2015 Monitoring Report
Jones Road Landfill Site

Part of Lots 1 and 2 Concession I,
and Part of Lots 1 and 2, Concession II,
Townships of Pettypiece and Jackman,
District of Kenora

Prepared for:
The City of Kenora

Prepared by:
Azimuth Environmental
Consulting, Inc.

June 2015

AEC 15-020

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

June 10, 2015 AEC 15-020

City of Kenora
Waste Management Department
60 14th Street
Kenora, Ontario
P9N 4M9

Attention: Mukesh Pokharel, P.Eng.
Environmental Supervisor

Re: **2015 Report on the Monitoring Programs at the Jones Road Landfill Site**

Dear Mr. Pokharel:

Azimuth Environmental Consulting, Inc. (Azimuth) is pleased to present our report on the 2012 - 2014 monitoring program conducted at the Jones Road Landfill Site. In general, the monitoring data obtained over this period indicates that the landfill is not causing unacceptable impact on the surrounding environment. Currently, no quantifiable impacts to the ground water regime are observed within either the landfill footprint or at monitors situated immediately downgradient of the waste cells. In addition, only minor impacts were observed at SW-1 (closest to fill area), which are assumed to be a result of the construction/demolition and sewage sludge waste and the recent addition of municipal waste. Slight water quality impacts were also measured at SW-2 and SW-3 although to a much lesser degree than observed at SW-1.

We would like to thank you for the opportunity to complete this project. If you have any questions or comments, please contact the undersigned.

85 Bayfield Street, Suite 400, Barrie, Ontario L4M 3A7
telephone: (705) 721-8451 • fax: (705) 721-8926 • info@azimuthenvironmental.com • www.azimuthenvironmental.com

Yours truly,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Colin Ross, B.Sc., P.Geo.
Hydrogeologist

Jennifer Thompson, M.Sc.,G.I.T..
Hydrogeologist

Attach:

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1.0 INTRODUCTION & BACKGROUND

The following information is provided as a summary of previous investigations to allow the reader to review this report in context. For more complete information, the reader should review the original documentation (see Section 5.0 References).

1.1 Location

The Jones Road landfill site is located immediately to the north of Highway 671 (Jones Road), and approximately 22 km northeast of the City of Kenora. Specifically, the site is located upon Part of Lots 1 and 2 of Concession I, and Part of Lots 1 and 2 of Concession II, in the Townships of Pettypiece and Jackman, of the District of Kenora (Figure 1). Construction of the site began on June 1, 2000, and was essentially complete by the end of the calendar year. The site is operated by the City of Kenora Solid Waste Department and is licensed by the Ministry of the Environment (Ministry) to receive "domestic, commercial, non-hazardous solid industrial and institutional, processed organic sewage sludge, sludge from future municipal or provincial fresh water treatment facilities, non-pathological agricultural and bio-medical, and grit and screenings from street cleaning and sediment basin clean-outs" under Certificate of Approval #A612018 (replaced C of A #A612016 (former MNR landfill)).

1.2 Geology

The Jones Road landfill site is situated within an interconnected bog/wetland complex that is surrounded by various bedrock ridges and knobs. In 1996, the local Quaternary and bedrock geology was characterized by Fenco MacLaren Inc. (Fenco) during an extensive field evaluation of the property. During this evaluation, they observed that the overburden within the bog was stratified, with three predominant layers observed, each of which is discussed in more detail below.

1.2.1 Peat

The surficial material existing within the bog consists of a dark brown to black peat. Field observations of the material indicate that the peat is fibrous at surface, consisting primarily of undecomposed organic material (i.e., rootlets, leaf litter). With increasing depth, the material becomes more hemic (i.e., muckier) as the proportion of decomposed material increases. The thickness of the peat within the bog was assessed through drilling and seismic monitoring by Fenco, and was found to range from essentially zero at the outer boundary to greater than 3 m at the center of the bog.

Testing of the vertical hydraulic conductivity of the peat was also conducted by Fenco during their evaluation. The results of this testing indicated a rate of $5x10^{-7}$ to $9x10^{-8}$ m/s under natural site conditions, given a porosity range of 0.81 to 0.95. Simulation of the vertical stress that the waste will potentially have upon the peat was also assessed through consolidation of the material under pressures of up to 800 kPa. In response to compaction, the vertical hydraulic conductivity of the material was observed to decrease by approximately three orders of magnitude to $5x10^{-11}$ m/s. The application of vertical pressure upon the peat also resulted in a decrease in the porosity of the material to about 0.67.

The horizontal hydraulic conductivity of the peat was only estimated during excavation of the peat, and was inferred to be much greater than vertical, in the order of about 10^{-5} m/s.

1.2.2 Clayey Silt

A layer of clayey silt exists beneath the surficial peat. Colouration of this material is variable, and provides an indicator of the degree of weathering the material has undergone. Unweathered material within this layer is generally blue-grey, while the weathered material possessed a green-brown colouration. During drilling by Fenco in 1996, it was determined that the material becomes siltier with depth, and that several thin, discontinuous sand seams were observed within the profile. The thickness of this material was found to range from approximately 2 to 8 m.

As with the overlying peat, vertical hydraulic conductivity testing was conducted in natural conditions as well as under the simulated load of the waste (i.e., pressures of up to 800 kPa). This testing indicated a vertical hydraulic conductivity of $2x10^{-9}$ to $3x10^{-9}$ m/s under natural conditions, while under load, a decrease of approximately three orders of magnitude was observed ($8x10^{-12}$ m/s). The application of 800 kPa of pressure also resulted in a decrease in the void ratio of the material by two-thirds, suggesting that consolidation of the material will be relatively rapid in response to the increased loading pressure of the waste. This consolidation will result in a rapid increase in the tensile strength of the material; however it will also result in a substantial decrease in its permeability to the underlying sediments.

1.2.3 Silty Sand Till

A basal layer of silty sand till exists between the clayey silt layer and the bedrock. The till is locally gravelly, and possesses several discontinuous lenses and layers of sand throughout its profile. The material also appears more lacustrine in nature at sporadic

locales throughout the site. The thickness of this material underlying the bog at the landfill site, as determined by Fenco, ranges from approximately 2 to 30 m.
The hydraulic conductivity of the till was determined through field and laboratory testing to range from $2x10^{-5}$ to $4x10^{-8}$ m/s, with a geometric mean of $8x10^{-7}$ m/s. Average linear ground water velocity in this unit ranges between 1 and 50 m/year based on the results provided.

1.2.4 Bedrock

The bedrock is granodioritic in composition (Barnett, *et al.*, 1991), and occurs at depths ranging from surficial exposure to greater than 20 m (based upon drilling and seismic monitoring) (Fenco, 1996). The rock quality designation (RQD) of the bedrock was noted by Fenco during coring of the bedrock at three locations throughout the area. RQD ranged from 63% to 100% within the three locations, suggesting that the bedrock is not highly fractured. Hydraulic conductivity testing was conducted by Fenco upon two wells drilled into the bedrock, indicating a range of $4x10^{-7}$ to $9x10^{-8}$m/s, with a geometric mean of $2x10^{-7}$m/s.

1.2.5 Hydrogeology

Overburden ground water flow in the vicinity of the property is controlled by the bedrock topography. Active natural ground water flow is restricted primarily to within the till, with the bedrock forming a lower boundary to the overburden aquifer. As discussed above, the mean hydraulic conductivity of the till and bedrock (i.e. bulk hydraulic conductivity, K) units are $8x10^{-7}$ m/s and $2x10^{-7}$ m/s, respectively. The landfill is located near the top of a small, unnamed watershed. Ground water flow within this watershed is directed toward the northeast, parallel to the apex of a small bedrock valley (Figure 2). Flow rates range within the till range from 1 to 50 m/year. Leachate flow will be northeasterly with the migration of ground water toward an area of surface water existing immediately to the west of a culvert passing beneath Jones Road, at a distance of about 750 m northeast of the waste cells. Migration time of ground water from the landfill to the surface water within the peat is estimated at approximately 5 to 10 years. During the migration period, leachate contaminants will be attenuated and biodegraded.

1.2.6 Hydrology

As discussed in Section 1.2.5, the site is near the top of a small, unnamed watershed that is situated between Crystal Bay (Silver Lake) to the north and Morgan Lake to the south. The watershed encompasses a total area of approximately 4 km^2, and ultimately discharges into Morgan Lake at a lateral distance of approximately 1.9 km southeast of the waste. Runoff from the area of the waste is directed primarily to the northeast through a bog/wetland complex toward a small surface water pond situated immediately

upgradient of the Jones Road culvert. Surface water flow then continues northeasterly through a series of channels, bogs, wetlands, and beaver ponds a further 700 m before finally shifting southward toward the eastern end of Morgan Lake (1,600 m). Morgan Lake lies within the larger Nelson River drainage system that encompasses the Lake Winnipeg River system and its tributaries, including the Little Black Sturgeon River, which flows both into and out of Morgan Lake.

To the northeast of the waste cells, a depression is noted in the topography (known as "the saddle") that may allow for a portion of the surface drainage from the site to migrate into Crystal Bay during spring freshet or in response to large precipitation events. Crystal Bay is located approximately 350 m north of the waste cells.

Along the southern extent of the site parallel to Jones Road, a portion of the landfill property is situated within a second watershed to the south. Flow within this watershed drains southwesterly and ultimately into the western end of Morgan Lake (~450 m). To note, the boundary of this watershed lies greater than 50 m south of the waste cells.

2.0 SITE DESIGN & OPERATIONS

The Jones Road landfill began accepting construction and demolition wastes on November 27, 2000 to provide a stable footprint for the waste cells. The site continued to collect these same waste materials through 2001 to 2009. As of November 18, 2009, the haul destination for all solid waste was revised from the Brady Road Landfill Site in Winnipeg, to the Jones Road Landfill. A summary of total annual quantities of waste received on a monthly basis at the Site over the period of 2012 - 2014 can be found in Appendix C.

The landfill has already filled sequence A-D, and is currently filling sequence E as per the SNC-Lavalin monitoring plan (September, 1999) (Figure 3), while the final contours are provided in Appendix L, which is from the Design and Operations Plan (Fenco McLaren. 1997). A 2013 Ministry inspection indicated there was deviation from the design plan, however it is noted that the City has since endeavoured to bring this back into compliance.

Based on scale readings from the incoming waste at the Site, the current waste mass as of December 2014 is 138,617 tonnes, or 17% of the total waste capacity (810,600 tonnes). The resulting remaining capacity for the Site based on average waste desnisty and the final contour dimensions of the Site is 671,983 tonnes. Given the average annual waste

acceptance rate from 2010 to 2014 of 21,900 tonnes, there is a remaining lifespan for the Site of approximately 31 years.

The site possesses an approved waste footprint of approximately 13.1 ha (Figure 4). As noted in Section 1.1, the site operates under Ministry Certificate of Approval #A612018 (Appendix B). No complaints concerning the operation of the Jones Road Landfill Site were received by the City of Kenora over the period of 2012 – 2014.

2.1 Operation Changes

The Jones Road Landfill is currently being operated and filled in accordance to the requirements established in the CoA as well as the Design and Operations Plan (Fenco McLaren. 1997). There have been no significant changes in operations, sequencing, equipment, or procedures made or produced at the Jones Road Landfill. No operating difficulties have been encountered over the course of 2012 – 2014. It is noted that the City is currently looking into establishing a composting operation at the Site to reduce the input of organic wastes (i.e. yard wastes, leaf, wood chips, etc). in 2014, the City submitted an application to include these operations at the Site, however, at the time of report issuance, no approval has been granted.

2.2 Cover Requirements, Erosion Protection

Over the period of 2012 – 2014, cover material was added as necessary to aid in grading and site access. Dewatered sewage sludge was also added to provide a relatively level working surface. No erosion was noted in over the period of 2012 - 2014, which is expected given that the landfill is only in the infancy of its lifespan (i.e., the volume of material held within the waste cells is small and of little vertical height). Cover material and erosion protection material is inspected regularly by landfill staff.

3.0 SUMMARY OF 2012-2014 MONITORING PROGRAMS

The 2012-2014 monitoring of ground water and surface water was facilitated through the collection of field measurements and water samples for laboratory analysis by City of Kenora staff. Ground water samples were collected in May and August, while surface water samples were collected in May, August and October. Sediment samples were collected in August of 2012.

The locations of the sampling stations monitored between 2012 and 2014 are depicted upon Figure 4. In May of 2013, the C of A was amended to reduce the frequency of sediment sampling from 5 to 10 years, and removed thirteen monitoring wells (10/7, 12/4, 6/14, 7/4, 8/22, 9/6, 2/17, 13/6, 13/14, 14/6, 14/21, 15/5, and 15/17) from the

sampling program. In addition, volatile organics were removed from the parameter list for all monitoring wells except for well 2/9. The above changes to the sampling program took effect at the start of the 2013 field season. The scope of the 2012 monitoring program was based on the requirements outlined in the previous MINISTRY Certificate of Approval. The details of the 2012-2014 monitoring program are summarized in Table 2 below.

Table 1: Summary of the Required 2012-2014 Monitoring Programs

Monitor Location	Annual Frequency	Parameters
Ground Water (2012)		
2/9, 2/13, 3/8, 4/6, 4/18, 5/17, 6/5, 6/14, 7/4, 16/15, 20/4, and 21/7	August	comprehensive list
2/9, 2/13, 3/8, 4/6, 4/18, 5/17, 6/5, 6/14, 7/4, 8/22, 9/6, 10/17, 11/4, 12/4, 13/6, 13/14, 14/6, 14/21, 15/5, 15/17, 16/15, 17/15, 19/16, 20/4, 21/7, 22/5, 23/3, KGS-2 and 24/5	May & August	indicator list & water levels
2/9, 2/13, 3/8, 4/6, 4/18, 5/17, 6/5, 6/14, 7/4, 8/22, 9/6, 10/17, 11/4, 12/4, 13/6, 13/14, 14/6, 14/21, 15/5, 15/17, 16/15, 17/15, 19/16, 20/4, 21/7, 22/5, 23/3, and 24/5	August	VOC's
Ground Water (2013 - 2014)		
1/17, 2/9, 2/13, 3/8, 4/6, 5/17, 6/5, 11/4, 16/15, 17/15, 19/16, 23/3, KGS-2 and 24/5	August	comprehensive list
1/17, 2/9, 2/13, 3/8, 4/6, 5/17, 6/5, 11/4, 16/15, 17/15, 19/16, 23/3, KGS-2 and 24/5	May & August	indicator list* & water levels
2/9	August	VOC's
Surface Water (2012 – 2014)		
SW-1, SW-2, SW-3, SW-4 and SW-5 (August only)	August & October	comprehensive list
SW-1, SW-2, SW-3 and SW-4	May	indicator list
SW-2 and SW-3	May, August & October	flow measurement
SW-2	August	VOC's
*Sediment (2012) ***		
SB-1, SB-2, and SB-R	August	major and minor inorganics & grain size

* - Only locations where comprehensive samples are not required for the August event

** - Sediment monitoring requirements were revised to every 10 years (next samples to be collected in 2021)

3.1 Monitoring Program Omissions

3.1.1 Ground Water

Over the 2012 – 2014 monitoring period a number of monitoring well samples were not available for analysis. According to the accompanying field notes, it was indicated that over the period of monitoring, some wells were either out of service (i.e. damaged or not working) or did not contain an adequate supply of water for sample collection on one or more occasion.

In 2012, samples were not collected from MW4/6, MW4/18, MW20/4, and MW22/5 as the field notes indicated that the monitoring wells were out of service due to becoming damaged. It is noted that these wells have since been removed from the monitoring program and decommissioned, with the exception of MW4/6, which was re-constructed in the summer of 2013. Samples were also missing from MW5/17, MW11/4, MW10/17, MW13/6, MW14/21, and MW18/6 due to limited water or dry conditions. It is noted that these locations were subsequently removed from the monitoring program due to redundancy in data and / or the monitors continually being dry.

The following omissions were noted in 2013 and 2014 from monitors required as part of the revised monitoring program.

In 2013, dry conditions were also observed at MW5/17 & 11/4 for both sampling events, while no sample was collected at MW24/5 in August due to damaged sample tubing.

In 2014, samples were not collected at MW5/17 during the spring event due to a dry conditions and MW24/5 was not sampled during the spring event due to damaged tubing, which was subsequently repaired prior to the August monitoring event.

In all instances where dry monitors were encountered, similar conditions were observed historically.

3.1.2 Surface Water

Over the 2012 – 2014 monitoring period, some surface water samples were not able to be collected due to dry conditions during the sampling event. These include SW-3 in August of 2012/2013/2014, SW-5 in May 2012/2013, and SW-5 in October 2013.

3.2 Quality Assurance and Quality Control Results

As part of any routine sampling program, duplicate samples should be collected and analyzed for quality assurance purposes. Over the period of monitoring, six quality assurance/quality control (QA/QC) samples were collected. The results were within acceptable limits with only some minor exceptions which are summarized in Table 3.

Table 2: Summary of Notable QA/QC Variations

Location	Occasion	NH_3-N	COD	TDS
MW16/15	May 2012		8.6 & 13	64 & 84
SW-5	August 2012			38 & 56
MW4/6	May 2014		74 & 100	

* - all concentrations in mg/L

It should be noted that the results for the remaining parameters for each duplicate sample collected indicated very good correlation. It should also be noted that the inconsistencies observed were relatively small, within historical ranges and are notable mainly due to the very minimal and un-impacted concentrations at all duplicate locations. As such, although some inconsistencies are present, the general indication is that the majority of the results are consistent and generally acceptable. The variance in COD could be attributable to the fact that the bottles associated with these parameters are not field filtered. As such sediment within the sample bottles could result in some variance between sample bottles.

In the future, it is suggested that field staff ensure that all duplicate samples are "split" to minimize any potential natural variation in water chemistry.

3.3 Ground Water & Leachate (Schedule "F")

During sampling over the monitoring period, water level measurements were obtained by City staff prior to any disturbance of the piezometric surface within each monitor using an electronic water level meter (accuracy of +/- 0.2 cm) as per Condition 2.4, Schedule F, of the current C of A. Ground water samples were then collected following purging of at least two borehole volumes of water from each monitoring well using dedicated check valve pumps and tubing. All ground water samples for inorganic analysis were also lab filtered.

Maxxam Analytics Inc. in Mississauga completed the analytical work from 2012 – 2014. The laboratory provided all sample bottles, which were prepared with preservatives for consistency, as required. Samples were maintained in coolers with freezer packs and

were delivered to the required laboratory within 24 to 36 hours of collection. A summary of the 2012 - 2014 analytical data is included in Appendix D.

3.3.1 Ground Water & Leachate Flow

Ground water measurements taken over the current monitoring period were compared to background data observed by Fenco during installation of several of the existing monitors in 1996. As detailed in Appendix E, in many locations the maximum ground water elevation value recorded over the 2012 -2014 monitoring period is below the value recorded in 1996. However in general the most recent water level data corresponds well with the available background data, indicating that ground water elevations in both the overburden as well as the shallow bedrock have remained relatively stable. Observed fluctuation in water table elevations over the course of 2012 - 2014 generally fall within 1 m, with a few exceptions.

Active ground water flow occurs within the till and is constrained by the bedrock surface, which forms a physical barrier to further vertical migration of ground water (i.e., like a bathtub). Within the bog, low topographic relief exists, as indicated by a surface elevation change of less than 2 m between the waste and the small pond at SW-1 (a total distance of ~750-800 m). For descriptive purposes, the water table elevations measured at all ground water monitors in May of 2014 have been included upon Figure 4. As can be observed, the slope of the water table corresponds well with the orientation of the local topography, with large lateral hydraulic gradients occurring at watershed boundaries (i.e., up to 0.24) and lower gradients occurring within the bog (i.e., as low as 0.001).

A watershed divide exists to the northeast of the waste footprint, between monitors 2 and 13 (see Figure 4). This divide is due to a rise in the elevation of the bedrock topography related to the surrounding topographic highs to the east, west, and north that exist beneath the bog. Within this watershed divide, there is an area which is referred to as the "saddle" area. The saddle represents a depression in a bedrock ridge that extends to the northeast. Monitoring wells are located in and around this feature (Figure 4 & 5) to determine ground water flow directions and gradients. With the exception of May 2007, ground water elevations within the saddle have been elevated above those to the south by at least 0.15 m since 2002, and was at least 0.45 m over 2012 - 2014 (Figure 5) indicating there is a limited potential for leachate migration past this feature. It is unclear as to why the gradient reversed during May 2007. It is also noted that as a result of Ministry concerns, more frequent measurements (at least once per month) were completed throughout 2010 and 2011 with results appearing to correlate well to the historical database (Figure 6).

3.3.2 Background Ground Water Quality

The background ground water geochemistry at the site is characterized by relatively low concentrations of most parameters (Table 5). Natural waters dissolve low quantities of elements through reaction with the soil minerals. Iron is derived through chemical weathering of soil and rock minerals and naturally occurs at levels approaching or greater than the Ontario Drinking Water Quality Standards (ODWQS). It is noted that elevated TDS concentrations were noted during both sampling events in 2014 with results greater than the ODWQS limit of 500 mg/L. As there were not corresponding elevations of any other parameter, it is possible, these results may be anomalous. As TDS is a general indicator to the presence of elevated inorganic constituents in the water, the minimal concentrations for the major ion chemistry does not match the elevated TDS concentration.

Table 3: Background Chemistry

	Ca	Mg	Na	Cl	Alk.	SO4	NH3-N	TKN	Fe	Cond.	TDS
OWDS	**---**	**---**	**20 or 200**	**250**	**30-500**	**500**	**org N=0.15**	**---**	**0.3**	**---**	**500**
Overburden											
# of samples	44	44	44	42	44	42	44		44	44	44
Maximum	37	10	11	17	130	11	6		13	248	828
Average	6.7	2.3	5.1	2.6	29	4.7	0.20	N/A	0.47	71	109
Minimum	2.0	0.8	2.0	0.5	9.0	0.5	0.03		0.01	31	10
STD	5.8	2.1	2.4	3.6	21.8	1.8	0.9		2.0	39	148
Bedrock											
# of samples	18	18	18	17	18	17	18	10	18	18	18
Maximum	26	5.2	4.3	8	91	10	0.12	1	0.54	216	184
Average	22	4	4	2	80	3	0.06	0.46	0.08	161	120
Minimum	14	3	3	1	53	1	0.03	0.06	0.01	139	92
STD	3.1	0.6	0.3	1.9	10.3	2.0	0.02	0.3	0.1	16.7	26.5

All values are given in mg/L. Overburden data are from monitors 11/4 and 12/4 and bedrock data is from monitor 5/17.

(STD = standard deviation, nd = not detected, n/a = not applicable, nt = not tested)

3.3.3 Leachate Quality

Leachate quality is controlled by the availability of soluble contaminants in the waste pile, the residence time of infiltrating water in the waste, and the physical conditions, such as temperature, redox potential, and pH of the solution. Compared to background waters, leachate that is produced from landfill waste typically possesses elevated concentrations (x10 or more) of magnesium, sodium, potassium, iron, zinc, chloride, alkalinity, ammonia, total kjeldahl nitrogen, conductivity, total dissolved solids and phenols. Since municipal wastes have only been accepted for a short time, leachate has not been created that will be substantially different than background waters. The acceptance of de-watered sewage sludge and contaminated waste from the removal of fuel tanks as well as the construction, demolition and industrial waste the site received to date may affect the parameters in the leachate and downgradient water samples. High

concentrations of total suspended solids (TSS) are explained by the lack of filtering of the general chemical samples in the field.

The quality of ground water underlying the waste has remained consistent to very slightly elevated (for certain inorganic compounds such as calcium and alkalinity) compared with the background ground water geochemistry. ODWQS was noted to be exceeded for alkalinity, DOC, iron, manganese, TDS at a few locations in or immediately surrounding the active waste area (MW23/3, 24/5, KGS/2, 1/17). Although most likely associated with leachate generation, these concentraitions are not viewed as a concern at this point given their relatively low and inconsistent concentrations, as well as the fact they are not seen to be elevated at any downgradient location owing to leachate presence.

3.3.4 Downgradient Ground Water Quality

As in previous years, the 2012 - 2014 analytical data do not indicate that leachate generation from the waste has resulted in impact to ground water quality either immediately downgradient of the waste or at any of the other monitors installed within the Contaminant Attenuation Zone (CAZ). Since the landfill commenced operation in the spring of 2001, the concentrations of parameters at all downgradient monitoring locations have remained at or very slightly above background levels, as can be observed in the time series graphs provided in Appendix F.

A suite of volatile organic compounds (VOC's) was analyzed at selected locations during sampling in August 2012as per Condition 2.3(b) of Schedule F, while samples in 2013 and 2014 were limited to MW2/9 and SW-2. No detections for any parameters were noted during this monitoring period. A summary of detected VOCs between 2001 and 2014 can be found in Appendix G.

3.4 Surface Water (Schedule "C")

City staff collected surface water samples in May, August and October of 2012, 2013, and 2014, with Maxxam Analytics Inc. in Mississauga completing the analytical work. The laboratory provided all sample bottles, which were prepared with preservatives for consistency, as required. The samples were kept in coolers with freezer packs and were delivered to the laboratory within 24-36 hours of collection. The 2012-2014 analytical data have been summarized and are included in Appendix H.

3.4.1 Surface Water Flow

Surface water from the area of the waste flows in a northeasterly direction through a large bog/wetland complex before eventually discharging into a pond at the west side of the Jones Road Culvert (SW-1) that serves as the headwaters of an unnamed creek. Discharge into the pond from the bog includes both surface flow and interflow within the peat.

From the pond, the creek flows beneath the roadway and in a northeasterly direction for approximately 700 m, before turning southward and eventually discharging into a further bog/wetland complex south of a logging road about 800 m upgradient of Morgan Lake (SW-2). Along its route, the creek is discontinuous as it passes through various bogs, wetlands, and beaver ponds. Periodic discharge from the Lunch Lake sub-watershed commingles with flow in the creek, providing additional flow at SW-2.

Approximately 150 m northeast of the waste footprint, a depression is noted in the landscape, known locally as the "saddle". This area allows a portion of surface drainage to migrate into Crystal Bay during spring freshet or in response to large precipitation events. Crystal Bay is located approximately 350 m north of the waste cells. Figure 2 shows the site's hydrologic features.

Estimates of stream flow were made by City Staff at SW-1, SW-2, SW-3, and SW-4 during the May and October sampling periods and at SW-1, SW-2, SW-3, SW-4 and SW-5 during August, as per Condition 2.4, Schedule C of the current C of A. Flow velocity measurements are summarized in the following table. As in previous years, flows are shown to be low and intermittent.

Table 4: Surface Water Flow Data

Location	Velocity (m/sec)								
	2012			2013			2014		
	May	Aug	Oct	May	Aug	Oct	May	Aug	Oct
SW-1	0.18	0	0.24	0.18	0	0	0	0	0
SW-2	0.06	0.06	0.24	0.30	0.03	0.06	0.11	0.03	0.3
SW-3	0	0	0	-	0	0	0	0	0
SW-4	0	0	0	-	0	0	0	0	0
SW-5	-	0.02	-	-	0	-	-	0	-

Although the flow data collected is limited, it is apparent that there is a consistent increase in flow between SW-1 and SW-2. This increase in flow would indicate that surface water contributions outside of the landfill property are providing attenuation through an increased dilution potential in the downstream feature.

3.4.2 Surface Water Quality

Surface water quality data obtained over 2012 -2014 were compared to the background quality data obtained at SW-1 and SW-2 prior to the construction of the site in 2000, as well as to the Provincial Water Quality Objectives (PWQO). In general, the surface water quality is good and falls within the limits of the PWQO, with the exception of iron, total phosphorus, and phenols. However, it was noted that concentrations are consistent with background concentrations and likely indicative of the shallow and stagnant nature of these locations where sediment entrainment may cause elevations of these parameters, especially iron, while natural decay of organic materials is attributed to the elevated total phosphorus concentrations.

As no impacts were observed at any ground water monitoring locations downgradient of the waste, and the composition of waste currently deposited at the site would not have generated a plume of sufficient size and strength to affect these locations, given the short residence time at the site, natural sources are believed to be the most likely source.

Boron values have been steadily increasing at SW-1 over the past ten years. Elevated levels of boron above the PWQO began as an isolated value in 2008, however it has been consistently measured above the PWQO at SW-1 over the period of 2012 – 2014. Although these values are increasing, they are not yet above the action level of 1.0 mg/L according to the trigger mechanism in place. Boron values at SW-1 should be carefully watched going forward and any potential trigger exceedances need to be reviewed relative to other leachate indicator parameters as wells as the downstream concentrations (SW-2).

A time-trend analysis of selected leachate parameters at SW-1 since 1996 is included in Appendix I. The developing geochemical database is illustrating a slight increasing trend for select typical leachate related parameters including alkalinity, conductivity, boron and sulphate**.** The elevations or these parameters specifically are not surprising as they are reflective of construction and demolition wastes (i.e. gypsum [calcium sulphate] wallboard). The boron is likely derived from boric acid, which is added to gypsum board to increase the strength of the material, reduce weight and provide better adhesion of the paper to the board. With the addition of municipal wastes over the last few years, a close watch will be kept on other parameters such as chloride and ammonia, which are good

indicators or municipal wastes. As most leachate indicator parameters have remained at relatively low concentrations, these values are not seen as an issue at this time. As well, these parameters have limited potential for environmental impacts unless they reach very high levels. A similar time-trend analysis for SW-2 indicates the same general trend observed at SW-1 has begun in 2008, however to a much smaller degree. These increasing trends indicate that possible impacts from construction, demolition and industrial waste fill are most apparent in the area closest to the waste area (SW-1), while impacts are reduced further away from the footprint, indicating attenuation. This is most evident in the boron concentrations which exceed PWQO at SW-1, but are an order of magnitude lower at SW-2. SW-3 is a background location that receives water from the Lunch Lake watershed and it shows increased ranges as well, although not to the same degree.

SW-4 & SW-5 are further downstream locations which have not surprisingly shown no measurable leachate impacts indicating that attentuative processes downstream of the landfill continue to be active and sufficient to address surface impacts observed a short distance downstream of the landfill SW-1.

3.5 Trigger Mechanism Assessment

The Trigger Mechanism and Contingency Plan for the Site was revised and submitted to the Ministry in 2014 for their review and comment. The purpose of this update is to provide a more appropriate trigger mechanism approach based on the current data set which now has 12 years of seasonal geochemical data. Leachate quality data is now better understood with the landfill recently beginning to accept municipal wastes in 2009.

Similar to the original plan, both surface and ground water monitoring locations were targeted. The targeted parameters and associated trigger concentrations for ground water are summarized in the following table.

Table 5: Proposed Trigger Limits – MW3/8

Parameter	ODWQS	Background *	Trigger Limit at MW3/8 **
Chloride	250	2.2	126
TDS	500	147	324
Alkalinity	500	68	284

It is noted that all concentrations at MW3/8 for these parameters have been less than 75% of the associated criteria for the period of record, with all concentrations for the reporting period (2012-2014) noted to be less than 50%.

Similar trigger limits were also created for surface water at SW-2, as well as an action criteria at SW-1, which is in place to provide additional review of the geochemical data to assess any potential trends prior to trigger limits being exceeded at SW-2. The criteria established is summarized in the following table.

Table 6: Proposed Surface Water Trigger Limits

Parameter	Typical Landfill Leachate	SW Background (SW-3)	Action Level at SW-1	Trigger Limit at SW-2*
Chloride	1000	1.9	158	187
Boron	5	0.02	0.8	0.2
Ammonia (unionized)	5	0.0005	0.8	0.02

It is noted that both chloride and un-ionized ammonia have both show to be well below their associated criteria at both locations (<45%), while boron has shown to be much more elevated (as discussed in Section 3.4), with concentrations (0.81 mg/L – August 2014) near the action level (1.0 mg/L) at SW-1. Although slightly elevated at SW-2 (0.1 mg/L – August 2014), the boron concentrations are shown to be greatly reduced from SW-1, indicating attenuative processes are active. As well, given the other leachate indicator parameters are not showing similar elevated levels in the surface water at SW-1 or SW-2, the elevated boron is not reflective of a large scale leachate trend. However, these trends will be monitored closely over the next three years as the leachate signature at the site evolves with an increased waste volume.

3.6 Sediment (Schedule "D")

In 2012, City staff collected sediment quality samples on August 31st at three locations as specified in the current C of A (i.e., SB-1, SB-2 and SB-R). As noted previously, in 2013, the frequency of sediment sampling was adjusted to every ten years. After 2012, the next sediment sampling event is not required until 2021. The 2012 analytical data have been summarized in Appendix J.

The analytical data obtained from each of the samples were compared to the criteria outlined in, *Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario* (MOE, 1993). Of the seventeen required parameters, not a single parameter exceeded in 2012 for either the lowest effect level (L.E.L.) or severe effect level (S.E.L.).

Grain size analysis was performed on the sediment samples in 2012. The results are located in Appendix J. Samples indicate that the SB1 and SBR are sands, while SB2 is noted to be silt. The results are somewhat similar to those found in previous years.

3.7 Biological Effects (Schedule "E")

Benthic invertebrate monitoring was conducted from 2000 to 2003. The need for continued or additional benthic monitoring is not necessary, since the minimum of three (3) years of sampling, as stated in the C of A, has been fulfilled. As requested during the 2013 Ministry inspection, the data from these previous studies has been included as an appendix for completeness (Appendix .

3.8 Landfill Gas (Schedule "G")

Landfill gas was previously required according to the C of A Schedule "G" on a bi-monthly basis during frozen ground conditions and quarterly during all other periods at the two proposed landfill gas monitors outlined in the SNC-Lavalin monitoring plan (September, 1999). Landfill gas was removed from the monitoring program as documented in the Ministry document dated April 23, 2013, however, as required in the letter, the monitoring locations were maintained for future use.

Although the potential for methane generation has increased with the commencement of domestic waste deposition at the Site in 2009, the limited size of the waste mound and relative small waste acceptance rate would still limit the methane generation at the Site. As well, the geochemical signature of the landfill leachate, which is most notable at MW1/17 (downgradient edge of waste) and MW23/3 (middle of waste) still has a relatively weak and variable leachate signature with chloride concentrations less than 150 mg/L. Elevated ammonia and DOC concentrations are also developing, which indicate anaerobic conditions are beginning to develop, likely the result of the acceptance of domestic wastes at the Site. Given this newly developing trend, significant methane production has not likely yet developed at this point, however, will be assessed as part of the next annual report, which is to be submitted in 2018. This time frame is deemed to be appropriate given the remoteness of the Site limits the potential for risk to surrounding residents. However, if a significant increasing trend in leachate concentrations develops in the interim, the City will conduct a round of methane measurements to document landfill gas concentrations such that an assessment regarding re-instatement of measurements as part of the monitoring program is necessary.

3.9 Geotechnical Monitoring (Schedule "H")

Shear testing was completed by Eng-Tech Inc. in 2014 within the east side of Cell A. The purpose of the testing was to determine the in-situ shear strengths and pore water pressures along the east side of the landfill in order to confirm previous geotechnical information obtained in 2009. Eng-Tech drilled four (4) boreholes along/ Eng-Tech also

installed two (2) vibrating wire piezometers within each borehole as per Schedule H of the C of A.

According to the Eng-Tech report, the in-situ shear strength values obtained in 2014 ranged from 20 to 31 kPa and are above the minimum recommended 5.5 kPa value by R. Kerry Rowe Inc. in their report *Kenora Landfill* dated February 21, 1997, Eng-Tech concluded that based on the soil stratigraphy and the shear strength values obtained on site, the 2014 results are in compliance with the values as stated in the previous geotechnical evaluation in 2009. Eng-Tech also supports the loading as recommended in the R. Kerry Rowe Inc (1997).

The complete Eng-Tech report can be found in Appendix K.

4.0 PROPOSED 2015 -2017 MONITORING PROGRAM

It is recommended that the 2015 – 2017 monitoring program for the City of Kenora Jones Road Landfill site remains the same as the 2014 program, which should follow the current C of A No A612018. The 2015 – 2017 program includes the monitoring of ground water levels and collection of ground and surface water samples as outlined in the following table.

Table 7: Summary of the Required 2015-2017 Monitoring Programs

Monitor Location	Annual Frequency	Parameters
Ground Water		
1/17, 2/9, 2/13, 3/8, 4/6, 5/17, 6/5 and 16/15	August	comprehensive list
1/17, 2/9, 2/13, 3/8, 4/6, 5/17, 6/5, 11/4, 16/15, 17/15, 19/16, 23/3, KGS-2 and 24/5	May & August	indicator list* & water levels
2/9	August	VOC's
Surface Water		
SW-1, SW-2, SW-3, SW-4 and SW-5 (August only)	August & October	comprehensive list
SW-1, SW-2, SW-3, SW-4 and SW-5	May	indicator list
SW-2 and SW-3	May, August & October	flow measurement
SW-2	August	VOC's

* - Only locations where comprehensive samples are not required for the August event

As per the Ministry letter dated April 24, 2013 (Appendix B), sediment sampling is to remain in the monitoring program, however the frequency of sample collection has been reduced to every 10 years with the next sample being required in 2021. However, it is also stated that if annual surface water samples in Morgan Lake or Crystal Bay show a significant increase in metal concentrations then the sediment sampling should be repeated in 2016 and therafter every five years. Based on the information outlined in Section 3.4, there does not appear to be a significant increase in metal concentrations, so it is therefore recommended that sediment sampling continue with the current sampling frequency of once in every ten years. Based on this information, the next sediment sample collection should occur during the 2021 field season.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Operation of the City of Kenora Jones Road Landfill site is in compliance with the C of A and is performed as designed. The site is not creating any adverse impacts on the surrounding environment. Therefore there are no requirements for any mitigation / remedial measures based on the existing site performance data compilation.

Currently, limited impacts to the ground water regime are observed only within either the landfill footprint or at monitors situated immediately downgradient of the waste cells. In addition, only minor impacts were observed at SW-1 (closest to fill area), which are assumed to be a result of the construction/demolition and sewage sludge waste and the recent addition of municipal waste. Slight water quality impacts were also measured at SW-2 and SW-3 although to a much lesser degree than observed at SW-1.

6.0 REFERENCES

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Ministry of the Environment. 2000. *Ontario Drinking Water Standards.*

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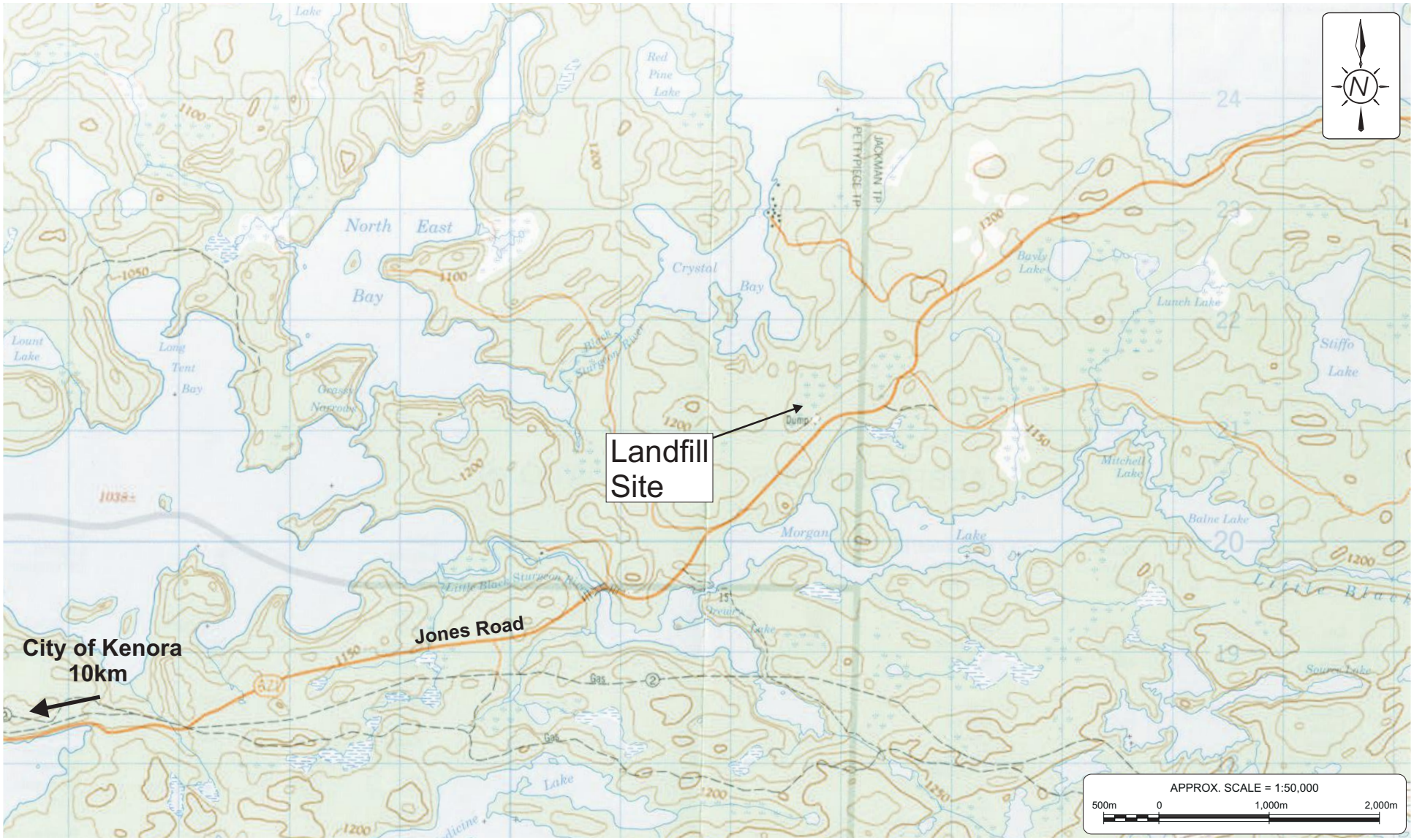
APPENDICES

APPENDIX A

Figures



Legend:

Source: Energy, Mines, and Resources Canada. 1996. 1:50,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

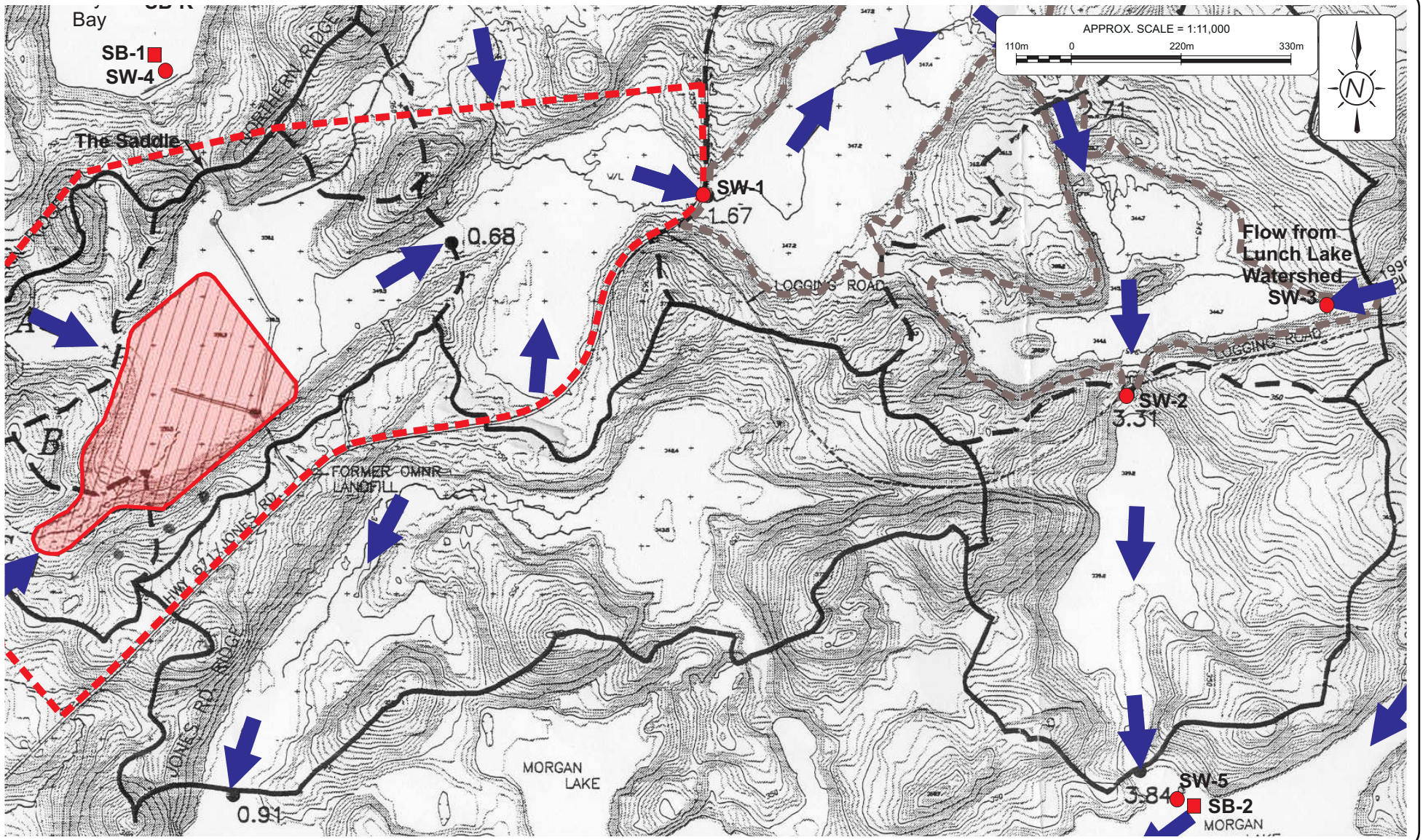
Site Location

Date Issued:	June 2015
Created By:	CMR
Project No.	15-020
File Name:	Figure 1 - Site Topo.CDR

2015 Annual Monitoring Report
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No.
1



Legend:

- Approved Waste Footprint
- Approximate Property Boundary
- Contaminant Attenuation Zone
- Watershed Boundary
- Surface Water Sampling Location
- Sediment/Benthic Sampling Location
- Surface Water Flow

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

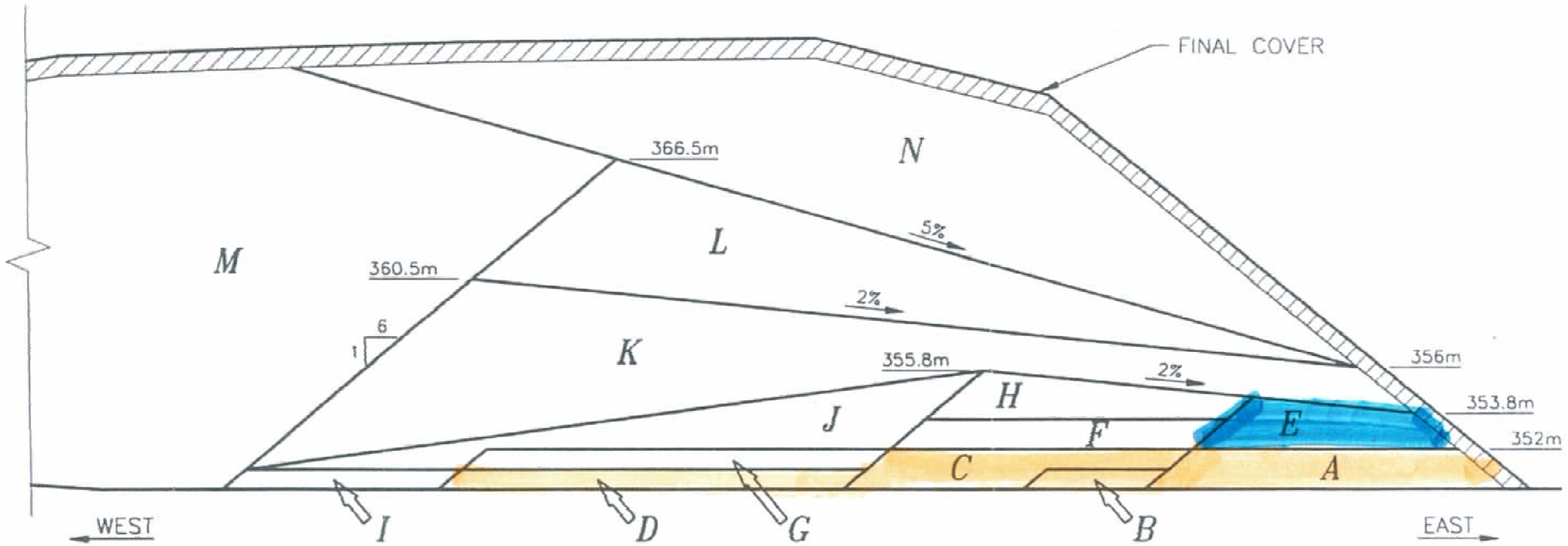
Hydrologic Features

Date Issued:	June 2015
Created By:	CMR
Project No.	15-020
File Name:	Figure 2 - Hydrologic Features.CDR

2015 Annual Monitoring Report
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **2**



LANDFILL SEQUENCE	APPROX. YEAR OF DEVELOPMENT	LANDFILL SEQUENCE	APPROX. YEAR OF DEVELOPMENT
A	1 – 3	H	11
B	4	I	12
C	5	J	13
D	6	K	14 –20
E	7 – 8	L	21 –23
F	9	M	24 –35
G	10	N	36 –40

Existing sequence of fill

already filled

Fenco MacLaren

SNC·LAVALIN

KENORA AREA
WASTE MANAGEMENT MASTER PLAN
PROPOSED KENORA AREA LANDFILL

FIGURE S1-5.1

LANDFILL DEVELOPMENT SEQUENCE

SCALE HOR. 1 : 1500
VERT. : 300

LEGEND:

Not to Scale

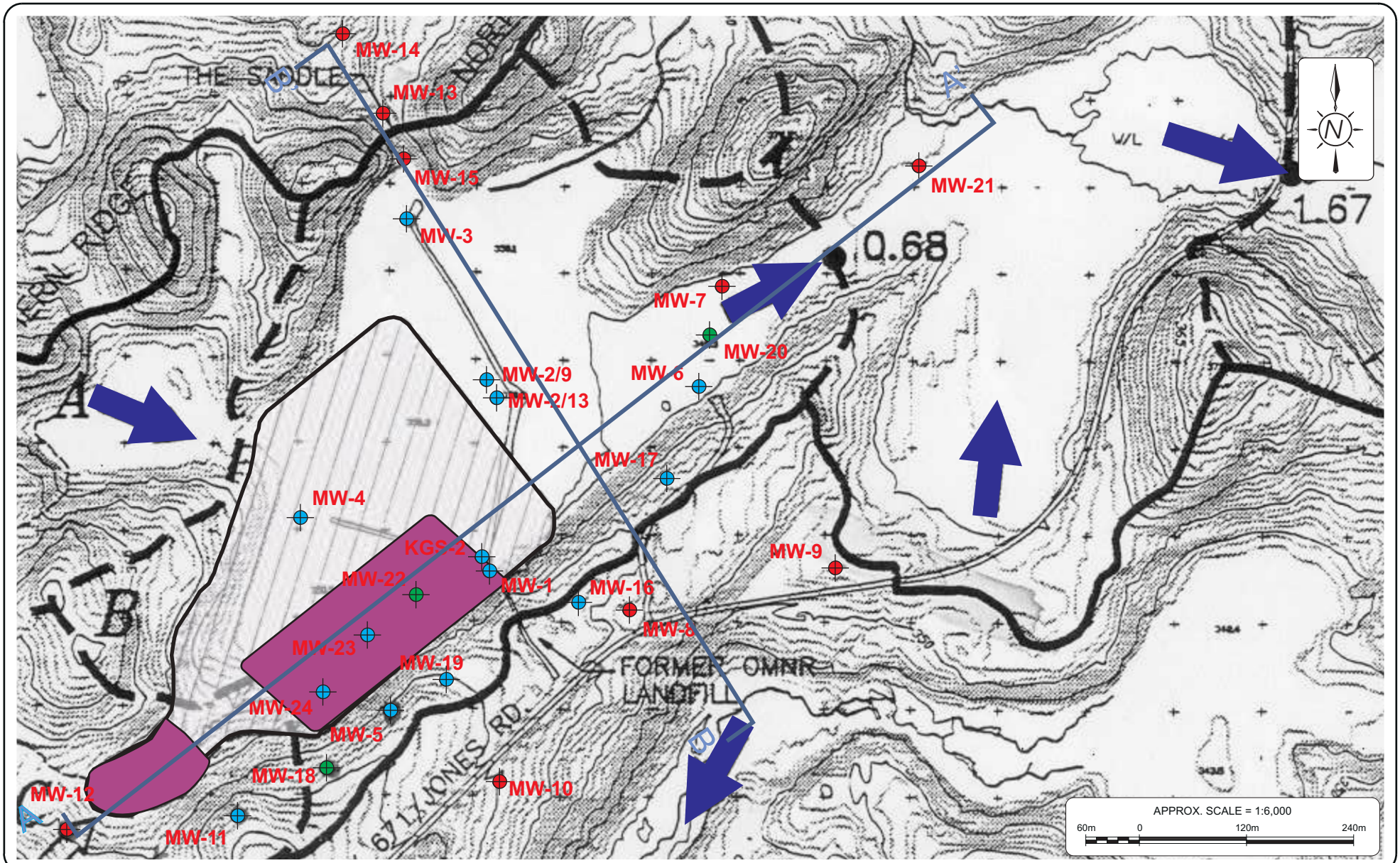
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Landfill Development Sequence

Jones Road Landfill
City of Kenora

DATE ISSUED:	June 2015	Figure No. 3
CREATED BY:	JLM	
PROJECT NO.:	15-020	
REFERENCE:		

DAYSTAMP: M:\15 Projects\15-020 2015 Jones Road Landfill Reporting\04.0 - Drafting\15-020.dwg



Legend:

- Approved Waste Footprint
- Ground Water Monitor (maintained)
- Ground Water Monitor (removed from program)
- Ground Water Monitor (decommissioned)
- Watershed Boundary
- Active Footprint Area

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

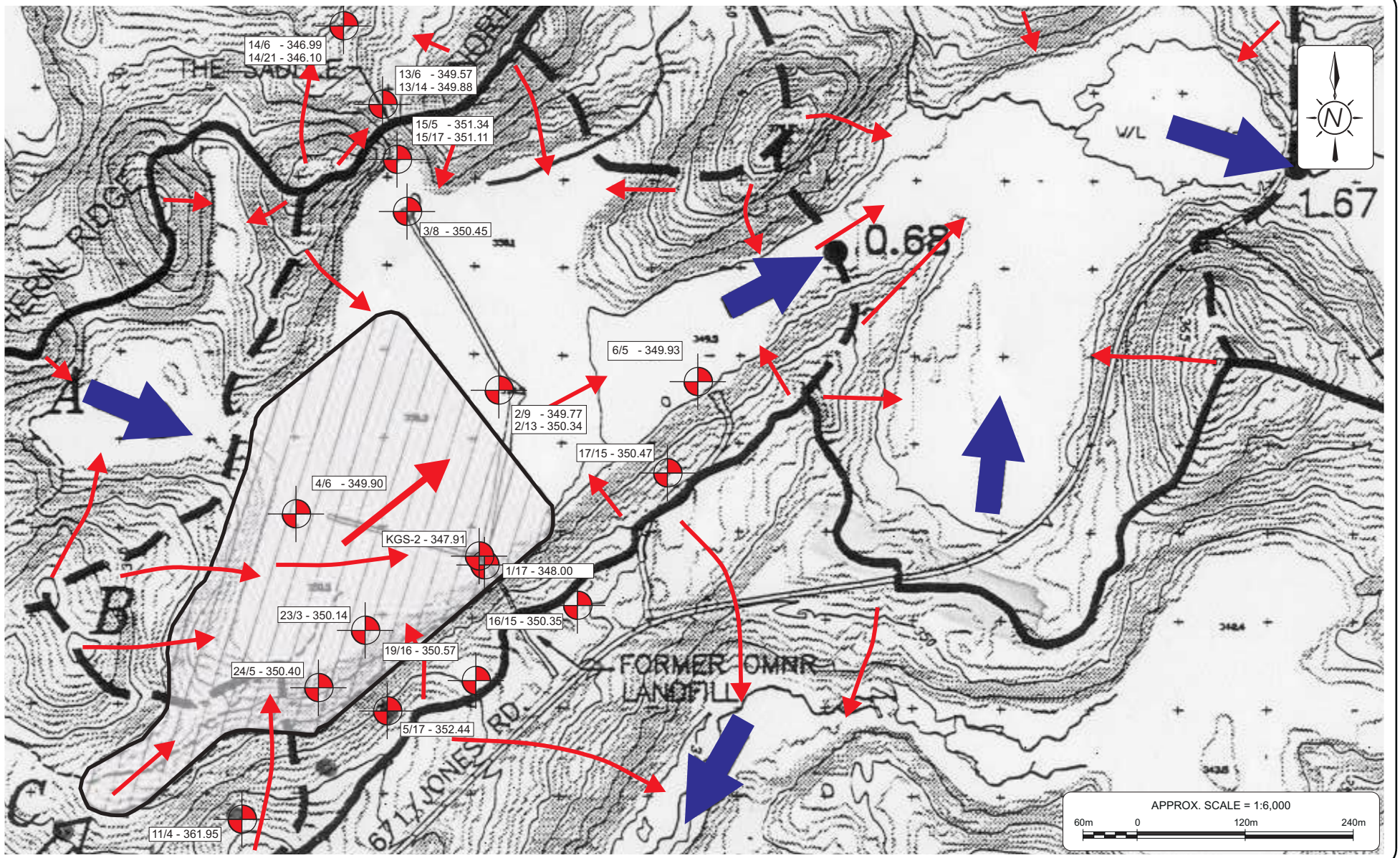
Ground Water Monitoring Network

Date Issued:	June 2015
Created By:	CMR
Project No.	15-020
File Name:	Figure 4 .CDR

2015 Annual Monitoring Report
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **4**



Legend:

- Approved Waste Footprint
- Ground Water Monitor
- Watershed Boundary
- Ground Water Flow Direction
- Surface Water Flow Direction
- Sub-watershed Boundary

Base Drawing: Fenco MacLaren (1997), Figure S3.1

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Ground Water Monitoring (May 2014)

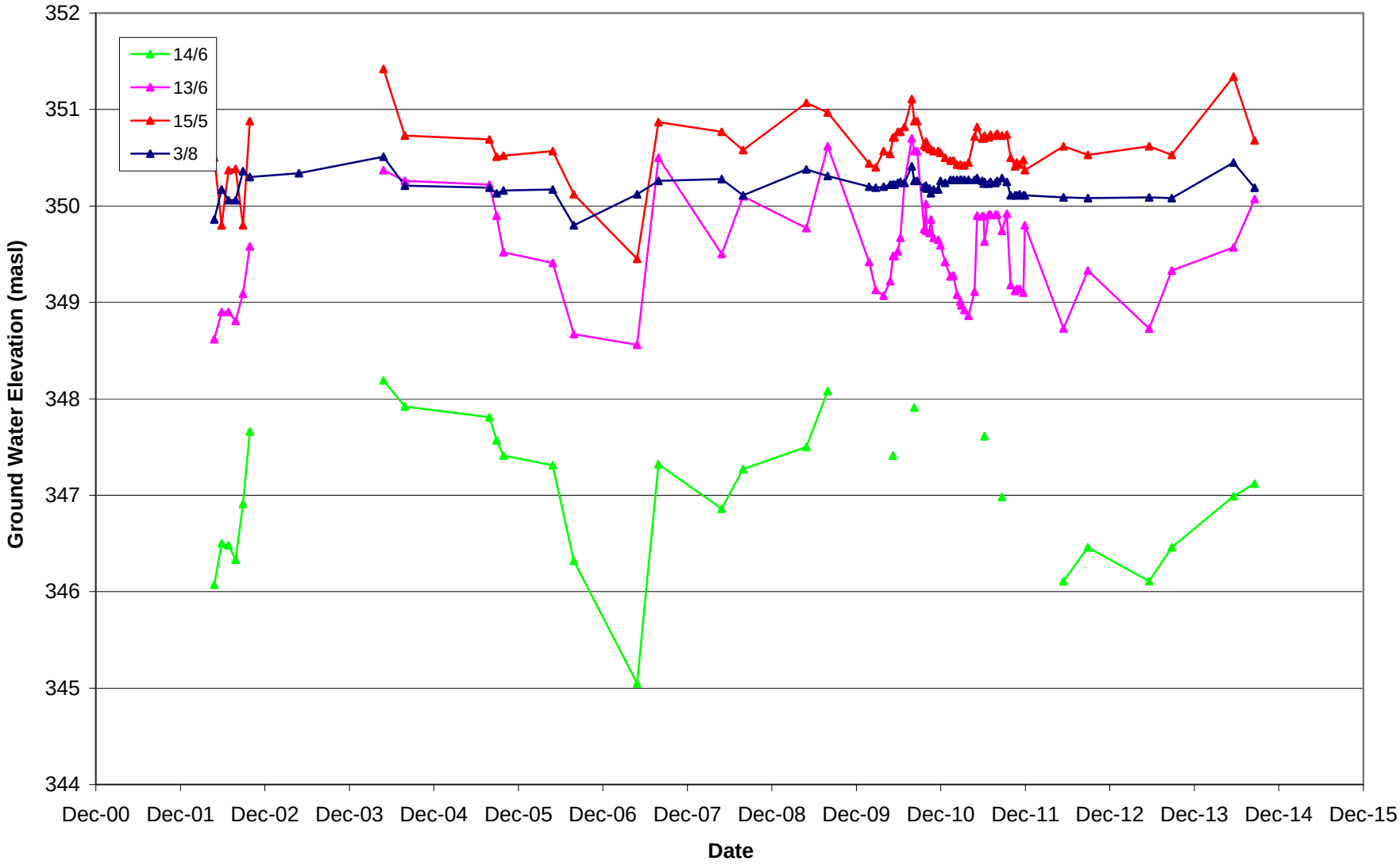
Date Issued:	June 2015
Created By:	CMR
Project No.	15-020
File Name:	Figure 5.CDR

2015 Annual Monitoring Report
Jones Road Landfill Site
City of Kenora

MOE Certificate of Approval No. A612018

Figure No. **5**

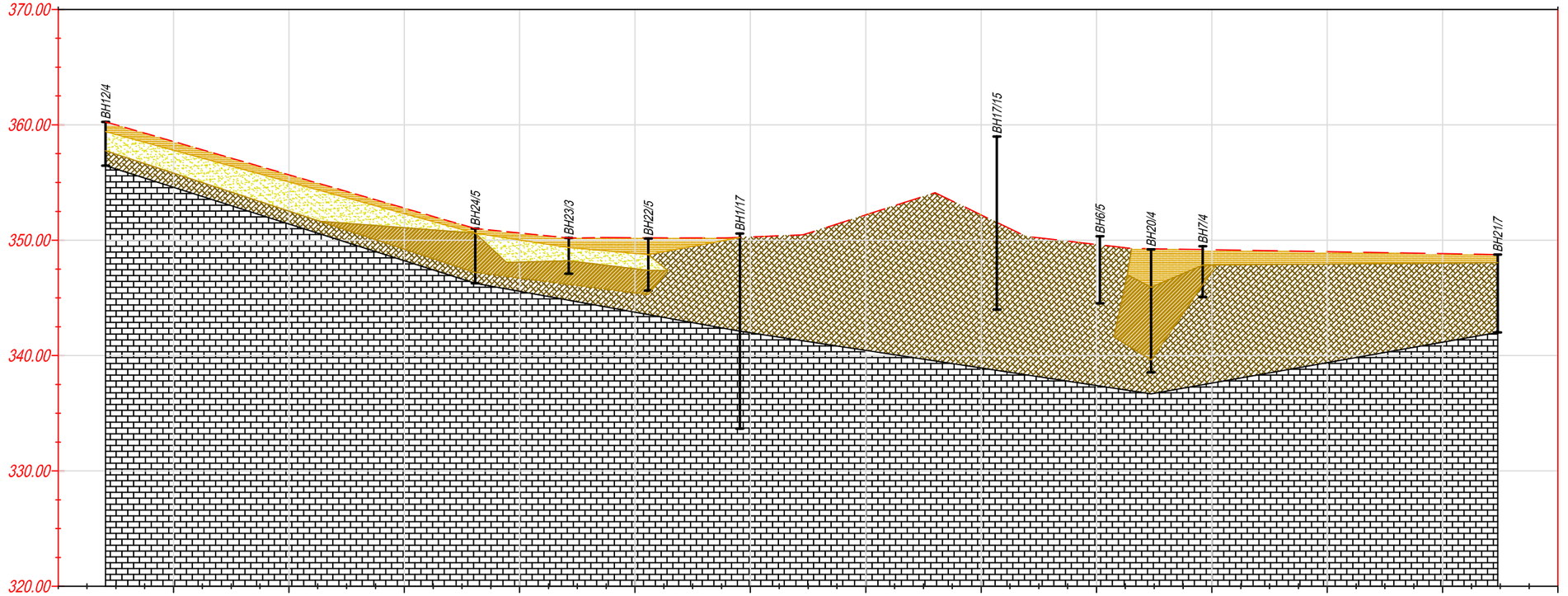
Figure 6 - Saddle Ground Water Elevations (overburden)



East-West

A

A'



LEGEND:

- Bedrock
- Peat
- Till
- Sand
- Clay

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

East-West Cross Section A-A'

Jones Road Landfill
City of Kenora

DATE ISSUED:	June 2015	Figure No. 7
CREATED BY:	JLM	
PROJECT NO.:	15-020	
REFERENCE:		

DAYSTAMP: M:\15 Projects\15-020 2015 Jones Road Landfill Reporting\04.0 - Drafting\15-020.dwg

Plotted by: JMCCARTNEY on June 2, 2015 at 1:23pm
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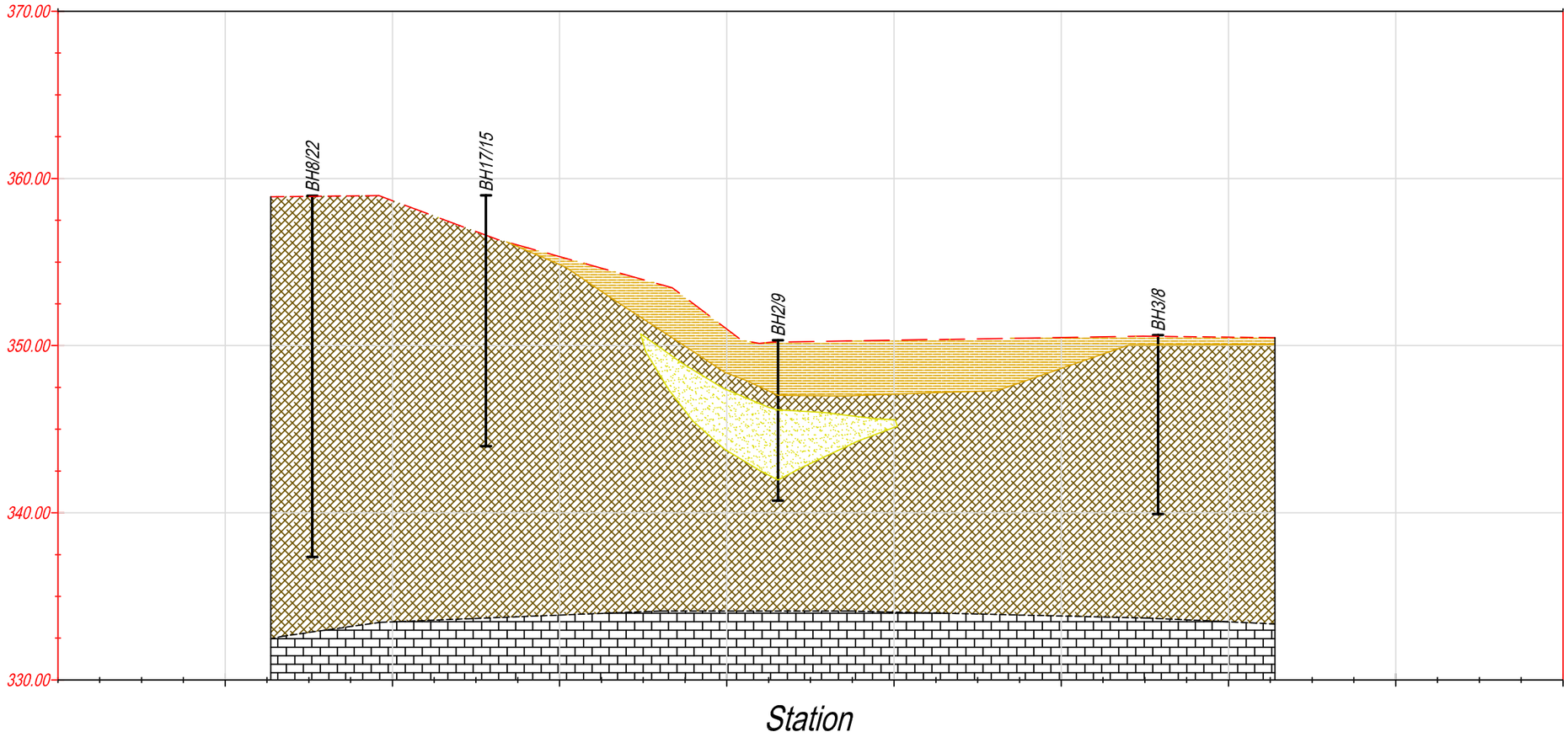
B

South-North

B'



LEGEND:

- Bedrock
- Peat
- Till
- Sand

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

South-North Cross Section B-B'

Jones Road Landfill
City of Kenora

DATE ISSUED:	June 2015	Figure No.
CREATED BY:	JLM	8
PROJECT NO.:	15-020	
REFERENCE:		

DAYSTAMP: M:\15 Projects\15-020 2015 Jones Road Landfill Reporting\04.0 - Drafting\15-020.dwg

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File: M:\15 Projects\15-020 2015 Jones Road Landfill Reporting\04.0 - Drafting\15-020.dwg Layout: Figure 8 Plotscale: 0.1

APPENDIX B

MOE Correspondence and Certificates of Approval

APPENDIX C

Annual Waste Quantities

2014 Waste Values

	Waste Volume (tonnes)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**TOTAL**
Collected Material													
Garbage	616.5	442.7	551.5	638.5	764.4	644.5	678.5	666.8	601.7	647.8	503.0	660.6	7416.6
Construction and demolition waste	253.0	338.6	407.4	467.7	1122.7	1055.7	1022.4	972.9	1,223.8	866.6	570.5	1,257.6	9,558.9
Contaminated waste	0.0	643.3	2.5	0.0	15.6	2.3	23.9	0.0	562.4	0.3	0.0	0.0	1,250.4
Sewage sludge	196.3	223.0	293.6	301.7	298.0	195.1	207.6	133.8	208.2	198.0	242.2	179.8	2,677.1
Ash	264.6	223.7	268.2	314.4	279.5	248.2	236.1	251.5	262.0	190.2	260.4	286.4	3,085.1
Asbestos	0.9	0.6	0.0	1.0	0.4	7.8	0.0	0.0	0.9	0.4	4.3	1.2	17.4
Woodchips	0.9	0.0	0.5	13.1	46.0	37.2	61.3	45.7	33.3	44.7	8.8	1.1	292.5
												Collected TOTAL	**24,298.0**
Diverted Material													
Recycles	150.9	100.8	112.6	126.7	140.5	128.2	119.7	130.2	134.9	129.3	111.2	107.0	1,492.0
Scrap metal	5.9	9.2	4.6	12.3	25.1	17.9	16.9	20.3	14.0	13.6	7.2	5.8	152.9
Electronics	4.9	10.0	0.0	5.1	10.7	19.7	14.2	5.3	10.3	8.9	12.8	9.0	110.8
												Diverted TOTAL	**1,755.7**
												GRAND TOTAL	**26,053.7**

Municipal Solid Waste quantities collected in tonnes for 2013

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Garbage	553	492	501	655	768	780	868	887	653	672	556	585	7,970
C & D	333	295	339	446	644	691	714	709	832	935	850	248	7,035
Recycles	140	94	109	126	110	129	168	137	121	135	104	94	1,468
Scrap metals	3	3	4	9	21	24	18	19	18	12	9	4	144
Contaminated Waste	0	3	6	41	398	0	9	58	9	1,507	0	0	2,030
Sewere sludge	211	204	241	192	286	132	237	194	204	268	130	149	2,447
Ash	238	305	262	298	282	180	214	245	199	254	200	258	2,934
Electronics	5	5	6	0	5	14	15	5	11	0	21	5	93
Asbestos	0	0	1	0	0	0	3	1	0	1	2	4	13
Woodchips	1	1	1	7	50	44	76	47	33	45	9	1	313
Total	1,484	1,403	1,470	1,773	2,565	1,994	2,321	2,300	2,080	3,829	1,880	1,347	24,445

Solid Waste Quantities 2012 in Tonnes

Month	Garbage	C& D	Recycles	Scrap Metals	Contaminated Waste	Sewarage sludge	Ash	Electronics	Asbestos	Wood chips	Total
January	508	277	110	8	149	173	157	7	0	0	1,390
February	436	323	122	7	136	221	256	0	0	1	1,501
March	570	692	134	10	30	188	245	5	0	11	1,885
April	554	737	88	17	103	161	250	0	0	32	1,943
May	669	618	135	15	15	238	239	6	0	50	1,985
June	682	725	130	13	9	228	184	6	0	66	2,043
July	793	656	149	18	0	143	169	0	0	41	1,969
August	841	626	162	17	19	183	173	18	1	43	2,084
September	561	791	127	12	93	138	243	6	0	39	2,009
October	644	891	137	15	0	208	264	0	0	30	2,190
November	555	504	101	6	691	182	283	21	0	15	2,359
December	452	302	106	5	0	106	212	0	1	3	1,186
Total	7,265	7,142	1,502	142	1,244	2,170	2,676	69	2	333	22,545

Municipal Solid Waste quantities collected in tonnes for 2013

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Garbage	553	492	501	655	768	780	868	887	653	672	556	585	7,970
C & D	333	295	339	446	644	691	714	709	832	935	850	248	7,035
Recycles	140	94	109	126	110	129	168	137	121	135	104	94	1,468
Scrap metals	3	3	4	9	21	24	18	19	18	12	9	4	144
Contaminated Waste	0	3	6	41	398	0	9	58	9	1,507	0	0	2,030
Sewere sludge	211	204	241	192	286	132	237	194	204	268	130	149	2,447
Ash	238	305	262	298	282	180	214	245	199	254	200	258	2,934
Electronics	5	5	6	0	5	14	15	5	11	0	21	5	93
Asbestos	0	0	1	0	0	0	3	1	0	1	2	4	13
Woodchips	1	1	1	7	50	44	76	47	33	45	9	1	313
Total	1,484	1,403	1,470	1,773	2,565	1,994	2,321	2,300	2,080	3,829	1,880	1,347	24,445

Solid Waste Quantities 2012 in Tonnes

Month	Garbage	C& D	Recycles	Scrap Metals	Contaminated Waste	Sewarage sludge	Ash	Electronics	Asbestos	Wood chips	Total
January	508	277	110	8	149	173	157	7	0	0	1,390
February	436	323	122	7	136	221	256	0	0	1	1,501
March	570	692	134	10	30	188	245	5	0	11	1,885
April	554	737	88	17	103	161	250	0	0	32	1,943
May	669	618	135	15	15	238	239	6	0	50	1,985
June	682	725	130	13	9	228	184	6	0	66	2,043
July	793	656	149	18	0	143	169	0	0	41	1,969
August	841	626	162	17	19	183	173	18	1	43	2,084
September	561	791	127	12	93	138	243	6	0	39	2,009
October	644	891	137	15	0	208	264	0	0	30	2,190
November	555	504	101	6	691	182	283	21	0	15	2,359
December	452	302	106	5	0	106	212	0	1	3	1,186
Total	7,265	7,142	1,502	142	1,244	2,170	2,676	69	2	333	22,545

APPENDIX D

Ground Water Quality Data

Ground Water Monitoring Data

Monitor	Date	*QA/QC*	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1/17	6/1/2001			0.019	0.205	25.2				0.20		2.6	6.6	
	8/1/2001		0.001	0.011	0.021	27.8	< 0.001	0.002	< 0.001	0.14	< 0.001	2.6	7.0	0.008
	5/9/2002			< 0.001	0.037	26.1				0.14			5.9	
	8/6/2002		0.002	0.003	0.045	30.3	< 0.001	< 0.001	0.0040	**0.46**	< 0.001	3.1	6.8	0.020
	8/6/2003		< 0.002	0.007	0.021	23.9	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.00005	2.6	5.4	
	5/26/2004			<0.01	0.023	26.1				<0.01			6.2	
	5/16/2006			< 0.02	0.03	24.1				< 0.02			5.4	
	8/29/2006		0.002	< 0.02		25.0	< 0.0001	< 0.005	< 0.001	< 0.02	< 0.0001	3.0	5.6	
	5/15/2007			< 0.02	0.03	24.5				< 0.02			5.4	
	8/18/2009		<0.001	<0.01	0.019	26.0	<0.0001	<0.005	<0.001	<0.1		3.0	5.6	
	18/05/2010					29.2						2.9	6.5	
	25/08/2010	Limited Sample												0.044
	5/31/2011	no sample												
	8/23/2011		<0.001	<0.01	0.023	32.0	<0.0001	<0.005	<0.001	<0.1		3.6	7.2	0.034
	5/16/2012			0.11	0.04	95.7				**9.3**			16.6	
	8/29/2012		<0.001	0.69	0.03	130	<0.0001	<0.005	<0.001	**42**	<0.0001	7.5	27.0	**4.1**
	5/22/2013			0.4	0.0	162				**68**			32.9	
	8/27/2013		<0.2	0.6	0.025	187	<0.005	<0.01	<0.02	**74**	<0.0001	10.0	39.7	**2.74**
	5/20/2014			1	0.11	290				**58**			58.0	
	8/19/2014		<0.001	0.11	0.042	55	<0.001	<0.005	<0.001	**14**	<0.0001	5.5	12.0	**0.61**

Monitor	Date	*QA/QC*	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
1/17	6/1/2001		3.6			0.4		< 0.1	13.5	8.07	86	< 0.10	1.1	207
	8/1/2001		3.2	< 0.001	0.001		< 0.10	1.7		8.10	90	< 0.10	1.3	202
	5/9/2002		2.7			3.1		< 0.1	15.1	8.19	80	< 0.10	2.0	196
	8/6/2002		4.0	< 0.001	0.036	7.7	< 0.05	< 0.03	14.5	8.17	144	< 0.10	1.5	202
	8/6/2003		4.9	< 0.0005	< 0.005	0.7	< 0.2	< 0.2	18.8	8.09	71	0.11	1.4	188
	5/26/2004		4.4			0.5		<0.2	16.4	8.17	80	0.16	1.5	184
	5/16/2006		3.4			3		< 0.2	21	8.10	78	0.08	1.6	198
	8/29/2006		3.0	< 0.0005	< 0.005	4	< 0.01	< 0.1	24	8.10	76	0.08	1.7	185
	5/15/2007		6.5			5		< 0.1	23	7.70	72	< 0.05	1.7	221
	8/18/2009		2.7	<0.0005	<0.005	4	<0.01	<0.1	26	7.30	74	0.09	2.1	203
	18/05/2010		3.5			11			38	7.90	56	0.06	1.3	242
	24/08/2010		9.6	<0.0005	0.016	9	<0.1	<0.1	36	7.40	99		3.1	344
	5/31/2011	no sample												
	8/23/2011		3.4	<0.0005	<0.005	14	<0.1	<0.1	46	7.78	56	<0.05	1.8	263
	5/16/2012		9.7			6		<0.1	37	7.12	280	0.95	**9.2**	600
	8/29/2012		20	<0.0005	0.0066	19	0.067	<0.1	88	6.79	380	1.5	**26**	910
	5/22/2013		23.7			36		<0.1	20	7.29	500	3.4	**42**	1100
	8/27/2013		40.9	<0.05	<0.01	66	<0.01	<0.1	<1	7.07	**640**	3.3	**80**	1400
	5/20/2014		84			110		<0.1	<1	6.92	**1100**	15	**77**	2000
	8/19/2014		10	<0.0005	<0.005	18	<0.01	<0.1	32	7.36	170	1.3	**5.2**	450

Monitor	Date	*QA/QC*	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
1/17	6/1/2001		20			22					
	8/1/2001		249	0.09	< 0.005	< 20		< 1	< 0.001	8.20	70
	5/9/2002		81			< 20	< 1	2		8.00	110
	8/6/2002		140	< 0.05		< 20	< 1	2	< 0.001	8.10	150
	8/6/2003		100	0.12	2.60	8	< 0.5	3690	< 0.001	7.90	160
	5/26/2004		122			15				7.30	40
	5/16/2006		143			< 4	< 2	7500		8.10	200
	8/29/2006		135	0.3	18	14	< 2		< 0.001	**8.85**	183
	5/15/2007		138			< 4	< 2			**4.07**	
	8/14/2007	*Under water*									
	8/18/2009		128	0.8	0.7	26			<0.001	8.13	204
	18/05/2010		116			21				7.90	
	25/08/2010		166							7.40	
	5/31/2011	no sample									
	8/23/2011		214	0.5	0.07	11	<2		0.001	**6.47**	276
	5/16/2012		364			69				6.80	818
	8/29/2012		**800**	3.9	0.14	150			0.016	6.72	1354
	5/22/2013		**824**			220				6.73	1203
	8/27/2013		**1140**	5.7	0.19	280	69	240	0.27	7.04	1642
	5/20/2014		**1290**			300				6.93	1114
	8/19/2014		264	1.5	0.037	35	13		0.012	6.88	2630

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2/9	6/1/2001			0.038	0.303	24.1				0.29		5.4	7.2	
	8/1/2001		< 0.001	0.016	0.057	27.4	< 0.001	0.004	< 0.001	0.07	< 0.001	5.4	7.7	0.019
	8/6/2002		< 0.001	0.017	0.084	26.4	< 0.001	0.001	0.0090	**1.12**	< 0.001	6.3	7.1	0.043
	8/6/2003		< 0.002	0.021	0.062	25.3	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.00005	7.4	6.4	
	5/26/2004			0.020	0.061	26.8				<0.01			7.1	
	8/24/2004		< 0.002	0.015	0.055	26.9	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.0001	5.3	6.4	0.024
	8/3/2005			0.022	0.061	26.0				< 0.05			7.0	
	9/1/2005		< 0.001	0.024	0.059	29.0	< 0.0001	< 0.005	0.0023	< 0.05	< 0.0001	6.6	7.4	0.018
	5/16/2006			<0.02	0.06	25.1				< 0.02			6.3	
	8/29/2006		< 0.001	0.018	0.064	27.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	5.6	6.4	
	5/15/2007			< 0.02	0.06	26.2				< 0.02			6.4	
	8/14/2007		< 0.001	0.015	0.075	30.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	6.6	7.6	0.027
	5/21/2008			0.02	0.07	25.9				< 0.05			6.3	
	8/19/2008		< 0.001	0.02	0.064	26.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	5.5	7.4	0.025
	5/19/2009			<0.02	0.06	24.9				<0.02			6.2	
	8/18/2009		<0.001	0.018	0.071	25.0	<0.0001	<0.005	<0.001	<0.001		5.7	6.3	0.021
	18/05/2010			<0.02	0.07	26.6				<0.001			6.4	
	24/08/2010		0.001	0.021	0.091	26.0	< 0.0001	<0.005	<0.001	<0.001	<0.0001	6.3	6.3	0.016
	5/31/2011			0.02	0.06	28.5				<0.05			6.6	
	8/23/2011		<0.001	0.014	0.074	28.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	5.7	6.9	0.026
	5/16/2012			<0.02	0.08	28.5				<0.02			6.7	
	8/29/2012		<0.001	0.023	0.081	28.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	6.0	7.2	0.022
	5/22/2013			0.02	0.078	28.9				0.03			7.0	
	8/27/2013		<0.2	0.03	0.082	28.3	<0.005	<0.01	<0.02	<0.02	<0.0001	6.0	6.9	0.03
	5/20/2014			0.02	0.081	29.0				<0.02			7.2	
	8/19/2014		<0.001	0.02	0.078	27.0	<0.001	<0.005	<0.001	<0.1	<0.0001	5.8	6.8	0.019

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
2/9	6/1/2001		8.8			1.3		< 0.1	9.7	8.24	106	< 0.10	0.9	227
	8/1/2001		8.1	< 0.001	0.002		< 0.10	0.1		7.92	100	< 0.10	0.6	216
	8/6/2002		9.0	0.0060	0.047	13.5	< 0.05	< 0.03	9.1	8.23	125	0.05	0.5	222
	8/6/2003		7.4	< 0.0005	< 0.005	< 0.5	< 0.2	< 0.2	11.4	8.06	96	0.14	0.8	220
	5/26/2004		7.8			<0.5		<0.2	11.2	8.24	100	0.11	0.9	209
	8/24/2004		6.9	0.0010	0.021	< 0.5	< 0.2	< 0.2	12.2	8.16	101	0.09	0.7	216
	8/3/2005		8.0			< 1		< 0.2	12.3	8.25	105	0.05	0.8	208
	9/1/2005		11.0	< 0.0005	0.062	< 1	< 0.3	< 0.2	< 1	8.16	109	0.08	0.9	209
	5/16/2006		7			1		< 0.2	12	8.20	111	0.07	0.7	226
	8/29/2006		6.9	< 0.0005	< 0.005	2	< 0.01	< 0.1	11	8.20	115	0.17	0.9	216
	5/15/2007		7			< 1		< 0.1	11	8.00	111	0.11	1.2	234
	8/14/2007		7.6	< 0.0005	< 0.005	1	0.02	< 0.1	12	8.10	113	0.13	1	218
	5/21/2008		6.8			2		0.1	13	8.20	106	0.06	0.7	223
	8/19/2008		7.3	< 0.0005	< 0.005	1	< 0.01	< 0.1	10	8.30	106	0.08	1.1	225
	5/19/2009		7			<1		<0.1	11	7.30	105	0.10	0.8	224
	8/18/2009		6.8	<0.0005	<0.005	<1	<0.01	<0.1	13	7.60	108	0.09	1.3	221
	18/05/2010		7.2			1			11	8.10	103	0.05	0.8	225
	24/08/2010		7.3	<0.0005	<0.005	<1	0.01	<0.1	12	8.20	107	<0.05	0.8	228
	5/31/2011		6.7			<1			11	8.24	103	0.15	0.9	224
	8/23/2011		7	<0.0005	<0.005	<1	<0.01	<0.1	10	8.14	106	0.1	1.2	223
	5/16/2012		7			<1		<0.1	9	7.94	110	<0.05	0.95	230
	8/29/2012		7.2	<0.0005	<0.005	<1	0.034	<0.1	8	7.78	110	0.11	1.8	230
	5/22/2013		7.8			1		<0.1	10	8.10	110	0.19	1.1	230
	8/27/2013		7.2	<0.05	<0.01	1	0.018	<0.1	8	8.14	110	0.19	1.5	230
	5/20/2014		8.1			3		<0.1	15	7.84	110	0.22	1.1	220
	8/19/2014		7.2	<0.0005	<0.005	2	<0.01	<0.1	15	8.07	100	0.21	3	230

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
2/9	6/1/2001		86			31					
	8/1/2001		270	0.08	< 0.005	< 20		< 1	< 0.001	8.20	90
	8/6/2002		120	< 0.05		< 20	< 1	2	< 0.001	8.20	160
	8/6/2003		152	0.22	< 0.05	5	< 0.5	4600	< 0.001	7.90	190
	5/26/2004		134			12				7.30	320
	8/24/2004		126	0.15	0.18	< 5			< 0.001	8.10	NA
	8/3/2005		105			7	< 3	2500		6.80	190
	9/1/2005		212	0.30	3.72	4			0.0010	7.10	190
	5/16/2006		150			< 4	< 2	3900		8.00	230
	8/29/2006		150	0.4	0.44	< 4	< 2			**8.88**	211
	5/15/2007		157			< 4	< 2			**8.72**	
	8/14/2007		150	0.6	0.43	< 4	< 2		< 0.001	8.03	
	5/21/2008		148			< 4	< 2	4000		8.45	
	8/19/2008		150	1.3	1.3	< 4	< 2		< 0.001	**8.83**	
	5/19/2009		140			5				**8.85**	294
	8/18/2009		140	0.5	0.43	12			<0.001	**8.52**	218
	18/05/2010		156							8.10	
	25/08/2010		144	0.5	0.46	5			<0.001	8.20	
	5/31/2011		146			<4				8.11	226
	8/23/2011		160	<1	1.2	<4			<0.001	**5.98**	230
	5/16/2012		130			7.2				8.10	230
	8/29/2012		170	0.28	0.38	<8			<0.001	8.05	297
	5/22/2013		168			4.8				8.00	270
	8/27/2013		162	0.64	6.1	5.5	<2	12000	<0.001	8.21	236
	5/20/2014		192			15				6.59	220
	8/19/2014		186	3.4	6.7	23	<2		0.0011	**8.63**	253

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2/13	6/1/2001			0.027	0.107	19.7				**0.44**		5.4	6.6	
	8/1/2001		< 0.001	0.018	0.021	21.2	< 0.001	0.003	< 0.001	0.07	0.001	5.4	6.7	0.029
	5/7/2002			0.027	0.028	24.0				0.06			6.7	
	8/6/2002		< 0.001	0.024	0.038	22.9	< 0.001	0.001	0.0050	**0.42**	< 0.001	6.2	6.8	0.048
	5/21/2003			0.030	0.029	24.2				< 0.01			6.9	
	8/6/2003		< 0.002	0.024	0.035	23.1	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.00005	5.8	6.9	
	5/26/2004			0.030	0.031	24.1				<0.01			7.5	
	8/24/2004		< 0.002	0.018	0.028	23.5	< 0.0001	< 0.005	< 0.0005	< 0.03	< 0.0001	5.5	6.8	0.032
	8/3/2005			0.024	0.029	24.0				< 0.05			7.1	
	9/1/2005		< 0.001	0.022	0.025	23.0	< 0.0001	< 0.005	0.0020	< 0.05	< 0.0001	6.0	6.9	0.020
	5/16/2006			< 0.02	0.02	23.0				< 0.02			6.7	
	8/29/2006		< 0.001	0.022	0.028	27.0	< 0.0001	< 0.005	< 0.001	0.05	<0.0001	5.9	7.0	
	5/15/2007			0.03	0.03	23.9				< 0.05			7.0	
	8/14/2007		< 0.001	0.02	0.024	25.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	6.3	7.8	<0.002
	5/21/2008			<0.02	0.03	23.3				<0.05			6.7	
	8/19/2008		< 0.001	0.025	0.025	22.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	5.4	8.0	0.019
	5/19/2009			0.02	0.03	23.8				<0.02			7.0	
	8/18/2009		< 0.001	0.018	0.071	25.0	< 0.0001	< 0.005	< 0.001	<0.02		5.7	6.3	0.021
	5/18/2010			<0.02	0.02	23.3				<0.1			7.0	
	8/24/2010		< 0.001	0.022	0.025	24.0	<0.0001	<0.005	<0.001	<0.1		6.0	7.2	0.015
	5/31/2011			0.03	0.01	29.0				<0.05			7.9	
	8/23/2011		<0.001	0.018	0.021	24.0	<0.0001	<0.005	<0.001	<0.1			6.9	
	5/16/2012			<0.02	0.03	26.6				<0.02			7.4	
	8/29/2012		<0.001	0.027	0.024	24.0	<0.0001	<0.005	<0.001	<0.1	<0.0001	6.0	7.7	0.0061
	5/22/2013			0.02	0.026	26.7				<0.02			7.6	
	8/27/2013		<0.2	0.03	0.023	25.9	<0.005	<0.01	<0.02	<0.02	<0.0001	6.0	7.4	0.01
	5/20/2014			0.03	0.031	27.0				<0.02			8.1	
	8/19/2014		<0.001	0.024	0.025	24.0	<0.001	<0.005	<0.001	<0.1	<0.0001	5.8	7.3	0.023

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
2/13	6/1/2001		15.4			1.1		0.8	10.6	8.10	109	< 0.10	0.7	235
	8/1/2001		18.0	< 0.001	0.002		< 0.10	0.5		8.06	110	< 0.10	0.7	228
	5/7/2002		14.6			21.5		< 0.1	9.5	7.97	108	0.08	1.0	239
	8/6/2002		12.1	0.0090	0.010	17.3	< 0.05	< 0.03	9.3	8.24	206	0.03	< 0.2	226
	5/21/2003		10.4			< 0.5		< 0.2	1.1	**10.40**	105	0.04	0.7	226
	8/6/2003		10.3	< 0.0005	0.006	< 0.5	< 0.2	< 0.2	14.5	8.15	95	0.08	1.0	224
	5/26/2004		10.6			< 0.5		<0.2	11.4	8.27	102	0.08	0.7	212
	8/24/2004		8.7	0.0009	< 0.005	< 0.5	< 0.2	< 0.2	12.3	8.17	106	0.03	0.5	219
	8/3/2005		13.0			< 1		0.2	12.7	8.24	107	< 0.05	0.7	211
	9/1/2005		14.0	< 0.0005	< 0.005	< 1	< 0.3	0.2	2.0	8.18	111	0.06	0.7	212
	5/16/2006		8.6			1		< 0.2	13	8.20	112	< 0.05		229
	8/29/2006		10	< 0.0005	< 0.005	1	0.02	0.1	10	8.20	114	0.08	0.9	217
	5/15/2007		9			< 1		< 0.1	11	8.10	109	< 0.05	0.8	234
	8/14/2007		9.4	<0.0005	<0.005	< 1	< 0.01	0.1	14	8.10	104	0.07	1.1	209
	5/21/2008		8.3			< 1		< 0.1	13	8.00	110	< 0.05	0.8	240
	8/19/2008		8.8	< 0.0005	< 0.005	< 1	< 0.01	< 0.1	13	8.30	102	< 0.05	0.9	223
	5/19/2009		8.7			<1		<0.1	12	7.80	103	<0.05	0.7	234
	8/18/2009		8.2	< 0.0005	< 0.005	<1	< 0.01	<0.1	12	7.60	107	<0.05	1	219
	5/18/2010		8.8			<1			12	8.10	104	<0.05	0.7	228
	8/24/2010		7.3	<0.0005	<0.005	1	<0.01	0.05	12	8.20	103	<0.05	1.3	175
	5/31/2011		9.5			<1			11	8.10	114	0.37	5.9	253
	8/23/2011		7.9	<0.0005	<0.005	<1	<0.01	<0.1	12	8.14	102	0.21	1.1	221
	5/16/2012		9.4			<1		0.11	11	7.91	110	0.17	2.4	240
	8/29/2012		8.9	<0.0005	<0.005	<1	<0.01	<0.1	12	7.78	100	<0.05	0.58	230
	5/22/2013		9.8			<1		<0.1	12	8.15	100	0.17	0.93	230
	8/27/2013		9.0	<0.05	<0.01	<1	<0.01	0.11	13	8.07	100	0.058	0.81	230
	5/20/2014		13.0			1		<0.1	13	8.01	110	0.1	0.69	230
	8/19/2014		9.1	<0.0005	<0.005	<1	<0.01	<0.1	13	8.09	110	0.081	0.77	240

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
2/13	6/1/2001		138			25					
	8/1/2001		165	0.37	< 0.005	< 20		37	< 0.001	8.00	90
	5/7/2002		196			< 20	5	0		7.80	
	8/6/2002		121	< 0.05		< 20	< 1	2	< 0.001	8.40	170
	5/21/2003		132			5	0.6			7.20	240
	8/6/2003		144	0.15	< 0.05	6	< 0.5	7860	< 0.001	8.00	180
	5/26/2004		130			6				7.10	290
	8/24/2004		128	0.17	0.35	< 5			< 0.001	8.10	NA
	8/3/2005		140			10	< 2	1900		6.50	190
	9/1/2005		220	0.40	6.60	< 4			< 0.001	7.50	190
	5/16/2006		141			< 4	< 2	2400		8.00	230
	8/29/2006		151	0.2	3.4	< 4	< 2		< 0.001	**8.97**	212
	5/15/2007		152			< 4	<2			**9.00**	
	8/14/2007		138	0.6	0.21	< 4	<2		< 0.001	**8.92**	
	5/21/2008		146			< 4	< 2	4500		**8.86**	
	8/19/2008		152	0.2	0.26	< 4	< 2		< 0.001	**8.92**	
	5/19/2009		145			<4				8.04	292
	8/18/2009		139	0.4	0.46	<4			< 0.001	**9.10**	216
	5/18/2010		140							8.12	199
	8/24/2010		144	0.3	0.19	5			<0.001	**11.37**	
	5/31/2011		160			16				7.64	265
	8/23/2011		160	0.6	0.24	<4			0.001	**5.60**	238
	5/16/2012		112			11				7.69	266
	8/29/2012		122	0.22	0.27	4.5			<0.001	8.05	297
	5/22/2013		152			5.2				7.91	270
	8/27/2013		210	0.36	0.36	<4	<2	180	<0.001	8.08	237
	5/20/2014		166			<4				6.85	228
	8/19/2014		150	0.37	0.64	<4	<2		<0.001	**8.65**	256

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
3/8	6/1/2001			0.019	0.201	23.8				**0.61**		2.2	3.4	
	8/1/2001		< 0.001	0.005	0.015	24.9	0.002	0.002	< 0.001	**0.33**	< 0.001	2.2	3.5	**0.137**
	5/7/2002			< 0.001	0.023	24.6				0.09			3.1	
	8/6/2002		< 0.001	0.003	0.062	25.4	< 0.001	0.002	0.0240	**1.93**	< 0.001	2.7	3.5	**0.157**
	8/6/2003		< 0.002	0.007	0.025	26.5	< 0.0001	< 0.005	0.0010	0.07	< 0.00005	2.5	3.3	
	5/26/2004			<0.01	0.020	27.1				0.08			3.5	
	8/24/2004		< 0.002	< 0.005	0.019	24.9	< 0.0001	< 0.005	< 0.0005	0.04	< 0.0001	2.3	3.1	**0.097**
	8/3/2005			< 0.01	0.019	27.0				< 0.05			3.4	
	9/1/2005		< 0.001	< 0.01	0.018	26.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	2.4	3.2	**0.078**
	5/16/2006			<0.02	0.020	24.9				< 0.05			3.0	
	8/29/2006		< 0.001	< 0.01	0.021	27.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	2.6	3.4	
	5/15/2007			<0.01	0.020	27.2				<0.05			3.2	
	8/14/2007		<0.001	<0.01	0.020	27.0	<0.0001	<0.005	<0.001	<0.05	<0.0001	2.8	3.5	0.047
	5/21/2008			< 0.01	< 0.01	24.5				< 0.05			2.9	
	8/19/2008		< 0.001	< 0.01	0.018	23.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	2.3	3.5	0.035
	5/19/2009			<0.02	0.020	24.5				<0.02			3.0	
	8/18/2009		< 0.001	<0.02	0.021	24.0	< 0.0001	< 0.005	< 0.001	<0.02		2.5	3.0	0.009
	5/18/2010				0.020	25.0				0.02			3.1	
	8/24/2010				0.02	24.0	<0.0001	<0.005	0.001			2.5	3.1	0.021
	5/31/2011			<0.02	0.03	28.8				<0.05			3.3	
	8/23/2011		<0.001	<0.01	0.021	25.0	<0.0001	<0.005	<0.001	<0.10	<0.0001	2.4	3.3	0.015
	5/16/2012			<0.02	0.02	27.6				<0.02			3.3	
	8/29/2012		0.021	<0.01	0.021	26.0	<0.0002	<0.005	<0.001	<0.10	<0.0001	2.6	3.5	<0.002
	5/22/2013			<0.01	0.02	25.5				<0.10			3.1	
	8/27/2013		<0.2	<0.02	0.022	26.9	<0.005	<0.01	<0.02	<0.02	<0.0001	4.0	3.4	<0.01
	5/20/2014			<0.02	0.022	29.0				<0.02			3.7	
	8/19/2014		<0.001	<0.01	0.021	25.0	<0.001	<0.005	0.0014	<0.1	<0.0001	2.4	3.2	0.0065

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Tigger					126					284			
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
3/8	6/1/2001		6.4			3.1		0.10	11.9	7.88	68	< 0.10	3.3	174
	8/1/2001		4.1	< 0.001	0.003		< 0.10	< 0.10		7.74	59	< 0.10	3.1	151
	5/7/2002		3.4			4.8		0.90	9.1	7.85	66	0.04	3.0	175
	8/6/2002		4.3	0.005	0.025	6.7	0.05	0.59	11.7	7.84	71	0.03	3.5	168
	8/6/2003		3.9	< 0.0005	< 0.005	1.7	< 0.2	< 0.2	16.7	7.82	71	0.03	**7.8**	185
	5/26/2004		3.8			1.4		0.20	17.3	7.85	70	0.03	**5.6**	171
	8/24/2004		3.4	0.001	0.005	1.8	< 0.2	0.50	19.7	7.92	72	0.04	**5.3**	172
	8/3/2005		4.0			1.0		0.20	19.9	8.00	65	< 0.05	**5.0**	160
	9/1/2005		3.7	< 0.0005	< 0.005	1.0	<0.3	1.30	8.0	7.92	65	< 0.05	**5.0**	169
	5/16/2006		3.5			2		0.6	18	7.90	73	< 0.05	4.5	183
	8/29/2006		3.7	< 0.0005	< 0.005	3	0.070	0.9	20	8.00	70	0.05	4.7	179
	5/15/2007		3.7			2		0.4	19	7.60	72	0.07	4.8	191
	8/14/2007		3.9	< 0.0005	< 0.005	3	0.010	1.2	21	7.80	62	< 0.05	4.7	170
	5/21/2008		3.4			2		0.5	20	8.00	64	< 0.05	4.4	174
	8/19/2008		3.5	< 0.0005	< 0.005	2	< 0.01	0.8	20	8.00	64	< 0.05	4.8	178
	5/19/2009		3.4			2		0.5	19	7.10	71	<0.05	4.2	175
	8/18/2009		3.2	< 0.0005	< 0.005	2	< 0.01	0.8	20	7.90	69	<0.05	4.1	177
	5/18/2010		3.3			2		0.7	18	7.90	64	0.05	3.6	176
	8/24/2010		3.3	<0.0005	<0.005	2	<0.01	1.2	18	8.00	62	<0.05	3.7	175
	5/31/2011		3.4			1		0.6	16	7.64	64	<0.05	3.6	176
	8/23/2011		3.4	<0.0005	<0.005	2	<0.01	0.8	17	7.83	67	<0.05	3.6	177
	5/16/2012		3.5			1		0.46	16	7.59	72	<0.05	3.8	180
	8/29/2012		3.6	<0.0005	<0.005	2	<0.01	0.63	17	7.42	73	<0.05	3.4	180
	5/22/2013		4.1			1		0.28	15	7.94	66	<0.05	3.5	170
	8/27/2013		3.6	<0.05	<0.01	<1	<0.01	0.66	15	7.96	68	<0.05	3.4	180
	5/20/2014		3.8			2		0.52	18	7.60	69	<0.05	3	180
	8/19/2014		3.4	<0.0005	<0.005	2	0.013	0.69	17	7.85	68	<0.05	3.5	180

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Trigger		324								
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
3/8	6/1/2001		110			28					
	8/1/2001		107	0.11	0.04	28		69.00	< 0.001	7.70	70
	5/7/2002		163			195	< 1	4.26		5.90	110
	8/6/2002		144	0.06		< 20	< 1	1.90	< 0.001	7.80	150
	8/6/2003		160	0.22	2.50	26	< 0.5	1920	< 0.001	7.30	150
	5/26/2004		130			20				6.20	40
	8/24/2004		122	0.37	3.10	15			< 0.001	7.70	NA
	8/3/2005		430			40	< 3	4800		4.20	160
	9/1/2005		237	1.70	2.92	22			0.003	7.10	360
	5/16/2006		118				< 2	2400		8.00	
	8/29/2006		141	0.40	2.30	8	< 2		< 0.001	8.37	
	5/15/2007		148			< 4	< 2			8.12	
	8/14/2007		118	0.80	2.80	27	< 2		< 0.001	7.23	163
	5/21/2008		128			17	< 2	1600		8.01	
	8/19/2008		120	1.00	1.50	< 4	< 2		< 0.001	7.98	
	5/19/2009		115			41				7.12	196
	8/18/2009		110	1.00	1.00	37			< 0.001	7.21	268
	5/18/2010		120			40				6.97	173
	8/24/2010		110	1.10	0.54	23			< 0.001	**11.19**	
	5/31/2011		108			11				7.63	185
	8/23/2011		177	1.00	1.30	11			<0.001	**5.71**	187
	5/16/2012					27				7.29	192
	8/29/2012		126	0.71	0.66	<8.0			<0.001	7.76	238
	5/22/2013		162			15				8.05	216
	8/27/2013		140	0.73	1.40	7.1	<2	2000	<0.001	7.38	202
	5/20/2014		134			15				8.26	437
	8/19/2014		136	0.86	0.99	10	<2		<0.001	**8.55**	247

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
4/6	6/1/2001			0.007	0.021	24.4				0.15		2.6	5.1	
	8/1/2001		< 0.001	0.004	0.017	26.4	< 0.001	0.003	< 0.001	0.06	< 0.001	2.6	5.3	0.002
	8/6/2002		< 0.001	0.004	0.048	33.3	< 0.001	0.002	0.0150	**1.58**	< 0.001	3.7	6.8	0.040
	5/21/2003			< 0.01	0.021	27.9				< 0.01			5.1	
	8/6/2003		< 0.002	0.009	0.023	27.6	< 0.0001	< 0.005	0.0014	< 0.03	< 0.00005	2.7	5.2	
	5/26/2004			<0.01	0.024	26.0				0.02			5.3	
	8/24/2004		< 0.002	0.006	0.019	25.6	< 0.0001	< 0.005	0.0007	< 0.03	< 0.0001	2.7	5.5	0.006
	8/3/2005			< 0.01	0.020	28.0				< 0.05			5.3	
	9/1/2005		< 0.001	< 0.01	0.019	26.0	< 0.0001	< 0.005	0.0028	< 0.05	< 0.0001	2.8	5.1	< 0.002
	5/16/2006				0.020	26.0				< 0.02			4.8	
	8/29/2006		< 0.001	< 0.01	0.019	27.0	0.0002	< 0.005	0.001	< 0.05	< 0.0001	2.7	4.9	
	5/15/2007			< 0.01	0.020	26.1				< 0.05			4.7	
	8/14/2007		0.001	< 0.01	0.020	29.0	< 0.0002	< 0.005	< 0.001	< 0.05	< 0.0001	2.8	5.3	< 0.002
	5/21/2008			< 0.01	0.020	25.6				< 0.05			4.6	
	8/19/2008		0.001	< 0.01	0.019	24.0	< 0.0002	< 0.005	< 0.001	< 0.05	< 0.0001	2.4	5.5	< 0.002
	5/18/2010	*No Recovery*												
	8/24/2010	*No Recovery*												
	5/31/2011	*No Recovery*												
	8/23/2011	*No Recovery*												
	5/16/2012	*Out of Service*												
	5/22/2013	*Out of Service*												
	8/27/2013*		<0.2	0.030	0.030	34.0	<0.005	<0.01	<0.02	<0.02	0.00025	3.0	6.0	**0.080**
	5/20/2014			0.020	0.035	38.0				0.02			6.6	
	5/20/2014	*Duplicate*		0.020	0.043	38.0				<0.02			6.6	
	8/19/2014		0.001	<0.01	0.035	30.0	<0.001	<0.005	<0.001	<0.1	0.00013	2.5	5.5	0.033

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
4/6	6/1/2001		3.5			1.4		0.10	6.7	8.17	83	< 0.10	1.2	182
	8/1/2001		3.8	< 0.001	0.002		< 0.10	< 0.10		7.95	88	< 0.10	1.3	182
	8/6/2002		4.9	0.006	0.140	7.3	0.05	3.21	4.6	7.99	308	0.03	0.8	188
	5/21/2003		3.8			< 0.5		< 0.2	0.8	8.10	87	0.06	1.4	190
	8/6/2003		4.6	< 0.0005	< 0.005	< 0.5	< 0.2	< 0.2	11.1	8.04	88	0.03	1.3	191
	5/26/2004		4.1			<0.5		<0.2	6.9	8.20	94	0.05	1.1	184
	8/24/2004		5.9	0.001	0.009	< 0.5	< 0.2	< 0.2	7.1	8.06	92	0.07	1.2	195
	8/3/2005		7.7			< 1		0.60	< 1	8.18	90	< 0.05	1.4	175
	9/1/2005		6.2	< 0.0005	< 0.005	< 1	< 0.3	< 0.2	4.0	8.06	95	< 0.05	1.2	180
	5/16/2006		3.7			1			8	8.10	95	0.14	1.4	191
	8/29/2006		4	< 0.0005	< 0.005	2	< 0.01	< 0.1	10	8.10	98	0.07	1.7	186
	5/15/2007		6.5			1		< 0.1	8	7.90	95	0.15	2	198
	8/14/2007		6	< 0.0005	< 0.005	1	< 0.01	< 0.1	9	8.10	98	0.09	1.3	192
	5/21/2008		5.3			2		< 0.1	12	8.10	94	< 0.05	1.1	198
	8/19/2008		5.9	< 0.0005	< 0.005	1	< 0.01	< 0.1	8	8.20	97	0.12	1.5	199
	5/18/2010	*No Recovery*												
	8/24/2010	*No Recovery*												
	5/31/2011	*No Recovery*												
	8/23/2011	*No Recovery*												
	5/16/2012	*Out of Service*												
	5/22/2013	*Out of Service*												
	8/27/2013*		4.4	<0.05	<0.01	<1	<0.01	<0.1	9	8.09	110	0.14	2.2	220
	5/20/2014		4.8			2		<0.1	5	7.76	130	0.17	2.4	250
	5/20/2014	*Duplicate*	5.1			2		<0.1	5	7.74	120	0.17	1.9	240
	8/19/2014		4	<0.0005	<0.005	<1	<0.01	<0.1	8	7.95	100	0.09	1.6	220

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
4/6	6/1/2001		74			< 20					
	8/1/2001		143	0.42	< 0.005	22		< 1	< 0.001	8.10	90
	8/6/2002		236	< 0.05		< 20	2	16.23	< 0.001	8.40	160
	5/21/2003		126			7	< 0.5			7.90	7.6
	8/6/2003		144	0.07	0.08	6	< 0.5	3860	< 0.001	7.80	160
	5/26/2004		130			11				7.30	180
	8/24/2004		134	0.10	1.24	8			< 0.001	NA	NA
	8/3/2005		390			220	< 3	7900		**3.00**	160
	9/1/2005		315	2.30	5.63	71			< 0.001	6.90	160
	5/16/2006		128			95	< 2	7300		7.90	
	8/29/2006		136	0.300	13	110	< 2		< 0.001	**8.75**	
	5/15/2007		121			38	<2			**8.77**	
	8/14/2007		134	< 1	1	4	< 2		< 0.001	**8.61**	
	5/21/2008		135			5	< 2	10000		**8.70**	
	8/19/2008		130	6	140	29	< 2		< 0.001	**8.88**	
	5/18/2010	*No Recovery*									
	8/24/2010	*No Recovery*									
	5/31/2011	*No Recovery*									
	8/23/2011	*No Recovery*									
	5/16/2012	*Out of Service*									
	5/22/2013	*Out of Service*									
	8/27/2013*		180	9.5	5.2	340	<2	6300	<0.001	7.73	317
	5/20/2014		162			74				7.69	229
	5/20/2014	*Duplicate*	196			100				7.69	229
	8/19/2014		144	7.7	2.5	210	<2		<0.001	8.07	294

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria * - first sample from newly constructed replacement well

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/17	6/1/2001			0.005	0.011	20.4				0.12		1.0	4.6	
	8/1/2001		< 0.001	0.001	0.009	22.7	< 0.001	0.002	0.002	0.08	< 0.001	1.0	3.9	< 0.001
	5/7/2002			< 0.001	0.010	17.9				0.07			3.5	
	8/6/2002		< 0.001	0.001	0.020	20.2	< 0.001	< 0.001	0.028	**0.57**	< 0.001	1.4	4.9	0.011
	5/26/2004			0.010	0.010	22.6				<0.01			4.6	
	8/24/2004		< 0.002	< 0.005	0.009	24.3	< 0.0001	< 0.005	0.002	< 0.03	< 0.0001	1.1	4.9	< 0.005
	8/3/2005			< 0.01	0.008	21.0				< 0.05			4.3	
	9/1/2005		< 0.001	< 0.01	0.008	22.0	< 0.0001	< 0.005	0.003	< 0.05	< 0.0001	0.9	4.3	< 0.002
	5/16/2006	*Dry*												
	8/29/2006	*Dry*												
	5/15/2007	*Dry*												
	8/14/2007		< 0.001	< 0.01	0.010	26.0	< 0.0001	< 0.005	0.004	< 0.05	< 0.0001	1.4	5.2	< 0.002
	5/21/2008			< 0.01	< 0.01	21.7				< 0.05			4.0	
	8/19/2008		< 0.001	< 0.01	0.008	22.0	< 0.0001	< 0.005	0.005	< 0.05	< 0.0001	1.2	5.1	< 0.002
	5/19/2009			<0.02	<0.02	20.9				<0.02			4.0	
	8/18/2009		< 0.001	<0.02	0.009	22.0	< 0.0001	< 0.005	0.003	<0.02		1.1	4.4	< 0.002
	5/18/2010				0.023	22.7				<0.02			4.3	
	8/24/2010		<0.001	<0.01	0.023	23.0	<0.0001	<0.005	0.005	<0.1	<0.0001	1.2	4.8	<0.002
	5/31/2011			<0.01	<0.01	24.9				<0.05			4.4	
	8/23/2011		<0.001	<0.01	0.009	22.0	<0.0001	<0.005	0.007	<0.1	<0.0001	1.3	4.5	<0.002
	5/16/2012	*Dry*												
	8/29/2012	*Dry*												
	5/22/2013	*Dry*												
	8/27/2013	*Dry*												
	5/20/2014	*Dry*												
	8/19/2014		<0.001	<0.01	0.010	25.0	<0.001	<0.005	0.0038	<0.1	<0.0001	1.1	5.2	<0.002

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
5/17	6/1/2001		3.1			1.1		< 0.10	2.7	8.07	78	< 0.10	1.4	159
	8/1/2001		3.7	< 0.001	0.003		< 0.10	< 0.10		7.90	78	< 0.10	1.0	143
	5/7/2002		3.3			5.1		< 0.10	1.4	7.98	73	0.03	1.0	148
	8/6/2002		4.3	0.0020	0.016	8.0	< 0.05	2.00	3.0	8.16	88	0.12	1.2	173
	5/26/2004		4.2			< 0.5		<.02	2.7	8.10	79	< 0.03	1.8	147
	8/24/2004		3.6	< 0.0005	0.014	< 0.5	< 0.2	< 0.2	2.7	8.20	91	0.03	0.9	163
	8/3/2005		3.4			< 1		< 0.2	3.0	8.24	77	< 0.05	1.4	139
	9/1/2005		3.4	< 0.0005	< 0.005	< 1	< 0.3	< 0.2	10.0	8.15	82	< 0.05	2.0	144
	5/16/2006	*Dry*												
	8/29/2006	*Dry*												
	5/15/2007	*Dry*												
	8/14/2007		3.8	< 0.0005	< 0.005	1	< 0.01	0.4	3	8.00	88	< 0.05	1.4	166
	5/21/2008		3.5			< 1		< 0.2	2	8.00	79	< 0.05	1.3	155
	8/19/2008		3.6	< 0.0005	< 0.005	< 1	< 0.01	< 0.1	2	8.10	85	< 0.05	1.3	163
	5/19/2009		3.9			1		<0.1	2	7.30	86	<0.05	1.2	159
	8/18/2009		3	< 0.0005	< 0.005	< 1	< 0.01	0.1	2	7.90	88	<0.05	1.3	165
	5/18/2010		3.8			1		<0.1	2	8.00	81	<0.05	1.3	164
	8/24/2010		3.4	<0.0005	<0.005	1	<0.01	0.2	2	8.10	85	<0.05	1.4	167
	5/31/2011		3.7			<1		<0.1	1	8.05	79	<0.05	1.5	161
	8/23/2011		3.6	<0.0005	<0.005	1	<0.01	<0.1	2	7.99	81	<0.05	1.4	162
	5/16/2012	*Dry*												
	8/29/2012	*Dry*												
	5/22/2013	*Dry*												
	8/27/2013	*Dry*												
	5/20/2014	*Dry*												
	8/19/2014		3.2	<0.0005	<0.005	<1	<0.01	0.33	2	8.05	90	<0.05	1.1	180

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
5/17	6/1/2001		118			22					
	8/1/2001		131	0.20	< 0.005	22		< 1	< 0.001	8.30	70
	5/7/2002		102			84	< 1	1.30		8.30	90
	8/6/2002		125	0.06		70	< 1	4.94	0.002	7.90	130
	5/26/2004		92			6				7.30	140
	8/24/2004		116	0.08	< 0.05	10			< 0.001	NA	NA
	8/3/2005		150			15	< 3	6000		8.30	130
	9/1/2005		184	0.40	19.400	< 4			< 0.001	**3.40**	120
	5/16/2006	*Dry*									
	8/29/2006	*Dry*									
	5/15/2007	*Dry*									
	8/14/2007		122	< 1	1.00	< 4	< 2		< 0.001	**8.55**	164
	5/21/2008		104			5	< 2	1100		**9.12**	
	8/19/2008		110	0.3	0.29	< 4	< 2		< 0.001	**8.88**	
	5/19/2009		100			51				7.40	192
	8/18/2009		105	0.4	0.73	13			< 0.001	7.71	172
	5/18/2010		114			11				7.59	145
	8/24/2010		106	0.7	1.50	8			<0.001	**11.16**	
	5/31/2011		98			12				7.58	161
	8/23/2011		100	<1	1.50	<4			<0.001	6.76	170
	5/16/2012	*Dry*									
	8/29/2012	*Dry*									
	5/22/2013	*Dry*									
	8/27/2013	*Dry*									
	5/20/2014	*Dry*									
	8/19/2014		126	0.44	0.37	9	<2		<0.001	7.73	216

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
6/5	6/1/2001			0.011	0.240	14.1				**0.42**		1.6	3.3	
	8/1/2001		< 0.001	< 0.001	0.013	16.8	< 0.001	< 0.001	< 0.001	0.08	< 0.001	1.6	2.9	< 0.001
	5/9/2002			< 0.001	0.014	24.3				0.08			4.7	
	8/6/2002		< 0.001	0.003	0.037	16.2	< 0.001	< 0.001	0.007	**1.05**	< 0.001	2.0	4.5	0.014
	5/21/2003			0.010	0.014	17.0				0.05			3.2	
	8/6/2003		< 0.002	0.005	0.013	15.4	< 0.0001	< 0.005	0.001	0.04	< 0.00005	1.7	3.3	
	5/26/2004			<0.01	0.012	15.6				0.01			3.4	
	8/24/2004		< 0.002	< 0.005	0.011	14.6	< 0.0001	< 0.005	0.001	< 0.03	< 0.0001	1.7	3.0	< 0.005
	8/3/2005			< 0.01	0.001	14.0				< 0.05			3.1	
	9/1/2005		< 0.001	< 0.01	0.013	16.0	< 0.0001	< 0.005	0.003	< 0.05	< 0.0001	1.8	3.2	0.004
	5/16/2006			< 0.02	< 0.02	15.0				< 0.02			2.9	
	8/29/2006		< 0.001	< 0.01	0.030	26.1	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	1.8	5.9	
	5/15/2007			< 0.02	< 0.02	16.4				< 0.02			3.3	
	8/14/2007		< 0.001	< 0.01	0.012	16.0	< 0.0001	< 0.005	0.001	< 0.05	< 0.0001	1.9	3.4	< 0.002
	5/21/2008			< 0.01	< 0.02	14.7				< 0.05			2.9	
	8/19/2008		< 0.001	< 0.01	0.012	15.0	< 0.0001	< 0.005	< 0.001	< 0.05	< 0.0001	1.7	3.4	< 0.002
	5/19/2009			<0.02	<0.02	15.2				<0.02			3.1	
	8/18/2009		< 0.001	<0.02	0.012	15.0	< 0.0001	< 0.005	< 0.001	<0.02		1.8	3.2	< 0.002
	5/18/2010			<0.02	<0.02	14.7				<0.02			3.0	
	8/24/2010		<0.001	<0.02	0.012	15.0	<0.0001	<0.005	<0.001	<0.01	<0.0001	1.8	3.1	0.003
	5/31/2011			<0.02	<0.02	17.3				<0.05			3.3	
	8/23/2011		<0.001	<0.02	0.013	16.0	<0.0001	<0.005	<0.001	<0.10	<0.0001	1.7	3.1	0.003
	5/16/2012			<0.02	<0.02	17.0				<0.02			3.3	
	8/29/2012		<0.001	<0.01	0.017	18.0	<0.0001	<0.005	<0.001	<0.10	<0.0001	2.1	3.8	<0.002
	5/22/2013			<0.01	0.016	19.9				<0.10			3.9	
	8/27/2013		<0.2	<0.02	0.015	17.7	<0.005	<0.01	<0.02	<0.02	<0.0001	2.0	3.4	<0.01
	5/20/2014			<0.02	0.017	19.0				<0.02			3.7	
	8/19/2014		<0.001	<0.01	0.013	15.0	<0.001	<0.005	<0.001	<0.1	<0.0001	1.7	3.1	0.0023

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
6/5	6/1/2001		3.0			1.2		0.1	6.7	7.88	50	< 0.10	2.0	115
	8/1/2001		2.6	< 0.001	0.002		< 0.10	0.3		7.62	55	< 0.10	1.2	112
	5/9/2002		3.9			5.1		< 0.1	5.6	8.19	56	0.01	3.0	120
	8/6/2002		3.7	0.0040	0.032	5.5	< 0.05	0.5	3.8	8.15	55	0.06	1.6	113
	5/21/2003		2.7			< 0.5		< 0.2	0.6	8.24	55	0.06	2.9	123
	8/6/2003		3.0	< 0.0005	< 0.005	< 0.5	< 0.2	< 0.2	7.0	8.05	53	< 0.03	2.4	121
	5/26/2004		2.8			<0.5		<0.2	6.0	8.19	52	<0.03	1.9	116
	8/24/2004		2.9	0.0010	0.015	< 0.5	< 0.2	< 0.2	4.9	8.17	51	< 0.03	1.5	114
	8/3/2005		3.0			< 1		1.3	7.0	8.09	53	< 0.05	2.0	106
	9/1/2005		3.1	< 0.0005	< 0.005	< 1	< 0.3	< 0.2	8.0	8.08	58	0.06	2.3	112
	5/16/2006		2.6			1		0.1	7.0	7.90	57	0.08	2.1	119
	8/29/2006		3.4	< 0.0005	< 0.005	57	< 0.01	< 0.1	6.0	8.10	57	< 0.05	1.9	113
	5/15/2007		2.6			2		< 0.1	8.0	7.70	59	< 0.05	2.0	134
	8/14/2007		3.2	< 0.0005	< 0.005	< 1	< 0.01	0.1	6.0	7.90	55	< 0.05	2.0	114
	5/21/2008		2.5			< 1		< 0.1	6.0	7.90	58	< 0.05	1.9	118
	8/19/2008		3.0	< 0.0005	< 0.005	< 1	< 0.01	0.1	6.0	8.10	54	< 0.05	1.9	115
	5/19/2009		2.6			<1		0.1	6.0	6.90	47	<0.05	1.8	122
	8/18/2009		2.9	< 0.0005	< 0.005	<1	< 0.01	0.2	6.0	7.90	56	<0.05	0.7	114
	5/18/2010		2.6			<1		0.1	6.0	7.90	51	<0.05	1.7	116
	8/24/2010		2.7	< 0.0005	< 0.005	<1	<0.01	0.1	6.0	8.00	52	0.09	1.7	118
	5/31/2011		2.6			<1		<0.1	5.0	7.81	54	0.05	1.7	119
	8/23/2011		2.7	<0.0005	<0.005	<1	<0.01	<0.1	9.0	7.59	52	<0.05	1.7	123
	5/16/2012		2.7			<1		0.2	6.0	7.62	56	<0.05	1.9	130
	8/29/2012		3.1	<0.0005	<0.005	<1	0.038	0.2	6.0	7.10	65	0.28	2.5	140
	5/22/2013		3.5			<1		0.2	8.0	7.94	63	0.14	1.8	150
	8/27/2013		3.0	<0.05	<0.01	<1	0.014	0.23	6.0	7.88	58	0.08	1.8	140
	5/20/2014		3.0			<1		0.16	7.0	7.51	59	<0.05	1.5	130
	8/19/2014		2.7	<0.0005	<0.005	<1	<0.01	0.17	6.0	7.82	55	<0.05	1.6	120

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
6/5	6/1/2001		92			22					
	8/1/2001		98	< 0.05	< 0.005	22		< 1	< 0.001	8.40	60
	5/9/2002		< 40			56	< 1	0.81		8.00	100
	8/6/2002		126	< 0.05		< 20	< 1	0.47	< 0.001	8.50	100
	5/21/2003		100			10	< 0.5			7.70	90
	8/6/2003		96	0.11	< 0.05	7	< 0.5	4840	< 0.001	8.20	90
	5/26/2004		74			6				7.10	30
	8/24/2004		88	0.11	< 0.05	8			< 0.001	NA	NA
	8/3/2005		136			5	< 2	860		6.50	100
	9/1/2005		150	0.50	0.710	7			0.003	**3.60**	100
	5/16/2006		80			9	< 2	1600		8.00	
	8/29/2006		70	0.2	0.390	6	< 2		< 0.001	**9.03**	110
	5/15/2007		82			6	< 2			**8.95**	
	8/14/2007		77	< 1	1.100	< 4	< 2		< 0.001	**9.47**	106
	5/21/2008		76			6	< 2	410		**8.70**	
	8/19/2008		80	0.4	0.950	< 4	< 2		< 0.001	**8.68**	
	5/19/2009		80			<4				8.38	132
	8/18/2009		76	0.7	0.560	12			< 0.001	7.68	140
	5/18/2010		74			<4				7.54	94
	8/24/2010		76	0.7	0.480	11			<0.001	**11.30**	
	5/31/2011		70			5				**6.80**	132
	8/23/2011		92	<1	0.400	5			<0.001	**6.27**	185
	5/16/2012		78			10				7.38	172
	8/29/2012		96	0.62	0.540	18			0.0054	7.58	214
	5/22/2013		92			21				7.88	166
	8/27/2013		122	0.51	0.400	9.1	<2	180	<0.001	7.68	159
	5/20/2014		108			10				6.77	129
	8/19/2014		90	0.25	0.250	<4	<2		<0.001	7.55	144

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	*QA/QC*	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS - Units -		0.025 mg/L	5 mg/L	1 mg/L	mg/L	0.005 mg/L	0.05 mg/L	1 mg/L	0.3 mg/L	0.001 mg/L	mg/L	mg/L	0.05 mg/L
11/4	6/1/2001			0.012	0.023	10.7				0.10			3.5	
	8/1/2001			< 0.001	0.035	11.7				**0.43**			3.6	
	5/7/2002			< 0.001	0.025	11.1				0.13			3.1	
	8/6/2002			< 0.001	0.049	14.6				**1.02**			4.6	
	5/26/2004			<0.01	0.022	9.3				0.04			2.9	
	8/24/2004			0.01	0.023	11.9				0.03			3.2	
	8/3/2005			< 0.01	0.025	12.0				< 0.05			3.5	
	9/1/2005			< 0.01	0.026	12.0				< 0.05			3.7	
	8/14/2007			< 0.02	< 0.02	8.2				< 0.05			2.3	
	5/21/2008			< 0.02	< 0.02	7.7				< 0.05			2.2	
	8/19/2008			< 0.02	< 0.02	7.7				< 0.05			2.3	
	5/19/2009			0.09	1.010	8.0				0.52			2.4	
	8/18/2009			< 0.02	< 0.02	8.3				< 0.05			2.4	
	5/18/2010			<0.02	0.02	8.7				0.06			2.5	
	8/24/2010			0.18	0.850	7.6				0.03			2.3	
	5/31/2011			<0.02	<0.02	8.3				<0.05			2.5	
	8/23/2011			<0.02	<0.02	9.0				<0.02			2.5	
	5/16/2012	*Dry*												
	8/29/2012			<0.02	<0.02	9.3				0.03			2.6	
	5/22/2013	*Dry*												
	8/27/2013	*Dry*												
	5/20/2014			<0.02	0.021	8.8				0.02			2.5	
	8/19/2014		<0.001	<0.01	0.018	6.9	<0.001	<0.005	0.0014	<0.1	<0.0001	1.1	2.0	0.0024

Monitor	Date	*QA/QC*	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS - Units -		200 mg/L	0.01 mg/L	5 mg/L	250 mg/L	mg/L	10 mg/L	500 mg/L	6.5 - 8.5 n/a	500 mg/L	mg/L	5.0 mg/L	µS/cm
11/4	6/1/2001		5.9			1.2		0.10	3.5	7.89	46	< 0.10	4.9	78
	8/1/2001		6.5					0.30		6.99	30	< 0.10	2.7	115
	5/7/2002		5.4			7.3		< 0.10	3.3	6.94	50	0.04	3.0	109
	8/6/2002		7.4			11.0		< 0.03	4.0	7.30	46	0.03	2.4	98.2
	5/21/2003	*Frozen*												
	8/24/2004		5.9			0.9		0.30	4.7	6.66	42	0.09	3.9	101
	8/3/2005		9.8			< 1		1.30	7.0	7.19	51	< 0.05	**5.3**	104
	9/1/2005		9.2			< 1		0.30	10.4	7.10	53	0.05	**5.9**	103
	5/16/2006	*Dry*												
	5/21/2008		5.3			< 1		< 0.1	5	7.20	36	< 0.1	4.4	82
	8/19/2008		5.8			< 1		< 0.1	4	7.30	39	< 0.1	**6.2**	84
	5/19/2009		9.1			<1		<0.1	4	6.60	38	0.06	3.5	93
	8/18/2009		5.9			<1		0.1	4	6.60	44	0.07	4.2	91
	5/18/2010		6			<1		<0.1	4	7.00	43	0.12	3.7	96
	8/24/2010		11.3			<1		0.1	4	6.80	43	<0.05	4.2	92
	5/31/2011		5.6			<1		<0.1	3	6.99	41	0.1	3.9	92
	8/23/2011		6.1			<1		<0.1	4	6.73	42	<0.05	3.9	92
	5/16/2012	*Dry*												
	8/29/2012		5.8			9		0.14	4	6.92	47	NA	4.6	100
	5/22/2013	*Dry*												
	8/27/2013	*Dry*												
	5/20/2014		6.3			<1		<0.1	4	6.74	38	<0.05	4.0	84
	8/19/2014		5.3	<0.0005	<0.005	9	<0.01	<0.1	4	6.79	35	0.066	4.0	83

Monitor	Date	*QA/QC*	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS - Units -		500 mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	6.5 - 8.5 mg/L	µS/cm
11/4	6/1/2001		136			36	7.9				
	8/1/2001		219			33					
	5/7/2002		184			84	3.0	3.74		7.00	60
	8/6/2002		152			28	< 1	0.45		6.70	90
	5/21/2003	*Frozen*									
	8/24/2004		176			13				NA	NA
	8/3/2005		175			< 4	< 2	7700		**5.40**	70
	9/1/2005		**550**			14				**4.80**	90
	5/16/2006	*Dry*									
	5/21/2008		56			< 4	< 2	27000		7.54	
	8/19/2008		60			15	< 2	14000		7.68	
	5/19/2009		60			28				6.83	100
	8/18/2009		57			53				6.63	88
	5/18/2010		64			83				7.52	91
	8/24/2010		58			26				**11.15**	
	5/31/2011		54			9				**6.26**	100
	8/23/2011		74			11				6.51	93
	5/16/2012	*Dry*									
	8/29/2012		NA			NA				**6.30**	136
	5/22/2013	*Dry*									
	8/27/2013	*Dry*								6.99	112
	5/20/2014		**1270**			21				7.56	78
	8/19/2014		**562**	<1	25	11	<2		<0.001	7.24	105

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
16/15	6/1/2001			0.005	0.006	13.3				0.08		1.40	2.9	
	8/1/2001		< 0.001	< 0.001	0.005	13.4	< 0.001	< 0.001	< 0.001	0.04	< 0.001	1.40	2.5	< 0.001
	5/7/2002			< 0.001	0.006	14.7				0.05			3.2	
	8/6/2002		< 0.001	0.004	0.018	18.7	< 0.001	< 0.001	0.0070	**0.56**	< 0.001	1.40	3.8	0.015
	5/21/2003			0.010	0.070	17.0				0.03			2.9	
	8/6/2003		< 0.002	0.005	0.007	14.0	< 0.0001	< 0.005	< 0.0005	< 0.03	<0.0005	1.20	2.8	
	5/26/2004			< 0.01	0.006	14.9				< 0.01			3.0	
	8/24/2004			0.005	0.005	15.8	< 0.0001	< 0.005	0.0009	< 0.03	< 0.0001	1.20	2.7	< 0.005
	8/3/2005			< 0.010	0.054	14.0				< 0.05			2.8	
	9/1/2005		< 0.001	< 0.01	< 0.005	14.0	< 0.0001	< 0.005	0.0018	< 0.05	< 0.0001	1.10	2.8	< 0.002
	5/16/2006			< 0.02	< 0.02	14.3				< 0.02			2.7	
	8/29/2006			< 0.02	0.005	14.0	< 0.0001	< 0.005	< 0.0001	< 0.05	< 0.0001	1.10	2.9	
	5/15/2007			< 0.02	< 0.02	14.3				< 0.05			2.7	
	8/14/2007		< 0.001	< 0.02	0.00.5	16.0	< 0.0001	< 0.005	< 0.0001	< 0.05	< 0.0001	1.20	3.1	< 0.002
	5/21/2008			< 0.02	< 0.02	14.7				< 0.05			2.8	
	8/19/2008		< 0.001	< 0.02	0.005	14.0	< 0.0001	< 0.005	< 0.0001	< 0.05	< 0.0001	1.20	3.3	< 0.002
	5/19/2009			<0.02	<0.02	14.6				<0.02			2.8	
	8/18/2009	*No Recovery*												
	5/18/2010	*No Recovery*												
	8/24/2010	*No Recovery*												
	5/31/2011			<0.02	<0.02	17.5				<0.02			3.0	
	8/23/2011		<0.001	<0.02	0.050	15.0	<0.0001	<0.005	<0.0001	<0.1	<0.0001	1.10	2.9	<0.002
	5/16/2012			<0.02	<0.02	15.0				<0.02			2.8	
	5/16/2012	*Duplicate*		<0.02	<0.02	15.1				<0.02			2.8	
	8/29/2012		<0.001	<0.02	0.052	14.0	<0.0001	<0.005	<0.0001	<0.1	<0.0001	1.00	3.0	<0.002
	5/22/2013			<0.02	0.005	15.7				<0.02			3.0	
	8/27/2013		<0.2	<0.02	0.005	15.7	<0.005	<0.01	<0.02	<0.02	<0.0001	1.00	3.1	<0.01
	5/20/2014			<0.02	0.008	17.0				<0.02			3.4	
	8/19/2014		<0.001	<0.01	0.008	17.0	<0.001	<0.005	0.0011	<0.1	<0.0001	1.10	3.1	0.006

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
16/15	6/1/2001		3.0			1.30		< 0.10	4.6	7.88	50	< 0.10	1.6	110
	8/1/2001		4.4	< 0.001	< 0.001		< 0.10	< 0.10		8.02	53	< 0.10	2.1	106
	5/7/2002		2.8			3.80		0.7	2.6	8.05	51	0.01	2.0	108
	8/6/2002		5.3	< 0.001	0.018	7.50	< 0.05	0.0	2.1	8.34	105	0.03	1.4	108
	5/21/2003		3.1			< 0.5		< 0.2	3.3	8.33	52	< 0.03	1.7	111
	8/6/2003		3.3	< 0.0005	0.008	0.80	< 0.2	< 0.2	2.7	8.15	51	0.03	2.3	110
	5/26/2004		3.2			<0.5		<0.2	3.3	8.24	51	<0.03	2.6	109
	8/24/2004		3.1	0.0008	0.007	0.70	< 0.2	< 0.2	17.3	8.22	54	< 0.03	1.7	106
	8/3/2005		2.9			< 1		< 0.2	4.0	8.10	51.5	< 0.05	1.9	101
	9/1/2005		3.3	< 0.0005	< 0.005	< 1	< 0.2	< 0.3	8.0	8.13	55	< 0.05	1.9	104
	9/1/2005	*Duplicate*	4.8	< 0.0005	< 0.005	< 1	< 0.2	0.3	10.0	8.18	55	< 0.05	1.9	104
	5/16/2006		2.8			1		< 0.1	6.0	8.1	56	< 0.05	1.7	106
	8/29/2006		3.0	< 0.0005	< 0.005	2	< 0.01	< 0.1	3.0	8.2	58	0.05	2.1	105
	5/15/2007		3.0			< 1		< 0.1	3.0	7.7	56	< 0.05	1.8	114
	8/14/2007		3.2	< 0.0005	< 0.005	2	< 0.01	< 0.1	4.0	7.9	54	< 0.05	1.6	106
	5/21/2008		3.1			1		0.1	4.0	7.9	52	< 0.05	1.8	108
	8/19/2008		3.3	< 0.0005	< 0.005	< 1	< 0.01	0.2	4.0	8.1	52	< 0.05	1.5	109
	5/19/2009		2.8			<1		0.2	3.0	7.2	52	<0.05	1.5	113
	8/18/2009	*No Recovery*												
	5/18/2010	*No Recovery*												
	8/24/2010	*No Recovery*												
	5/31/2011		2.9			1		0.3	3.0	7.85	53	<0.05	1.8	118
	8/23/2011		2.9	<0.0005	<0.005	<1	<0.01	0.2	3.0	7.85	51	<0.05	1.4	110
	5/16/2012		2.8			<1		0.14	3.0	7.72	52	<0.05	1.4	110
	5/16/2012	*Duplicate*	2.8			<1		0.16	3.0	7.63	52	<0.05	1.3	110
	8/29/2012		3.0	<0.0005	<0.005	<1	<0.01	0.21	3.0	7.71	55	<0.05	1.7	110
	5/22/2013		3.8			<1		0.22	3.0	8.06	53	0.08	1.4	110
	8/27/2013		3.2	<0.05	<0.01	<1	<0.01	0.29	3.0	8.20	54	<0.05	1.3	110
	5/20/2014		3.5			<1		0.34	3.0	7.77	56	<0.05	1.3	120
	8/19/2014		2.9	<0.0005	<0.005	<1	<0.01	0.46	4.0	7.81	55	<0.05	1.2	120

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
16/15	6/1/2001		95			< 20	2				
	8/1/2001		203	0.15	0.01	< 20		< 1.00	< 0.001		
	5/7/2002		104			28	< 1	0.23		**8.6**	60
	8/6/2002		84	< 0.05		< 20	< 1	5.43	< 0.001	**8.9**	90
	5/21/2003		84			7	0.7			8.4	90
	8/6/2003		100	0.29	<0.05	6	1	1910	< 0.001	8.4	90
	5/26/2004		104			9					
	8/24/2004		90	0.11	< 0.05	7			< 0.001	NA	NA
	8/3/2005		152			20	< 3	850		5.8	80
	9/1/2005		170	0.20	1.88	< 4			0.002	5.1	100
	9/1/2005	*Duplicate*	154	0.30	6.70	14			0.001	5.1	100
	5/16/2006		70			< 4	< 2	2100		8.1	
	8/29/2006		82	0.2	6.30	6	< 2		< 0.001	**9.45**	
	5/15/2007		76			< 4	< 2			**9.32**	
	8/14/2007		88	< 1	0.85	< 4	< 2		< 0.001	**9.37**	
	5/21/2008		80			5	< 2	950		**9.48**	
	8/19/2008		70	0.4	0.29	< 4	< 2		< 0.001	**9.31**	
	5/19/2009		70			<4				**9.04**	130
	8/18/2009	*No Recovery*									
	5/18/2010	*No Recovery*									
	8/24/2010	*No Recovery*									
	5/31/2011		70			9				6.98	125
	8/23/2011		84	<1	0.49	<4			<0.001	6.88	122
	5/16/2012		64			8.6					
	5/16/2012	*Duplicate*	84			13				8.15	145
	8/29/2012		76	3.4	0.25	4.4			<0.001	8.29	159
	5/22/2013		84			10				8.43	122
	8/27/2013		152	0.11	0.37	4.6	<2	290	0.002	8.41	122
	5/20/2014		100			<4				**8.6**	102
	8/19/2014		54	0.14	0.33	7.3	<2		<0.001	**8.62**	149

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
17/15	6/1/2001			0.035	0.240	25.4				0.30			6.5	
	8/1/2001			0.001	0.026	28.5				0.10			6.0	
	5/7/2002			< 0.001	0.031	25.8				0.07			6.6	
	8/6/2002			0.004	0.043	32.0				**0.43**			8.6	
	5/21/2003			< 0.01	0.034	27.9				< 0.01			6.4	
	8/6/2003			< 0.01	0.029	24.6				< 0.01			5.7	
	5/26/2004			< 0.01	0.032	26.1				< 0.01			5.9	
	8/24/2004			0.010	0.022	22.9				< 0.01			4.4	
	8/3/2005			< 0.010	0.037	28.0				< 0.05			6.5	
	9/1/2005			< 0.01	0.030	25.0				< 0.05			5.9	
	5/16/2006			< 0.02	0.030	24.2				< 0.02			5.4	
	8/29/2006			< 0.02	0.030	26.1				< 0.02			5.9	
	5/15/2007			< 0.02	0.030	22.6				< 0.02			4.9	
	8/14/2007			< 0.02	0.020	23.0				< 0.02			4.7	
	8/19/2008			< 0.02	0.030	25.8				< 0.02			5.8	
	5/19/2009			<0.02	0.030	24.7				<0.02			5.5	
	8/18/2009	*No Recovery*												
	8/24/2010	*No Recovery*												
	5/31/2011			<0.02	0.040	26.3				<0.02			5.8	
	8/23/2011			<0.02	0.030	24.5				<0.02			5.5	
	5/16/2012			<0.02	0.030	26.3				<0.02			5.7	
	8/29/2012			<0.02	0.030	22.4				<0.02			4.8	
	5/22/2013			<0.02	0.024	22.4				<0.02			4.8	
	8/27/2013		<0.2	<0.02	0.030	23.8	<0.005	<0.01	<0.02	<0.02	<0.0001	2	5.2	<0.01
	5/20/2014			<0.02	0.027	23.0				<0.02			5.0	
	8/19/2014		0.001	<0.01	0.033	24.0	<0.001	<0.005	0.0012	<0.1	<0.0001	1.8	5.6	ND

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
17/15	6/1/2001		6.6			0.90		0.2	12.8	8.05	88	< 0.10	2.6	211
	8/1/2001		5.7					0.2		8.00	139	< 0.10	1.7	205
	5/7/2002		3.8			5.20		0.4	11.2	8.12	85	0.01	2.0	198
	8/6/2002		5.3			8.00		< 0.03	13.0	8.22	91	0.03	2.5	194
	5/21/2003		3.1			< 0.5		< 0.2	3.3	8.33	52	< 0.03	1.7	111
	8/6/2003		3.7			0.80		< 0.2	11.9	7.99	77	< 0.03	2.4	192
	5/26/2004		3.6			0.80		0.3	12.0	8.04	83	< 0.03	2.7	180
	8/24/2004		3.9			0.70		< 0.2	6.5	8.14	74	< 0.03	3.0	152
	8/3/2005		7.6			< 1		0.2	12.8	8.08	82	< 0.05	2.4	177
	9/1/2005		3.8			< 1		0.4	< 1	8.06	88	< 0.05	2.3	183
	5/16/2006		3.5			1		0.3	13.0	8.00	90	< 0.05	2.5	193
	8/29/2006		3.4			1		0.2	14.0	8.10	90	< 0.05	2.4	188
	5/15/2007		3.5			< 1		0.3	9.0	7.60	78	< 0.05	3.5	178
	8/14/2007		3.3			< 1		0.1	14.0	8.00	80	< 0.05	2.7	172
	8/19/2008		3.4			1		0.1	14.0	8.10	85	< 0.05	2.6	193
	5/19/2009		3.3			3		<0.1	12.0	7.10	76	<0.05	2.3	200
	8/18/2009	*No Recovery*												
	8/24/2010	*No Recovery*												
	5/31/2011		3.3			<1		0.1	11.0	7.98	83	<0.05	2.4	191
	8/23/2011		3.1			<1		0.1	11.0	7.76	83	<0.05	2.3	188
	5/16/2012		3.3			<1		<0.1	10.0	7.74	84	<0.05	2.7	190
	8/29/2012		3			<1		0.15	7.0	7.53	78	<0.05	3.3	170
	5/22/2013		3.9			<1		0.11	5.0	8.06	73	0.07	2.7	150
	8/27/2013		3.5	<0.05	<0.01	<1	<0.01	<0.1	7.0	8.11	80	<0.05	3.0	170
	5/20/2014		3.7			<1		0.1	5.0	7.76	74	<0.05	2.3	150
	8/19/2014		3	<0.0005	<0.005	<1	<0.01	<0.1	13.0	7.97	86	<0.05	2.1	200

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
17/15	6/1/2001		106			61	3				
	8/1/2001		244			< 20					
	5/7/2002		135			< 20	< 1	0.16		8.2	120
	8/6/2002		130			< 20	< 1	0.31		7.7	160
	5/21/2003		132			8	< 0.5			8	150
	8/6/2003		122			8	< 0.5			7.8	160
	5/26/2004		140			9					
	8/24/2004		128			7				6.6	40
	8/3/2005		149			7	< 2	230		6.1	140
	9/1/2005		151			10				3.9	160
	5/16/2006		121			9	< 2	57		7.9	
	8/29/2006		111				< 2			**8.71**	
	5/15/2007		113			6	< 2			**8.9**	
	8/14/2007		115			12	< 2	110		**8.97**	128
	8/19/2008		130			< 4	< 2	77		**9.06**	
	5/19/2009		120			8				7.4	240
	8/18/2009	*No Recovery*									
	8/24/2010	*No Recovery*									
	5/31/2011		138			17				6.79	223
	8/23/2011		128			8				**6.44**	197
	5/16/2012		110			16				7.96	233
	8/29/2012		104			15				7.99	240
	5/22/2013		92			7.9				8.1	163
	8/27/2013		130	0.2	0.064	4.7	<2	110	<0.001	7.72	183
	5/20/2014		110			10				8.15	132
	8/19/2014		110	0.15	0.054	8.2	<2		<0.001	7.71	189

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
19/16	6/1/2001			0.006	0.019	36.0				0.24			9.4	
	8/1/2001			0.001	0.017	38.3				0.17			8.3	
	5/7/2002			< 0.001	0.016	41.5				0.09			10.5	
	8/6/2002			0.002	0.029	36.6				**0.36**			8.7	
	5/21/2003			< 0.01	0.015	38.8				< 0.01			8.9	
	8/6/2003			< 0.01	0.016	39.0				< 0.01			9.3	
	5/26/2004			< 0.01	0.016	40.5				< 0.01			9.6	
	8/24/2004			0.020	0.014	37.1				< 0.01			8.8	
	8/3/2005			< 0.010	0.016	39.0				**0.64**			9.0	
	9/1/2005			< 0.01	0.014	40.0				< 0.05			9.1	
	5/16/2006			< 0.02	< 0.02	36.5				< 0.02			8.2	
	8/29/2006			< 0.02	< 0.02	39.6				< 0.02			9.0	
	5/15/2007			< 0.02	< 0.02	41.1				< 0.02			9.1	
	8/14/2007			< 0.02	< 0.02	40.4				< 0.02			9.0	
	5/21/2008			< 0.02	< 0.02	40.7				< 0.02			9.0	
	8/19/2008			< 0.02	< 0.02	40.6				< 0.02			9.1	
	5/19/2009			<0.02	<0.02	38.5				<0.02			8.7	
	8/18/2009	No Recovery												
	5/18/2010			<0.02	<0.02	39.5				<0.02			8.7	
	8/24/2010			<0.02	<0.02	37.5				<0.02			8.8	
	5/31/2011			<0.02	<0.02	39.8				<0.02			9.0	
	8/23/2011			<0.02	<0.02	39.6				<0.02			8.9	
	5/16/2012			<0.02	<0.02	41.5				<0.02			9.0	
	8/29/2012			<0.02	<0.02	41.7				<0.02			9.1	
	5/22/2013			<0.02	0.014	45.3				<0.02			10.2	
	8/27/2013		<0.2	<0.02	0.017	45.8	<0.005	<0.01	<0.02	<0.02	<0.0001	2.00	10.4	<0.01
	5/20/2014			<0.02	0.018	49.0				<0.02			11.0	
	8/19/2014		<0.001	<0.01	0.016	43.0	<0.001	<0.005	<0.001	<0.1	<0.0001	2.20	10.0	<0.01

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
19/16	6/1/2001		4.4			2.4		0.50	6.8	8.09	134	< 0.10	1.9	272
	8/1/2001		6.8					0.20		7.96	81	< 0.10	2.0	272
	5/7/2002		4.2			6.4		< 0.10	4.9	8.20	138	0.02	2.0	274
	8/6/2002		5.3			< 0.5		0.44	5.7	8.13	145	0.03	2.1	275
	5/21/2003		4.4			0.7		< 0.2	7.1	8.10	138	< 0.03	2.3	276
	8/6/2003		4.5			1.0		< 0.2	7.0	7.96	136	< 0.03	1.8	270
	5/26/2004		4.6			1.0		< 0.2	7.1	8.20	138	< 0.03	2.0	258
	8/24/2004		4.3			1.4		0.10	6.8	8.19	130	< 0.03	2.2	248
	8/3/2005		8.2			1.0		1.30	8.0	8.23	137	< 0.05	2.1	252
	9/1/2005		4.8			< 1		< 0.2	7.0	8.09	142	< 0.05	2.0	252
	5/16/2006		4.1			2		< 0.1	6	8.20	143	< 0.05	2.1	270
	8/29/2006		4.4			2		< 0.1	6	8.10	150	< 0.05	2.1	267
	5/15/2007		4.6			1		0.2	7	8.10	150	< 0.05	2.5	298
	8/14/2007		4.2			< 1		0.1	8	8.10	149	< 0.05	1.9	271
	5/21/2008		4.5			1		< 0.1	6	8.20	142	< 0.05	2.0	278
	8/19/2008		4.3			1		< 0.1	6	8.30	159	< 0.05	1.8	287
	5/19/2009		4.2			2		0.1	6	7.80	141	<0.05	1.7	285
	8/18/2009	No Recovery												
	5/18/2010		4.3			2		0.1	5	8.20	137	<0.05	1.7	273
	8/24/2010		4.2			1		0.1	5	8.10	135	<0.05	1.8	275
	5/31/2011		4			1		0.1	4	8.11	138	<0.05	1.9	278
	8/23/2011		4.1			1		0.1	4	7.99	142	<0.05	1.6	279
	5/16/2012		4.3			<1		0.12	4	8.04	140	<0.05	1.9	280
	8/29/2012		4.1			<1		0.15	5	8.02	150	<0.05	2.9	290
	5/22/2013		5.3			<1		0.12	5	8.22	150	0.06	1.7	300
	8/27/2013		4.8	<0.05	<0.01	<1	<0.01	<0.1	5	8.28	160	0.05	1.6	310
	5/20/2014		5.1			2		<0.1	5	8.17	160	<0.05	1.5	300
	8/19/2014		4.4	<0.0005	<0.005	1	<0.01	0.1	5	8.15	160	<0.05	2.3	310

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
19/16	6/1/2001		137			< 20				7.00	110
	8/1/2001		275			< 20				7.80	130
	5/7/2002		189			64	1	0.23		8.10	180
	8/6/2002		180			< 20	1	1.39		8.20	260
	5/21/2003		118			9	0.8			8.00	230
	8/6/2003		180			8	1			7.80	210
	5/26/2004		186			8				7.20	240
	8/24/2004		182			5				NA	NA
	8/3/2005		164			< 4	< 3	580		**6.40**	240
	9/1/2005		183			9				**5.00**	220
	5/16/2006		189			5	< 2	360		7.90	
	8/29/2006		165			< 4	< 2			**8.63**	
	5/15/2007		184			<4	<2			**8.74**	
	8/14/2007		175			< 4	< 2	700		8.48	
	5/21/2008		176			10	< 2	350		**8.66**	
	8/19/2008		200			< 4	< 2	760		**8.73**	
	5/19/2009		180			<4				7.86	334
	8/18/2009	No Recovery									
	5/18/2010		186			6				8.07	274
	8/24/2010		180			8				**11.42**	
	5/31/2011		172			7				6.83	302
	8/23/2011		190			<4				7.05	304
	5/16/2012		142			10				7.95	320
	8/29/2012		156			8				7.92	374
	5/22/2013		180			4.3				7.86	317
	8/27/2013		310	0.110	0.32	<4	<2	290	<0.001	7.80	337
	5/20/2014		186			6.3				8.08	253
	8/19/2014		176	0.380	0.19	<4	<2		<0.001	8.33	300

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
23/3	6/1/2001			0.040	0.254	19.7				0.26			5.1	
	8/1/2001			< 0.001	0.015	24.8				0.08			5.3	
	5/7/2002			< 0.001	0.017	21.1				0.10			5.6	
	8/6/2002			0.004	0.087	25.9				**3.06**			7.1	
	5/21/2003			< 0.01	0.019	27.1				0.04			6.0	
	8/6/2003			< 0.01	0.024	25.1				0.03			6.1	
	5/26/2004			< 0.01	0.016	23.7				0.07			6.0	
	8/24/2004			0.010	0.015	29.3				0.01			5.8	
	8/3/2005			< 0.01	0.013	26.0				< 0.05			5.9	
	9/1/2005			< 0.01	0.013	25.0				< 0.05			5.7	
	5/16/2006			< 0.02	< 0.02	23.7				< 0.02			5.4	
	8/29/2006			< 0.02	< 0.02	24.6				< 0.02			5.6	
	5/15/2007			< 0.02	< 0.02	24.7				< 0.02			5.8	
	8/14/2007			< 0.02	< 0.02	23.5				< 0.02			5.4	
	5/21/2008			< 0.02	< 0.02	22.8				< 0.02			5.1	
	8/19/2008			< 0.02	< 0.02	24.6				< 0.02			5.5	
	8/18/2009			< 0.02	< 0.02	24.3				< 0.02			5.4	
	5/18/2010			< 0.02	< 0.02	24.0				< 0.02			5.5	
	8/24/2010			< 0.02	< 0.02	22.0				< 0.02			5.4	
	5/31/2011			<0.02	<0.02	29.4				<0.02			6.3	
	8/23/2011			<0.02	<0.02	24.7				<0.02			5.5	
	5/16/2012			<0.02	<0.02	26.6				<0.02			5.8	
	8/29/2012			<0.02	<0.02	25.3				<0.02			5.5	
	5/22/2013			<0.02	0.016	27.8				<0.02			6.3	
	8/27/2013		<0.2	<0.02	0.014	27.4	<0.005	<0.01	<0.02	<0.02	<0.0001	2	6.3	<0.01
	5/20/2014			1.90	0.54	190.0				**34**			81.0	
	8/19/2014		0.001	0.13	0.045	39.0	<0.001	<0.005	<0.001	<0.1	<0.0001	14	11.0	0.22

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
23/3	6/1/2001		5.3			2.3		< 0.10	7.5	8.00	76	< 0.10	1.9	168
	8/1/2001		4.6					0.40		7.92	90	< 0.10	4.3	176
	5/7/2002		2.8			3.7		< 0.10	4.5	7.80	74	0.05	1.0	153
	8/6/2002		5.1			< 0.5		0.45	5.7	7.87	90	0.03	1.1	183
	5/21/2003		3.6			< 0.5		0.20	8.0	7.93	84	0.09	4.3	186
	8/6/2003		3.5			< 0.5		< 0.2	11.9	7.74	83	0.05	2.5	189
	5/26/2004		2.9			0.5		< 0.2	7.0	7.98	88	0.09	4.6	171
	8/24/2004		3.9			0.7		0.20	7.4	8.00	93	0.08	2.7	173
	8/3/2005		7.4			< 1		0.70		8.05	75	0.08	3.2	147
	9/1/2005		6.0			< 1		< 0.2	5.0	8.05	91	0.11	5.0	172
	5/16/2006		3.4			2		0.1	9	8.1	93	< 0.05	2.1	180
	8/29/2006		3.5			2		0.1	10	8.10	95	< 0.05	1.9	179
	5/15/2007		3.6			1		< 0.01	7	7.70	93	0.22	**5.5**	194
	8/14/2007		3.4			10		< 0.1	< 1	8.30	199	0.11	3.7	339
	5/21/2008		3.2			5		0.1	8	8.10	85	0.26	3.0	178
	8/19/2008		3.5			1		0.1	8	8.20	88	0.1	3.1	185
	8/18/2009		3.4			< 1		0.2	7	7.60	89	0.15	1.8	179
	5/18/2010		3.5			2		0.1	8	8.10	85	0.5	1.3	184
	8/24/2010		3.3			1		0.2	8	8.10	86	0.3	2.1	186
	5/31/2011		3.5			1		0.1	9	8.06	87	0.43	1.4	189
	8/23/2011		3.4			2		0.1.	9	7.70	89	<0.05	1.5	189
	5/16/2012		3.7			1		<0.1	8	7.93	95	<0.05	1.4	200
	8/29/2012		3.4			<1		0.12	8	7.36	90	0.14	2.2	190
	5/22/2013		4.7			2		<0.1	11	8.04	93	0.22	2.0	200
	8/27/2013		4	<0.05	<0.01	2	<0.01	<0.1	6	7.89	93	<0.05	1.8	200
	5/20/2014		72			110		<0.1	300	7.30	**750**	11	**97.0**	2200
	8/19/2014		7.4	<0.0005	<0.005	9	<0.01	<0.1	25	7.78	150	0.54	4.6	360

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
23/3	6/1/2001		98			< 20	< 1			7.80	70
	8/1/2001		225			< 20				7.70	80
	5/7/2002		152			120	1	2.20		7.60	100
	8/6/2002		232			< 20	< 1	1.56		7.80	170
	5/21/2003		140			13	< 0.5			7.60	130
	8/6/2003		128			10	< 0.5			7.70	140
	5/26/2004		174			15				7.10	30
	8/24/2004		162			12				NA	NA
	8/3/2005		420			320	< 2	5600		7.00	130
	9/1/2005		390			880				8.10	370
	5/16/2006		126			190	< 2	7700		7.80	
	8/29/2006		113			120	< 2			8.36	
	5/15/2007		130			520	< 2			**8.55**	
	8/14/2007		120			89	< 2	36000		8.13	
	5/21/2008		124			250	< 2	6400		8.40	
	8/19/2008		130			170	< 2	4900		**8.80**	
	8/18/2009		117			360				**8.96**	156
	5/18/2010		122			1800				7.92	170
	8/24/2010		120			310				8.07	
	5/31/2011		118			740				7.01	209
	8/23/2011		136			25				**6.44**	204
	5/16/2012		110			45				7.82	223
	8/29/2012		142			100				7.73	250
	5/22/2013		216			220				7.92	226
	8/27/2013		182	2.2	1.8	52	<2	2700	<0.001	7.41	246
	5/20/2014		**1560**			380				6.99	1130
	8/19/2014		222	1.2	0.69	34	<2		0.0052	7.32	331

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
24/5	6/1/2001			0.008	0.028	14.7				0.09			7.0	
	8/1/2001			0.003	0.031	19.2							7.3	
	5/7/2002			0.011	0.034	19.6				0.13			8.1	
	8/6/2002			0.008	0.067	22.8				**2.37**			10.9	
	5/21/2003			0.010	0.028	18.2				0.03			7.6	
	8/6/2003			< 0.01	0.028	17.2				0.02			7.1	
	5/26/2004			< 0.01	0.023	16.3				0.04			7.2	
	8/24/2004			< 0.01	0.026	18.5				**0.59**			7.9	
	8/3/2005			< 0.01	0.026	18.0				**0.44**			7.1	
	9/1/2005			< 0.01	0.021	16.0				< 0.05			6.7	
	5/16/2006			< 0.02	0.02	14.9				< 0.02			6.2	
	8/29/2006			< 0.02	0.03	17.7				< 0.02			6.7	
	5/15/2007			< 0.02	0.03	15.9				< 0.02			6.3	
	8/14/2007			< 0.02	0.03	17.3				< 0.02			6.6	
	5/21/2008			< 0.02	0.03	16.8				< 0.02			6.3	
	8/19/2008			< 0.02	0.03	17.0				< 0.02			6.7	
	5/19/2009			<0.02	0.02	13.2				<0.02			5.5	
	8/18/2009			<0.02	0.03	17.4				<0.02			6.5	
	5/18/2010			<0.02	0.03	16.1				<0.02			6.7	
	8/24/2010			<0.02	0.03	16.0				<0.02			6.6	
	5/31/2011			<0.02	0.03	15.7				0.03			6.4	
	8/23/2011			<0.02	0.02	16.0				<0.02			6.4	
	5/16/2012			<0.02	0.03	16.4				<0.02			6.7	
	8/29/2012			<0.02	0.03	17.0				0.02			6.5	
	5/22/2013			<0.02	0.03	17.2				0.06			7.1	
	8/27/2013	*Tubing Damaged*												
	5/20/2014	*Tubing Damaged*												
	8/19/2014		<0.001	<0.01	0.026	15.0	<0.001	<0.005	0.0041	<0.1	<0.0001	2.3	6.5	**0.24**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
24/5	6/1/2001		5.9			2.1		< 0.10	2.7	7.86	79	< 0.10	3.4	166
	8/1/2001		8.4					< 0.10				< 0.10	4.3	
	5/7/2002		6.2			8.4		< 0.10	4.4	7.85	93	0.10	**21.0**	194
	8/6/2002		8.7			< 0.5		< 0.03	3.2	7.32	91	0.06	4.1	183
	5/21/2003		5.8			< 0.5		< 0.2	5.3	7.38	95	< 0.03	4.5	177
	8/6/2003		6.0			< 0.5		< 0.2	4.9	7.21	85	< 0.03	3.9	175
	5/26/2004		5.8			0.5		< 0.2	4.6	7.22	83	< 0.03	4.4	167
	8/24/2004		6.5			0.9		< 0.2	5.4	7.27	80	0.03	3.2	170
	8/3/2005		6.3			< 1		< 0.2	5.0	7.85	88	< 0.05	4.4	148
	9/1/2005		7.1			< 1		< 0.2	8.0	7.64	90	< 0.05	4.2	164
	5/16/2006		5.5			2		< 0.01	7	7.70	88	< 0.05	4.4	169
	8/29/2006		6			2		< 0.01	6	7.60	89	< 0.05	4.1	167
	5/15/2007		5.7			1		< 0.01	6	7.40	81	< 0.05	5.0	168
	8/14/2007		5.7			1		< 0.01	8	7.60	83	< 0.05	4.3	163
	5/21/2008		5.7			3		< 0.01	7	7.80	81	< 0.05	3.7	163
	8/19/2008		5.9			1		< 0.01	6	7.80	81	< 0.05	4.6	166
	5/19/2009		5			1		0.2	5	6.90	68	<0.05	3.7	142
	8/18/2009		5.9			< 1		0.3	6	7.00	84	<0.05	4.6	169
	5/18/2010		5.8			1		< 0.01	5	7.60	78	0.07	4.0	164
	8/24/2010		5.9			<1		0.4	5	7.50	78	<0.05	4.4	106
	5/31/2011		5.3			1		<0.1	7	7.44	73	<0.05	0.5	156
	8/23/2011		5.7			<1		<0.1	5	7.25	78	<0.05	4.1	166
	5/16/2012		6.1			<1		<0.1	6	7.21	77	<0.05	4.9	
	8/29/2012		5.8			<1		<0.1	5	6.96	80	0.16	**5.8**	170
	5/22/2013		6.9			7		<0.1	5	7.56	75	0.10	4.3	160
	8/27/2013	*Tubing Damaged*												
	5/20/2014	*Tubing Damaged*												
	8/19/2014		6.1	<0.0005	<0.005	<1	<0.01	<0.1	5	7.33	75	0.065	6.2	160

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
24/5	6/1/2001		122			31	< 1			7.40	60
	8/1/2001					25				7.70	80
	5/7/2002		440			28	4	0.39		7.00	120
	8/6/2002		196			< 20	1	4.08		7.30	160
	5/21/2003		140			15	< 0.5			7.60	130
	8/6/2003		146			14	< 0.5			7.30	130
	5/26/2004		198			14				6.70	130
	8/24/2004		110			13				NA	NA
	8/3/2005		460			7	< 2	2100		5.00	140
	9/1/2005		154			9				7.40	170
	5/16/2006		117			< 4	< 2	190		7.40	
	8/29/2006		106			< 4	< 2			6.88	
	5/15/2007		100			< 4	< 2			7.95	
	8/14/2007		131			6	< 2	860		7.72	
	5/21/2008		102			10	< 2	670		8.22	
	8/19/2008		110			20	< 2	1500		8.16	
	5/19/2009		95			15				7.67	162
	8/18/2009		110			29				8.36	158
	5/18/2010		112			17				7.45	103
	8/24/2010		106			15				**11.08**	
	5/31/2011		102			9				6.90	196
	8/23/2011		138			5				**6.45**	172
	5/16/2012		232			22				7.51	155
	8/29/2012		184			11				7.19	229
	5/22/2013		162			10				7.59	132
	8/27/2013	*Tubing Damaged*								7.26	226
	5/20/2014	*Tubing Damaged*									
	8/19/2014		288	3.4	1.6	7.5	< 2		< 0.0010	7.33	160

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

Ground Water Monitoring Data

Monitor	Date	QA/QC	As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn
	ODWQS -		0.025	5	1		0.005	0.05	1	0.3	0.001			0.05
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
KGS-2	6/1/2001			0.000	0.022	26.6				0.18			7.2	
	8/1/2001			0.008	0.021	34.0				0.08			8.3	
	5/7/2002			0.012	0.041	29.8				0.27			6.7	
	8/6/2002			0.008	0.053	31.1				**2.04**			8.0	
	5/21/2003			0.020	0.019	29.8				< 0.01			6.9	
	8/6/2003			< 0.01	0.024	29.7				0.02			6.8	
	5/26/2004			< 0.01	0.026	31.4				< 0.01			7.4	
	8/24/2004			0.010	0.025	32.9				0.02			6.9	
	8/3/2005			< 0.01	0.021	30.0				< 0.05			6.7	
	9/1/2005			< 0.01	0.026	31.0				< 0.05			6.9	
	5/16/2006			< 0.02	0.030	32.3				< 0.02			7.1	
	8/29/2006			< 0.02	0.030	29.4				< 0.02			6.4	
	5/15/2007			< 0.02	0.040	38.8				< 0.02			7.8	
	8/14/2007	*under water*												
	5/21/2008	*no access*												
	8/19/2008	*no access*												
	5/19/2009	*no access*												
	8/18/2009			< 0.02	0.040	47.2				< 0.02			10.1	
	5/18/2010			< 0.02	0.030	39.0				< 0.02			8.5	
	8/24/2010			< 0.02	0.040	35.3				< 0.02			8.2	
	5/31/2011			<0.02	0.050	45.4				<0.05			8.8	
	8/23/2011			<0.02	0.040	41.0				<0.03			8.2	
	5/16/2012			<0.02	0.060	60.5				<0.02			12.6	
	5/16/2012	*Duplicate*		<0.02	0.060	58.9				<0.02			12.2	
	5/22/2013			<0.02	0.051	51.8				<0.02			10.9	
	8/27/2013		<0.2	<0.02	0.039	46.9	<0.005	<0.01	<0.02	<0.02	<0.0001	4	10.0	**0.34**
	5/20/2014			<0.02	0.037	46.0				<0.02			9.7	
	8/19/2014		<0.001	<0.01	0.037	44.0	<0.001	<0.005	<0.001	<0.1	<0.0001	4.2	9.7	**0.24**

Monitor	Date	QA/QC	Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	DOC	Th Cond
	ODWQS -		200	0.01	5	250		10	500	6.5 - 8.5	500		5.0	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	µS/cm
KGS-2	6/1/2001		5.2			2.4		< 0.10	15.9	8.10	95	< 0.10	3.0	222
	8/1/2001		5.5					< 0.10		8.07	104	< 0.10	1.4	227
	5/7/2002		12.8			17.1		< 0.10	10.9	8.16	99	0.14	2.0	226
	8/6/2002		6.6			0.6		< 0.03	10.3	8.08	104	0.13	3.8	232
	5/21/2003		3.6			< 0.5		< 0.2	1.7	8.17	97	0.05	1.7	216
	8/6/2003		4.3			< 0.5		< 0.2	17.8	8.00	94	< 0.03	1.7	224
	5/26/2004		3.9			0.9		< 0.2	18.2	8.29	92	0.06	1.7	213
	8/24/2004		4.1			0.7		< 0.2	17.3	8.17	94	0.08	1.1	211
	8/3/2005		4.4			< 1		< 0.2	17.8	8.10	93	< 0.05	2.0	196
	9/1/2005		6.3			< 1		0.50	4.0	8.10	101	0.07	1.9	211
	5/16/2006		3.6			3		< 0.01	25.0	8.10	102	0.11	3.9	249
	8/29/2006		3.9			2		< 0.01	20.0	8.10	105	0.06	1.9	220
	5/15/2007		6.9			14		< 0.01	18.0	7.50	126	0.21	**10.8**	318
	8/14/2007	*under water*												
	5/21/2008	*no access*												
	8/19/2008	*no access*												
	5/19/2009	*no access*												
	8/18/2009		4.5			12		< 0.01	70.0	7.30	87	0.05	2.3	346
	5/18/2010		3.8			9		< 0.01	52.0	8.00	82	0.14	1.7	303
	8/24/2010		9.6			7		< 0.01	40.0	8.00	85	< 0.05	2.2	291
	5/31/2011		3.9			5			34.0	7.97	108	0.12	2.0	306
	8/23/2011		4.2			9		<0.01	43.0	7.92	93	<0.05	2.2	288
	5/16/2012		5.4			11		<0.01	67.0	7.49	130	0.09	3.5	420
	5/16/2012	*Duplicate*	5.3			11		<0.01	70.0	7.48	120	0.14	3.1	410
	5/22/2013		5.6			11		<0.10	67.0	8.03	97	0.26	2.4	370
	8/27/2013		4.5	<0.05	<0.01	10	<0.01	<0.10	67.0	7.89	83	<0.05	2.9	340
	5/20/2014		4.7			7		<0.1	46.0	7.76	100	0.07	2.4	310
	8/19/2014		4.1	<0.0005	<0.005	7	<0.01	<0.1	53.0	8.02	94	0.12	2.0	320

Monitor	Date	QA/QC	Th TDS	TKN	Total P	COD	BOD	TSS	Phenols	Field pH	Field Cond
	ODWQS -		500							6.5 - 8.5	
	Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm
KGS-2	6/1/2001		151			28					
	8/1/2001		173			28					
	5/7/2002		160			61	2	8.01		8.10	150
	8/6/2002		192			< 20	3	3.29		8.30	210
	5/21/2003		100			12	< 0.5			7.80	170
	8/6/2003		148			12	< 0.5			7.80	180
	5/26/2004		156			14				7.20	40
	8/24/2004		168			7				NA	NA
	8/3/2005		140			38	< 2	9200		6.70	180
	9/1/2005		450			49				3.90	190
	5/16/2006		150			30	< 2	5600		8.10	
	8/29/2006		162			8	< 2			8.38	
	5/15/2007		207			37	6			7.87	
	8/14/2007	*under water*									
	5/21/2008	*no access*									
	8/19/2008	*no access*									
	5/19/2009	*no access*									
	8/18/2009		230			20				8.33	344
	5/18/2010		204			10				7.79	404
	8/24/2010		184			16				8.00	
	5/31/2011		192			15				6.99	364
	8/23/2011		20			<4				**6.32**	301
	5/16/2012		262			32				7.33	491
	5/16/2012	*Duplicate*	256			44					
	5/22/2013		306			48				7.36	448
	8/27/2013		256	0.49	0.75	<4	<2	1400	<0.001	7.66	413
	5/20/2014		292			10				7.69	284
	8/19/2014		234	2.60	1.2	11	<2		<0.001	7.21	337

Notes: **Bold** denotes exceedance of ODWQS (2006) criteria

NA - Not Analyzed

APPENDIX E

Ground Water Levels

Historical Water Level Monitoring Data

Monitor	Target Zone	Surface Elevation (masl)	Trigger Elevation (masl)	Background	Ground Water Elevations										
				Fenco (10/96)	1-May-02	1-Jun-02	1-Jul-02	1-Aug-02	1-Sep-02	1-Oct-02	1-May-03	1-May-04	1-Aug-04	1-Aug-05	1-Sep-05
1/17	Till	351.44		350.87	350.66			350.23			350.74	350.74	NA	NA	NA
2/9	Till	351.07		350.08	350.32	350.26	350.17	350.16	350.32	349.62	349.62	350.62	350.36	350.23	350.32
2/13	Bedrock	350.85		350.06	350.10			349.93			350.18	350.35	350.15	350.13	350.13
3/8	Till	351.51		350.44	349.86	350.17	350.06	350.06	350.36	350.30	350.34	350.51	350.21	350.19	350.13
4/6	Till	351.48		350.36	350.13			349.93			349.79	350.18	350.08	350.06	350.00
5/17	Till / Bedrock	370.13	361.75	355.57	353.08	352.82	352.63	N/A	352.43	352.58	353.59	353.83	357.10	357.77	357.18
6/5	Till	351.09		349.90	349.77			349.55			349.71	349.97	349.87	349.79	349.75
11/4	Till	366.45	366.45		361.36	361.34	361.41	N/A	361.34	362.11	361.95	363.85	363.19	363.41	363.01
13/6	Till	355.02			348.62	348.90	348.90	348.81	349.09	349.58		350.37	350.26	350.22	349.90
13/14	??	354.72			349.27	350.00	349.15	348.72	349.62	349.87		351.22	350.63	350.78	350.27
14/6	Till	348.91			346.07	346.50	346.48	346.33	346.91	347.66		348.19	347.92	347.81	347.57
14/21	??	348.68			345.18	345.50	345.45	345.30	345.92	346.53		347.18	346.91	346.72	346.32
15/5	Till	352.17			350.50	349.80	350.37	350.38	349.80	350.88		351.42	350.73	350.69	350.51
15/17	??	352.08			350.58	350.60	350.47	350.47	350.85	350.83		351.99	350.80	358.59	358.57
16/15	??	362.25	362.25		350.37	350.07	349.95	349.94	Dry	350.27	350.51	350.55	351.04	352.05	352.13
17/15	??	359.99			350.37			350.14			350.72	350.99	351.79	352.47	352.09
19/6	Till	364.15	364.15		357.60	357.54	364.15	N/A	Dry	Dry	357.54	357.45	dry	dry	353.02
23/3	Peat	351.19			350.33			350.12			350.46	350.39	351.00	350.27	350.25
24/5	Till	352.01			350.56			350.80			350.89	351.01	350.91	350.79	350.79
KGS-2	??	351.38		350.37	349.93			349.66			350.08	350.08	350.08	350.20	350.20

Note: **?? denotes unknown target zone**

Historical Water Level Monitoring Data

Monitor	Target Zone	Surface Elevation (masl)	Trigger Elevation (masl)	Background	Ground Water Elevations											
				Fenco (10/96)	1-Oct-05	1-May-06	1-Aug-06	1-May-07	1-Aug-07	1-May-08	1-Aug-08	1-May-09	1-Aug-09	10-May-10	10-Aug-10	9-Jun-11
1/17	Till	351.44		350.87	NA	350.66	350.04	350.38	351.44	349.37	no access	no access	349.99	349.47	350.00	349.50
2/9	Till	351.07		350.08	349.62	349.95	349.77	349.82	349.85	349.88	349.79	349.86	349.84	349.74	349.74	349.72
2/13	Bedrock	350.85		350.06	350.14	350.10	349.93	350.06	350.02	350.14	350.07	350.12	350.15	350.08	350.18	350.16
3/8	Till	351.51		350.44	350.16	350.17	349.80	350.12	350.26	350.28	350.11	350.38	350.31	350.22	350.26	350.25
4/6	Till	351.48		350.36	350.39	350.05	349.73	350.13	350.16	350.29	350.23	350.85	350.58	350.52	350.54	350.52
5/17	Till / Bedrock	370.13	361.75	355.57	356.10	dry	dry	Dry	354.91	353.54	354.88	353.28	356.27	353.65	356.05	353.58
6/5	Till	351.09		349.90	349.79	349.73	349.02	349.65	349.75	349.81	349.55	349.87	349.84	349.74	349.84	349.80
11/4	Till	366.45	366.45		362.05	dry	dry	Dry	362.75	362.26	362.82	362.61	363.45	362.22	363.57	362.53
13/6	Till	355.02			349.52	349.41	348.67	348.56	350.50	349.50	350.10	349.77	350.62	349.48	350.57	349.63
13/14	??	354.72			350.22	350.07	348.39	349.09	350.35	349.69	350.16	350.02	350.77	350.22	350.76	350.26
14/6	Till	348.91			347.41	347.31	346.32	345.05	347.32	346.86	347.27	347.50	348.08	347.41	347.91	347.61
14/21	??	348.68			346.37	346.33	345.33	344.20	346.30	345.91	346.26	346.55	347.03	346.43	347.86	347.56
15/5	Till	352.17			350.52	350.57	350.12	349.45	350.87	350.77	350.58	351.07	350.97	350.71	350.88	350.73
15/17	??	352.08			359.53	350.66	350.26	350.56	350.82	350.78	350.67	350.95	350.92	350.73	350.90	350.75
16/15	??	362.25	362.25		351.56	350.50	350.19	349.60	350.63	350.44	350.91	350.46	351.41	350.62	356.58	350.70
17/15	??	359.99			351.53	350.58	350.23	349.72	351.40	350.55	350.99	350.62	351.64	350.59	351.84	350.83
19/6	Till	364.15	364.15		dry	dry	dry	Dry	Dry	Dry	Dry	Dry	Dry	dry	357.56	dry
23/3	Peat	351.19			350.30	350.22	349.85	350.17	350.32	350.39	350.32	350.44	350.63	349.79	350.48	350.57
24/5	Till	352.01			351.01	350.79	350.53	350.52	350.75	350.83	350.89	341.74	351.04	350.61	351.01	351.01
KGS-2	??	351.38		350.37	349.34	349.98	349.79	349.84	no access	348.87	no access	351.38	no access	348.45	349.08	349.97

Note: **?? denotes unknown target zone**

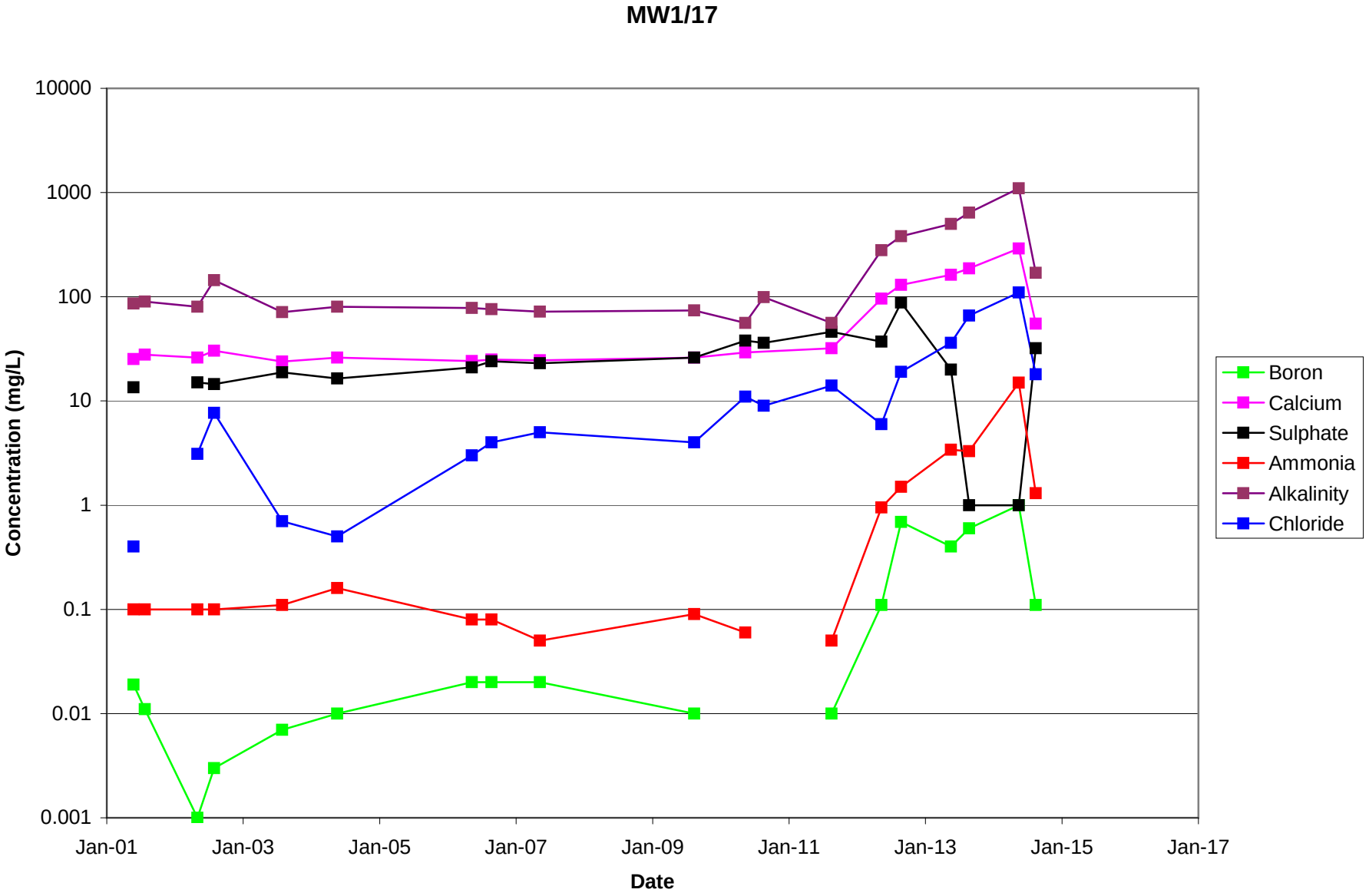
Historical Water Level Monitoring Data

Monitor	Target Zone	Surface Elevation (masl)	Trigger Elevation (masl)	Background	Ground Water Elevations							Maximum (masl)	Minimum (masl)	Fluctuation (m)
				Fenco (10/96)	23-Aug-11	16-May-12	29-Aug-12	21-May-13	26-Aug-13	20-May-14	19-Aug-14			
1/17	Till	351.44		350.87	351.44	349.02	349.22	349.02	349.22	348.00	348.19	351.44	348.00	**3.44**
2/9	Till	351.07		350.08	349.67	349.57	349.57	349.57	349.57	349.77	349.60	350.62	349.57	**1.05**
2/13	Bedrock	350.85		350.06	350.07	350.07	350.06	350.07	350.06	350.34	350.17	350.35	349.93	**0.42**
3/8	Till	351.51		350.44	350.13	350.09	350.08	350.09	350.08	350.45	350.19	350.51	349.80	**0.71**
4/6	Till	351.48		350.36	N/A	N/A	N/A	NA	350.08	349.90	348.94	350.85	348.94	**1.91**
5/17	Till / Bedrock	370.13	361.75	355.57	354.68	352.43	352.73	352.43	352.73	352.44	355.79	357.77	352.43	**5.34**
6/5	Till	351.09		349.90	349.48	349.62	349.30	349.62	349.30	349.93	349.67	349.97	349.02	**0.95**
11/4	Till	366.45	366.45		362.58	361.24	361.59	361.24	361.59	361.95	362.93	363.85	361.24	**2.61**
13/6	Till	355.02			349.62	348.73	349.33	348.73	349.33	349.57	350.07	350.62	348.56	**2.06**
13/14	??	354.72			349.63	348.96	349.28	348.96	349.28	349.88	350.11	351.22	348.39	**2.83**
14/6	Till	348.91			346.98	346.11	346.46	346.11	346.46	346.99	347.12	348.19	345.05	**3.14**
14/21	??	348.68			346.00	345.16	345.49	345.16	345.49	346.10	346.07	347.86	344.20	**3.66**
15/5	Till	352.17			350.56	350.62	350.53	350.62	350.53	351.34	350.68	351.42	349.45	**1.97**
15/17	??	352.08			350.66	350.53	350.59	350.53	350.59	351.11	349.75	359.53	349.75	**9.78**
16/15	??	362.25	362.25		350.93	349.71	350.41	349.71	350.41	350.35	350.95	356.58	349.60	**6.98**
17/15	??	359.99			351.05	350.04	350.29	350.04	350.29	350.47	351.52	352.47	349.72	**2.75**
19/6	Till	364.15	364.15		dry	dry	dry	350.31	350.75	350.57	351.84	364.15	350.31	**13.84**
23/3	Peat	351.19			350.50	350.46	350.45	350.46	350.45	350.14	349.28	351.00	349.28	**1.72**
24/5	Till	352.01			350.79	350.69	350.84	350.69	350.84	350.40	349.65	351.04	341.74	**9.30**
KGS-2	??	351.38		350.37	348.95	348.74	348.83	348.74	348.83	347.91	347.56	351.38	347.56	**3.82**

Note: **?? denotes unknown target zone**

APPENDIX F

Ground Water Chemistry Over Time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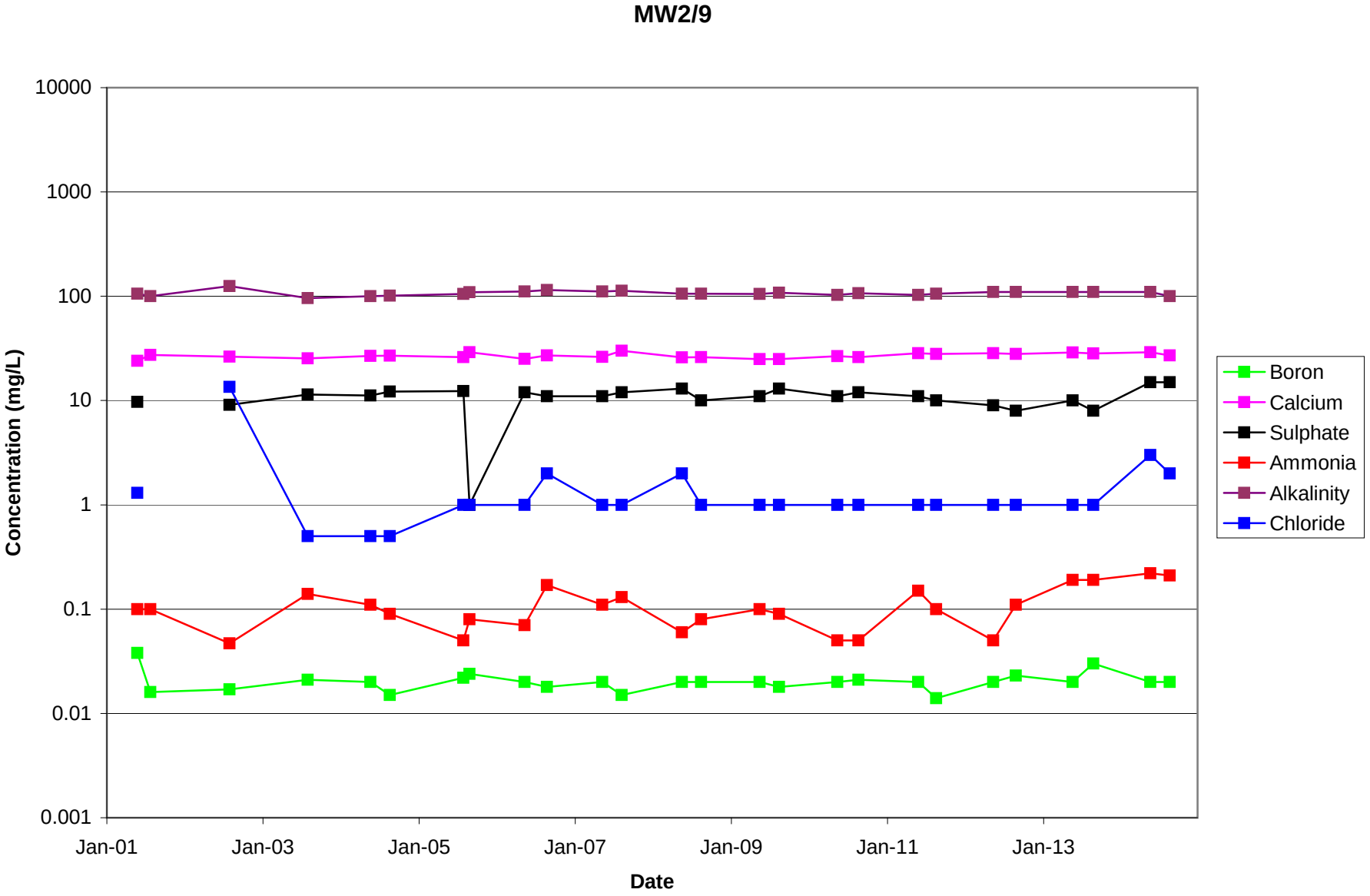
Concentration (mg/L)
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Jan-15
Jan-17
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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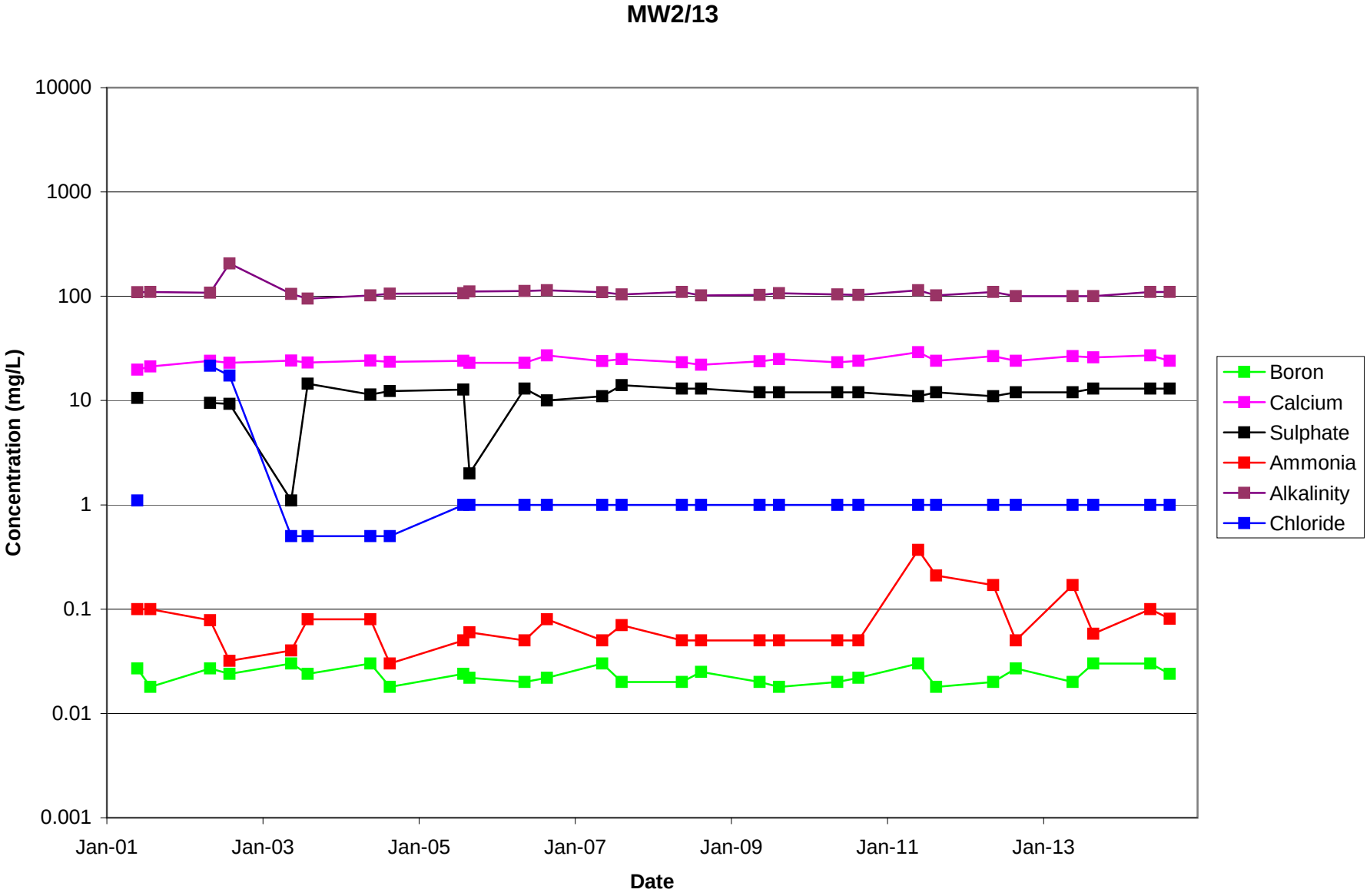
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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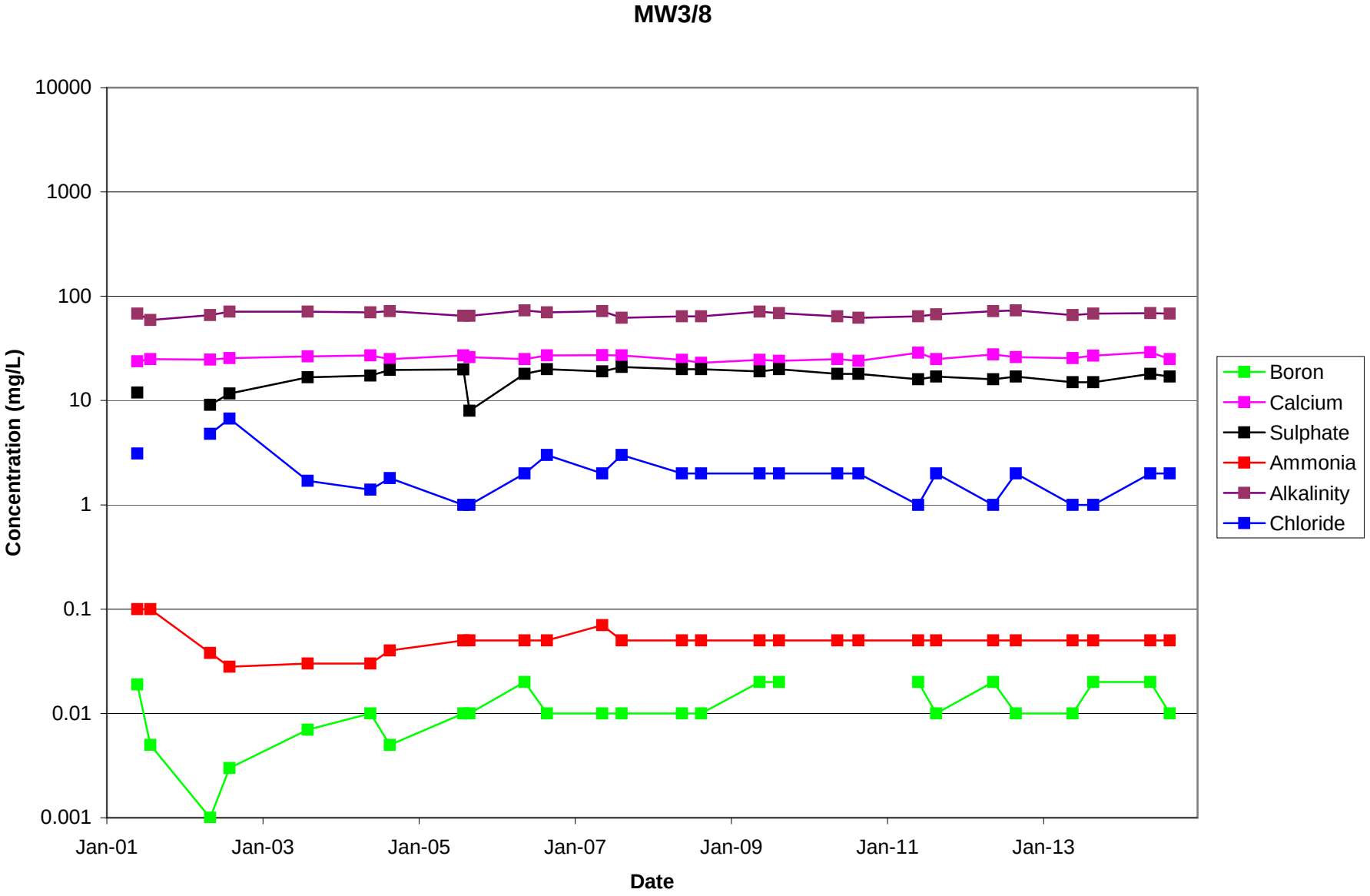
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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0.001
Concentration (mg/L)
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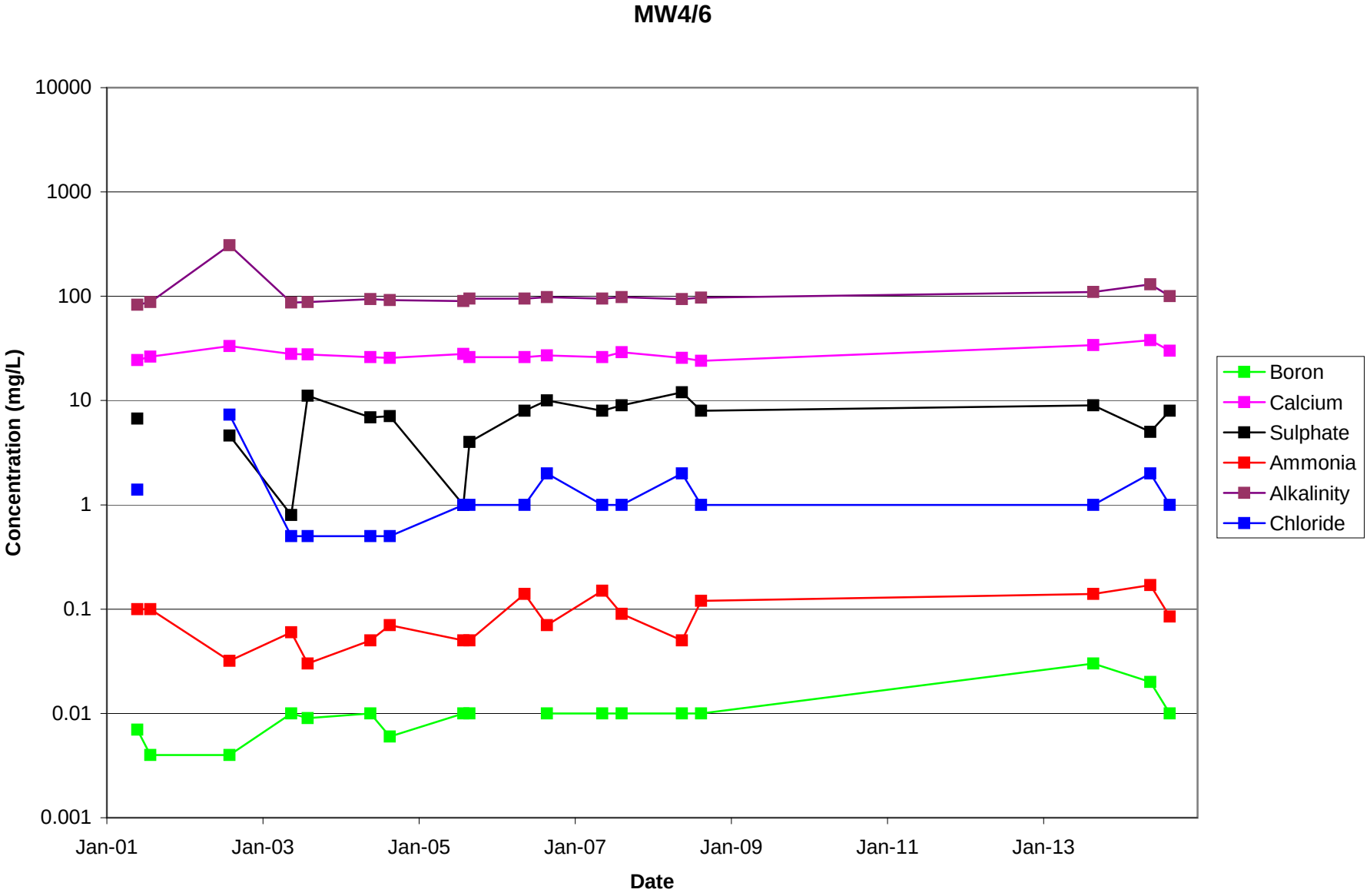
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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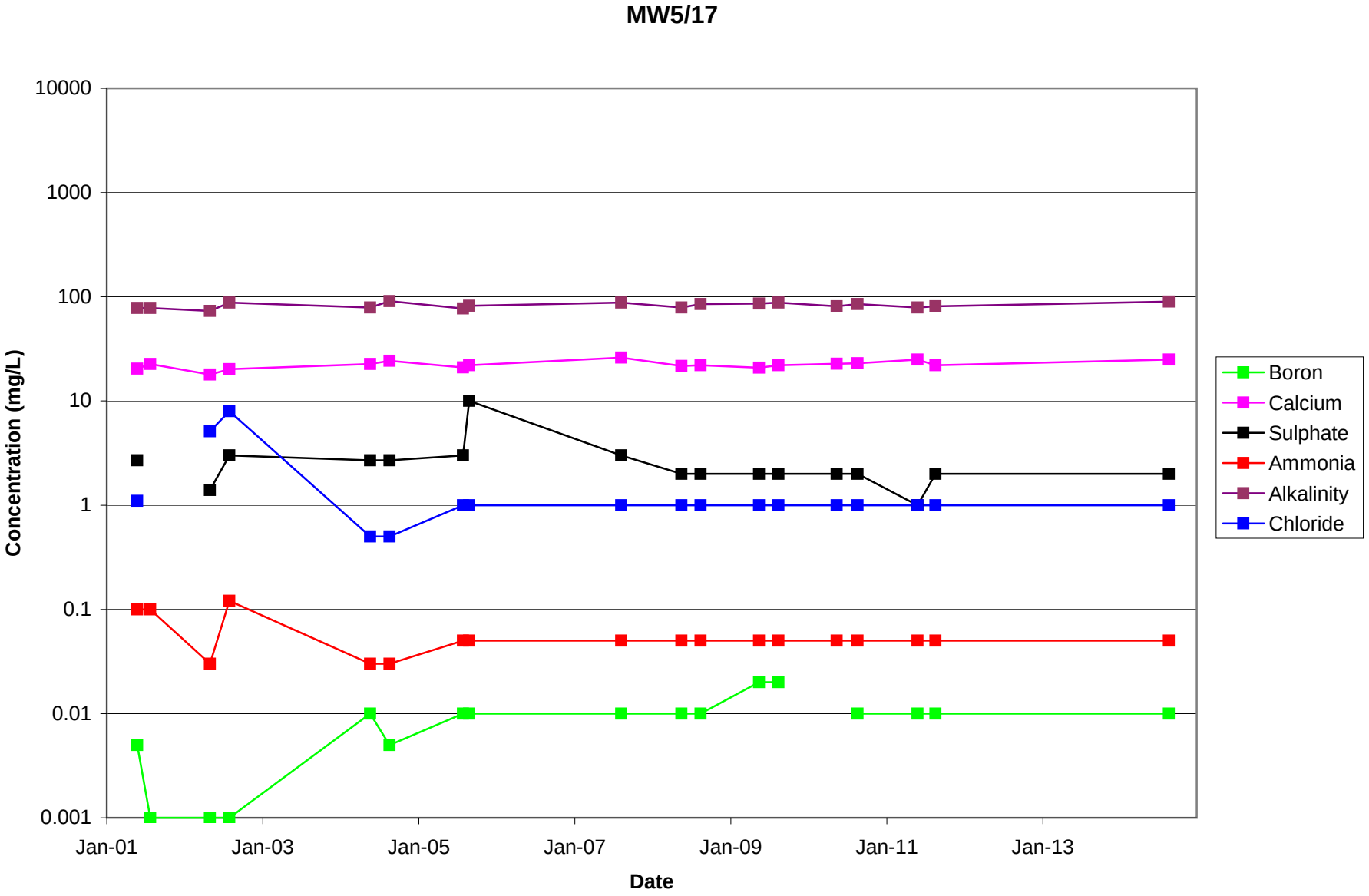
Concentration (mg/L)
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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Concentration (mg/L)
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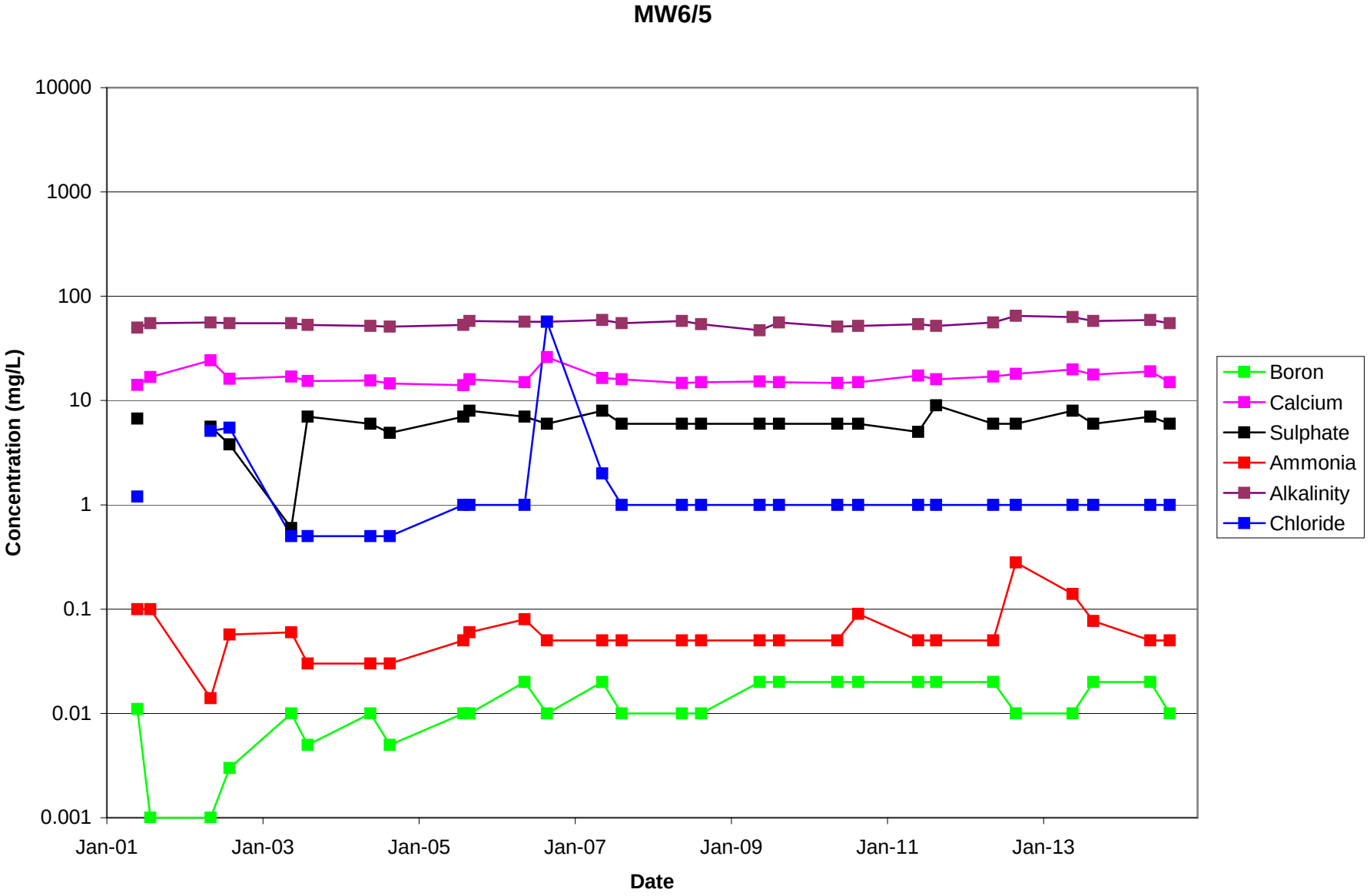
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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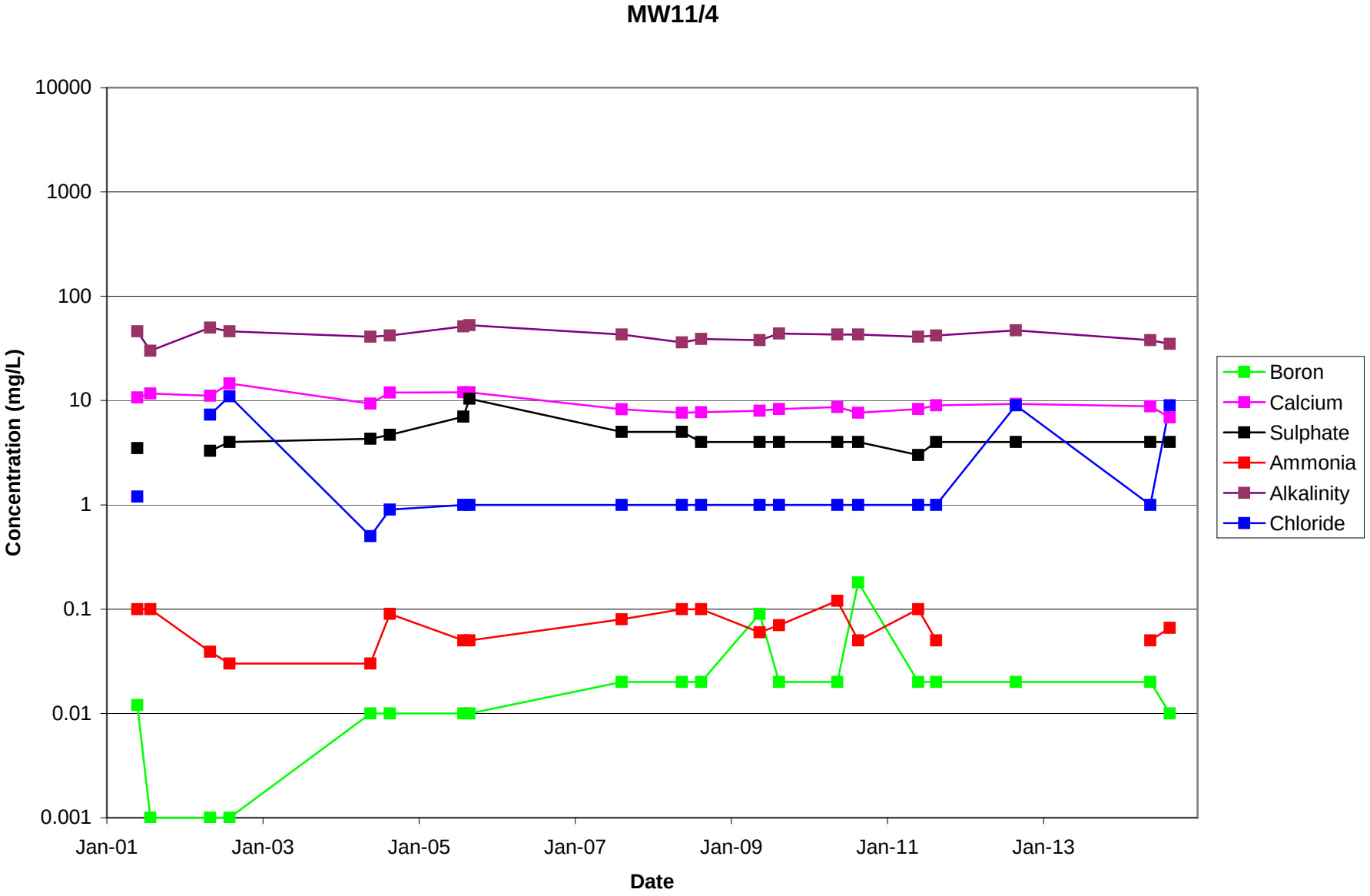
0.01
0.001
Concentration (mg/L)
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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Concentration (mg/L)
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Jan-05
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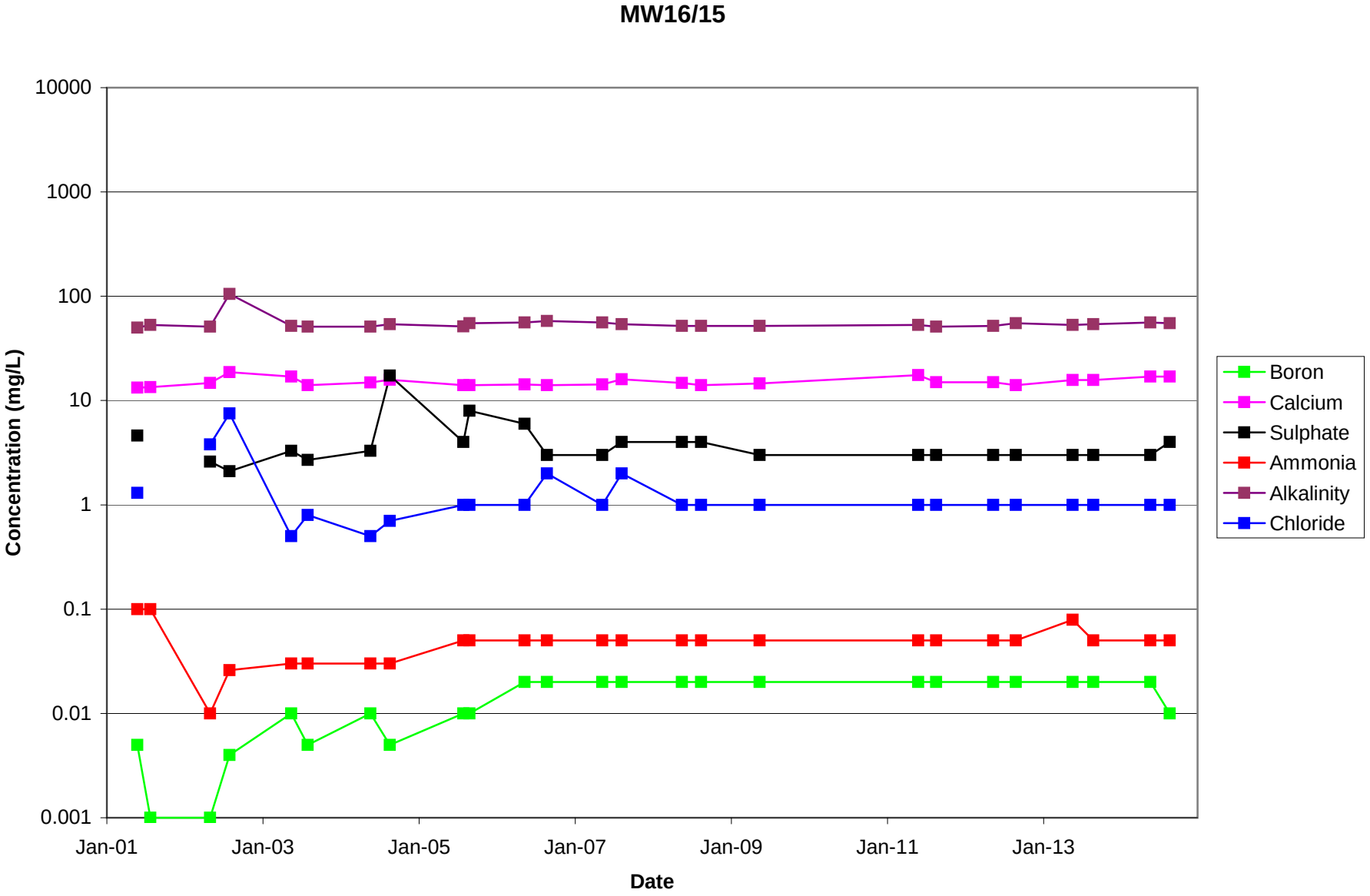
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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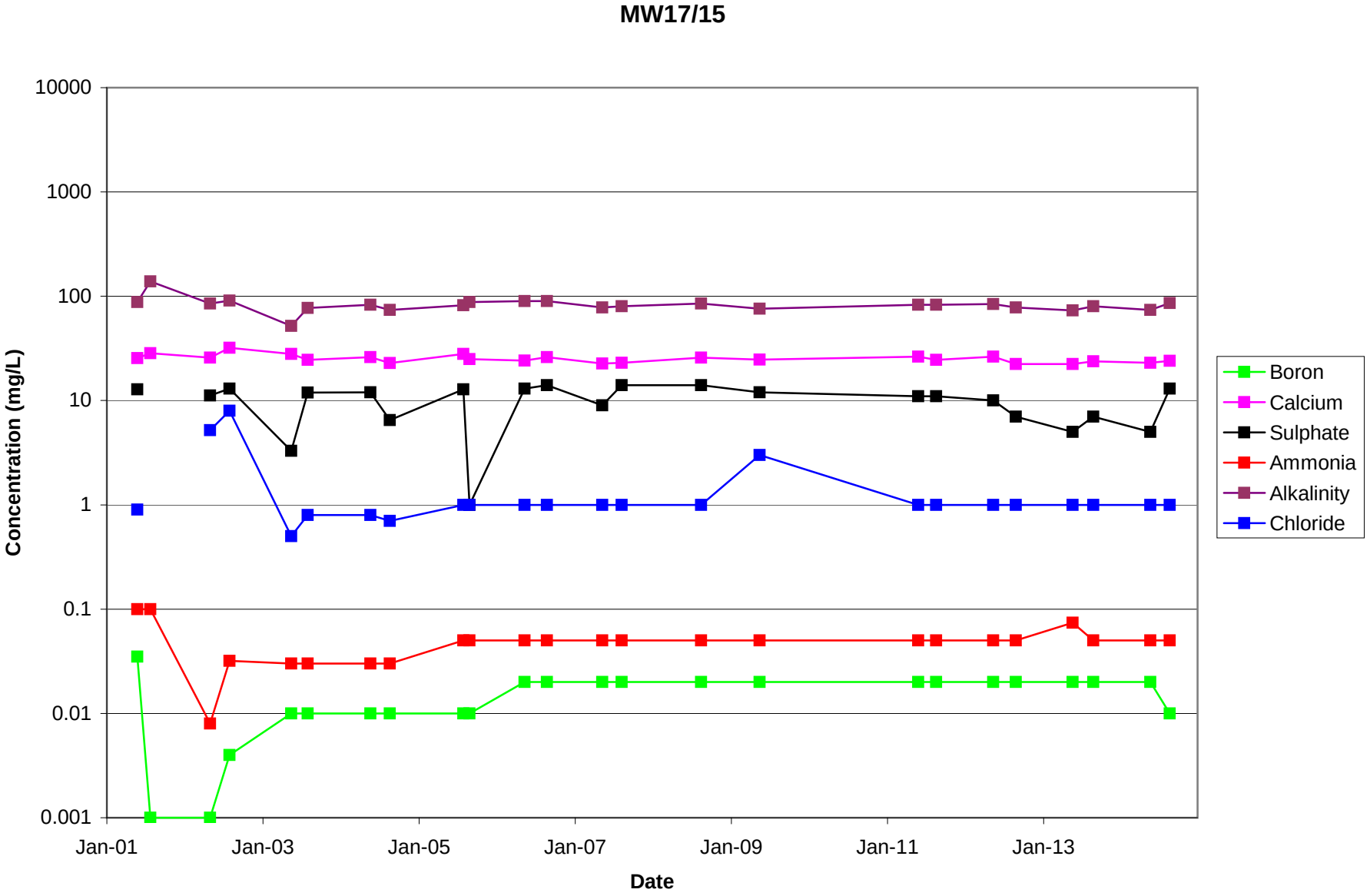
0.01
0.001
Concentration (mg/L)
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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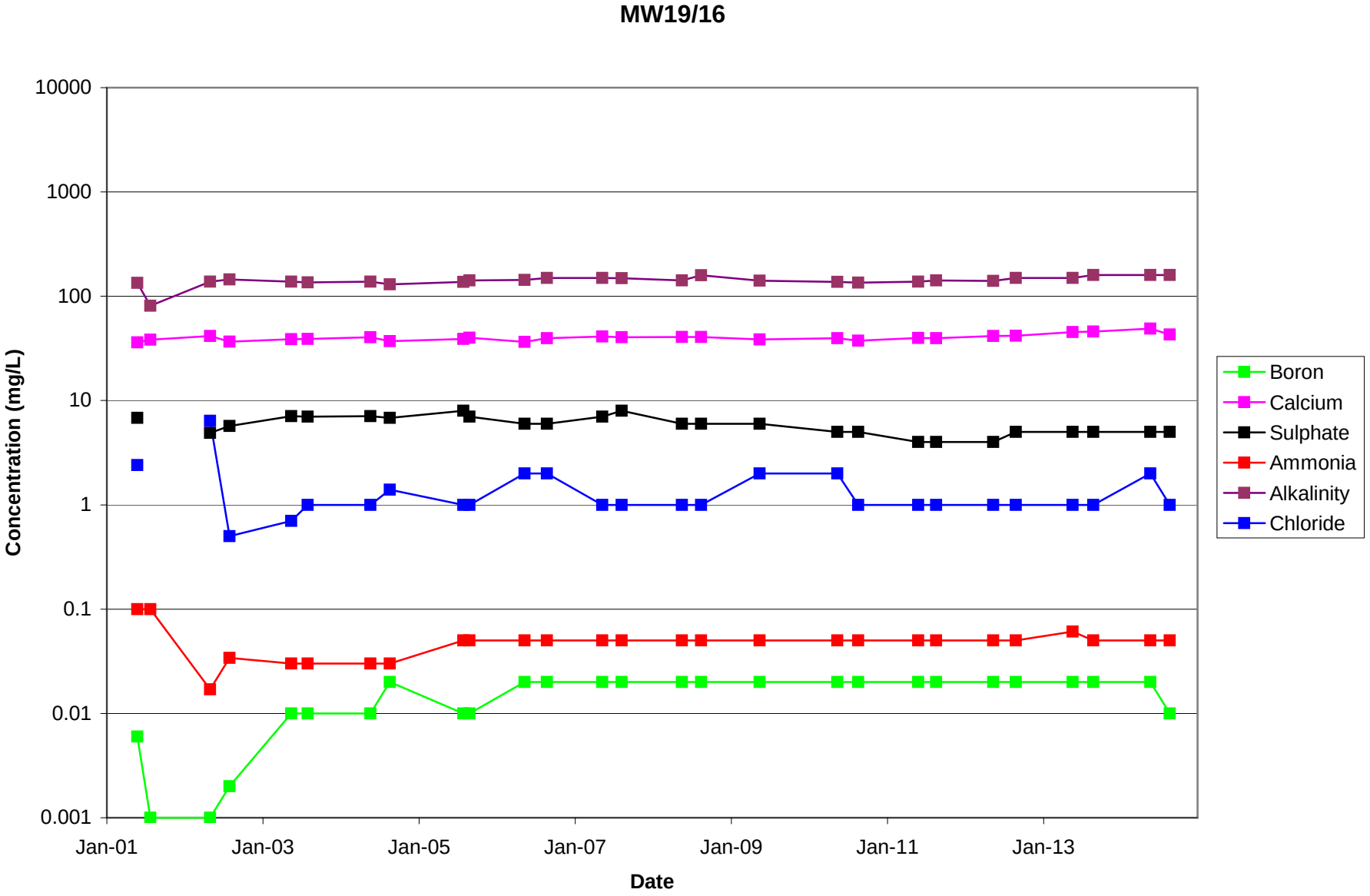
0.01
0.001
Concentration (mg/L)
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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0.01
0.001
Concentration (mg/L)
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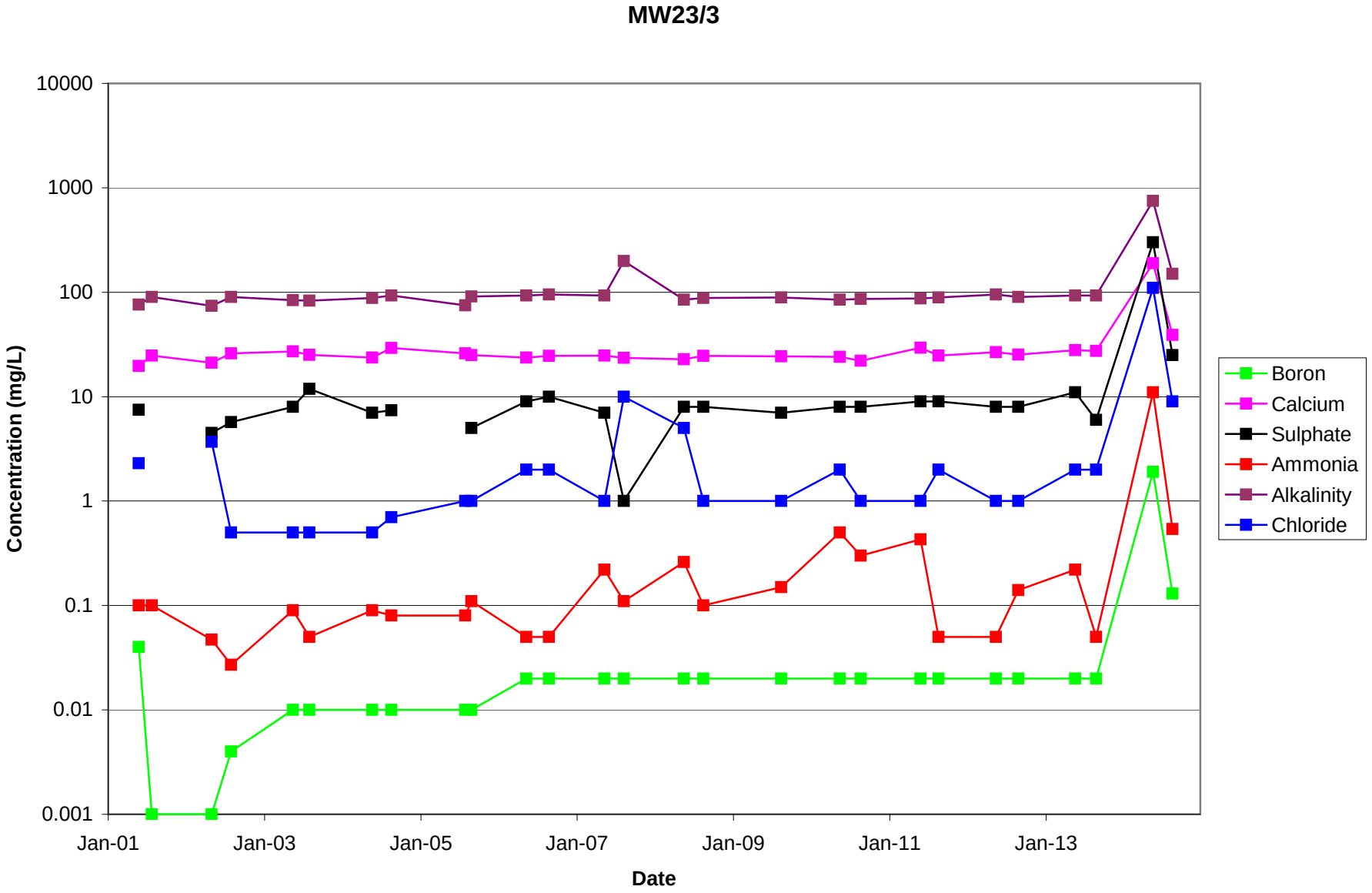
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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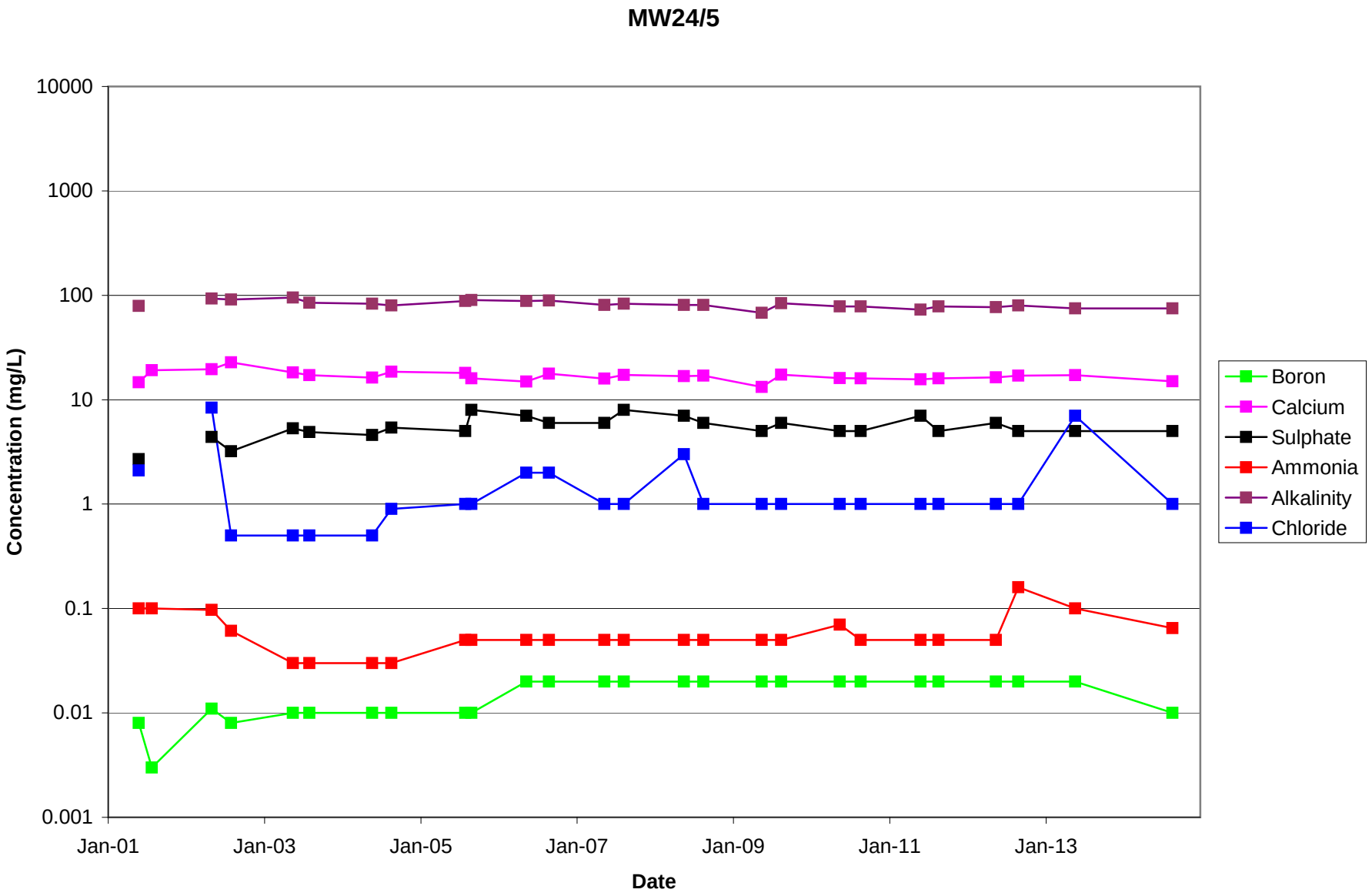
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride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0.01
0.001
Concentration (mg/L)
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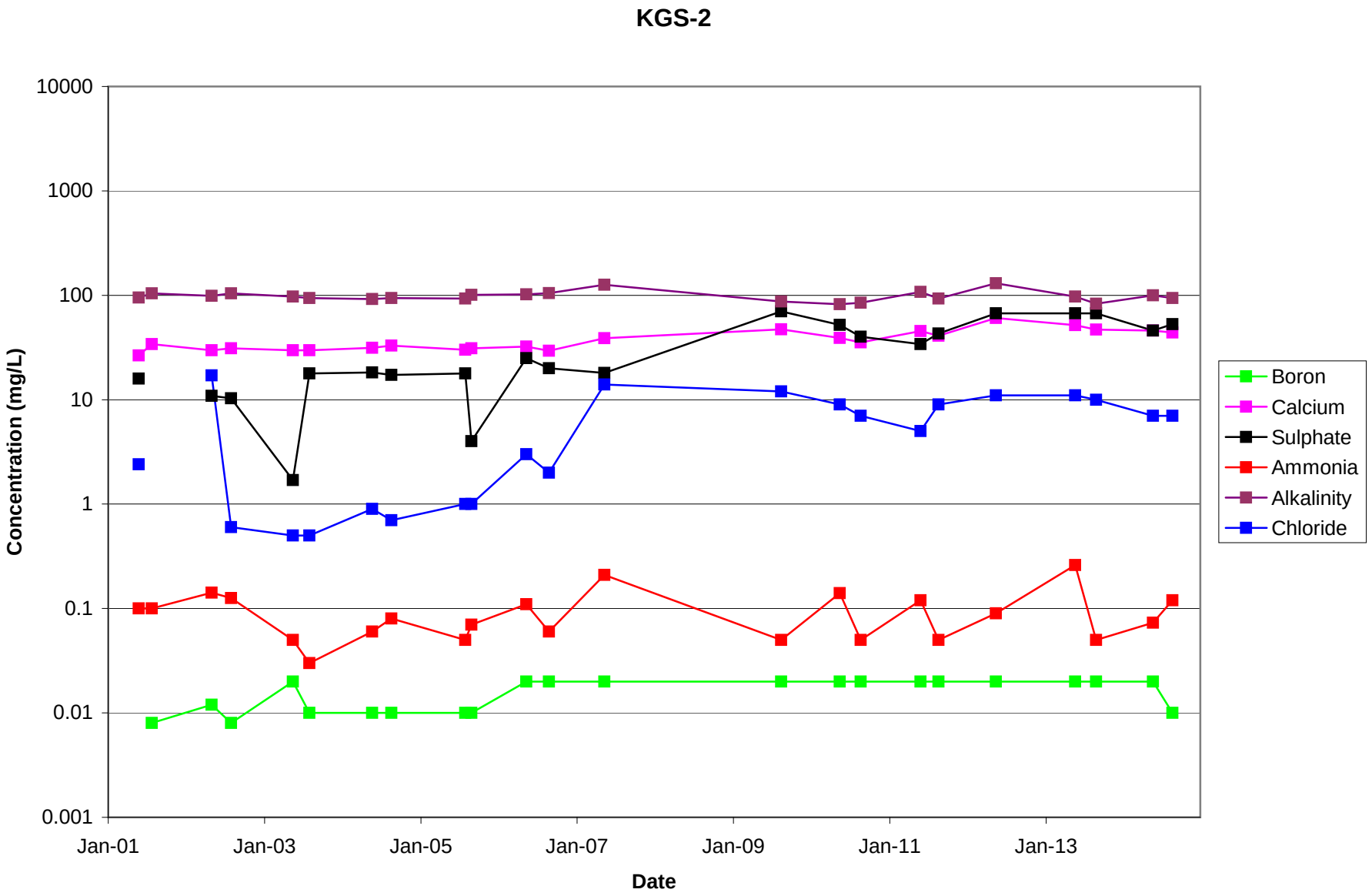
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride


KGS-2
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1000
100
10
1
0.1
0.01
0.001
Concentration (mg/L)
Jan-01
Jan-03
Jan-05
Jan-07
Jan-09
Jan-11
Jan-13
Date
Boron
Calcium
Sulphate
Ammonia
Alkalinity
Chloride

APPENDIX G

Detected Volatile Organic Compounds

Summary Table of Detected Volatile Organic Compounds

Monitor	Date	Toluene (mg/L) *0.024 (ODWQS, 2006)*	1,4 dichloro-benzene (mg/L) *0.001 (ODWQS, 2006)*
4/18	August, 2001	-	0.001
1/17	August, 2002	0.001	-
2/9	August, 2002	0.0006	-
3/8	August, 2002	0.0026	-
4/6	August, 2002	0.0013	-
4/18	August, 2002	0.003	-
5/17	August, 2002	0.0005	-
6/5	August, 2002	0.0021	-
20/4	August, 2004	0.0002	-
4/6-II	August, 2008	0.0004	-
SW-2	August, 2010	0.001	-

All results for all other required sampling parameters were below laboratory detection limits.

In 2006, VOC samples were collected at monitors: 1/17, 2/9, 2/13, 3/8, 4/6, 4/18, 6/14, 7/4,16/15, 20/4, 21/7 and SW-2

In 2007, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 4/6, 4/18, 5/17, 6/5, 6/5 II, 6/14, 7/4,16/15, 20/4, 21/7 and SW-2

In 2008, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 4/6, 4/6-II, 4/18, 5/17, 6/5, 6/14, 7/4, 16/15, 20/4, 21/7 and SW-2

In 2009, VOC samples were collected at monitors: 1/17, 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4, 20/4, 21/7 and SW-2

In 2010, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4 and SW-2

In 2011, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4, 16/15, 21/7 and SW-2

In 2012, VOC samples were collected at monitors: 2/9, 2/13, 3/8, 5/17, 6/5, 6/14, 7/4, 16/15, 21/7 and SW-2

In 2013, VOC samples were collected at monitors: 2/9 and SW-2

In 2014, VOC samples were collected at monitors: 2/9 and SW-2

APPENDIX H

Surface Water Quality Data

Station: SW-1

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Action**	QA/QC		1.0																
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/13/2002									**0.51**						0.95	< 0.010	56	1.0	5
7/3/2002									**0.93**						1.11	< 0.020	56	2.0	3
8/6/2002		0.002	0.018	0.021		< 0.001	0.002	0.005	**4.57**	< 0.001				212	3.89		111	4.0	13
9/4/2002									**18.23**						3.27	**0.415**	81	3.0	78
10/6/2002		< 0.001	0.022	0.027		< 0.001	0.001	0.002	**1.83**	< 0.001				207	1.45	**0.128**	62	1.0	31
4/8/2003									**6.04**						1.33	**0.118**	66	10.8	56
5/21/2003		<0.002	0.013	0.014		<0.0001	< 0.005	0.001	**0.55**	< 0.00005				120	1.04	0.019	84	0.8	4
6/10/2003									**0.70**						0.88	0.011	70	1.0	3
7/17/2003									**1.20**						1.29	**0.035**	95	1.6	10
8/6/2003		< 0.002	0.017	0.015		< 0.0001	< 0.005	**1.130**	**1.13**	< 0.0005				154	0.85	0.013	84	< 0.5	3
9/25/2003									**1.03**						2.10	0.029	148	1.5	3
10/28/2003		< 0.002	0.024	0.024		< 0.0001	< 0.005	0.005	**0.54**	< 0.00005				294	1.26	0.015	95	0.8	2
5/26/2004									**0.50**						2.16	**0.053**	82	1.0	5
8/19/2004		< 0.002	0.057	0.021	27.40	< 0.0001	< 0.005	0.001	**0.54**	< 0.0001	22.5	6.5	0.015	276	1.10	**0.160**	129	0.9	2
10/14/2004		< 0.002	0.062	0.028		< 0.0001	< 0.005	< 0.005	0.27					362	1.19	0.017	99	1.0	2
8/3/2005		0.002	0.065	0.029	25.00	< 0.0001	< 0.005	0.004	**3.20**		12	5.3	0.081		2.40	**0.228**	120	< 2	110
9/2/2005		0.0012	0.058	0.03		< 0.0001	< 0.005	0.0015	**11**	< 0.0001				304	1.70	**0.114**	81	5.0	26
10/21/2005		< 0.001	0.090	0.034		< 0.0001	< 0.005	< 0.001	**2.30**	< 0.0001				258	1.30	**0.055**	89	< 2	14
5/16/2006									**0.35**					98	1.40	0.009	78	< 2	< 1
8/29/2006		< 0.001	0.060	0.039		< 0.0001	< 0.005	0.002	**17**	< 0.0001				216	1.90	0.130	96	10.0	75
5/31/2011		< 0.2	0.040	0.040		< 0.005	< 0.01	< 0.02	**8.2**	< 0.0001				213	1.40	**0.061**	54	5.0	9
5/15/2007									**0.43**					183	2.00	**0.043**	92	<2	<1
8/15/2007		<0.2	0.170	0.070		<0.005	<0.01	<0.02	**4.7**	<0.0001				418	3.00	**0.320**	150	5.0	7
10/18/2007		<0.2	0.080	0.050		<0.005	<0.01	<0.02	**1.7**	<0.0001				246	3.00	**0.120**	140	3.0	5
5/21/2008									**0.67**						1.30	**0.052**	87	< 2	< 1
8/20/2008		<0.2	**0.230**	0.050		<0.005	<0.01	<0.02	**1.8**	<0.0001				270	3.30	**0.530**	280	6.0	14
10/24/2008		<0.2	0.130	0.030		<0.005	<0.01	<0.02	**1.5**	<0.0001				420	2.50	**0.210**	120	3.0	6
5/19/2009									0.29						1.30	**0.096**	81	2.0	< 1
8/18/2009		<0.2	0.120	0.050		<0.005	<0.01	<0.02	**1.6**	<0.0001				266	2.40	**0.740**	200	5.0	10
10/22/2009		<0.2	0.160	0.040		<0.005	<0.01	<0.02	**1.2**	<0.0001				335	1.90	**0.130**	100	< 2	5
5/18/2010									**0.32**						1.90	**0.092**	100	5.0	3
8/25/2010	*no sample*																		
10/21/2010		<0.2	0.130	0.040		<0.005	<0.01	<0.02	**0.38**	<0.0001				506	1.50	**0.210**	90	<2	1
5/31/2011									**0.39**						1.50	**0.210**	89	<2	4
8/24/2011		<0.2	**0.330**	0.040		<0.005	<0.01	<0.02	**0.51**	<0.0001				470	2.00	**0.400**	110	<2	3
10/25/2011		<0.2	0.130	0.030		<0.005	<0.01	<0.02	**0.88**	<0.0001				344	2.00	**0.200**	110	<2	2
5/18/2012									0.29						1.80	**0.150**	90	<2	3
8/30/2012		<0.2	**0.250**	0.070		<0.005	<0.01	<0.02	**2.5**	<0.0001				752	3.40	**0.810**	160	4.0	54
10/23/2012		<0.2	**0.230**	0.040		<0.005	<0.01	<0.02	0.26	<0.0001				696	1.80	**0.370**	120	<2	2
5/24/2013									0.24						2.80	**0.004**	110	<2	2
8/29/2013		<0.2	**0.470**	0.470		<0.005	<0.01	<0.02	**7.3**	<0.0001				780	4.70	**0.830**	150		56
10/17/2013		<0.2	**0.390**	0.070		<0.005	<0.01	<0.02	**1.9**	<0.0001				680	2.10	**0.370**	130	2.0	7
5/23/2014									**0.4**						2.40	**0.150**	96	<2	5
8/21/2014		<0.2	**0.810**	0.150		<0.005	<0.01	<0.02	**6.8**	<0.0001				1230	4.40	**0.940**	180	11.0	55
10/9/2014		<0.2	**0.610**	0.075		<0.005	<0.01	<0.02	**1.9**	<0.0001				788	2.30	**0.290**	110	<2	3

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Action**					194							0.96							
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/13/2002					3.7	< 0.10	< 0.10	14.1	**6.05**	6	0.03	0.000003		74.8	**0.003**	9	5.70	1.5	30
7/3/2002					1.3	< 0.01	< 0.01	23.1	**6.14**	10	0.04	0.00002		102.5	< 0.001	16	5.80	17.5	90
8/6/2002			0.001	**0.279**	5.0	< 0.05	< 0.03	7.0	7.16	50	0.18	0.00105		109	**0.002**	26	6.20	20.0	110
9/4/2002					5.3	< 0.05	< 0.03	2.6	6.99	39	0.74	0.00198		107	< 0.001	20	6.80	15.0	90
10/6/2002			< 0.001	**0.032**	3.0	< 0.50	< 1.00	45.0	6.59	10	0.08	0.00003		186	**0.013**	20	6.80	3.5	90
5/31/2011					22.4	< 0.2	< 0.2	100.0	6.56	27	0.44	0.00014		152	**0.004**	10	6.10	1.0	100
5/21/2003			< 0.0005	0.008	4.5	< 0.2	< 0.2	39.0	**5.85**	7	0.18	0.00001		142	< 0.001	15	6.60	4.0	110
6/10/2003					6.2	< 0.2	< 0.2	53.8	**5.95**	7	< 0.03	<0.0003		170	< 0.001	9	5.60	7.0	170
7/17/2003					5.3	< 0.2	< 0.2	44.0	**5.87**	11	0.05	0.00001		149	< 0.001	8	5.90	19.5	130
8/6/2003			< 0.0005	0.006	3.6	< 0.2	< 0.2	39.3	**6.07**	11	0.06	0.00002		145	< 0.001	15	5.70	18.5	110
9/25/2003					15.6	< 0.2	< 0.2	114.0	6.58	25	0.61	0.00037		374	< 0.001	10	5.60	8.0	340
10/28/2003			< 0.0005	< 0.005	15.6	< 0.2	0.20	95.3	6.64	8	0.36	0.00015		337	< 0.001		5.80	2.0	280
5/26/2004					8.5	< 0.2	< 0.2	40.4	7.08	44	1.29	0.00193		218	< 0.001	6	6.20	5.0	230
8/19/2004			< 0.0005	**0.056**	8.8	< 0.2	< 0.2	45.2	7.65	62	NA			246	0.001	6		10.0	
10/14/2004			< 0.0005	< 0.005	10.2	< 0.2	< 0.2	48.1	7.63	136	0.03	0.00016		420	< 0.001	5	6.80	5.0	440
8/3/2005			0.0022	**0.036**	5	< 0.3	< 0.2	11.1	7.58	75	0.09	0.00114		175	**0.002**	10	4.50	17.8	170
9/2/2005			< 0.0005	**0.072**	17	< 0.3	1.600	10.4	7.49	133	0.26	0.00197		294	< 0.001	19	6.00	13.7	270
10/21/2005			< 0.0005	**0.092**	10	< 0.01	< 0.1	11.0	7.78	115	0.08	0.00079		230	< 0.001	13	3.70	8.5	20
5/16/2006					8	< 0.01	< 0.1	14.0	7.70	85	< 0.05	<0.0005		221	< 0.001	10	7.30	17.2	
8/29/2006			< 0.0005	0.100	21	< 0.01	< 0.1	1.0	7.10	117	0.14	0.00057		291	0.001	11	6.71	17.4	
10/17/2006			< 0.02	**0.250**	30	< 0.01	< 0.1	30.0	7.60	113	0.46	0.00310		353	0.001	6	6.24	8.9	
5/15/2007					14	0.020	0.700	105.0	7.40	66	0.05	0.00034		417	<0.001	12	6.93	14.8	
8/15/2007			<0.05	**0.200**	21	<0.01	<0.1	33.0	8.00	306	0.58	0.01745		624	0.005	8	7.6	16.7	687
10/18/2007			<0.05	0.010	14	<0.01	<0.1	33.0	7.90	181	0.09	0.00141		458	0.004	6	7.21	11	
5/21/2008					10	<0.01	< 0.1	52.0	7.80	121	< 0.05	<0.0005		370	0.001	10	7.5	10.9	
8/20/2008			<0.05	<0.005	<1	<0.01	< 0.1	23.0	8.00	181	0.23	0.00901		402	<0.001	6	7.37	20.4	
10/24/2008			<0.05	<0.005	17	<0.01	< 0.1	< 2	8.20	280	0.05	0.00126		656	<0.001	9	7.06	8.4	309
5/19/2009					12	<0.01	< 0.1	48.0	7.00	99	< 0.05	<0.0005		322	<0.001	9	7.35	n/a	326
8/18/2009			<0.05	0.020	<1	<0.01	< 0.1	< 2	7.40	188	0.17	0.00133		438	**0.005**	4	7.52	16.9	480
10/22/2009			<0.05	**0.030**	20	<0.01	< 0.1	74.0	7.50	147	0.09	0.00043		514	<0.001	10	7.74	7.4	498
5/18/2010					19	<0.01	<0.1	35.0	8.10	159	0.16	0.00771		455	<0.001	8	7.72	20.2	430
8/25/2010	*no sample*															7	6.64	16	692
10/21/2010			<0.05	<0.01	28	<0.01	<0.1	85.0	8.01	254	<0.05	<0.0005		779	<0.001	9	7.94	5.1	784
5/31/2011					19	<0.01	<0.1	54.0	7.88	182	<0.05	<0.0005		552	<0.001	4	7.42	11.8	490
8/24/2011			<0.05	<0.01	27	<0.01	<0.1	27.0	8.02	262	<0.05	<0.0005		691	<0.001	6	8.14	18.1	699
10/25/2011			<0.0001	<0.01	24	<0.01	<0.1	13.0	7.71	185	0.22	0.00139		502	**0.007**	4	7	4.9	509
5/18/2012					26	<0.01	<0.1	31.0	7.76	170	<0.05	<0.0005		510	**0.007**	10	6.6	18	540
8/30/2012			<0.05	<0.01	61	<0.01	<0.1	13.0	8.18	400	0.3	0.01628		1000	<0.001	9	7.68	19.4	1259
10/23/2012			<0.05	<0.01	62	<0.01	<0.1	71.0	7.84	310	0.092	0.00083		960	<0.001	9	7.76	5.7	694
5/24/2013					31	0.025	0.310	9.0	7.94	220	0.63	0.01050		620	**0.004**	10	9.51	10.6	604
8/29/2013			<0.05	<0.01	68	<0.01	<0.1	<1	7.76	440	1.0	0.00843		1100	<0.001	6	7.37	18.8	1297
10/17/2013			<0.05	<0.01	60	0.011	<0.1	20.0	7.96	340	0.16	0.00110		940	**0.011**	6	7.65	7.7	801
5/23/2014					29	<0.01	0.240	30.0	7.87	210	1.5	0.01625		580	**0.011**	8	7.61	14.8	566
8/21/2014			<0.05	**0.070**	90	<0.05	<0.5	<1	7.94	570	0.32	0.01060		1400	<0.001	6	8.37	19.9	1290
10/9/2014			<0.05	0.020	71	<0.01	<0.10	20.0	7.87	380	0.33	0.00161		1000	**0.017**	4	7.54	6.6	886

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Action Criteria

* should not be decreased by more than 25% of the natural concentration

** - action level according to trigger mechanism

Station: SW-2

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Trigger -			0.2																
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/13/2002									**0.37**						0.72	< 0.010	28	2.0	< 3
7/3/2002									**1.88**						1.43	0.024	56	2.0	10
8/6/2002		0.001	0.010	0.013		< 0.001	< 0.001	0.003	**0.79**	< 0.001				126	1.42		50	2.0	13
9/4/2002									**1.20**						1.05	**0.212**	< 20	1.0	8
10/6/2002		< 0.001	0.003	0.013		< 0.001	< 0.001	< 0.001	**0.56**	< 0.001				64	1.05	**0.092**	32	1.0	47
4/8/2003									**1.50**						0.87	**0.057**	47	5.6	6
5/21/2003		<0.002	0.007	0.011		<0.0001	< 0.005	0.001	**0.36**	< 0.00005				66	0.85	**0.025**	63	0.8	5
6/10/2003									**0.48**						0.84	**0.019**	70	1.0	10
7/17/2003									**1.02**						1.40	**0.044**	93	1.0	9
8/6/2003		< 0.002	0.008	0.014		< 0.0001	< 0.005	**0.940**	**0.94**	< 0.0005				94	1.02	**0.033**	78	< 0.5	2
9/25/2003									**0.67**						1.04	**0.019**	110	1.2	2
10/28/2003		< 0.002	0.008	0.020		< 0.0001	< 0.005	0.001	**0.54**	< 0.00005				170	0.77	**0.010**	90	0.8	1
5/26/2004									**0.29**						0.66	**0.036**	64	0.7	4
8/19/2004		< 0.002	0.010	0.014	8.60	< 0.0001	< 0.005	0.002	**0.95**	< 0.0001	5.9	3.4	0.042	138	0.98	0.024	105	0.9	1
10/14/2004		< 0.002	0.009	0.017		< 0.0001	< 0.005	< 0.0005	**0.5**					156	1.02	0.013	113	1.3	1
8/3/2005		0.001	0.016	0.020	16	< 0.0001	< 0.005	0.003	**1.1**		5.1	4.8	0.120		1.10	**0.033**	77	< 2	3
9/2/2005		< 0.001	0.019	0.019		< 0.0001	< 0.005	0.001	**0.94**	0.0001				194	1.10	**0.035**	64	< 2	8
10/21/2005		< 0.001	0.019	0.017		< 0.0001	< 0.005	0.001	**0.71**	< 0.0001				198	0.90	0.024	73	< 2	8
5/16/2006									0.25					50	1.50	0.006	61	< 2	1
8/29/2006		0.001	0.018	0.020		< 0.0001	0.012	0.001	**1.7**	< 0.0001				105	1.50	**0.081**	60	< 2	< 1
10/17/2006		< 0.2	< 0.02	< 0.02		< 0.005	< 0.1	< 0.02	0.19	< 0.0001				113	0.60	0.009	33	< 2	< 1
5/31/2011									0.29					69	1.50	**0.017**	72	<2	<1
8/15/2007		<0.2	0.05	0.03		<0.005	<0.01	<0.02	**1.6**	<0.0001				146	1.70	**0.050**	110	<2	3.0
10/18/2007		<0.2	0.05	0.02		<0.005	<0.01	<0.02	**0.37**	<0.0001				124	1.20	0.021	78	<2	<1
5/21/2008									**0.41**						1.00	0.010	63	<2	<10
8/20/2008		<0.2	0.05	0.05		<0.005	<0.01	<0.02	**4.2**	<0.0001				150	2.10	**0.076**	110	<2	40
10/24/2008		<0.2	0.04	<0.02		<0.005	<0.01	<0.02	**0.33**	0.0003				325	1.60	**0.190**	83	<2	<1
5/19/2009									**0.17**						0.80	0.020	71	<2	<1
8/18/2009		<0.2	0.05	0.03		<0.005	<0.01	<0.02	**2.1**	<0.0001				155	1.70	**0.044**	120	<2	2
10/22/2009		<0.2	0.03	<0.02		<0.005	<0.01	<0.02	**0.36**	<0.0001				140	1.10	0.014	72	<2	1
5/18/2010									**0.58**						1.40	0.019	75	<2	4
8/25/2010		<0.2	0.04	0.03		<0.005	<0.01	<0.02	**1.8**	<0.0001				200	1.70	**0.073**	97	<2	2
10/21/2010		<0.2	0.03	0.03		<0.005	<0.01	<0.02	**0.36**	<0.0001				192	0.70	0.016	64	<2	<1
5/31/2011									**0.51**						1.30	**0.050**	72	<2	3
8/24/2011		<0.2	0.05	0.03		<0.005	<0.01	<0.02	**0.97**	<0.0001				228	1.30	**0.090**	91	<2	228
8/24/2011	*Duplicate*	<0.2	0.05	0.03		<0.005	<0.01	<0.02	**0.98**	<0.0001				198	1.50	**0.099**	110	<2	198
10/25/2011		<0.2	0.03	0.02		<0.005	<0.01	<0.02	**0.4**	<0.0001				224	7.30	**0.042**	68	<2	2
5/18/2012									**0.44**						1.10	**0.081**	72	<2	2
8/30/2012		<0.2	0.05	0.03		<0.005	<0.01	<0.02	**0.89**	<0.0001				180	1.70	**0.099**	96	<2	11
10/23/2012		<0.2	0.03	<0.02		<0.005	<0.01	<0.02	**0.37**	<0.0001				184	1.30	0.011	78	<2	<1
5/24/2013									0.30						1.50	**0.043**	69	<2	<1
8/29/2013		<0.2	0.06	0.048		<0.005	<0.01	<0.02	**1.5**	<0.0001				334	1.90	**0.130**	110		6
10/17/2013		<0.2	0.05	0.028		<0.005	<0.01	<0.02	**0.9**	<0.0001				272	1.40	**0.049**	96	2	<1
5/23/2014									0.26						1.20	**0.032**	79	<2	<1
8/21/2014		<0.2	0.1	0.065		<0.005	<0.01	<0.02	**3.8**	<0.0001				382	2.20	**0.310**	120	2	10
10/9/2014		<0.2	0.09	0.038		<0.005	<0.01	<0.02	**1.4**	<0.0001				292	1.30	**0.065**	75	2	9

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Trigger -		50			125							0.02							
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/13/2002					6.9	< 0.10	0.50	10.1	6.76	13	0.02	0.00001		64.9	< 0.001	9	6.00	4.0	30
7/3/2002					2.5	0.01	<0.01	2.8	6.92	30	0.04	0.00013		78.2	< 0.001	15	6.50	19.0	70
8/6/2002			< 0.001	0.011	4.0	< 0.05	< 0.03	< 0.2	7.30	14	0.17	0.00143		74.8	< 0.001	11	6.60	21.0	70
9/4/2002					2.6	< 0.05	< 0.03	8.3	7.09	23	0.04	0.00012		76	< 0.001	10	7.00	14.0	60
10/6/2002			< 0.001	0.003	3.0	< 0.50	< 1.00	3.0	7.16	15	0.06	0.00008		67	**0.008**	10	7.00	1.0	60
4/8/2003					6.9	< 0.2	< 0.2	2.3	6.70	30	0.18	0.00007		6.9	**0.002**	13	6.20	0.0	30
5/21/2003			< 0.0005	< 0.005	4.0	< 0.2	< 0.2	8.5	7.11	13	0.06	0.00008		85	< 0.001	16	6.20	3.0	50
6/10/2003					4.4	< 0.2	< 0.2	12.1	6.67	19	0.03	0.00003		88	< 0.001	15	6.10	10.0	70
5/31/2011					5.3	< 0.2	< 0.2	4.2	6.71	28	0.05	0.00009		87	< 0.001	8	6.50	18.5	70
8/6/2003			< 0.0005	< 0.005	4.1	< 0.2	< 0.2	1.1	6.88	31	0.06	0.00018		90	< 0.001	8	6.60	20.0	70
9/25/2003					6.2	< 0.2	< 0.2	31.4	6.53	15	0.03	0.00002		141	< 0.001	14	5.60	8.5	110
10/28/2003			< 0.0005	< 0.005	8.4	< 0.2	< 0.2	38.7	6.62	12	< 0.03	<0.0003		168	< 0.001	19	6.10	2.0	160
5/26/2004					4.9	< 0.2	<0.2	20.9	6.81	18	0.04	0.00004		113	<0.001	8	5.80	8.0	120
8/19/2004		4.9	< 0.0005	< 0.005	5.0	< 0.2	< 0.2	6.8	7.24	30	NA			96	0.001	6		11.5	
10/14/2004			< 0.0005	< 0.005	6.1	< 0.2	< 0.2	13.6	7.15	38	< 0.03	<0.0003		146	<0.001	7	6.40	6.0	140
8/3/2005			0.0003	< 0.005	6.0	< 0.3	< 0.2	3.0	7.55	54	< 0.05	<0.0005		126	**0.002**	9	5.20	22.1	110
9/2/2005			< 0.0005	< 0.005	7.0	< 0.3	< 0.2	15.3	7.56	50	< 0.05	<0.0005		116	< 0.001	13	6.00	14.2	110
10/21/2005			< 0.0005	< 0.005	7.0	< 0.01	< 0.1	< 1	7.57	44	< 0.05	<0.0005		102	< 0.001	11	3.90	7.1	10
5/16/2006					7	< 0.01	< 0.1	2	7.40	37	< 0.05	<0.0005		109	< 0.001	9	6.20	16.4	
8/29/2006			< 0.0005	0.008	7	< 0.01	< 0.1	2	7.50	55	0.09	0.00098		134	< 0.001	6	6.90	18.3	
10/17/2006			< 0.05	0.020	14	< 0.01	< 0.1	5	7.80	48	< 0.05	<0.0005		154	< 0.001	12	7.42	7.5	
5/15/2007					7	<0.01	<0.1	30	7.00	26	<0.05	<0.0005		152	**0.004**	13	6.77	12.1	
8/15/2007			<0.05	<0.01	6	<0.01	<0.1	<1	7.90	88	0.11	0.00265		201	**0.002**	7	7.55	16.7	212
10/18/2007			<0.05	<0.01	9	<0.01	<0.1	28	7.70	49	<0.05	<0.0005		187	<0.001	5	7.04	11.4	
5/21/2008					6	<0.01	<0.1	19	7.40	43	<0.05	<0.0005		150	<0.001	7	7.53	8	
8/20/2008			<0.05	<0.01	11	<0.01	<0.1	<1	8.00	98	<0.05	<0.0005		223	<0.001	6	7.45	22.9	
10/24/2008			<0.05	<0.01	10	<0.01	<0.1	1	8.20	195	<0.05	<0.0005		516	<0.001	11	7.56	7.3	166
5/19/2009					6	<0.01	<0.1	<1	6.90	47	<0.05	<0.0005		161	<0.001	8	7.37	n/a	242
8/18/2009			<0.05	<0.01	<1	<0.01	<0.1	<1	7.40	102	<0.05	<0.0005		232	<0.001	9	7.74	18.1	244
10/22/2009			<0.05	<0.01	10	<0.01	<0.1	<1	7.40	84	<0.05	<0.0005		213	<0.001	11	7.74	4	196
5/18/2010					8	<0.01	<0.1	<1	7.40	67	0.05	0.00040		177	<0.001	8	7.63	17	171
8/25/2010			<0.05	<0.01	14	<0.01	<0.1	<1	7.70	123	<0.05	<0.0005		301	<0.001	5	7.30	18.6	
10/21/2010			<0.05	<0.01	14	<0.01	<0.1	<1	7.55	109	<0.05	<0.0005		587	<0.001	7	8.17	6.7	
5/31/2011					6	<0.01	<0.1	<1	7.59	74	<0.05	<0.0005		199	<0.001	7	7.18	11.4	199
8/24/2011			<0.05	<0.01	13	<0.01	<0.1	<1	7.63	122	<0.05	<0.0005		292	<0.001	6	8.19	18.1	306
8/24/2011	*Duplicate*		<0.05	<0.01	13	<0.01	<0.1	<1	7.57	117	0.08	0.00101		298	**0.002**	6	8.19	18.1	306
10/25/2011			<0.05	<0.01	15	<0.01	<0.1	<1	7.93	111	<0.05	<0.0005		292	**0.003**	10	7.66	4.3	337
5/18/2012					13	<0.01	<0.1	<1	7.48	100	<0.05	<0.0005		260	**0.005**	8	6.29	18	540
8/30/2012			<0.05	<0.01	16	<0.01	<0.1	<1	7.74	130	0.058	0.00109		320	<0.001	7	7.50	18.3	435
10/23/2012			<0.05	<0.01	13	<0.01	<0.1	<1	7.37	72	0.076	0.00023		210	<0.001	9	7.71	5.3	216
5/24/2013					14	<0.01	<0.1	<1	7.66	88	0.073	0.00070		250	**0.005**	8	9.57	11.6	278
8/29/2013			<0.05	<0.01	26	<0.01	<0.1	<1	7.80	160	0.083	0.00179		420	<0.001	5	7.49	18.3	545
10/17/2013			<0.05	<0.01	23	<0.01	<0.1	<1	7.70	120	<0.05	<0.0005		340	**0.006**	7	7.70	5.5	314
5/23/2014					15	<0.01	<0.1	<1	7.46	96	<0.05	<0.0005		270	**0.009**	8	7.80	14.1	313
8/21/2014			<0.05	0.010	25	<0.05	<0.5	<1	7.71	160	0.096	0.00154		410	<0.001	7	8.35	17	468
10/9/2014			<0.05	<0.01	26	<0.01	<0.1	<1	7.64	140	0.096	0.00057		370	0.001	9	7.40	6.1	352

Notes:

Bold denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

Underline indicates exceedance of Trigger Criteria

* should not be decreased by more than 25% of the natural concentration

Station: SW-3

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/13/2002									**0.76**						1.00	< 0.010	56	1.0	7
7/3/2002									**3.49**						1.94	0.03	84	3.0	18
8/6/2002	*no sample*																		
9/4/2002									0.29						1.49	**0.15**	< 20	3.0	46
10/6/2002		< 0.001	0.006	0.020		< 0.001	0.001	0.003	**0.46**	< 0.001				42	1.74	**0.10**	54	2.0	35
4/8/2003									**1.96**						2.58	**0.40**	60	12.4	18
5/21/2003		< 0.002	0.008	0.016		<0.0001	< 0.005	**0.011**	**0.54**	< 0.00005				78	1.34	**0.04**	82	1.6	11
6/10/2003									**0.52**						1.13	**0.10**	70	1.0	2
7/17/2003									**3.52**						2.05	**0.14**	129	3.1	60
8/6/2003		< 0.002	0.017	0.030		< 0.0001	< 0.005	**2.630**	**2.63**	< 0.0005				84	2.19	**0.31**	76	2.5	49
9/25/2003									**1.26**						2.10	**0.04**	98	0.8	5
10/28/2003		< 0.002	< 0.005	0.028		< 0.0001	< 0.005	0.005	**2.46**	< 0.00005				118	0.72	**0.06**	86	0.8	4
5/26/2004									**1.49**						0.59	**0.05**	62	1.0	34
8/19/2004		< 0.002	< 0.002	0.065	5.90	< 0.0001		**0.011**	**7.64**	< 0.0001	2	3.5	0.115	170	0.70	**0.17**	115	0.9	32
10/14/2004	*Dry*																		
8/3/2005		0.0012	< 0.01	0.016	11	< 0.0001	< 0.005	0.0025	**1.1**		5.1	4.8	0.12		1.4	**0.14**	86	< 2	21
9/2/2005		< 0.0001	0.011	0.017		< 0.0001	< 0.005	0.002	**1.9**	< 0.0001				92	1.9	**0.18**	73	9	10
10/21/2005		< 0.001	0.017	0.016		< 0.0001	< 0.005	< 0.001	**0.55**	< 0.0001				126	1.1	**0.02**	76	2	14
5/16/2006									**12**					22	1.6	**0.14**	91	< 2	110
5/15/2007									**0.72**					32	3	**0.06**	85	<2	8
8/15/2007		<0.2	<0.02	0.04		<0.005	<0.01	<0.02	**12**	<0.0001				62	18	**2.10**	320	4.0	1100
10/18/2007		<0.2	<0.02	0.03		<0.005	<0.01	<0.02	0.13	<0.0001				47	2.1	**0.08**	82	<2	1
5/21/2008									**1.7**						1	**0.05**	66	<2	<1
8/20/2008		<0.2	0.02	0.44		<0.005	0.05	**0.06**	**7.7**	<0.0001				110	40	**3.00**	1000	12	6400
5/31/2011		<0.2	<0.02	<0.03		<0.005	<0.01	<0.02	**1.1**	<0.0001				35	1.8	**0.05**	100	<2	<1
5/19/2009									**0.76**						1.1	0.03	78	3	4
8/18/2009		<0.2	<0.02	0.03		<0.005	<0.01	<0.02	**1.5**	<0.0001				60	1.5	**0.07**	91	2	16
10/22/2009		<0.2	<0.02	<0.03		<0.005	<0.01	<0.02	**2.1**	<0.0001				35	1.3	**0.06**	76	<2	3
5/18/2010									**5.7**						4.3	**0.67**	190	2	95
8/25/2010		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	**9.1**	<0.0001				46	1.7	**0.097**	110	3	21
10/21/2010		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	**1.5**	<0.0001				36	1.0	**0.035**	60	<2	43
5/31/2011									**2.1**						2.6	**0.190**	110	<2	5
8/24/2011		<0.2	<0.02	0.03		<0.005	<0.01	<0.02	**12**	<0.0001				80	3.0	**0.360**	120	7	25
10/25/2011		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	**0.86**	<0.0001				58	1.3	**0.058**	52	<2	15
5/18/2012									**3.7**						3.5	**0.038**	150	18	84
8/30/2012	*Dry*																		
10/23/2012		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	**1.5**	<0.0001				122	1.5	**0.032**	84	<2	<1
5/24/2013									**1.2**						1.5	**0.070**	76	<2	4
8/29/2013	*Dry*																		
10/17/2013		<0.2	<0.02	0.065		<0.005	<0.01	<0.02	**7.3**	<0.0001				132	4.4	**0.340**	220	3	190
5/23/2014									**1.7**						1.4	**0.250**	67	3	26
8/21/2014	*Dry*																		
10/9/2014		<0.2	<0.02	0.025		<0.005	<0.01	<0.02	**2.3**	<0.0001				118	1.3	**0.056**	80	2	6

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/24/2001			< 0.001	0.004	1.2	< 0.10	0.10	2.0	6.86	13	< 0.01	<0.0001		35		13	6.00	13.0	20
7/23/2001					9.9	< 0.10	< 0.10	6.5	6.64	21	< 0.01	<0.0001		53	< 0.001				
8/10/2001					1.1	< 0.10	0.10	0.9			< 0.01	<0.0001			**0.015**	5	6.10	15.0	
8/31/2001						< 0.10	< 0.10	0.3	7.58	60	0.30	0.00371		110	**0.035**	8	5.90	17.5	60
9/28/2001					1.9	< 0.10	< 0.10	1.8	7.15	41	< 0.01	<0.0001		86	< 0.001				
11/2/2001			**0.004**	**0.027**	2.2	< 0.10	0.60	3.7	**6.39**	15	< 0.01	<0.0001		49	< 0.001			2.0	
5/13/2002					0.4	< 0.10	0.40	2.8	6.92	15	0.02	0.00002		44	< 0.001	10	5.90	5.0	10
7/3/2002					0.2	0.3	< 0.01	18.2	7.34	63	0.10	0.00075		125	< 0.001	16	6.60	18.5	120
8/6/2002	*no sample*																		
9/4/2002					2.3	< 0.05	0.03	33.5	7.04	14	0.04	0.00012		124	< 0.001	10	6.70	15.0	110
10/6/2002			< 0.001	0.012	< 2	< 0.50	18.0	14.0	**4.45**	< 1	0.05	0.00000		111	**0.004**	10	6.70	1.0	110
4/8/2003					1.9	< 0.2	< 0.2	6.5*	**6.46**	28	0.10	0.00002		29	**0.001**	7	6.00	0.0	40
5/21/2003			< 0.0005	0.011	< 0.5	< 0.2	< 0.2	7.3	6.62	12	0.07	0.00004		55	< 0.001	12	6.00	5.0	40
6/10/2003					< 0.5	< 0.2	< 0.2	3.7	6.59	22	< 0.03	<0.0003		61	< 0.001	14	5.80	10.0	40
7/17/2003					< 0.5	< 0.2	< 0.2	0.7	**6.35**	31	0.05	0.00003		71	< 0.001	11	6.40	14.5	50
8/6/2003			0.0022	0.012	< 0.5	< 0.2	< 0.2	5.3	**6.39**	29	0.08	0.00006		78	< 0.001	9	6.00	17.0	50
9/25/2003					< 0.5	< 0.2	< 0.2	4.1	**6.15**	9	< 0.03	<0.0003		37	< 0.001	15	5.20	7.5	30
10/28/2003			0.001	0.011	< 0.5	< 0.2	< 0.2	2.8	6.59	17	< 0.03	<0.0003		48	< 0.001	23	6.00	1.0	30
5/26/2004					<0.5	< 0.2	< 0.2	2.8	**6.18**	7	0.03	0.00001		27	<0.001	11	5.50	4.5	30
8/19/2004		1.8	0.0026	**0.047**	5	< 0.2	< 0.2	1.5	6.65	13	NA			31	**0.001**	5		10.0	
10/14/2004	*Dry*																		
8/3/2005		2.4	0.0007	**0.022**	2	< 0.3	< 0.2	4	7.10	40.6	< 0.05	<0.0005		86	**0.002**	6	4.40	19.4	90
9/2/2005			< 0.0005	0.0067	2	< 0.3	< 0.2	15.6	6.95	36.1	< 0.05	<0.0005		92	< 0.001	10	5.20	13.1	70
10/21/2005			< 0.0005	0.005	7	< 0.01	< 0.1	< 1	7.45	43	0.05	0.00021		103	< 0.001	12	4.00	7.3	10
5/16/2006					2	< 0.01	< 0.1		7.10	25	< 0.05	<0.0005		55	< 0.001	12	6.60	17.5	
5/31/2011					1	<0.01	<0.1	18	**6.40**	9	<0.05	<0.0005		85	<0.001	13	6.25	9.3	
8/15/2007			<0.05	0.02	<10	<0.01	<0.1	< 1	7.20	43	0.27	0.00114		90	**0.003**	6	6.79	14.7	65
10/18/2007			<0.05	0.01	2	0.01	<0.1	13	7.00	17	<0.05	<0.0005		75	<0.001	5	6.12	11	
5/21/2008					1	<0.01	<0.1	1	6.70	9	<0.05	<0.0005		38	<0.001	16	6.64	5.5	
8/20/2008			<0.05	**0.19**	<1	0.01	<0.1	< 1	7.30	83	0.41	0.00363		166	**0.008**	8	6.46	21.7	
10/24/2008			<0.05	<0.02	<1	<0.01	<0.1	< 1	6.90	17	<0.05	<0.0005		57	<0.001	9	6.76	6.7	50
5/19/2009					<1	<0.01	<0.1	< 1	6.60	9	<0.05	<0.0005		39	<0.001	10	6.91	n/a	58
8/18/2009			<0.05	<0.02	<1	<0.01	<0.1	< 1	6.70	43	<0.05	<0.0005		89	<0.001	5	7.08	16.6	76
10/22/2009			<0.05	<0.02	<1	<0.01	<0.1	< 1	6.50	23	<0.05	<0.0005		54	<0.001	7	7.68	3.2	48
5/18/2010					1	<0.01	<0.1	30	**6.00**	6	0.07	0.00002		43	<0.001	10	7.25	16.3	41
8/25/2010			<0.05	<0.01	2	<0.01	<0.1	<1	6.70	34	<0.05	<0.0005		75	**0.004**	13	6.30	16.5	
10/21/2010			<0.05	<0.01	1	<0.01	<0.1	<1	6.79	28	<0.05	<0.0005		59	<0.001	7	8.48	6.8	80
5/31/2011					1	<0.01	<0.1	<1	**6.48**	9	0.08	0.00006		35	<0.001	6	6.87	13	34
8/24/2011			<0.05	<0.01	2	<0.01	<0.1	9	6.61	40	0.05	0.00007		104	**0.019**	3	7.43	17.9	100
10/25/2011			<0.05	<0.01	<1	<0.01	<0.1	18	6.80	15	<0.05	<0.0005		84	**0.002**	10	6.94	2.8	97
5/18/2012					2	<0.01	<0.1	5	6.47	26	<0.05	<0.0005		84	**0.006**	11	6.50	24.7	99
8/30/2012	*Dry*																		
10/23/2012			<0.05	<0.01	2	<0.01	<0.1	9	**6.13**	8.4	0.073	0.00001		59	<0.001	9	6.84	6.3	65
5/24/2013					1	<0.01	<0.1	1	6.65	8.9	0.072	0.00007		37	**0.004**	12	9.67	12.5	45
8/29/2013	*Dry*																		
10/17/2013			<0.05	<0.01	2	<0.01	<0.1	<1	6.55	25	<0.05	<0.0005		62	**0.007**	6	7.06	5.2	51
5/23/2014					2	<0.01	<0.1	2	**6.44**	9	<0.05	<0.0005		35	**0.006**	11	7.52	20.6	61
8/21/2014	*Dry*																		
10/9/2014			<0.05	0.01	1	<0.01	<0.1	<1	**6.44**	15	0.086	0.00004		59	**0.008**	5	7.45	7.7	61

Notes: **Bold** denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

* should not be decreased by more than 25% of the natural concentration

Station: SW-4

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/13/2002									0.05						0.23	< 0.010	< 20	2.0	15
7/3/2002									0.06						0.44	< 0.020	< 20	1.0	6
8/6/2002		< 0.001	0.005	0.007		< 0.001	< 0.001	**0.006**	0.04	< 0.001				< 40	0.19		< 20	< 1.0	12
9/4/2002									0.12						0.29	**0.035**	< 20	1.0	10
10/6/2002		< 0.001	0.003	0.005		< 0.001	< 0.001	< 0.001	0.05	< 0.001				< 20	0.32	0.025	< 20	2.0	45
4/8/2003	*Dry*																		
5/21/2003		< 0.002	0.006	0.006		<0.0001	< 0.005	0.001	< 0.03	< 0.00005				20	0.33	0.012	17	2.6	1
6/10/2003									0.05						0.26	**0.082**	11	0.6	3
7/17/2003									< 0.03						0.31	0.006	15	< 0.5	3
8/6/2003		< 0.002	0.008	0.006		< 0.0001	< 0.005	**0.040**	0.04	< 0.0005				28	0.25	0.009	10	< 0.5	2
9/25/2003									0.06						0.27	0.015	17	1.0	5
10/28/2003		< 0.002	0.006	0.006		< 0.0001	< 0.005	**0.006**	0.07	< 0.00005				30	0.25	0.007	14	0.9	< 1
5/26/2004									0.04						0.18	0.009	12	0.8	4
8/19/2004		< 0.002	< 0.005	0.008	5.80	< 0.0001	< 0.005	0.001	**0.31**	<0.0001	0.8	1.3	0.010	32	0.28	**0.072**	24	0.9	6
10/14/2004		< 0.002	< 0.005	0.007		< 0.0001	< 0.005	0.0006	< 0.03					34	0.22	0.009	14	1.0	6
8/3/2005		< 0.001	< 0.010	0.0059	4.1	< 0.0001	< 0.005	**0.0053**	< 0.050		0.82	1.2	0.0085		0.40	0.025	12	< 2	1
9/2/2005		< 0.001	< 0.010	0.006		< 0.0001	< 0.005	< 0.0011	< 0.050	< 0.0001				64	0.40	0.009	8	< 2	4
10/21/2005		< 0.001	< 0.010	0.006		< 0.0001	< 0.005	< 0.001	0.058	< 0.0001				40	0.30	0.006	12	< 2	4
5/16/2006									0.091					73	0.50	0.007	11	< 2	3
8/29/2006		< 0.001	< 0.010	0.005		< 0.0001	< 0.005	< 0.001	< 0.050	< 0.0001				21	0.40	0.011	10	< 2	1
10/17/2006		< 0.2	< 0.02	< 0.02		< 0.005	< 0.01	< 0.02	0.06	< 0.0001				29	0.30	0.011	11	< 2	1
5/15/2007									<0.05					17	0.50	0.012	10	<2	<1
8/15/2007		<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	0.17	<0.0001				24	0.40	0.009	12	<2	<1
10/18/2007		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.13	<0.0001				40	0.50	0.015	13	<2	3
5/31/2011									< 0.05						0.40	0.006	16	<2	<1
8/20/2008		<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	<0.05	<0.0001				28	0.40	0.015	9	<2	<1
10/24/2008		<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	0.03	<0.0001				26	0.30	0.030	10	<2	1
5/19/2009									**0.34**						0.70	**0.044**	21	<2	10
8/18/2009		<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	<0.05	<0.0001				26	0.40	0.008	12	<2	<1
10/22/2009		<0.02	<0.02	<0.02		<0.005	<0.01	<0.02	0.05	<0.0001				25	0.30	0.003	12	<2	6
5/18/2010									0.03						0.40	<0.002	13	<2	2
8/25/2010		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.04	<0.0001				24	0.40	0.004	13	<2	2
10/21/2010		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.05	<0.0001				22	0.40	0.005	<4	<2	3
5/31/2011									0.03						0.40	0.008	15	<2	2
8/24/2011		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.12	<0.0001				30	0.50	0.015	24	<2	12
10/25/2011		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.03	<0.0001				24	0.30	0.003	13	<2	<1
5/18/2012									<0.02						0.39	0.011	12	<2	<1
8/30/2012		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.04	<0.0001				28	0.38	0.018	13		7
10/23/2012		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	<0.02	<0.0001				40	0.34	<0.004	25	<2	15
5/24/2013									0.06						0.97	0.009	13	<2	4
8/29/2013		<0.2	<0.02	0.006		<0.005	<0.01	<0.02	<0.02	<0.0001				42	0.38	0.010	10	<2	5
10/17/2013		<0.2	<0.02	0.007		<0.005	<0.01	<0.02	0.14	<0.0001				48	0.59	0.023	31	<2	16
5/23/2014									0.06						0.40	<0.002	10	<2	2
8/21/2014		<0.2	<0.02	0.006		<0.005	<0.01	<0.02	0.03	<0.0001				34	0.34	0.008	12	<2	160
10/9/2014		<0.2	<0.02	0.011		<0.005	<0.01	<0.02	0.37	<0.0001				44	0.77	0.019	8.7	<2	21

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/13/2002					1.70	< 0.10	< 0.10	3.4	6.95	14	0.01	0.00001		38.1	< 0.001	17	7.00	6.0	10
7/3/2002					0.31	< 0.01	< 0.01	2.6	7.14	14	0.04	0.00020		36.8	< 0.001	19	7.30	20.5	30
8/6/2002			< 0.001	**0.033**	12.40	< 0.05	< 0.03	2.4	7.20	15	0.03	0.00019		37.5	< 0.001	9	7.20	20.0	40
9/4/2002					0.50	< 0.05	< 0.03	2.9	7.10	15	< 0.01	<0.0001		37	< 0.001	11	7.00	17.0	30
10/6/2002			< 0.001	0.002	< 2.00	< 0.50	<1.00	3.0	7.63	13	0.04	0.00023		37	< 0.002	11	7.00	5.0	30
4/8/2003	*Dry*																		
5/21/2003			< 0.0005	< 0.005	0.70	< 0.2	< 0.2	3.4	7.32	15	< 0.3	<0.003		41	< 0.001	13	7.40	5.0	40
6/10/2003					0.80	< 0.2	< 0.2	4.8	7.02	15	< 0.03	<0.0003		39	< 0.001	10	6.30	11.5	30
7/17/2003					0.60	< 0.2	< 0.2	3.1	7.22	15	< 0.03	<0.0003		41	< 0.001	10	6.70	18.0	30
8/6/2003			< 0.0005	< 0.005	< 0.5	< 0.2	< 0.2	3.1	7.18	15	< 0.03	<0.0003		41	< 0.001	17	7.30	17.0	30
9/25/2003					0.70	< 0.2	< 0.2	4.3	7.05	15	< 0.03	<0.0003		40	< 0.001	19	5.60	13.0	20
10/28/2003			< 0.0005	< 0.005	< 0.5	< 0.2	< 0.2	4.4	7.35	15	< 0.03	<0.0003		39	< 0.001	16	6.30	5.0	30
5/26/2004					<0.5	< 0.2	<0.2	3.1	7.25	20	< 0.03	<0.0003		37	< 0.001	6	5.70	11.0	40
8/19/2004		1.2	< 0.0005	**0.021**	< 0.5	< 0.2	< 0.2	3.1	7.26	16	NA			36	< 0.001	8		17.0	
10/14/2004			< 0.0005	< 0.005	0.7	< 0.2	< 0.2	2.9	7.18	14	< 0.03	<0.0003		39	< 0.001	9	6.60	10.0	30
5/31/2011		1.100	< 0.0002	< 0.005	< 1	< 0.3	< 0.2	10.0	7.44	13	< 0.05	<0.0005		35	< 0.001	9	7.20	23.7	30
9/2/2005			< 0.0005	< 0.005	2	< 0.3	1.700	10.8	7.41	13	< 0.05	<0.0005		36	< 0.001	16	4.90	23.7	20
10/21/2005			< 0.0005	< 0.005	< 1	< 0.01	< 0.1	3.0	7.36	14	< 0.05	<0.0005		34	< 0.001	12	4.10	7.8	20
5/16/2006					1	< 0.01	< 0.1	< 1	7.10	14	< 0.05	<0.0005		38	< 0.001	19	7.90	14.3	
8/29/2006			< 0.0005	< 0.005	1	< 0.01	< 0.1	3.0	7.40	14	< 0.05	<0.0005		39	< 0.001	11	7.76	19.5	
10/17/2006			< 0.05	< 0.01	1	< 0.01	< 0.1	3.0	7.40	15	< 0.05	<0.0005		40	< 0.001	16	7.96	8.2	
5/15/2007					<1	<0.01	<0.1	3.0	6.80	17	<0.05	<0.0005		41	<0.001	6	7.55	16	
8/15/2007			<0.05	<0.01	<1	<0.01	<0.1	3.0	7.30	13	<0.05	<0.0005		36	<0.001	13	8.32	17.8	44
10/18/2007			<0.05	<0.01	2	<0.01	<0.1	4.0	7.00	13	<0.05	<0.0005		41	<0.001	9	7.7	10.2	
5/21/2008					<1	<0.01	<0.1	6.0	7.00	9	0.07	0.00016		39	<0.001	13	7.43	12.6	
8/20/2008			<0.0005	<0.01	2	<0.01	<0.1	3.0	7.40	13	<0.05	<0.0005		41	<0.001	12	7.82	22.3	
10/24/2008			<0.0005		1	<0.01	<0.1	4.0	6.80	13	<0.05	<0.0005		40	<0.001	13	7.95	10.3	30
5/19/2009					6	<0.01	<0.1	5.0	**6.30**	10	<0.05	<0.0005		60	<0.001	11	8.84	n/a	54
8/18/2009			<0.0005	<0.01	1	<0.01	<0.1	3.0	**6.40**	15	<0.05	<0.0005		36	<0.001	9	7.91	20.8	38
10/22/2009			<0.0005	<0.01	<1	<0.01	<0.1	6.0	8.10	15	<0.05	<0.0005		46	<0.001	12	8.92	3.6	42
5/18/2010					<1	<0.01	<0.1	5.0	7.10	10	<0.05	<0.0005		36	<0.001	14	8.37	16.2	32
8/25/2010			<0.05	<0.01	<1	<0.01	<0.1	3.0	7.10	12	<0.05	<0.0005		37	<0.001	8	7.97	16.8	
10/21/2010			<0.05	<0.01	<1	<0.01	<0.1	3.0	7.09	13	<0.05	<0.0005		37	<0.001	11	8.55	8.3	65
5/31/2011					<1	0.050	<0.1	3.0	7.09	11	<0.05	<0.0005		37	<0.001	10	7.60	13.7	30
8/24/2011			<0.05	<0.01	3	<0.01	<0.1	3.0	7.59	12	<0.05	<0.0005		35	<0.001	9	8.23	21	36
10/25/2011			<0.05	<0.01	<1	<0.01	<0.1	3.0	7.37	13	<0.05	<0.0005		38	**0.003**	10	7.32	6.9	90
5/18/2012					<1	<0.01	<0.1	3.0	6.63	12	<0.05	<0.0005		38	**0.002**	9	6.04	20	43
8/30/2012			<0.05	<0.01	<1	<0.01	<0.1	3.0	6.37	11	<0.05	<0.0005		37	<0.001	8	8.13	20.1	75
10/23/2012			<0.05	<0.01	<1	<0.01	<0.1	3.0	6.76	12	<0.05	<0.0005		38	<0.001	10	7.57	7.9	38
5/24/2013					<1	<0.01	<0.1	3.0	7.19	12	0.077	0.00039		37	<0.001	12	8.12	17.3	38
8/29/2013			<0.05	<0.01	<1	<0.01	<0.1	3.0	7.16	13	<0.05	<0.0005		37	<0.001	8	7.92	23.5	65
10/17/2013			<0.05	<0.01	<1	<0.01	<0.1	3.0	6.83	12	<0.05	<0.0005		37	<0.001	11	8.30	9.9	38
5/23/2014					<1	<0.01	<0.1	3.0	**6.46**	11	<0.05	<0.0005		36	**0.002**	10	7.90	15.1	78
8/21/2014			<0.05	<0.01	<1	<0.05	<0.5	3.0	7.11	13	<0.05	<0.0005		37	<0.001	9	8.58	22	51
10/9/2014			<0.05	<0.01	<1	<0.01	<0.1	3.0	6.66	12	0.064	0.00005		37	**0.002**	11	8.69	8.9	33

Notes: **Bold** denotes exceedance of PWQO (1994) criteria

NA - Not Analyzed

* should not be decreased by more than 25% of the natural concentration

Station: SW-5

Parameter -		As	B	Ba	Ca	Cd	Cr	Cu	Fe	Hg	K	Mg	Mn	TDS	TKN	Total P	COD	BOD	TSS
PWQO -		0.1	0.2			0.0001	0.1	0.005	0.3	0.0002						0.03			
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
5/13/2002									0.17						0.37	< 0.010	42	2.0	21
7/3/2002									0.17						0.37	< 0.020	20	1.0	< 0.01
8/6/2002		< 0.001	0.002	0.006		< 0.001	< 0.001	0.005	0.13	< 0.001				44	0.61		20	1.0	4
9/4/2002									0.13						0.46	**0.051**	20	< 1.0	6
10/6/2002		< 0.001	0.003	0.008		< 0.001	< 0.001	< 0.001	0.16	< 0.001				< 20	0.38	**0.039**	20	1.0	31
4/8/2003	*Dry*																		
5/21/2003		< 0.002	0.005	0.006		<0.0001	< 0.005	0.001	0.17	< 0.00005				34	0.56	0.019	25	2.0	3
6/10/2003									0.10						0.43	0.010	23	0.9	3
7/17/2003									0.18						0.52	0.016	28	< 0.5	5
8/6/2003		< 0.002	0.008	0.008		< 0.0001	< 0.005	**0.290**	0.29	< 0.0005				36	0.47	0.013	24	1.0	1
9/25/2003									0.22						0.43	0.015	35	0.8	3
10/28/2003		< 0.002	0.005	0.007		< 0.0001	< 0.005	0.001	0.20	< 0.00005				48	0.36	0.017	25	0.9	1
8/19/2004		< 0.002	< 0.005	0.006	4.50	< 0.0001	< 0.005	0.001	0.17	< 0.0001				42	0.36	0.011	28	0.6	2
9/1/2005		< 0.001	< 0.010	0.008		< 0.0001	< 0.005	**0.024**	0.30	< 0.0001				58	0.40	0.019	22	< 2	6
8/29/2006		< 0.001	< 0.010	0.006		< 0.0001	0.006	0.002	0.071	< 0.0001				19	0.50	0.009	17	< 2	1
8/15/2007									0.17					37	0.60	0.016	28	< 2	< 1
8/20/2008		< 0.001	< 0.01	< 0.001		< 0.0001	< 0.005	< 0.001	0.09	< 0.0001				27	0.60	0.009	24	< 2	1
8/18/2009		< 0.001	< 0.01	< 0.001		< 0.0001	< 0.005	< 0.001	0.17	< 0.0001				25	0.60	0.012	17	< 2	2
8/25/2010	*Dry*																		
8/24/2011		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.27	<0.0001				26	0.50	<0.1	32	<2	<1
8/31/2012		<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.1	<0.0001				38	0.42	0.017	23	<2	1
8/31/2012	*Duplicate*	<0.2	<0.02	<0.02		<0.005	<0.01	<0.02	0.1	<0.0001				56	0.63	0.022	25	<2	<1
8/29/2013		<0.2	<0.02	0.006		<0.005	<0.01	<0.02	0.05	<0.0001				42	0.43	0.009	22	<2	<1
8/21/2014		<0.2	<0.02	0.007		<0.005	<0.01	<0.02	0.13	<0.0001				52	0.40	0.008	22	<2	1

Parameter -		Na	Pb	Zn	Cl-	NO2-N	NO3-N	SO4	pH	alk42	NH3-N	Unionized NH3-N	DOC	Cond.	Phenols	DO	Field pH	Field T	Field Cond
PWQO -			0.003	0.02					6.5 - 8.5	*		0.02			0.001				
Units -		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	n/a	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			
5/13/2002					3.6	< 0.10	< 0.10	1.9	6.69	10.0	0.01	0.00001		36	< 0.001	14	6.60	5.5	10
7/3/2002					2.5	< 0.01	< 0.01	2.1	6.85	9.0	0.03	0.00007		35	< 0.001	9	7.10	20.5	30
8/6/2002			< 0.001	0.013	3.1	< 0.05	< 0.03	2.0	7.13	10.0	0.04	0.00028		37	< 0.001	11	7.30	25.0	30
9/4/2002					3.1	< 0.05	< 0.03	2.0	7.00	9.0	< 0.01	<0.0001		37	< 0.001	9	7.40	18.0	30
10/6/2002			< 0.001	**0.188**	3.0	< 0.50	1.00	< 2.0	6.82	10.0	0.05	0.00004		38	**0.002**	9	7.40	5.0	30
4/8/2003	*Dry*																		
5/21/2003			< 0.0005	< 0.005	2.6	< 0.2	< 0.2	1.8	7.08	10.0	0.05	0.00011		38	< 0.001	16	6.60	9.5	20
6/10/2003					3.1	< 0.2	< 0.2	3.2	6.92	10.0				38	< 0.001	14	6.40	14.5	30
7/17/2003					3.3	< 0.2	< 0.2	2.4	7.02	11.0	< 0.03	<0.0003		41	< 0.001	9	6.90	21.0	30
8/24/2011																			
10/25/2011																			
8/6/2003			< 0.0005	0.014	2.6	< 0.2	< 0.2	2.1	6.86	11.0	< 0.03	<0.0003		43	< 0.001		6.40	19.0	30
9/25/2003					3.0	< 0.2	< 0.2	3.6	6.78	10.0	< 0.03	<0.0003		40	< 0.001	12	5.90	10.5	40
10/28/2003			< 0.0005	< 0.005	2.8	< 0.2	< 0.2	2.5	7.41	10.0	0.06	0.00018		44	< 0.001	19	6.20	4.0	30
8/19/2004		2.9	< 0.0005	**0.021**	2.8	< 0.2	< 0.2	2.2	7.14	12.0	NA			41	< 0.001				
9/1/2005			< 0.0005	0.0066	4.0	< 0.3	1.60	10.4	6.97	8.0	< 0.05	<0.0005		38	< 0.001	13	5.10	21.7	30
8/29/2006			< 0.0005	0.013	5.0	< 0.01	< 0.1	1.0	7.80	14.0	< 0.05	<0.0005		44	< 0.001	13	7.20	22.5	
8/15/2007			< 0.0005	< 0.01	< 1	< 0.01	0.200	2.0	7.00	8.0	0.05	0.00021		41	< 0.001	9	7.30	20.6	36
8/20/2008			< 0.0005	< 0.01	5.0	< 0.01	< 0.1	2.0	7.20	8.0	< 0.05	<0.0005			< 0.001	10	7.18	26.8	
8/18/2009			< 0.0005	< 0.01	5.0	< 0.01	< 0.1	< 2.0	7.00	9.0	< 0.05	<0.0005		40	< 0.001	8	8.75	19.8	40
8/25/2010	*Dry*																		
8/24/2011			<0.05	<0.01	4.0	<0.01	<0.1	<1	6.98	10.0	<0.05	<0.0005		41	<0.001	9	7.42	23.2	48
8/31/2012			<0.05	<0.01	4.0	<0.01	<0.1	2.0	**6.38**	7.5	<0.05	<0.0005		42	<0.001	10	7.45	22.6	132
8/31/2012	*Duplicate*		<0.05	<0.01	4.0	<0.01	<0.1	1.0	**6.39**	8.3	<0.05	<0.0005		41	<0.001	10	7.45	22.6	132
8/29/2013			<0.05	<0.01	5.0	<0.01	<0.1	1.0	7.11	9.7	<0.05	<0.0005		46	<0.001	8	7.99	24.1	87
8/21/2014			<0.05	<0.01	5.0	<0.05	<0.5	2.0	6.72	7.3	<0.05	<0.0005		43	<0.001	9	8.85	23.3	62

Bold denotes exceedance of PWQO (1994) criteria

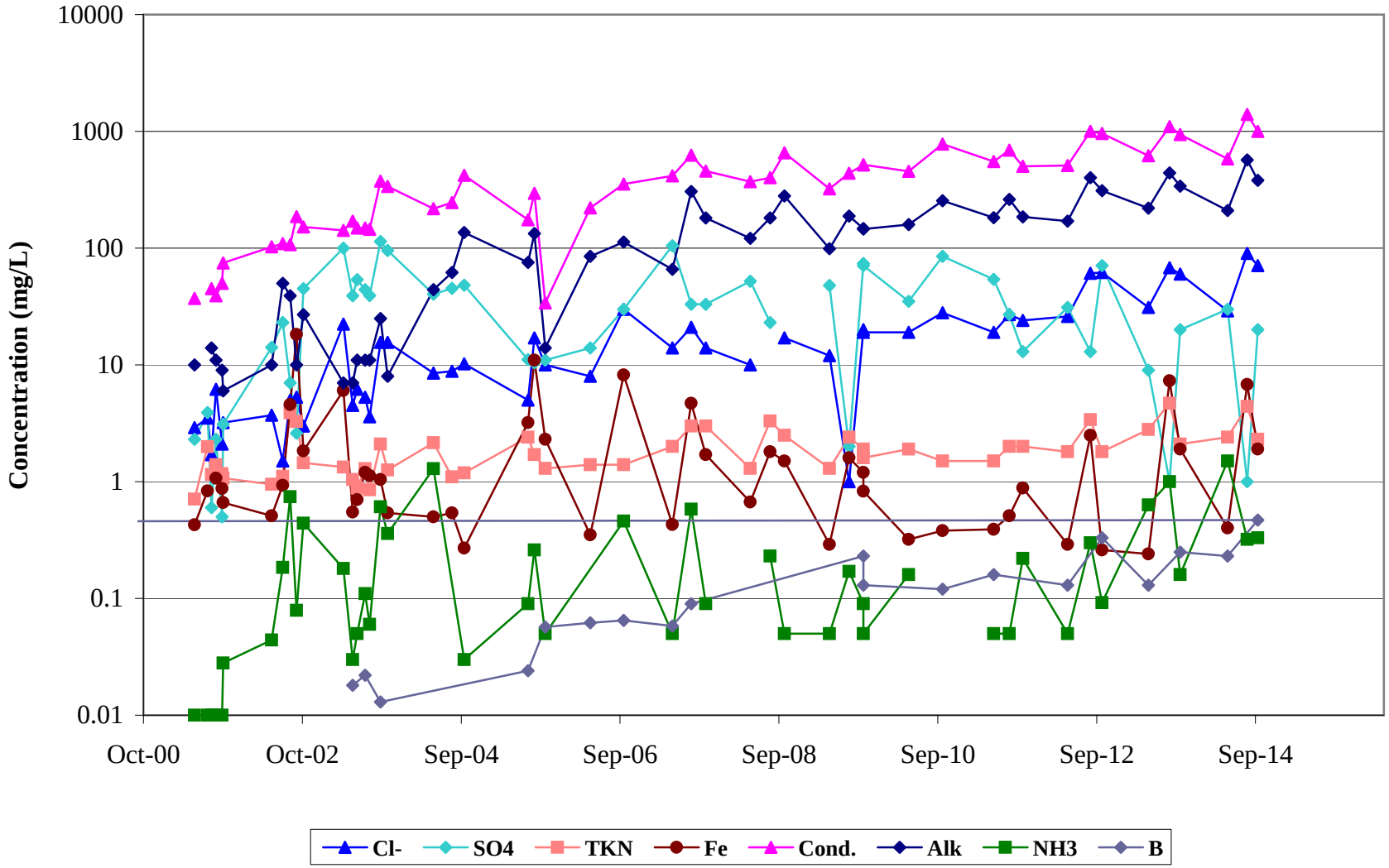
NA - Not Analyzed

* should not be decreased by more than 25% of the natural concentration

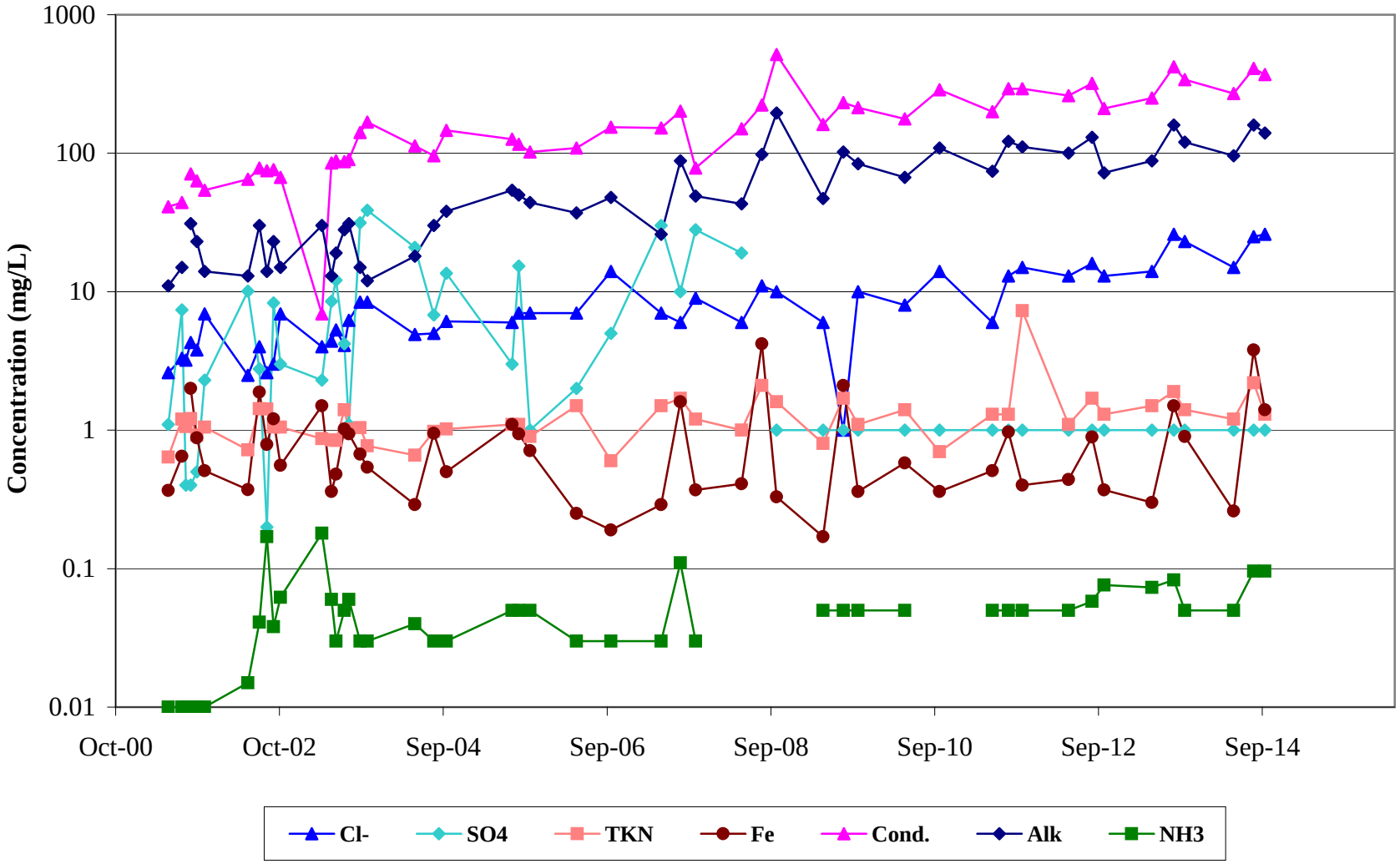
APPENDIX I

Surface Water Quality Over Time

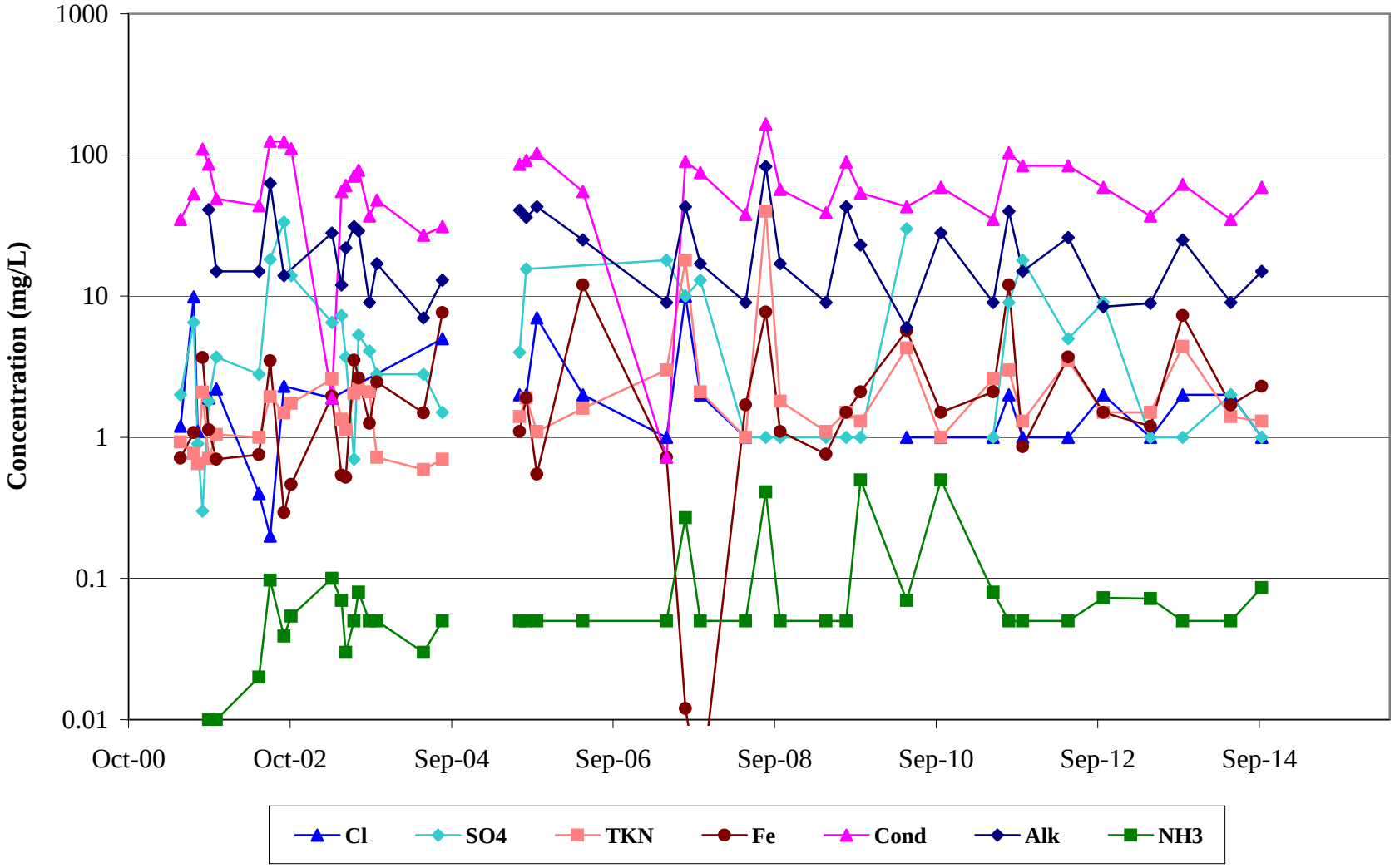
Chemistry Over Time At SW-1



Chemistry Over Time At SW-2



Chemistry Over Time At SW-3



APPENDIX J

Sediment Sampling Data

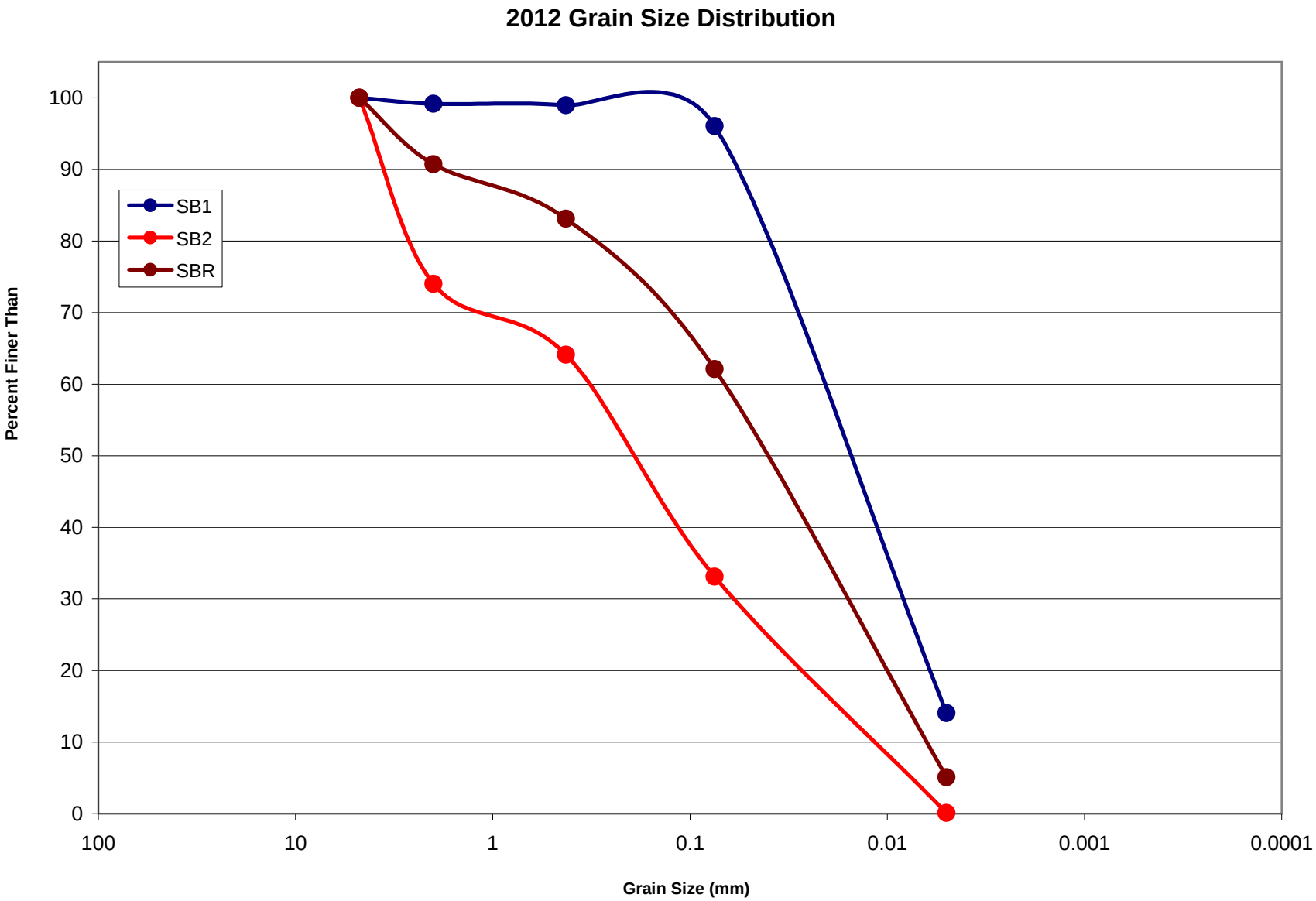

2012 Grain Size Distribution
Percent Finer Than
100
90
80
70
60
50
40
30
20
10
0
SB1
SB2
SBR
100
10
1
0.1
0.01
0.001
0.0001
Grain Size (mm)

Table 7: Sediment Sampling Analysis

Parameter	Laboratory Detection Limit	Lowest Effect Level	Severe Effect Level	Units	Measured Concentration SB-1 9/24/2001	8/30/2003	8/23/2004	9/2/2005	8/30/2006	8/15/2007	8/20/2008	8/18/2009	8/22/2010	8/25/2011	8/31/2012
Aluminum	20			ug/g	573	1710	3930	7500	800	970	1300	640	590	530	790
Ammonia	40	100		ug/g	1	**196**	**280**	69.9	< 25	25	< 25	< 25	<25	<25	<25
Arsenic	0.2	6	33	ug/g	1.9	0.7	1.0	NA	< 1	<1	<1	< 1	<1	<1	<1
Cadmium	0.5	0.6	10	ug/g	< 0.04	< 0.5	< 0.5	< 0.3	< 0.3	<0.3	<0.3	< 0.3	<0.3	<0.3	<0.3
Chromium	1	26	110	ug/g	1.15	4	9	21	2.5	3.3	3.5	1.3	1.3	1.2	1.8
Cobalt	2	50		ug/g	< 0.04	< 2	3	5.4	0.9	0.6	1.1	< 0.5	<0.5	<0.5	NA
Copper	1	16	110	ug/g	< 0.04	2	7	**30**	2.6	2.2	2.5	1.8	0.7	0.8	1.8
Iron	50	2%	4%	%	0.07	0.26	0.47	1.10	0.15	0.16	0.2	0.11	0.8	0.065	0.09
Lead	5	31	250	ug/g	0.93	5	11	12	2	2	3	2	2	2	2
Manganese	1	460	1100	ug/g	6.75	59	62	110	17	13	21	13	10	10	12
Mercury	0.01	0.2	2	ug/g	< 0.04	<0.01	0.02	< 0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05
Nickel	2	16	75	ug/g	1.07	3	8	**22**	1.7	1.3	2.7	1.1	0.9	0.7	1.1
Oil & Grease	100	0.15%	-	%	< 0.006	< 0.010	0.010	**0.400**	0.006	0.014	0.047	0.04	**0.46**	<0.01	0.049
Phosphorous	20	600	2000	ug/g	186	**956**	**882**	**920**	530	NA	NA	300	540	**1000**	**660**
Total Kjeldahl Nitrogen	60	550	4800	ug/g	127	**1450**	**2180**	**6330**	510	**724**	**553**	343	163	131	524
Total Organic Carbon	0.05	1%	10%	%	0.32	0.76	**2.39**	**7.8**	0.64	0.53	**1.3**	0.51	0.002	0.14	0.41
Zinc	5	120	820	ug/g	< 0.04	9	18	57	6	4	8	4	<3	<3	3

Bold Denotes Exceedance in Lowest Effect Level

Underline Denotes Exceedance in Severe Effect Level

NA - Not Analyzed

Table 7: Sediment Sampling Analysis

Parameter	Laboratory Detection Limit	Lowest Effect Level	Severe Effect Level	Units	Measured Concentration SB-2 9/24/2001	8/30/2003	8/23/2004	9/2/2005	8/30/2006	8/15/2007	8/20/2008	8/18/2009	8/25/2011	8/31/2012
Aluminum	20			ug/g	1424	14500	9930	4100	6800	3400	3100	4200	2400	3200
Ammonia	40	100		ug/g	7.3	**1590**	**887**	1.09	< 25	<30	<25	< 25	<25	<25
Arsenic	0.2	6	33	ug/g	1.4	3.8	1.5	NA	1	<1	<1	< 1	1	<1
Cadmium	0.5	0.6	10	ug/g	< 0.04	0.5	< 0.5	< 0.3	< 0.3	<0.3	<0.3	< 0.3	<0.3	<0.3
Chromium	1	26	110	ug/g	2.53	26	18	8.4	15	8.7	8.8	11	7.9	9.9
Cobalt	2	50		ug/g	< 0.04	13	5	4.3	5.9	3.4	2.8	3.7	2	NA
Copper	1	16	110	ug/g	< 0.04	16	14	12	9	13	5.4	11	7	8.5
Iron	50	2%	4%	%	0.27	**2.89**	1.24	0.85	1.3	0.57	0.6	0.79	0.65	0.67
Lead	5	31	250	ug/g	0.93	12	11	5.1	5	3	3	4	3	3
Manganese	1	460	1100	ug/g	6.75	**2920**	235	310	210	89	61	88	72	69
Mercury	0.01	0.2	2	ug/g	< 0.04	0.1	0.09	< 0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05	<0.05
Nickel	2	16	75	ug/g	2.18	**21**	14	6.9	11	6	5.3	7.8	4.5	5.5
Oil & Grease	100	0.15%	-	%	0.020	**0.336**	**0.273**	**0.200**	0.003	0.028	<0.01	0.02	<0.01	0.05
Phosphorous	20	600	2000	ug/g	228	998	583	440	570	NA	NA	300	290	330
Total Kjeldahl Nitrogen	60	550	4800	ug/g	**686**	**8900**	**7700**	**1180**	120	142	149	87	65	206
Total Organic Carbon	0.05	1%	10%	%	0.91	**9.94**	**17**	**4.1**	0.19	0.78	0.84	0.03	0.24	0.2
Zinc	5	120	820	ug/g	10.8	88	45	27	47	17	15	22	12	14

Bold Denotes Exceedance in Lowest Effect Level

Underline Denotes Exceedance in Severe Effect Level

NA - Not Analyzed

Table 7: Sediment Sampling Analysis

Parameter	Laboratory Detection Limit	Lowest Effect Level	Severe Effect Level	Units	Measured Concentration SB-R 9/24/2001	8/30/2003	8/23/2004	9/2/2005	8/30/2006	8/15/2007	8/20/2008	8/18/2009	8/25/2010	8/25/2011	8/31/2012
Aluminum	20			ug/g	939	1460	829	1000	710	660	760	580	860	960	840
Ammonia	40	100		ug/g	2.2	**322**	98	1.99	< 25	<30	<25	< 25	<25	<25	<25
Arsenic	0.2	6	33	ug/g	2.92	0.4	< 0.2	NA	< 1	<1	<1	< 1	<1	<1	<1
Cadmium	0.5	0.6	10	ug/g	< 0.04	<0.5	< 0.5	< 0.3	< 0.3	<0.3	<0.3	< 0.3	<0.3	<0.3	<0.3
Chromium	1	26	110	ug/g	3.02	4	3	3	2	1.6	2	1.5	2.8	2.7	2.4
Cobalt	2	50		ug/g	0.86	<2	<2	0.9	0.6	<0.5	0.6	< 0.5	0.6	0.7	NA
Copper	1	16	110	ug/g	< 0.04	3	1	4.8	2.1	1.3	1	6	1.2	1.3	1.5
Iron	50	2%	4%	%	0.20	0.25	0.14	0.19	0.12	0.1	0.16	0.12	1.6	0.2	0.14
Lead	5	31	250	ug/g	2.49	6	6	5	4	3	4	2	3	3	3
Manganese	1	460	1100	ug/g	< 0.04	65	27	23	12	13	34	12	19	22	17
Mercury	0.01	0.2	2	ug/g	< 0.04	< 0.01	**6**	< 0.05	< 0.05	<0.05	<0.05	< 0.05	<0.05	<0.05	<0.05
Nickel	2	16	75	ug/g	2.3	4	< 2	3.3	1.7	1.2	1.6	1.3	2.3	2.2	1.9
Oil & Grease	100	0.15%	-	%	0.048	0.014	< 0.010	0.052	0.0025	0.024	<0.01	0.04	**0.2**	<0.01	0.026
Phosphorous	20	600	2000	ug/g	359	575	385	370	410	NA	NA	170	520	570	520
Total Kjeldahl Nitrogen	60	550	4800	ug/g	454	**1960**	336	**666**	348	120	**732**	163	402	191	339
Total Organic Carbon	0.05	1%	10%	%	**3.05**	**2.28**	0.67	**1.8**	0.61	0.48	0.71	0.33	0.005	0.46	0.45
Zinc	5	120	820	ug/g	7.43	15	6	12	8	5	5	9	8	7	6

Bold Denotes Exceedance in Lowest Effect Level

Underline Denotes Exceedance in Severe Effect Level

NA - Not Analyzed

APPENDIX K

Eng-Tech 2014 Report

#6 - 854 Marion Street, Winnipeg, Manitoba, R2J 0K4
Phone: (204) 233-1694 Fax: (204) 235-1579
E-mail: eng_tech@mts.net
www.eng-tech.ca

August 8, 2014

File No. 14-415-01

City of Kenora
60 Fourteenth Street North
Kenora, Ontario
P9N 4M9

ATTENTION: Mukesh Pokharel

RE: In-Situ Shear Strength Testing and Piezometer Installation – Kenora Landfill – Jones Road, Ontario

INTRODUCTION

ENG-TECH Consulting Limited (ENG-TECH) completed in-situ shear strength testing of the soils and supervised installation of vibrating wire piezometers within the new stage area in Cell "A". The purpose of the testing was to determine the in-situ shear strengths and pore water pressures in order to verify that values obtained are as previously recommended in our report.

Scope of Work

ENG-TECH completed the following scope of work:

- Reviewed existing information related to the project and objections.
- Drilled four (4) bore holes then completed field vane tests at predetermined depths.
- Installed two (2) vibrating wire piezometers within each borehole as per Schedule H of the Provisional Certificate of Approval No. A1612018.
- Collected soil samples at selected depths and compared these samples with existing information.
- A laboratory testing program on select soil samples.
- A report on the results and the in-situ shear strength values.

TEST HOLE DRILLING, SOIL SAMPLING, and LABORATORY TESTING

ENG-TECH supervised the drilling of four (4) test holes (TH1 to TH4) on July 11, 2014 at the locations shown on Figure 1, attached. The test holes were drilled using a Acker SS track mounted drill rig equipped with 125 mm diameter solid stem continuous flight augers owned and operated by Maple Leaf Drilling Ltd. The test holes were advanced to various depths and upon the completion of drilling two (2) vibrating wire piezometers were installed in each test hole at various depths as shown on Figure 2.

The soil stratigraphy was visually classified using the modified Unified Soil Classification System (USCS) at the time of drilling. Soil samples were collected off the auger flights at selected depths on an as required basis. All soil samples were retained for testing in ENG-TECH's Winnipeg laboratory.

Moisture contents were determined on eight (8) soil samples collected, with two (2) Atterberg Limits and one (1) hydrometer test completed on select samples. Six (6) field shear vane tests were conducted at

various depths in the clay. Attached are test hole summary logs showing the moisture contents, Atterberg Limits, field test results, and one (1) particle size analysis report.

STRATIGRAPHY

The stratigraphy at the site consisted of waste fill, sand fill, peat, and clay to the depths explored. The waste fill was 1.8 to 2.7 m thick and consisted of large objects which limited the ability to use hollow stem augers to the required depths. The sand fill in TH2 to TH4 was 1.2 to 3.6 m thick, black, moist, loose, fine grained and rubble like plastic bags and waste material. The peat was between 0.6 to 3.0 m thick and was brown, moist, firm to soft and contained trace wood pieces & organics. The clay was grey, moist to wet, highly plastic, soft to firm and contained trace to some silt, trace gravel, with more silt encountered at TH2.

Groundwater was encountered at depth ranging from 3.0 to 2.1 m below grade at TH1 and TH2, respectively, and 2.4 to 2.2 m at TH3 and TH4, respectively.

A summary of the subsurface conditions are shown on the test hole summary logs.

RECOMMENDATION

The in-situ shear strength values ranged from 20 to 31 kPa are above the minimum recommended 5.5 kPa value by R. Kerry Rowe Inc. in their report *Kenora Landfill,* dated February 21, 1997. Based on the soil stratigraphy and shear strength values obtained on site, ENG-TECH concluded that the results are compliance with the values as stated in our previous report (File No. 09-415-01). Therefore, ENG-TECH supports the loading as recommended by R. Kerry Rowe Inc. for Cell A in Stage 7 of the Jones Road Landfill Development Plan.

CLOSURE

ENG-TECH trusts the above is all the information you require. If you have any questions or require additional information, please contact the undersigned.

Sincerely,
ENG-TECH Consulting Limited

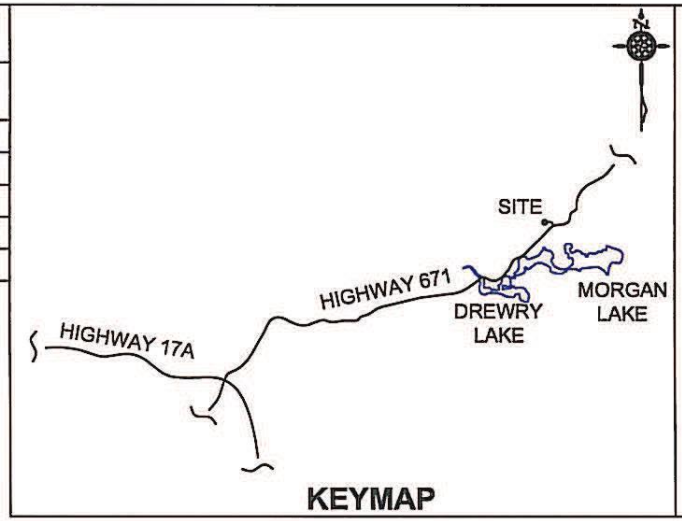
Clark Hryhoruk, M.Sc., P.Eng.
Principal, Geotechnical Engineer

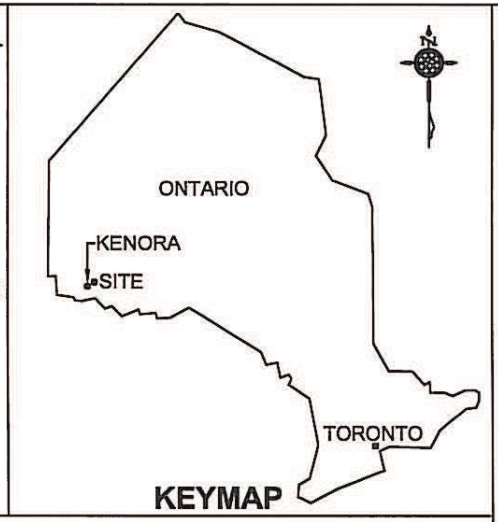
PROVINCE OF MANITOBA
C. D. HRYHORUK
REGISTERED PROFESSIONAL ENGINEER

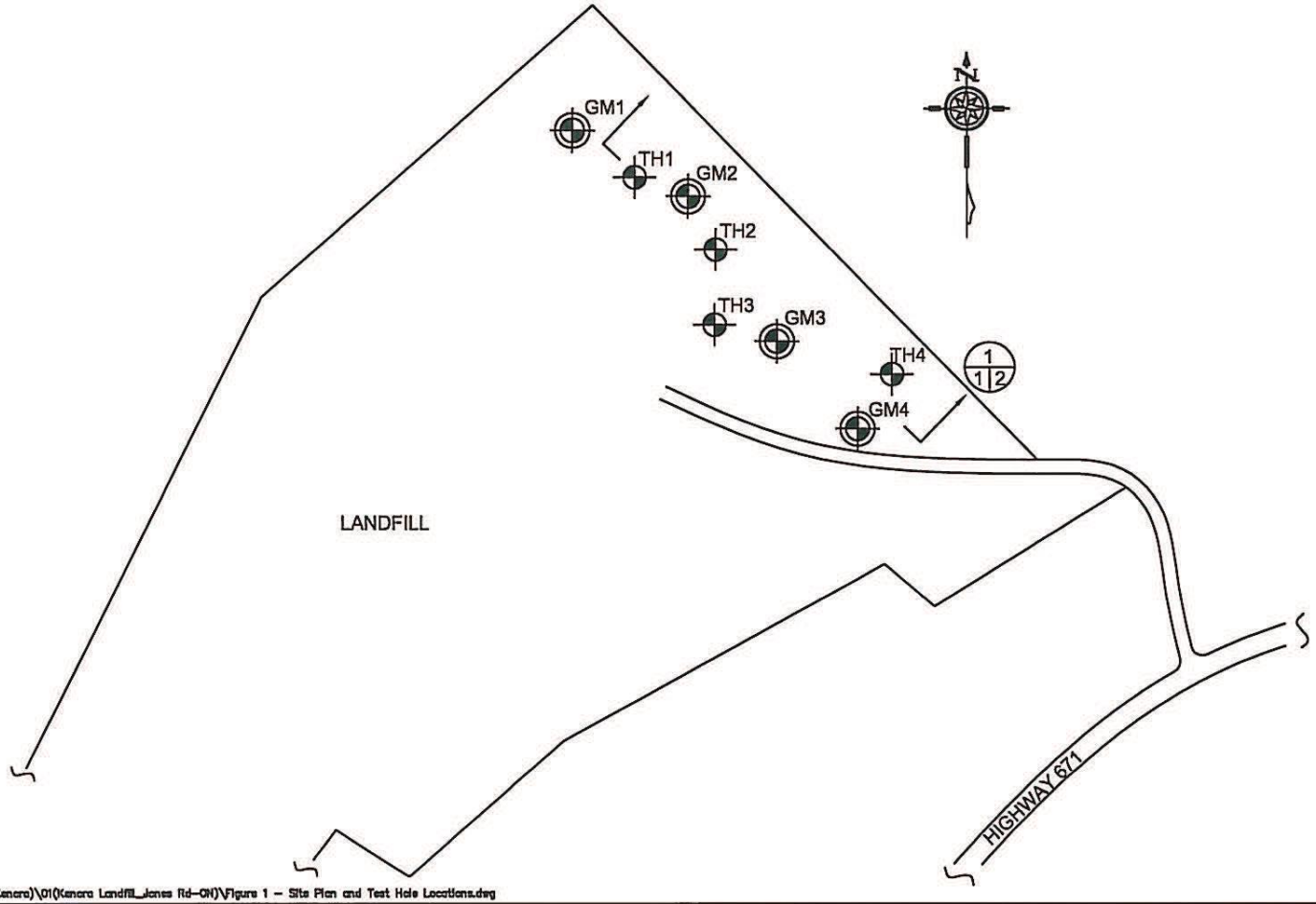
CDH/wg

Attachments: Figure 1 – Site Plan and Test Hole Locations
Figure 2 – Hydrogeological Cross Section Profile
Modified Unified Classification System for Soils
Test Hole Summary Logs (4)
Particle Size Analysis Report (1)

TEST HOLE LOCATION TABLE		
HOLE #	GPS COORDINATES OF TEST HOLES JULY 11, 2014	
	UTM 15U	
TH 1	0412622	5521378
TH 2	0412664	5521335
TH 3	0412664	5521293
TH 4	0412756	5521258







LEGEND

TH1 — TEST HOLE AND INSTALLED VW PIEZOMETER

GM1 — EXISTING PIEZOMETER

SECTION/DETAIL No.

SECTION/DETAIL PAGE LOCATION

SECTION / DETAIL PAGE REFERENCE

NO.	DATE	ISSUE / REVISION
0	Aug. 8/14	report

ENG-TECH CONSULTING LIMITED
6 - 854 Marion Street
Winnipeg, MB R2J 0K4
Phone: (204) 233-1694
Fax: (204) 235-1579

ENG. STAMP:

APEGM
Certificate of Authorization
ENG-TECH Consulting Limited
No.2475 Expiry: April 30, 2015

CLIENT: CITY OF KENORA

PROJECT: IN-SITU SHEAR STRENGTH TESTING AND PIEZOMETER INSTALLATION - KENORA LANDFILL, JONES ROAD, ONTARIO

DWG DESCRIPTION: SITE PLAN AND TEST HOLE LOCATIONS

SCALE: 1:3000

DRAWN BY: MRR

DATE: AUGUST 2014

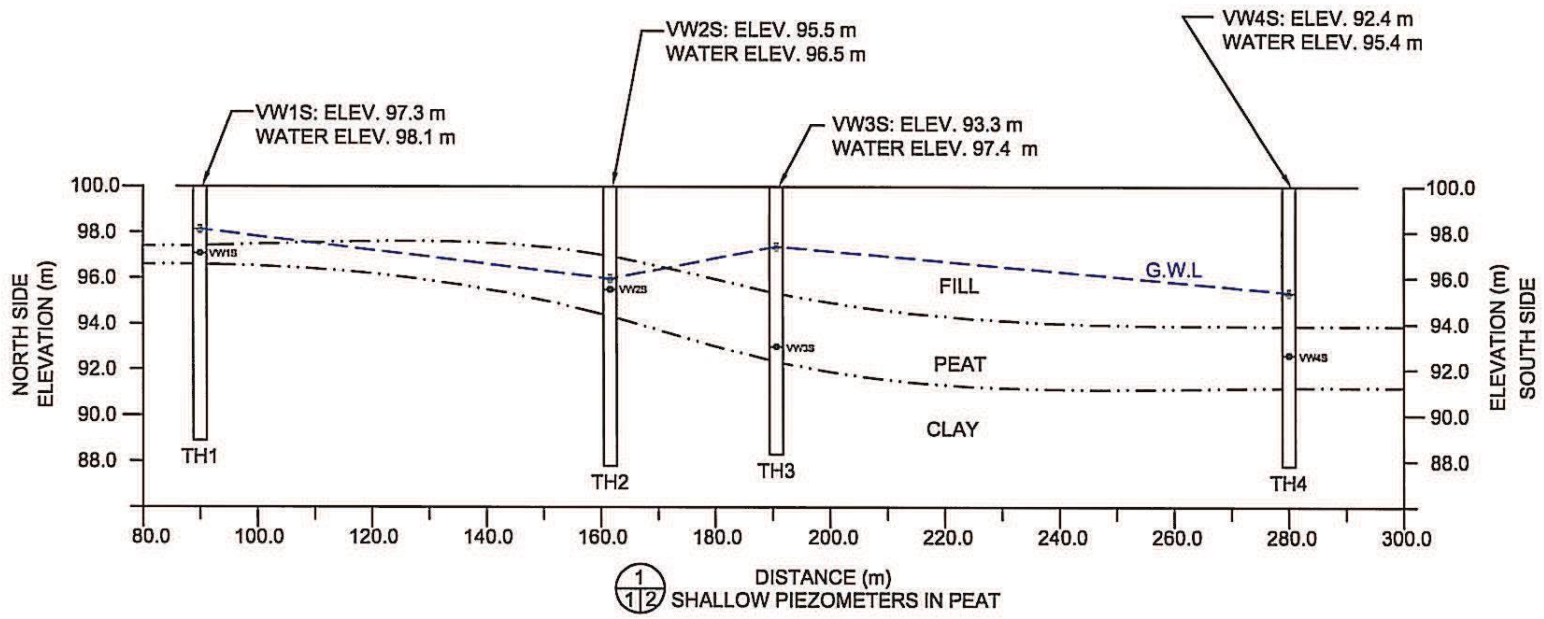
FILE No.: 14-415-01

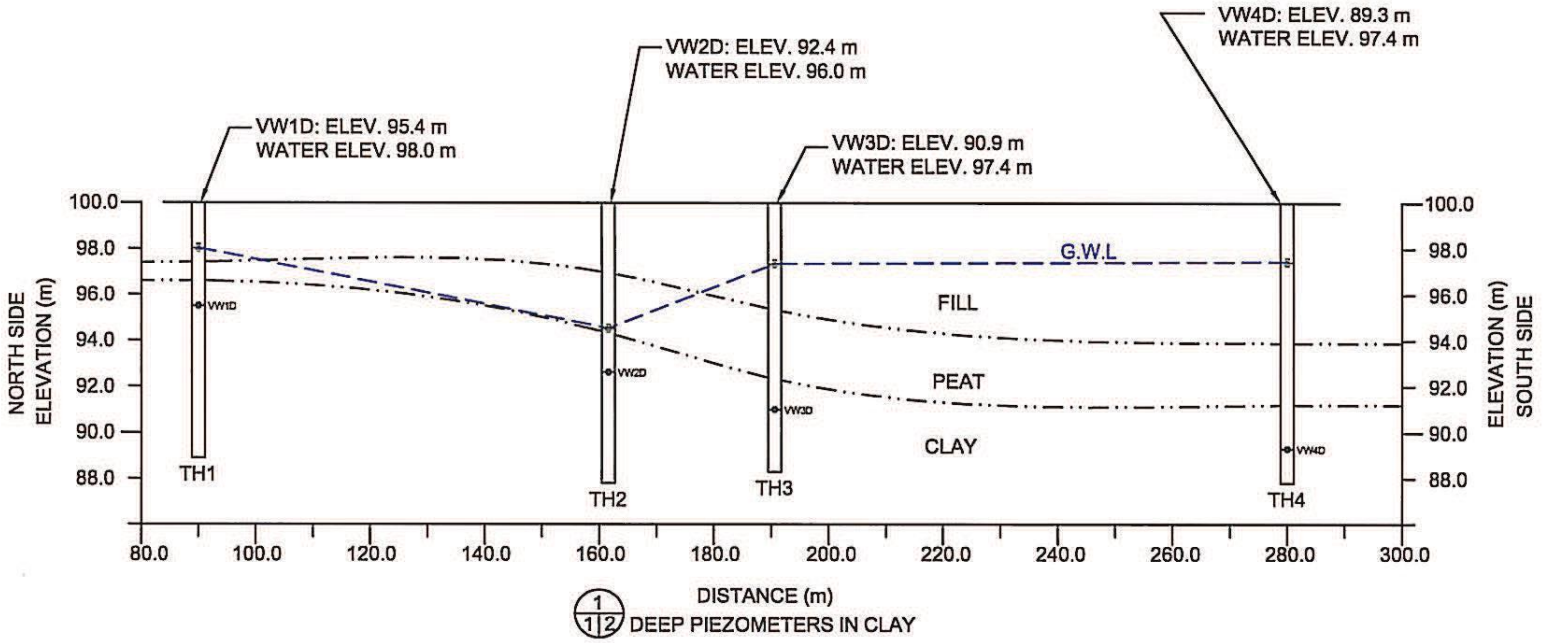
CLIENT DWG/FIG. No.:

ENG-TECH DWG/FIG. No.: 1

NO.:

P:\2014\Projects\415(City_Of_Kenora)\01(Kenora Landfill_Jones Rd-ON)\Figure 1 - Site Plan and Test Hole Locations.dwg





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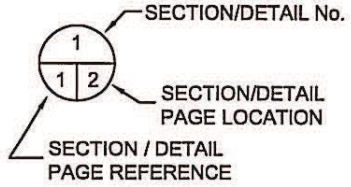

DEPTH OF TEST HOLES	
TEST HOLE No.	DEPTH (m)
TH 1	9.1
TH 2	12.2
TH 3	10.7
TH 4	12.2

NO.	DATE	ISSUE / REVISION
0	Aug. 8/14	report

ENG-TECH CONSULTING LIMITED
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Winnipeg, MB R2J 0K4
Phone: (204) 233-1694
Fax: (204) 235-1579

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APEGM
Certificate of Authorization
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No.2475 Expiry: April 30, 2015

CLIENT: CITY OF KENORA

PROJECT: IN-SITU SHEAR STRENGTH TESTING AND PIEZOMETER INSTALLATION - KENORA LANDFILL, JONES ROAD, ONTARIO

DWG DESCRIPTION: HYDROGEOLOGICAL CROSS-SECTIONS

SCALE: 1:1250

DRAWN BY: MRR

DATE: AUGUST 2014

FILE No.: 14-415-01

CLIENT DWG/FIG. No.:

ENG-TECH DWG/FIG. No.: 2

NO.:

P:\2014\Projects\415(City_Of_Kenora)\01(Kenora Landfill_Jones Rd-ON)\Figure 2 – Hydrogeological Cross Sections.dwg

MODIFIED UNIFIED CLASSIFICATION SYSTEM FOR SOILS

MAJOR DIVISION			GROUP SYMBOL	GRAPH SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75 µm)	GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75 mm	CLEAN GRAVELS (TRACE OR NO FINES)	GW		WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	$C_U = \frac{D_{60}}{D_{10}} > 4$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ TO } 3$
			GP		POORLY GRADED GRAVELS, GRAVEL- SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
		DIRTY GRAVELS (WITH SOME OR MORE FINES)	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	ATTERBERG LIMITS ABOVE "A" LINE AND P.I. MORE THAN 7
	SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75 mm	CLEAN SANDS (TRACE OR NO FINES)	SW		WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_U = \frac{D_{60}}{D_{10}} > 6$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1 \text{ TO } 3$
			SP		POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
		DIRTY SANDS (WITH SOME OR MORE FINES)	SM		SILTY SANDS, SAND-SILT MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR P.I. LESS THAN 4
			SC		CLAYEY SANDS, SAND-CLAY MIXTURES	ATTERBERG LIMITS ABOVE "A" LINE AND P.I. MORE THAN 7
FINE GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75 µm)	SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT	LL ≤ 50%	ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHTY PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)
		LL > 50%	MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	
	CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT	LL ≤ 30%	CL		INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS	
		30% < LL ≤ 50%	CI		INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	
		LL > 50%	CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	ORGANIC SILTS & CLAYS BELOW "A" LINE	LL < 50%	OL		ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		LL > 50%	OH		ORGANIC CLAYS OF HIGH PLASTICITY	
HIGHLY ORGANIC SOILS			PI		PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR, AND OFTEN FIBROUS TEXTURE

ADDITIONAL SYMBOLS

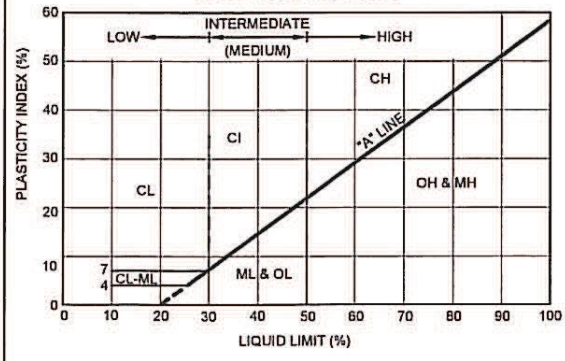
TILL		SANDSTONE	
		GRANITE	
FILL			
TOPSOIL			
CONCRETE			
SHALE			
LIMESTONE			

PLASTIC SOILS

MOISTURE	PLASTICITY	INTRUSIONS	CONSISTENCY	POCKET PEN (TSF)	(N)
DRY	LOW	ROOTLETS	VERY SOFT		< 2
DAMP	MEDIUM	OXIDES	SOFT	0 - 0.5	2 - 4
MOIST	HIGH	MICA	FIRM	0.5 - 1.0	4 - 8
WET		GYPSUM	STIFF	1.0 - 2.0	8 - 15
		ETC.	VERY STIFF	2.0 - 4.0	15 - 30
			HARD	> 4.0	> 30

TSF x 95.8 = kPa (q_U) $S_U = \frac{1}{2} \times q_U$

PLASTICITY CHART FOR SOILS PASSING 425 µm SIEVE



SOIL DESCRIPTIONS

TRACE:	0 - 10%	BOULDERS:	> 200 mm	COARSE SAND:	2 - 4.75 mm
SOME:	10 - 20%	COBBLES:	75 - 200 mm	MEDIUM SAND:	0.425 - 2 mm
WITH:	20 - 35%	COURSE GRAVEL:	19 - 75 mm	FINE SAND:	0.075 - 0.425 mm
AND:	35 - 50%	FINE GRAVEL	4.75 - 75 mm	FINES:	< 0.075 mm

GRANULAR SOILS

MOISTURE	DENSITY	GRADATION	INTRUSIONS	SPT (N)
DRY	VERY LOOSE	POORLY	ROOTLETS	0 - 4
DAMP	LOOSE	WELL	OXIDES	4 - 10
MOIST	MED. DENSE		MICA	10 - 30
WET	DENSE		FINES	30 - 50
	VERY DENSE		ETC.	> 50

DEFINITIONS

LL = LIQUID LIMIT
P.I. = PLASTICITY INDEX
C_U = COEFFICIENT OF UNIFORMITY
q_U = UNCONFINED COMPRESSIVE STRENGTH
S_U = UNDRAINED SHEAR STRENGTH
C_C = COMPRESSION INDEX
PL = PLASTIC LIMIT

F: \Drafting\SOIL CLASSIFICATIONS\SOIL CLASSIFICATIONS.dwg

ENG-TECH CONSULTING LIMITED
6 - 854 Marion Street
Winnipeg, MB R2J 0K4
Phone: (204) 233-1694
Fax: (204) 235-1579

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH1

Client: City of Kenora .
Site: Kenora, Ontario
Location: See Figure 1
Project: Insitu Shear Strength Test & Piezometer Installation - Jones Road, ON

File No.: 14-415-01
Date Drilled: July 11, 2014
Grade Elevation: 100.0 m
Water Elevation: 97.0 m

Depth (m)	Description	Elevation (m)
0	Ground Surface	100.0
	Waste Fill	
3	***Peat*** - dark brown, moist, firm to soft, trace processed wood pieces, and organics.	97.0
4	***Clay (CH)*** - grey, moist, firm, highly plastic, trace to some silt, trace gravel.	96.0
9	***End of Test Hole*** - end of test hole at 9.1 m below grade. - water seepage and sloughing observed at 3.0 m below grade. - piezometer installed at 2.7 and 4.6 m below grade.	91.0
11		89.0

SAMPLE DATA: S1 at 95.0; S2 at 94.0

UNDRAINED SHEAR STRENGTH (kPa): Shear Value, Rebound

Water Content (%): PL I---------X---------I LL; 20 40 60 80

GRAIN SIZE DISTRIBUTION %: GRAVEL, SAND, SILT, CLAY

ENG-TECH Consulting Limited
Logged by: WG
Reviewed by: CM

Drilled By: Maple Leaf Drilling
Drill Rig: Acker SS
Auger Size: 125 mm

Completion Depth: 9.1 m
Completion Elevation: 90.9 m
Sheet: 1 of 1

SAMPLE TYPE: SPLIT BARREL, SHELBY TUBE, AUGER CUTTINGS, SPLIT SPOON

ENG-TECH Consulting Limited

Engineering And Testing Solutions That Work For You

Test Hole #: TH2

Client: City of Kenora .

Site: Kenora, Ontario

Location: See Figure 1

Project: Insitu Shear Strength Test & Piezometer Installation - Jones Road, ON

File No.: 14-415-01

Date Drilled: July 11, 2014

Grade Elevation: 100.0 m

Water Elevation: 97.9 m

Depth (m)	Soil Symbol	Description	Elevation (m)	Sample No.	Sample Type	Shear Value	Rebound	Water Content (%) PL I------‹---X---------I LL 20 40 60 80	GRAVEL	SAND	SILT	CLAY
0		Ground Surface	100.0									
0		***Waste Fill***										
1			99.0									
2		***Sand Fill*** - black, moist, medium dense, loose, fine grained, trace waste material, and processed wood pieces.	98.0									
3			97.0									
		Peat - brown, moist, soft, trace processed wood pieces & organics.										
4			96.0									
5			95.0									
6		***Clay (CH)*** - grey, moist to wet, soft, highly plastic, and silt.	94.0	S1		25	21					
7			93.0	S2		22	20		0.1	3.2	46.3	50.4
8		- below 8.5 m, trace to some gravel.	92.0									
9			91.0									
10			90.0									
11			89.0									
12			88.0									
		End of Test Hole - end of test hole at 12.2 m below grade. - water seepage observed at 2.1 m below grade and sloughing observed at 8.5 m below grade. - piezometer installed at 4.5 and 7.5 m below grade.										
13			87.0									
14			86.0									

ENG-TECH Consulting Limited

Logged by: WG

Reviewed by:

Drilled By: Maple Leaf Drilling

Drill Rig: Acker SS

Auger Size: 125 mm

Completion Depth: 12.2 m

Completion Elevation: 87.8 m

Sheet: 1 of 1

SAMPLE TYPE — SPLIT BARREL — SHELBY TUBE — AUGER CUTTINGS — SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH3

Client: City of Kenora .

Site: Kenora, Ontario

Location: See Figure 1

File No.: 14-415-01

Date Drilled: July 11, 2014

Grade Elevation: 100.0 m

Water Elevation: 97.6 m

Project: Insitu Shear Strength Test & Piezometer Installation - Jones Road, ON

Depth (m)	Soil Symbol	Description	Elevation (m)	Sample No.	Sample Type	Shear Value	Rebound	Water Content (%) PL I---X---I LL 20 40 60 80	GRAVEL	SAND	SILT	CLAY
0		Ground Surface	100.0									
		Waste Fill										
1			99.0									
2			98.0									
		Sand Fill - black, moist, loose, fine grained, trace plastic bags & processed wood pieces.										
3			97.0									
4			96.0									
		Peat - brown, wet, soft, trace processed wood pieces & organics. - below 6.1 m, soft to firm.										
5			95.0									
6			94.0									
7			93.0									
		Clay (CH) - grey, moist, firm to soft, highly plastic, trace to some silt.		S1		20	14					
8			92.0									
9			91.0	S2		31	29					
10			90.0									
		End of Test Hole - end of test hole at 10.7 m below grade. - water seepage observed at 2.4 m below grade and sloughing observed at 5.2 m below grade. - piezometer installed at 6.7 and 9.1 m below grade.										
11			89.0									
12			88.0									

ENG-TECH Consulting Limited

Logged by: WG

Reviewed by: CHS

Drilled By: Maple Leaf Drilling

Drill Rig: Acker SS

Auger Size: 125 mm

Completion Depth: 10.7 m

Completion Elevation: 89.3 m

Sheet: 1 of 1

SAMPLE TYPE — SPLIT BARREL — SHELBY TUBE — AUGER CUTTINGS — SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Engineering And Testing Solutions That Work For You

Test Hole #: TH4

Client: City of Kenora .

Site: Kenora, Ontario

Location: See Figure 1

File No.: 14-415-01

Date Drilled: July 11, 2014

Grade Elevation: 100.0 m

Water Elevation: 97.8 m

Project: Insitu Shear Strength Test & Piezometer Installation - Jones Road, ON

Depth (m)	Description	Elevation (m)	Sample No.	Sample Type	Shear Value (kPa)	Rebound (kPa)	Water Content (%) PL 20 40 60 80 LL	GRAVEL	SAND	SILT	CLAY
0	Ground Surface	100.0									
0	***Waste Fill***										
1		99.0									
2		98.0									
2	***Sand Fill*** - black, moist, loose, fine grained, trace plastic bags & processed wood pieces.										
3		97.0									
4		96.0									
5		95.0									
6		94.0									
6	***Peat*** - brown, moist, soft, trace processed wood pieces, and organics.										
7		93.0									
8		92.0									
9	***Clay (CH)*** - grey, moist, soft, highly plastic, trace to some silt, trace gravel.	91.0	S1		22	18					
10		90.0									
11		89.0	S2		49	37					
12		88.0									
12	***End of Test Hole*** - end of test hole at 12.2 m below grade. - water seepage observed at 2.2 m below grade and sloughing observed at 9.1 m below grade. - piezometer installed at 7.6 and 10.7 m below grade.										
13		87.0									
14		86.0									

ENG-TECH Consulting Limited

Logged by: WG

Reviewed by:

Drilled By: Maple Leaf Drilling

Drill Rig: Acker SS

Auger Size: 125 mm

Completion Depth: 12.2 m

Completion Elevation: 87.8 m

Sheet: 1 of 1

SAMPLE TYPE — SPLIT BARREL | SHELBY TUBE | AUGER CUTTINGS | SPLIT SPOON

ENG-TECH CONSULTING LIMITED

Unit 6 - 854 Marion Street
Winnipeg, Manitoba
R2J 0K4
eng_tech@mts.net
www.eng-tech.ca

PARTICLE SIZE ANALYSIS REPORT

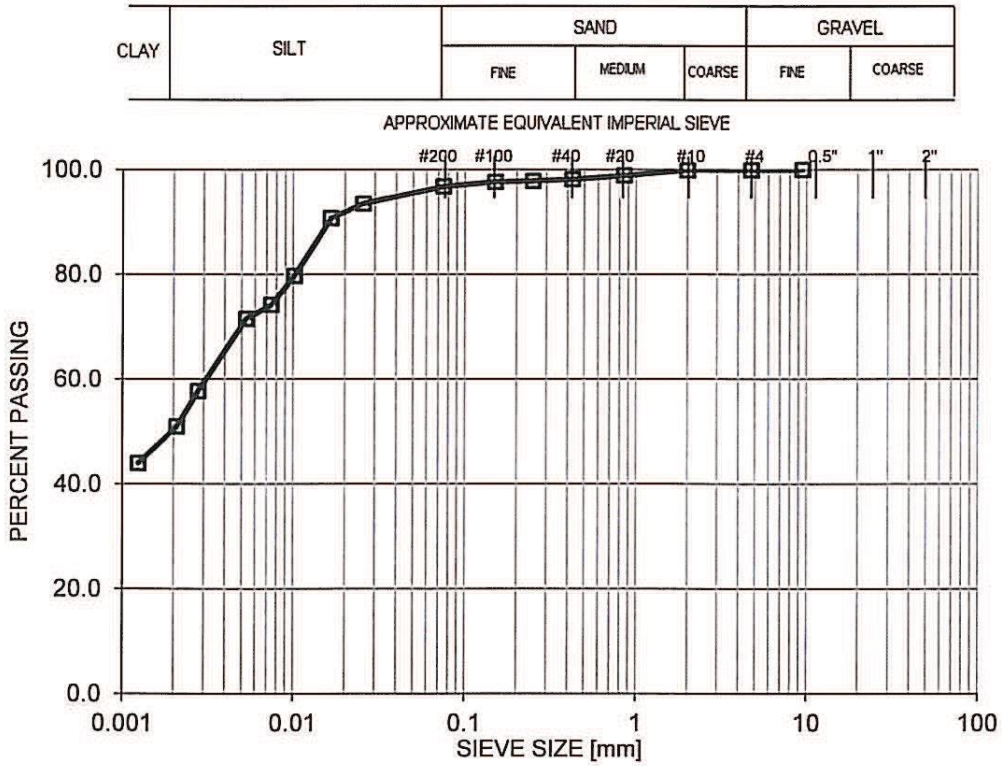
City of Kenora
60 Fourteenth Street N.
Kenora, ON
P9N 4M9

File No.: 14-415-01
Ref. No.: 14-415-1-1

ATTENTION: Mukesh Pokharel

PROJECT: IN-SITU SHEAR STRENGTH TEST AND PIEZOMETER INSTALLATION - KENORA LANDFILL

Test Hole No.	TH2	**Sample No.**	S2	**Depth:**	7.0 m
Sampled By:	ENG-TECH	**Type of Sample:**	Grab	**Source:**	Project Site
Date Sampled:	Jul 11/14	**Date Received:**	Jul 14/14	**Date Tested:**	Jul 16/14



SIEVE SIZE (mm)	PERCENT PASSING
9.500	100.0
4.750	99.9
2.000	99.9
0.850	98.9
0.425	98.2
0.250	97.8
0.150	97.6
0.075	96.8
0.026	93.5
0.017	90.7
0.0102	79.7
0.0074	74.2
0.0053	71.6
0.0028	57.7
0.0021	51.0
0.0012	44.0

Percent of: GRAVEL (0.1 %), SAND (3.2 %), SILT (46.3 %), CLAY (50.4 %)
Sample Description:

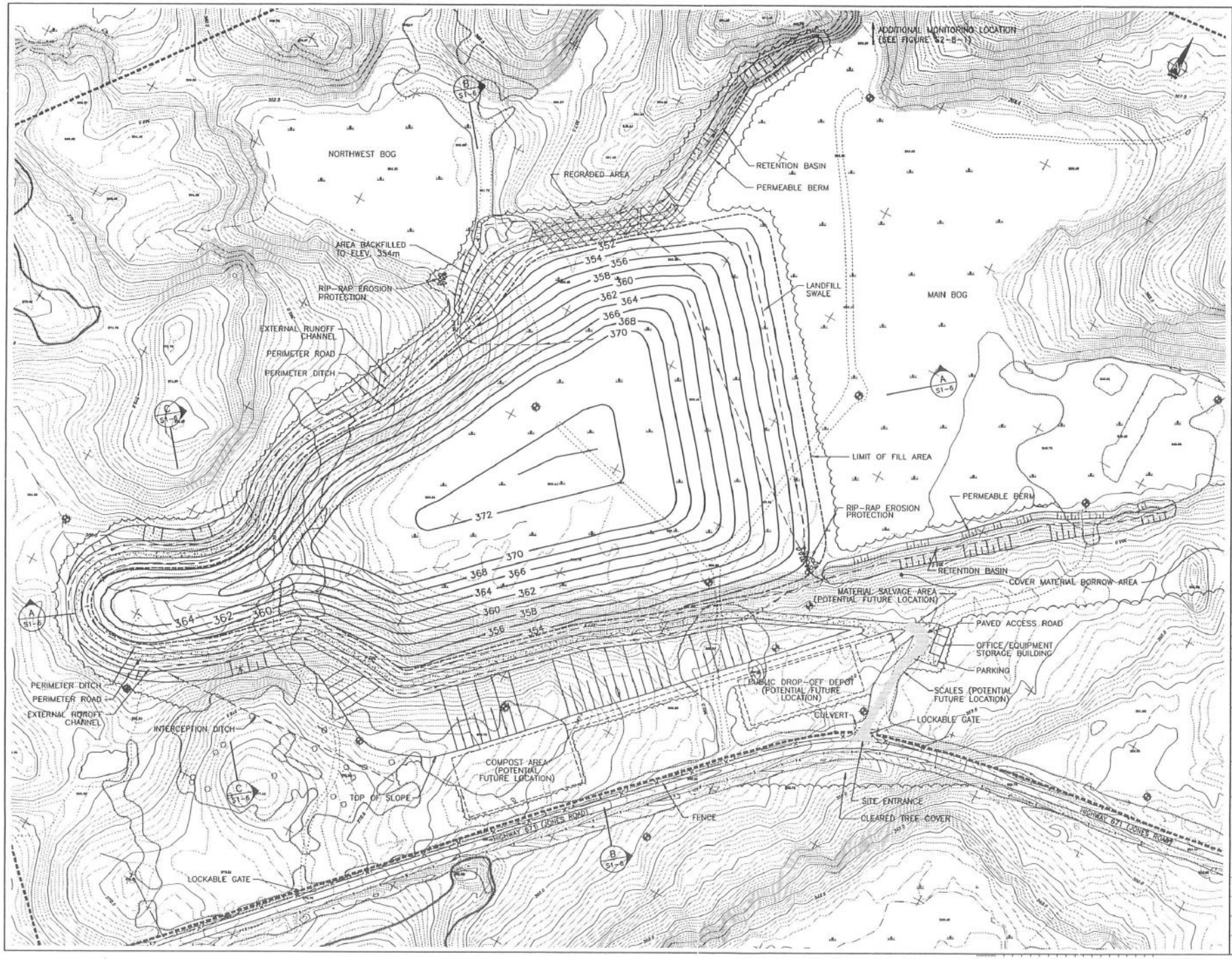
COMMENTS:

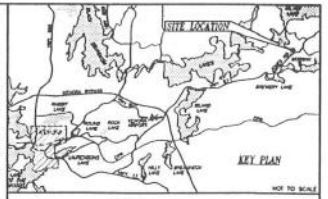
ENG-TECH Consulting Limited

per _____
Clark Hryhoruk, M.Sc., P.Eng., President
Ph: (204) 233-1694 Fax: (204) 235-1579

APPENDIX L

Final Contours Design Drawing





LEGEND

- EXISTING CONTOURS
- STREAM
- INTERMEDIATE STREAM
- EXISTING TRAIL
- EXISTING TREE LINE
- ROCK OUTCROP
- EXISTING DITCH
- BOG
- LIMIT OF CUTBACK TO TREE LINE
- FENCE
- SITE BOUNDARY
- LIMIT OF WASTE DISPOSAL
- 368 FINAL CONTOUR
- PAVED ACCESS ROAD
- GRANULAR PERIMETER/ ACCESS ROAD
- CULVERT
- DITCH/CHANNEL
- PROPOSED FACILITIES
- POTENTIAL FUTURE FACILITIES
- GROUNDWATER MONITORING LOCATION
- GAS MONITORING PROBE

REV.	DATE	REVISIONS/ISSUES/APPROVALS	APP'D

Fenco MacLaren
Member of the SNC-LAVALIN Group

CLIENT
TOWN OF KENORA

PROJECT
KENORA AREA WASTE MANAGEMENT MASTER PLAN
PROPOSED KENORA AREA LANDFILL

TITLE
FINAL CONTOURS

DESIGNED BY:	T. TAYLOR	DATE:	FEBRUARY 1997
DRAWN BY:	D. McKENZIE	SCALE	1 : 1500
CHECKED BY:	T. TAYLOR	FILE NAME:	KEN-FCON.DWG
PROJECT NUMBER:	015926	DRAWING NUMBER:	S1-2

APPENDIX M

Borehole Logs

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/12 - 96/2/14 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.9 m; HQ Coring to 16.9 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-1/17

Piezometers: MW-1/17

SS Split Spoon Sample
RX Rock Core
WA Wash Sample
GR Grab Sample
AU Auger Sample
Piezometer Screen
CN Continuous Sample
Water Level Elev. m (with date)
SH Shelby Tube Sample

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.57 m						
5 1		GRAVELLY SILTY SAND - grey-rust mottled, becoming grey below 2.3 m - with cobbles and some boulders - locally TILL-LIKE - wet below 0.8 m - generally compact; locally dilatant, becoming more dense with depth			1		SS	14
					2		SS	7
10 3					3		SS	41/23cm
				Holeplug and Cave	4		SS	55/15cm
15 5					5		SS	67
					6		SS	102
					7		SS	100/25cm
20 6		- auger refusal at 5.9 m; changed to HQ coring			1		RX	
25 8					2		RX	
30 9					3		RX	
35 11					4		RX	
40 12		- becomes very sandy, less till-like below 12.2 m			5		RX	
45 14					6		RX	
50 15				Cave	7		RX	
16								

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-1/17

Continuation Sheet

Sheet 2 of 2

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
55 — 17	333.7							
	16.9	End of Borehole @ 16.9 m						
60 — 18								
19								
65 — 20								
21								
70 — 22								
75 — 23								
24								
80 — 25								
85 — 26								
27								
90 — 28								
95 — 29								
30								
100 — 31								
105 — 32								
33								
110 — 34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/30 - 96/1/30 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 9.6 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-2/10

Piezometers: MW-2/9

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.33 m						
5 1		PEAT/ORGANICS - frozen to 0.6 m, wet below - dark brown to black			1		GRAB	
					2		SS	1
10 3	347.2 3.1	CLAYEY SILT - bluish grey - very soft - increasing silt content with depth, becoming SILT, SOME CLAY below 5.5 m - wet		Holeplug	3		SS	push
					4		SS	push
15 5					5		SS	push
					6		SS	2
20 6	344.0 6.3	SAND - trace to some silt - grey - generally fine to medium, locally medium to coarse - wet			7		SS	3
					8		SS	6
25 8					9		SS	2
	341.7 8.6	SILT-SAND TILL - grey - gravelly - compact; wet		Cave				
30 9	340.7 9.6				10		SS	24
10		End of Borehole @ 9.6 m						
35 11								
12								
40 13								
45 14								
15								
50 16								

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/7 - 96/2/7 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 11.4 m; HQ Coring to 13.3 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-2/13

Piezometers: MW-2/13

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.11 m						
		See Borehole BH-2/10 for Geology Above 10.7 m		Holeplug				
				Cave				
	339.4 10.7	SILT-SAND TILL - grey - with coarse sand and fine gravel - dense to very dense - wet			1A		SS	50/15cm
	338.7 11.4			Holeplug	1		RX	
					2		RX	
		BEDROCK - granodiorite - RQD = 100%		Silica Sand				
	336.7 13.4	End of Borehole @ 13.4 m						

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/27 - 96/1/27 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 10.7 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Threaded PVC, #10 Slot with Geosock

Borehole No.: BH-3/11

Piezometers: MW-3/8

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.63 m						
	350.2 0.5	PEAT/ORGANICS - black						
5 / 1		SAND TILL - some silt to silty, some gravel to gravelly - brown, becoming grey below 1.5 m - evidence of roots to 2.7 m - wet - generally compact		Holeplug	1		SS	11
					2		SS	15
10 / 2					3		SS	14
					4		SS	19
15 / 3				Cave	5		SS	9
					6		SS	18
20 / 4					7		SS	30
				Geosock on Screen	8		SS	20
25 / 5					9		SS	47
		- augering continued to 10.7 m, however, due to bouldery conditions and flowing sands, samples were not recovered below 8 m.						
30 / 6				Cave				
	340.0 10.7	End of Borehole @ 10.7 m						
35 / 7								
40 / 8								
45 / 9								
50 / 10								

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/26 - 96/1/26 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-4/6

Piezometers: MW-4/6

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.75 m						
		PEAT/ORGANICS - black, wet			1		SS	push
					2		SS	push
	348.5 2.3	CLAYEY SILT - green-brown to grey-brown - with trace, very thin silty fine sand layers - soft to very soft - wet		Holeplug	3		SS	5
					4		SS	5
					5		SS	push
	346.2 4.6	SAND TILL - some silt, some gravel and cobbles - grey		Silica Sand and Cave	6		SS	11
	345.0 5.8	- loose - wet			7		SS	11
		End of Borehole @ 5.8 m						

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/9 - 96/2/9 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.8 m;
HQ Coring to 18.3 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-4/18

Piezometers: MW-4/18

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.56 m						
		See Borehole Log BH-4/6 for Descriptions to 5.8 m		Holeplug				
	344.8 5.8	SAND to SILTY SAND TILL - with cobbles, some boulders - grey to greenish grey		Cave	1 2 3 4 5 6		RX RX RX RX RX RX	

5 10 15 20 25 30 35 40 45 50 ft.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 m

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-4/18

Continuation Sheet

Sheet 2 of 2

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Sample Plot	Sample Type	Vapour Conc.
55 17								
60 18	332.3							
	18.3	End of Borehole @ 18.3 m		Cave	7		RX	
65 19								
70 20 21								
75 22 23								
80 24 25								
85 26 27								
90 28								
95 29 30								
100 31								
105 32 33								
110 34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/23 - 96/1/25 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 6.6 m; HQ Coring to 17.5 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-5/17

Piezometers: MW-5/17

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 369.35 m						
5 1		SAND TILL - some silt to silty - with gravel and cobbles - grey-brown - dry to damp - loose to crumbly texture		Holeplug	1		GRAB	
					2		SS	32
10 3					3		SS	17/15cm
					4		SS	31
15 5					5		SS	25
					6		SS	21
20 6					7		SS	4/10cm
				Silica Sand	8		SS	5/13cm
		- auger refusal at 6.6 m; continued with HQ coring			1		RX	
25 8								
					2		RX	
30 9					3		RX	
10								
35 11					4		RX	
					5		RX	
40 12								
13								
45 14				Cave	6		RX	
50 15					7		RX	
16								

Borehole Record

S. Bricks
Prepared by

H. Jackson
Checked by

Fenco MacLaren
97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-5/17

Continuation Sheet

Sheet 2 of 2

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
	352.7							
55 — 17	16.6	probable BEDROCK - granodiorite - RQD = 63%		Cave	8		RX	
	351.9							
60 — 18	17.5	End of Borehole @ 17.5 m						
19								
65 — 20								
21								
70 — 22								
75 — 23								
24								
80 — 25								
85 — 26								
27								
90 — 28								
95 — 29								
30								
100 — 31								
105 — 32								
33								
110 — 34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/25 - 96/1/25 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 5.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Threaded PVC, #10 Slot with Geosock

Borehole No.: BH-6/6

Piezometers: MW-6/5

Sheet 1 of 1

SS Split Spoon Sample
RX Rock Core
WA Wash Sample
GR Grab Sample
AU Auger Sample
Piezometer Screen
CN Continuous Sample
Water Level Elev. m (with date)
SH Shelby Tube Sample

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Sample Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 350.34 m						
5 / 1		SILTY SAND TILL (weathered) - sand is fine to medium grained - locally with thin sand or silt laminae - grey to brown, with rust discolouration to 1.5 m - root traces noted to 1.9 m - wet - loose to compact		Holeplug	1		SS	11
					2		SS	14
					3		SS	24
10 / 3	347.3 3.1	SILTY SAND TILL - with some thin sand laminae - some gravel to gravelly - grey - wet		Cave	4		SS	34
					5		SS	38/23cm
15 / 5				Geosock on Screen				
	344.6 5.8	End of Borehole @ 5.8 m			6		SS	105
20 / 6								
25 / 8								
30 / 9								
35 / 11								
40 / 12								
45 / 14								
50 / 15								

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/5 - 96/2/5 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 4.6 m; HQ Coring to 14.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-6/15

Piezometers: MW-6/14

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 349.96 m						
		See Borehole Log BH-6/6 for Descriptions to 4.6 m		Holeplug and Cave				
	345.4 / 4.6	SILTY SAND TILL - some gravel to gravelly - some cobbles with depth - grey - wet		Cave	1 2 3 4 5 6 7		RX	
	335.2 / 14.8	End of Borehole @ 14.8 m						

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/1/26 - 96/1/26 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 4.4 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Threaded PVC, #10 Slot with Geosock

Borehole No.: BH-7/4

Piezometers: MW-7/4

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Sample Type	Vapour Conc.
		Ground Surface Elevation: 349.47 m					
	349.0 / 0.5	PEAT/ORGANICS - black			1	GRAB	
5 — 1		CLAYEY SILT - with organics - soft					
	347.8 / 1.7	- wet		Holeplug	2	SS	20
		SILTY SAND and GRAVEL (TILL-LIKE) - grey-brown - loose to compact - wet			3	SS	20
10 — 3				Cave	4	SS	17
4				Geosock on Screen	5	SS	13/23cm
15 — 5	345.1 / 4.4	End of Borehole @ 4.4 m					
20 — 6							
7							
25 — 8							
30 — 9							
10							
35 — 11							
40 — 12							
13							
45 — 14							
15							
50 — 16							

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/14 - 96/2/15 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Solid Stem Augers to 13.8 m; HQ Coring to 21.6 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-8/22

Piezometers: MW-8/22

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 358.96 m						
5 / 10 / 15 / 20 / 25 / 30 / 35 / 40 / 45 / 50		SAND to SILTY SAND TILL - some gravel to gravelly - brown, becoming grey below 1.2 m - compact to very compact - damp to moist, wet below 10.7 m - with numerous thin (<3 cm) sand lenses throughout		Holeplug	1		SS	78
					2		SS	54
					3		SS	70
					4		SS	90/23cm
					5		SS	60/15cm
					6		SS	80
					7		SS	57
					8		SS	110/25cm
					9		SS	75
					10		SS	50/15cm
					11		SS	70/15cm
					12		SS	100/8cm
					13		SS	135/23cm
					14		SS	105/18cm
					15		SS	110/23cm
		- possible thick sand and gravel lens at approximately 13.7 m - soils too loose to continue with solid stem augers below 13.8 m; continued with HQ coring		Cave	1		RX	

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren — 97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-8/22

Continuation Sheet

Sheet 2 of 2

Scale (ft.)	Scale (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
55	17								
	18								
60	19								
65	20				Cave				
	21								
70	22	337.3 21.6	End of Borehole @ 21.6 m						
75	23								
	24								
80	25								
85	26								
	27								
90	28								
95	29								
	30								
100	31								
105	32								
	33								
110	34								

Borehole Record

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/15 - 96/2/15 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 1.5 m; HQ Coring to 5.8 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-9/6

Piezometers: MW-9/6

Sheet 1 of 1

SS Split Spoon Sample
WA Wash Sample
AU Auger Sample
CN Continuous Sample
SH Shelby Tube Sample
RX Rock Core
GR Grab Sample
Piezometer Screen
Water Level Elev. m (with date)

Scale (ft.) (m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 352.98 m						
5 — 1	351.5 / 1.5	Primarily SILT TILL, with numerous interbeds of silt and sand - grey - dry			1		SS	18/15cm
					2		SS	70/23cm
		BEDROCK - granodiorite - RQD = 94% - subvertical fracturing noted		Holeplug	1		RX	
10 — 2					2		RX	
3					3		RX	
4					4		RX	
15 — 5					5		RX	
				Silica Sand	6		RX	
	347.2 / 5.8	End of Borehole @ 5.8 m			7		RX	
20 — 6								
7								
25 — 8								
9								
30 — 10								
35 — 11								
12								
40 — 13								
45 — 14								
15								
50 — 16								

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project: Kenora WMMP No.: 015926

Date Drilled: 96/2/16 - 96/2/16 Driller: Paddock Drilling

Borehole Location: See Figure S2-3-1

Drilling Supervised by: S. Bricks

Drilling Method: Hollow Stem Augers to 5.2 m; HQ Coring to 16.6 m

Piezometer Details

Type of Pipe: 51 mm Dia. Sch. 40 Threaded PVC

Type of Screen: 51 mm Dia. Sch. 40 Threaded PVC, #10 Slot

Borehole No.: BH-10/17

Piezometers: MW-10/17

SS Split Spoon Sample
RX Rock Core
WA Wash Sample
GR Grab Sample
AU Auger Sample
Piezometer Screen
CN Continuous Sample
Water Level Elev. m (with date)
SH Shelby Tube Sample

Scale (ft.) (m)	Elev. (m GSD) Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		Ground Surface Elevation: 361.83 m						
		SILTY SAND to SANDY SILT TILL - some gravel to gravelly, some cobbles and boulders - brown to grey - compact to dense - damp to moist			1		SS	47
					2		SS	42
					3		SS	85
					4		SS	80/23cm
					5		SS	90/23cm
					6		SS	80/15cm
		- auger refusal at 5.2 m; continued with HQ coring			1		RX	
					2		RX	
				Holeplug and Cave				
					3		RX	
					4		RX	
					5		RX	
				Cave	6		RX	

Borehole Record

S. Bricks — Prepared by

H. Jackson — Checked by

Fenco MacLaren

97/2/19

Project Kenora WMMP No.: 015926

Borehole No. BH-10/17

Continuation Sheet

Sheet 2 of 2

Scale (ft.)	(m)	Elev. (m GSD) / Depth (m)	Geological Log — Description	Strat. Plot	Monitor Details	Sample No.	Plot	Sample Type	Vapour Conc.
		345.2 / 16.6	End of Borehole @ 16.6 m						

Borehole Record

Fenco MacLaren

97/2/19

APPENDIX N

Benthic Invertebrate Monitoring

Benthic Sampling Results - Jones Road Landfill Site												
Biological Endpoints	**SB-1**				**SB-2**				**SB-R**			
	Aug-00	**Aug-01**	**Aug-02**	**Aug-03**	**Aug-00**	**Aug-01**	**Aug-02**	**Aug-03**	**Aug-00**	**Aug-01**	**Aug-02**	**Aug-03**
Density (as number of organisms per square meter) of total benthic invertebrates	752	376	406	1540	731	969	928	4217	1612	434	507	4866
Density by taxon (as number of Families per station)	8	1	5	6	6	4	8	17	12	4	8	12

APPENDIX O

MOE Landfill Reporting Submission Forms

Appendix D-Monitoring and Screening Checklist
General Information and Instructions

General Information: The checklist is to be completed, and submitted with the Monitoring Report.
Instructions: A complete checklist consists of:
(a) a completed and signed checklist, including any additional pages of information which can be attached as needed to provide further details where indicated.
(b) completed contact information for the Competent Environmental Practitioner (CEP)
(c) self-declaration that CEP(s) meet(s) the qualifications as set out below and in Section 1.2 of the Technical Guidance Document.

Definition of Groundwater CEP:
For groundwater, the CEP must have expertise in hydrogeology and meet one of the following:
(a) the person holds a licence, limited licence or temporary licence under the *Professional Engineers Act*; or
(b) the person holds a certificate of registration under the *Professional Geoscientists Act, 2000* and is a practicing member, temporary, member or limited member of the Association of Professional Geoscientists of Ontario. O. Reg. 66/08, s. 2..
Definition of Surface water CEP:
A CEP for surface water assessments is a scientist, professional engineer or professional geoscientist as described in (a) and (b) above with demonstrated experience and post-secondary education, either a diploma or degree, in hydrology, aquatic ecology, limnology, aquatic biology, physical geography with specialization in surface water, and/or water resource management.

The type of scientific work that a CEP performs must be consistent with that person's education and experience. If an individual has appropriate training and credentials in both groundwater and surface water and is responsible for both areas of expertise, the CEP may then complete and validate both sections of the checklist.

Monitoring Report and Site Information	
Waste Disposal Site Name	Kenora Area Waste Disposal Site (Jones Road Landfill)
Location (e.g. street address, lot, concession)	Part Lot 1 & 2, Concession II, Township of PettyPiece.
GPS Location (taken within the property boundary at front gate/ front entry)	412895 , 5521124
Municipality	District of Kenora
Client and/or Site Owner	City of Kenora
Monitoring Period (Year)	2012-2014
This Monitoring Report is being submitted under the following:	
Certificate of Approval No.:	A612018
Director's Order No.:	Type Here
Provincial Officer's Order No.:	Type Here
Other:	Type Here

Report Submission Frequency	○ **Annual** ◉ **Other**	Specify (Type Here): every three years
The site is:	◉ **Active** ○ **Inactive** ○ **Closed**	
If closed, specify C of A, control or authorizing document closure date:		Select Date
Has the nature of the operations at the site changed during this monitoring period?	○ **Yes** ◉ **No**	
If yes, provide details:	Type Here	
Have any measurements been taken since the last reporting period that indicate landfill gas volumes have exceeded the MOE limits for subsurface or adjacent buildings? (i. e. exceeded the LEL for methane)	○ Yes ◉ No	

Groundwater WDS Verification:

Based on all available information about the site and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The monitoring program continues to effectively characterize site conditions and any groundwater discharges from the site. All monitoring wells are confirmed to be in good condition and are secure:	◉ **Yes** ○ **No**	If no, list exceptions (Type Here):
2) All groundwater, leachate and WDS gas sampling and monitoring for the monitoring period being reported on was successfully completed as required by Certificate(s) of Approval or other relevant authorizing/control document(s):	○ **Yes** ◉ **No** ○ **Not Applicable**	If no, list exceptions below or attach information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
MW4/6	damaged in 2012 and 2013, no samples collected until August 2013, when monitor was replaced	Select Date
MW5/17	Dry in 2012, 2013 and May 2014, no samples collected	Select Date
MW11/4	Dry in May 2012 and both events in 2013. No samples collected	Select Date
MW24/5	sample tubing damaged in in August 2013 and May 2014, no samples collected. repaired and sample collected in August 2014	Select Date

3) a) Some or all groundwater, leachate and WDS gas sampling and monitoring requirements have been established or defined outside of a ministry C of A, authorizing, or control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, the sampling and monitoring identified under 3(a) for the monitoring period being reported on was successfully completed in accordance with established protocols, frequencies, locations, and parameters developed as per the Technical Guidance Document:	○ **Yes** ○ **No** ○ **Not Applicable**	If no, list exceptions below or attach additional information.

Groundwater Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for groundwater investigations was done in accordance with standard operating procedures as established/outlined per the Technical Guidance Document (including internal/external QA/QC requirements) (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:			
5) The site has an adequate buffer, Contaminant Attenuation Zone (CAZ) and/or contingency plan in place. Design and operational measures, including the size and configuration of any CAZ, are adequate to prevent potential human health impacts and impairment of the environment.	◉ **Yes** ○ **No**	If no, the potential design and operational concerns/ exceptions are as follows (Type Here):	
6) The site meets compliance and assessment criteria.	◉ **Yes** ○ **No**	If no, list and explain exceptions (Type Here):	
7) The site continues to perform as anticipated. There have been no unusual trends/ changes in measured leachate and groundwater levels or concentrations.	◉ **Yes** ○ **No**	If no, list exceptions and explain reason for increase/change (Type Here):	
1) Is one or more of the following risk reduction practices in place at the site: ***(a)*** **There is minimal reliance on natural attenuation of leachate due to the presence of an effective waste liner and active leachate collection/treatment; or** ***(b)*** **There is a predictive monitoring program in-place (modeled indicator concentrations projected over time for key locations); or** ***(c)*** **The site meets the following two conditions (typically achieved after 15 years or longer of site operation):** ***i.*** **The site has developed stable leachate mound(s) and stable leachate plume geometry/concentrations; and** ***ii.*** **Seasonal and annual water levels and water quality fluctuations are well understood.**	◉ **Yes** ○ **No**	**Note which practice(s):**	☐ **(a)** ☒ **(b)** ☒ **(c)**
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here):	

Groundwater CEP Declaration:

I am a licensed professional Engineer or a registered professional geoscientist in Ontario with expertise in hydrogeology, as defined in Appendix D under Instructions. Where additional expertise was needed to evaluate the site monitoring data, I have relied on individuals who I believe to be experts in the relevant discipline, who have co-signed the compliance monitoring report or monitoring program status report, and who have provided evidence to me of their credentials.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended), and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature and will be rectified for the next monitoring/reporting period. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

11-Jun-2015

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No changes to the monitoring program are recommended**	Type Here
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No Changes to site design and operation are recommended**	Type Here
○ **The following change(s) to the site design and operation is/ are recommended:**	

Name:	Colin Ross		
Seal:	Add Image 		
Signature:		**Date:**	~~Select Date~~ June 19/15.
CEP Contact Information:	Colin Ross		
Company:	Azimuth Environmental Consulting Inc.		
Address:	85 Bayfield Street, Barrie, ON L4M 3A7		
Telephone No.:	705-721-8451	Fax No. :	705-5721-8926
E-mail Address:	colin@azimuthenvironmental.com		
Co-signers for additional expertise provided:			
Signature:		**Date:**	Select Date
Signature:		**Date:**	Select Date

Surface Water WDS Verification:

Provide the name of surface water body/bodies potentially receiving the WDS effluent and the approximate distance to the waterbody (including the nearest surface water body/bodies to the site):

Name (s)	Morgan Lake
Distance(s)	1.9 km

Based on all available information and site knowledge, it is my opinion that:

Sampling and Monitoring Program Status:

1) The current surface water monitoring program continues to effectively characterize the surface water conditions, and includes data that relates upstream/background and downstream receiving water conditions:	(●) Yes ( ) No	If no, identify issues (Type Here):
2) All surface water sampling for the monitoring period being reported was successfully completed in accordance with the Certificate(s) of Approval or relevant authorizing/control document(s) (if applicable):	(●) Yes ( ) No ( ) **Not applicable (No C of A, authorizing / control document applies)**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	Description/Explanation for change (change in name or location, additions, deletions)	Date
SW-3	location dry in August 2012, 2013, 2014, no samples collected	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

3) a) Some or all surface water sampling and monitoring program requirements for the monitoring period have been established outside of a ministry C of A or authorizing/control document.	○ **Yes** ◉ **No** ○ **Not Applicable**	
b) If yes, all surface water sampling and monitoring identified under 3 (a) was successfully completed in accordance with the established program from the site, including sampling protocols, frequencies, locations and parameters) as developed per the Technical Guidance Document:	○ **Yes** ○ **No** ○ **Not Applicable**	If no, specify below or provide details in an attachment.

Surface Water Sampling Location	**Description/Explanation for change (change in name or location, additions, deletions)**	**Date**
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date
Type Here	Type Here	Select Date

4) All field work for surface water investigations was done in accordance with standard operating procedures, including internal/external QA/QC requirements, as established/ outlined as per the Technical Guidance Document, MOE 2010, or as amended. (Note: A SOP can be from a published source, developed internally by the site owner's consultant, or adopted by the consultant from another organization):	◉ **Yes** ○ **No**	If no, specify (Type Here):

Sampling and Monitoring Program Results/WDS Conditions and Assessment:

5) The receiving water body meets surface water-related compliance criteria and assessment criteria: i.e., there are no exceedances of criteria, based on MOE legislation, regulations, Water Management Policies, Guidelines and Provincial Water Quality Objectives and other assessment criteria (e.g., CWQGs, APVs), as noted in Table A or Table B in the Technical Guidance Document (Section 4.6):	◉ **Yes** ○ **No**

If no, list parameters that exceed criteria outlined above and the amount/percentage of the exceedance as per the table below or provide details in an attachment:

Parameter	Compliance or Assessment Criteria or Background	Amount by which Compliance or Assessment Criteria or Background Exceeded
e.g. Nickel	e.g. C of A limit, PWQO, background	e.g. X% above PWQO
Total Phosphorus	0.03 mg/L	maximum exceedance for period of record (2012-2014) is 0.31 mg/L or 1033%
Iron	0.3 mg/L	maximum exceedance for period of record (2012-2014) is 3.8 mg/L or 1266%
phenols	0.001	maximum exceedance for period of record (2012-2014) is 0.009 mg/L or 900%
Type Here	Type Here	Type Here
6) In my opinion, any exceedances listed in Question 5 are the result of non-WDS related influences (such as background, road salting, sampling site conditions)?	◉ **Yes** ○ **No**	All these concentrations are within the range observed at background locations (SW-3 & 4) indicating they are natural in source. The total phosphorus and phenols concentrations are typical of stagnant wetland type conditions, while elevated iron concentrations are also observed in background or non-impacted ground water monitoring wells supporting this as a naturally occuring earth element source.

7) All monitoring program surface water parameter concentrations fall within a stable or decreasing trend. The site is not characterized by historical ranges of concentrations above assessment and compliance criteria.	○ **Yes** ◉ **No**	Some increasing trends are noted at SW-1 and to a lesser extent at SW-2 for leachate indicator parameters. This trend is just beginning to develop and is not surprising given the age of the landfill site. These trends will be tracked as the monitoring program progresses.
8) For the monitoring program parameters, does the water quality in the groundwater zones adjacent to surface water receivers exceed assessment or compliance criteria (e.g., PWQOs, CWQGs, or toxicity values for aquatic biota (APVs)):	○ Yes ◉ No ○ Not Known ○ Not Applicable	
9) Have trigger values for contingency plans or site remedial actions been exceeded (where they exist):	○ **Yes** ◉ **No** ○ **Not Applicable**	If yes, list value(s) that are/have been exceeded and follow-up action taken (Type Here)

Surface Water CEP Declaration:

I, the undersigned hereby declare that I am a Competent Environmental Practitioner as defined in Appendix D under Instructions, holding the necessary level of experience and education to design surface water monitoring and sampling programs, conduct appropriate surface water investigations and interpret the related data as it pertains to the site for this monitoring period.

I have examined the applicable Certificate of Approval and any other environmental authorizing or control documents that apply to the site. I have read and followed the Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water Technical Guidance Document (MOE, 2010, or as amended) and associated monitoring and sampling guidance documents, as amended from time to time. I have reviewed all of the data collected for the above-referenced site for the monitoring period(s) identified in this checklist. Except as otherwise agreed with the ministry for certain parameters, all of the analytical work has been undertaken by a laboratory which is accredited for the parameters analysed to *ISO/IEC 17025:2005 (E)- General requirements for the competence of testing and calibration laboratories,* or as amended from time to time by the ministry.

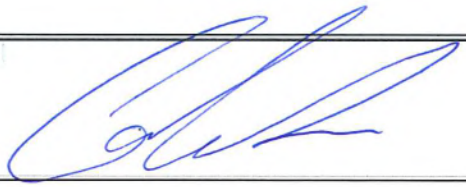
If any exceptions or potential concerns have been noted in the questions in the checklist attached to this declaration, it is my opinion that these exceptions and concerns are minor in nature or will be rectified for future monitoring events. Where this is not the case, the circumstances concerning the exception or potential concern and my client's proposed action have been documented in writing to the Ministry of the Environment District Manager in a letter from me dated:

11-Jun-2015

Recommendations:

Based on my technical review of the monitoring results for the waste disposal site:

◉ **No Changes to the monitoring program are recommended**	Type Here
○ **The following change(s) to the monitoring program is/are recommended:**	
◉ **No changes to the site design and operation are recommended**	Type Here
○ **The following change(s) to the site design and operation is/are recommended:**	

CEP Signature	
Relevant Discipline	Water Quality Assessor
Date:	11-Jun-2015
CEP Contact Information:	Colin Ross
Company:	Azimuth Environmental Consulting Inc.
Address:	85 Bayfield Street, Suite 400, Barrie, ON. L4M 3A7
Telephone No.:	705-721-8451
Fax No. :	705-721-8926
E-mail Address:	colin@azimuthenvironmental.com

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