediation Plan, please find attached one (1) paper copy and one (1) electronic copy of the 2018 Annual Site Summary Report for the Domtar Transcona Site, located in Winnipeg, Manitoba. We have forwarded two (2) paper copies and one (1) electronic copy to Manitoba Sustainable Development on your behalf.

KGS Group sincerely appreciates the opportunity to have been of service. If you have any questions, please contact Mr. Michael Smith, P.Geo., or the undersigned.

Yours truly,

A handwritten signature in blue ink that reads 'Ed Collins'.

Ed. Collins, P.Eng., FEC  
Senior Environmental Engineer

MPS/jr  
Enclosure

## EXECUTIVE SUMMARY

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group), was retained by Domtar Inc. to prepare the 2018 Annual Site Summary Report for the Domtar Transcona Site, located in Winnipeg, Manitoba. In 2014, Manitoba Conservation (now Manitoba Sustainable Development) approved a revised long term remediation plan for the site. This revised plan was followed for 2018.

***KGS Group Annual Well Inspection and Well Security Program*** – The August 2018 inspection confirmed that all bedrock and overburden well casings were in good condition and that well casing lids were secure. A J-Plug cap with lock was found to be missing from the south Leachate Collection System cap at the containment cell. This cap was subsequently replaced and the cover secured. No other concerns were noted.

***KGS Group Containment Cell Inspections*** – The Containment Cell includes both a Leachate Collection System (LCS) and Leakage Detection System (LDS) No major concerns were noted in either June or October inspections. The water level within the LCS remained steady through 2018, with only a gradual increase observed, consistent with recent observations. The water level within the LDS was stable in 2018. Previously, the water level within the LDS showed a distinct increase between 2013 and 2017. As of October 2018, the water levels within the LCS and LDS were generally below the surrounding overburden water level measured in 2013, prior to the previous dewatering event, however the LDS water level was now above the groundwater level observed in the adjacent overburden well 2003-B2. Overall, water levels in the surrounding overburden and LDS were greater than the LCS, creating a hydraulic inward barrier to any outward migration of leachate.

***Cell Dewatering*** – No Cell Dewatering Program occurred in 2018.

***Fort Whyte Soil, Vegetation, and Drainage Site Inspections*** – For the May and October inspections, no concerns were noted in the cell cover, engineered cap, or site drainage systems at the site. No recommendations for work were outstanding for 2018.

***KGS Group Groundwater Sampling Program*** – A revised groundwater sampling program has been approved for the site. Groundwater for select wells was sampled in 2018, with the last sampling event conducted in 2013. Results indicated detectable polynuclear aromatic hydrocarbons (PAH) concentrations in seven of the fifteen monitoring wells sampled at the site. No pentachlorophenol (PCP) was detected in any water samples in the 2018 sampling event. All individual PAH and PCP parameters were below Site Groundwater Action Levels. With the exception of MW-12 (20.27 µg/L), all wells had total PAH concentrations below the City of Winnipeg Discharge Criterion of 20 µg/L. Results were consistent with past observations. Off-site monitoring wells show PAH and PCP concentrations well below the Site Groundwater Action Levels and the City of Winnipeg Discharge Criterion. No evidence of groundwater PAH migration from the containment cell was observed.

***Proposed 2019 Work Program*** - Based on the reduced long term remediation plan approved in 2014, the following work is required for the site for 2019.



- **Annual Well Inspection** – An annual visual inspection of all onsite and offsite bedrock and overburden monitoring wells, with any noted repairs completed on an as needed basis.
- **Containment Cell Water Level Inspections** – Inspections should be conducted in late spring and early fall. Water levels within the LCS and LDS and the four surrounding overburden wells are to be recorded. A dewatering program should be scheduled if water elevations in the cell increase above the level of the surrounding overburden water table, similar to 2013 prior to the most recent 2013 dewatering program.
- **Soil, Vegetation and Drainage Inspections** – Inspections to be conducted in late spring and early fall, with any noted repairs completed on an as needed basis.
- **Site Groundwater Sampling Program** – No groundwater monitoring or sampling is scheduled for 2019. A full round of groundwater monitoring and sampling is scheduled once every 5 years. The next event would be scheduled for 2023.
- **Reporting** – An Annual Summary Report is to be submitted to Manitoba Sustainable Development after the completion of the 2019 site activity requirements.

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## **1.0 INTRODUCTION**

### **1.1 TERMS OF REFERENCE**

Kontzamanis Graumann Smith MacMillan Inc. (KGS Group) was retained by Domtar Inc. to conduct the 2018 groundwater sampling and site inspections and prepare the annual summary report for the Domtar Transcona Site, located in Winnipeg, Manitoba. This report is in accordance with the Domtar Transcona Site Post Remediation Performance Monitoring Plan (PRPMP) (UMA Engineering Ltd. May, 1998. Report No. 6138-011-06) and updated 2014 Remediation Plan (KGS Group 2014 Annual Report 14-0953-001 and Manitoba Conservation and Water Stewardship (now Manitoba Sustainable Development) letter dated September 30, 2014). The area of study (Figures 1 and 2) is a location that previously contained a wood preservative treatment facility, operated by Domtar Inc. The site is now a public park (Transcona Community Bioreserve) and is managed by Fort Whyte Alive (Formerly the Fort Whyte Centre).

### **1.2 BACKGROUND INFORMATION**

The Domtar Transcona site is located in Winnipeg, Manitoba and is bordered on the north by Gunn Road, on the west by the Bellavance Street allowance (road not constructed) and on the south by the CNR Victoria Beach Right-of-Way (Figure 1). The current site is a rectangular parcel of land approximately 47 ha in size (Figure 2).

Domtar Inc. operated a wood preservative plant at the west centre of the site between 1911 and 1976. For the first 40 years, creosote and petroleum based creosote solutions were used as preservative on site. Starting in the 1950s, both creosote and pentachlorophenol (PCP) were used. Process water from the plant was treated in settling tanks. Prior to 1969, the wastewater from the tanks was discharged to a ditch along the western boundary of the site, which drained north to a ditch routed west along Gunn Road. After 1969, the wastewater was directed to ponds on site. In the 1930s, two bedrock drainage wells (50 and 78 m deep) were installed to drain storm water from the site, as the clay overburden prevented rapid infiltration. It is possible that the drainage wells also received treated process wastewater. The drainage wells were decommissioned in 1986. In 1995, a thermal desorption system, owned by TriWaste Reduction Services Inc. was installed for site remediation. The system was discontinued, as it could not



treat the clay soils to the necessary treatment levels. In 1996 a proposed remedial plan was submitted to Manitoba Environment for remediation of the site. On April 27, 1998, Manitoba Environment issued Director's Order D1-019 to Domtar to initiate site remedial activities. Site remedial activities included:

- excavation of impacted soil with PCP concentrations greater than 100 ppm from the site and placement of this soil in a secure containment cell, constructed at the northeast corner of the site.
- construction of an engineered cap to be placed over the remaining impacted soils with concentrations of PCP below 100 ppm.
- re-vegetation of all excavated areas.
- installation of groundwater monitoring wells to monitor bedrock and overburden PCP and PAH impacts.

The monitoring well sampling program was based upon the program outlined in the May 1998 Domtar Transcona Site PRPMP, which was prepared by UMA Engineering Ltd. (Job No. 41 01 6138 011 06). Currently, the site is governed by the Director's Amending Order D1-019-05, issued on March 10, 2004. Between 2004 and 2008, three amendment requests were approved by Manitoba Conservation. The first amendment was to remove the requirement to collect groundwater samples from overburden wells that had visible dense non-aqueous phase liquid (DNAPL) creosote present, as the presence of the creosote created extremely high groundwater polynuclear aromatic hydrocarbons (PAH) concentrations, which were not representative of the groundwater in the area. This request was approved by Manitoba Conservation on March 11, 2004. The second amendment request was to reduce the sampling frequency of non or low impacted on-site bedrock monitoring wells from twice to once per year. This request was approved by Manitoba Conservation on September 27, 2004. The Director's Amending Order D1-019-05 and first two amendment requests are included in the 2004 KGS Group Annual Environmental Activities Report (04-953-01), issued March 22, 2005. The third amendment request in 2007 was to: reduce the sampling frequency of non-impacted, on-site bedrock monitoring wells from once per year to once every four years; reduce the sampling frequency of low impacted on-site bedrock monitoring wells from once per year to once every two years; reduce the sampling frequency of highly impacted on-site bedrock monitoring wells from twice per year to once per year; reduce the sampling frequency of onsite nested overburden monitoring wells from twice per year to once per year. This request was approved by Manitoba

Conservation on July 9, 2007. The 2007 amendment is included in the 2007 KGS Group Annual Environmental Activities Report (07-953-01), issued March 12, 2008.

In April 2014, a meeting was held between Manitoba Conservation, Domtar Inc. and KGS Group to provide an updated summary of the site so as to commence transition to a long term site management plan, with reduced field and reporting requirements. Following this meeting, KGS Group prepared a Site Status Summary Report for submission to Manitoba Conservation. The report provided an outline of site work done to date, and proposed a revised management/monitoring plan for future work. Based on this report, Manitoba Conservation approved an updated, long term remediation plan on September 30, 2014.

The approved plan included the following items:

- Securing of all overburden and bedrock monitoring wells excluded from the regular monitoring program by tack welding the casing and lid together to minimize the chance of vandalism;
- Incorporation of an annual visual inspection of each secured well casing;
- Discontinuation of sampling for Nested Monitoring wells 99-1S/1D, 99-2S/2D and 99-3S/3D;
- Reduction in sampling frequency for containment cells wells 99-Cell-1, 2003-Cell-2, 99-Cell-3, and 99-Cell-4 to once every five years;
- Reduction in sampling frequency for off-site wells to once every five years (99-B1 and 99-B2);
- Reduction in sampling frequency for down gradient perimeter wells to once every five years (MW-03, MW-04, MW-06, MW-10, MW-11, MW-12, MW-13, 2000-B1 and 2000-B2);
- Discontinuation of sampling for remaining wells (MW-01, MW-02, MW-07, MW-08 (damaged), MW-09, MW-14, 2000-B3 (damaged), 2000-B4 and 2002-B5);
- Reduction in annual inspection program by Fort Whyte. Site inspections of this nature are to be conducted twice a year (spring and fall), with any noted repairs completed on an as needed basis;
- Reduction in site inspections and measurements of water levels within the cells from monthly to twice per year (spring and fall). During each inspection, the water levels within the four overburden wells surrounding the cell would be recorded; and

- Scheduled dewatering as required to ensure that water elevations within the cell do not rise above the surrounding groundwater elevation. Dewatering on this schedule would maintain an inward hydraulic pressure on the cell, providing further protection to outward migration of impacts into the surrounding environment.

### **1.3 2018 SCOPE OF WORK**

The 2018 Scope of Work for the Transcona site included the following items:

- Annual Well Inspection by KGS Group;
- Soil, Vegetation, and Drainage Site Inspections by Fort Whyte;
- Containment Cell Leachate Collection System and Leakage Detection System Inspections by KGS Group;
- Groundwater Monitoring and Sampling Program by KGS Group.

This Annual Site Summary Report describes the results of the above listed Scope of Work.

## **2.0 PHYSICAL CHARACTERISTICS OF THE SITE**

### **2.1 PHYSIOGRAPHIC SETTING AND CLIMATE**

The City of Winnipeg is located at the junction of the Red and Assiniboine Rivers. The land is generally flat lying to slightly undulating floodplain of primarily glaciolacustrine silts and clays.

The mean monthly air temperature in Winnipeg ranges from approximately +19.7°C in July to -16.4°C in January. The average annual precipitation is approximately 521 mm, with 419 mm falling as rain. Weather data is for the Winnipeg International Airport weather station (Government of Canada - Canadian Climate Normals - 1981 to 2010 Station Data).

### **2.2 REGIONAL GEOLOGY**

The City of Winnipeg is located in the Manitoba Lowlands, which is bounded to the west by the Manitoba Escarpment and to the east by the Canadian Shield. Bedrock in the Winnipeg area is a Paleozoic limestone or dolomite of the Red River formation, and is encountered at approximately 30 to 35 m depth. Overlying the bedrock is a silty till of glacial origin, which varies from approximately 1 to 10 m in thickness and is overlain in turn by deep basin glaciolacustrine deposits of silts and clays, from about 1 to 30 m in thickness. Within the City of Winnipeg itself, an upper complex zone of stratified silty clay and silt with variable alluvial silts and sands or man-made fill is encountered.

### **2.3 REGIONAL HYDROGEOLOGY**

In the Winnipeg region, the bedrock aquifers located within the Ordovician Red River Formation bedrock are commonly grouped together and termed the upper carbonate aquifer. This aquifer supplies potable water, with yields in excess of 50 L/s possible. Generally, the water type is magnesium-calcium-bicarbonate type, and is developed for industrial use. The City of Winnipeg obtains drinking water from Shoal Lake, located on the Manitoba-Ontario border.



Regional groundwater flow in the Winnipeg area east of the Red River, is to the west, due to extensive recharge zones in the till unit exposures, approximately 50 km east of the City and in the Sandilands area of southeastern Manitoba consisting of sands and gravels.

## 2.4 HYDROLOGY

The closest major water body to the Domtar site is the Red River, approximately 8 km to the west. The former Domtar site has been designated a community bioreserve, managed by Fort Whyte and has been landscaped. Drainage is generally towards a marsh and wetland pond area, located near the centre of the site (Figure 2).

## 2.5 SITE GEOLOGY

The site area is generally flat. The soil profile geology consists of an upper laminated soft brown silty clay between seven and nine metres thick, which is highly fractured with numerous silt pockets and gypsum nodules. There is a visible transition to a grey to dark grey silty clay, extending approximately three to six metres below the brown clay unit. The underlying grey clay is generally unfractured. One to four metres of silty glacial till, with abundant sand and cobbles, separates the site clay and highly fractured limestone bedrock. A copy of the drilling logs for all monitoring wells at the site are included in Appendix A.

## 2.6 SITE HYDROGEOLOGY

**Bedrock Groundwater Flow** – Groundwater flow and direction was last fully characterized for the site in 2013. A figure from the 2013 annual report for the site has been provided in Appendix B for reference purposes. Groundwater flow was generally from east to west across the site, with a horizontal hydraulic gradient of approximately 0.01 m/m.

With the incorporation of a revised long term management plan, approved in 2014, a number of the bedrock wells used for this groundwater flow assessment are no longer monitored and thus the current 2018 groundwater flow across the site cannot be plotted. Groundwater elevations recorded in 2018, for the remaining accessible wells, are provided in Table 2. Measured elevations were within the range of expected values. Given long term stability of groundwater

flow across the site, it is assumed that groundwater flow in 2018 followed patterns similar to that observed in 2013.

**Overburden Groundwater Flow** – Since approval of the revised long term management plan, in 2014, overburden groundwater levels are only measured at containment cell area perimeter wells. Groundwater levels measured in October 2018 in overburden wells at the containment cell ranged between 228.0 to 229.3 masl (Table 3 and Figure 3). Groundwater flow is from south east to northwest across this cell area. Note that large fluctuations in groundwater elevations have been observed at 99-Cell-4 (3.6 m), which may coincide with presence / absence of surface water at this well location at the time of sampling. Other overburden wells surrounding the cell also showed groundwater fluctuations (0.7 to 1.1 m) however to a much lesser extent.

### **3.0 2018 FIELD INVESTIGATION PROGRAM**

#### **3.1 ANNUAL WELL SECURITY INSPECTION**

KGS Group conducted an Annual Monitoring Well Inspection on June 28, 2018. Inspection photos are provided in Appendix C (Photos 1 to 32).

The KGS Group inspection confirmed that all bedrock and overburden well casings were in good condition and that each casing lid was secured with a lock. All casing lid tack welds were competent on wells not included in the long term groundwater monitoring program, which include 9 bedrock and 6 overburden wells).

A J-Plug cap with lock was found to be missing from the north Leachate Collection System (S-LCS) cap at the containment cell. This cap was subsequently replaced and the cover secured.

#### **3.2 CONTAINMENT CELL SITE INSPECTIONS**

KGS Group personnel monitored the water levels in the Leachate Collection System (LCS) and Leakage Detection System (LDS) of the secure containment cell on June 28 and October 10, 2018.

The KGS Group LCS and LDS inspection reports for 2018 are included in Appendix D. For each inspection, the measured distance down the sloped LCS and LDS riser pipes to water was recorded during each visit. Water levels were recorded as the depth to water, from the outer collar, down each LCS/LDS inclined slope pipe on both the north and south sides of the containment cell. The inclined pipes are designed at approximately a 1V:4H decline. The water levels as of October 10, 2018 in the LCS and LDS systems as (measured from the south side pipes) and within the surrounding overburden are displayed on Figure 3.

Since dewatering in 2013, the water level within the LCS has shown a very gradual increase through 2018. The water level within the LCS has increased at approximately 0.06 m/year since dewatering, consistent with the 0.1 m/year rate of increase observed historically. In contrast, the water level in the underlying LDS has shown a greater change. The water level within the

LDS showed a distinct increase between 2013 and 2017 of 2.3 m vertically (average of 0.57 m/yr). Since then, it appears the water level has stabilized. Rapid rises have occurred in the LDS after dewatering in the past. Future monitoring will confirm whether the increase observed in the LCS continues at this rate, or whether the water level stabilizes. The increase in LDS water level observed, which is above the LCS level, demonstrates an inward hydraulic pressure on the cell, protecting against outward migration of leachate.

As of October 2018, the water levels within the LCS and LDS were generally below the surrounding overburden well water levels measured since 2013 (prior to the previous dewatering event), with the exception the LDS exceeding the level measured at overburden monitoring well 2003-Cell-2. As the LCS water level is still well below surrounding overall groundwater elevations, and the previous level observed in 2013 prior to dewatering of the LCS and LDS, no dewatering is recommended at this time.

### **3.3 CELL DEWATERING**

No Cell Dewatering Program was conducted in 2018. The last dewatering program was conducted in late 2013. Future dewatering would be recommended if the water level within the LCS reaches a similar level to observed in 2013, prior to the last dewatering event. Currently the water level in the LCS is well below the 2013 and current surrounding overburden levels and thus no dewatering program is recommended at this time.

### **3.4 SOIL, VEGETATION AND DRAINAGE SITE INSPECTIONS**

Inspections of the site vegetation and soil cover for the containment cell, engineered cap, and drainage system were conducted by Fort Whyte personnel in May and October 2018. Their inspection reports are provided in Appendix E, with a summary of details provided below.

#### **3.4.1 Secure Containment Cell Cover and Engineered Cap Cover Inspections**

For both the Containment Cell and Engineered Cap, the ground cover was examined by Fort Whyte personnel for:



- Dry vegetation;
- Dead vegetation;
- Growth of deep rooted vegetation;
- Growth of deep rooted vegetation in the first 10 m of the 30 m buffer zone (containment cell only);
- Cracked soil or gulleying due to erosion;
- Damage to survey benchmarks;
- Settlement of grass cover;
- Animal infestation; and
- Human damage.

No concerns were noted in 2018. As of the last inspection on October 1, 2018, no recommendations for additional work were outstanding.

### **3.4.2 Site Drainage System Inspections**

Each inspection event by Fort Whyte personnel consisted of inspection of the drainage system for the following:

- Collection of debris in the site drainage system;
- Growth of excess vegetation and woody plant species in the drainage swales or site drains;
- Animal inhabitation within the site drainage system;
- Ponding on the secure containment cell;
- Poor or inadequate drainage around the secure containment cell; and
- Poor or inadequate drainage around the engineered cap.

No concerns were noted in 2018. As of the last inspection on October 1, 2018, no recommendations for additional work were outstanding.

### **3.5 GROUNDWATER SAMPLING**

A revised groundwater sampling program has been implemented for the site. The program is outlined in Table 1. Groundwater was sampled in 2018, with results provided below. A copy of the 2018 laboratory certificates of analyses are found in Appendix F.

### 3.5.1 ASSESSMENT CRITERIA

Groundwater in the area is not used as a residential source of potable water. The City of Winnipeg uses surface water from Shoal Lake, at the Manitoba/Ontario border, as a source of drinking water. As a component of the 1996 UMA Transcona Remediation report (No. 6138-011-01-01), a Site Specific Risk Assessment (SSRA) was conducted. For the SSRA, site specific groundwater criteria (Groundwater Action Levels) were developed for PAH and PCP compounds. The SSRA was based upon guidance developed from the Canadian Council of Ministry of the Environment (CCME) for the National Contaminated Sites Remediation Program and guidance developed from the United States Environmental Protection Agency (USEPA) for the Superfund Program.

### 3.5.2 GROUNDWATER FIELD CHEMISTRY

Eleven bedrock wells were sampled as part of the 2018 field program (Table 1). Field chemistry readings are provided in Table 2. Groundwater electrical conductivity ranged from 786 to 1,530  $\mu\text{S}/\text{cm}$ . The pH ranged from 6.3 to 11.1 and temperature ranged from 3.9°C to 11.8°C. The results are consistent with historical values measured for these locations.

Four overburden wells, surrounding the soil containment cell, were sampled as part of the 2018 field program (Table 1). Groundwater chemistry ranged from 1,173 to 3,706  $\mu\text{S}/\text{cm}$  for electrical conductivity, 6.73 to 7.48 for pH, and 5.3 to 6.6°C for temperature (Table 3), consistent with past results.

### 3.5.3 GROUNDWATER LABORATORY ANALYSIS RESULTS

#### ***Bedrock Wells***

Eleven groundwater samples were taken from the bedrock monitoring wells. Seven wells had total PAH concentrations above detection (Table 4):

- MW-03, 18.79  $\mu\text{g}/\text{L}$ ;
- MW-06, 0.02  $\mu\text{g}/\text{L}$ ;
- MW-10, 0.07  $\mu\text{g}/\text{L}$ ;
- MW-12, 20.27  $\mu\text{g}/\text{L}$ ;
- 99-B1, 7.11  $\mu\text{g}/\text{L}$ ;
- 99-B2, 4.18  $\mu\text{g}/\text{L}$ ;
- 2000-B2, 0.05  $\mu\text{g}/\text{L}$ ;

All individual PAH and PCP parameters were below Site Groundwater Action Levels. No PCP was detected in any water samples in the 2018 sampling event. With the exception of MW-12 (20.27 µg/L), all wells had total PAH concentrations below the City of Winnipeg Discharge Criterion of 20 µg/L.

The revised monitoring and sampling program is focused on monitoring of water quality at and downgradient of the site property boundary. The groundwater sampling results observed were as expected, based on previous sampling programs. The highest concentrations of PAHs were measured at MW-03 (18.79 µg/L) and MW-12 (20.27 µg/L). These results are expected and within the recent range of between 15 and 30 µg/L total PAHs. No long term increasing trends are observed for these locations (Figure 4). At offsite wells, 99-B1 and 99-B2, concentrations were lower, between 4 and 7 µg/L for total PAHs. Slightly higher concentrations of PAHs have been observed since 2013 at 99-B2 and future sampling will confirm whether any increasing long term trends develop. Despite the higher concentrations observed at 99-B2 in 2013 and 2018, concentrations are still low and well below groundwater action levels and City discharge criterion. Based on the 2018 groundwater sampling results, no changes to the groundwater sampling network or frequency are recommended at this time.

### ***Overburden Wells***

Four overburden wells surrounding the containment cell were sampled in October 2018. All PAH concentrations were below laboratory detection levels, and thus below City of Winnipeg Stormwater Discharge maximum total concentrations and site Groundwater Action Levels (Table 5). No evidence of groundwater PAH migration from the containment cell was observed. Based on the 2018 results, no changes to the groundwater sampling network or frequency are recommended at this time.

### **3.5.4 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)**

Quality Assurance/Quality Control (QA/QC) results are assessed using the Relative Percentage Difference (RPD), which is calculated as the percentage of the absolute difference between the original sample result and the duplicate sample result divided by the arithmetic average of the two results. One duplicate were collected in 2018 for MW-04. Results indicate that the PAH

concentrations were non-detectable for all parameters except acenaphthene (which was at the detection limit of 0.02 µg/L and therefore RPDs could not be calculated. Results between the original and duplicate sample correlated well.

Field and trip blanks were also submitted to the laboratory as part of the sample package. Results indicate that all parameters had concentrations that were below laboratory detection limits.



## 4.0 SUMMARY AND CONCLUSIONS

Based on the work conducted in 2018, the following summary and conclusions are provided:

**Revised Long Term Remediation Plan** – A revised long term remediation plan outlining a reduction in inspections and groundwater monitoring and sampling at the site was approved in 2014. This revised plan was followed for 2018 and included a groundwater sampling program.

**KGS Group Annual Well Inspection and Well Security Program** – KGS Group conducted an Annual Monitoring Well Inspection in August 2018. The KGS Group inspection confirmed that all bedrock and overburden wells were in good condition and that each casing lid was secured with a lock. All casing lid tack welds previously installed on wells no longer included in the long term groundwater monitoring program were secure. A J-Plug cap with lock was found to be missing from the north Leachate Collection System (S-LCS) cap at the containment cell. This cap was subsequently replaced and the cover secured.

**KGS Group Containment Cell Inspections** – KGS Group conducted inspections of the containment cell in June and October 2018. No major concerns were noted. The water level within the LCS remained steady through 2018, with only a gradual increase of 0.06 m/year observed since the last dewatering event. The water level within the LDS showed a distinct increase between 2013 and 2017 of 2.3 m vertically (average of 0.57 m/yr). Since then, it appears the water level has stabilized. As of October 2018, the water levels within the LCS and LDS were generally below the surrounding overburden water level measured in 2013, prior to the previous dewatering event, however the LDS water level was now above the groundwater level observed in the adjacent overburden well 2003-B2. Overall, water levels in the surrounding overburden and LDS were greater than the LCS, creating a hydraulic inward barrier to any outward migration of leachate.

**Cell Dewatering** – No Cell Dewatering Program occurred in 2018. The last dewatering program was conducted in late 2013. Future dewatering would be recommended if the water level within the LCS reaches a similar level to observed in 2013, prior to the last dewatering event.

**Fort Whyte Soil, Vegetation, and Drainage Site Inspections** – Fort Whyte conducted inspections in May and October 2018. No concerns were noted in the cell cover, engineered cap, or site drainage systems at the site. As of the last inspection in October 2018, no recommendations for work were outstanding.

**KGS Group Groundwater Sampling Program** – A revised groundwater sampling program has been approved for the site. Groundwater for select wells was sampled in 2018, with the last sampling event conducted in 2013. Results indicated detectable PAH concentrations in seven of the fifteen monitoring wells sampled at the site, with results consistent with past observations. All individual PAH and PCP parameters were below Site Groundwater Action Levels. No PCP was detected in any water samples in the 2018 sampling event. With the exception of MW-12 (20.27 µg/L), all wells had total PAH concentrations below the City of Winnipeg Discharge Criterion of 20 µg/L. Off-site monitoring wells show PAH and PCP concentrations well below the Site Groundwater Action Levels and the City of Winnipeg Discharge Criterion. No evidence of groundwater PAH migration from the containment cell was observed.

**Proposed 2019 Work Program** – Based on the 2018 program results, no changes to the reduced long term remediation plan, approved in 2014, are recommended at this time. Based on the approved program, the following work should be scheduled for the site for 2019:

- **Annual Well Inspection** – An annual visual inspection of all onsite and offsite bedrock and overburden monitoring wells should be conducted, with any noted repairs completed on an as needed basis;
- **Containment Cell Water Level Inspections** – Inspections should be conducted in late spring and early fall. Water levels within the LCS and LDS and the four surrounding overburden wells should be recorded. A dewatering program would be scheduled if water elevations in the cell, in particular the LCS, increase above the level of the surrounding overburden water table, as observed in 2013 prior to the most recent 2013 dewatering program.
- **Soil, Vegetation and Drainage Inspections** – Inspections should be conducted in late spring and early fall, with any noted repairs completed on an as needed basis;
- **KGS Group Groundwater Monitoring Program** – No Groundwater monitoring or sampling is scheduled for 2019. A full round of groundwater monitoring and sampling is scheduled once every 5 years. The next event would be scheduled for 2023.

- **Reporting** – A Summary Report should be submitted to Manitoba Sustainable Development after the completion of all required 2019 site activity requirements. The report should include a summary of containment cell operation inspections, soil vegetation and drainage inspections and site monitoring well inspections,. Any repairs conducted in 2019 should be documented.

## **5.0 STATEMENT OF LIMITATIONS AND CONDITIONS**

### **5.1 THIRD PARTY USE**

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

### **5.2 GEO-ENVIRONMENTAL STATEMENT OF LIMITATIONS**

KGS Group prepared 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, including its conclusions, is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of the Domtar Inc. As the report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

## TABLES

**TABLE 1  
LONG TERM APPROVED MONITORING AND SAMPLING PROGRAM**

LOCATION	WATER LEVEL MONITORING	GROUNDWATER SAMPLING
<b>Bioreserve Bedrock Monitoring Wells</b>		
MW3, MW4, MW6, MW10, MW11, MW12, MW13, 2000-B1, 2000-B2	Once Every 5 years	Once Every 5 years, Starting in 2018
<b>Offsite Bedrock Monitoring Wells</b>		
99-B1, 99-B2	Once Every 5 years	Once Every 5 years, Starting in 2018
<b>Containment Cell Area and Overburden Monitoring Wells</b>		
LCS / LDS	2 x per year Spring and Fall	Prior to Next Dewatering Event, on As Required Basis
99-Cell-1, 2003-Cell-2, 99-Cell-3, 99-Cell-4	2 x per year Spring and Fall	Once Every 5 years, Starting in 2018

**Notes:**

1. Site Monitoring Wells No Longer Monitored or Sampled include MW1, MW2, MW7, MW8, MW9, MW14, 2000-B3, 2002-B5, 99-1S/1D, 99-2S/2D, 99-3S/3D
2. An annual visual inspection of all secured well casings is to be completed, including wells no longer included in the Sampling Program.

**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
MW 01	2-Oct-13	233.476	-	11.060	222.416	-	-	-	not sampled
	14-Nov-12	233.476	-	10.450	223.026	-	-	-	not sampled
	4-Oct-11	233.476	-	10.290	223.186	-	-	-	not sampled
	1-Sep-10	233.476	-	9.485	223.991	10.4	5.94	1,022	grey, no odour
	10-Aug-09	233.476	-	8.650	224.826	-	-	-	not sampled
	16-Jul-08	233.476	-	10.450	223.026	-	-	-	not sampled
	20-Sep-07	233.476	-	10.790	222.686	-	-	-	not sampled
	1-Nov-06	233.476	-	10.659	222.817	-	-	-	not sampled
	6-Jul-06	233.476	-	11.060	222.416	9.9	7.52	1,050	odourless
	7-Nov-05	233.476	-	9.839	223.637	-	-	-	not sampled
	14-Jul-05	233.476	-	8.165	225.311	-	-	-	not sampled
	27-Jun-05	233.176	-	8.780	224.396	12.4	7.57	1,034	slight odour, black cloudy
	9-Dec-04	233.476	-	10.180	223.296	-	-	-	not sampled
	13-Jul-04	233.476	-	10.000	223.476	8.7	7.58	690	grey, no odour
	1-Oct-03	233.476	-	11.602	221.874	6.4	7.2	841	slight grey and odour
	3-Jun-03	233.476	-	10.995	222.481	7.6	6.55	923	cloudy, no odour
7-Dec-02	233.476	-	10.581	222.895	4.9	-	831	clear	
28-Aug-02	233.476	-	-	-	9.1	-	909	cloudy	
MW 02	2-Oct-13	235.310	-	13.750	221.560	-	-	-	not sampled
	14-Nov-12	235.310	-	12.280	223.030	4.0	7.55	942	Clear
	4-Oct-11	235.310	-	12.340	222.970	-	-	-	not sampled
	1-Sep-10	235.310	-	11.794	223.516	11.8	6.01	927	clear, no odour
	10-Aug-09	235.310	-	10.840	224.470	-	-	-	not sampled
	16-Jul-08	235.310	-	12.970	222.340	8.9	7.36	910	-
	20-Sep-07	235.310	-	13.380	221.930	-	-	-	not sampled
	1-Nov-06	235.310	-	12.820	222.490	-	-	-	not sampled
	6-Jul-06	235.310	-	13.990	221.320	12.5	7.53	921	odourless
	7-Nov-05	235.310	-	12.219	223.091	-	-	-	not sampled
	14-Jul-05	235.310	-	11.151	224.159	-	-	-	not sampled
	27-Jun-05	235.310	-	11.995	223.315	10.1	7.37	955	clear and odourless
	9-Dec-04	235.310	-	12.690	222.620	-	-	-	not sampled
	13-Jul-04	235.310	-	13.554	221.756	11.2	7.28	624	murky, no odour
	1-Oct-03	235.310	-	14.666	220.644	6.2	7.5	781	slight brown, no odour
	3-Jun-03	235.310	-	13.890	221.420	7.4	6.91	1,012	clear, no odour
7-Dec-02	235.310	-	13.377	221.933	7.1	-	778	milky	
28-Aug-02	235.310	-	14.730	220.580	9.9	-	825	milky	
MW 03	11-Oct-18	233.535	-	10.981	222.554	4.4	7.80	800	clear, swampy smell
	2-Oct-13	233.535	-	11.970	221.565	8.4	7.34	827	clear, no odour
	14-Nov-12	233.535	-	11.308	222.227	6.1	7.43	795	Clear
	4-Oct-11	233.535	-	10.840	222.695	11.4	7.33	866	clear, swampy smell
	1-Sep-10	233.535	-	10.141	223.394	9.6	5.98	862	cloudy
	10-Aug-09	233.535	-	9.280	224.255	10.6	5.67	741	-
	16-Jul-08	233.535	-	11.300	222.235	8.4	7.29	848	-
	20-Sep-07	233.535	-	11.680	221.855	7.4	6.72	916	-
	1-Nov-06	233.535	-	11.156	222.379	6.7	7.45	841	clear, no odour
	6-Jul-06	233.535	-	12.260	221.275	9.6	7.55	828	swampy, odour
	7-Nov-05	233.535	-	10.583	222.952	7.4	7.3	766	clear with black particles, no odour
	14-Jul-05	233.535	-	9.551	223.984	-	-	-	not sampled
	27-Jun-05	233.535	-	10.136	223.399	10.0	7.25	852	-
	9-Dec-04	233.535	-	10.470	223.065	5.0	6.49	826	milky
	13-Jul-04	233.535	-	11.872	221.663	9.0	6.88	564	brown, black particulates, sulfur odour
	1-Oct-03	233.535	-	12.863	220.672	6.6	7.3	672	slight grey and odour
3-Jun-03	233.535	-	12.128	221.407	8.2	6.66	742	clear, slight odour	
7-Dec-02	233.535	-	11.668	221.867	4.6	-	683	brown	
28-Aug-02	233.535	-	12.948	220.587	9.0	-	721	clear	



**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
MW 04	11-Oct-18	233.374	-	11.011	222.363	3.9	7.08	971	cloudy, brown, no odour
	2-Oct-13	233.374	-	12.120	221.254	-	-	-	not sampled
	14-Nov-12	233.374	-	11.375	221.999	-	-	-	not sampled
	4-Oct-11	233.374	-	10.770	222.604	-	-	-	not sampled
	30-Nov-10	233.374	-	9.030	224.344	5.0	7	1,021	clear
	1-Sep-10	233.374	-	10.141	223.233	-	-	-	could not sample
	10-Aug-09	233.374	-	9.200	224.174	-	-	-	not sampled
	16-Jul-08	233.374	-	11.270	222.104	-	-	-	not sampled
	20-Sep-07	233.374	-	11.730	221.644	-	-	-	not sampled
	1-Nov-06	233.374	-	11.186	222.188	-	-	-	not sampled
	6-Jul-06	233.374	-	12.400	220.974	9.8	7.55	892	odourless
	7-Nov-05	233.374	-	10.528	222.846	7.5	9.3	983	slightly grey with particulates, no odour
	14-Jul-05	233.374	-	9.525	223.849	-	-	-	not sampled
	9-Dec-04	233.374	-	11.040	222.334	-	-	-	not sampled
	13-Jul-04	233.374	-	11.918	221.456	9.1	7.11	651	clear, no odour
	1-Oct-03	233.374	-	13.044	220.330	6.9	7.7	761	clear, no odour
3-Jun-03	233.374	-	12.266	221.108	8.5	6.6	875	clear, no odour	
7-Dec-02	233.374	-	11.724	221.650	5.1	-	787	clear	
27-Aug-02	233.374	-	13.042	220.332	8.6	-	877	clear	
MW 06	10-Oct-18	232.830	-	10.344	222.486	11.8	6.3	851	cloudy, no odour
	2-Oct-13	232.830	-	11.330	221.500	-	-	-	not sampled
	14-Nov-12	232.830	-	10.625	222.205	5.5	7.75	827	clear
	4-Oct-11	232.830	-	10.030	222.800	-	-	-	not sampled
	2-Sep-10	232.830	-	8.703	224.127	11.7	6.99	875	clear, no odour
	10-Aug-09	232.830	-	8.280	224.550	-	-	-	not sampled
	15-Jul-08	232.830	-	10.620	222.210	10.0	8.07	846	-
	20-Sep-07	232.830	-	10.960	221.870	-	-	-	not sampled
	1-Nov-06	232.830	-	10.500	222.330	-	-	-	not sampled
	6-Jul-06	232.830	-	11.560	221.270	11.0	7.49	839	grey to clear, odourless
	7-Nov-05	232.830	-	9.888	222.942	-	-	-	not sampled
	14-Jul-05	232.830	-	8.791	224.039	-	-	-	not sampled
	28-Jun-05	232.830	-	9.567	223.263	11.8	7.59	862	clear and odourless
	9-Dec-04	232.830	-	10.330	222.500	-	-	-	not sampled
	13-Jul-04	232.830	-	11.159	221.671	10.4	7.21	543	slight brown, no odour
	1-Oct-03	232.830	-	12.210	220.620	6.7	7.6	692	slight grey and odour
3-Jun-03	232.830	-	11.472	221.358	8.6	6.8	754	clear, no odour	
7-Dec-02	232.830	-	11.006	221.824	7.2	-	701	clear	
29-Aug-02	232.830	-	12.300	220.530	11.0	-	742	clear	
MW 07	2-Oct-13	233.221	-	9.490	223.731	-	-	-	not sampled
	14-Nov-12	233.221	-	9.070	224.151	5.5	7.32	978	clear
	4-Oct-11	233.221	-	8.930	224.291	-	-	-	not sampled
	2-Sep-10	233.221	-	8.495	224.726	11.6	7.1	739	clear, no odour
	10-Aug-09	233.221	-	8.310	224.911	-	-	-	not sampled
	17-Jul-08	233.221	-	9.210	224.011	8.7	7.03	828	-
	20-Sep-07	233.221	-	9.430	223.791	-	-	-	not sampled
	1-Nov-06	233.221	-	9.205	224.016	-	-	-	not sampled
	6-Jul-06	233.221	-	9.420	223.801	-	7.8	791	clear, odourless
	7-Nov-05	233.221	-	8.754	224.467	-	-	-	not sampled
	14-Jul-05	233.221	-	6.195	227.026	-	-	-	not sampled
	28-Jun-05	233.221	-	6.465	226.756	9.7	7.38	822	-
	9-Dec-04	233.221	-	-	-	-	-	-	could not locate
	13-Jul-04	233.221	-	11.201	222.020	8.2	7.01	521	clear, no odour
	1-Oct-03	233.221	-	9.624	223.597	5.8	7.2	622	clear, no odour
	3-Jun-03	233.221	-	9.294	223.927	10.2	7.16	696	particulates, no odour
7-Dec-02	233.221	-	8.922	224.299	5.2	-	632	slight organic	
28-Aug-02	233.221	-	9.571	223.650	10.3	-	707	clear	

**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
MW 09	2-Oct-13	233.002	-	11.760	221.242	-	-	-	not sampled
	14-Nov-12	233.002	-	10.995	222.007	-	-	-	not sampled
	4-Oct-11	233.002	-	9.980	223.022	-	-	-	not sampled
	1-Sep-10	233.002	-	9.735	223.267	9.2	5.66	1,052	clear, no odour
	10-Aug-09	233.002	-	-	-	-	-	-	CNL
	16-Jul-08	233.002	-	10.930	222.072	-	-	-	not sampled
	20-Sep-07	233.002	-	11.350	221.652	-	-	-	not sampled
	1-Nov-06	233.002	-	10.805	222.197	-	-	-	not sampled
	6-Jul-06	233.002	-	11.970	221.032	11.2	7.45	1,021	clear, odourless
	7-Nov-05	233.002	-	10.159	222.843	-	-	-	not sampled
	14-Jul-05	233.002	-	9.140	223.862	-	-	-	not sampled
	28-Jun-05	233.002	-	9.947	223.055	11.0	7.39	1,026	clear and odourless
	9-Dec-04	233.002	-	10.650	222.352	-	-	-	not sampled
	13-Jul-04	233.002	-	11.552	221.450	10.3	7.18	696	clear, no odour
1-Oct-03	233.002	-	12.625	220.377	7.4	7.2	831	clear, no odour	
3-Jun-03	233.002	-	11.834	221.168	8.5	6.21	926	clear, no odour	
7-Dec-02	233.002	-	11.331	221.671	8.1	-	834	clear	
29-Aug-02	233.002	-	12.730	220.272	9.9	-	1,545	clear	
MW 10	10-Oct-18	233.366	-	11.621	221.745	5.9	8.80	900	clear, no odour
	2-Oct-13	233.366	-	12.690	220.676	-	-	-	not sampled
	14-Nov-12	233.366	-	11.935	221.431	5.2	7.28	976	clear
	4-Oct-11	233.366	-	11.305	222.061	-	-	-	not sampled
	31-Aug-10	233.366	-	10.716	222.650	10.4	7.02	869	clear, no odour
	10-Aug-09	233.366	-	9.820	223.546	-	-	-	not sampled
	15-Jul-08	233.366	-	11.880	221.486	8.8	7.16	965	-
	20-Sep-07	233.366	-	12.310	221.056	-	-	-	not sampled
	1-Nov-06	233.366	-	11.771	221.595	-	-	-	not sampled
	6-Jul-06	233.366	-	12.910	220.456	9.2	7.42	968	clear, odourless
	7-Nov-05	233.366	-	11.150	222.216	-	-	-	not sampled
	14-Jul-05	233.978	-	10.087	223.891	-	-	-	not sampled
	28-Jun-05	233.978	-	10.915	223.063	9.6	7.27	982	clear and odourless
	9-Dec-04	233.978	-	11.750	222.228	-	-	-	not sampled
	13-Jul-04	233.978	-	12.497	221.481	9.6	7.6	620	clear, no odour
	1-Oct-03	233.978	-	13.589	220.389	6.0	7.5	719	clear, no odour
	3-Jun-03	233.978	-	12.823	221.155	8.1	6.96	843	clear, no odour
7-Dec-02	233.366	-	11.662	221.704	6.2	-	816	clear	
27-Aug-02	233.366	-	12.989	220.377	9.9	-	840	clear	
MW 11	11-Oct-18	233.813	-	10.941	222.872	5.5	7.88	908	clear, no odour
	2-Oct-13	233.813	-	11.920	221.893	-	-	-	not sampled
	14-Nov-12	233.813	-	11.229	222.584	-	-	-	not sampled
	4-Oct-11	233.813	-	10.700	223.113	-	-	-	not sampled
	31-Aug-10	233.813	-	10.138	223.675	10.7	7.30	843	clear, no odour
	10-Aug-09	233.813	-	9.405	224.408	-	-	-	not sampled
	16-Jul-08	233.813	-	11.360	222.453	-	-	-	not sampled
	20-Sep-07	233.813	-	11.610	222.203	-	-	-	not sampled
	1-Nov-06	233.813	-	11.140	222.673	-	-	-	not sampled
	6-Jul-06	233.199	-	12.070	221.129	11.1	7.55	964	clear, odourless
	7-Nov-05	233.199	-	10.567	222.632	-	-	-	not sampled
	14-Jul-05	233.813	-	9.225	224.588	-	-	-	not sampled
	29-Jun-05	233.813	-	9.875	223.938	9.8	7.5	956	clear and odourless
	9-Dec-04	233.813	-	10.140	223.673	-	-	-	not sampled
	13-Jul-04	233.813	-	11.787	222.026	8.2	7	625	clear, no odour
	1-Oct-03	233.813	-	12.700	221.113	6.7	7.4	736	clear, no odour
	3-Jun-03	233.813	-	12.021	221.792	8.5	7.09	845	clear, no odour
7-Dec-02	233.199	-	10.942	222.257	7.1	-	789	clear	
27-Aug-02	233.199	-	12.100	221.099	11.0	-	836	clear	

**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
MW 12	11-Oct-18	232.979	-	10.483	222.496	6.2	7.48	786	clear, no odour
	1-Oct-13	232.979	-	11.460	221.519	8.9	7.36	839	clear, no odour
	14-Nov-12	232.979	-	10.770	222.209	4.1	7.33	887	clear, no odour
	4-Oct-11	232.979	-	10.190	222.789	7.8	7.37	871	clear, no odour
	30-Nov-10	232.979	-	8.610	224.369	4.3	6.66	857	clear, no odour
	1-Sep-10	232.979	-	9.665	223.314	-	-	-	could not sample
	10-Aug-09	232.979	-	8.775	224.204	12.8	7.89	757	-
	15-Jul-08	232.979	-	10.790	222.189	8.5	7.21	857	-
	20-Sep-07	232.979	-	11.170	221.809	7.8	6.6	930	clear, marshy odour
	1-Nov-06	232.979	-	10.638	222.341	6.7	7.5	835	clear, no odour
	6-Jul-06	232.979	-	11.770	221.209	10.5	7.45	816	clear, odourless
	7-Nov-05	232.979	-	10.055	222.924	6.4	7.6	833	clear, no odour
	14-Jul-05	232.979	-	8.975	224.004	-	-	-	not sampled
	9-Dec-04	232.979	-	10.970	222.009	5.2	7.01	828	milky
	13-Jul-04	232.979	-	11.381	221.598	9.1	7.18	563	clear, no odour
	1-Oct-03	232.979	-	12.384	220.595	6.1	8	649	clear, no odour
3-Jun-03	232.979	-	11.654	221.325	8.5	6.74	732	clear, no odour	
7-Dec-02	232.979	-	11.175	221.804	1.3	-	727	clear	
29-Aug-02	232.979	-	12.482	220.497	9.0	-	737	clear	
MW 13	10-Oct-18	233.193	-	10.671	222.522	6.6	7.37	1,053	clear, no odour
	2-Oct-13	233.193	-	11.680	221.513	-	-	-	not sampled
	14-Nov-12	233.193	-	10.970	222.223	-	-	-	not sampled
	4-Oct-11	233.193	-	10.360	222.833	-	-	-	not sampled
	1-Sep-10	233.193	-	9.867	223.326	9.5	6.19	1,119	clear, no odour
	10-Aug-09	233.193	-	8.975	224.218	-	-	-	not sampled
	16-Jul-08	233.193	-	10.970	222.223	-	-	-	not sampled
	1-Nov-06	233.193	-	10.860	222.333	-	-	-	not sampled
	6-Jul-06	233.193	-	11.930	221.263	10.0	7.32	1,126	clear, odourless
	7-Nov-05	233.193	-	10.247	222.946	-	-	-	not sampled
	14-Jul-05	233.193	-	9.120	224.073	-	-	-	not sampled
	27-Jun-05	233.193	-	9.809	223.384	10.4	7.37	1,085	-
	9-Dec-04	233.193	-	10.670	222.523	-	-	-	not sampled
	13-Jul-04	233.193	-	11.546	221.647	8.6	7.21	662	clear, no odour
	1-Oct-03	233.193	-	12.543	220.650	6.9	8.2	866	clear, no odour
	3-Jun-03	233.193	-	11.793	221.400	7.8	6.72	939	clear, no odour
7-Dec-02	233.193	-	11.337	221.856	8.4	-	907	clear	
27-Aug-02	233.193	-	12.530	220.663	9.6	-	988	clear	
MW 14	2-Oct-13	235.191	-	13.270	221.921	-	-	-	not sampled
	14-Nov-12	235.191	-	12.610	222.581	4.7	7.45	888	-
	4-Oct-11	235.191	-	12.040	223.151	-	-	-	not sampled
	1-Sep-10	235.191	-	11.529	223.662	10.5	7.03	817	grey, no odour
	10-Aug-09	235.191	-	10.780	224.411	-	-	-	not sampled
	16-Jul-08	235.191	-	12.610	222.581	8.4	7.2	945	-
	20-Sep-07	235.191	-	12.830	222.361	-	-	-	not sampled
	1-Nov-06	235.191	-	12.527	222.664	-	-	-	not sampled
	6-Jul-06	235.191	-	13.430	221.761	9.5	7.48	950	grey, odourless
	7-Nov-05	235.191	-	11.933	223.258	-	-	-	not sampled
	14-Jul-05	235.191	-	10.588	224.603	-	-	-	not sampled
	28-Jun-05	235.191	-	11.307	223.884	15.2	9.01	757	clear with black sediment, no odour
	9-Dec-04	235.191	-	12.360	222.831	-	-	-	not sampled
	13-Jul-04	235.191	-	13.125	222.066	11.2	7.26	592	clear with black sediment, no odour
	1-Oct-03	235.191	-	14.070	221.121	6.5	7.4	723	slight grey, no odour
	3-Jun-03	235.191	-	13.366	221.825	8.8	6.92	838	clear, no odour
7-Dec-02	235.191	-	12.900	222.291	7.0	-	775	clear	
28-Aug-02	235.191	-	14.105	221.086	9.1	-	828	slight brown	

**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
2000-B1	11-Oct-18	233.360	-	10.796	222.564	6.4	7.67	902	clear
	1-Oct-13	233.360	-	11.760	221.600	-	-	-	not sampled
	14-Nov-12	233.360	-	11.095	222.265	-	-	-	not sampled
	4-Oct-11	233.360	-	10.495	222.865	-	-	-	not sampled
	30-Nov-10	233.360	-	8.900	224.460	4.4	6.59	974	cloudy
	1-Sep-10	233.360	-	10.066	223.294	-	-	-	could not sample
	10-Aug-09	233.360	-	9.030	224.330	-	-	-	not sampled
	16-Jul-08	233.360	-	11.100	222.260	-	-	-	not sampled
	20-Sep-07	233.360	-	11.470	221.890	-	-	-	not sampled
	1-Nov-06	233.360	-	10.958	222.402	-	-	-	not sampled
	6-Jul-06	233.360	-	12.060	221.300	9.8	7.84	954	cloudy, odourless
	7-Nov-05	233.360	-	10.360	223.000	6.7	7.2	956	cloudy, no odour
	14-Jul-05	233.360	-	9.260	224.100	-	-	-	not sampled
	13-Jul-04	233.360	-	11.683	221.677	9.1	7.04	651	murky, no odour
	1-Oct-03	233.360	-	12.695	220.665	6.1	7.9	768	cloudy, no odour
3-Jun-03	233.360	-	11.958	221.402	7.9	6.95	870	cloudy, no odour	
7-Dec-02	233.360	-	11.490	221.870	7.0	-	813	milky	
30-Aug-02	233.360	-	12.717	220.643	9.8	-	859	milky	
2000-B2	11-Oct-18	233.370	-	10.971	222.399	6.1	7.28	981	clear, no odour
	2-Oct-13	233.370	-	12.080	221.290	-	-	-	not sampled
	14-Nov-12	233.370	-	11.315	222.055	5.1	7.53	1037	clear
	4-Oct-11	233.370	-	10.710	222.660	-	-	-	not sampled
	30-Nov-10	233.370	-	9.005	224.365	4.9	6.95	1021	cloudy
	1-Sep-10	233.370	-	10.083	223.287	-	-	-	could not sample
	10-Aug-09	233.370	-	9.200	224.170	-	-	-	not sampled
	16-Jul-08	233.370	-	11.240	222.130	7.6	6.99	1,070	-
	20-Sep-07	233.370	-	11.680	221.690	-	-	-	not sampled
	1-Nov-06	233.370	-	11.156	222.214	-	-	-	not sampled
	6-Jul-06	233.370	-	12.340	221.030	8.0	6.95	1,043	clear, odourless
	8-Nov-05	233.370	-	10.497	222.873	6.2	7.5	991	clear with light brown, no odour
	14-Jul-05	233.370	-	9.477	223.893	-	-	-	not sampled
	9-Dec-04	233.370	-	10.990	222.380	-	-	-	not sampled
	13-Jul-04	233.370	-	11.905	221.465	8.5	6.33	671	grey, no odour
	1-Oct-03	233.370	-	12.974	220.396	6.9	7.6	800	slight grey and odour
	3-Jun-03	233.370	-	12.222	221.148	8.5	6.76	917	cloudy, no odour
7-Dec-02	233.370	-	11.688	221.682	6.8	-	869	milky	
27-Aug-02	233.370	-	12.985	220.385	9.3	-	914	-	
2000-B3	2-Oct-13	233.576	-	-	-	-	-	-	Damaged CNM
	14-Nov-12	233.576	-	-	-	-	-	-	CNM Watera jammed
	4-Oct-11	233.576	-	-	-	-	-	-	CNM Watera jammed
	31-Aug-10	233.576	-	-	-	-	-	-	CNM Watera jammed
	10-Aug-09	233.576	-	-	-	-	-	-	CNM may be damaged
	16-Jul-08	233.576	-	-	-	-	-	-	not sampled
	20-Sep-07	233.576	-	11.170	222.406	-	-	-	not sampled
	1-Nov-06	233.576	-	11.140	222.436	-	-	-	not sampled
	6-Jul-06	233.576	-	12.320	221.256	12.2	7.78	387	clear, odourless
	7-Nov-05	233.576	-	10.659	222.917	5.6	7.5	414	clear, no odour
	14-Jul-05	233.576	-	9.569	224.007	-	-	-	not sampled
	9-Dec-04	233.576	-	11.070	222.506	-	-	-	not sampled
	13-Jul-04	233.576	-	11.973	221.603	8.9	7.43	274	clear, no odour
	1-Oct-03	233.576	-	13.025	220.551	5.6	7.8	307	clear, no odour
	3-Jun-03	233.576	-	12.231	221.345	17.5	7.65	334	clear, no odour
7-Dec-02	233.576	-	11.804	221.772	7.0	-	329	clear	
30-Aug-02	233.576	-	13.011	220.565	12.1	-	800	clear	

**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
2000-B4	2-Oct-13	232.798	-	11.520	221.278	-	-	-	not sampled
	14-Nov-12	232.798	-	10.765	222.033	-	-	-	not sampled
	4-Oct-11	232.798	-	10.120	222.678	-	-	-	not sampled
	30-Nov-10	232.798	-	8.410	224.388	2.4	6.88	1,811	clear, no odour
	1-Sep-10	232.798	-	9.484	223.314	-	-	-	could not sample
	10-Aug-09	232.798	-	8.540	224.258	-	-	-	not sampled
	16-Jul-08	232.798	-	10.690	222.108	-	-	-	not sampled
	20-Sep-07	232.798	-	11.410	221.388	-	-	-	not sampled
	1-Nov-06	232.798	-	10.851	221.947	-	-	-	not sampled
	6-Jul-06	232.798	-	12.040	220.758	9.0	7.54	2,126	clear, odourless
	7-Nov-05	232.798	-	-	-	7.9	7	1,800	clear, no odour
	9-Dec-04	232.798	-	10.640	222.158	-	-	-	not sampled
	13-Jul-04	232.798	-	11.329	221.469	10.9	7.4	1,246	clear, no odour
	1-Oct-03	232.798	-	12.434	220.364	7.1	7.2	1,554	clear, no odour
3-Jun-03	232.798	-	11.673	221.125	8.8	6.8	1,818	cloudy, no odour	
7-Dec-02	232.798	-	11.133	221.665	4.8	-	1,617	milky	
30-Aug-02	232.798	-	12.485	220.313	11.1	-	1,788	milky	
2002-B5	2-Oct-13	233.620	-	12.325	221.295	-	-	-	not sampled
	14-Nov-12	233.620	-	11.505	222.115	5.0	7.5	972	Clear
	4-Oct-11	233.620	-	10.960	222.660	-	-	-	not sampled
	30-Nov-10	233.620	-	9.260	224.360	5.2	7.05	958	clear, no odour
	1-Sep-10	233.620	-	10.336	223.284	-	-	-	could not sample
	10-Aug-09	233.620	-	9.450	224.170	-	-	-	not sampled
	16-Jul-08	233.620	-	10.570	223.050	8.5	7.01	957	-
	20-Sep-07	233.620	-	11.948	221.672	-	-	-	not sampled
	1-Nov-06	233.620	-	11.384	222.236	6.8	7.4	935	clear, no odour
	6-Jul-06	233.620	-	12.730	220.890	8.9	7.31	930	brown, odourless
	7-Nov-05	233.620	-	10.805	222.815	6.4	7.6	951	light grey, marshy odour
	9-Dec-04	233.620	-	11.210	222.410	4.4	6.49	911	milky
	13-Jul-04	233.620	-	12.162	221.458	10.5	7.49	605	slight grey, marshy odour
	1-Oct-03	233.620	-	13.223	220.397	7.1	7.6	736	slight grey and odour
3-Jun-03	233.620	-	12.483	221.137	10.2	6.88	827	light grey, no odour	
7-Dec-02	233.620	-	11.941	221.679	2.9	-	805	light grey	
29-Aug-02	233.620	-	13.320	220.300	10.7	-	835	light grey	
99-B1	11-Oct-18	233.362	-	10.935	222.427	7.0	11.1	1,530	clear
	1-Oct-13	233.362	-	11.940	221.422	9.6	12.01	1,573	clear, no odour
	14-Nov-12	233.362	-	11.260	222.102	6.1	11.6	1,355	clear
	4-Oct-11	233.362	-	10.630	222.732	13.4	11.52	1,434	cloudy
	31-Aug-10	233.362	-	10.055	223.307	11.3	9.99	1,960	clear slight odour
	10-Aug-09	233.362	-	9.310	224.052	15.8	6.45	1,554	-
	16-Jul-08	233.362	-	11.360	222.002	9.5	12.45	-	-
	20-Sep-07	233.362	-	11.690	221.672	8.2	12.02	-	cloudy, no odour
	6-Jul-06	233.362	-	12.350	221.012	11.5	11.87	864	clear, odourless
	13-Jul-05	233.362	-	9.456	223.906	13.5	11.3	720	-
	13-Jul-04	233.362	-	11.918	221.444	10.1	12.43	865	cloudy, no odour
	1-Oct-03	233.362	-	12.811	220.551	8.8	8.6	432	cloudy, slight odour
	3-Jun-03	233.362	-	12.120	221.242	9.0	9.49	594	cloudy, no odour
	2-Dec-02	233.362	-	11.549	221.813	6.1	-	526	clear
29-Aug-02	233.362	-	13.030	220.332	10.5	-	566	clear	

**TABLE 2  
GROUNDWATER MONITORING DATA - BEDROCK WELLS**

Location	Date	Reference Elev. (m)	Depth to Product	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
99-B2	11-Oct-18	234.346	-	11.761	222.585	6.5	7.61	863	clear, no odour
	1-Oct-13	234.346	-	12.780	221.566	8.7	7.82	897	clear, no odour
	14-Nov-12	234.346	-	12.100	222.246	4.9	8.59	950	clear, no odour
	4-Oct-11	234.346	-	11.380	222.966	9.1	8.07	967	clear, no odour
	31-Aug-10	234.346	-	10.835	223.511	9.5	6.17	1,030	clear, no odour
	10-Aug-09	234.346	-	9.940	224.406	7.8	4.99	862	-
	16-Jul-08	234.346	-	12.400	221.946	8.3	7.11	989	-
	20-Sep-07	234.346	-	12.490	221.856	7.2	6.41	1,060	clear, no odour
	6-Jul-06	234.346	-	13.230	221.116	10.3	7.44	943	clear, odourless
	14-Jul-05	234.346	-	10.285	224.061	12.4	8.01	689	clear and odourless
	13-Jul-04	234.346	-	12.738	221.608	10.0	7.56	641	clear, no odour
	1-Oct-03	234.346	-	13.673	220.673	6.7	8.9	755	clear, no odour
	3-Jun-03	234.346	-	12.975	221.371	8.7	6.9	864	clear, no odour
2-Dec-02	234.346	-	12.449	221.897	5.5	-	802	clear	
28-Aug-02	234.346	-	13.904	220.442	9.6	-	846	clear	

**Notes:** 1. Field chemistry parameters in 2010 were measured on August 30 -September 1, 2010 & November 30 , 2010.

Note:  
"-" indicates no data

**TABLE 3  
GROUNDWATER MONITORING DATA - OVERBURDEN WELLS**

	Date	Reference Elev. (m)	Depth to Product (m)	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
99-1S	2-Oct-13	234.067	-	4.030	230.037	-	-	-	trace DNAPL present
	16-Nov-12	234.067	-	3.660	230.407	-	-	-	trace DNAPL present
	4-Oct-11	234.067	-	5.525	228.542	-	-	-	trace DNAPL present
	31-Aug-10	234.067	8.394	1.504	232.563	-	-	-	trace DNAPL present
	10-Aug-09	234.067	-	1.440	232.627	-	-	-	trace DNAPL present
	17-Jul-08	234.067	-	3.095	230.972	-	-	-	not sampled
	5-Nov-07	234.067	-	3.050	231.017	-	-	-	not sampled
	20-Jul-06	234.067	4.525	3.429	230.638	-	-	-	not sampled
	14-Jul-05	234.067	4.1	2.014	232.053	-	-	-	not sampled
	16-Jul-04	234.067	-	2.716	231.351	-	-	-	not sampled
	28-Oct-03	234.067	4.864	-	-	-	-	-	DNAPL only
3-Dec-02	234.067	4.175	-	-	-	-	-	DNAPL only	
99-1D	2-Oct-13	234.062	-	6.040	228.022	-	-	-	trace DNAPL present
	16-Nov-12	234.062	-	6.493	227.569	-	-	-	trace DNAPL present
	4-Oct-11	234.062	-	3.515	230.547	-	-	-	trace DNAPL present
	31-Aug-10	234.062	12.897	0.973	233.089	-	-	-	trace DNAPL present
	10-Aug-09	234.062	-	1.635	232.427	-	-	-	trace DNAPL present
	17-Jul-08	234.062	-	2.410	231.652	-	-	-	trace DNAPL present
	5-Nov-07	234.062	-	1.288	232.774	-	-	-	not sampled
	20-Jul-06	234.062	-	7.382	226.680	-	-	-	not sampled
	14-Jul-05	234.062	-	1.430	232.632	-	-	-	trace DNAPL present
	16-Jul-04	234.062	-	1.837	232.225	-	-	-	trace DNAPL present
	28-Oct-03	234.062	-	2.425	231.637	-	-	-	trace DNAPL present
3-Dec-02	234.062	-	7.105	226.957	-	-	-	not sampled	
99-2S	2-Oct-13	235.202	-	3.010	232.192	-	-	-	clear
	16-Nov-12	235.202	-	3.110	232.092	-	-	-	trace DNAPL present
	4-Oct-11	235.202	-	2.710	232.492	-	-	-	trace DNAPL present
	31-Aug-10	235.202	-	0.899	234.303	-	-	-	No sample
	10-Aug-09	235.202	8.34	1.547	233.656	-	-	-	trace DNAPL present
	17-Jul-08	235.202	8.33	2.580	232.622	-	-	-	not sampled
	5-Nov-07	235.202	-	2.888	232.314	-	-	-	not sampled
	20-Jul-06	235.202	8.245	2.678	232.524	-	-	-	not sampled
	14-Jul-05	235.202	8.24	1.495	233.707	-	-	-	not sampled
	16-Jul-04	235.202	8.187	3.055	232.147	-	-	-	DNAPL present
	28-Oct-03	235.202	8.020	3.110	232.092	-	-	-	DNAPL present
3-Dec-02	235.202	7.930	3.543	231.659	-	-	-	clear	
99-2D	2-Oct-13	235.21	-	9.110	226.100	8.7	6.53	2,539	clear, no odour
	16-Nov-12	235.21	-	8.900	226.310	4.47	7.46	2,166	clear, no odour
	4-Oct-11	235.21	-	8.885	226.325	9.67	6.69	2,465	clear, no odour
	31-Aug-10	235.21	-	9.912	225.298	10.21	6.84	2,209	clear, no odour
	10-Aug-09	235.21	-	9.115	226.095	10.01	5.49	2,420	-
	17-Jul-08	235.21	-	9.330	225.880	-	-	-	not sampled
	5-Nov-07	235.21	-	9.278	225.932	8.1	-	2,342	clear, no odour
	20-Jul-06	235.21	-	9.355	225.855	13.3	6.81	2,450	clear, marshy
	28-Jun-05	235.21	-	9.432	225.778	8.9	7.07	2,082	cloudy, black, odourless
	16-Jul-04	235.210	-	9.508	225.702	10.6	6.35	1,505	clear, naphthalene odour
	28-Oct-03	235.210	-	9.419	225.791	5.7	6.9	1,967	clear, odour
3-Dec-02	235.210	-	9.536	225.674	4.2	-	2,610	clear	



**TABLE 3  
GROUNDWATER MONITORING DATA - OVERBURDEN WELLS**

	Date	Reference Elev. (m)	Depth to Product (m)	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
99-3S	1-Oct-13	233.268	-	4.030	229.238	8.1	6.6	3,482	clear, no odour
	16-Nov-12	233.268	-	3.655	229.613	5.42	7.76	2,651	clear, swamp odour
	4-Oct-11	233.268	-	3.410	229.858	8.34	6.86	3,175	clear, swamp odour
	31-Aug-10	233.268	-	3.505	229.763	9.7	6.92	3,032	clear, slight PAH odour
	10-Aug-09	233.268	-	3.850	229.418	13.1	5.36	3,008	-
	17-Jul-08	233.268	-	3.885	229.383	-	-	-	-
	5-Nov-07	233.268	-	3.948	229.320	8.5	-	2,199	clear
	20-Jul-06	233.268	-	3.755	229.513	10.3	11	2,250	clear to cloudy, naphthalene
	7-Nov-05	233.268	-	3.309	229.959	-	-	-	cloudy, naphthalene odour
	14-Jul-05	233.268	-	3.198	230.070	-	-	-	not sampled
	16-Jul-04	233.268	-	3.350	229.918	11.3	11.55	1,240	milky, slight mothball odour
28-Oct-03	233.268	-	-	-	6.9	11.3	1,702	cloudy, odour	
3-Dec-02	233.268	-	3.790	229.478	6.7	-	2,370	clear	
99-3D	1-Oct-13	233.266	-	8.880	224.386	8.2	7.3	1,581	clear, no odour
	16-Nov-12	233.266	-	6.905	226.361	5.5	7.61	2,862	clear, swamp odour
	4-Oct-11	233.266	-	7.720	225.546	7.51	7	2,900	clear, swamp odour
	31-Aug-10	233.266	-	0.872	232.394	9.35	6.79	2,295	clear, slight PAH odour
	10-Aug-09	233.266	-	0.855	232.411	15.7	6.65	2,042	-
	17-Jul-08	233.266	-	1.275	231.991	-	-	-	-
	5-Nov-07	233.266	-	1.321	231.945	8.5	-	1,980	clear
	20-Jul-06	233.266	-	5.232	228.034	11.2	8.25	1,842	clear, slight PAH odour
	7-Nov-05	233.266	-	4.038	229.228	-	-	-	cloudy, naphthalene odour
	14-Jul-05	233.266	-	3.194	230.072	-	-	-	not sampled
	16-Jul-04	233.266	-	2.909	230.357	13.2	12.73	3,900	milky, mothball odour
28-Oct-03	233.266	-	11.025	222.241	6.1	8	1,191	cloudy, no odour	
3-Dec-02	233.266	-	10.329	222.937	5.6	-	1,146	clear	
99-Cell-1	10-Oct-18	233.476	-	4.175	229.301	6.4	7.48	1,173	clear, no odour
	1-Oct-13	233.476	-	3.341	230.135	7.6	7.34	1,352	clear, no odour
	14-Nov-12	233.476	-	3.625	229.851	6.7	7.16	1,336	clear, no odour
	4-Oct-11	233.476	-	3.425	230.051	7.59	6.64	1,659	clear, no odour
	31-Aug-10	233.476	-	2.562	230.914	11	6.26	1,647	clear, no odour
	10-Aug-09	233.476	-	2.650	230.826	9.54	5.62	1,362	-
	15-Jul-08	233.476	-	2.280	231.196	9.0	7.17	1,597	-
	5-Nov-07	233.476	-	2.810	230.666	8.5	-	1,533	clear, no odour
	1-Nov-06	233.476	-	3.466	230.010	6.7	6.78	1,637	silty brown
	20-Jul-06	233.476	-	3.167	230.309	-	-	-	not sampled
	14-Feb-06	233.476	-	3.260	230.216	4.2	6.73	1,781	clear
19-Jul-04	233.476	-	4.316	229.160	10	7.02	1,105	-	
28-Oct-03	233.476	-	4.230	229.246	5.7	7.7	1,251	clear, no odour	
7-Dec-02	233.476	-	4.010	229.466	5.7	nd	1,412	clear	
99-Cell-2	7-Dec-02	-	-	-	-	-	-	-	Destroyed in August 2002
2003-Cell-2	10-Oct-18	233.640	-	5.640	228.000	5.3	6.73	1,912	clear, no odour
	1-Oct-13	233.640	-	5.475	228.165	9.2	6.6	2,119	clear, no odour
	14-Nov-12	233.640	-	5.285	228.355	4.6	6.81	2,072	clear, no odour
	4-Oct-11	233.640	-	5.230	228.410	7.75	6.78	2,201	clear, no odour
	31-Aug-10	233.640	-	5.239	228.401	11.8	5.99	1,950	slight grey, no odour
	10-Aug-09	233.640	-	5.320	228.320	9.4	5.78	1,732	-
	15-Jul-08	233.640	-	5.270	228.370	8.9	6.57	2,070	-
	5-Nov-07	233.640	-	5.220	228.420	7.6	-	1,904	brown, cloudy, no odour
	1-Nov-06	233.640	-	5.151	228.489	6.8	6.76	1,799	-
	20-Jul-06	233.640	-	5.110	228.530	-	-	-	not sampled
	14-Feb-06	233.640	-	4.930	228.710	4.2	6.88	2,350	clear
19-Jul-04	233.640	-	5.075	228.565	9.1	6.56	1,308	-	
28-Oct-03	233.640	-	5.830	227.810	5.5	7.4	1,528	slight grey, no odour	

**TABLE 3  
GROUNDWATER MONITORING DATA - OVERBURDEN WELLS**

	Date	Reference Elev. (m)	Depth to Product (m)	Depth to GW (m)	GW Elev. (m)	Field Temp. (°C)	Field pH (units)	Field Conductivity (µS/cm)	Comments (colour, odour, turbidity)
99-Cell-3	10-Oct-18	233.249	-	4.114	229.135	6.6	7.01	1,834	clear, no odour
	1-Oct-13	233.249	-	4.090	229.159	8.7	6.71	1,937	clear, no odour
	14-Nov-12	233.249	-	3.930	229.319	6.6	6.72	1,871	clear , swamp odour
	4-Oct-11	233.249	-	3.920	229.329	7.9	6.82	1,972	clear , swamp odour
	31-Aug-10	233.249	-	3.901	229.348	8.3	6.01	1,980	clear, no odour
	10-Aug-09	233.249	-	3.930	229.319	10.3	5.4	1,637	-
	15-Jul-08	233.249	-	3.940	229.309	9	6.62	1,844	clear
	5-Nov-07	233.249	-	3.900	229.349	7.6	-	1,772	clear, marshy odour
	1-Nov-06	233.249	-	3.962	229.287	7.4	6.5	1,658	clear, no odour
	20-Jul-06	233.249	-	3.970	229.279	-	-	-	not sampled
	14-Feb-06	233.249	-	3.760	229.489	5	6.42	1,919	clear
	19-Jul-04	233.249	-	3.895	229.354	9.8	6.53	1,201	-
28-Oct-03	233.249	-	3.900	229.349	6.1	6.8	1,434	clear, no odour	
7-Dec-02	233.249	-	3.763	229.486	6.1	-	1,113	clear	
99-Cell-4	10-Oct-18	233.498	-	4.413	229.085	6.1	7.18	3,706	clear, no odour
	1-Oct-13	233.498	-	3.740	229.758	7.8	7.3	3,761	clear, no odour
	14-Nov-12	233.498	-	3.655	229.843	6.2	7.53	2,692	cloudy, no odour
	4-Oct-11	233.498	-	3.970	229.528	7.85	7.39	3,027	cloudy, no odour
	31-Aug-10	233.498	-	1.000	232.498	9.4	6.21	2,100	clear, no odour
	10-Aug-09	233.498	-	0.980	232.518	10.7	6.87	1,856	-
	15-Jul-08	233.498	-	1.110	232.388	9.0	9.2	1,743	-
	5-Nov-07	233.498	-	1.770	231.728	7.7	-	1,622	clear, no odour
	1-Nov-06	233.498	-	4.298	229.200	6.1	6.81	1,962	silty brown, no odour
	20-Jul-06	233.498	-	-	-	-	-	-	not sampled
	14-Feb-06	233.498	-	4.630	228.868	4.4	6.86	2,500	clear
	19-Jul-04	233.498	-	4.804	228.694	12	12.97	3,940	-
28-Oct-03	233.498	-	4.290	229.208	5.7	7.6	1,143	clear, no odour	
7-Dec-02	233.498	-	4.209	229.289	6.0	-	1,283	clear	

- Notes:**
1. Field chemistry parameters in 2010 were measured on August 30 -September 1 , 2010.
  2. "-" means no data







**TABLE 4  
POLYNUCLEAR AROMATIC HYDROCARBONS IN GROUNDWATER - BEDROCK WELLS**

Well	Date	Comments	Parameter <sup>(1)</sup>																				Total PAHS		
			1-Methyl Naphthalene	2-Methyl Naphthalene	Ace-naphthene	Ace-naphthylene	Acridine	Anthracene	Benzo (a) Anthracene	Benzo (a) Pyrene	Benzo (b) Fluoranthene	Benzo(b&j) fluoranthene	Benzo (g h i) Perylene	Benzo (k) Fluoranthene	Chrysene	Dibenzo (a h) Anthracene	Fluoranthene	Fluorene	Indeno (1 2 3 cd) Pyrene	Naphthalene	Penta-chlorophenol	Phen-anthrene		Pyrene	Quinoline
Groundwater Action Levels <sup>(3)</sup>			-	-	6,132	-	-	30,660	3.9	0.39	3.9	-	-	3.9	392	0.39	4,088	4,088	3.9	4,088	60	-	3,066	-	-
CCME <sup>(2)</sup>			-	-	-	-	-	-	-	0.01 (MAC)	-	-	-	-	-	-	-	-	-	60 (MAC) 30 (AO)	-	-	-	-	-
City of Winnipeg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
<b>MW-14</b>	14-Nov-12	-	<0.02	<0.02	<0.02	<0.02	<4.0	<0.02	<0.02	<0.005	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.027	<0.5	<0.02	<0.02	<0.04	0.03
	31-Aug-10	-	<0.05	<0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	-
	17-Jul-08	-	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.005	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	-
	25-Jul-06	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	28-Jun-05	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	0.160	0.160	0.270	-	0.230	0.130	0.090	0.230	0.050	<0.05	0.360	<0.05	<0.05	<0.01	0.100	<0.05	1.78
	16-Jul-04	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.01	<0.05	<0.01	<0.05	-
	28-Oct-03	-	0.060	1.000	<0.05	0.350	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	0.700	<0.02	<0.05	<0.05	-	2.11
	12-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
11-Dec-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-	
28-Aug-02	<sup>(4)</sup>	<0.5	<0.5	<0.5	<0.5	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.5	<0.01	<0.5	<0.05	<0.05	<0.05	-	-	
<b>99-B1</b>	11-Oct-18	-	<0.02	0.099	0.394	0.062	1.090	0.017	<0.01	<0.005	-	<0.01	<0.02	<0.01	<0.02	<0.005	<0.02	0.211	<0.01	2.810	<0.50	<0.05	<0.01	2.430	7.11
	1-Oct-13	-	<0.020	0.252	1.010	0.176	<4.0	0.088	0.024	0.008	<0.020	-	<0.020	<0.020	<0.020	<0.020	0.204	0.699	<0.020	6.070	<0.50	0.046	0.133	3.040	11.75
	15-Nov-12	-	0.235	1.420	3.600	0.389	<4.0	0.345	0.037	0.011	<0.02	-	<0.02	<0.02	0.028	<0.02	0.308	2.860	<0.02	29.300	<0.5	0.173	0.211	7.590	46.51
	4-Oct-11	-	4.570	4.140	0.527	0.100	1.580	0.014	<0.01	<0.005	-	<0.01	<0.02	<0.01	<0.020	<0.005	0.023	0.280	<0.01	3.800	<0.05	<0.005	0.014	2.950	18.00
	31-Aug-10	-	0.092	0.941	2.250	0.291	4.500	0.236	0.027	0.007	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.266	1.730	<0.01	13.100	<0.05	0.118	0.172	6.380	30.11
	10-Aug-09	-	0.13	0.175	0.785	0.27	1.78	0.035	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.03	0.415	<0.010	2.6	<0.05	0.02	0.015	3.1	9.37
	17-Jul-08	-	0.180	1.180	3.040	0.450	4.000	0.340	0.040	0.009	<0.02	-	<0.02	<0.02	0.030	<0.02	0.300	2.570	<0.02	21.200	<0.05	0.130	0.210	10.200	43.88
	20-Sep-07	-	4.400	0.490	1.200	0.210	2.300	0.210	0.030	<0.01	0.020	-	<0.01	<0.01	<0.05	<0.01	0.350	1.100	<0.01	6.500	<0.05	0.120	0.180	4.600	21.71
	25-Jul-06	-	0.240	0.060	0.290	0.080	0.640	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.020	0.150	<0.01	1.400	<0.05	<0.01	0.010	2.500	5.39
	13-Jul-05	-	0.500	0.340	0.250	<0.05	0.710	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	1.200	<0.05	<0.01	<0.01	4.200	7.20
	14-Jul-04	-	0.590	<0.05	0.420	0.130	1.000	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	0.190	<0.01	1.500	<0.05	<0.01	<0.01	2.100	5.93
	24-Oct-03	-	-	-	7.100	1.400	-	0.280	<0.02	<0.01	<0.02	-	<0.02	<0.02	<0.05	<0.02	0.260	4.500	<0.02	<0.05	<0.5	0.090	0.140	-	13.77
	10-Jun-03	-	0.460	0.140	18.000	1.300	-	1.300	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	1.300	11.000	<0.01	1.200	<0.05	0.210	0.450	-	35.36
	2-Dec-02	-	<0.05	0.290	8.100	1.600	-	0.410	0.020	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	1.400	7.600	<0.01	3.200	<0.05	0.120	0.470	-	23.21
2-Dec-02	Field Dup.	<0.05	0.220	7.600	1.200	-	0.510	0.010	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	1.100	6.900	<0.01	1.100	<0.05	0.100	0.370	-	19.11	
29-Aug-02	-	2.100	0.210	11.000	1.300	-	0.570	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.490	4.400	<0.01	2.900	<0.05	0.170	0.220	-	23.36	
29-Aug-02	Field Dup.	<0.05	<0.05	1.500	0.180	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.060	0.610	<0.01	0.510	<0.05	<0.05	<0.05	-	2.86	
<b>99-B2</b>	11-Oct-18	-	<0.02	<0.02	3.310	0.179	<0.02	0.048	<0.01	<0.005	-	<0.01	<0.02	<0.01	<0.02	<0.005	0.064	0.557	<0.01	<0.05	<0.50	<0.05	0.021	<0.02	4.18
	1-Oct-13	-	<0.020	<0.020	2.860	0.185	<4.0	0.041	<0.020	<0.0050	<0.020	-	<0.020	<0.020	<0.020	<0.020	0.070	0.317	<0.020	0.025	<0.50	<0.020	0.027	<0.040	3.53
	15-Nov-12	-	<0.02	<0.02	2.100	0.111	<4.0	0.045	<0.02	<0.005	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.053	0.098	<0.02	0.034	<0.5	<0.02	<0.02	<0.04	2.44
	4-Oct-11	-	<0.02	<0.02	1.160	0.046	<0.02	0.035	<0.01	<0.005	-	<0.01	<0.02	<0.01	<0.02	<0.005	0.044	0.023	<0.01	<0.05	<0.05	<0.05	0.015	<0.02	1.32
	31-Aug-10	-	<0.05	<0.02	1.100	0.045	<0.05	0.034	<0.02	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.047	0.049	<0.01	<0.01	<0.05	<0.01	<0.01	0.074	1.35
	10-Aug-09	-	<0.050	<0.050	0.964	0.063	<0.05	0.042	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.052	0.104	<0.010	0.026	<0.05	0.01	0.016	<0.050	1.28
	17-Jul-08	-	<0.02	<0.02	1.290	0.070	<0.05	0.060	<0.02	<0.005	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.060	0.120	<0.02	<0.02	<0.05	<0.02	0.020	<0.02	1.62
	20-Sep-07	-	<0.05	<0.05	0.840	<0.05	0.010	0.030	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.050	0.130	<0.01	<0.05	<0.05	<0.01	0.020	<0.05	1.08
	25-Jul-06	-	<0.05	<0.05	0.570	<0.05	<0.01	0.020	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.040	0.110	<0.01	<0.05	<0.05	<0.01	0.010	<0.05	0.75
	14-Jul-05	-	<0.05	<0.05	0.920	0.050	<0.01	0.040	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.050	0.200	<0.01	<0.05	<0.05	<0.01	0.020	<0.05	1.28
	14-Jul-04	-	<0.05	<0.05	0.870	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	0.200	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	1.07
	24-Oct-03	-	-	-	0.900	0.070	-	0.060	<0.02	<0.01	<0.02	-	<0.02	<0.02	<0.05	<0.02	0.050	0.280	<0.02	<0.05	<0.5	<0.05	<0.05	-	1.36
10-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.180	0.120	<0.01	<0.05	<0.05	<0.05	<0.05	-	0.30	
2-Dec-02	-	<0.05	<0.05	0.930	0.060	-	0.060	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.100	0.270	<0.01	<0.05	<0.05	<0.05	<0.05	-	1.42	
28-Aug-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-	

**TABLE 4  
POLYNUCLEAR AROMATIC HYDROCARBONS IN GROUNDWATER - BEDROCK WELLS**

Well	Date	Comments	Parameter <sup>(1)</sup>																				Total PAHS		
			1-Methyl Naphthalene	2-Methyl Naphthalene	Ace-naphthene	Ace-naphthylene	Acridine	Anthracene	Benzo (a) Anthracene	Benzo (a) Pyrene	Benzo (b) Fluoranthene	Benzo(b&j) fluoranthene	Benzo (g h i) Perylene	Benzo (k) Fluoranthene	Chrysene	Dibenzo (a h) Anthracene	Fluoranthene	Fluorene	Indeno (1 2 3 cd) Pyrene	Napthalene	Penta-chlorophenol	Phen-anthrene		Pyrene	Quinoline
Groundwater Action Levels <sup>(3)</sup>			-	-	6,132	-	-	30,660	3.9	0.39	3.9	-	-	3.9	392	0.39	4,088	4,088	3.9	4,088	60	-	3,066	-	-
CCME <sup>(2)</sup>			-	-	-	-	-	-	-	0.01 (MAC)	-	-	-	-	-	-	-	-	-	60 (MAC) 30 (AO)	-	-	-	-	-
City of Winnipeg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
2000-B1	11-Oct-18	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01	<0.005	-	<0.01	<0.02	<0.01	<0.02	<0.005	<0.02	<0.02	<0.01	<0.05	<0.50	<0.05	<0.01	<0.02	-
	30-Nov-10	-	<0.05	<0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	-
	25-Jul-06	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	8-Nov-05	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	15-Jul-04	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	28-Oct-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.02	<0.05	<0.05	-	-
	12-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
	11-Dec-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
30-Aug-02	-	<0.5	<0.5	<0.5	<0.5	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.5	<0.01	<0.5	<0.05	<0.05	<0.05	-	-	
30-Aug-02	Field Dup.		<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	-	-	
2000-B2	11-Oct-18	-	<0.02	<0.02	0.039	<0.02	<0.02	0.013	<0.01	<0.005	-	<0.01	<0.02	<0.01	<0.02	<0.005	<0.02	<0.02	<0.01	<0.05	<0.50	<0.05	<0.01	<0.02	0.05
	14-Nov-12	-	<0.02	<0.02	0.068	<0.02	<4.0	<0.038	<0.02	<0.005	<0.02	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.5	<0.02	<0.02	<0.04	0.07
	30-Nov-10	-	<0.05	<0.05	0.055	<0.01	<0.05	0.039	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	0.09
	17-Jul-08	-	<0.02	<0.02	0.050	<0.02	<0.05	0.050	<0.02	<0.005	<0.02	-	<0.02	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	<0.02	<0.02	0.10
	25-Jul-06	-	<0.05	<0.05	<0.05	<0.05	<0.05	0.030	<0.01	<0.01	0.010	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	0.04
	8-Nov-05	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	14-Jul-04	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	24-Oct-03	-	-	-	0.080	<0.05	-	<0.05	<0.02	<0.01	<0.02	-	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	-	0.08
	11-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
10-Dec-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-	
27-Aug-02	-	<0.05	<0.05	0.100	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	0.060	<0.01	<0.05	<0.05	<0.05	<0.05	-	0.16	
2000-B3	25-Jul-06	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	8-Nov-05	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	15-Jul-04	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	28-Oct-03	-	-	-	<0.05	<0.05	-	<0.05	<0.02	<0.01	<0.02	-	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	-	-
	11-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
	10-Dec-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
30-Aug-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-	
2000-B4	30-Nov-10	-	<0.05	<0.05	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	-
	25-Jul-06	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	7-Nov-05	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	15-Jul-04	-	<0.05	<0.05	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.01	<0.05	-
	24-Oct-03	-	-	-	<0.05	<0.05	-	<0.05	<0.02	<0.01	<0.02	-	<0.02	<0.02	<0.05	<0.02	<0.05	<0.05	<0.02	<0.05	<0.5	<0.05	<0.05	-	-
	11-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
	12-Dec-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
30-Aug-02	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-	



**TABLE 4  
POLYNUCLEAR AROMATIC HYDROCARBONS IN GROUNDWATER - BEDROCK WELLS**

Well	Date	Comments	Parameter <sup>(1)</sup>																				Total PAHS		
			1-Methyl Naphthalene	2-Methyl Naphthalene	Ace-naphthene	Ace-naphthylene	Acridine	Anthracene	Benzo (a) Anthracene	Benzo (a) Pyrene	Benzo (b) Fluoranthene	Benzo(b&j) fluoranthene	Benzo (g h i) Perylene	Benzo (k) Fluoranthene	Chrysene	Dibenzo (a h) Anthracene	Fluoranthene	Fluorene	Indeno (1 2 3 cd) Pyrene	Napthalene	Penta-chlorophenol	Phen-anthrene		Pyrene	Quinoline
Groundwater Action Levels <sup>(3)</sup>			-	-	6,132	-	-	30,660	3.9	0.39	3.9	-	-	3.9	392	0.39	4,088	4,088	3.9	4,088	60	-	3,066	-	-
CCME <sup>(2)</sup>			-	-	-	-	-	-	-	0.01 (MAC)	-	-	-	-	-	-	-	-	-	-	60 (MAC) 30 (AO)	-	-	-	-
City of Winnipeg			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20
2002-B5	15-Nov-12	-	<0.02	<0.02	0.411	<0.02	<4.0	<0.207	<0.02	<0.005	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.164	0.409	<0.02	<0.02	<0.5	<0.02	0.102	<0.04	1.09
	30-Nov-10	-	<0.05	<0.05	0.476	0.020	<0.05	0.237	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.01	<0.01	0.176	0.456	<0.01	<0.01	<0.05	<0.01	0.111	<0.05	1.48
	17-Jul-08	-	0.020	<0.02	0.390	<0.02	<0.05	0.250	<0.02	0.007	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.150	0.480	<0.02	<0.02	<0.05	<0.02	0.100	<0.02	1.40
	1-Nov-06	-	0.050	0.050	0.350	<0.05	<0.01	<0.01	0.010	<0.01	0.020	-	0.010	<0.01	<0.05	<0.01	0.150	0.480	0.020	0.350	<0.05	0.180	0.100	<0.05	1.77
	25-Jul-06	-	<0.05	<0.05	0.310	<0.05	0.040	0.160	<0.05	0.020	0.020	-	0.010	0.010	<0.05	<0.01	0.140	0.330	0.020	<0.05	<0.05	<0.01	0.100	<0.05	1.16
	7-Nov-05	-	<0.05	<0.05	0.310	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.170	0.330	<0.01	<0.05	<0.05	<0.01	0.020	<0.05	0.83
	9-Dec-04	-	<0.05	<0.05	0.490	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.160	0.620	<0.01	<0.05	<0.05	<0.01	<0.01	0.140	1.41
	14-Jul-04	-	<0.05	<0.05	0.380	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.150	0.410	<0.01	<0.05	<0.05	<0.01	0.100	<0.05	1.04
	14-Jul-04	Field Dup.	<0.05	<0.05	0.860	0.060	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	0.040	0.220	<0.01	<0.05	<0.05	<0.01	0.100	<0.05	1.28
	24-Oct-03	-	-	-	0.540	<0.05	-	0.300	0.030	0.020	<0.02	-	<0.02	<0.02	<0.05	<0.02	0.240	0.510	<0.02	<0.05	<0.5	<0.05	0.190	-	1.83
	11-Jun-03	-	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.01	<0.01	<0.01	-	<0.01	<0.01	<0.05	<0.01	<0.05	<0.05	<0.01	<0.05	<0.05	<0.05	<0.05	-	-
	3-Dec-02	-	0.120	0.170	0.530	<0.05	-	0.160	0.020	0.010	0.030	-	0.010	0.010	<0.05	<0.01	0.320	0.380	0.010	0.830	<0.05	0.090	0.130	-	2.82
	3-Dec-02	Field Dup.	0.060	<0.05	0.410	<0.05	-	0.320	0.030	0.020	0.020	-	0.010	0.010	<0.05	<0.01	0.560	0.410	0.020	<0.05	<0.05	<0.05	0.160	-	2.03
29-Aug-02	-	0.060	<0.05	0.440	<0.05	-	0.790	0.050	0.030	0.060	-	0.030	0.020	0.060	<0.01	0.530	0.350	0.030	<0.05	0.080	<0.05	0.140	-	2.67	

**Notes:**

"-" = No Data

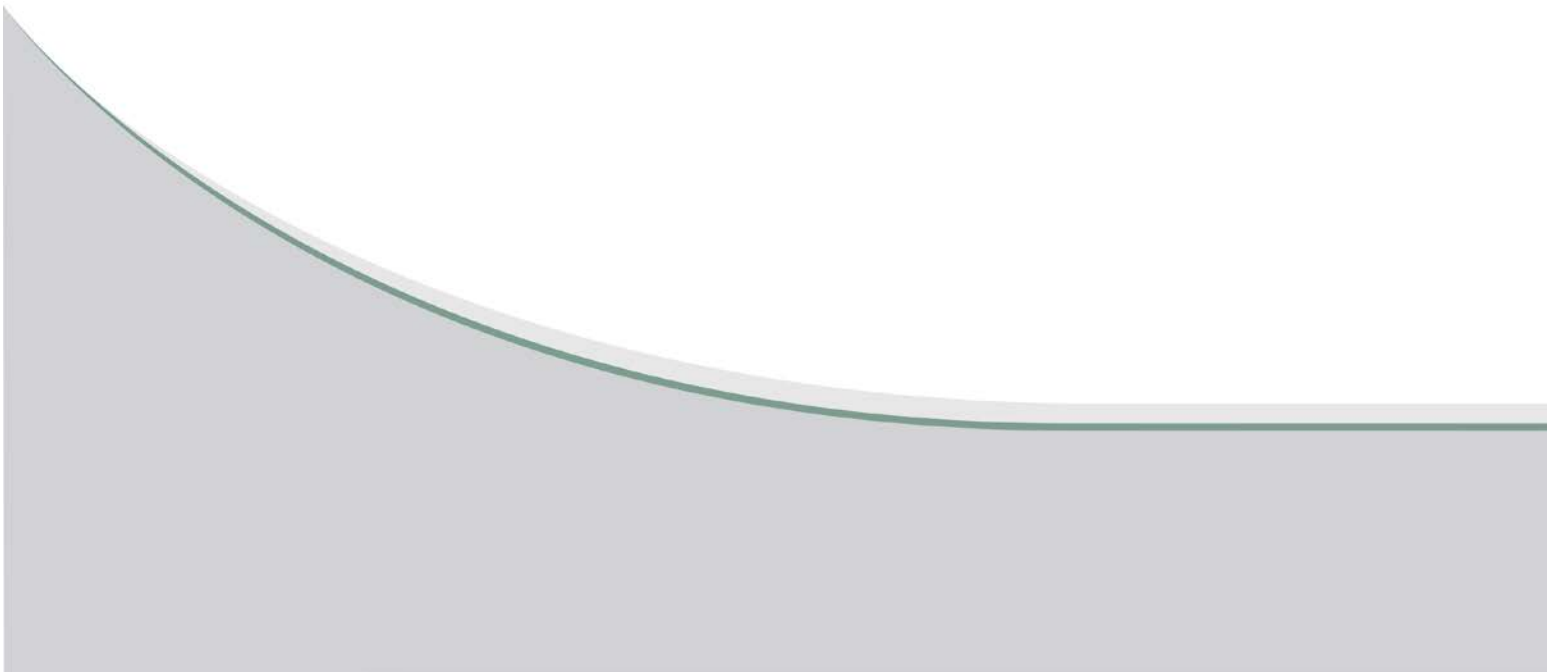
- All concentrations are in micrograms per litre (µg/L).
- CCME - Canadian Council of Ministers of the Environment - Canadian Environmental Quality Guidelines, Update 2017. MAC = Maximum Acceptable Concentration. AO = Aesthetic Objective. CCME criteria are included on the table for reference purposes only, as Site Specific Groundwater Action Levels have been developed for the site.
- Site Specific Groundwater Action Levels developed as part of the 1996 UMA Site Specific Risk Assessment (Report No. 6138-011-01-01)
- PAH sample detection limits were raised due to matrix effect.

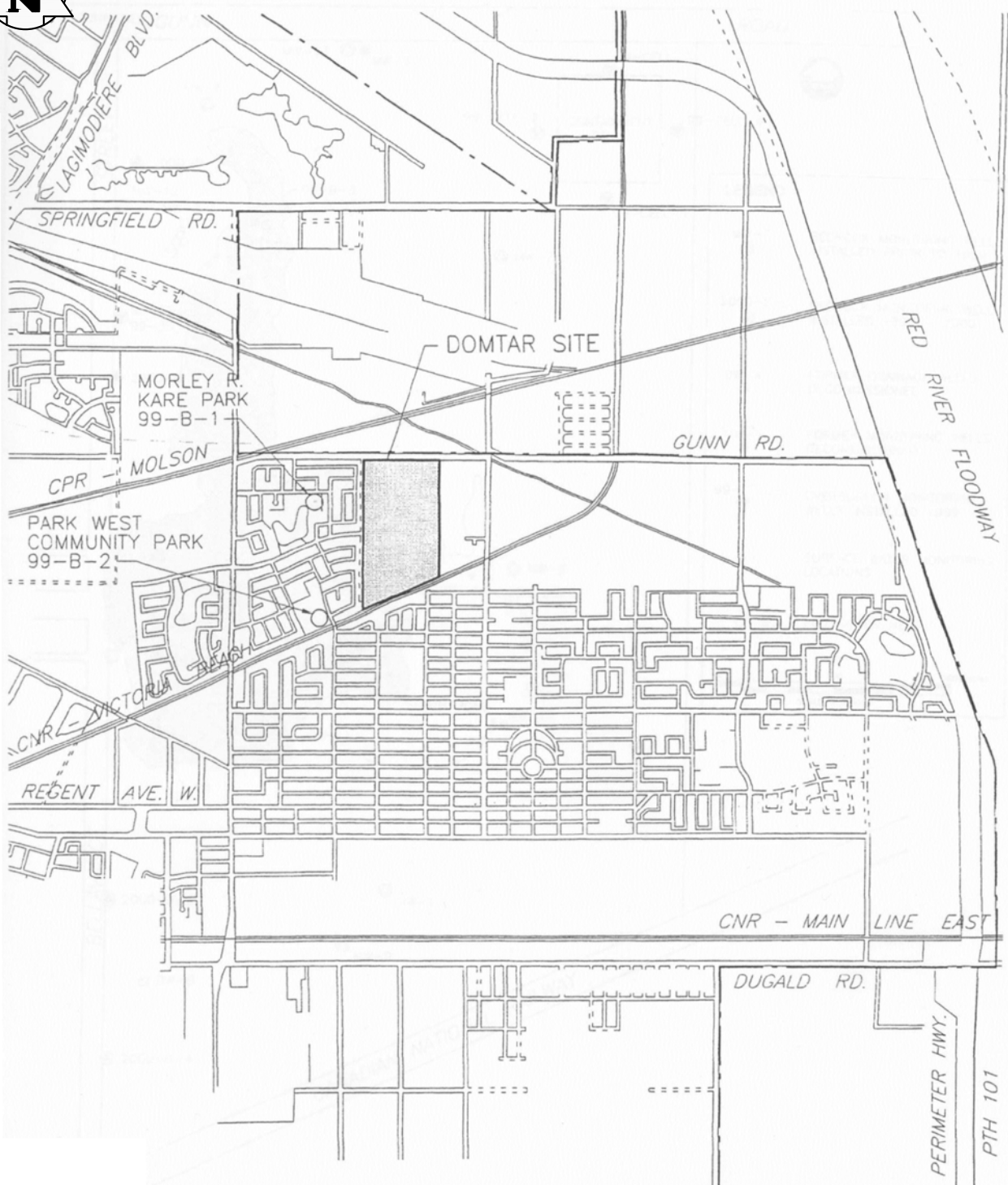
1400	- Exceeds Groundwater Action Levels UMA 1996 Health Based Site Specific Groundwater Action Levels.
23	- Exceeds City of Winnipeg Stormwater Discharge maximum total concentrations for PAH compounds and PCP of 20 µg/L (applied for discharge of monitoring well purge water).





## FIGURES



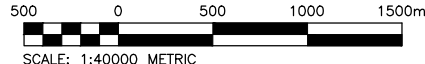


**LEGEND:**

- OFF-SITE MONITORING WELLS

**NOTES:**

- DRAWING IS BASED ON DILLON ACAD DRAWING FILE:  
G:\AD\018745\LOCATION 2.DWG 02/20/02



0	19/03/14	ISSUED WITH FINAL REPORT	PJL	MPS
NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
<b>KGS GROUP</b> CONSULTING ENGINEERS		<b>DOMTAR INC.</b>		
		2018 SITE SUMMARY REPORT FORMER CREOSOTE SITE TRANSCONA, WINNIPEG, MB		
LOCATION PLAN				
MARCH 2019		FIGURE 1		REV: 0

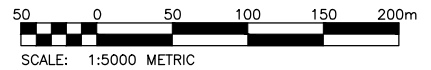


**LEGEND:**

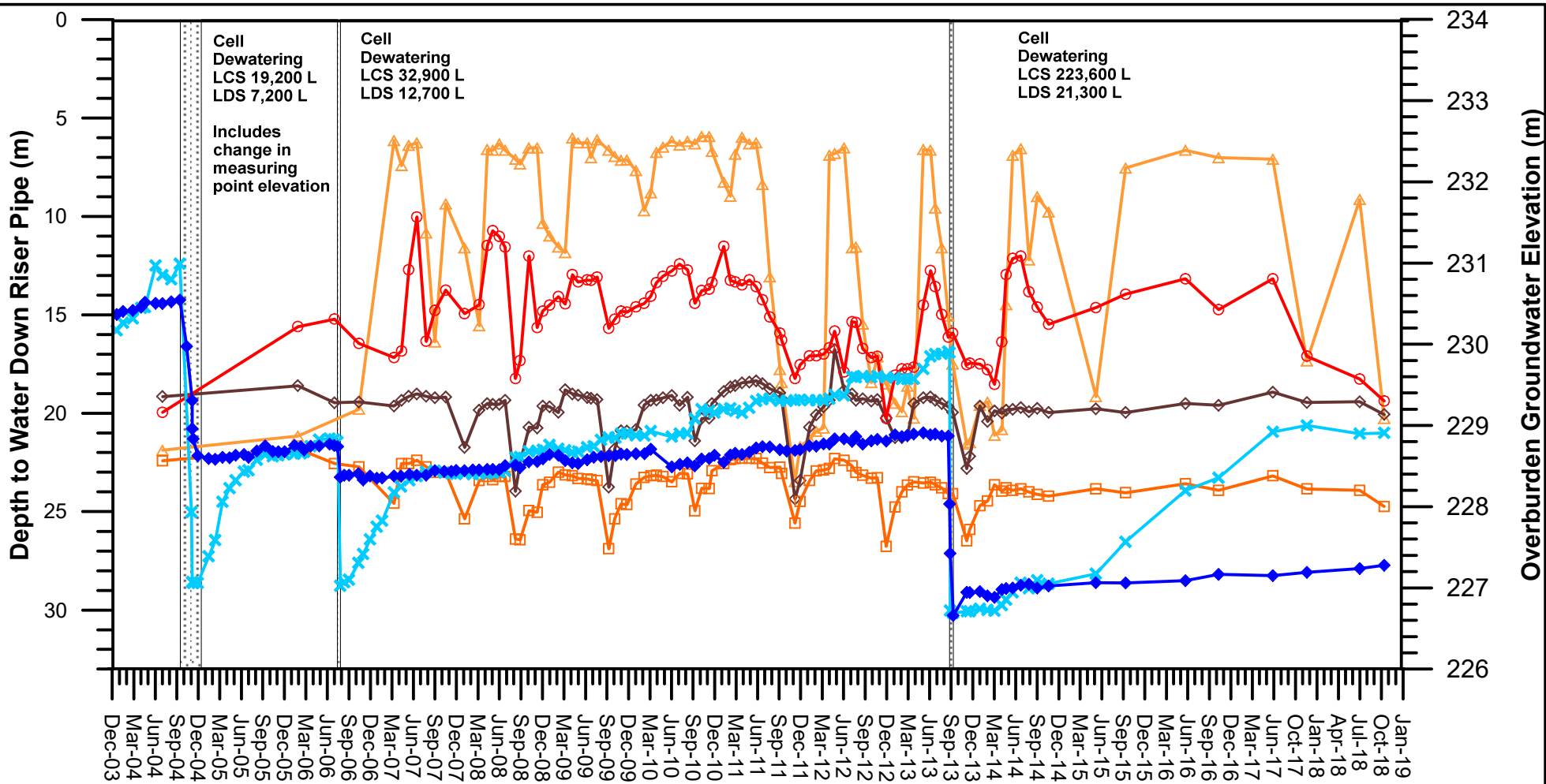
- MW1 ● BEDROCK MONITORING WELL
- 99-CELL-1 ◈ OVERBURDEN MONITORING WELL
- MW5 ● FORMER MONITORING WELL
- DW-A ■ FORMER DRAINAGE WELL
- P1 ⊗ PIEZOMETER NEST
- (DES) WELL DESTROYED
- (DEC) WELL DECOMMISSIONED

**NOTES:**

1. DRAWING IS BASED ON DILLON ACAD DRAWING FILE: G:\AD\018745\EDROCK\_1.DWG 02/13/02

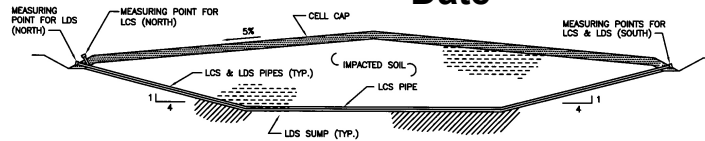


NO.	YY/MM/DD	DESCRIPTION	ISSUED BY	CHECK BY
0	19/03/14	ISSUED WITH FINAL REPORT	PJL	MPS
REVISIONS / ISSUE				
<b>KGS GROUP</b> CONSULTING ENGINEERS		<b>DOMTAR INC.</b>		
2018 SITE SUMMARY REPORT FORMER CREOSOTE SITE TRANSCONA, WINNIPEG, MB				
DETAILED SITE PLAN				
MARCH 2019		FIGURE 2		REV: 0



Date

- ◆ LCS (within cell)
- × LDS (within cell)
- 99-Cell-1 (overburden)
- 2003-Cell-2 (overburden)
- ◇ 99-Cell-3 (overburden)
- △ 99-Cell-4 (overburden)



**Secure Containment Cell Cross Section (Typ.)**

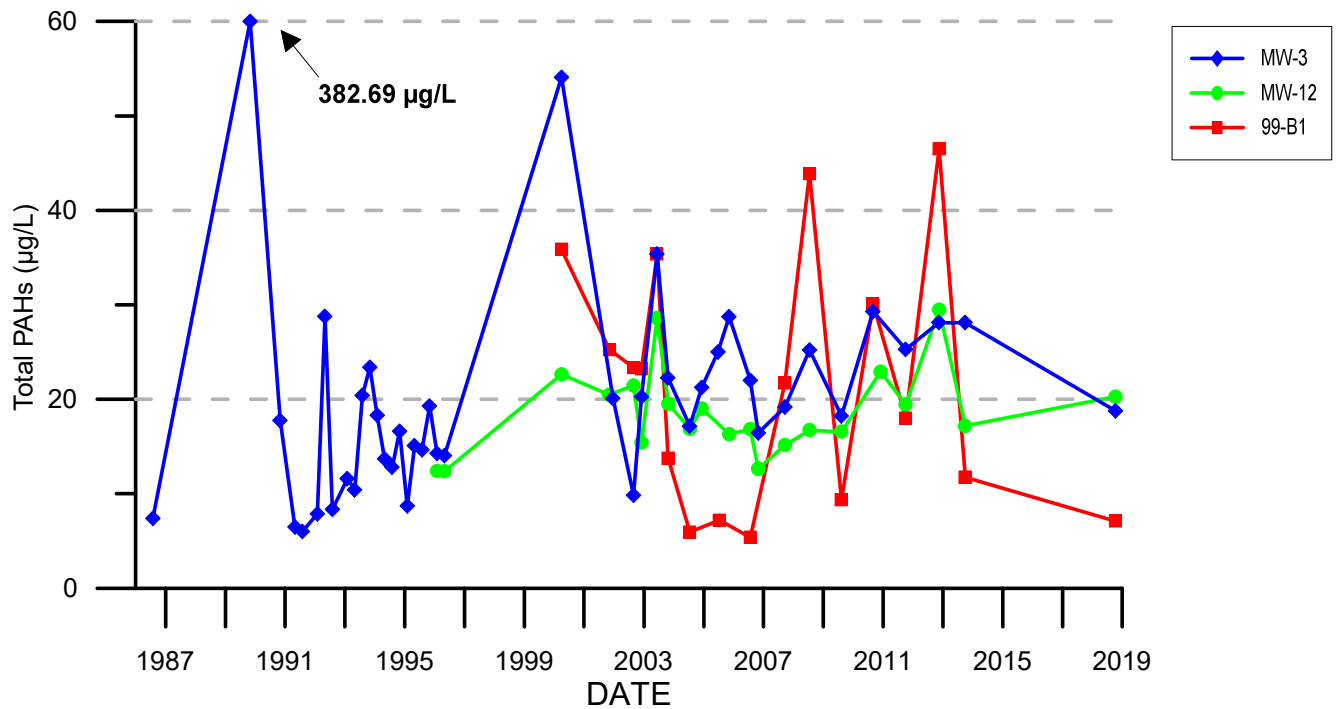
**Notes:**

1. The water levels readings were taken from the LCS and LDS riser pipes on the south side of the containment cell.
2. Measurements are referenced to the top end of each of the LCS and LDS riser pipes, which are at similar elevations.
3. An assumption has been made that the slope of both riser pipes are similar, at a designed slope of 1V:4H.
4. The depth to water down riser pipe measurements are currently aligned to correspond with overburden water elevations at the site (0 m depth to water = elev 234.0 m and 33 m depth to water = elev 226.0 m) with a 1 m change in elevation equal to a 4.123 m change in water level measurement (1V:4H slope).

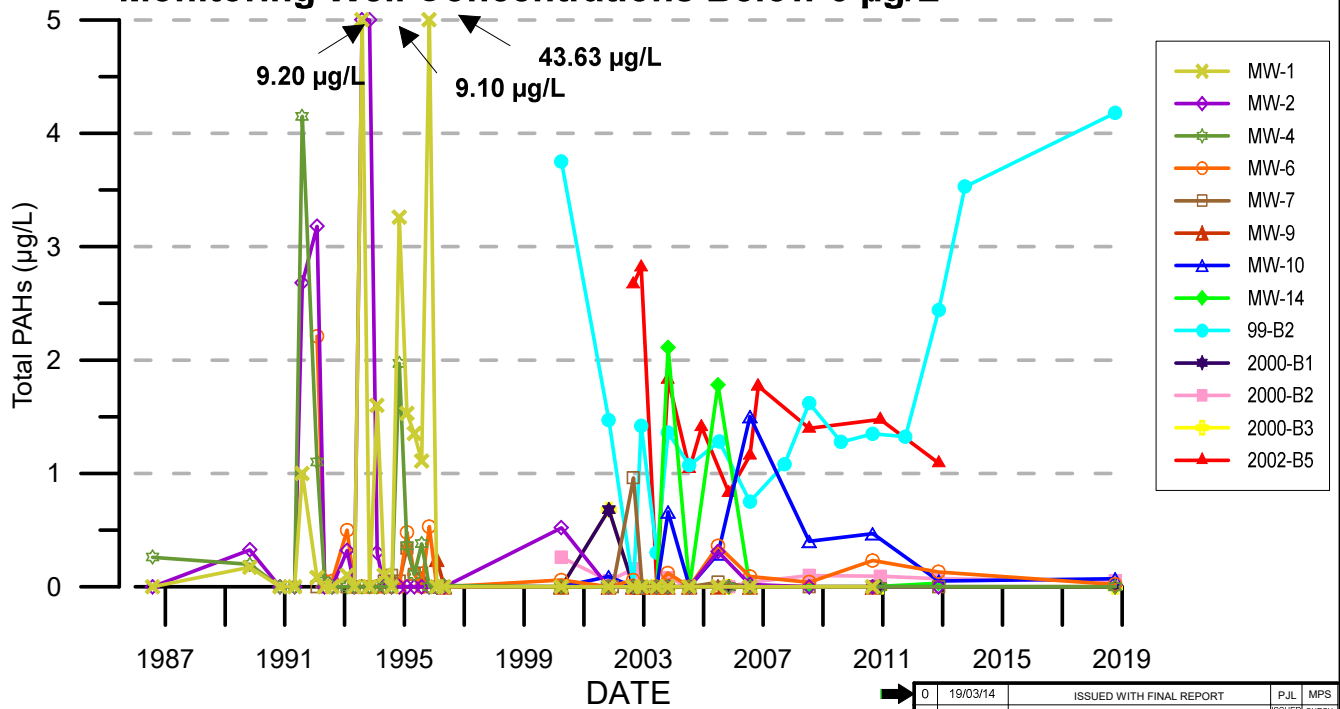
0	19/03/14	ISSUED WITH FINAL REPORT	PJL	MPS
NO.	YYMMDD	DESCRIPTION	ISSUED BY	CHECKED BY
REVISIONS / ISSUE				
<b>KGS GROUP</b>		<b>DOMTAR INC.</b>		
CONSULTING ENGINEERS				
2018 SITE SUMMARY REPORT FORMER CREOSOTE SITE TRANSCONA, WINNIPEG, MB				
CONTAINMENT CELL AND OVERBURDEN WATER LEVELS 2004 to 2018				
March 2019		FIGURE 3		REV 0



### Monitoring Well Concentrations Above 5 µg/L

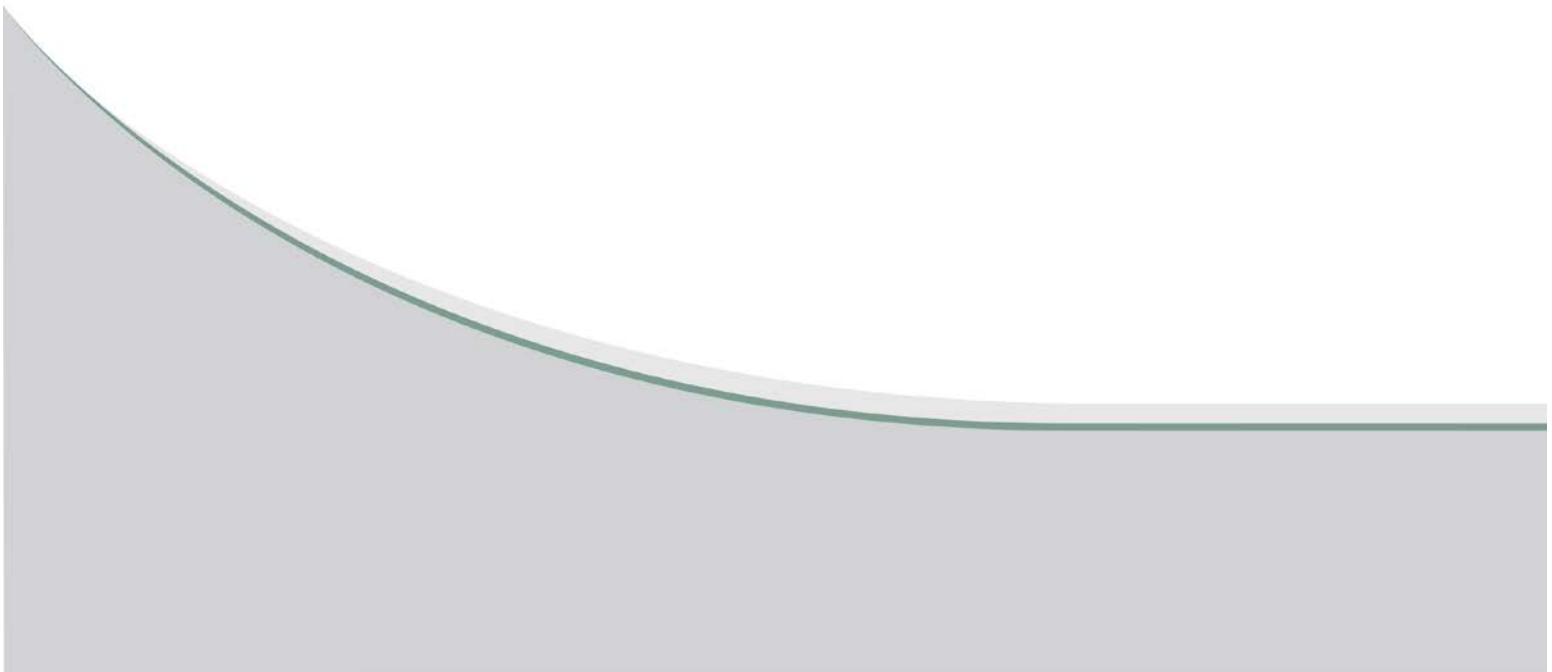


### Monitoring Well Concentrations Below 5 µg/L









0	19/03/14	ISSUED WITH FINAL REPORT	PJL	MPS
NO	YYMMDD	DESCRIPTION	ISSUED BY	CHECK BY
REVISIONS / ISSUE				
<b>KGS GROUP</b> CONSULTING ENGINEERS		<b>DOMTAR INC.</b>		
2018 SITE SUMMARY REPORT FORMER CREOSOTE SITE TRANSCONA WINNIPEG, MB				
TOTAL PAHS IN GROUNDWATER BEDROCK WELLS 1986 - 2018				
MARCH 2019		FIGURE 4		REV: 0

**APPENDIX A**  
**MONITORING WELL DRILL LOGS**



**CLIENT** DOMTAR INC.  
**PROJECT** WELL REPLACEMENT  
**LOCATION** DOMTAR CONTAMINANT CELL, TRANSCONA

**JOB NO.** 03-953-02  
**DATE DRILLED** 26/02/03

GRAPHICS	DESCRIPTION	PIEZ. LOG	DEPTH (m)	SAMPLE		Cu from Unconfined Comp. Test (kPa) $\diamond$ Cu TORVANE (kPa) $\blacklozenge$ PL MC LL % - kPa 20 40 60 80
				TYPE	NUMBER	
	SOIL DESCRIPTION					
	<u>FILL</u>					
	<u>SILTY CLAY</u>					
	PIEZOMETRIC LOG					
	Solid pipe with bentonite chips backfill - Pipe consists of Schedule 40 PVC 50mm dia., threaded joints					
	Solid pipe with bentonite grout backfill					
	Solid pipe with 0.65mm silica sand backfill					
	Slotted pipe with 0.65mm silica sand backfill - No. 10- slotted screen PVC pipe with friction fit PVC end plugs					

SAMPLE TYPE  AUGER GRAB  SHELBY  SPLIT SPOON  SPLIT BARREL

CONTRACTOR: Maple Leaf Enterprises INSPECTOR: M. Smith/E. Levay

APPROVED \_\_\_\_\_ DATE 23/04/03

**CLIENT** DOMTAR INC.  
**PROJECT** WELL REPLACEMENT  
**SITE** DOMTAR CONTAMINANT CELL, TRANSCONA  
**LOCATION** West side of containment cell 0642644 m East, 5531064 m North (+/- 3.5 m)  
**DRILLING METHOD** 125 mm ø Solid Stem Auger, B-40 Drill Rig

**JOB NO.** 03-953-02  
**GROUND ELEV.** 232.78 m  
**TOP OF PVC ELEV.** 233.64 m  
**WATER ELEV.**  
**DATE DRILLED** 26/02/03

ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RUN	JOINTS PER RUN	RECOVERY %	RQD %
232.02	0.5		<u>FILL</u> - Dark grey, frozen.		0.46					
	1.0		<u>SILTY CLAY</u> - Light brown, mottled, stiff, intermediate plasticity, occ. nodules.		1.52					
	3.5					1				
	6.5				6.40	2				
	7.5				7.42					
	7.70				7.70					
	8.5		-grey below 8.4 m							
223.56	9.0				9.22	3				
	9.22		<b>END OF HOLE @ 9.22 m</b>							
	9.5		Notes: 1. Test hole dry upon drilling completion. 2. Monitoring well completed with above ground surface lockable protective steel casing.							
	10.0									
	10.5									

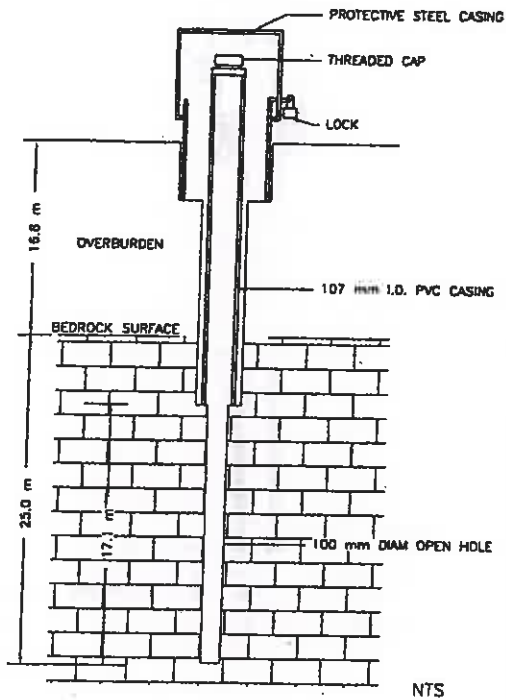
SAMPLE TYPE AUGER GRAB

CONTRACTOR  
Maple Leaf Enterprises

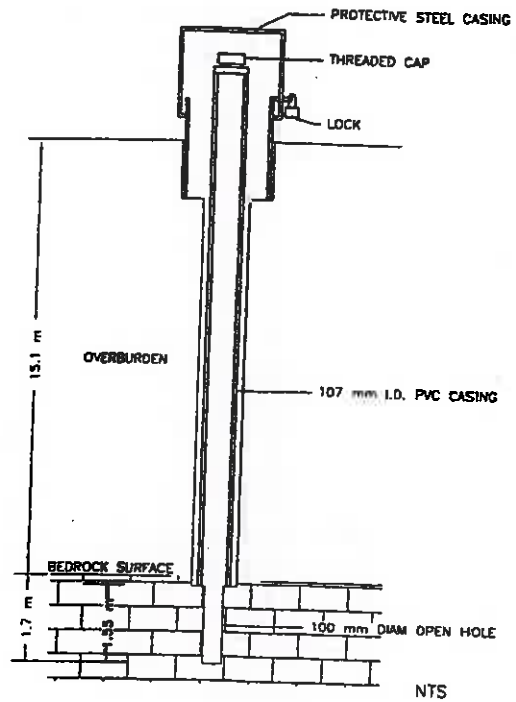
INSPECTOR  
M. Smith/E. Levay

APPROVED

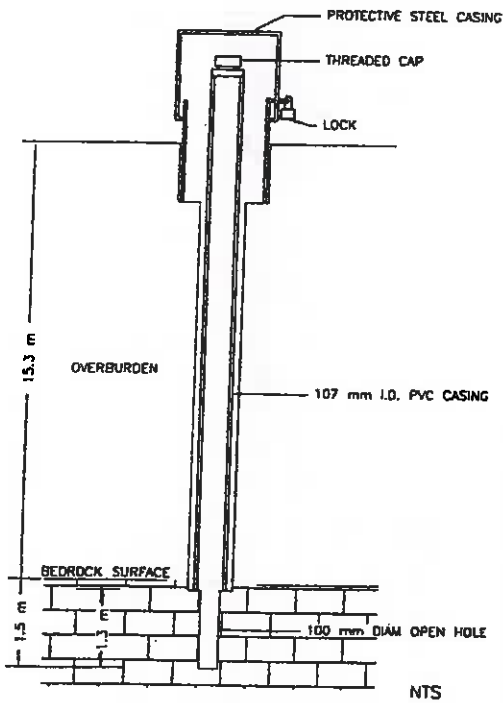
DATE 23/04/03



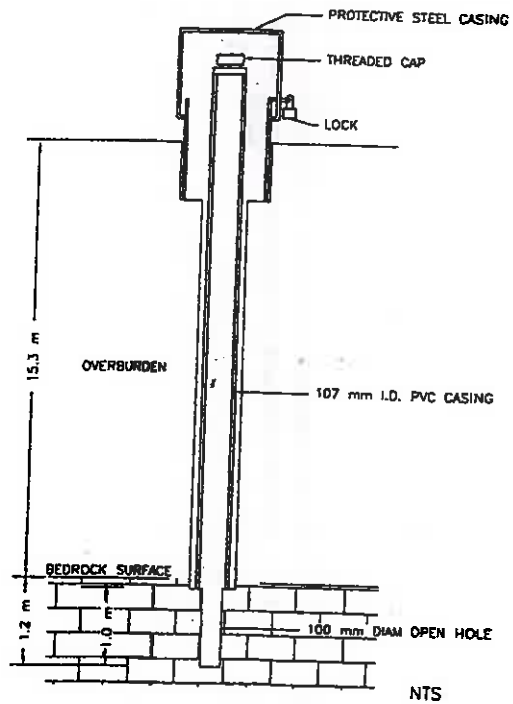
MW-01



MW-02



MW-03



MW-04



**DOMTAR TRANSCONA  
GROUND WATER MANAGEMENT PROGRAM**

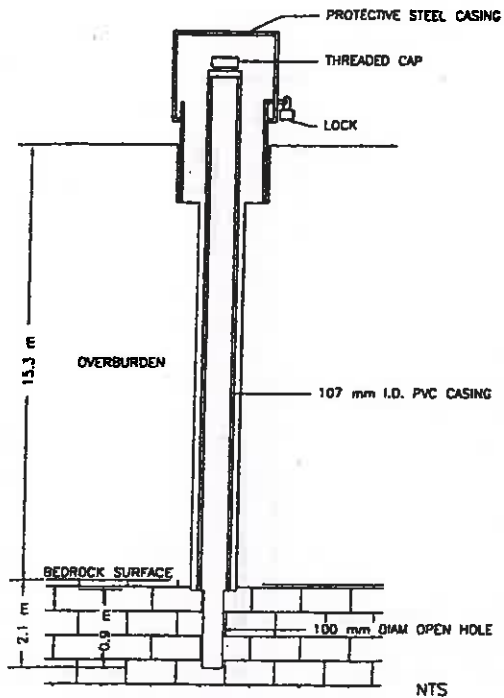
**EXISTING MONITORING WELL DESIGNS**

**MW-01 TO MW-04**

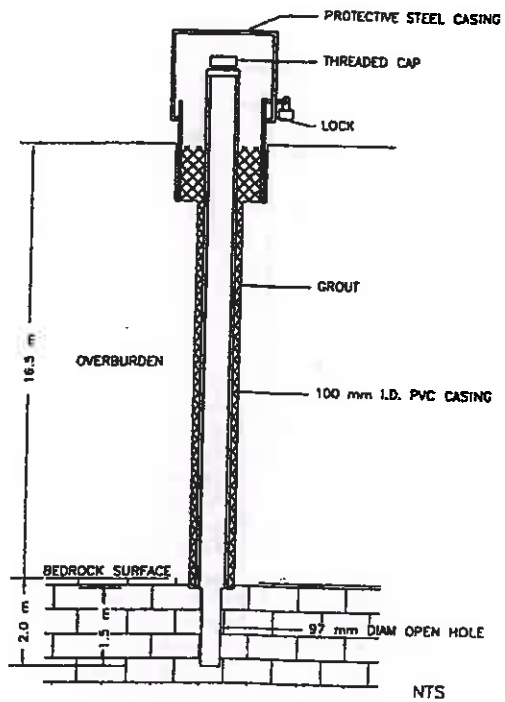
PROJ. NO.  
98-5289-0502

FIG. NO.

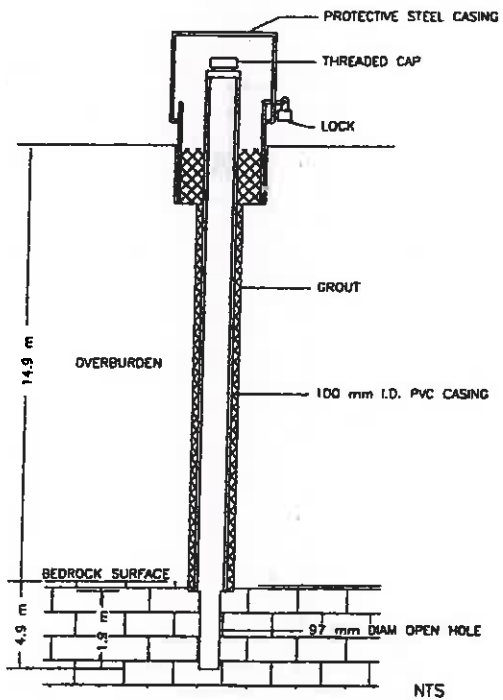
**8**



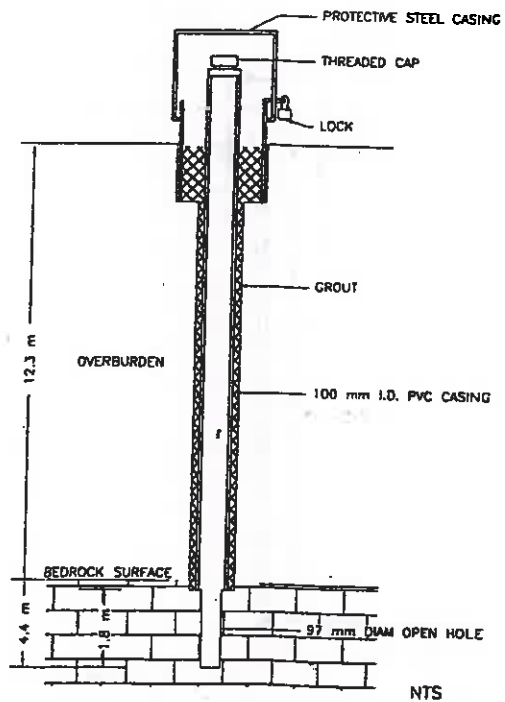
MW-05



MW-06



MW-07



MW-08

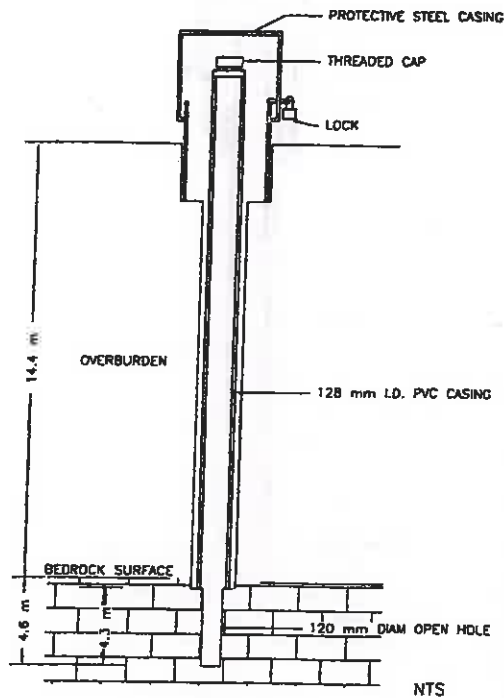


**DOMTAR TRANSCONA  
GROUND WATER MANAGEMENT PROGRAM**

**EXISTING MONITORING WELL DESIGNS  
MW-05 TO MW-08**

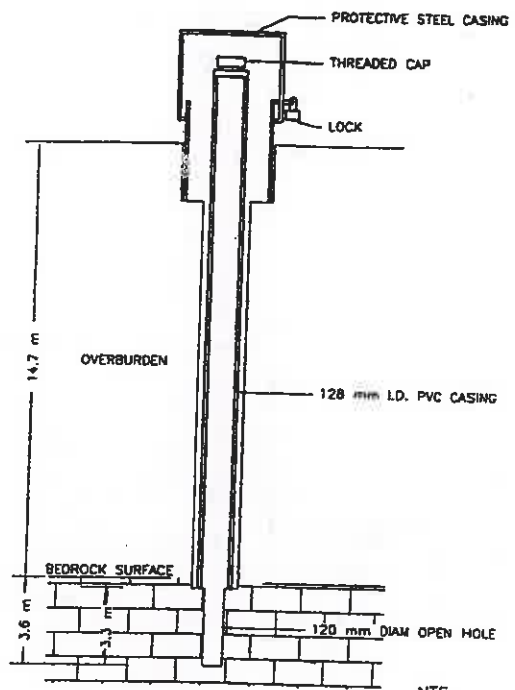
PROJ. NO.  
98-5289-0502

FIG. NO.  
**9**



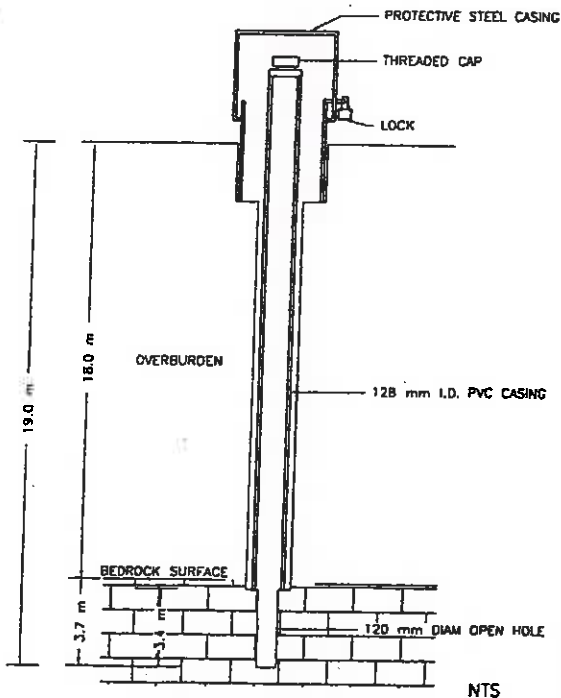
MW-09

NOTE: DEPTHS MEASURED FROM CROSS-SECTIONAL DRAWING  
 \* - ESTIMATED CASING DEPTH INTO BEDROCK



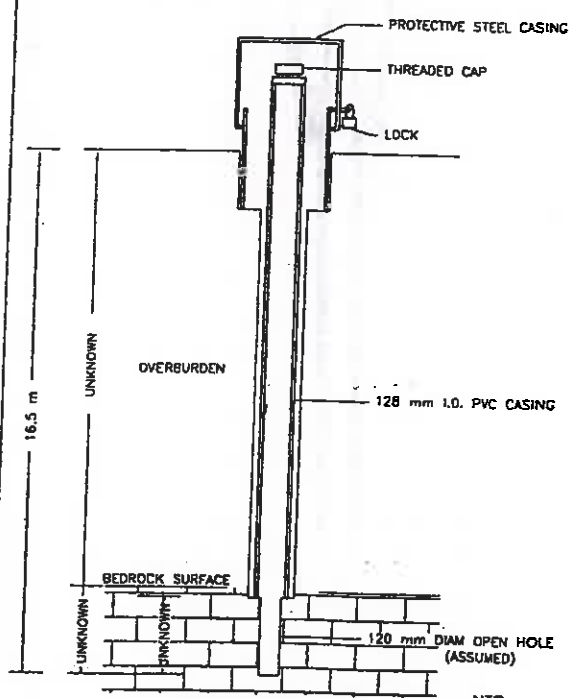
MW-10

NOTE: DEPTHS MEASURED FROM CROSS-SECTIONAL DRAWING  
 \* - ESTIMATED CASING DEPTH INTO BEDROCK



MW-11

NOTE: DEPTHS MEASURED FROM CROSS-SECTIONAL DRAWING  
 \* - ESTIMATED CASING DEPTH INTO BEDROCK



MW-09

NOTE: TOTAL DEPTH DERIVED FROM FIELD WELL MEASUREMENT



JULY 2000

**DOMTAR TRANSCONA  
 GROUND WATER MANAGEMENT PROGRAM**

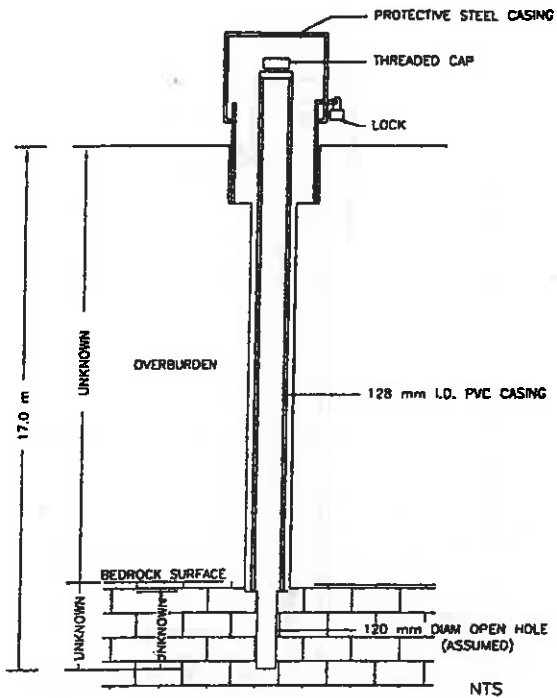
**EXISTING MONITORING WELL DESIGNS**

**MW-09 TO MW-12**

PROJ. NO.  
 98-5289-0502

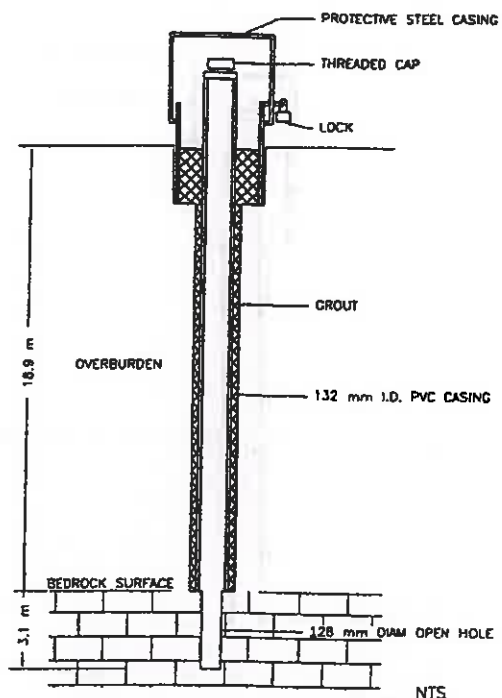
FIG. NO.

**10**

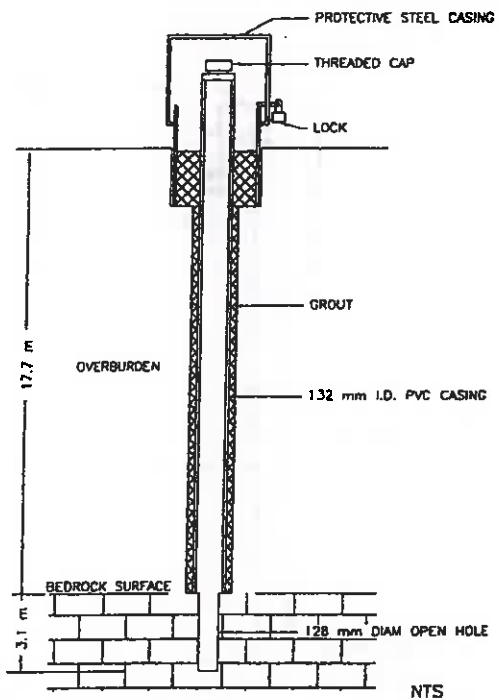


MW-13

NOTE: TOTAL DEPTH DERIVED FROM FIELD WELL MEASUREMENT



MW-14



MW-15



JULY 2000

**DOMTAR TRANSCONA  
GROUND WATER MANAGEMENT PROGRAM**

**EXISTING MONITORING WELL DESIGNS**

**MW-03 TO MW-15**

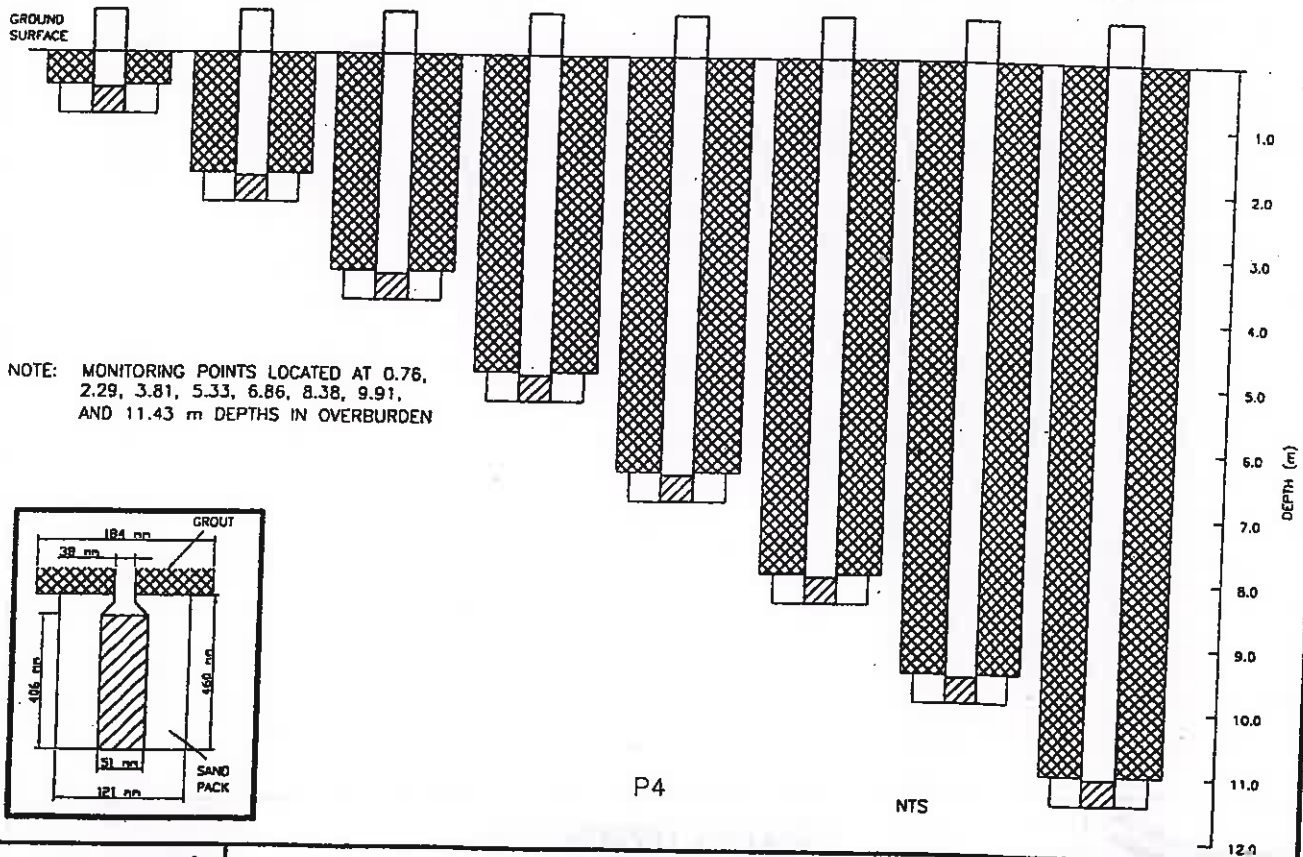
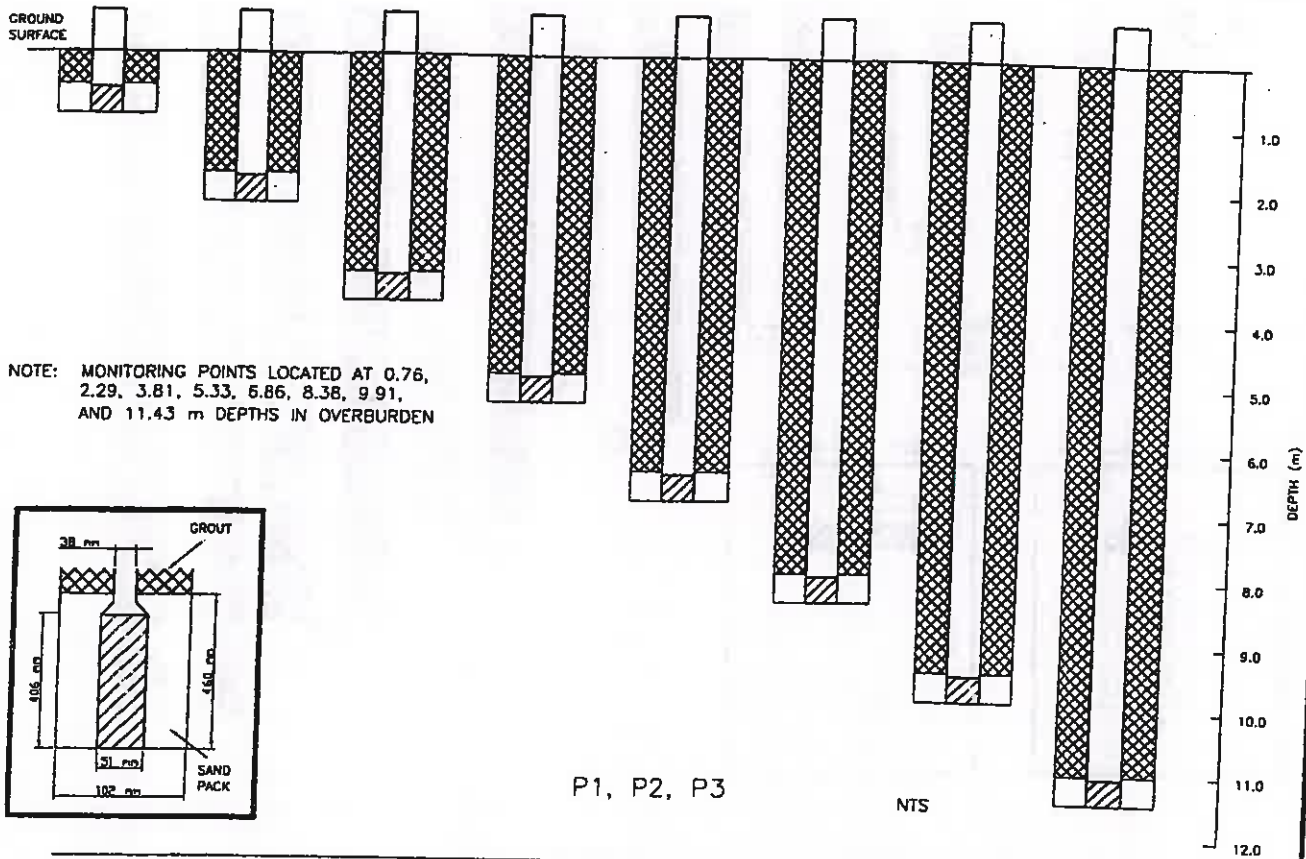
PROJ. NO.

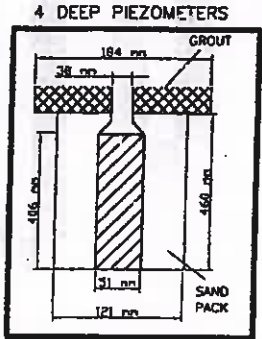
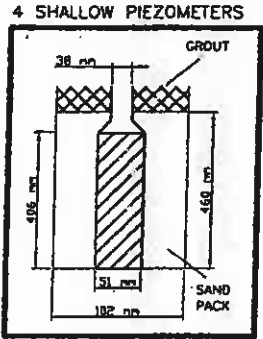
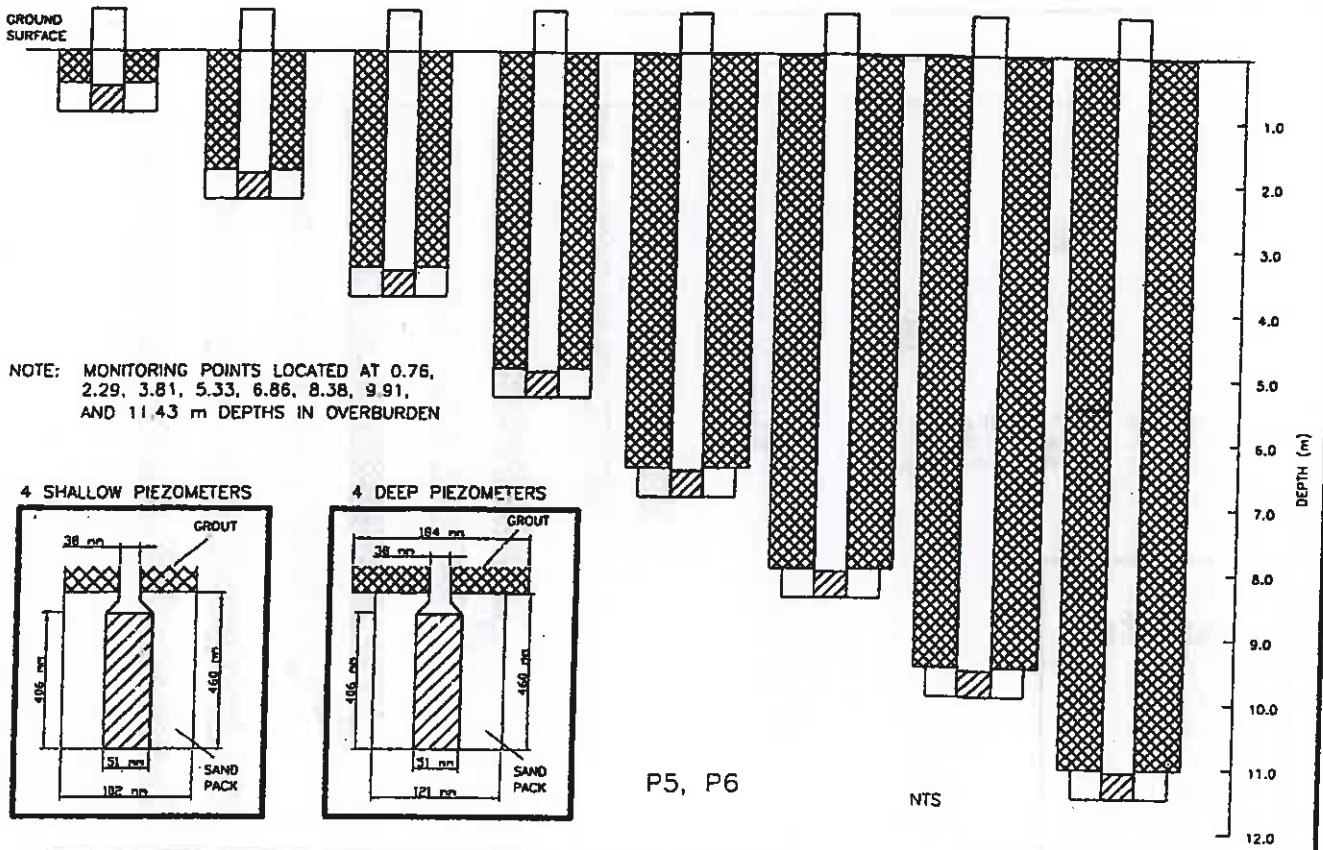
98-5289-0502

FIG. NO.

**11**







## Dillon Symbol Legend

### Lithology

	Sand		Clay		Sandy Till		Silt
	Gravel		Till		Silty Till		Mafic Igneous
	Evaporite Bedrock: gypsum, anhydrite, salt		Felsic Igneous		Metamorphic		Asphalt
	Concrete		Limestone		Shale		Dolomite
	Peat		Topsoil				

### Well Symbols

#### Pipe and Screen

	None		Solid Pipe		Solid Pipe in Casing		Backfilled
	Screen		Wide Opening Screen		Open Hole		Open Hole

#### Top Fittings

	None		Cap		Lockable Cap		Aboveground Cover
	Union		Step down Union		No Cap		No cap

#### Bottom Fittings

	None		Friction Fit Cap		Casagrande Tip		Treaded Cap
	Union		Step up Union		Rounded Tip		No Cap

#### Packing and Backfill

	None		Grout		Bentonite		Natural Clay Backfill
	Asphalt or Concrete		Silica Sand		Natural Sand Backfill		Pea Gravel

### Sample Symbols

	Shelby Tube		Auger Sample		Split Spoon		Grab
	Continuous Core		Excavation		Undisturbed		No Sample

Project No: 98-5289-0502

## Log of Borehole: 99-Cell-1

Project: Domtar Overburden Wells

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.715		
		<i>Top Soil</i> Dark brown, organic-rich, peaty soil.	232.565		Northing...5531008.703m Easting...643020.721m
		<i>Brown Clay</i> Dark brown-black, stiff, damp, clay.	232.105		
		<i>Silt</i> Light brown, soft, moist, silt	231.805		
1		<i>Brown Clay</i> Light brown, plastic, damp, silty clay. Numerous silt pockets.	231.195		
2					
3					
4		Brown, plastic, moist, silty clay. Minor gypsum crystals.			
5					
			227.385		

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.715m

Well Top Elevation 233.476m

Sheet: 1 of 2

Project No: 98-5289-0502

# Log of Borehole: 99-Cell-1

Project: Domtar Overburden Wells

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
6		<b>Grey Clay</b> Grey, moist, plastic silty clay. Numerous small gypsum crystals.	226.62		Water level recorded November 22, 1999
		<b>Brown Clay</b> Brown, moist, silty clay	226.315		
7		<b>Grey Clay</b> Grey, soft, silty clay with 10 cm silt lens at 7.45 m. Minor subrounded limestone pebbles.			
8					
9			223.575		
		End of Borehole			
10					
11					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.715m

Well Top Elevation 233.476m

Sheet: 2 of 2

Project No: 98-5289-0502

### Log of Borehole: 99-Cell-3

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.482		
		<i>Top Soil and Fill</i> Approximately 10 cm of peaty topsoil.			Northing...5531122.884 Easting...643020.009
1					
2					
3		<i>Brown Clay</i> Dark brown, stiff, damp, silty clay. 5 cm silt lens at 1.52 m. Becomes plastic at 2.1 m. Plasticity increases with depth Minor gypsum crystals.			
4					
5					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

Dillon Consulting Limited  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.482m

Well Top Elevation 233.249m

Sheet: 1 of 2



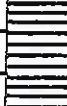

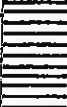

Project No: 98-5289-0502

### Log of Borehole: 99-Cell-3

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
6		<b>Grey Clay</b> Grey-brown, moist, plastic silty clay. Becomes quite soft below 7.5 m. Minor limestone pebbles near bottom.	226.692		Water level recorded November 22, 1999
7					
8					
9					
		End of Borehole	223.342		
10					
11					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.482m

Well Top Elevation 233.249m

Sheet 2 of 2



Project No: 98-5289-0502

### Log of Borehole: 99-Cell-4

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.782		
		<b>Top Soil.</b> Very dark brown-black, organic rich, clayey soil.			Northing...5531071.090 Easting...643079.690
		<b>Silt</b> Light brown, moist, soft silt.	232.322		
			232.172		
1					
2					
3		<b>Brown Clay</b> Dark brown, stiff, damp, silty clay. Becomes more moist and soft with depth.			
4					
5			227.752		
		<b>Brown Clay</b> Brown, plastic, moist, silty clay.			

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.782m

Well Top Elevation 233.498m

Sheet: 1 of 2







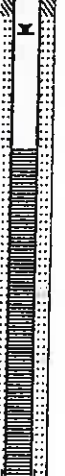

Project No: 98-5289-0502

### Log of Borehole: 99-Cell-4

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
6		<b>Grey Clay</b> Grey, moist, plastic silty clay to 6.40 m then becoming quite soft to the end of hole. Minor gypsum crystals.	226.992 226.682		
7					Water level recorded November 22, 1999
8		<b>Grey Clay</b> Grey, plastic, moist, silty clay. Minor gypsum crystals. 10 cm brown clay seam at 6.40 m. Minor limestone pebbles and gypsum crystals.			
9		End of Borehole	223.642		
10					
11					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.782m

Well Top Elevation 233.498m

Sheet: 2 of 2

Project No: 98-5289-0502

# Log of Borehole: 99-1S

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	233.301		
		<b>Top Soil.</b> Very dark brown-black, organic rich, clayey soil.			Northing...5530615.094 Easting...642798.125
1		<b>Clay fill</b> Light brown, stiff, moist, clay fill.			
2		<b>Silt</b> Light brown, moist, soft silt. Moderate naphthalene odour.	231.321 231.171		
3					Water level recorded November 22, 1999
4					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-22-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.301m

Well Top Elevation 234.067m

Sheet: 1 of 2

Project No: 98-5289-0502

### Log of Borehole: 99-1S

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
5		<b>Brown Clay</b> Brown, plastic, moist, silty clay. Minor creosote patches. Weak naphthalene odour from 3.0 m down. Occasional limestone pebbles starting at 6.7 m.	225.68		
6					
7					
8		End of Borehole			

233.301 - 6.12 m  
227.18

226.93

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-22-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.301m

Well Top Elevation 234.067m

Sheet: 2 of 2

Project No: 98-5289-0502

# Log of Borehole: 99-1D

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		<b>Ground Surface</b> <b>Top Soil.</b> Very dark brown-black, organic rich, clayey soil.	233.138		Northing...5530616.093 Easting....642798.140
1		<b>Clay fill</b> Light brown, stiff, moist, clay fill.			
2		<b>Silt</b> Light brown, moist, soft silt. Moderate naphthalene odour.	231.158 231.008		
3					
4					
5		<b>Brown Clay</b> Brown, plastic, moist, silty clay. Minor creosote patches. Weak naphthalene odour from 3.0 m down. Occasional limestone pebbles starting at 6.7 m.			
6					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 08-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.138m

Well Top Elevation 234.062m

Sheet: 1 of 2

Project No: 98-5289-0502

### Log of Borehole: 99-1D

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
			225.528		
8					
9					
10		<p><b>Grey Clay</b>            Grey, plastic, moist, silty clay.            Weak-moderate creosote odour.            Minor gypsum crystals and limestone pebbles throughout.            Wet below 9.14 m with weak creosote odour.</p>			Water level recorded November 22, 1999
					233.14 - 10.6 = = 222.54
11					221.76
12					
		End of Borehole	220.948		

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba,  
 R3L 0K6

Datum: Geodetic

Ground Elevation 233.138m

Well Top Elevation 234.062m

Sheet: 2 of 2

Project No: 98-5289-0502

# Log of Borehole: 99-2S

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	234.288		
		<b>Topsoil</b>			
		<b>Clay Fill</b> Light brown clay fill, moist, stiff, slight odour of naphthalene near surface			Northing...5530596.415 Easting....642639.602
1			233.068		
2		- heavily impacted silty clay fill - dark grey to black oil staining			
			231.848		
3		<b>Clay</b> Brown clay, stiff, moist, moderate naphthalene odour minor gypsum salts			
4					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-22-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 234.288m

Well Top Elevation 235.202m

Sheet: 1 of 2


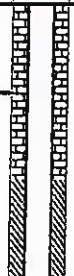

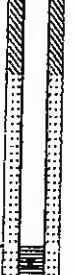
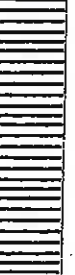
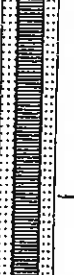

Project No: 98-5289-0502

### Log of Borehole: 99-2S

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
5		- water seeping in from above	229.718		
6			228.188		Water level recorded November 22, 1999
7		- 5 to 10% silt pockets			- 227.427
		End of Borehole	226.667		
8					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-22-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 234.288m

Well Top Elevation 235.202m

Sheet: 2 of 2

Project No: 98-5289-0502

# Log of Borehole: 99-2D

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	234.31		
		<b>Top Soil.</b> Very dark brown-black, organic rich, clayey soil.			Northing...5530616.093 Easting....642798.140
1		<b>Clay fill</b> Light brown, stiff, moist, clay fill.			
2		<b>Silt</b> Light brown, moist, soft silt. Moderate naphthalene odour.	232.33 232.18		
3					
4					
5		<b>Brown Clay</b> Brown, plastic, moist, silty clay. Minor creosote patches. Weak naphthalene odour from 3.0 m down. Occasional limestone pebbles starting at 6.7 m.			
6					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

Dillon Consulting Limited  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 234.310m

Well Top Elevation 235.210m

Sheet: 1 of 2



Project No: 98-5289-0502

### Log of Borehole: 99-2D

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7			226.7		
8					
9					
10		<b>Grey Clay</b> Grey, plastic, moist, silty clay. Weak-moderate creosote odour. Minor gypsum crystals and limestone pebbles throughout. Wet below 9.14 m with weak creosote odour.			
11			223.62		Water level recorded November 22, 1999
			1.5 screen		→ 222.87
12			222.12		
		End of Borehole			

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 234.310m

Well Top Elevation 235.210m

Sheet: 2 of 2

Project No: 98-5289-0502

### Log of Borehole: 99-3S

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.656		
0.9		<b>Clay</b> Dark brown silty clay, plastic, moist, moderate naphthalene odour below 0.9 m			Northing...5530891.201 Easting...642598.046
1.0			231.136		
2.0		- moderate naphthalene odour, minor gypsum salts			
3.0			229.606		
4.0		- weak naphthalene odour 3 - 4.6 m			
4.6			228.086		Water level recorded November 22, 1999
6.0		- occasional limestone pebble, no odour 4.6 - 7.62 m			
7.62			226.536		

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.354m

Well Top Elevation 233.268m

Sheet: 1 of 2



Project No: 98-5289-0502

### Log of Borehole: 99-3S

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					225.786
		End of Borehole	225.036		
8					
9					
10					
11					
12					

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.354m

Well Top Elevation 233.268m

Sheet: 2 of 2

Project No: 98-5289-0502

# Log of Borehole: 99-3D

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.656		
0.9		<b>Clay</b> Dark brown silty clay, plastic, moist, moderate naphthalene odour below 0.9 m			Northing...5530892.260 Easting...642598.052
1.0			231.136		
2.0		- moderate naphthalene odour, minor gypsum salts			
3.0			229.606		
4.0		- weak naphthalene odour 3 - 4.6 m			
5.0			228.086		
6.0		- occasional limestone pebble, no odour 4.6 - 7.9 m			

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.656m

Well Top Elevation 233.266m

Sheet: 1 of 2

Project No: 98-5289-0502

### Log of Borehole: 99-3D

Project: Overburden Well Installation

Client: Domtar

Inspector JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8			224.736		
9		<i>Grey Clay</i> Grey silty clay, moist, plastic	223.516		
10					
11		sticky wet silty grey clay	221.966		
12			221.216		Water level recorded November 22, 1999
		End of Borehole	220.466		

Drilled By: Maple Leaf Drilling

Drill Method: Solid Stem Auger

Drill Date: 09-23-99

Hole Size: 125mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.656m

Well Top Elevation 233.266m

Sheet: 2 of 2


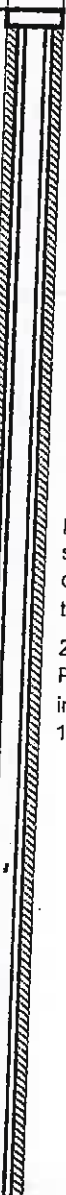
Project No: 98-5289-0502

## Log of Borehole: 99-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.64		
0 - 9.14		Clay 0 - 9.14 m, brown grey silty clay, laminated, some silt pockets, firm to soft, damp to moist, becomes softer and wetter with depth, grades into unit below			Well 99-B-1, Located at Northeast corner of Morley R. Kare Park, near corner of North Meadow Drive and Fireside Crescent
1					NOTES ON DRILLING Drilled with mud rotary 200 mm tricone bit to 17.22 m Drilled with air rotary 100 mm chisel bit 17.22 to 19.81 m
2					Aboveground Installation 130 mm Steel Casing installed to 17.22 m, cemented 17.31 m of solid 50 mm PVC plus 0.67 m stickup, locked cap, solid PVC sealed with expanding cement grout from surface to 17.22 m 2.5 m of #10 slotted 50 mm PVC screen, pea gravel installed in annulus from 17.22 - 19.81 m
3					
4					
5					
6					

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.640 masl

Well Top Elevation 233.362 masl

Sheet: 1 of 4

Project No: 98-5289-0502

### Log of Borehole: 99-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8					
9			223.5		
9.14		<b>Clay</b> 9.14 - 15.54 m, dark grey silty clay, laminated, occasional pebbles, soft, wet, grades into unit above			
10					
11					Water level measured April 3, 2000 Depth to water: 10.158 m below ground surface
12					

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.640 masl

Well Top Elevation 233.362 masl

Sheet: 2 of 4

Project No: 98-5289-0502

## Log of Borehole: 99-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
13					
14					
15					
16		<p><b>Glacial Till</b> 15.54 - 17.07 m, grey brown glacial till, predominately silty matrix with abundant limestone pebbles, some clay and sand, dense, damp</p> <p>- abundant limestone cobbles 16.76 - 17.07</p>	217.1		
17		<p><b>Limestone</b> 17.07 - 19.81 m, light grey and tan limestone, fine crystalline, dolomitic, fractured, wet</p> <p>- abundant water produced by fractures</p> <p>- fractured throughout</p>	215.57		
18					bottom of casing shoe at 17.22 m

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.640 masl

Well Top Elevation 233.362 masl

Sheet 3 of 4



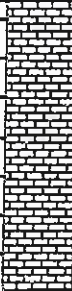

Project No: 98-5289-0502

### Log of Borehole: 99-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
19					
			212.83		
20		End of Borehole			
21					
22					
23					
24					

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.640 masl

Well Top Elevation 233.362 masl

Sheet: 4 of 4

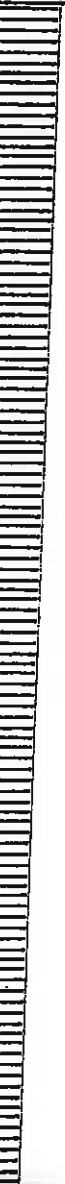

Project No: 98-5289-0502

### Log of Borehole: 99-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	233.346		
0 - 9.14		Clay 0 - 9.14 m, brown grey silty clay, laminated, some silt pockets, firm to soft, damp to moist, becomes softer and wetter with depth, grades into unit below			Well 99-B-2, Located at the east corner of Park City Community club, near corner of Hoka Street and Cambie Road  NOTES ON DRILLING Drilled with mud rotary 200 mm tricone bit to 20.27 m Drilled with air rotary 100 mm chisel bit 20.27 to 22.86 m  Aboveground Installation 130 mm Steel Casing installed to 20.27 m, cemented 20.36 m of solid 50 mm PVC plus 0.65 m stickup, locked cap, solid PVC sealed with expanding cement grout from surface to 20.27 m 2.5 m of #10 slotted 50 mm PVC screen, pea gravel installed in annulus from 20.27 to 22.86 m

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.346 masl

Well Top Elevation 234.346 masl

Sheet: 1 of 4

Project No: 98-5289-0502

### Log of Borehole: 99-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8					
9			224.206		
9.14 - 15.84		<i>Clay</i> 9.14 - 15.84 m, dark grey silty clay, laminated, occasional pebbles, soft, wet, grades into unit above			
10					
11					
12					

Water level measured  
April 3, 2000  
Depth to water: 10.34 m  
below ground surface

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.346 masl

Well Top Elevation 234.346 masl

Sheet: 2 of 4

Project No: 98-5289-0502

### Log of Borehole: 99-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
13					
14					
15					
16		<b>Glacial Till</b> 15.84 - 19.81 m, grey brown glacial till, predominately silty matrix with abundant limestone pebbles, some clay and sand, dense, damp	217.506		
17					
18					

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.346 masl

Well Top Elevation 234.346 masl

Sheet: 3 of 4



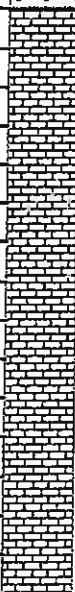
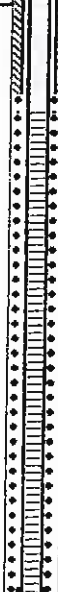








Project No: 98-5289-0502

## Log of Borehole: 99-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
19		- abundant limestone cobbles and broken rock 19.20 - 19.81 m	213.536		
20		<b>Limestone</b> 19.81- 22.86 m, light grey and tan limestone, fine crystalline, dolomitic, partly fractured, wet			bottom of casing shoe at 20.27 m
21		-abundant water produced by fracture zone at 21.33 m			
22			210.486		
23		End of Borehole			
24					

Drilled By: Friesen Drillers Ltd.

Drill Method: See Notes

Drill Date: Oct. 19 to 20, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.346 masl

Well Top Elevation 234.346 masl

Sheet: 4 of 4

Project No: 98-5289-0502

## Log of Borehole: 99-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	233.267		Well 99-B-3, Located approximately 8 m west of Former Drainage Well 'A', north end of engineered cap at Domtar Transcona Site  NOTES ON DRILLING Drilled with mud rotary 200 mm tricone bit to 17.53 m Drilled with air rotary 100 mm chisel bit 17.53 to 21.64 m  Aboveground Installation 130 mm Steel Casing installed to 17.53 m, cemented Open hole 17.53 to 21.64 m
	■	<b>Topsoil</b> 0 - 0.15 m black topsoil	233.117		
	▨	<b>Clay</b> 0.15 - 1.22 m compacted clay backfill			
1					
	▨	<b>Clay</b> 1.22 - 10.06 m, brown silty clay, laminated, occasional silt pockets, damp to moist, firm to soft, becomes softer and wetter with depth, grades into unit below	232.047		
2					
3					
4					
5					
6		- occasional stones below 6 m			

Drilled By: Maple Leaf Drilling Ltd.

Drill Method: See Notes

Drill Date: Nov. 2 to 3, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba,  
 R3L 0K6

Datum: Geodetic

Ground Elevation 233.267 masl

Well Top Elevation 234.195 masl

Sheet: 1 of 4

Project No: 98-5289-0502

### Log of Borehole: 99-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8					
9					
10			223.207		
10.06 - 13.72		<i>Clay</i> 10.06 - 13.72 m, dark grey silty clay, laminated; soft, wet, occasional stones, grades into unit above			
11					Water level measured November 9, 1999 Depth to Water 11.265 m below ground surface
12					

Drilled By: Maple Leaf Drilling Ltd.

Drill Method: See Notes

Drill Date: Nov. 2 to 3, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited.**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.267 masl

Well Top Elevation 234.195 masl

Sheet: 2 of 4

Project No: 98-5289-0502

## Log of Borehole: 99-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
13			219.547		
14		<b>Silty Till</b> 13.72 - 14.33 m, light brown grey silty till, abundant limestone pebbles, wet, dense	218.937		
		<b>Limestone boulder</b> 14.33 - 14.94 limestone boulder	218.327		
15		<b>Sandy Till</b> 14.94 - 16.92 m, light brown grey sandy till, abundant limestone pebbles, some silt and clay, dense, wet	216.347		
16		- limestone cobbles and broken rock 16.76 to 16.92 m			
17		<b>Limestone</b> 16.92 - 19.20 m, light grey and tan limestone, fine crystalline, pinpoint porosity (vuggy porosity?), dolomitic, fractured			
18					
					bottom of casing shoe at 17.53 m
					Open hole 17.53 to 21.64 m

Drilled By: Maple Leaf Drilling Ltd.

Drill Method: See Notes

Drill Date: Nov. 2 to 3, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.267 masl

Well Top Elevation 234.195 masl

Sheet: 3 of 4



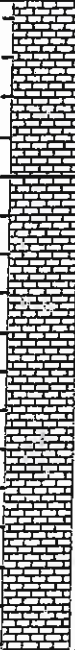

Project No: 98-5289-0502

### Log of Borehole: 99-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector R. Reichelt, P. Geo.

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
19			214.067		Open hole 17.53 to 21.64 m
20		<b>Limestone</b> 19.2 - 21.64 m, light grey and tan limestone, fine crystalline, some pinpoint and vuggy porosity, very fractured - abundant black creosote			
21			211.627		
22		End of Borehole			
23					
24					

Drilled By: Maple Leaf Drilling Ltd.

Drill Method: See Notes

Drill Date: Nov. 2 to 3, 1999

Hole Size: 200 mm & 100 mm

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 233.267 masl

Well Top Elevation 234.195 masl

Sheet: 4 of 4

Project No: 98-5289-0502

## Log of Borehole: 2000-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.522		<p>Well 2000-B-1 located 150 m south of well MW-12 near west fence line</p> <p><b>Notes on Drilling</b>                      Drilled with 200 mm mud rotary tricone bit to 19.51 m                      Drilled with 100 mm mud rotary chiesel bit to 24.38 m</p> <p><b>Casing Installation Notes</b>                      102 mm welded steel casing installed at 19.51 m, cemented</p> <p><b>Well Installation Notes</b>                      3.05 m No. 10 Slotted 50 mm PVC Screen at bottom                      21.34 m Sched. 40 50 mm solid PVC Pipe to above surface                      Aboveground, Locked Cover</p> <p><b>Annular Fill Notes</b>                      Cement grout: Surface - 19.5 m                      Sandpack: 19.5 - 24.38 m</p>
1	▨	<b>Clay Fill</b> 0 - 1.07 m, brown grey silt clay fill, trace fine pebbles, compacted, frozen to 0.6 m			
2	▨	<b>Clay</b> 1.07 - 4.88 m, brown grey silt clay, laminated with silt pockets, slight creosote odour, firm	231.452		
3	▨				
4	▨				
5	▨	<b>Clay</b> 4.88 - 11.89 m, dark grey silty clay, laminated, soft, wet, no odour	227.642		
6	▨				

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 8 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba,  
 R3L 0K6

Datum: Geodetic

Ground Elevation 232.522 masl

Well Top Elevation 233.260 masl

Sheet: 1 of 4







Project No: 98-5289-0502

### Log of Borehole: 2000-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8					
9					
10					Water level measured March 27, 2000 Depth to Water 9.972 m below ground surface
11					
12		<i>Till</i> 11.89 - 12.65 m, grey till, sandy silty matrix with clay and fine pebbles, dense, damp	220.632		

Drilled By: Maple Leaf Drilling  
Drill Method: See Drilling Notes  
Drill Date: Feb 8 - Feb 22, 2000  
Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic  
Ground Elevation 232.522 masl  
Well Top Elevation 233.260 masl  
Sheet: 2 of 4




Project No: 98-5289-0502

### Log of Borehole: 2000-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
13		<b>Sand Gravel</b> 12.65 - 13.41 m, brown silty sand with abundant fine pebbles, wet, dense	219.872		
14		<b>Till</b> 13.41 - 19.05 m, light grey till, silty matrix with pebbles, sand and clay, dense, damp	219.112		
17		- Abundant cobbles and boulders 16.8 - 18.3 m			

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 8 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.522 masl

Well Top Elevation 233.260 masl

Sheet: 3 of 4


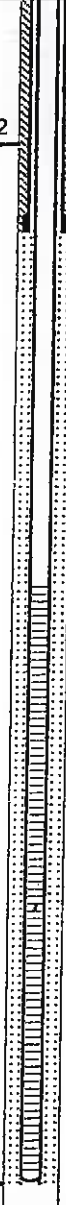
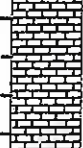
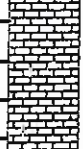
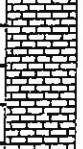

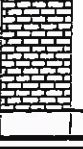
Project No: 98-5289-0502

### Log of Borehole: 2000-B-1

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
19		<b>Limestone</b> 19.05 - 24.38 m, mottled tan and light grey limestone, fine crystalline, granular and cryptocrystalline texture, fractured in part, good pin point porosity in cuttings, dolomitic,	213.472		Casing Shoe
20					
21					
22					
23		- Creosote odour in cuttings at 22.9 and 24 m - Fractured at 23 m			
24			208.142		

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 8 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.522 masl

Well Top Elevation 233.260 masl

Sheet: 4 of 4

Project No: 98-5289-0502

## Log of Borehole: 2000-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.443		
0		100 mm Topsoil			
0.1 - 8.84		Clay 0.1 - 8.84 m brown silty clay, laminated, damp, plastic, firm, no odour			Well 2000-B-2 located 215m south of well MW-10 near west fence line
1					Notes on Drilling Drilled with 200 mm mud rotary tricone bit to 16.15 m Drilled with 100 mm air rotary chiesel bit to 21.03 m
2					Casing Installation Notes 102 mm welded steel casing installed at 16.15 m, cemented
3					Well Installation Notes 3.05 m No. 10 Slotted 50 mm PVC Screen at bottom 17.98 m Sched. 40 50 mm solid PVC pipe to inside cover Aboveground locked cover
4					Annular Fill Notes Cement grout surface - 16.15 m Sandpack 16.15 m - 21.03 m
5					
6					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 17 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.443 masl

Well Top Elevation 233.370 masl

Sheet: 1 of 4


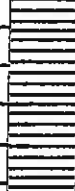
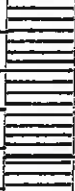

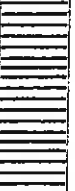
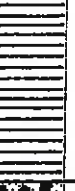
Project No: 98-5289-0502

### Log of Borehole: 2000-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8					
9		<b>Clay</b> 8.84 - 11.89 m, grey silty clay, laminated, wet, plastic, soft, no odour	223.603		
10					Water level measured March 28, 2000 Depth to Water 10.073 m below ground level
11					
12		<b>Till</b> 11.89 - 15.55 m, grey till, silty matrix with abundant limestone pebbles, cobbles and boulder; dense, damp, no odour	220.553		

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 17 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.443 masl

Well Top Elevation 233.370 masl

Sheet 2 of 4

Project No: 98-5289-0502

### Log of Borehole: 2000-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
13					
14					
15					
15.55 - 16.15		<b>Broken Limestone</b> 15.55 - 16.15 m, Broken rubby limestone	216.893		
16					
16.15 - 21.03		<b>Limestone</b> 16.15 - 21.03 m, Limestone, mottled light and medium grey, fine crystalline, granular to cryptocrystalline texture, some vuggy porosity, fractured in part	216.293		- Casing shoe
17					
17.4 - 18		- large fractures 17.4 - 18 m			
18					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 17 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.443 masl

Well Top Elevation 233.370 masl

Sheet: 3 of 4





Project No: 98-5289-0502

### Log of Borehole: 2000-B-2

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
19		- weak creosote odour at 19.8 m	211.413		
20					
21		End of Borehole			
22					
23					
24					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 17 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.443 masl

Well Top Elevation 233.370 masl

Sheet: 4 of 4

Project No: 98-5289-0502

## Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
0		Ground Surface	232.411		
0		Topsoil	232.261		
0.15		0.15 m dark brown topsoil			
0.15 - 9.14		Clay 0.15 - 9.14 m, brown silty clay, laminated, damp, plastic, firm, no silt seams			Well 2000-B-3 located 60 m north of well MW-12 near west fence line
1					Notes on Drilling Drilled with 200 mm mud rotary tricone bit to 17.53 m, then reamed out hole with 254 mm mud rotary tricone bit
2					Drilled to 30.48 m with 100 mm mud rotary chiesel bit, then reamed out hole with 159 mm mud rotary tricone bit
3					Drilled to 50.29 m with 100 mm mud rotary chiesel bit
4					Casing Installation Notes 168 mm welded steel casing installed at 17.53 m, cemented 102 mm welded steel casing installed at 30.48 m, cemented
5					Well Installation Notes 6.1 m No. 10 Slotted 50 mm PVC Screen at bottom 44.2 m Sched. 40 50 mm Solid PVC Pipe to surface Aboveground, locked cover
6					Annular Fill Notes Cement grout surface -38.71 m Bentonite 38.71 - 39.62 m Sandpack 39.62 - 50.29 m

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

Dillon Consulting Limited  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 1 of 9

Project No: 98-5289-0502

### Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
7					
8					
9					
		<i>Clay</i> 9.14 - 13.41 m, grey silty clay, laminated. plastic, soft, wet	223.271		
10					Water level measured March 28, 2000 Depth to Water 9.765 m below ground level
11					
12					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 2 of 9

Project No: 98-5289-0502

## Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
13		<b>Till</b> 13.41 - 15.54 m, Till, sandy matrix with abundant granitic and limestone pebbles, calcareous, dense, wet	219.001		
14					
15					
16		<b>Broken Limestone</b> 15.54 - 17.07 m, soft broken limestone rock	216.871		
17					
18		<b>Limestone</b> 17.07 - 50.29, mottled tan and light grey limestone, fine crystalline, cryptocrystalline texture, fractured in part, good pin point porosity in cuttings, dolomitic	215.341		
					Casing Shoe - 168 mm Casing

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 3 of 9

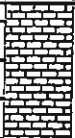

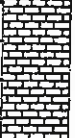









Project No: 98-5289-0502

### Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
19					
20					
21					
22					
23					
24					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 4 of 9



Project No: 98-5289-0502

### Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
31					
32					
33					
34					
35					
36					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 6 of 9

Project No: 98-5289-0502

### Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks	
37						
38						
39						
40						
41						
42						

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 7 of 9









Project No: 98-5289-0502

### Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
43					
44					
45					
46					
47					
48					

Drilled By: Maple Leaf Drilling  
Drill Method: See Drilling Notes  
Drill Date: Feb 14 - Feb 22, 2000  
Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic  
Ground Elevation 232.411 masl  
Well Top Elevation 233.576 masl  
Sheet: 8 of 9



Project No: 98-5289-0502

### Log of Borehole: 2000-B-3

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Depth, m	Symbol	Description	Elevation	Well Data	Remarks
49					
50		End of Borehole	182.121		
51					
52					
53					
54					

Drilled By: Maple Leaf Drilling

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba,  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.411 masl

Well Top Elevation 233.576 masl

Sheet: 9 of 9


Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
0		Ground Surface	232.308				 <p>Well 2000-B-4 located 90 m north of well MW-4 near west fence line</p> <p>Notes on Drilling                      Friesen Drilling                      Drilled with 222 mm mud rotary bit to 17.07 m                      Drilled with 159 mm air rotary bit to 30.48 m                      Rodren Drilling                      Drilled HQ Core with 98 mm bit to 78.23 m</p> <p>Casing Installation Notes                      178 mm threaded steel casing installed at 17.07 m, cemented                      102 mm threaded steel casing installed at 30.48 m, cemented</p> <p>Well Installation Notes                      3.05 m No. 10 Slotted 50 mm PVC Screen at bottom                      78.23 m Sched. 40 50 mm solid PVC pipe to above surface                      Aboveground locked cover</p> <p>Annular Fill Notes                      Cement grout, surface - 60.96 m</p>	<p>Well 2000-B-4 located 90 m north of well MW-4 near west fence line</p>
0	Clay	0 - 4.88 m, brown silty clay, laminated, occasional silt seams, damp, plastic, firm, no odour						
1								
2								
3								
4								
5								
6								

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba  
 R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 1 of 13

Project No: 98-5289-0502

### Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
7								
8								
9			223.168					
9.14 - 13.41		Clay 9.14 - 13.41 m, grey silty clay, laminated. plastic, soft, wet						
10							Water level measured March 28, 2000 Depth to Water 10.280 m below ground surface	
11								
12								

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 2 of 13

Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
13	[Symbol]		218.898					
14	[Symbol]	<b>Till</b> 13.41 - 15.54 m, Till, sandy matrix with abundant granitic and limestone pebbles, calcareous, dense, wet						
15	[Symbol]		216.768					
16	[Symbol]	<b>Broken Limestone</b> 15.54 - 17.07 m, soft broken limestone rock						
17	[Symbol]		215.238					
18	[Symbol]	<b>Limestone</b> 17.07 - 30.48 m, mottled tan and light grey limestone, fine crystalline, cryptocrystalline texture, fractured in part, good pin point porosity in cuttings, dolomitic,					178 mm casing shoe	

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 3 of 13


Project No: 98-5289-0502

### Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
19								
20								
21								
22								
23								
24								

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 4 of 13


Project No: 98-5289-0502

### Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
25								
26								
27								
28								
29								
30								
			HQ CORE DESCRIPTION	201.828				102 mm casing shoe

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 5 of 13

Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks			
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery					
31		<b>CB01, 30.48 - 32.00 m</b> Limestone, mottled medium and light grey, fine crystalline, granular texture, trace vuggy porosity, some vugs infilled with kaolinitic material, dolomitic, minor vertical fractures, occasional coral fossil		CB01							
32			200.308								
33		<b>CB02, 32.00 - 33.53 m</b> Limestone, as above, minor vertical fractures		CB02							
			198.778								
34		<b>CB03, 33.53 - 35.05 m</b> Limestone, as above, minor vertical fractures		CB03							
35			197.258								
36		<b>CB04, 35.05 - 36.58 m</b> Limestone, as above, stylolite at 35.05 m, no fractures, minor vuggy porosity		CB04							
			195.728								

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 6 of 13



Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery	
37		<b>CB05, 36.58 - 38.10 m</b> Limestone, as above, tabulate coral fossil at 36.88 m, minor vuggy porosity	194.208	CB05	-	-	
38		<b>CB06, 38.10 - 39.62 m</b> Limestone, as above, minor vertical fractures, minor vuggy porosity	192.688	CB06	-	-	
39		<b>CB07, 39.62 - 41.15 m</b> Limestone, as above, good to minor vuggy porosity	191.158	CB07	-	-	
40		<b>CB08, 41.15 - 42.67 m</b> Limestone, as above, trace vuggy porosity, 2 cm kaolinitic clay seam at 42.21 m	189.638	CB08	-	-	
41							
42							

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba  
 R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 7 of 13

Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Remarks	
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
43		<b>CB09A, 42.67 - 43.43 m</b> Limestone, as above, kaolinitic calcareous clay seam 43.28 - 43.43 m		CB09A				
			188.878					
44		<b>CB09B, 43.43 - 44.20 m</b> Limestone, as above, good vuggy and interclastic porosity, tabulate coral fossil at 43.59 m		CB09B				
			188.108					
45		<b>CB10, 44.20 - 45.72 m</b> Limestone, as above, good vuggy porosity		CB10				
			186.588					
46	<b>CB11 45.72 - 47.24</b> Limestone, mottled light and medium grey, fine crystalline, granular texture, poor vuggy porosity, some vertical fractures, occasional fossil clasts, dolomitic		CB11					
		185.068						
47	<b>CB12A, 47.24 - 47.85 m</b> Limestone, as above, 1 cm seam of kaolinitic clay at 47.85 m		CB12A					
		184.458						
48	<b>CB12B, 47.85 - 48.77 m</b> Limestone, as above, vertical fractures, poor vuggy porosity, tabulate coral fossil at 48.46 m		CB12B					
		183.538						

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 8 of 13

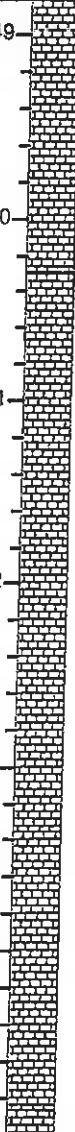


Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
49		<b>CB13, 48.77 - 50.29 m</b> Limestone, as above, vertical fractures, poor vuggy porosity	182.018	CB13				
50								
51		<b>CB14, 50.29 - 51.82 m</b> Limestone, as above, vertical fractures filled with grey clay	180.488	CB14				
52								
53		<b>CB15, 51.82 - 53.34 m</b> Limestone, as above, vertical fractures filled with grey clay	178.968	CB15				
54		<b>CB16, 53.34 - 54.86 m</b> Limestone, as above, many vertical fractures	177.448	CB16				

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba  
 R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 9 of 13

Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Well Data	Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery		
55	[Limestone symbol]	<b>CB17, 54.86 - 56.39 m</b> Limestone, as above, vertical fractures		CB17	[Core recovery diagram]	[Recovery diagram]		
56			175.918					
57		<b>CB18, 56.39 - 57.91 m</b> Limestone, as above, no fractures, poor vuggy porosity		CB18				
58			174.398					
59	[Limestone symbol]	<b>CB19, 57.91 - 59.44 m</b> Limestone, as above, no fractures, trace vuggy porosity		CB19	[Core recovery diagram]	[Recovery diagram]		
60			172.868					
61	[Limestone symbol]	<b>CB20, 59.44 - 60.96 m</b> Limestone, as above, no fractures, 2 cm seam of kaolinific clay at 60.81 m		CB20				
			171.348					

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 10 of 13





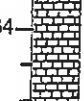

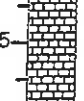

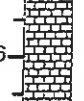
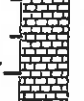
Project No: 98-5289-0502

### Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery	
62		<b>CB21, 60.96 - 62.48 m</b> Limestone, mottled light and dark grey, pink in part (iron stain), very fine crystalline, granular texture, dolomitic, 5 cm kaolinitic infilling at 62.48 m, tabulate coral fossil at 62.18 m	169.828	CB21			
63		<b>CB22, 62.48 - 64.01 m</b> Limestone, as above, some vuggy porosity, and kaolinitic infillings, trace vertical fractures, some pink iron stains	168.298	CB22			
64		<b>CB23, 64.01 - 65.53 m</b> Limestone, as above, occasional kaolinitic infilling, good vuggy porosity, iron stains in vugs at 63.4 m	166.778	CB23			
65		<b>CB24, 65.53 - 67.06 m</b> Limestone, mottled light and dark grey, occasionally tan, very fine crystalline, granular texture, occasional vuggy porosity, trace interclastic porosity, occasional broken pelecypod fossil clasts, no fractures, occasional kaolinitic infillings in vugs	165.248	CB24			
66							
67							

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 11 of 13

Project No: 98-5289-0502

## Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery	
68		<b>CB25, 67.06 - 68.58 m</b> Limestone, as above, occasional pink iron stains, occasional kaolinitic infillings	163.728	CB25			
69		<b>CB26, 68.58 - 70.10 m</b> Limestone, as above, occasional pink iron stains, occasional interclastic porosity, occasional kaolinitic infillings, minor vertical fractures	162.208	CB26			
70		<b>CB27, 70.10 - 71.63 m</b> Limestone, as above, minor vertical fractures	160.678	CB27			
71		<b>CB28, 71.63 - 73.15 m</b> Limestone, as above, occasional minor vertical fractures and interclastic porosity, occasional vuggy porosity, trace pink iron stains	159.158	CB28			
72							
73							

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
 6 Donald Street South  
 Winnipeg, Manitoba  
 R3L 0K6

Datum: Geodetic

Ground Elevation 232.308 masl

Well Top Elevation 232.798 masl

Sheet 12 of 13



Project No: 98-5289-0502

### Log of Borehole: 2000-B-4

Project: Transcona Site Remediation

Client: Domtar Inc.

Inspector RAR/JRB

Subsurface Profile				Samples			Remarks
Depth, m	Symbol	Description	Elevation	Number	Type	Recovery	
74		<b>CB29, 73.15 - 74.68 m</b> Limestone, as above, occasional interclastic and vuggy porosity	157.628	CB29			
75		<b>CB30, 74.68 - 76.20 m</b> Limestone, as above, some vertical fractures	156.108	CB30			
76		<b>CB31 76.20 - 76.90 m</b> Limestone, mottled grey and dark grey, fine crystalline, granular texture, occasional vuggy porosity, no fractures	155.408	CB31			
77		<b>CB32 76.9 - 78.23 m</b> Limestone, as above, some iron stains, occasional pelecypos clasts, minor fractures, minor interclastic porosity, occasional kaolinic infillings	154.078	CB32			
78		End of Borehole					
79							

Drilled By Rodren/Friesen

Drill Method: See Drilling Notes

Drill Date: Feb 14 - Feb 22, 2000

Hole Size: See Drilling Notes

**Dillon Consulting Limited**  
6 Donald Street South  
Winnipeg, Manitoba  
R3L 0K6

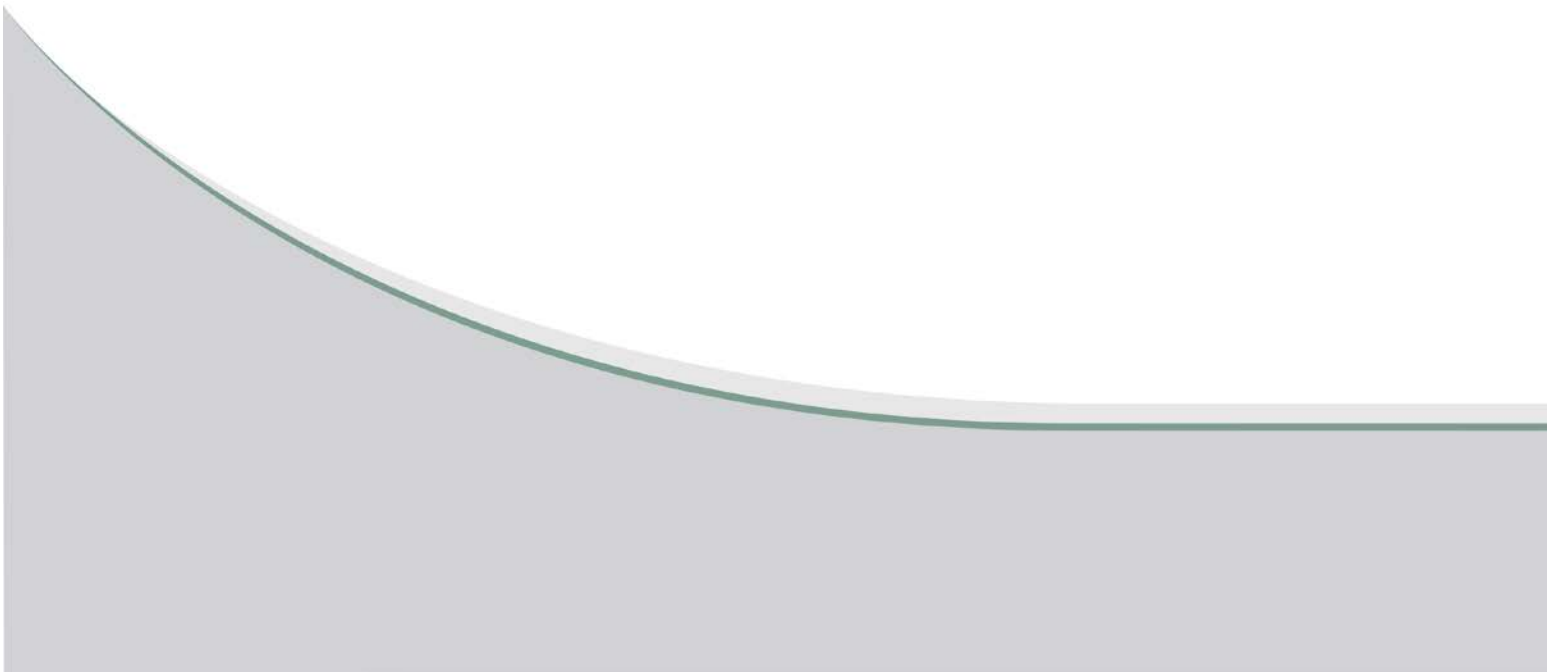
Datum: Geodetic

Ground Elevation 232.308 masl

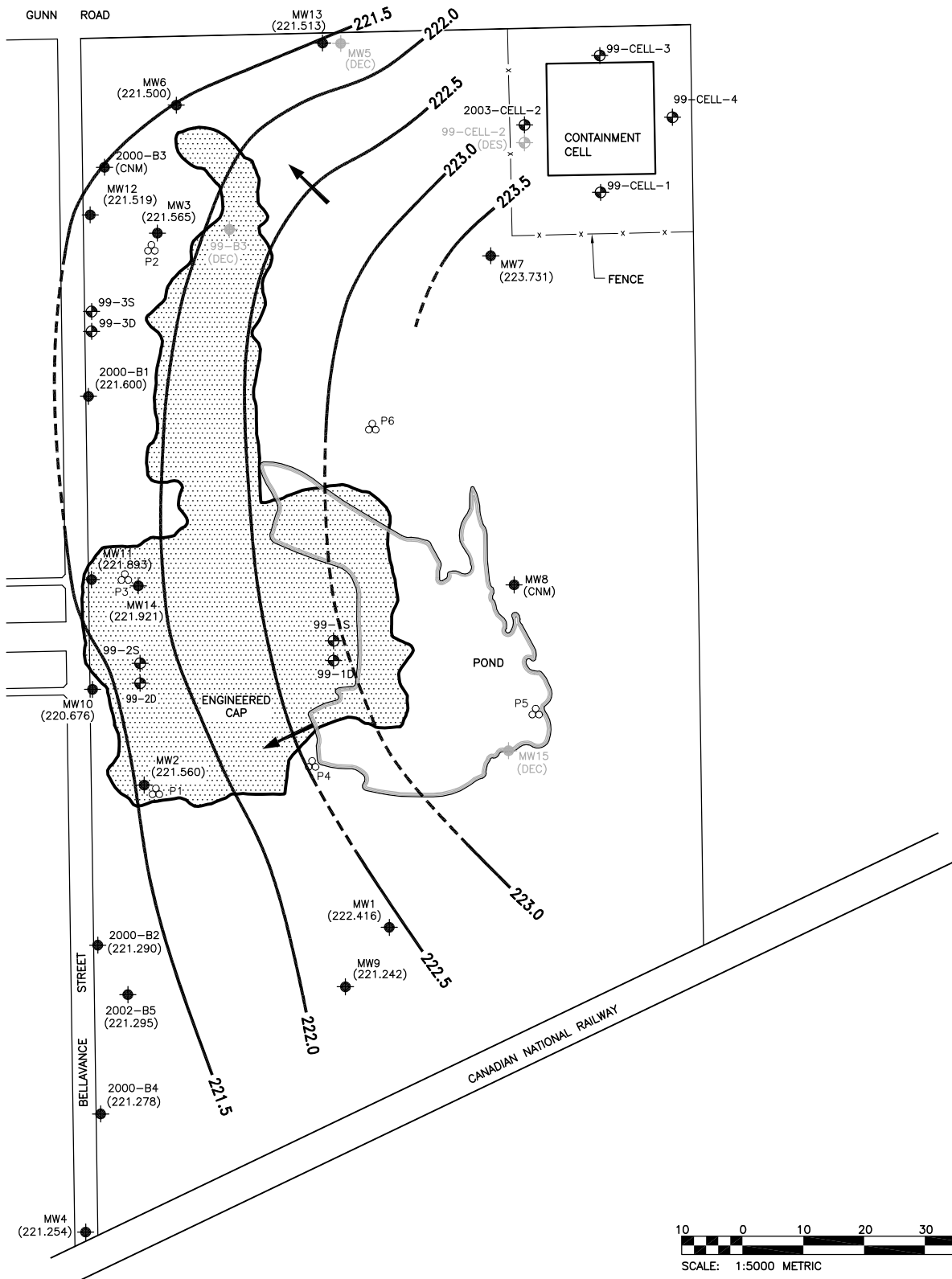
Well Top Elevation 232.798 masl

Sheet 13 of 13

**APPENDIX B**  
**2013 GROUNDWATER FLOW**





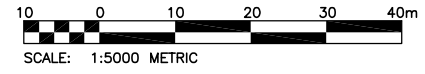


**LEGEND:**

- MW1 BEDROCK MONITORING WELL
- (224.170) GEODETIC GROUNDWATER ELEVATION AT WELL (m)
- (CNM) COULD NOT MONITOR
- (CNL) COULD NOT LOCATE
- 99-CELL-1 OVERBURDEN MONITORING WELL
- MW5 FORMER MONITORING WELL
- P1 FORMER DRAINAGE WELL
- P1 PIEZOMETER NEST
- 224.0 BEDROCK GROUNDWATER SURFACE CONTOUR GEODETIC (m)
- GROUNDWATER FLOW DIRECTION

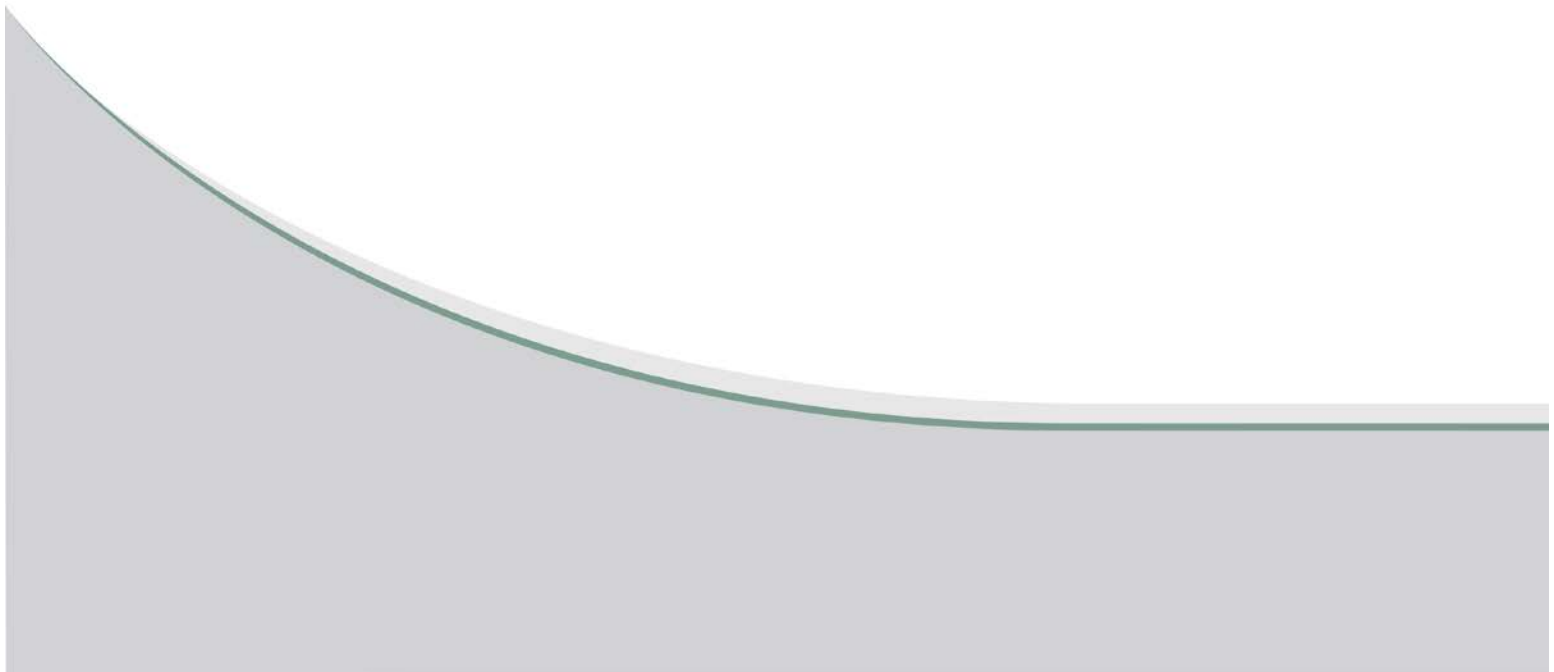
**NOTES:**

1. DRAWING IS BASED ON DILLON ACAD DRAWING FILE: G:\AD\018745\BEDROCK\_1.DWG 02/13/02



0	14/02/06	ISSUED WITH FINAL REPORT	ATM
NO.	YY/MM/DD	DESCRIPTION	BY
REVISIONS / ISSUE			
<b>KGS GROUP</b>		<b>DOMTAR INC.</b>	
CONSULTING ENGINEERS			
2013 ANNUAL ENVIRONMENTAL SITE ACTIVITIES, FORMER CREOSOTE SITE TRANSCONA, WINNIPEG, MB			
DETAILED SITE PLAN SHOWING BEDROCK GROUNDWATER ELEVATIONS			
FEBRUARY 2014		FIGURE 03	REV: 0

**APPENDIX C**  
**ANNUAL SITE INSPECTION PHOTOS**





**Photo 1 – Gunn Road Access Gate at Entrance to Bioreserve – Locked Upon Arrival**



**Photo 2 – Well MW1 – Casing Locked and Welded**





**Photo 3 – Well MW2 – Casing Locked and Welded**



**Photo 4 – Well MW3 – Casing Locked**





**Photo 5 – Well MW4 – Casing Locked**



**Photo 6 – Well MW6 – Casing Locked**





**Photo 7 – Well MW7 – Casing Locked and Welded**



**Photo 8 – Well MW8 – Casing Locked and Welded**





**Photo 9 - Well MW9 – Casing Locked and Welded**



**Photo 10 - Well MW10 – Casing Locked**





**Photo 11 - Well MW11 – Casing Locked**



**Photo 12 - Well MW12 – Casing Locked**





**Photo 13 - Well MW13 – Casing Locked**



**Photo 14 - Well MW14 – Casing Locked and Welded**





**Photo 15 - Well 2000-B1 – Casing Locked**



**Photo 16 - Well 2000-B2 – Casing Locked**





**Photo 17 - Well 2000-B3 – Casing Locked and Welded**



**Photo 18 - Well 2000-B4 – Casing Locked and Welded**





**Photo 19 - Well 2002-B5 – Casing Locked and Welded**



**Photo 20 - Well 99-B1 – Casing Locked**





**Photo 21 – Well 99-B2 – Casing Locked**



**Photo 22 - Wells 99-1S and 99-1D – Casings Locked and Welded**





**Photo 23 - Wells 99-2S and 99-2D – Casings Locked and Welded**



**Photo 24 - Wells 99-3S and 99-3D – Casings Locked and Welded**





**Photo 25 - Well 99-Cell-1 – Casing Locked**



**Photo 26 - Well 2003-Cell-2 – Casing Locked**





**Photo 27 – Well 99-Cell-3 – Casing Locked**



**Photo 28 – Well 99-Cell-4 – Casing Locked**



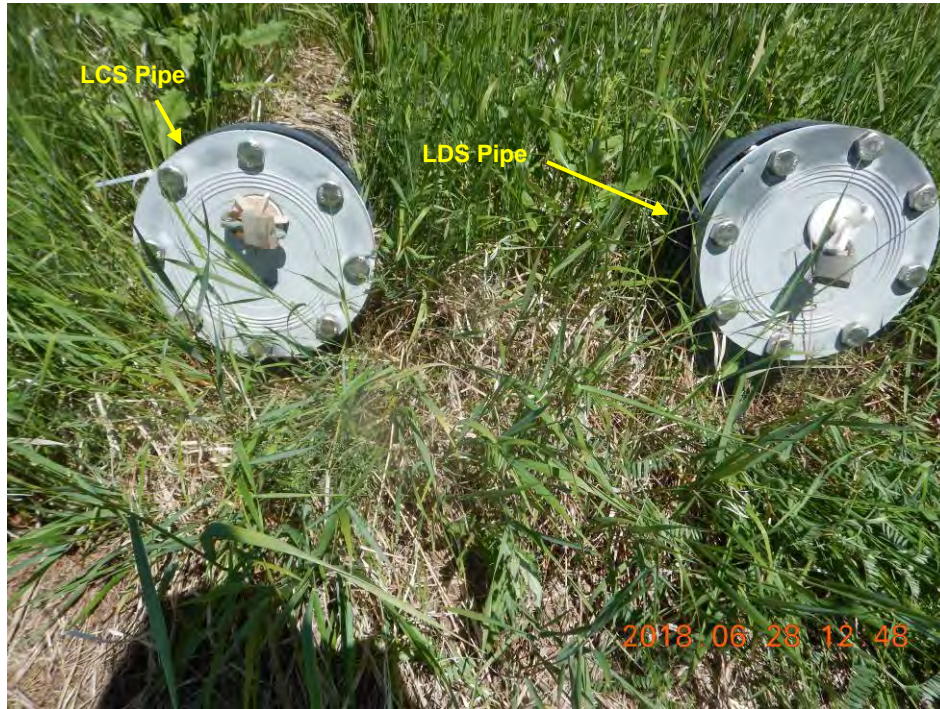


**Photo 29 – Leachate Collection and Leakage Detection System (LCS and LDS) Access Pipes North Side – Locked and Secure**



**Photo 30 – Leachate Collection and Leakage Detection System (LCS and LDS) Access Pipes South Side – Missing LCS cap and lock.**





**Photo 31 – Leachate Collection and Leakage Detection System (LCS and LDS) Access Pipes South Side – Locked and Secure after Cap and Lock Replacement**



**Photo 32 – Containment Cell Area Entrance Gate – Locked at Completion of Cell Inspection**

**APPENDIX D**  
**KGS GROUP INSPECTION REPORTS**

DOMTAR TRANSCONA SITE  
INSPECTION AND MAINTENANCE REPORT

REPORT NUMBER: 01/18	DATE: June 28, 2018
REFERENCE NUMBER:	INSPECTOR: P. Lindell

**LEACHATE COLLECTION SYSTEM**

Measured Leachate Levels – June 28, 2018

Riser Pipe No.1 = 23.77 metres below top of leachate collection riser pipe.  
(north side)

Riser Pipe No.2 = 27.93 metres below top of leachate collection riser pipe.  
(south side)

Leachate Sampling and Analysis YES  NO

Riser Pipe No.1 Sample Date \_\_\_\_\_

Riser Pipe No.2 Sample Date \_\_\_\_\_

Receiving Laboratory \_\_\_\_\_

Sample Submission Date \_\_\_\_\_

Laboratory Analytical Results: Attached YES  NO

Leachate Removal YES  NO

Volume of Leachate Removed = \_\_\_\_\_

Method of Removal: \_\_\_\_\_

Method of Disposal/Treatment: \_\_\_\_\_

DOMTAR TRANSCONA SITE  
INSPECTION AND MAINTENANCE REPORT

REPORT NUMBER: 01/18	DATE: June 28, 2018
REFERENCE NUMBER:	INSPECTOR: P. Lindell

**LEAKAGE DETECTION SYSTEM:**

Measured Leachate Levels – June 28, 2018

Riser Pipe No.1 = 19.92 metres below top of leakage detection riser pipe.  
(north side)

Riser Pipe No.2 = 21.16 metres below top of leakage detection riser pipe.  
(south side)

Leachate Sampling and Analysis    YES     NO

Riser Pipe No.1 Sample Date \_\_\_\_\_

Riser Pipe No.2 Sample Date \_\_\_\_\_

Receiving Laboratory \_\_\_\_\_

Sample Submission Date \_\_\_\_\_

Leachate Removal    YES     NO

Volume of Leachate Removed = \_\_\_\_\_

Method of Removal: \_\_\_\_\_

Method of Disposal/Treatment: \_\_\_\_\_

DOMTAR TRANSCONA SITE  
INSPECTION AND MAINTENANCE REPORT

REPORT NUMBER: 02/18	DATE: October 10, 2018
REFERENCE NUMBER:	INSPECTOR: A. Sinclair

**LEACHATE COLLECTION SYSTEM**

Measured Leachate Levels – October 10, 2018

Riser Pipe No.1 = 24.33 metres below top of leachate collection riser pipe.  
(north side)

Riser Pipe No.2 = 27.76 metres below top of leachate collection riser pipe.  
(south side)

Leachate Sampling and Analysis YES  NO

Riser Pipe No.1 Sample Date \_\_\_\_\_

Riser Pipe No.2 Sample Date \_\_\_\_\_

Receiving Laboratory \_\_\_\_\_

Sample Submission Date \_\_\_\_\_

Laboratory Analytical Results: Attached YES  NO

Leachate Removal YES  NO

Volume of Leachate Removed = \_\_\_\_\_

Method of Removal: \_\_\_\_\_

Method of Disposal/Treatment: \_\_\_\_\_

DOMTAR TRANSCONA SITE  
INSPECTION AND MAINTENANCE REPORT

<b>REPORT NUMBER:</b> 02/18	<b>DATE:</b> October 10, 2018
<b>REFERENCE NUMBER:</b>	<b>INSPECTOR:</b> A. Sinclair

**LEAKAGE DETECTION SYSTEM:**

Measured Leachate Levels – October 10, 2018

Riser Pipe No.1 = 19.95 metres below top of leakage detection riser pipe.  
(north side)

Riser Pipe No.2 = 21.12 metres below top of leakage detection riser pipe.  
(south side)

Leachate Sampling and Analysis    YES     NO

Riser Pipe No.1 Sample Date \_\_\_\_\_

Riser Pipe No.2 Sample Date \_\_\_\_\_

Receiving Laboratory \_\_\_\_\_

Sample Submission Date \_\_\_\_\_

Leachate Removal    YES     NO

Volume of Leachate Removed = \_\_\_\_\_

Method of Removal: \_\_\_\_\_

Method of Disposal/Treatment: \_\_\_\_\_

**APPENDIX E**  
**FORT WHYTE INSPECTION REPORTS**





# FortWhyte Alive

HUMAN NATURE.

## FACSIMILE TRANSMITTAL PAGE

TO:

FAX: PHONE:

*ARIEL MELVIN*

---

DATE:

TOTAL # PAGES:

---

FROM:

*KEN CAOMORE*

RE:

PHONE: (204) 228-8369

FAX: (204) 896-5753

---

*DOMTAR TRANSCONA BIORESERVE*

*SITE REPORTS 2018*

---



**DOMTAR TRANSCONA SITE  
INSPECTION AND MAINTANANCE REPORT**

REPORT NUMBER:	DATE: <b>MAY 1 2018</b>
REFERENCE NUMBER:	INSPECTOR: <b>R. CHOMORE</b>

**ENGINEERED CAP - VISUAL INSPECTION:**

INSPECTION ITEM	LOCATION/STATUS/ ACTION REQUIRED	ACTION COMPLETED DATE
Dry vegetation.	NO	
Dead vegetation.	NO	
Growth of deep rooted vegetation.	NO	
Cracked soil or gulling due to erosion.	NO	
Damage to survey benchmarks.	NO	
Settlement of the grass cover.	NO	
Animal infestation.	NO	
Human damage.	NO	

**ENGINEERED CAP - MAINTENANCE PERFORMED:**

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# DOMTAR TRANSCONA SITE INSPECTION AND MAINTANANCE REPORT

REPORT NUMBER:	DATE: <u>OCT. 1 2018</u>
REFERENCE NUMBER:	INSPECTOR: <u>K. CUDMORE</u>

### SECURE CONTAINMENT CELL COVER - VISUAL INSPECTION:

INSPECTION ITEM	LOCATION/STATUS/ ACTION REQUIRED	ACTION COMPLETED/ DATE
Dry vegetation.	NO	
Dead vegetation.	NO	
Growth of deep rooted vegetation.	NO	
Growth of deep rooted vegetation in the first 10 m of 30 m buffer zone.	NO	
Cracked soil or gulling due to erosion.	NO	
Damage to survey benchmarks.	NO	
Settlement of the grass cover.	NO	
Animal infestation.	NO	
Human damage.	NO	

### SECURE CONTAINMENT CELL COVER - MAINTENANCE PERFORMED:

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# DOMTAR TRANSCONA SITE INSPECTION AND MAINTANANCE REPORT

REPORT NUMBER:	DATE: <i>OCT 1 2018</i>
REFERENCE NUMBER:	INSPECTOR: <i>K. CUDMORE</i>

### ENGINEERED CAP - VISUAL INSPECTION:

INSPECTION ITEM	LOCATION/STATUS/ ACTION REQUIRED	ACTION COMPLETED DATE
Dry vegetation.	<i>NO</i>	
Dead vegetation.	<i>NO</i>	
Growth of deep rooted vegetation.	<i>NO</i>	
Cracked soil or gulling due to erosion.	<i>NO</i>	
Damage to survey benchmarks.	<i>NO</i>	
Settlement of the grass cover.	<i>NO</i>	
Animal infestation.	<i>NO</i>	
Human damage.	<i>NO</i>	

### ENGINEERED CAP - MAINTENANCE PERFORMED:

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**APPENDIX F**  
**LABORATORY CERTIFICATES OF ANALYSES**



KGS Group Consultants (Winnipeg)  
ATTN: Michael Smith  
865 Waverly Street - 3rd Floor  
Winnipeg MB R3T 5P4

Date Received: 10-OCT-18  
Report Date: 22-OCT-18 12:59 (MT)  
Version: FINAL

Client Phone: 204-896-1209

## Certificate of Analysis

Lab Work Order #: L2178717  
Project P.O. #: NOT SUBMITTED  
Job Reference: 18-0953-001  
C of C Numbers:  
Legal Site Desc:

Hua Wo  
Chemistry Laboratory Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2178717-1 2003 CELL-2 Sampled By: ADS on 10-OCT-18 @ 11:30 Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.000060	EMPC	0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	75.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	74.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	82.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	71.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	77.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	100.9		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2178717-2 99-CELL-1 Sampled By: ADS on 10-OCT-18 @ 11:50 Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907

\* 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
L2178717-2 99-CELL-1 Sampled By: ADS on 10-OCT-18 @ 11:50 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	104.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	97.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	106.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	98.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	102.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	99.1		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2178717-3 99-CELL-4 Sampled By: ADS on 10-OCT-18 @ 12:10 Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	80.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	70.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	82.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	75.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	79.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	99.1		40-150	%	17-OCT-18	18-OCT-18	R4285448

\* 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
L2178717-4 99-CELL-3 Sampled By: ADS on 10-OCT-18 @ 12:30 Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	99.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	94.6		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	101.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	92.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	97.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	103.4		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2178717-5 MW-13 Sampled By: ADS on 10-OCT-18 @ 14:00 Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907

\* 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
L2178717-5 MW-13 Sampled By: ADS on 10-OCT-18 @ 14:00 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	79.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	78.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	90.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	73.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	77.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	59.5		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2178717-6 MW-6 Sampled By: ADS on 10-OCT-18 @ 14:30 Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	0.000017		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	83.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	76.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	77.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	77.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	79.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	99.2		40-150	%	17-OCT-18	18-OCT-18	R4285448

\* 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
L2178717-7 MW-10							
Sampled By: ADS on 10-OCT-18 @ 16:00							
Matrix: GW							
<b>Miscellaneous Parameters</b>							
1+2-Methylnaphthalenes	<0.000028		0.000028	mg/L		22-OCT-18	
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.000065		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	83.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	78.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	84.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	78.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	81.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	85.5		40-150	%	17-OCT-18	18-OCT-18	R4285448

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
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**
METHYLNAPS-CALC-WP	Water	PAH-Calculated Parameters	EPA SW 846/8270-GC/MS
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.			
PCP-WT	Water	Pentachlorophenol	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			

\*\* 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
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

### Chain of Custody Numbers:

### 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: L2178717

Report Date: 22-OCT-18

Page 1 of 3

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

Contact: Michael Smith

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PAH,PANH-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R4290907</b>							
<b>WG2903614-2 LCS</b>								
1-Methyl Naphthalene			97.4		%		60-130	18-OCT-18
2-Methyl Naphthalene			97.0		%		60-130	18-OCT-18
Acenaphthene			89.9		%		60-130	18-OCT-18
Acenaphthylene			82.7		%		60-130	18-OCT-18
Anthracene			76.2		%		60-130	18-OCT-18
Acridine			84.1		%		60-130	18-OCT-18
Benzo(a)anthracene			85.4		%		60-130	18-OCT-18
Benzo(a)pyrene			76.3		%		60-130	18-OCT-18
Benzo(b&j)fluoranthene			84.4		%		60-130	18-OCT-18
Benzo(g,h,i)perylene			87.5		%		60-130	18-OCT-18
Benzo(k)fluoranthene			86.1		%		60-130	18-OCT-18
Chrysene			117.7		%		60-130	18-OCT-18
Dibenzo(a,h)anthracene			102.0		%		60-130	18-OCT-18
Fluoranthene			94.9		%		60-130	18-OCT-18
Fluorene			89.0		%		60-130	18-OCT-18
Indeno(1,2,3-cd)pyrene			81.3		%		60-130	18-OCT-18
Naphthalene			93.1		%		50-130	18-OCT-18
Phenanthrene			91.3		%		60-130	18-OCT-18
Pyrene			94.6		%		60-130	18-OCT-18
Quinoline			81.5		%		60-130	18-OCT-18
<b>WG2903614-1 MB</b>								
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-OCT-18
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-OCT-18
Acenaphthene			<0.000020		mg/L		0.00002	18-OCT-18
Acenaphthylene			<0.000020		mg/L		0.00002	18-OCT-18
Anthracene			<0.000010		mg/L		0.00001	18-OCT-18
Acridine			<0.000020		mg/L		0.00002	18-OCT-18
Benzo(a)anthracene			<0.000010		mg/L		0.00001	18-OCT-18
Benzo(a)pyrene			<0.000005C		mg/L		0.000005	18-OCT-18
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	18-OCT-18
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	18-OCT-18
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	18-OCT-18
Chrysene			<0.000020		mg/L		0.00002	18-OCT-18
Dibenzo(a,h)anthracene			<0.000005C		mg/L		0.000005	18-OCT-18



## Quality Control Report

Workorder: L2178717

Report Date: 22-OCT-18

Page 2 of 3

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PAH,PANH-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R4290907</b>							
<b>WG2903614-1</b>	<b>MB</b>							
Fluoranthene			<0.000020		mg/L		0.00002	18-OCT-18
Fluorene			<0.000020		mg/L		0.00002	18-OCT-18
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	18-OCT-18
Naphthalene			<0.000050		mg/L		0.00005	18-OCT-18
Phenanthrene			<0.000050		mg/L		0.00005	18-OCT-18
Pyrene			<0.000010		mg/L		0.00001	18-OCT-18
Quinoline			<0.000020		mg/L		0.00002	18-OCT-18
Surrogate: Acenaphthene d10			87.4		%		40-130	18-OCT-18
Surrogate: Acridine d9			80.6		%		40-130	18-OCT-18
Surrogate: Chrysene d12			87.8		%		40-130	18-OCT-18
Surrogate: Naphthalene d8			83.4		%		40-130	18-OCT-18
Surrogate: Phenanthrene d10			83.8		%		40-130	18-OCT-18
<b>PCP-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R4285448</b>							
<b>WG2905710-2</b>	<b>LCS</b>							
Pentachlorophenol			123.8		%		50-140	18-OCT-18
<b>WG2905710-3</b>	<b>LCSD</b>	<b>WG2905710-2</b>						
Pentachlorophenol		123.8	121		%	2.5	50	18-OCT-18
<b>WG2905710-1</b>	<b>MB</b>							
Pentachlorophenol			<0.50		ug/L		0.5	18-OCT-18
Surrogate: 2,4,6-Tribromophenol			89.8		%		40-150	18-OCT-18

# Quality Control Report

Workorder: L2178717

Report Date: 22-OCT-18

Page 3 of 3

## Legend:

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

## Hold Time Exceedances:

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

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

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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.





Label here only

Report To		Report Format / Distribution				Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply					
Contact and company name below will appear on the final report Company: <b>KGS Group</b> Contact: <b>MIKE SMITH</b> Phone: <b>204 996-1809</b>		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX				<input checked="" type="checkbox"/> Regular [R] <input type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply		<input type="checkbox"/> 4 day [P4] <input type="checkbox"/> 3 day [P3] <input type="checkbox"/> 2 day [P2]		<input type="checkbox"/> 1 Business day [E1] <input type="checkbox"/> Same Day, Weekend or Statutory holiday [E0]	
Company address below will appear on the final report Street: <b>865 WAVERLEY ST, BROOK LANE</b> City/Province: <b>WINNIPEG, MB</b> Postal Code: <b>R3T 5P4</b>		Email 1 or Fax: <b>M SMITH@KGSGROUP.COM</b> Email 2: <b>DL-DLELL@KGSGROUP.COM</b> Email 3: <b>A SINGH@KGSGROUP.COM</b>				Date and Time Required for all E&P TATs: _____					
Invoice To: Same as Report To <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Copy of Invoice with Report <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: <b>W MACQUARRIE@KGSGROUP.COM</b> Email 2: _____				For tests that cannot be performed according to the service level selected, you will be contacted.					
Project Information ALS Account # / Quote #: <b>Q68268</b> Job #: <b>18-0953-C01</b> PO / AFE: _____ LSD: _____		Oil and Gas Required Fields (client use) AFE/Cost Center: _____ PO#: _____ Major/Minor Code: _____ Routing Code: _____ Requisitioner: _____ Location: _____				Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below					
ALS Lab Work Order # (lab use only): _____		ALS Contact: <b>CRAB</b>		Sampler: <b>AOS</b>		<p style="writing-mode: vertical-rl; transform: rotate(180deg);">PAM PCP-WT</p>		Number of Containers			
ALS Sample # (lab use only):		Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mm-yy)		Time (hh:mm)				Sample Type	
		2003 CELL-2		OCT 10/19		11:30		AW			
		99-Cell-1		↓		11:50		X			
		99-Cell-4				12:10		X			
		99-Cell-3				12:30		X			
		MW-13				14:00		X			
		MW-6				14:30		X			
		MW-10				16:00		X			
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)				SAMPLE CONDITION AS RECEIVED (lab use only)					
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input type="checkbox"/>					
Are samples for human drinking water use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO						Initial Cooler Temperatures °C: 6.3		Final Cooler Temperatures °C:			
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)					
Released by: [Signature] Date: <b>OCT 10/18</b>		Received by: [Signature] Date: <b>10-10-18</b>		Time: <b>4:20</b>		Received by:		Date:			



KGS Group Consultants (Winnipeg)  
ATTN: Michael Smith  
865 Waverly Street - 3rd Floor  
Winnipeg MB R3T 5P4

Date Received: 11-OCT-18  
Report Date: 22-OCT-18 11:41 (MT)  
Version: FINAL

Client Phone: 204-896-1209

## Certificate of Analysis

Lab Work Order #: L2179416  
Project P.O. #: NOT SUBMITTED  
Job Reference: 18-0953-001  
C of C Numbers:  
Legal Site Desc:

Hua Wo  
Chemistry Laboratory Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 1329 Niakwa Road East, Unit 12, Winnipeg, MB R2J 3T4 Canada | Phone: +1 204 255 9720 | Fax: +1 204 255 9721  
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2179416-1 MW-3 Sampled By: ADS on 11-OCT-18 @ 09:30 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	0.000239		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.00809		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	0.00137		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	0.000703		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	0.000411		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	0.000092		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	0.000062		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	0.000087		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	0.000940		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	0.00494		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	0.000760		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	0.000286		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	0.000679		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	0.000177	EMPC	0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	75.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	71.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	76.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	72.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	74.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	97.7		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-2 MW-11 Sampled By: ADS on 11-OCT-18 @ 10:15 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907

\* 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
L2179416-2 MW-11 Sampled By: ADS on 11-OCT-18 @ 10:15 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	98.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	90.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	99.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	93.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	95.6		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	94.1		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-3 MW-4 Sampled By: ADS on 11-OCT-18 @ 11:30 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	85.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	85.6		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	94.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	79.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	82.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	99.5		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-4 2000-B2 Sampled By: ADS on 11-OCT-18 @ 12:10 Matrix: GW							

\* 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
L2179416-4 2000-B2							
Sampled By: ADS on 11-OCT-18 @ 12:10							
Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.000039		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	0.000013		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	82.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	78.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	83.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	76.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	80.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	88.2		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-5 2000-B1							
Sampled By: ADS on 11-OCT-18 @ 12:50							
Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907

\* 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
L2179416-5 2000-B1 Sampled By: ADS on 11-OCT-18 @ 12:50 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	86.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	81.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	87.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	81.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	85.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	90.4		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-6 MW-12 Sampled By: ADS on 11-OCT-18 @ 13:20 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	0.000024		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.0106		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	0.00130		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	0.000425		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	0.000033		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	0.000652		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	0.00672		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	0.000059		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	0.000309		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	0.000145	EMPC	0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	89.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	86.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	94.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	86.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	88.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	91.8		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-7 99-B2 Sampled By: ADS on 11-OCT-18 @ 14:30 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							

\* 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
L2179416-7 99-B2 Sampled By: ADS on 11-OCT-18 @ 14:30 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.00331		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	0.000179		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	0.000048		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	0.000064		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	0.000557		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	0.000021		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	89.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	84.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	90.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	82.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	87.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	17-OCT-18	18-OCT-18	R4285448
Surrogate: 2,4,6-Tribromophenol	87.2		40-150	%	17-OCT-18	18-OCT-18	R4285448
L2179416-8 99-B1 Sampled By: ADS on 11-OCT-18 @ 15:00 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	0.000099		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.000394		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	0.000062		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	0.000017		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	0.00109		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	0.000211		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	0.00281		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907

\* 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
L2179416-8 99-B1 Sampled By: ADS on 11-OCT-18 @ 15:00 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	0.00243		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	79.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	77.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	83.6		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	77.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	79.7		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	18-OCT-18	22-OCT-18	R4288076
Surrogate: 2,4,6-Tribromophenol	95.4		40-150	%	18-OCT-18	22-OCT-18	R4288076
L2179416-9 TRIP BLANK Sampled By: ADS on 11-OCT-18 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	86.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	80.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	91.3		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	80.8		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	84.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	18-OCT-18	22-OCT-18	R4288076
Surrogate: 2,4,6-Tribromophenol	88.9		40-150	%	18-OCT-18	22-OCT-18	R4288076
L2179416-10 FIELD BLANK Sampled By: ADS on 11-OCT-18 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							

\* 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
L2179416-10 FIELD BLANK							
Sampled By: ADS on 11-OCT-18							
Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	93.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	85.6		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	96.0		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	86.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	90.1		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	18-OCT-18	22-OCT-18	R4288076
Surrogate: 2,4,6-Tribromophenol	89.8		40-150	%	18-OCT-18	22-OCT-18	R4288076
L2179416-11 MW-100							
Sampled By: ADS on 11-OCT-18 @ 12:00							
Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
1-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
2-Methyl Naphthalene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthene	0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Acenaphthylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Acridine	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)anthracene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(a)pyrene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(b&j)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(g,h,i)perylene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Benzo(k)fluoranthene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Chrysene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Dibenzo(a,h)anthracene	<0.0000050		0.0000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluoranthene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Fluorene	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
Indeno(1,2,3-cd)pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Naphthalene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907

\* 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
L2179416-11 MW-100 Sampled By: ADS on 11-OCT-18 @ 12:00 Matrix: GW							
<b>Polyaromatic Hydrocarbons (PAHs)</b>							
Phenanthrene	<0.000050		0.000050	mg/L	12-OCT-18	18-OCT-18	R4290907
Pyrene	<0.000010		0.000010	mg/L	12-OCT-18	18-OCT-18	R4290907
Quinoline	<0.000020		0.000020	mg/L	12-OCT-18	18-OCT-18	R4290907
B(a)P Total Potency Equivalent	<0.000030		0.000030	mg/L	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acenaphthene d10	99.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Acridine d9	99.4		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Chrysene d12	109.9		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Naphthalene d8	90.5		40-130	%	12-OCT-18	18-OCT-18	R4290907
Surrogate: Phenanthrene d10	97.2		40-130	%	12-OCT-18	18-OCT-18	R4290907
<b>Pentachlorophenol</b>							
Pentachlorophenol	<0.50		0.50	ug/L	18-OCT-18	22-OCT-18	R4288076
Surrogate: 2,4,6-Tribromophenol	89.9		40-150	%	18-OCT-18	22-OCT-18	R4288076

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

## Reference Information

### Sample Parameter Qualifier Key:

Qualifier	Description
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**
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.			
PCP-WT	Water	Pentachlorophenol	SW846 8270
Aqueous samples are extracted and extracts are analyzed on GC/MSD.			

\*\* 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
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA
WP	ALS ENVIRONMENTAL - WINNIPEG, MANITOBA, CANADA

### Chain of Custody Numbers:

### 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: L2179416

Report Date: 22-OCT-18

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

Contact: Michael Smith

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PAH,PANH-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R4290907</b>							
<b>WG2903614-2</b>	<b>LCS</b>							
1-Methyl Naphthalene			97.4		%		60-130	18-OCT-18
2-Methyl Naphthalene			97.0		%		60-130	18-OCT-18
Acenaphthene			89.9		%		60-130	18-OCT-18
Acenaphthylene			82.7		%		60-130	18-OCT-18
Anthracene			76.2		%		60-130	18-OCT-18
Acridine			84.1		%		60-130	18-OCT-18
Benzo(a)anthracene			85.4		%		60-130	18-OCT-18
Benzo(a)pyrene			76.3		%		60-130	18-OCT-18
Benzo(b&j)fluoranthene			84.4		%		60-130	18-OCT-18
Benzo(g,h,i)perylene			87.5		%		60-130	18-OCT-18
Benzo(k)fluoranthene			86.1		%		60-130	18-OCT-18
Chrysene			117.7		%		60-130	18-OCT-18
Dibenzo(a,h)anthracene			102.0		%		60-130	18-OCT-18
Fluoranthene			94.9		%		60-130	18-OCT-18
Fluorene			89.0		%		60-130	18-OCT-18
Indeno(1,2,3-cd)pyrene			81.3		%		60-130	18-OCT-18
Naphthalene			93.1		%		50-130	18-OCT-18
Phenanthrene			91.3		%		60-130	18-OCT-18
Pyrene			94.6		%		60-130	18-OCT-18
Quinoline			81.5		%		60-130	18-OCT-18
<b>WG2903614-1</b>	<b>MB</b>							
1-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-OCT-18
2-Methyl Naphthalene			<0.000020		mg/L		0.00002	18-OCT-18
Acenaphthene			<0.000020		mg/L		0.00002	18-OCT-18
Acenaphthylene			<0.000020		mg/L		0.00002	18-OCT-18
Anthracene			<0.000010		mg/L		0.00001	18-OCT-18
Acridine			<0.000020		mg/L		0.00002	18-OCT-18
Benzo(a)anthracene			<0.000010		mg/L		0.00001	18-OCT-18
Benzo(a)pyrene			<0.000050		mg/L		0.000005	18-OCT-18
Benzo(b&j)fluoranthene			<0.000010		mg/L		0.00001	18-OCT-18
Benzo(g,h,i)perylene			<0.000020		mg/L		0.00002	18-OCT-18
Benzo(k)fluoranthene			<0.000010		mg/L		0.00001	18-OCT-18
Chrysene			<0.000020		mg/L		0.00002	18-OCT-18
Dibenzo(a,h)anthracene			<0.000050		mg/L		0.000005	18-OCT-18





## Quality Control Report

Workorder: L2179416

Report Date: 22-OCT-18

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Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
<b>PAH,PANH-WP</b>		<b>Water</b>						
<b>Batch</b>	<b>R4290907</b>							
<b>WG2903614-1</b>	<b>MB</b>							
Fluoranthene			<0.000020		mg/L		0.00002	18-OCT-18
Fluorene			<0.000020		mg/L		0.00002	18-OCT-18
Indeno(1,2,3-cd)pyrene			<0.000010		mg/L		0.00001	18-OCT-18
Naphthalene			<0.000050		mg/L		0.00005	18-OCT-18
Phenanthrene			<0.000050		mg/L		0.00005	18-OCT-18
Pyrene			<0.000010		mg/L		0.00001	18-OCT-18
Quinoline			<0.000020		mg/L		0.00002	18-OCT-18
Surrogate: Acenaphthene d10			87.4		%		40-130	18-OCT-18
Surrogate: Acridine d9			80.6		%		40-130	18-OCT-18
Surrogate: Chrysene d12			87.8		%		40-130	18-OCT-18
Surrogate: Naphthalene d8			83.4		%		40-130	18-OCT-18
Surrogate: Phenanthrene d10			83.8		%		40-130	18-OCT-18
<b>PCP-WT</b>		<b>Water</b>						
<b>Batch</b>	<b>R4285448</b>							
<b>WG2905710-2</b>	<b>LCS</b>							
Pentachlorophenol			123.8		%		50-140	18-OCT-18
<b>WG2905710-3</b>	<b>LCSD</b>	<b>WG2905710-2</b>						
Pentachlorophenol		123.8	121		%	2.5	50	18-OCT-18
<b>WG2905710-1</b>	<b>MB</b>							
Pentachlorophenol			<0.50		ug/L		0.5	18-OCT-18
Surrogate: 2,4,6-Tribromophenol			89.8		%		40-150	18-OCT-18
<b>Batch</b>	<b>R4288076</b>							
<b>WG2906845-2</b>	<b>LCS</b>							
Pentachlorophenol			120.3		%		50-140	19-OCT-18
<b>WG2906845-3</b>	<b>LCSD</b>	<b>WG2906845-2</b>						
Pentachlorophenol		120.3	107		%	12	50	19-OCT-18
<b>WG2906845-1</b>	<b>MB</b>							
Pentachlorophenol			<0.50		ug/L		0.5	19-OCT-18
Surrogate: 2,4,6-Tribromophenol			91.9		%		40-150	19-OCT-18

# Quality Control Report

Workorder: L2179416

Report Date: 22-OCT-18

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## Legend:

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

## Hold Time Exceedances:

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

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

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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.



L2179416-COFC

<b>Report To</b> Contact and company name below will appear on the final report Company: <b>KES GROUP / MIKE SMITH</b> Contact: <b>MIKE SMITH</b> Phone: <b>204 996-1209</b> <small>Company address below will appear on the final report</small>		<b>Report Format / Distribution</b> Select Report Format: <input checked="" type="checkbox"/> PDF <input type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL) Quality Control (QC) Report with Report <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: <b>M.SMITH@KESGROUP.COM</b> Email 2: <b>PLINDELLE@KESGROUP.COM</b> Email 3: <b>TSINCLAIR@KESGROUP.COM</b>		<small>Service Level Below - Please confirm all E&amp;P TATs with your AM - surcharges will apply</small> Regular (R) <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply Priority (Business Days): 4 day (P4) <input type="checkbox"/> 3 day (P3) <input type="checkbox"/> 2 day (P2) <input type="checkbox"/> Emergency: 1 Business day (E1) <input type="checkbox"/> Same Day, Weekend or Statutory holiday (E0) <input type="checkbox"/>	
Street: <b>865 WAVERLEY ST, 3RD FLOOR</b> City/Province: <b>WINNIPEG, MB</b> Postal Code: <b>R3T 5P4</b>		Invoice To: Same as Report To <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Copy of invoice with Report <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Company: <b>KES GROUP</b> Contact: <b>BILL MACQUARRIE</b>		Invoice Distribution: Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX Email 1 or Fax: <b>W.MACQUARRIE@KESGROUP.COM</b> Email 2:	
<b>Project Information</b> ALS Account # / Quote #: <b>Q 68200</b> Job #: <b>18-0953-001</b> PO / AFE: LSD:		<b>Oil and Gas Required Fields (client use)</b> AFE/Cost Center: PO# Major/Minor Code: Routing Code: Requisitioner: Location:		<b>Analysis Request</b> <small>Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below</small>	
ALS Lab Work Order # (lab use only)		ALS Contact: <b>CRAIG</b> Sampler: <b>ADS</b>		P AH P CP - WT Number of Containers:	
<b>ALS Sample #</b> (lab use only)	<b>Sample Identification and/or Coordinates</b> <small>(This description will appear on the report)</small>	<b>Date</b> <small>(dd-mm-yy)</small>	<b>Time</b> <small>(hh:mm)</small>	<b>Sample Type</b>	(Grid for Analysis Request)
	MW-3	Oct 11/18	09:30	GW	X X
	MW-11		10:15		X X
	MW-4		11:30		X X
	2000-B2		12:10		X X
	2000-B1		12:50		X X
	MW-12		13:20		X X
	99-B2		14:30		X X
	99-B1		15:00		X X
	TRIP BLANK				X X
	F.FLD BLANK				X X
	MW-100		17:00		X X

<b>Drinking Water (DW) Samples<sup>1</sup> (client use)</b> Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO Are samples for human drinking water use? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		<b>Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)</b>		<b>SAMPLE CONDITION AS RECEIVED (lab use only)</b> Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input type="checkbox"/> INITIAL COOLER TEMPERATURES °C: <b>4.9</b> FINAL COOLER TEMPERATURES °C:	
<b>SHIPMENT RELEASE (client use)</b> Released by: <b>[Signature]</b> Date: <b>09/11/18</b> Time: <b>1515</b>		<b>INITIAL SHIPMENT RECEPTION (lab use only)</b> Received by: <b>[Signature]</b> Date: <b>10/11/18</b> Time: <b>2:10</b>		<b>FINAL SHIPMENT RECEPTION (lab use only)</b> Received by: _____ Date: _____ Time: _____	

**KGS**  
GROUP  
CONSULTING  
ENGINEERS

