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**BELLE PARK CLOSED LANDFILL SITE
(Cataraqui Park, Kingston, Ontario)**

**ENVIRONMENTAL OPERATIONS AND
MONITORING
2013 - 2014**

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Report to:

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NOTICE TO READER

This report summarizes the environmental operations and monitoring activities undertaken for The Corporation of the City of Kingston during the period of January 2013 through December 2014. Site operations and improvement activities were completed following earlier recommendations, and to maintain the active pumping systems at the site. Environmental monitoring was conducted in order to confirm information collected and reported previously, and to provide on-going baseline data with respect to the environmental conditions at this site. This report should be read in conjunction with the Cataraqui Park Environmental Impact Study report (*Malroz*, 1999) and subsequent Environmental Monitoring and Operations reports (*Malroz*, 2001 through 2013).

The findings reported in this document are based on tasks completed by Malroz Engineering Inc. (*Malroz*). Professional judgment, experience with similar undertakings, and available data collected within the scope of work form the basis for this report. *Malroz* has prepared this report using information understood to be factual and correct, and shall not be responsible for conditions arising from information or facts that were inaccurate, concealed, or not fully disclosed at the time of work.

The assessment of environmental conditions is based on our review of data collected at specific point locations within the study area. Conditions between data locations have been inferred and actual conditions may vary from those reported. Environmental conditions can be expected to change over time. The findings and conclusions of this report are valid only at the time at which this work was conducted. If future work is undertaken, or additional information becomes available, *Malroz* should be authorized to re-evaluate the conclusions of this report and make amendments as required.

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Respectfully Submitted,

MALROZ ENGINEERING INC.

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1.0 INTRODUCTION

This report provides a biennial summary of the activities and findings of ongoing environmental management and site monitoring programs at the closed Belle Park landfill site conducted by Malroz Engineering Inc. (*Malroz*). The current reporting period is from January, 2013, to December, 2014 (the “current reporting period”). Included are the results of site observations, monitoring and maintenance of the groundwater extraction system, and semi-annual environmental sampling conducted at the Belle Park landfill. The work reported herein is a continuation of ongoing environmental operations and monitoring activities initiated at Belle Park in 1997. For a full understanding of site characteristics and background, this report should be read in conjunction with previous reports prepared by *Malroz* (1999 through 2013). *Malroz* (1999) provides the results of a comprehensive investigation of on-site conditions and environmental quality of the surrounding environment, conducted between February of 1997 and April of 1999. It also describes the infrastructure and operational procedures employed to manage leachate generated at the site. *Malroz* (2001 through 2013) describe the site improvements and results of environmental monitoring carried out from May 1999 through December 2012.

1.1 Background

The Belle Park site operated as a municipal landfill from 1952 to 1974. During this operational period, waste was deposited over an area of approximately 44 hectares of marshland extending into the Kingston Inner Harbour from the west bank of the Great Cataraqui River. Following closure, the Belle Park landfill site was converted to Cataraqui Park - a multiple use recreational facility. Access to Cataraqui Park is from Montreal Street between Highway 401 and Highway 2. The location of the site is shown in Figure A1 (Appendix A).

In 1997, *Malroz* was retained by the City of Kingston to initiate temporary seep management measures at Cataraqui Park for the purpose of preventing groundwater impacts to the natural environment during development of a long-term groundwater management plan. The groundwater management system, in operation during the current reporting period, includes four seep management areas where direct seepage of groundwater to the natural environment was previously identified. At these seep management areas, wells and barriers have been installed to intercept, collect and pump groundwater to the sanitary sewer system for treatment at the City of Kingston’s Ravensview Water Pollution Control Plant. Figure A2 (Appendix A) shows the locations of the four seep management areas; positioning of extraction wells; routing of underground waste water discharge lines; and points of connection to the municipal sanitary sewer system.

The Belle Park site is operated under authorizations/approvals granted by a number of regulatory authorities. Table B1 (Appendix B) provides a listing of environmental permits, certificates of approval and letters of authorization under which the Belle Park landfill site was managed during the current reporting period.

2.0 ENVIRONMENTAL OPERATIONS AND MANAGEMENT

Operation of the pumping system and related environmental management infrastructure at the Belle Park Landfill site continued during the current reporting period with no substantial change from the operations and management systems in place in recent years.

2.1 Site Observation Visits

Regularly scheduled observation visits to the Belle Park landfill site (Cataraqui Park) were conducted to observe the shoreline, near-shore surface waters and the interior of the peninsula. The purpose of these visits was to maintain visual surveillance of the site for evidence of seeps or other environmental concerns that may require further investigation or action.

2.1.1 Site Observations during the Current Reporting Period

For the current reporting period, a total of 113 site observation visits were conducted: 58 in 2013 and 55 in 2014. Additional site visits were undertaken during periods of increased seep activity, during periods of equipment vandalism and power failure (see Section 2.4.1).

Observations made during site visits identified progressive degradation of landfill cover due to slumping along portions of the ditch between Belle Island and the Belle Park Peninsula.

2.2 Groundwater Seep Observations and Sampling

Mounded groundwater from the topographic height of the Belle Park landfill (“ski hill” area) flows radially outward in all directions towards the shoreline of the park. In some hydraulically active areas of the shoreline, the groundwater emerges from the subsurface as seepage. This normally occurs during periods of lower water levels in the Great Cataraqui River. Groundwater extraction wells have been positioned in groundwater seepage areas to intercept and redirect groundwater to the municipal sanitary sewer system. Monitoring of the perimeter of the Belle Park landfill site for new seeps is undertaken by means of regularly scheduled observation visits. Observations of atypical or point source seepage are evaluated according to the *Seep Management Protocol* (Table B2, Appendix B).

During the current reporting period, site visit observations identified diffuse seepage in several historically active areas of the site. These observations included damp conditions along the site banks and observations of discoloured soil and vegetation indicative of *iron* staining. In accordance with the Belle Park *Seep Management Protocol*, these areas of diffuse seepage were monitored for change throughout the year. When a seep occurrence triggers sampling based on the Belle Park *Seep Management Protocol*, duplicate samples are collected and forwarded to a CALA accredited laboratory for analysis. Results are assessed according to the *Seep Management Protocol* (Table B2, Appendix B). Sampling events from the current reporting period are summarized below in Section 2.2.1.

2.2.1 Seep Sampling during the Current Reporting Period

Seep occurrences that triggered sampling based on the Belle Park Seep *Management Protocol* are summarized below and their locations are plotted on Figure A3 (Appendix A). Analytical results of sampling are reported in Tables E1-E2 (Appendix E).

Date Observed	Seep ID	Date Sampled	Comment
January 15, 2013	SD044.4	January 15, 2013	Seep naturally abated
March 28, 2013	SD009.5	March 28, 2013 April 1, 2013 (extended suite)	Seep naturally abated
	SD062	March 28, 2013	Ammonia met standards
April 15, 2013	SD009.5	April 15, 2013 April 16, 2013 (extended suite)	Seep naturally abated
June 13, 2013	SD009.5	June 13, 2013 June 17, 2013 (extended suite)	Seep naturally abated
April 1, 2014	SD009.5	April 1, 2014	Ammonia met standards
April 4, 2014	SD009.55	April 4, 2014	Ammonia met standards
April 7, 2014	SD056.8	April 7, 2014	Ammonia met standards
	SD062	April 7, 2014	Ammonia met standards
April 9, 2014	SD011	April 9, 2014	Ammonia met standards
	SD064	April 9, 2014	Ammonia met standards
May 22, 2014	SD009.5	May 22, 2014	Seep naturally abated
	SD011	May 22, 2014	Unable to re-sample (low flow)

2.3 Illegal Dumping

Illegally dumped debris and refuse was occasionally observed during the current reporting period. Illegal dumping was reported to City of Kingston staff when observed.

2.4 Groundwater Management

The Belle Park groundwater management system consists of interception, extraction and pumping of groundwater from four management areas (Figure A2, Appendix A). Extracted water is discharged as waste water to the municipal sanitary sewer system. Water was taken under the authority of Ontario Ministry of the Environment (now Ontario Ministry of the Environment and Climate Change – *MOECC*) Permits to Take Water #97-P-4109 and #4365-9K2K75, with numerically defined quality compliance limits specified in the City of Kingston Sewer Use By-Law No. 2008-192.

The *MOECC* Permits to Take Water authorize maximum daily groundwater withdrawals of: 1000, 1220, 720, and 720 m³/day, from the North, South, East and West Management Areas (well fields), respectively. Information on the relevant permits for this water taking is presented in Table B1 (Appendix B).

For the purpose of determining compliance with the *MOECC* specified withdrawal limits, an

estimated calculation of the total amounts of water pumped per day is required. For operational purposes, pump run times are recorded weekly during well maintenance visits by operations staff. Daily volumes of discharged waste water are estimated using pressure adjusted pump capacities and dividing weekly operating times by the number of days between readings.

The volumes of waste water withdrawals from the four Seep Management Areas during the current reporting period are presented in Appendix C, Table C1 and Figures C1 to C5. A review of the data shows the volumes of groundwater takings from the Belle Park landfill to be below authorized withdrawal limits during the current reporting period.

Figure C5 (Appendix C), provides a summary of annual withdrawal volumes from the four Seep Management Areas along with the total annual extraction volumes from the site. Historic waste water withdrawal records used to generate these data are contained in previous *Malroz* reports. Figure C5 (Appendix C) illustrates two periods of water taking increases (1997 - 1999, and 2001 - 2004) that generally reflect additions of extraction wells and the intensity of groundwater management that has occurred at the landfill site since 1997.

Because groundwater takings are related to seasonal changes in river elevation, river elevations are monitored. The source of river elevation data is the United States Army Corps of Engineers (Lake Ontario, Kingston Station). Figure C6 (Appendix C), shows river elevations recorded during the current reporting period compared to historic records.

Pumping system operations continue to follow the schedule established in 2004. This schedule includes the following activities for system maintenance and data collection as outlined in the Belle Park Site Management Plan (2013).

- Pump run-time counts are recorded weekly.
- Line pressure and pump amperage measurements are recorded weekly.

A summary of the maintenance schedule for the pumping system is shown in Table B3 (Appendix B).

2.4.1 Pumping System Management and Maintenance during the Current Period

Ball valves remained in their existing orientations to reduce flows at east well field extraction wells E1, E3a and E3b and south well field extraction wells S3 and S8 (Table B4, Appendix B). Ball valves at south extraction wells S4 and S5 were left in the fully open position.

Line cleaning in the spring and fall of 2013 and spring of 2014 was not fully completed due to various equipment malfunctions. Line cleaning conducted in the fall of 2014 accessed the majority of groundwater pumping lines at the park. Approximately 160 m of the 150 mm force main in the north (between the north manhole and W1 connection) and approximately 100 m of the 75 mm force main in the south (between the south manhole and SCO-1) were not accessible with the equipment used by the contractor.

The north well field electrical panel and electrical components were discovered to be vandalized on October 24, 2013. Repairs to the pumps were completed on December 2, 2013. In the intermediate period wells were pumped manually, until dry on a daily basis by the well contractor, with the exception of November 29 as the wells were under repair on this date. The area was observed daily to ensure that no seepage occurred. Work included trenching/excavating to install new electrical wires from the pumps to the electrical panel, rewiring of new Pumptec Plus and runcounter electrical components and upgrading and welding steel armouring to the electrical panel and exposed wiring.

A winter storm occurred December 21-22, 2013, causing damage to overhead electrical wires leaving the extraction wells S4/S5, S1/S7 and east electrical panels without power. From December 24-31, 2013, site observations were completed daily to inspect the south and east shorelines. Wells were pumped manually by the contractor during this period. Utilities Kingston restored power to the S1/S7 and east panels on December 31, 2013, followed by the S4/S5 panel on January 9, 2013.

Due to continued vandalism of on site electrical panels during the current reporting period, electrical panels throughout the park were armoured and additional locks were added during December, 2013, and January, 2014.

On September 4, 2014, MacLellan Water Technology observed that the header pipe at S2 had broken underground near the well. The area around the well was excavated and repairs were conducted on September 5, 2014. There was no spill occurrence as a result of this break.

2.4.2 Withdrawal Volumes during the Current Period

The north well field electrical panel and electrical components were discovered to be vandalized on October 24, 2013, leaving pumps N2, N3, N4 and N5 inoperable. Wells were pumped manually, until dry on a daily basis by the well contractor. Wastewater withdrawal volumes from each well were recorded daily during that time.

In August, 2014, MacLellan Water Technologies (*MacLellan*) began to use a digital paddlewheel system to test the pumping rate on pumps removed for preventative maintenance cleanings and/or repairs before they were re-installed at Belle Park. Pump test results using the new equipment varied from the historic results received from *MacLellan* and required an updating of the pump curve used to calculate flow volumes at Belle Park. The updated pump curve has been used to calculate the 2014 wastewater withdrawal volumes.

2.5 Irrigation Pumping

Irrigation water was taken under the authority of *MOECC* Permit to Take Water # 3347-87LHB8. Information on the current permits for this water taking is presented in Table B1 (Appendix B). There were no changes to permitted water taking volumes. The volume of water

pumped is measured daily by a magnetic flow meter installed on the irrigation system. Water takings were monitored by downloading water taking data from the flow meter on a monthly basis. Automated flow measurements were compared to the irrigation log maintained by City of Kingston Municipal Parks staff. Water takings for the golf course irrigation system were below *MOECC* permitted volumes and rates during the current reporting period and are summarized in Table C2 (Appendix C).

2.5.1 Irrigation Pumping during the Current Period

The data logger on the irrigation pumping system was not functioning properly during the months of June and July, 2014. The totalizer value on the logger display in the pump house appeared to be reporting the total volume of water pumped by the irrigation system, however, the daily volumes of water pumped were not being logged into memory. The total volume pumped by the irrigation system for the month of June, 2014, was calculated from totalizer readings manually recorded by park staff at the start and end of each pumping event.

Field staff visited the site and reset the data logger on July 25. Parks staff were requested to leave the main power switch on in the pump house during the irrigation pumping season to avoid future complications with the data logger.

2.6 Implementation of Long-Term Environmental Management Strategy

The City of Kingston has been working toward long-term environmental site management solutions. Phreatophytes and native shrubs were planted in 2008 at Belle Park to reduce the quantity of groundwater requiring interception and management. The City of Kingston won a 2013 FCM Sustainable Community Award for its work in managing groundwater flow at Belle Park with phreatophyte tree plantings. In addition, the City of Kingston is in the process of preparing plans to upgrade the west stream and create a constructed wetland area in the stream that would improve the water quality of this storm water discharge before entering the Greater Cataraqui River.

2.6.1 Related Maintenance Items during the Current Period

The planning, design, and permitting of a constructed wetland for the West Stream remained suspended. Details regarding the long term environmental strategy are outlined in the Belle Park Site Management Plan (2013).

Beaver activity was observed in phreatophyte plantation areas along the south shore and near the east well field. Snow fencing historically installed along the south shoreline to discourage beavers from further damaging trees near the shoreline remained in place. Metal wire fencing was added to areas along the south shore in the fall of 2014 to further discourage the beavers from damaging trees in the area.

3.0 ENVIRONMENTAL MONITORING AND SAMPLING

Environmental monitoring at Belle Park has been ongoing since February of 1997. During the current reporting period waste water, groundwater, and surface water were sampled semi-annually during the spring and fall. Groundwater monitoring of select monitoring wells was conducted semi-annually prior to groundwater sampling. Sampling and analytical methodologies employed during the current reporting period followed those utilized and described in detail in the 2006 Belle Park environmental monitoring report. Results of the environmental monitoring and sampling program were within expected ranges for the waste water, groundwater, and surface water samples, unless otherwise noted below.

3.1 Wastewater Sampling

Samples of the waste water from the groundwater extraction system were taken prior to the waste water discharging into the sanitary sewer system. This sampling was carried out to monitor bulk groundwater quality and to assess compliance with the City of Kingston Sewer Use By-Law. Samples were analyzed for *iron*, *chloride*, *total kjeldahl nitrogen (TKN)*, *total PCBs*, and *total suspended solids*. Analyzed parameters did not exceed the Sewer Use By-Law (2008-192) during the current reporting period. Results of the sampling program from the current reporting period are summarized in Table D1 (Appendix D). Waste water chemistry data from the current reporting period, along with historic ranges of values, are illustrated in Figures D1 to D5 (Appendix D).

3.2 Groundwater Monitoring and Sampling

During the current reporting period, groundwater was sampled at seven representative monitors shown in Figure A4 (Appendix A). These monitors included 36S (in the “ski hill” area), 41S (in the geophysical anomaly) and 3S, 7S, 26S, 30S and 40S (distributed along representative groundwater flow paths from the hill towards the Great Cataraqui River). These groundwater monitors are installed at the water table in landfill wastes. Analyses of the groundwater samples were performed for site- specific indicators of landfill leachate and include - *pH*, *TDS*, *chloride*, *ammonia-N* and *iron*. Groundwater elevations measured on the monitoring dates are included in Table E3 (Appendix E). Results of the sampling program from the current reporting period are summarized in Table E4 (Appendix E). Groundwater chemistry data from the current reporting period, along with historic ranges of values, are illustrated in Figures E1 to E6 (Appendix E).

Light non-aqueous phase liquid (LNAPL) has historically been observed during groundwater monitoring in monitoring wells MW43s and MW43d. Hydrocarbon absorbent socks have been used in these wells to remove free product as it accumulates in the wells over time.

3.2.1 Groundwater Monitoring during the Current Period

Monitoring well MW43s contained a hydrocarbon absorbent sock during the current reporting period. Monitoring wells MW43s and MW43d were monitored monthly for depth to water and presence of LNAPL. LNAPL (measureable thickness, globules, or sheen) was observed in monitoring well MW43s on several occasions during the current

reporting period. The hydrocarbon absorbent sock in the well was monitored monthly and was removed and replaced as needed. LNAPL was not observed and socks were not used in monitoring well MW43d during the current reporting period.

3.3 Surface Water Sampling

The closed Belle Park landfill site is almost completely surrounded by surface water. Since there are neither on-site nor off-site groundwater uses to be impacted by landfill leachate, the surface water surrounding the site represents the receptor of potential concern. In addition to groundwater inputs from the site, there are other sources of contaminants having an influence on water quality of the West Stream and the South Stream. In turn, discharges from these streams and other sources are capable of having an influence on water quality in the Great Cataraqui River.

The surface water monitoring program is undertaken to provide surveillance for landfill indicator parameters and an assessment of compliance with Provincial Water Quality Objectives (PWQOs). Surface water sampling is undertaken at strategic locations around Belle Park to monitor the effectiveness of groundwater remedial measures that have been implemented at the landfill site. Surface water sampling is also undertaken at reference surface water stations on the West Stream and in the Great Cataraqui River to allow characterization of background water quality at locations outside the influence of the Belle Park landfill. Locations of the surface water quality monitoring stations are shown in Figure A5 (Appendix A). Results of the sampling program from the current reporting period are summarized in Table F1 (Appendix F). Surface water chemistry data from the current reporting period, along with historic ranges of values, are illustrated in Figures F1 to F13 (Appendix F).

3.4 QA/QC Samples

The QA/QC sampling program during the current period included blind duplicate samples and field blanks. The QA/QC data are included in the chemistry tables (Tables E1, E2, E4, and F1, Appendices E and F). Results for duplicate samples show good agreement between original and duplicate samples. The spring and fall laboratory prepared blanks were opened at a station during the surface water sampling program to determine if contamination was introduced to samples during the sampling, transporting, or laboratory processes. Low detections of metals were reported in both the spring and fall samples. Due to the low concentrations detected, it is our opinion that the results of this QC sample analyses do not adversely affect the sample data.

4.0 SUMMARY CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

This report documents the operations and monitoring activities conducted at Belle Park during 2013 and 2014.

Site Observations and Related Activities

A total of 113 site visits were conducted by *Malroz* during the current reporting period. Site visits were normally scheduled with a weekly frequency. Additional site visits were undertaken during periods of increased seep activity and during periods of equipment vandalism and power failure. Observations of seepage at various locations triggered several rounds of sampling in accordance with the Belle Park *Seep Management Protocol*. The seeps naturally abated.

Pumping System Management

During the current period, groundwater takings at Belle Park were conducted in accordance with *MOECC* Permits to Take Water #97-P-4109 and #4365-9K2K75. Throughout the current reporting period, water takings remained below the maximum permitted values. Maintenance of the groundwater extraction system included twice weekly inspection and data collection by qualified technicians, semi-annual cleaning of the collection lines, and bi-monthly acid cleaning of wells and trickle beds. Line pressures, pump amperage and run-time data collected by technicians were processed, evaluated and stored by *Malroz*. The current permit for this water taking expires on May 31, 2024.

Golf Course Irrigation

During the current period, surface water takings at Belle Park were conducted in accordance with *MOECC* Permit to Take Water # 3347-87LHB8. Water takings for the golf course irrigation system were measured using a magnetic flow meter and were within *MOECC* permitted volumes and rates during the current reporting period. The current permit for this water taking expires on November 1, 2019.

Waste Water, Groundwater, and Surface Water Quality

During the current reporting period, wastewater, groundwater, and surface water samples exhibited values that reflect historic trends and generally fall within previously established concentration ranges. Wastewater samples did not exceed the City of Kingston Sewer Use By-Law No 2008 -192.

Surface water quality was generally consistent with historic results. The yearly variability in reported metals concentrations is attributed to corresponding degrees of sediment disturbance caused by either change in natural energy levels in the water column or disturbance of sediments during sampling under shallow water conditions.

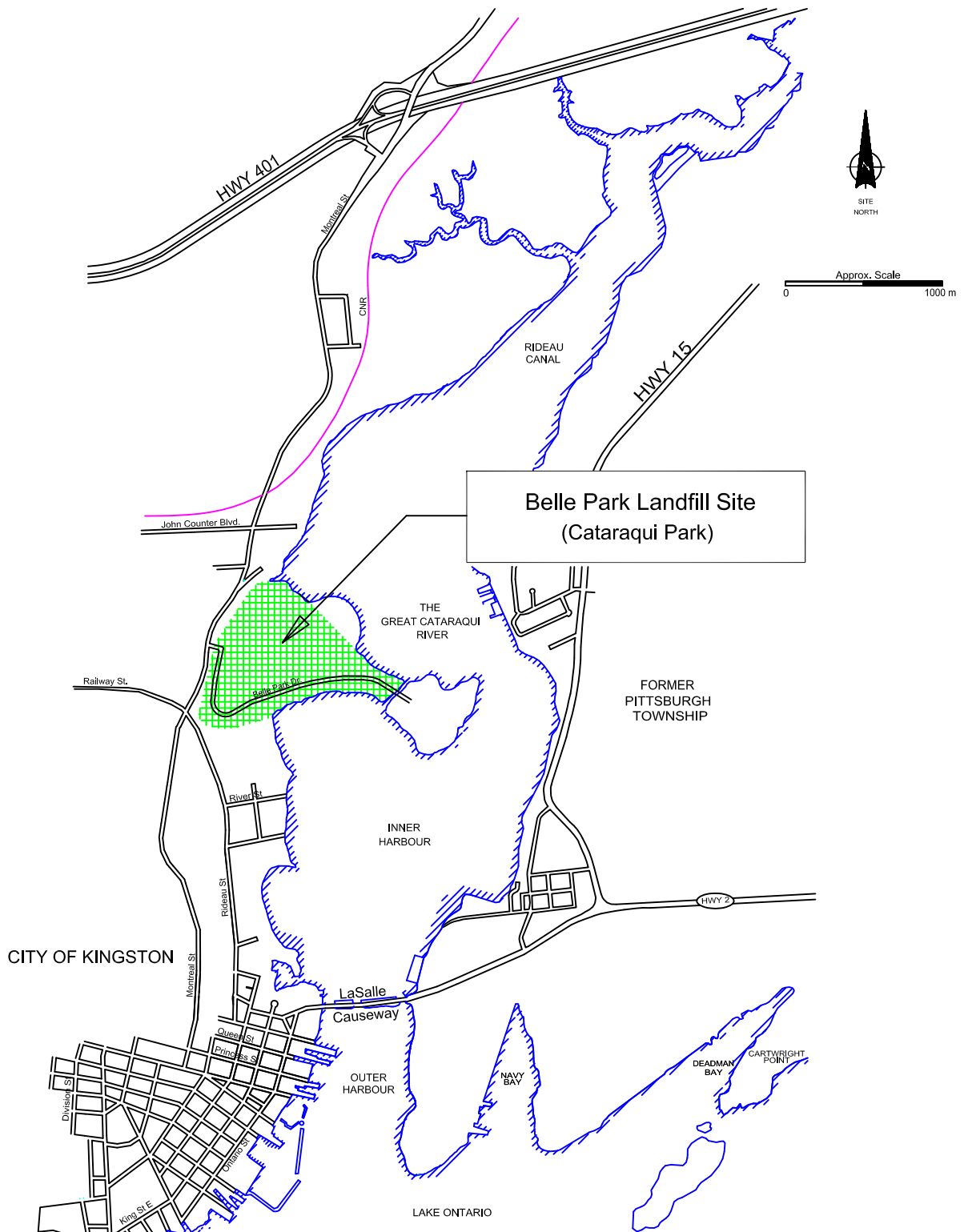
4.2 Recommendations

Results and findings from activities during the current reporting period were evaluated and the following operations and monitoring activities are recommended:

- 1) Maintain Seep Management Plan surveillance of previously identified seep sites along the landfill perimeter where intermittent seepage has been observed and sampled during previous years.
- 2) Continue regular inspections and maintenance activities to ensure ongoing efficient performance of the groundwater extraction system.
- 3) Continue operation of the existing groundwater extraction system and collection of compliance data in support of water taking permits at the site.
- 4) Continue waste water, groundwater, and surface water environmental monitoring programs. Sampling of these media should be continued at the same frequency (twice yearly) at stations that are currently monitored.
- 5) Plan for future modifications to the existing groundwater elevation monitoring program to ensure that sufficient data are being collected to determine the influence, over time, of planted hybrid poplars on the shallow groundwater.
- 6) Repair landfill cover along portions of the ditch between Belle Island and the Belle Park Peninsula.
- 7) Continue to provide site information to regulators and other stakeholders through periodic distribution or public posting of information and open presentations.

APPENDIX A

FIGURES



Site Location

Environmental Operations and Monitoring 2013-2014
Belle Park Landfill Site

Figure

A1

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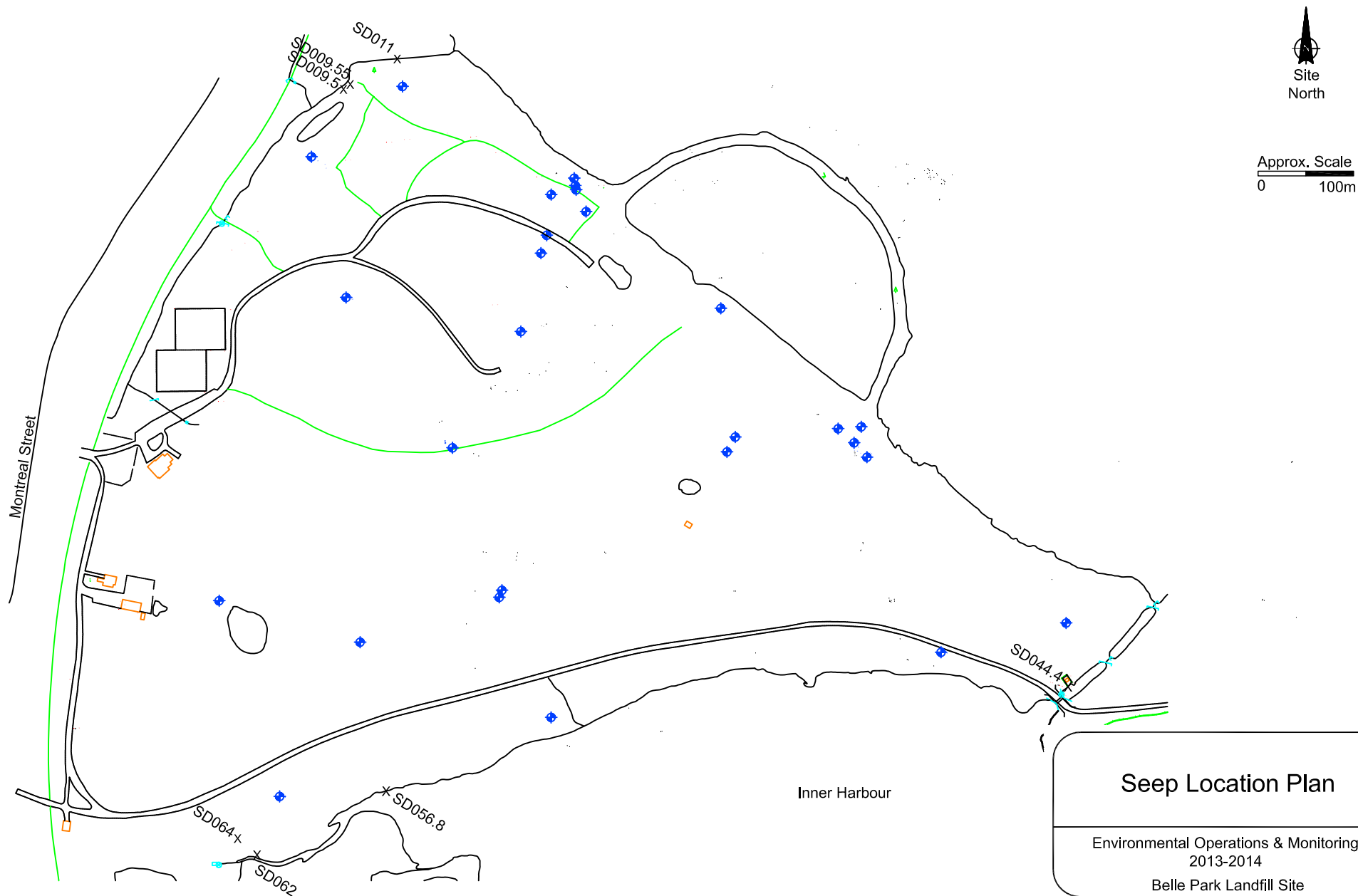
General Site Layout

Environmental Operations & Monitoring 2013-2014
Belle Park Landfill Site

Figure
A2

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Legend:

- ◆ Groundwater Monitor Location
- X SD011 Groundwater Discharge Location and ID.

Seep Location Plan

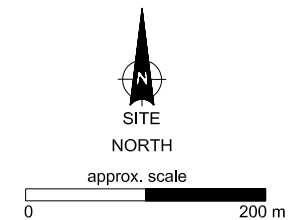
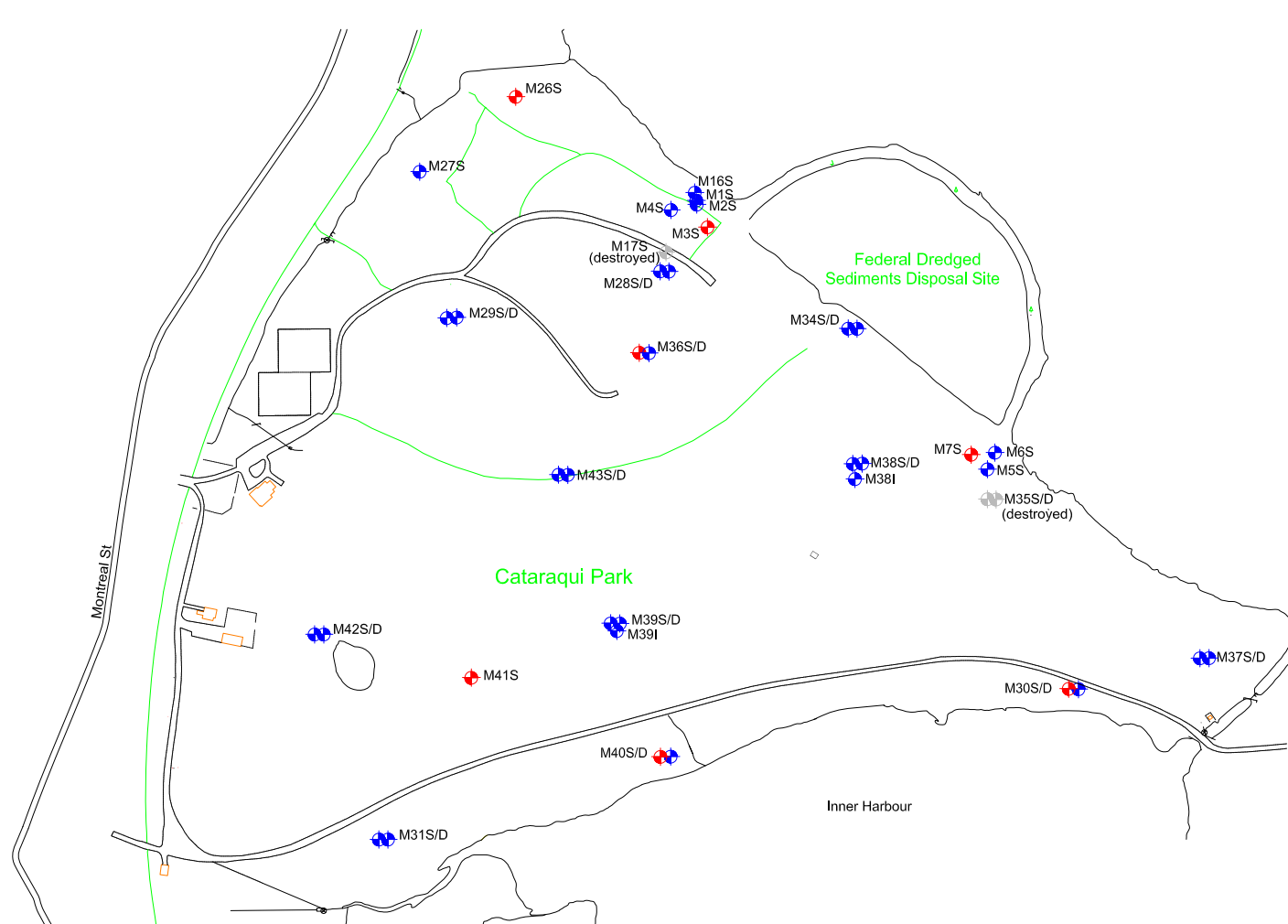
Environmental Operations & Monitoring
2013-2014
Belle Park Landfill Site



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File: 218-1847.25

Figure:

A3



Legend:

- ◆ M41S Groundwater Monitor location and ID. (sampled)
- ◆ M42S Groundwater Monitor location and ID. (not sampled)
- ◆ M17S Groundwater Monitor (destroyed)

Groundwater Sample Locations

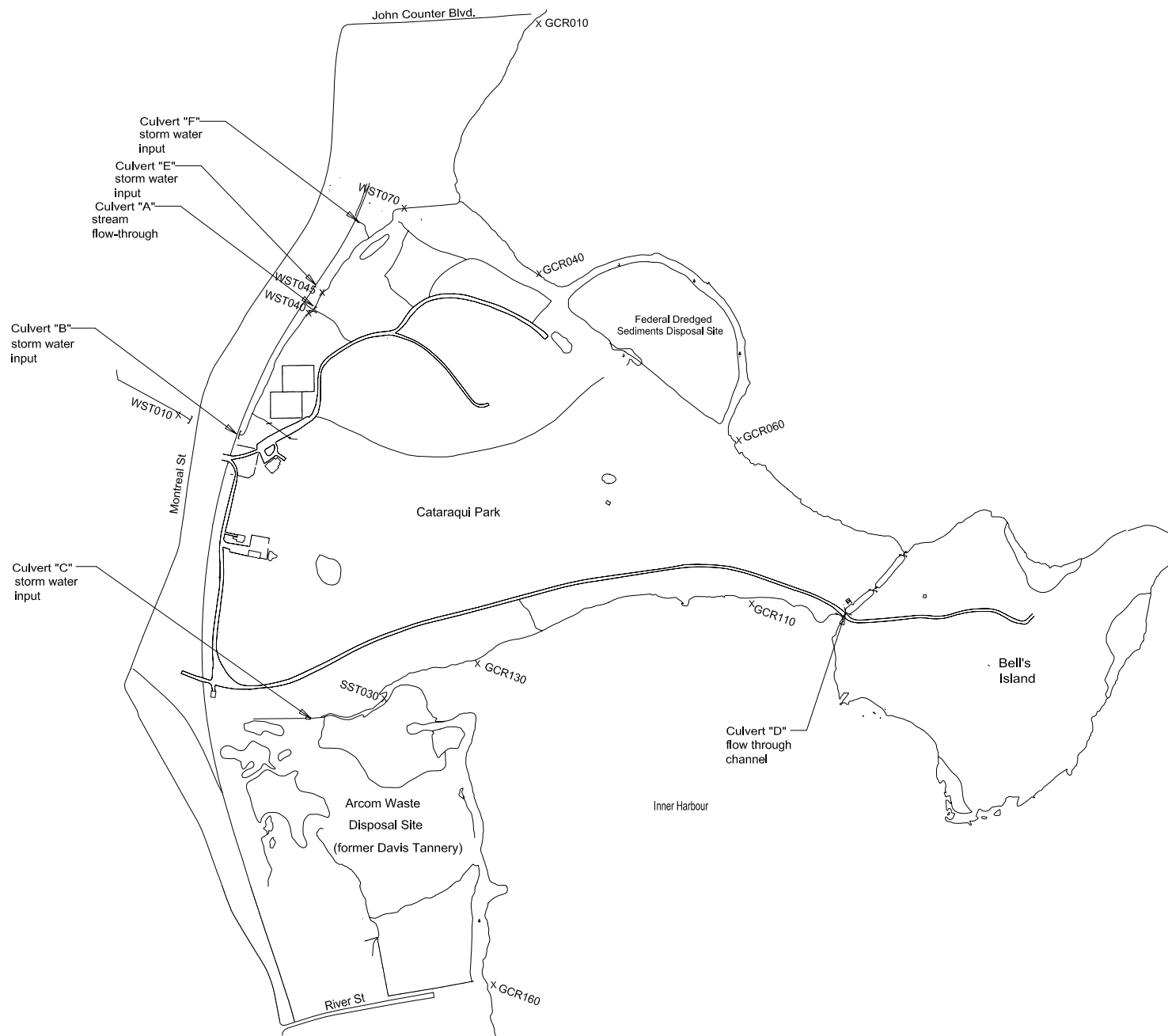
Environmental Operations & Monitoring
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Belle Park Landfill Site



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Figure:

A4



SITE
NORTH

APPROX. SCALE
0 200 m

Legend

GCR Great Cataraqi River
WST West Stream
SST South Stream
X Sampling Station Location and ID
WST 045: sample collected directly in front of SW input from Culvert "E"

Surface Water Sample Locations

Environmental Operations & Monitoring
2013-2014
Belle Park Landfill Site



Date: 14/12/18
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Figure:

A5

APPENDIX B
OPERATIONS AND MANAGEMENT TABLES

Table B1
Permits and Authorizations for Belle Park Environmental Operations

Agency	Authority	Permit/ Authorization	Purpose	Date Issued	Expiry Date
Ministry of Environment	Environmental Protection Act	Provisional C of A #380101	Landfill Closure	May 27, 1974	N/A
Ministry of Environment	Ontario Water Resources Act	PTTW # 97-P-4109	Groundwater Extraction	February 20, 2004	February 19, 2014
Ministry of Environment	Ontario Water Resources Act	PTTW # 4365-9K2K75	Groundwater Extraction	May 21, 2014	May 31, 2024
Ministry of Environment	Ontario Water Resources Act	PTTW # 3347-87LHB8	Belle Park Irrigation	July 22, 2010	November 1, 2019
Cataraqui Region Conservation Authority	Ontario Reg. 143/90	Fill Permit # F-108/12-GCR	Construct GW Extraction Wells	June 11, 2012	June 11, 2014
Cataraqui Region Conservation Authority	Ontario Reg. 143/90	Fill Permit # F-248/14-GCR	Construct GW Extraction Wells	September 23, 2014	September 23, 2016
City of Kingston	Municipal By-Law	By-Law # 2008 -192	Discharge to Municipal Sanitary Sewer	November 4, 2008	N/A

Table B2
Belle Park Seep Management Protocol

Record observations of site conditions during site work and site monitoring visits. Note and record observations of atypical conditions or groundwater seepage and any distinguishing features (e.g. staining or discoloration, films, odours, other unusual features).

< ***Is there evidence of atypical conditions or point source seepage?***

No - Note the location of observation and continue site monitoring.

Yes - Observe for evidence of flow.

Observe whether any flow of water/liquid is associated with the evidence of atypical conditions or seepage. Can discharge flow be identified?

< ***Is there evidence of flow?***

No - Record the location of observation and continue to monitor this location during future monitoring rounds.

Yes - ***Is it possible to collect a sediment-free sample from the flow?***

No - Record the location of observation and continue to monitor this location during future monitoring rounds.

Yes - Sample the discharge flow.

Measure the temperature and pH of the discharge. Sample the discharge and submit for analytical testing of total ammonia and pH. Calculate the un-ionized ammonia concentration using the field measured temperature and pH. If necessary, repeat the sampling and testing to confirm that the test results are reliable.

< ***Does the discharge exceed MOE PWQOs?***

No - Continue to monitor the location during future site visits. Re-sample flow from this location in future scheduled site sampling events to evaluate the quality and quantity of flow from this location.

Yes - Re-sample the flow for a full suite of parameters.

Does the discharge exceed MOE PWQOs?

No - Continue to monitor the location during future site visits. Re-sample flow from this location in future scheduled site sampling events to evaluate the quality and quantity of flow from this location.

Yes - Evaluate the specific nature of the discharge relative to the legal tests required to determine whether it is a significant or trivial discharge.

Evaluate the results against the Aquatic Protection Values (APVs) and Assessment Criteria for Waste Disposal Sites (ACWDSs).

< ***Does the discharge exceed APVs or ACWDSs?***

No - Continue to monitor the location during future site visits. Re-sample flow from this location in future scheduled site sampling events to evaluate the quality and quantity of flow from this location.

Yes - Initiate groundwater management planning. Design groundwater extraction system for temporary seep management (TSM), schedule contractors for TSM system construction.

Upon scheduling contractors, proceed with construction of temporary groundwater extraction system. Include monitoring and maintenance of this system in daily site work. Liaise with MOE and CRCA concerning permit approvals for proposed constructed works.

< ***Proceed with Installation of Interim Management Works***

Table B3
Maintenance Schedule

Date	Pumping System Component	Activity	Comment
May 14, 2013	waste water force mains, collection lines, and clean-outs	high pressure flushing of collection lines to remove precipitates and debris	Scott Environmental did not complete line cleaning due to an equipment malfunction
November 21, 2013	waste water force mains, collection lines, and clean-outs	high pressure flushing of collection lines to remove precipitates and debris	Scott Environmental conducted a partial cleaning with an International (200 psi/65 gpm) Flusher on International Roll-off Truck, and Mack HydroVac Truck but did not complete line cleaning due to an equipment malfunction
May 13, 2014	waste water force mains, collection lines, and clean-outs	high pressure flushing of collection lines to remove precipitates and debris	Scott Environmental did not complete line cleaning due to an equipment malfunction
September 9, 2014	waste water force mains, collection lines, and clean-outs	high pressure flushing of collection lines to remove precipitates and debris	TEAM Solutions attended site but did not have appropriate equipment to conduct the line cleaning.
September 17-19, 2014 October 8, 2014	waste water force mains, collection lines, and clean-outs	high pressure flushing of collection lines to remove precipitates and debris	Drain-All Ltd. conducted work with a combo truck and wet vacuum truck
January 7, 2013 March 4, 2013 May 13, 2013 September 3, 2013 November 8, 2013 March 6, 2014 May 12, 2014 July 10, 2014 September 31, 2014 November 20, 2014	wells and trickle beds	acid wash wells and trickle beds to remove build-up of organic and carbonate precipitates	MacLellan Water Technology conducted cleaning with a Husky 1750 pressure washer (water) and 20° Baume hydrochloric acid

Table B4
Valve Schedule

Well Field	Well ID	Pump	Ball Valve [% closed]	Period	Flow (L/min)¹
North	N2	25S10	NI	2013 - 2014	110
	N3	25S10	NI	2013 - 2014	110
	N4	25S10	NI	2013 - 2014	110
	N5	25S10	NI	2013 - 2014	110
West	W1	25S10	NI	2013 - 2014	110
South	S1	25S10	NI	2013 - 2014	110
	S2	25S10	NI	2013 - 2014	110
	S3	25S10	50	2013 - 2014	57
	S4	25S10	0	2013 - 2014	110
	S5	25S10	0	2013 - 2014	110
	S6	25S10	NI	2013 - 2014	110
	S7	25S10	NI	2013 - 2014	110
	S8	25S10	50	2013 - 2014	57
East	E1	25S10	30	2013 - 2014	76
	E3a	25S10	30	2013 - 2014	76
	E3b	25S10	30	2013 - 2014	76

¹ Pump flow rates less than 110 L/min (max) are based on actual measurements

NI Not Installed

APPENDIX C
WATER TAKING TABLES AND FIGURES

Table C1
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

January 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/01/2013	0	0	0	0
02/01/2013	0	0	0	0
03/01/2013	111,483	10,983	525,501	335,023
04/01/2013	0	0	0	0
05/01/2013	0	0	0	0
06/01/2013	0	0	0	0
07/01/2013	0	0	0	0
08/01/2013	0	0	0	0
09/01/2013	0	0	0	0
10/01/2013	185,634	23,029	1,129,755	817,927
11/01/2013	0	0	0	0
12/01/2013	0	0	0	0
13/01/2013	0	0	0	0
14/01/2013	0	0	0	0
15/01/2013	0	0	0	0
16/01/2013	0	0	0	0
17/01/2013	594,844	70,678	1,805,096	1,160,794
18/01/2013	0	0	0	0
19/01/2013	0	0	0	0
20/01/2013	0	0	0	0
21/01/2013	0	0	0	0
22/01/2013	0	0	0	0
23/01/2013	0	0	0	0
24/01/2013	406,490	56,385	1,088,924	1,100,830
25/01/2013	0	0	0	0
26/01/2013	0	0	0	0
27/01/2013	0	0	0	0
28/01/2013	0	0	0	0
29/01/2013	0	0	0	0
30/01/2013	0	0	0	0
31/01/2013	271,767	48,612	901,352	948,206
Daily Mean (L)	50,652	6,764	175,827	140,735
Cumulative (L)	1,570,218	209,687	5,450,629	4,362,780

February 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/02/2013	0	0	0	0
02/02/2013	0	0	0	0
03/02/2013	0	0	0	0
04/02/2013	0	0	0	0
05/02/2013	0	0	0	0
06/02/2013	0	0	0	0
07/02/2013	326,023	53,222	1,403,398	1,419,437
08/02/2013	0	0	0	0
09/02/2013	0	0	0	0
10/02/2013	0	0	0	0
11/02/2013	0	0	0	0
12/02/2013	0	0	0	0
13/02/2013	0	0	0	0
14/02/2013	270,370	40,247	1,428,498	851,398
15/02/2013	0	0	0	0
16/02/2013	0	0	0	0
17/02/2013	0	0	0	0
18/02/2013	0	0	0	0
19/02/2013	0	0	0	0
20/02/2013	0	0	0	0
21/02/2013	254,894	35,826	1,024,099	785,597
22/02/2013	0	0	0	0
23/02/2013	0	0	0	0
24/02/2013	0	0	0	0
25/02/2013	0	0	0	0
26/02/2013	0	0	0	0
27/02/2013	0	0	0	0
28/02/2013	294,789	35,306	1,062,640	986,875
Daily Mean (L)	40,931	5,879	175,666	144,404
Cumulative (L)	1,146,077	164,601	4,918,634	4,043,306

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals.
Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

March 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/03/2013	0	0	0	0
02/03/2013	0	0	0	0
03/03/2013	0	0	0	0
04/03/2013	0	0	0	0
05/03/2013	0	0	0	0
06/03/2013	0	0	0	0
07/03/2013	350,077	41,933	1,266,791	1,193,945
08/03/2013	0	0	0	0
09/03/2013	0	0	0	0
10/03/2013	0	0	0	0
11/03/2013	0	0	0	0
12/03/2013	0	0	0	0
13/03/2013	0	0	0	0
14/03/2013	0	0	0	0
15/03/2013	1,089,625	102,927	2,570,218	1,347,206
16/03/2013	0	0	0	0
17/03/2013	0	0	0	0
18/03/2013	0	0	0	0
19/03/2013	0	0	0	0
20/03/2013	0	0	0	0
21/03/2013	582,381	59,718	1,698,891	1,304,251
22/03/2013	0	0	0	0
23/03/2013	0	0	0	0
24/03/2013	0	0	0	0
25/03/2013	0	0	0	0
26/03/2013	0	0	0	0
27/03/2013	0	0	0	0
28/03/2013	484,696	62,173	1,891,064	1,543,469
29/03/2013	0	0	0	0
30/03/2013	0	0	0	0
31/03/2013	278,262	33,047	878,885	617,867
Daily Mean (L)	89,840	9,671	267,931	193,766
Cumulative (L)	2,785,041	299,798	8,305,850	6,006,738

April 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/04/2013	0	0	0	0
02/04/2013	0	0	0	0
03/04/2013	0	0	0	0
04/04/2013	371,016	44,062	1,171,847	823,823
05/04/2013	0	0	0	0
06/04/2013	0	0	0	0
07/04/2013	0	0	0	0
08/04/2013	0	0	0	0
09/04/2013	0	0	0	0
10/04/2013	0	0	0	0
11/04/2013	462,767	57,531	1,891,459	1,244,105
12/04/2013	0	0	0	0
13/04/2013	0	0	0	0
14/04/2013	0	0	0	0
15/04/2013	0	0	0	0
16/04/2013	0	0	0	0
17/04/2013	0	0	0	0
18/04/2013	1,051,940	97,027	2,956,344	1,254,638
19/04/2013	0	0	0	0
20/04/2013	0	0	0	0
21/04/2013	0	0	0	0
22/04/2013	0	0	0	0
23/04/2013	0	0	0	0
24/04/2013	0	0	0	0
25/04/2013	756,225	71,325	3,239,567	987,468
26/04/2013	0	0	0	0
27/04/2013	0	0	0	0
28/04/2013	0	0	0	0
29/04/2013	0	0	0	0
30/04/2013	515,115	39,412	2,122,326	953,105
Daily Mean (L)	105,235	10,312	379,385	175,438
Cumulative (L)	3,157,063	309,358	11,381,544	5,263,139

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals.
Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

May 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/05/2013	0	0	0	0
02/05/2013	206,046	15,765	848,930	381,242
03/05/2013	0	0	0	0
04/05/2013	0	0	0	0
05/05/2013	0	0	0	0
06/05/2013	0	0	0	0
07/05/2013	0	0	0	0
08/05/2013	0	0	0	0
09/05/2013	784,215	42,756	2,923,132	829,099
10/05/2013	0	0	0	0
11/05/2013	0	0	0	0
12/05/2013	0	0	0	0
13/05/2013	0	0	0	0
14/05/2013	0	0	0	0
15/05/2013	0	0	0	0
16/05/2013	463,623	40,010	2,953,836	1,109,676
17/05/2013	0	0	0	0
18/05/2013	0	0	0	0
19/05/2013	0	0	0	0
20/05/2013	0	0	0	0
21/05/2013	0	0	0	0
22/05/2013	0	0	0	0
23/05/2013	304,440	30,269	2,073,586	1,335,305
24/05/2013	0	0	0	0
25/05/2013	0	0	0	0
26/05/2013	0	0	0	0
27/05/2013	0	0	0	0
28/05/2013	0	0	0	0
29/05/2013	283,773	25,169	1,988,388	881,038
30/05/2013	0	0	0	0
31/05/2013	176,809	10,602	736,272	424,468
Daily Mean (L)	71,578	5,309	371,747	160,027
Cumulative (L)	2,218,906	164,571	11,524,144	4,960,827

June 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/06/2013	0	0	0	0
02/06/2013	0	0	0	0
03/06/2013	0	0	0	0
04/06/2013	0	0	0	0
05/06/2013	0	0	0	0
06/06/2013	530,427	31,806	2,208,816	1,273,403
07/06/2013	0	0	0	0
08/06/2013	0	0	0	0
09/06/2013	0	0	0	0
10/06/2013	0	0	0	0
11/06/2013	0	0	0	0
12/06/2013	0	0	0	0
13/06/2013	1,077,716	107,917	2,820,143	1,689,845
14/06/2013	0	0	0	0
15/06/2013	0	0	0	0
16/06/2013	0	0	0	0
17/06/2013	0	0	0	0
18/06/2013	0	0	0	0
19/06/2013	0	0	0	0
20/06/2013	1,362,959	121,109	4,400,693	1,849,034
21/06/2013	0	0	0	0
22/06/2013	0	0	0	0
23/06/2013	0	0	0	0
24/06/2013	0	0	0	0
25/06/2013	0	0	0	0
26/06/2013	0	0	0	0
27/06/2013	1,279,865	34,251	3,464,311	1,369,368
28/06/2013	0	0	0	0
29/06/2013	0	0	0	0
30/06/2013	579,665	12,384	1,611,476	335,688
Daily Mean (L)	161,021	10,249	483,515	217,245
Cumulative (L)	4,830,632	307,467	14,505,440	6,517,338

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

July 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/07/2013	0	0	0	0
02/07/2013	0	0	0	0
03/07/2013	0	0	0	0
04/07/2013	772,886	16,512	2,148,635	447,584
05/07/2013	0	0	0	0
06/07/2013	0	0	0	0
07/07/2013	0	0	0	0
08/07/2013	0	0	0	0
09/07/2013	0	0	0	0
10/07/2013	0	0	0	0
11/07/2013	1,350,733	19,928	3,760,219	867,494
12/07/2013	0	0	0	0
13/07/2013	0	0	0	0
14/07/2013	0	0	0	0
15/07/2013	0	0	0	0
16/07/2013	0	0	0	0
17/07/2013	0	0	0	0
18/07/2013	1,309,207	12,520	3,975,066	1,216,517
19/07/2013	0	0	0	0
20/07/2013	0	0	0	0
21/07/2013	0	0	0	0
22/07/2013	0	0	0	0
23/07/2013	0	0	0	0
24/07/2013	0	0	0	0
25/07/2013	1,172,870	10,055	4,115,286	946,109
26/07/2013	0	0	0	0
27/07/2013	0	0	0	0
28/07/2013	0	0	0	0
29/07/2013	0	0	0	0
30/07/2013	0	0	0	0
31/07/2013	1,006,987	7,062	3,332,171	729,926
Daily Mean (L)	181,054	2,131	559,077	135,730
Cumulative (L)	5,612,683	66,076	17,331,378	4,207,629

August 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/08/2013	167,831	1,177	555,362	121,654
02/08/2013	0	0	0	0
03/08/2013	0	0	0	0
04/08/2013	0	0	0	0
05/08/2013	0	0	0	0
06/08/2013	915,564	4,380	2,821,544	567,127
07/08/2013	0	0	0	0
08/08/2013	0	0	0	0
09/08/2013	0	0	0	0
10/08/2013	0	0	0	0
11/08/2013	0	0	0	0
12/08/2013	0	0	0	0
13/08/2013	1,201,663	5,295	2,753,274	816,331
14/08/2013	0	0	0	0
15/08/2013	0	0	0	0
16/08/2013	0	0	0	0
17/08/2013	0	0	0	0
18/08/2013	0	0	0	0
19/08/2013	0	0	0	0
20/08/2013	961,254	2,057	5,259,977	949,985
21/08/2013	0	0	0	0
22/08/2013	0	0	0	0
23/08/2013	0	0	0	0
24/08/2013	0	0	0	0
25/08/2013	0	0	0	0
26/08/2013	0	0	0	0
27/08/2013	729,699	0	2,796,752	1,285,738
28/08/2013	0	0	0	0
29/08/2013	0	0	0	0
30/08/2013	0	0	0	0
31/08/2013	353,483	3,501	2,186,510	882,503
Daily Mean (L)	139,661	529	528,175	149,140
Cumulative (L)	4,329,494	16,410	16,373,419	4,623,338

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

September 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/09/2013	0	0	0	0
02/09/2013	0	0	0	0
03/09/2013	265,112	2,625	1,639,883	661,877
04/09/2013	0	0	0	0
05/09/2013	0	0	0	0
06/09/2013	0	0	0	0
07/09/2013	0	0	0	0
08/09/2013	0	0	0	0
09/09/2013	0	0	0	0
10/09/2013	502,318	3,941	3,758,725	1,347,982
11/09/2013	0	0	0	0
12/09/2013	0	0	0	0
13/09/2013	0	0	0	0
14/09/2013	0	0	0	0
15/09/2013	0	0	0	0
16/09/2013	0	0	0	0
17/09/2013	427,704	4,053	2,647,084	1,023,173
18/09/2013	0	0	0	0
19/09/2013	0	0	0	0
20/09/2013	0	0	0	0
21/09/2013	0	0	0	0
22/09/2013	0	0	0	0
23/09/2013	0	0	0	0
24/09/2013	354,617	5,165	2,447,169	767,995
25/09/2013	0	0	0	0
26/09/2013	0	0	0	0
27/09/2013	0	0	0	0
28/09/2013	0	0	0	0
29/09/2013	0	0	0	0
30/09/2013	272,916	3,910	1,478,064	654,412
Daily Mean (L)	60,756	656	399,031	148,515
Cumulative (L)	1,822,667	19,695	11,970,925	4,455,439

October 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/10/2013	45,486	652	246,344	109,069
02/10/2013	0	0	0	0
03/10/2013	0	0	0	0
04/10/2013	0	0	0	0
05/10/2013	0	0	0	0
06/10/2013	0	0	0	0
07/10/2013	0	0	0	0
08/10/2013	316,801	4,838	1,072,293	938,585
09/10/2013	0	0	0	0
10/10/2013	0	0	0	0
11/10/2013	0	0	0	0
12/10/2013	0	0	0	0
13/10/2013	0	0	0	0
14/10/2013	0	0	0	0
15/10/2013	298,030	6,145	1,168,350	1,003,793
16/10/2013	0	0	0	0
17/10/2013	0	0	0	0
18/10/2013	0	0	0	0
19/10/2013	0	0	0	0
20/10/2013	0	0	0	0
21/10/2013	0	0	0	0
22/10/2013	358,466	8,300	1,773,630	8,803,627
23/10/2013	0	0	0	0
24/10/2013	54,656	0	0	0
25/10/2013	0	0	0	0
26/10/2013	22,373	0	0	0
27/10/2013	20,883	0	0	0
28/10/2013	15,914	0	0	0
29/10/2013	15,690	7,443	936,191	4,757,038
30/10/2013	14,787	0	0	0
31/10/2013	15,284	4,815	506,190	1,609,341
Daily Mean (L)	38,012	1,038	183,968	555,531
Cumulative (L)	1,178,370	32,193	5,702,998	17,221,452

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

November 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/11/2013	19,506	0	0	0
02/11/2013	21,560	0	0	0
03/11/2013	20,656	0	0	0
04/11/2013	17,948	0	0	0
05/11/2013	18,962	12,038	1,265,475	4,023,353
06/11/2013	27,226	0	0	0
07/11/2013	23,592	0	0	0
08/11/2013	21,695	0	0	0
09/11/2013	29,123	0	0	0
10/11/2013	24,716	0	0	0
11/11/2013	24,266	0	0	0
12/11/2013	22,350	11,107	1,979,096	1,341,096
13/11/2013	22,688	0	0	0
14/11/2013	21,447	0	0	0
15/11/2013	20,769	0	0	0
16/11/2013	24,608	0	0	0
17/11/2013	20,180	0	0	0
18/11/2013	21,108	0	0	0
19/11/2013	21,668	17,520	1,817,692	786,281
20/11/2013	23,479	0	0	0
21/11/2013	36,912	0	0	0
22/11/2013	32,509	0	0	0
23/11/2013	26,527	0	0	0
24/11/2013	20,878	0	0	0
25/11/2013	31,832	0	0	0
26/11/2013	20,429	18,710	1,768,565	809,126
27/11/2013	34,654	0	0	0
28/11/2013	23,705	0	0	0
29/11/2013	0	0	0	0
30/11/2013	28,536	10,765	720,202	467,283
Daily Mean (L)	23,451	2,338	251,701	247,571
Cumulative (L)	703,528	70,140	7,551,029	7,427,139

December 2013	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/12/2013	20,205	0	0	0
02/12/2013	0	0	0	0
03/12/2013	250,594	8,074	540,151	350,462
04/12/2013	0	0	0	0
05/12/2013	0	0	0	0
06/12/2013	0	0	0	0
07/12/2013	0	0	0	0
08/12/2013	0	0	0	0
09/12/2013	0	0	0	0
10/12/2013	705,204	18,632	1,544,004	874,061
11/12/2013	0	0	0	0
12/12/2013	0	0	0	0
13/12/2013	0	0	0	0
14/12/2013	0	0	0	0
15/12/2013	0	0	0	0
16/12/2013	0	0	0	0
17/12/2013	269,724	12,647	802,344	1,042,963
18/12/2013	0	0	0	0
19/12/2013	0	0	0	0
20/12/2013	0	0	0	0
21/12/2013	0	0	0	0
22/12/2013	0	0	0	570,182
23/12/2013	277,501	10,444	249,625	3,116
24/12/2013	0	0	10,046	4,028
25/12/2013	0	0	4,854	3,876
26/12/2013	0	0	7,676	2,964
27/12/2013	0	0	8,014	2,736
28/12/2013	0	0	7,563	2,812
29/12/2013	0	0	9,256	2,812
30/12/2013	348,799	11,920	315,302	46
31/12/2013	5,027	2,200	55,649	85,380
Daily Mean (L)	60,550	2,062	114,661	95,014
Cumulative (L)	1,877,055	63,917	3,554,486	2,945,438
Monthly Mean	85,228	4,745	324,223	196,926
Yearly Cumulative	31,231,735	1,723,913	118,570,475	72,034,565

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

(continued)

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

January 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/01/2014	0	0	3,068	0
02/01/2014	0	0	4,462	0
03/01/2014	0	0	349	0
04/01/2014	0	0	418	0
05/01/2014	0	0	837	0
06/01/2014	0	0	4,602	0
07/01/2014	431,060	18,852	902,769	1,000,572
08/01/2014	0	0	0	0
09/01/2014	0	0	0	0
10/01/2014	0	0	0	0
11/01/2014	0	0	0	0
12/01/2014	0	0	0	0
13/01/2014	0	0	0	0
14/01/2014	1,043,090	41,869	2,952,556	1,015,968
15/01/2014	0	0	0	0
16/01/2014	0	0	0	0
17/01/2014	0	0	0	0
18/01/2014	0	0	0	0
19/01/2014	0	0	0	0
20/01/2014	0	0	0	0
21/01/2014	1,305,200	49,892	3,309,393	1,683,780
22/01/2014	0	0	0	0
23/01/2014	0	0	0	0
24/01/2014	0	0	0	0
25/01/2014	0	0	0	0
26/01/2014	0	0	0	0
27/01/2014	0	0	0	0
28/01/2014	653,798	39,041	2,595,162	1,414,991
29/01/2014	0	0	0	0
30/01/2014	0	0	0	0
31/01/2014	189,089	14,793	986,115	521,745
Daily Mean (L)	116,846	5,305	347,088	181,841
Cumulative (L)	3,622,236	164,447	10,759,729	5,637,057

February 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/02/2014	0	0	0	0
02/02/2014	0	0	0	0
03/02/2014	0	0	0	0
04/02/2014	252,118	19,724	1,314,819	695,661
05/02/2014	0	0	0	0
06/02/2014	0	0	0	0
07/02/2014	0	0	0	0
08/02/2014	0	0	0	0
09/02/2014	0	0	0	0
10/02/2014	0	0	0	0
11/02/2014	471,767	32,050	2,209,488	1,069,822
12/02/2014	0	0	0	0
13/02/2014	0	0	0	0
14/02/2014	0	0	0	0
15/02/2014	0	0	0	0
16/02/2014	0	0	0	0
17/02/2014	0	0	0	0
18/02/2014	381,400	29,081	2,892,166	1,107,396
19/02/2014	0	0	0	0
20/02/2014	0	0	0	0
21/02/2014	0	0	0	0
22/02/2014	0	0	0	0
23/02/2014	0	0	0	0
24/02/2014	0	0	0	0
25/02/2014	952,201	48,918	2,801,354	1,192,349
26/02/2014	0	0	0	0
27/02/2014	0	0	0	0
28/02/2014	359,653	16,897	939,421	510,772
Daily Mean (L)	86,326	5,238	362,759	163,429
Cumulative (L)	2,417,139	146,670	10,157,248	4,575,999

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals.
Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

March 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/03/2014	0	0	0	0
02/03/2014	0	0	0	0
03/03/2014	0	0	0	0
04/03/2014	479,537	22,529	1,252,562	681,029
05/03/2014	0	0	0	0
06/03/2014	0	0	0	0
07/03/2014	0	0	0	0
08/03/2014	0	0	0	0
09/03/2014	0	0	0	0
10/03/2014	0	0	0	0
11/03/2014	644,470	35,342	2,135,964	1,014,737
12/03/2014	0	0	0	0
13/03/2014	0	0	0	0
14/03/2014	0	0	0	0
15/03/2014	0	0	0	0
16/03/2014	0	0	0	0
17/03/2014	0	0	0	0
18/03/2014	641,144	38,720	2,286,317	1,025,362
19/03/2014	0	0	0	0
20/03/2014	0	0	0	0
21/03/2014	0	0	0	0
22/03/2014	0	0	0	0
23/03/2014	0	0	0	0
24/03/2014	0	0	0	0
25/03/2014	953,469	53,713	2,869,835	764,849
26/03/2014	0	0	0	0
27/03/2014	0	0	0	0
28/03/2014	0	0	0	0
29/03/2014	0	0	0	0
30/03/2014	0	0	0	0
31/03/2014	1,085,146	60,410	2,936,470	937,979
Daily Mean (L)	122,702	6,797	370,360	142,708
Cumulative (L)	3,803,767	210,714	11,481,148	4,423,956

April 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/04/2014	180,858	10,068	489,412	156,330
02/04/2014	0	0	0	0
03/04/2014	0	0	0	0
04/04/2014	0	0	0	0
05/04/2014	0	0	0	0
06/04/2014	0	0	0	0
07/04/2014	2,145,217	139,781	3,820,304	1,741,966
08/04/2014	0	0	0	0
09/04/2014	0	0	0	0
10/04/2014	0	0	0	0
11/04/2014	0	0	0	0
12/04/2014	0	0	0	0
13/04/2014	0	0	0	0
14/04/2014	2,855,903	233,338	4,659,447	1,489,524
15/04/2014	0	0	0	0
16/04/2014	0	0	0	0
17/04/2014	0	0	0	0
18/04/2014	0	0	0	0
19/04/2014	0	0	0	0
20/04/2014	0	0	0	0
21/04/2014	2,102,855	175,427	4,935,506	1,455,689
22/04/2014	0	0	0	0
23/04/2014	0	0	0	0
24/04/2014	0	0	0	0
25/04/2014	0	0	0	0
26/04/2014	0	0	0	0
27/04/2014	0	0	0	0
28/04/2014	1,010,306	111,271	4,206,502	1,273,061
29/04/2014	0	0	0	0
30/04/2014	419,533	38,493	1,434,373	441,447
Daily Mean (L)	290,489	23,613	651,518	218,601
Cumulative (L)	8,714,673	708,378	19,545,543	6,558,016

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals.
Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

May 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/05/2014	0	0	0	0
02/05/2014	0	0	0	0
03/05/2014	0	0	0	0
04/05/2014	0	0	0	0
05/05/2014	1,048,832	96,231	3,585,933	1,103,618
06/05/2014	0	0	0	0
07/05/2014	0	0	0	0
08/05/2014	0	0	0	0
09/05/2014	0	0	0	0
10/05/2014	0	0	0	0
11/05/2014	0	0	0	0
12/05/2014	0	0	0	0
13/05/2014	1,257,063	116,979	6,291,706	2,640,468
14/05/2014	0	0	0	0
15/05/2014	0	0	0	0
16/05/2014	0	0	0	0
17/05/2014	0	0	0	0
18/05/2014	0	0	0	0
19/05/2014	0	0	0	0
20/05/2014	1,559,327	116,246	5,846,650	2,076,031
21/05/2014	0	0	0	0
22/05/2014	0	0	0	0
23/05/2014	0	0	0	0
24/05/2014	0	0	0	0
25/05/2014	0	0	0	0
26/05/2014	0	0	0	0
27/05/2014	2,035,484	97,530	6,788,209	1,739,047
28/05/2014	0	0	0	0
29/05/2014	0	0	0	0
30/05/2014	0	0	0	0
31/05/2014	814,566	41,405	3,147,816	1,263,954
Daily Mean (L)	216,622	15,109	827,752	284,617
Cumulative (L)	6,715,273	468,392	25,660,313	8,823,118

June 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/06/2014	0	0	0	0
02/06/2014	0	0	0	0
03/06/2014	610,925	31,053	2,360,862	947,965
04/06/2014	0	0	0	0
05/06/2014	0	0	0	0
06/06/2014	0	0	0	0
07/06/2014	0	0	0	0
08/06/2014	0	0	0	0
09/06/2014	0	0	0	0
10/06/2014	1,613,971	218,756	4,486,765	2,224,733
11/06/2014	0	0	0	0
12/06/2014	0	0	0	0
13/06/2014	0	0	0	0
14/06/2014	0	0	0	0
15/06/2014	0	0	0	0
16/06/2014	0	0	0	0
17/06/2014	1,409,841	97,091	6,006,082	2,252,549
18/06/2014	0	0	0	0
19/06/2014	0	0	0	0
20/06/2014	0	0	0	0
21/06/2014	0	0	0	0
22/06/2014	0	0	0	0
23/06/2014	0	0	0	0
24/06/2014	1,506,204	75,656	5,581,542	1,621,627
25/06/2014	0	0	0	0
26/06/2014	0	0	0	0
27/06/2014	0	0	0	0
28/06/2014	0	0	0	0
29/06/2014	0	0	0	0
30/06/2014	1,336,173	57,580	4,411,857	1,596,228
Daily Mean (L)	215,904	16,005	761,570	288,103
Cumulative (L)	6,477,114	480,137	22,847,109	8,643,102

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

July 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/07/2014	0	0	0	0
02/07/2014	0	0	0	0
03/07/2014	0	0	0	0
04/07/2014	0	0	0	0
05/07/2014	0	0	0	0
06/07/2014	0	0	0	0
07/07/2014	0	0	0	0
08/07/2014	1,821,231	58,865	5,493,288	2,006,993
09/07/2014	0	0	0	0
10/07/2014	0	0	0	0
11/07/2014	0	0	0	0
12/07/2014	0	0	0	0
13/07/2014	0	0	0	0
14/07/2014	0	0	0	0
15/07/2014	1,379,870	41,117	4,454,096	1,706,352
16/07/2014	0	0	0	0
17/07/2014	0	0	0	0
18/07/2014	0	0	0	0
19/07/2014	0	0	0	0
20/07/2014	0	0	0	0
21/07/2014	0	0	0	0
22/07/2014	1,205,372	48,443	3,762,995	1,665,358
23/07/2014	0	0	0	0
24/07/2014	0	0	0	0
25/07/2014	0	0	0	0
26/07/2014	0	0	0	0
27/07/2014	0	0	0	0
28/07/2014	0	0	0	0
29/07/2014	956,757	8,199	2,949,872	1,515,881
30/07/2014	0	0	0	0
31/07/2014	521,673	7,874	912,159	348,619
Daily Mean (L)	189,836	5,306	566,852	233,652
Cumulative (L)	5,884,902	164,498	17,572,410	7,243,202

August 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/08/2014	0	0	0	0
02/08/2014	0	0	0	0
03/08/2014	0	0	0	0
04/08/2014	0	0	0	0
05/08/2014	1,304,183	19,685	2,280,396	871,546
06/08/2014	0	0	0	0
07/08/2014	0	0	0	0
08/08/2014	0	0	0	0
09/08/2014	0	0	0	0
10/08/2014	0	0	0	0
11/08/2014	0	0	0	0
12/08/2014	1,336,115	22,534	2,892,521	1,367,658
13/08/2014	0	0	0	0
14/08/2014	0	0	0	0
15/08/2014	0	0	0	0
16/08/2014	0	0	0	0
17/08/2014	0	0	0	0
18/08/2014	0	0	0	0
19/08/2014	1,014,660	43,125	3,309,456	1,607,058
20/08/2014	0	0	0	0
21/08/2014	0	0	0	0
22/08/2014	0	0	0	0
23/08/2014	0	0	0	0
24/08/2014	0	0	0	0
25/08/2014	0	0	0	0
26/08/2014	0	0	0	0
27/08/2014	930,120	32,420	3,652,660	1,752,226
28/08/2014	0	0	0	0
29/08/2014	0	0	0	0
30/08/2014	0	0	0	0
31/08/2014	460,635	14,514	768,557	918,810
Daily Mean (L)	162,765	4,267	416,245	210,235
Cumulative (L)	5,045,713	132,278	12,903,590	6,517,297

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

September 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/09/2014	0	0	0	0
02/09/2014	230,318	7,257	384,279	459,405
03/09/2014	0	0	0	0
04/09/2014	0	0	0	0
05/09/2014	0	0	0	0
06/09/2014	0	0	0	0
07/09/2014	0	0	0	0
08/09/2014	0	0	0	0
09/09/2014	807,587	20,648	2,204,355	1,485,967
10/09/2014	0	0	0	0
11/09/2014	0	0	0	0
12/09/2014	0	0	0	0
13/09/2014	0	0	0	0
14/09/2014	0	0	0	0
15/09/2014	0	0	0	0
16/09/2014	681,267	22,288	1,544,440	829,373
17/09/2014	0	0	0	0
18/09/2014	0	0	0	0
19/09/2014	0	0	0	0
20/09/2014	0	0	0	0
21/09/2014	0	0	0	0
22/09/2014	0	0	0	0
23/09/2014	501,488	22,068	1,221,924	881,767
24/09/2014	0	0	0	0
25/09/2014	0	0	0	0
26/09/2014	0	0	0	0
27/09/2014	0	0	0	0
28/09/2014	0	0	0	0
29/09/2014	0	0	0	0
30/09/2014	418,885	22,227	880,535	837,398
Daily Mean (L)	87,985	3,150	207,851	149,797
Cumulative (L)	2,639,545	94,488	6,235,533	4,493,910

October 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/10/2014	0	0	0	0
02/10/2014	0	0	0	0
03/10/2014	0	0	0	0
04/10/2014	0	0	0	0
05/10/2014	0	0	0	0
06/10/2014	0	0	0	0
07/10/2014	368,097	21,268	718,381	776,203
08/10/2014	0	0	0	0
09/10/2014	0	0	0	0
10/10/2014	0	0	0	0
11/10/2014	0	0	0	0
12/10/2014	0	0	0	0
13/10/2014	263,538	18,228	625,969	694,534
14/10/2014	0	0	0	0
15/10/2014	0	0	0	0
16/10/2014	0	0	0	0
17/10/2014	0	0	0	0
18/10/2014	0	0	0	0
19/10/2014	0	0	0	0
20/10/2014	0	0	0	0
21/10/2014	199,246	22,807	707,472	864,850
22/10/2014	0	0	0	0
23/10/2014	0	0	0	0
24/10/2014	0	0	0	0
25/10/2014	0	0	0	0
26/10/2014	0	0	0	0
27/10/2014	0	0	0	0
28/10/2014	164,182	23,310	585,237	762,842
29/10/2014	0	0	0	0
30/10/2014	0	0	0	0
31/10/2014	69,316	8,738	249,782	451,929
Daily Mean (L)	34,335	3,044	93,124	114,528
Cumulative (L)	1,064,378	94,351	2,886,842	3,550,357

(continued)

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C1 (continued)
Wastewater Withdrawal Records for Extraction Wells
Cumulative Average Daily Flow (Reported Weekly)

November 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/11/2014	0	0	0	0
02/11/2014	0	0	0	0
03/11/2014	0	0	0	0
04/11/2014	92,421	11,651	333,043	602,571
05/11/2014	0	0	0	0
06/11/2014	0	0	0	0
07/11/2014	0	0	0	0
08/11/2014	0	0	0	0
09/11/2014	0	0	0	0
10/11/2014	0	0	0	0
11/11/2014	167,310	19,193	618,502	1,012,411
12/11/2014	0	0	0	0
13/11/2014	0	0	0	0
14/11/2014	0	0	0	0
15/11/2014	0	0	0	0
16/11/2014	0	0	0	0
17/11/2014	0	0	0	0
18/11/2014	163,931	15,991	587,653	700,370
19/11/2014	0	0	0	0
20/11/2014	0	0	0	0
21/11/2014	0	0	0	0
22/11/2014	0	0	0	0
23/11/2014	0	0	0	0
24/11/2014	0	0	0	0
25/11/2014	212,371	20,377	639,905	772,555
26/11/2014	0	0	0	0
27/11/2014	0	0	0	0
28/11/2014	0	0	0	0
29/11/2014	0	0	0	0
30/11/2014	139,301	13,816	484,403	384,994
Daily Mean (L)	25,844	2,701	88,784	115,763
Cumulative (L)	775,334	81,029	2,663,506	3,472,903

December 2014	North Field (L/d)*	West Field (L/d)*	South Field (L/d)*	East Field (L/d)*
PTTW Daily Limit	1,000,000	720,000	1,220,000	720,000
01/12/2014	0	0	0	0
02/12/2014	55,720	5,526	193,761	153,998
03/12/2014	0	0	0	0
04/12/2014	0	0	0	0
05/12/2014	0	0	0	0
06/12/2014	0	0	0	0
07/12/2014	0	0	0	0
08/12/2014	0	0	0	0
09/12/2014	193,621	17,909	699,803	363,022
10/12/2014	0	0	0	0
11/12/2014	0	0	0	0
12/12/2014	0	0	0	0
13/12/2014	0	0	0	0
14/12/2014	0	0	0	0
15/12/2014	0	0	0	0
16/12/2014	211,887	18,869	720,672	354,084
17/12/2014	0	0	0	0
18/12/2014	0	0	0	0
19/12/2014	0	0	0	0
20/12/2014	0	0	0	0
21/12/2014	0	0	0	0
22/12/2014	0	0	0	0
23/12/2014	215,939	27,382	1,102,211	456,547
24/12/2014	0	0	0	0
25/12/2014	0	0	0	0
26/12/2014	0	0	0	0
27/12/2014	0	0	0	0
28/12/2014	0	0	0	0
29/12/2014	0	0	0	0
30/12/2014	442,508	26,467	1,025,547	833,887
31/12/2014	59,607	3,730	179,602	177,540
Daily Mean (L)	38,041	3,222	126,503	75,454
Cumulative (L)	1,179,282	99,883	3,921,596	2,339,078
Monthly Mean	132,308	7,813	401,700	181,561
Yearly Cumulative	48,339,355	2,845,264	146,634,568	66,277,995

Note: * These withdrawal volumes are based on measurements recorded at seven day intervals. Seven day periods that straddle the beginning and/or end of each month are reported here on a prorated basis.

Table C2
Irrigation Withdrawal Records

January 2013	Volume pumped per day (m³)	February 2013	Volume pumped per day (m³)	March 2013	Volume pumped per day (m³)	April 2013	Volume pumped per day (m³)
1-Jan-13	0	1-Feb-13	0	1-Mar-13	0	1-Apr-13	0
2-Jan-13	0	2-Feb-13	0	2-Mar-13	0	2-Apr-13	0
3-Jan-13	0	3-Feb-13	0	3-Mar-13	0	3-Apr-13	0
4-Jan-13	0	4-Feb-13	0	4-Mar-13	0	4-Apr-13	0
5-Jan-13	0	5-Feb-13	0	5-Mar-13	0	5-Apr-13	0
6-Jan-13	0	6-Feb-13	0	6-Mar-13	0	6-Apr-13	0
7-Jan-13	0	7-Feb-13	0	7-Mar-13	0	7-Apr-13	0
8-Jan-13	0	8-Feb-13	0	8-Mar-13	0	8-Apr-13	0
9-Jan-13	0	9-Feb-13	0	9-Mar-13	0	9-Apr-13	0
10-Jan-13	0	10-Feb-13	0	10-Mar-13	0	10-Apr-13	0
11-Jan-13	0	11-Feb-13	0	11-Mar-13	0	11-Apr-13	0
12-Jan-13	0	12-Feb-13	0	12-Mar-13	0	12-Apr-13	0
13-Jan-13	0	13-Feb-13	0	13-Mar-13	0	13-Apr-13	0
14-Jan-13	0	14-Feb-13	0	14-Mar-13	0	14-Apr-13	0
15-Jan-13	0	15-Feb-13	0	15-Mar-13	0	15-Apr-13	0
16-Jan-13	0	16-Feb-13	0	16-Mar-13	0	16-Apr-13	0
17-Jan-13	0	17-Feb-13	0	17-Mar-13	0	17-Apr-13	0
18-Jan-13	0	18-Feb-13	0	18-Mar-13	0	18-Apr-13	0
19-Jan-13	0	19-Feb-13	0	19-Mar-13	0	19-Apr-13	0
20-Jan-13	0	20-Feb-13	0	20-Mar-13	0	20-Apr-13	0
21-Jan-13	0	21-Feb-13	0	21-Mar-13	0	21-Apr-13	0
22-Jan-13	0	22-Feb-13	0	22-Mar-13	0	22-Apr-13	0
23-Jan-13	0	23-Feb-13	0	23-Mar-13	0	23-Apr-13	0
24-Jan-13	0	24-Feb-13	0	24-Mar-13	0	24-Apr-13	0
25-Jan-13	0	25-Feb-13	0	25-Mar-13	0	25-Apr-13	0
26-Jan-13	0	26-Feb-13	0	26-Mar-13	0	26-Apr-13	0
27-Jan-13	0	27-Feb-13	0	27-Mar-13	0	27-Apr-13	0
28-Jan-13	0	28-Feb-13	0	28-Mar-13	0	28-Apr-13	0
29-Jan-13	0			29-Mar-13	0	29-Apr-13	0
30-Jan-13	0			30-Mar-13	0	30-Apr-13	0
31-Jan-13	0			31-Mar-13	0		

(continued)

Table C2 (continued)
Irrigation Withdrawal Records

May 2013	Volume pumped per day (m ³)	June 2013	Volume pumped per day (m ³)	July 2013	Volume pumped per day (m ³)	August 2013	Volume pumped per day (m ³)
1-May-13	0	1-Jun-13	0	1-Jul-13	0	1-Aug-13	0
2-May-13	0	2-Jun-13	0	2-Jul-13	0	2-Aug-13	103
3-May-13	0	3-Jun-13	0	3-Jul-13	0	3-Aug-13	0
4-May-13	0	4-Jun-13	0	4-Jul-13	0	4-Aug-13	0
5-May-13	0	5-Jun-13	0	5-Jul-13	0	5-Aug-13	0
6-May-13	0	6-Jun-13	0	6-Jul-13	0	6-Aug-13	128
7-May-13	0	7-Jun-13	0	7-Jul-13	0	7-Aug-13	0
8-May-13	0	8-Jun-13	0	8-Jul-13	0	8-Aug-13	108
9-May-13	0	9-Jun-13	0	9-Jul-13	0	9-Aug-13	0
10-May-13	0	10-Jun-13	0	10-Jul-13	0	10-Aug-13	93
11-May-13	0	11-Jun-13	0	11-Jul-13	0	11-Aug-13	0
12-May-13	0	12-Jun-13	0	12-Jul-13	0	12-Aug-13	47
13-May-13	0	13-Jun-13	0	13-Jul-13	0	13-Aug-13	68
14-May-13	0	14-Jun-13	0	14-Jul-13	0	14-Aug-13	0
15-May-13	0	15-Jun-13	0	15-Jul-13	58	15-Aug-13	123
16-May-13	0	16-Jun-13	0	16-Jul-13	25	16-Aug-13	0
17-May-13	0	17-Jun-13	0	17-Jul-13	110	17-Aug-13	88
18-May-13	0	18-Jun-13	0	18-Jul-13	112	18-Aug-13	10
19-May-13	0	19-Jun-13	0	19-Jul-13	30	19-Aug-13	98
20-May-13	0	20-Jun-13	0	20-Jul-13	0	20-Aug-13	105
21-May-13	0	21-Jun-13	0	21-Jul-13	0	21-Aug-13	129
22-May-13	0	22-Jun-13	0	22-Jul-13	86	22-Aug-13	0
23-May-13	0	23-Jun-13	0	23-Jul-13	81	23-Aug-13	0
24-May-13	0	24-Jun-13	0	24-Jul-13	100	24-Aug-13	120
25-May-13	0	25-Jun-13	0	25-Jul-13	61	25-Aug-13	0
26-May-13	0	26-Jun-13	0	26-Jul-13	81	26-Aug-13	65
27-May-13	0	27-Jun-13	0	27-Jul-13	111	27-Aug-13	0
28-May-13	0	28-Jun-13	0	28-Jul-13	0	28-Aug-13	25
29-May-13	0	29-Jun-13	0	29-Jul-13	129	29-Aug-13	0
30-May-13	0	30-Jun-13	0	30-Jul-13	85	30-Aug-13	4
31-May-13	0			31-Jul-13	130	31-Aug-13	3

(continued)

Table C2 (continued)
Irrigation Withdrawal Records

September 2013	Volume pumped per day (m ³)	October 2013	Volume pumped per day (m ³)	November 2013	Volume pumped per day (m ³)	December 2013	Volume pumped per day (m ³)
1-Sep-13	72	1-Oct-13	0	1-Nov-13	0	1-Dec-13	0
2-Sep-13	0	2-Oct-13	0	2-Nov-13	0	2-Dec-13	0
3-Sep-13	0	3-Oct-13	0	3-Nov-13	0	3-Dec-13	0
4-Sep-13	62	4-Oct-13	0	4-Nov-13	0	4-Dec-13	0
5-Sep-13	0	5-Oct-13	0	5-Nov-13	0	5-Dec-13	0
6-Sep-13	77	6-Oct-13	0	6-Nov-13	0	6-Dec-13	0
7-Sep-13	0	7-Oct-13	0	7-Nov-13	0	7-Dec-13	0
8-Sep-13	0	8-Oct-13	0	8-Nov-13	0	8-Dec-13	0
9-Sep-13	60	9-Oct-13	0	9-Nov-13	0	9-Dec-13	0
10-Sep-13	0	10-Oct-13	0	10-Nov-13	0	10-Dec-13	0
11-Sep-13	0	11-Oct-13	0	11-Nov-13	0	11-Dec-13	0
12-Sep-13	0	12-Oct-13	0	12-Nov-13	0	12-Dec-13	0
13-Sep-13	0	13-Oct-13	0	13-Nov-13	0	13-Dec-13	0
14-Sep-13	0	14-Oct-13	0	14-Nov-13	0	14-Dec-13	0
15-Sep-13	0	15-Oct-13	0	15-Nov-13	0	15-Dec-13	0
16-Sep-13	0	16-Oct-13	0	16-Nov-13	0	16-Dec-13	0
17-Sep-13	0	17-Oct-13	0	17-Nov-13	0	17-Dec-13	0
18-Sep-13	0	18-Oct-13	0	18-Nov-13	0	18-Dec-13	0
19-Sep-13	0	19-Oct-13	0	19-Nov-13	0	19-Dec-13	0
20-Sep-13	0	20-Oct-13	0	20-Nov-13	0	20-Dec-13	0
21-Sep-13	0	21-Oct-13	0	21-Nov-13	0	21-Dec-13	0
22-Sep-13	0	22-Oct-13	0	22-Nov-13	0	22-Dec-13	0
23-Sep-13	0	23-Oct-13	0	23-Nov-13	0	23-Dec-13	0
24-Sep-13	0	24-Oct-13	0	24-Nov-13	0	24-Dec-13	0
25-Sep-13	0	25-Oct-13	0	25-Nov-13	0	25-Dec-13	0
26-Sep-13	0	26-Oct-13	0	26-Nov-13	0	26-Dec-13	0
27-Sep-13	0	27-Oct-13	0	27-Nov-13	0	27-Dec-13	0
28-Sep-13	0	28-Oct-13	0	28-Nov-13	0	28-Dec-13	0
29-Sep-13	0	29-Oct-13	0	29-Nov-13	0	29-Dec-13	0
30-Sep-13	62	30-Oct-13	0	30-Nov-13	0	30-Dec-13	0
		31-Oct-13	0		0	31-Dec-13	0

(continued)

Table C2 (continued)
Irrigation Withdrawal Records

January 2014	Volume pumped per day (m³)	February 2014	Volume pumped per day (m³)	March 2014	Volume pumped per day (m³)	April 2014	Volume pumped per day (m³)
1-Jan-14	0	1-Feb-14	0	1-Mar-14	0	1-Apr-14	0
2-Jan-14	0	2-Feb-14	0	2-Mar-14	0	2-Apr-14	0
3-Jan-14	0	3-Feb-14	0	3-Mar-14	0	3-Apr-14	0
4-Jan-14	0	4-Feb-14	0	4-Mar-14	0	4-Apr-14	0
5-Jan-14	0	5-Feb-14	0	5-Mar-14	0	5-Apr-14	0
6-Jan-14	0	6-Feb-14	0	6-Mar-14	0	6-Apr-14	0
7-Jan-14	0	7-Feb-14	0	7-Mar-14	0	7-Apr-14	0
8-Jan-14	0	8-Feb-14	0	8-Mar-14	0	8-Apr-14	0
9-Jan-14	0	9-Feb-14	0	9-Mar-14	0	9-Apr-14	0
10-Jan-14	0	10-Feb-14	0	10-Mar-14	0	10-Apr-14	0
11-Jan-14	0	11-Feb-14	0	11-Mar-14	0	11-Apr-14	0
12-Jan-14	0	12-Feb-14	0	12-Mar-14	0	12-Apr-14	0
13-Jan-14	0	13-Feb-14	0	13-Mar-14	0	13-Apr-14	0
14-Jan-14	0	14-Feb-14	0	14-Mar-14	0	14-Apr-14	0
15-Jan-14	0	15-Feb-14	0	15-Mar-14	0	15-Apr-14	0
16-Jan-14	0	16-Feb-14	0	16-Mar-14	0	16-Apr-14	0
17-Jan-14	0	17-Feb-14	0	17-Mar-14	0	17-Apr-14	0
18-Jan-14	0	18-Feb-14	0	18-Mar-14	0	18-Apr-14	0
19-Jan-14	0	19-Feb-14	0	19-Mar-14	0	19-Apr-14	0
20-Jan-14	0	20-Feb-14	0	20-Mar-14	0	20-Apr-14	0
21-Jan-14	0	21-Feb-14	0	21-Mar-14	0	21-Apr-14	0
22-Jan-14	0	22-Feb-14	0	22-Mar-14	0	22-Apr-14	0
23-Jan-14	0	23-Feb-14	0	23-Mar-14	0	23-Apr-14	0
24-Jan-14	0	24-Feb-14	0	24-Mar-14	0	24-Apr-14	0
25-Jan-14	0	25-Feb-14	0	25-Mar-14	0	25-Apr-14	0
26-Jan-14	0	26-Feb-14	0	26-Mar-14	0	26-Apr-14	0
27-Jan-14	0	27-Feb-14	0	27-Mar-14	0	27-Apr-14	0
28-Jan-14	0	28-Feb-14	0	28-Mar-14	0	28-Apr-14	0
29-Jan-14	0			29-Mar-14	0	29-Apr-14	0
30-Jan-14	0			30-Mar-14	0	30-Apr-14	0
31-Jan-14	0			31-Mar-14	0		

(continued)

Table C2 (continued)
Irrigation Withdrawal Records

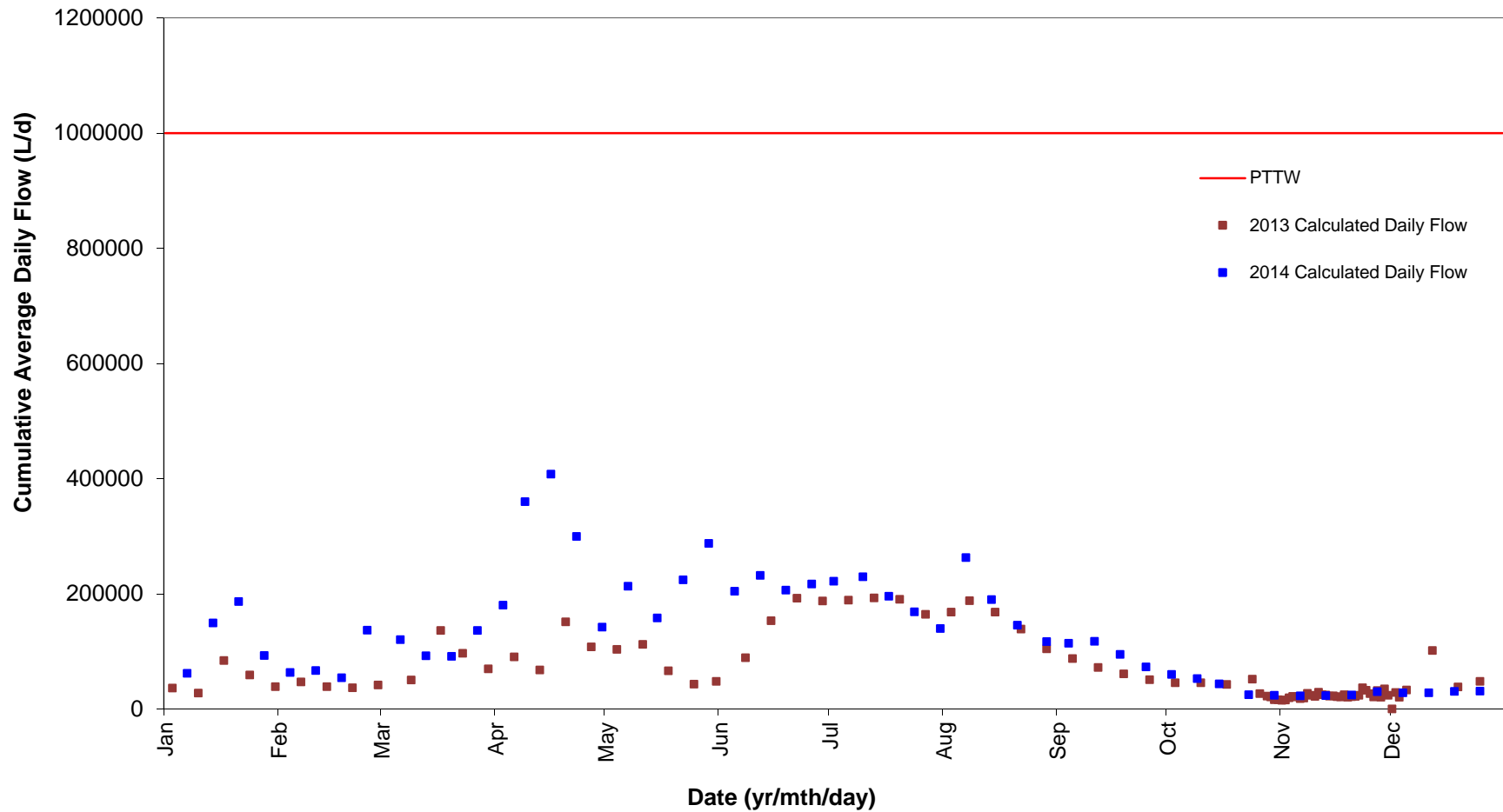
May 2014	Volume pumped per day (m³)	June 2014	Volume pumped per day (m³)	July 2014	Volume pumped per day (m³)	August 2014	Volume pumped per day (m³)
1-May-14	0	1-Jun-14	0	1-Jul-14	82	1-Aug-14	133.48
2-May-14	0	2-Jun-14	0	2-Jul-14	17	2-Aug-14	0
3-May-14	0	3-Jun-14	52	3-Jul-14	65	3-Aug-14	0
4-May-14	0	4-Jun-14	0	4-Jul-14	0	4-Aug-14	144
5-May-14	0	5-Jun-14	0	5-Jul-14	0	5-Aug-14	72
6-May-14	0	6-Jun-14	95	6-Jul-14	0	6-Aug-14	42
7-May-14	0	7-Jun-14	0	7-Jul-14	120	7-Aug-14	100
8-May-14	0	8-Jun-14	0	8-Jul-14	0	8-Aug-14	0
9-May-14	0	9-Jun-14	28	9-Jul-14	0	9-Aug-14	0
10-May-14	0	10-Jun-14	0	10-Jul-14	0	10-Aug-14	0
11-May-14	0	11-Jun-14	0	11-Jul-14	0	11-Aug-14	0
12-May-14	0	12-Jun-14	0	12-Jul-14	0	12-Aug-14	0
13-May-14	0	13-Jun-14	0	13-Jul-14	0	13-Aug-14	0
14-May-14	0	14-Jun-14	0	14-Jul-14	0	14-Aug-14	0
15-May-14	0	15-Jun-14	0	15-Jul-14	0	15-Aug-14	0
16-May-14	0	16-Jun-14	0	16-Jul-14	0	16-Aug-14	0
17-May-14	0	17-Jun-14	0	17-Jul-14	0	17-Aug-14	0
18-May-14	0	18-Jun-14	0	18-Jul-14	100	18-Aug-14	0
19-May-14	0	19-Jun-14	0	19-Jul-14	0	19-Aug-14	0
20-May-14	0	20-Jun-14	0	20-Jul-14	0	20-Aug-14	0
21-May-14	0	21-Jun-14	0	21-Jul-14	108	21-Aug-14	0
22-May-14	0	22-Jun-14	0	22-Jul-14	88	22-Aug-14	0
23-May-14	0	23-Jun-14	0	23-Jul-14	98	23-Aug-14	0
24-May-14	0	24-Jun-14	0	24-Jul-14	0	24-Aug-14	0
25-May-14	0	25-Jun-14	0	25-Jul-14	76	25-Aug-14	0
26-May-14	0	26-Jun-14	27	26-Jul-14	0	26-Aug-14	60
27-May-14	0	27-Jun-14	0	27-Jul-14	0	27-Aug-14	0
28-May-14	50	28-Jun-14	0	28-Jul-14	0	28-Aug-14	101
29-May-14	0	29-Jun-14	0	29-Jul-14	0	29-Aug-14	0
30-May-14	55	30-Jun-14	95	30-Jul-14	0	30-Aug-14	0
31-May-14	0			31-Jul-14	0	31-Aug-14	0

(continued)

Table C2 (continued)
Irrigation Withdrawal Records

September 2014	Volume pumped per day (m ³)	October 2014	Volume pumped per day (m ³)	November 2014	Volume pumped per day (m ³)	December 2014	Volume pumped per day (m ³)
1-Sep-14	0	1-Oct-14	0	1-Nov-14	0	1-Dec-14	0
2-Sep-14	0	2-Oct-14	0	2-Nov-14	0	2-Dec-14	0
3-Sep-14	0	3-Oct-14	0	3-Nov-14	0	3-Dec-14	0
4-Sep-14	0	4-Oct-14	0	4-Nov-14	0	4-Dec-14	0
5-Sep-14	0	5-Oct-14	0	5-Nov-14	0	5-Dec-14	0
6-Sep-14	0	6-Oct-14	0	6-Nov-14	0	6-Dec-14	0
7-Sep-14	0	7-Oct-14	0	7-Nov-14	0	7-Dec-14	0
8-Sep-14	0	8-Oct-14	0	8-Nov-14	0	8-Dec-14	0
9-Sep-14	0	9-Oct-14	0	9-Nov-14	0	9-Dec-14	0
10-Sep-14	0	10-Oct-14	0	10-Nov-14	0	10-Dec-14	0
11-Sep-14	0	11-Oct-14	0	11-Nov-14	0	11-Dec-14	0
12-Sep-14	0	12-Oct-14	0	12-Nov-14	0	12-Dec-14	0
13-Sep-14	0	13-Oct-14	0	13-Nov-14	0	13-Dec-14	0
14-Sep-14	0	14-Oct-14	0	14-Nov-14	0	14-Dec-14	0
15-Sep-14	0	15-Oct-14	0	15-Nov-14	0	15-Dec-14	0
16-Sep-14	0	16-Oct-14	0	16-Nov-14	0	16-Dec-14	0
17-Sep-14	0	17-Oct-14	0	17-Nov-14	0	17-Dec-14	0
18-Sep-14	0	18-Oct-14	0	18-Nov-14	0	18-Dec-14	0
19-Sep-14	0	19-Oct-14	0	19-Nov-14	0	19-Dec-14	0
20-Sep-14	0	20-Oct-14	0	20-Nov-14	0	20-Dec-14	0
21-Sep-14	0	21-Oct-14	0	21-Nov-14	0	21-Dec-14	0
22-Sep-14	0	22-Oct-14	0	22-Nov-14	0	22-Dec-14	0
23-Sep-14	69	23-Oct-14	0	23-Nov-14	0	23-Dec-14	0
24-Sep-14	0	24-Oct-14	0	24-Nov-14	0	24-Dec-14	0
25-Sep-14	0	25-Oct-14	0	25-Nov-14	0	25-Dec-14	0
26-Sep-14	0	26-Oct-14	0	26-Nov-14	0	26-Dec-14	0
27-Sep-14	0	27-Oct-14	0	27-Nov-14	0	27-Dec-14	0
28-Sep-14	0	28-Oct-14	0	28-Nov-14	0	28-Dec-14	0
29-Sep-14	0	29-Oct-14	0	29-Nov-14	0	29-Dec-14	0
30-Sep-14	0	30-Oct-14	0	30-Nov-14	0	30-Dec-14	0
		31-Oct-14	0		0	31-Dec-14	0

North Well Field Daily Discharge Volumes



North Well Field Daily Discharge Volumes

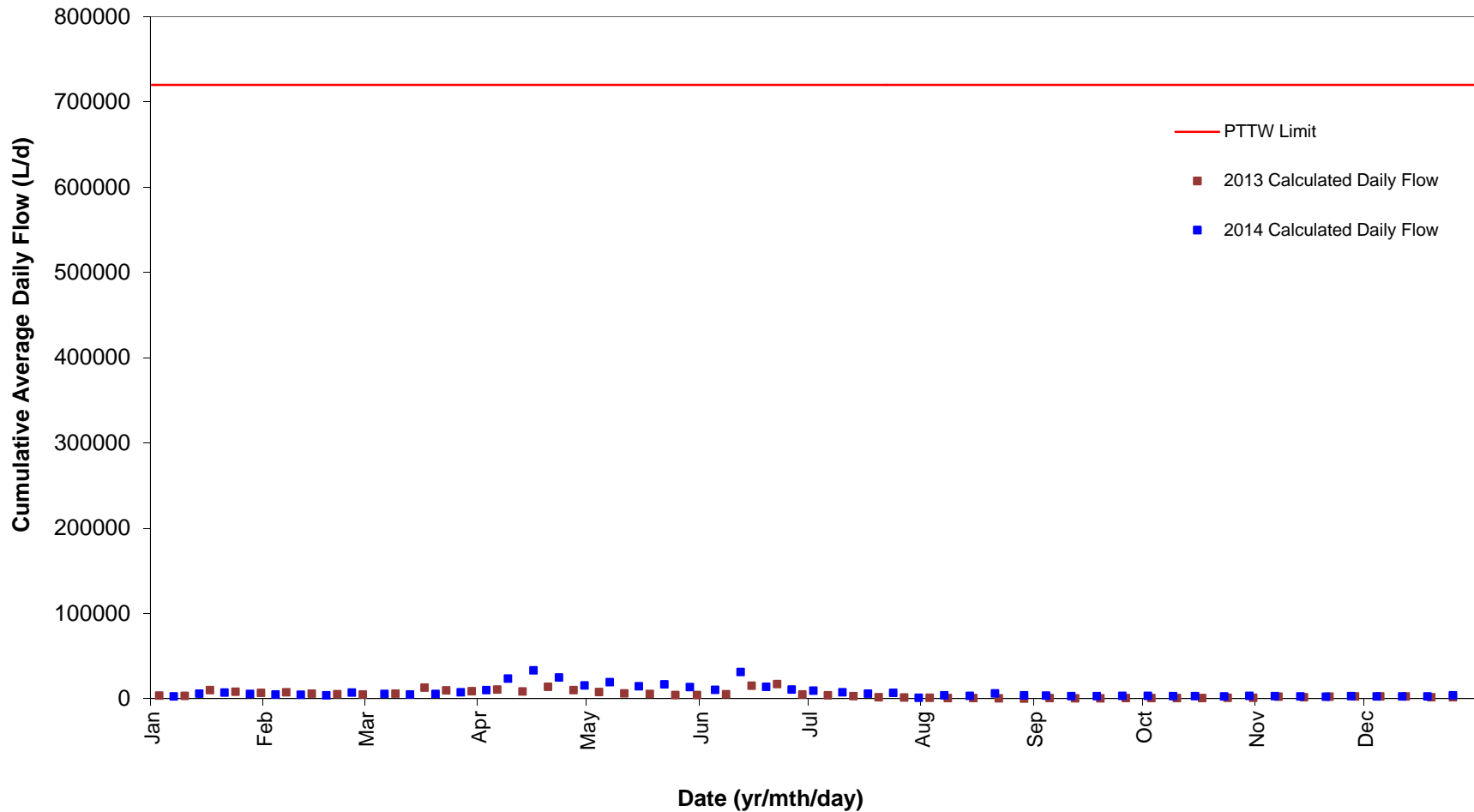
Environmental Operations and Monitoring 2013-2014
Belle Park Landfill Site

Appendix C
Figure

C1

Date: 12/2014
File: 218-1847.25

West Well Field Daily Discharge Volume



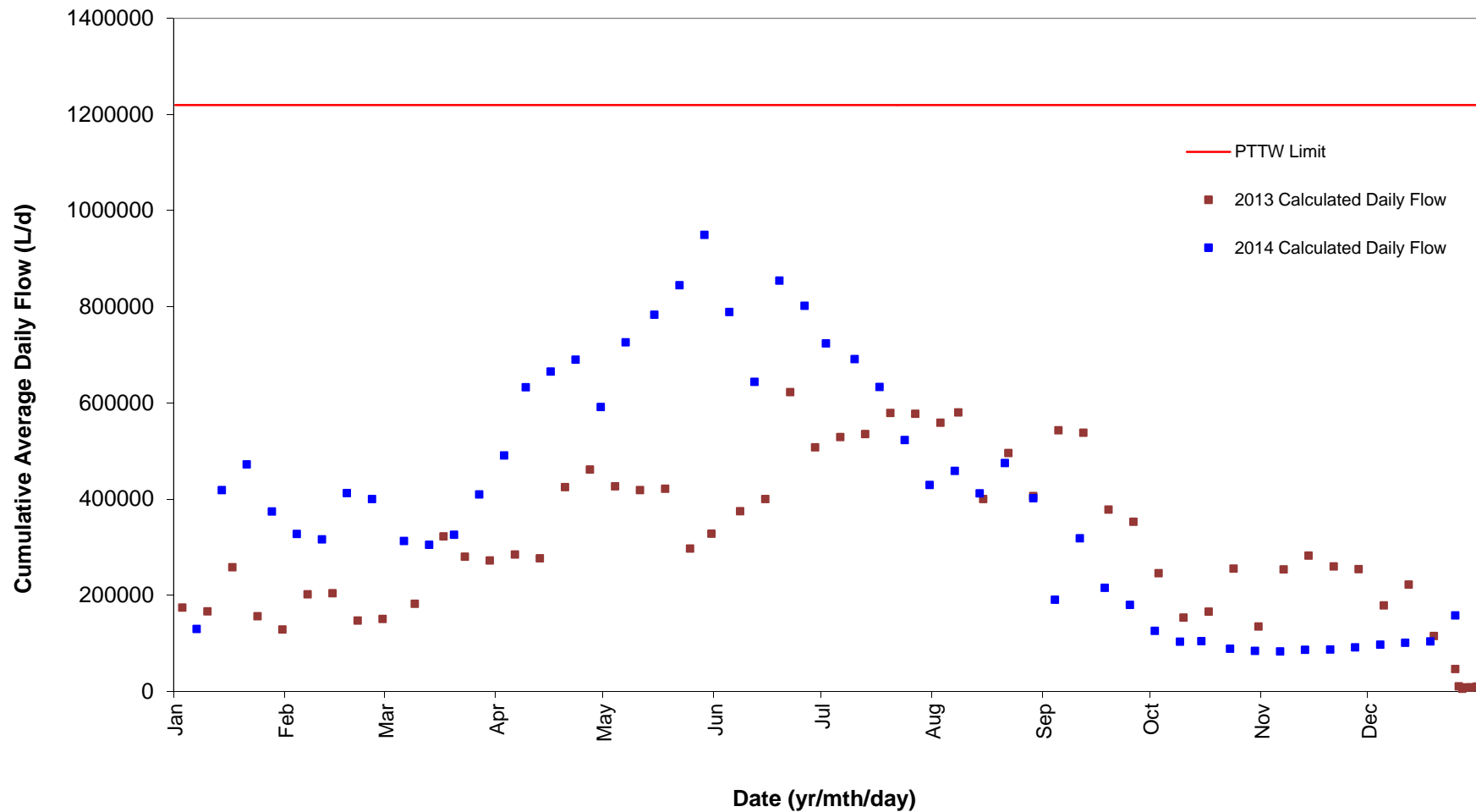
West Well Field Daily Discharge Volumes

Environmental Operations and Monitoring 2013-2014
Belle Park Landfill Site

Appendix C
Figure
C2

Date: 12/2014
File: 218-1847.25

South Well Field Daily Discharge Volume



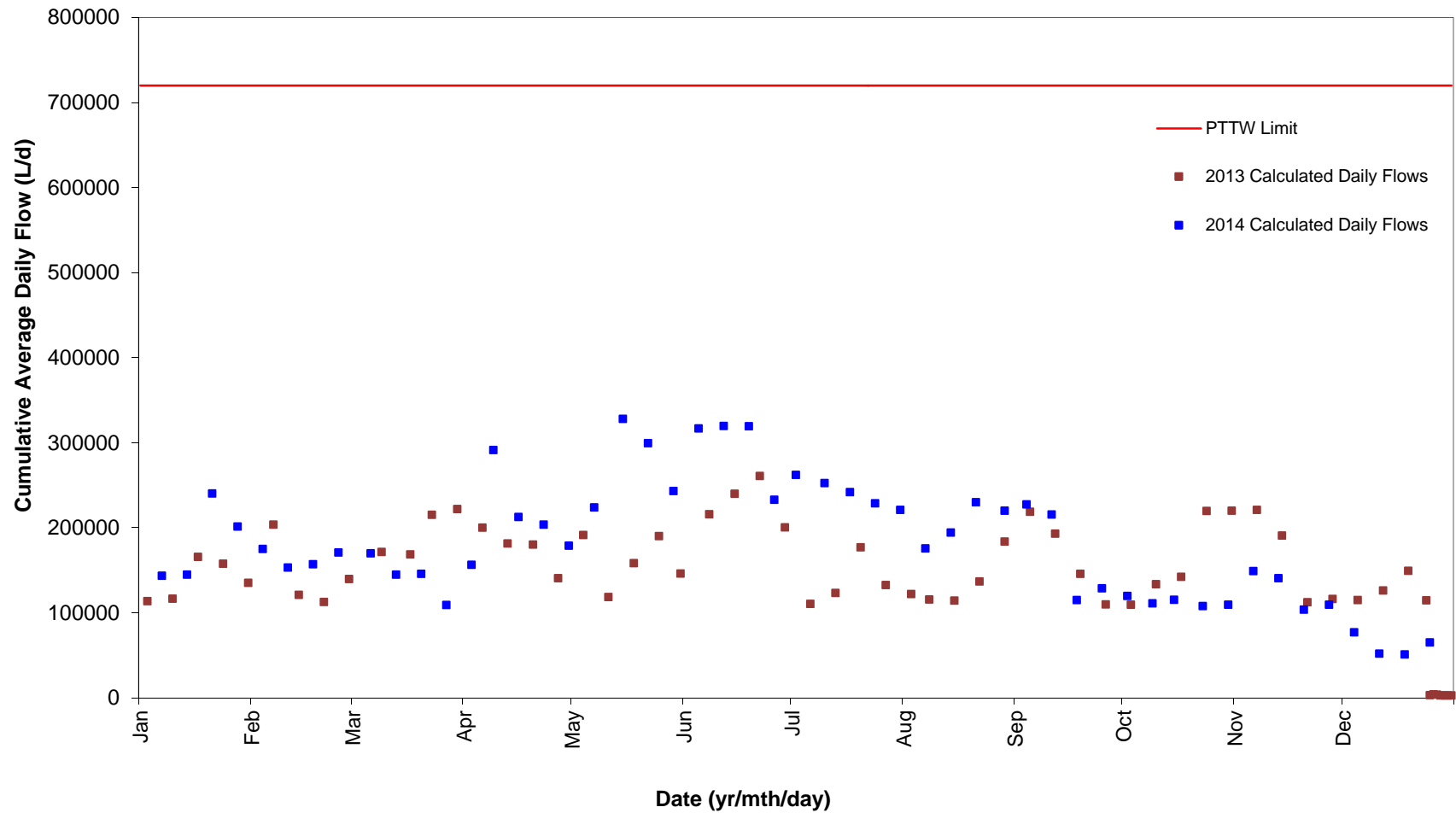
South Well Field Daily Discharge Volumes
Environmental Operations and Monitoring 2013-2014
Belle Park Landfill Site

Appendix C
Figure

C3

Date: 12/2014
File: 218-1847.25

East Well Field Daily Discharge Volumes



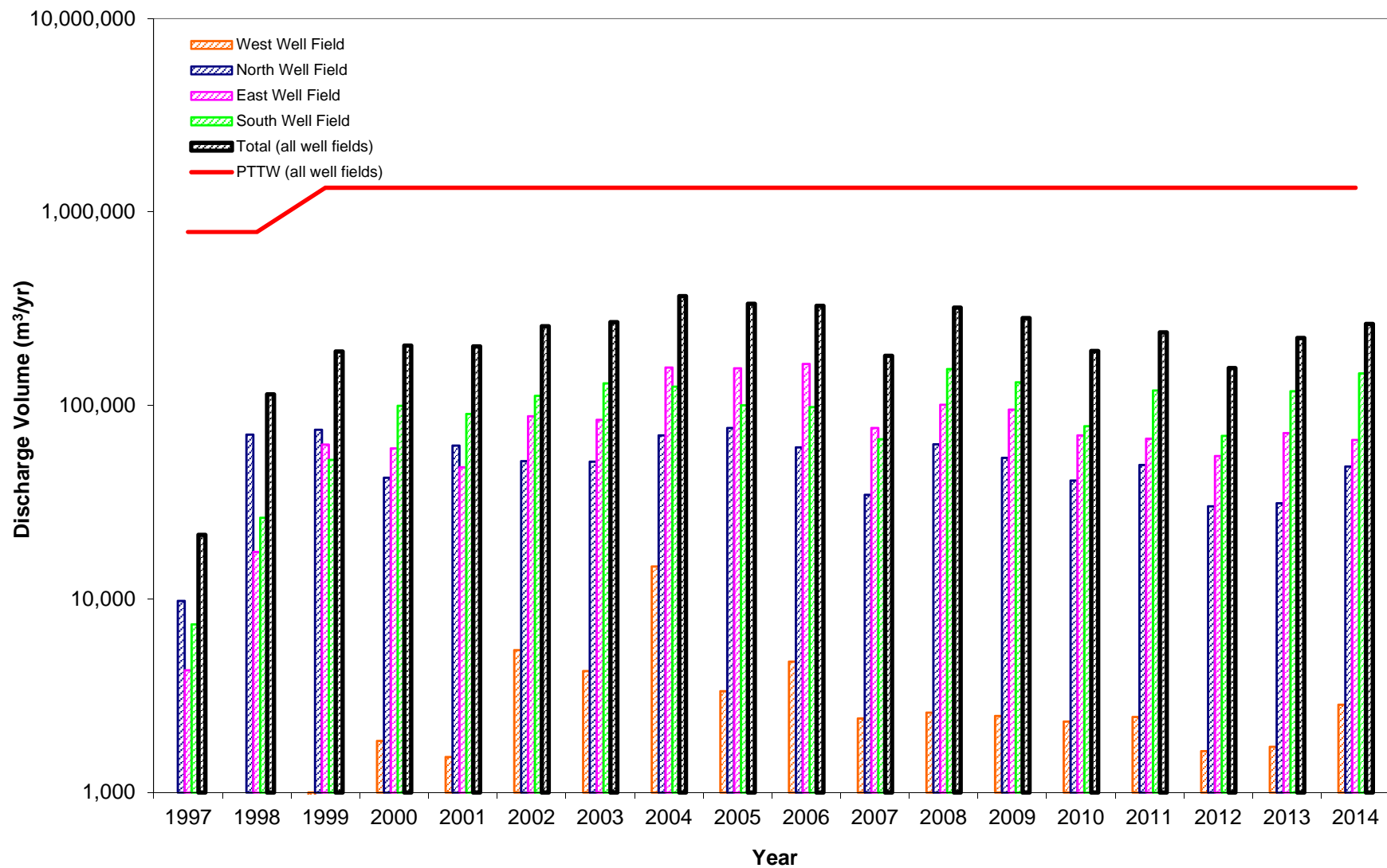
East Well Field Daily Discharge Volumes

Environmental Operations and Monitoring 2013-2014
Belle Park Landfill Site

Appendix C
Figure

C4

Date: 12/2014
File: 218-1847.25



Annual Wastewater Withdrawal Volumes

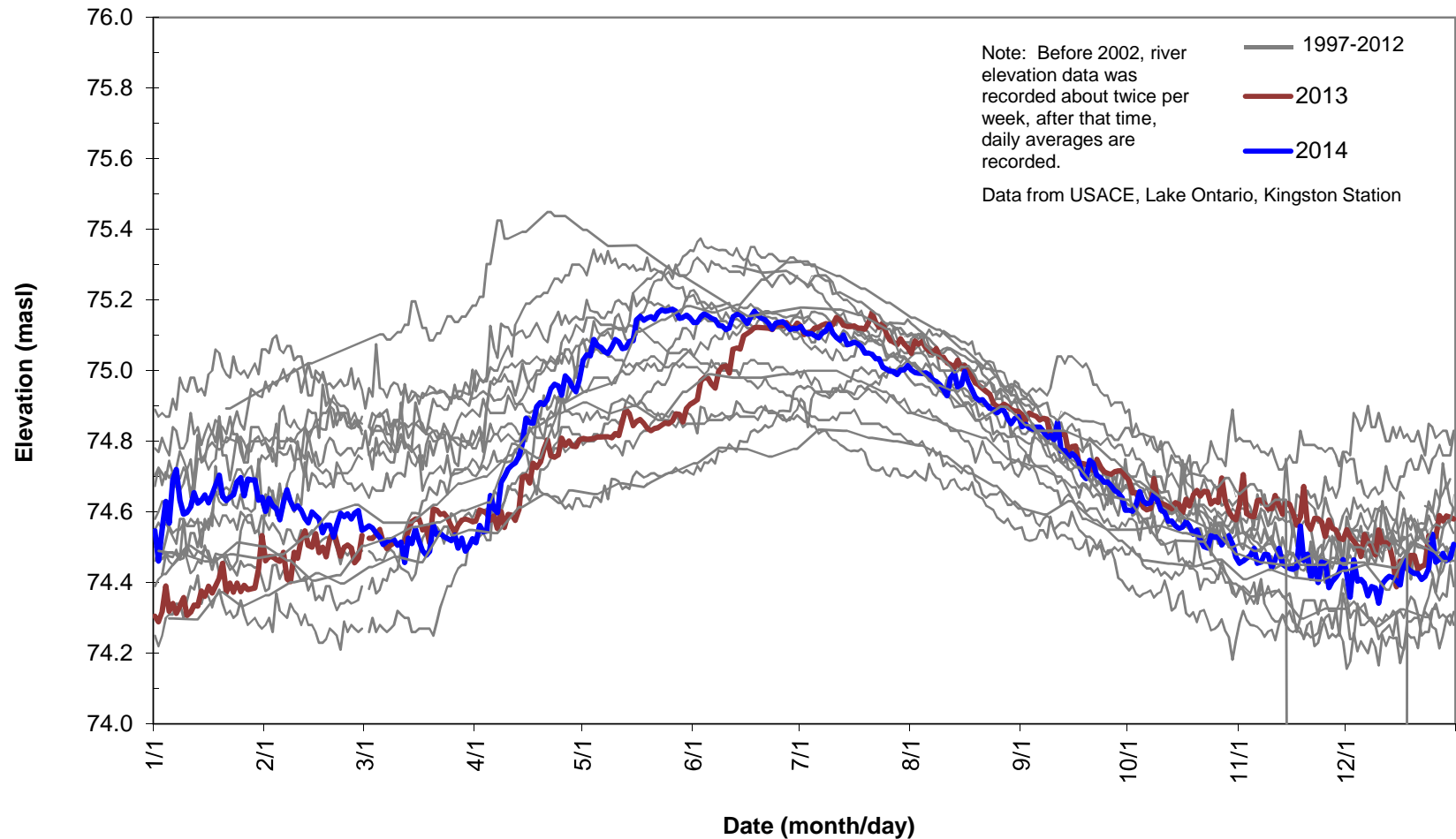
Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix C
Figure

C5

Date: 12/2015
File: 218-1847.25

River Elevation



River Elevation

Environmental Operations and Monitoring 2013-2014
Belle Park Landfill Site

Appendix C
Figure

C6

Date: 12/2014
File: 218-1847.25

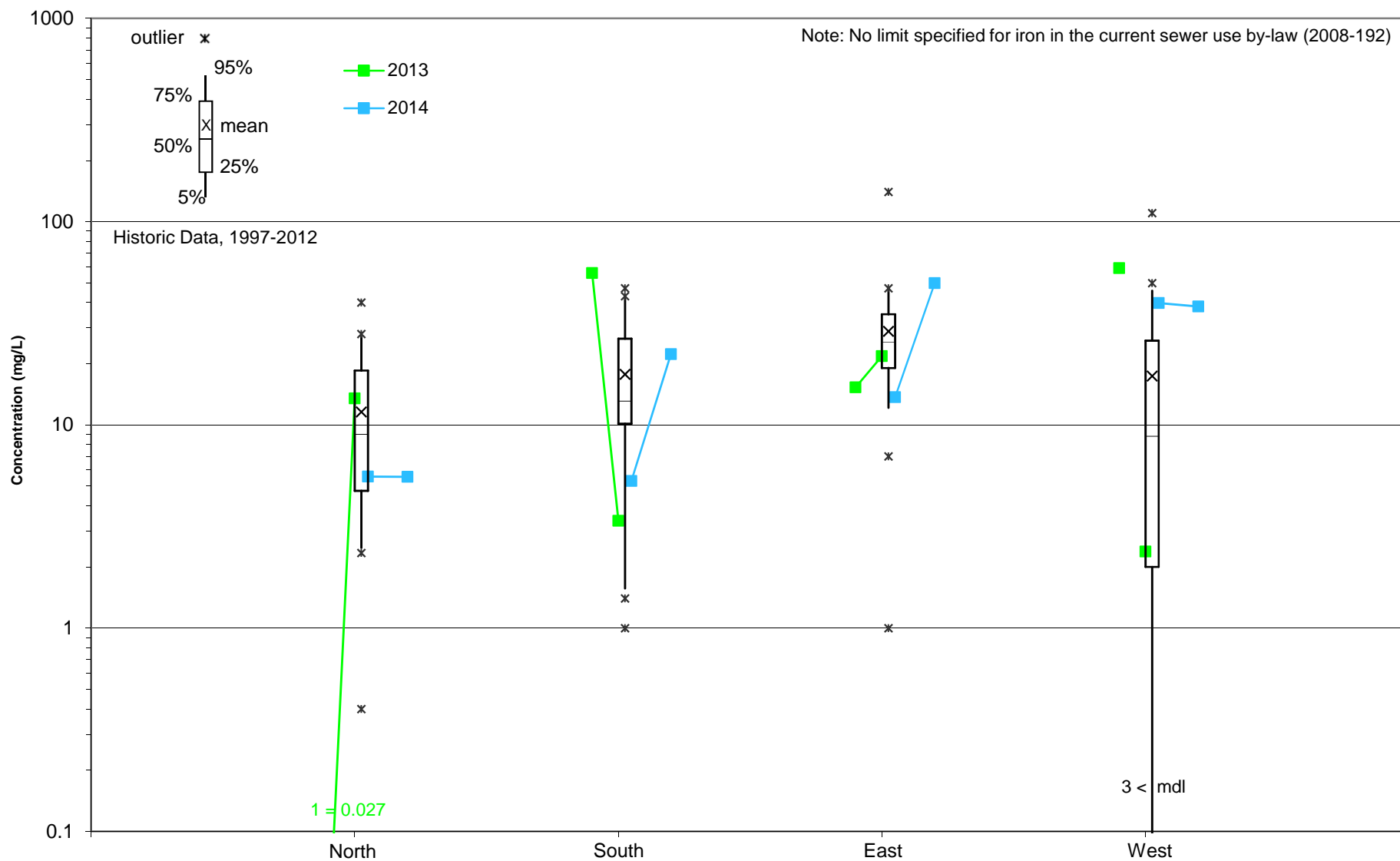
APPENDIX D
WASTE WATER ANALYSES TABLES & FIGURES

Table D1
Summary of Wastewater Analyses

Sample Location ID & Date	Sample ID	Chloride mg/L	Iron mg/L	Total Kjeldahl Nitrogen mg/L	Total PCBs µg/L	Total Suspended Solids mg/L
Sewer Use Bylaw				100	1	350
East Wells						
May 29, 2013	13-W035	15.1	15.3	10.6	<0.2	30
December 3, 2013	13-W065	19.4	21.8	25.0	<0.2	44
May 23, 2014	14-W039	12.6	13.7	9.8	<0.4	26
November 28, 2014	14-W067	19.6	49.8	26.5	<0.4	110
North Wells						
May 29, 2013	13-W038	88.8	0.027	31.4	<0.05	14
December 3, 2013	13-W068	137	13.5	66.4	<0.2	38
May 23, 2014	14-W042	74.6	5.57	33.7	<0.4	18
November 28, 2014	14-W066	271	5.56	79.4	<0.4	20
South Wells						
May 29, 2013	13-W036	20.2	55.8	10.7	<0.1	38
December 3, 2013	13-W066	20.3	3.37	17.6	<0.2	10
May 23, 2014	14-W040	16.8	5.29	24.9	<0.4	24
November 28, 2014	14-W068	24.5	22.3	25.4	<0.4	44
West Well						
May 29, 2013	13-W037	21.6	59.1	32.3	<0.2	64
December 3, 2013	13-W067	53.7	2.38	5.9	<0.2	8
May 23, 2014	14-W041	16.7	39.7	28.5	<0.4	146
November 28, 2014	14-W065	70.8	38.2	6.2	<0.4	210

Note:

1. Grey shading indicates concentrations higher than the Sewer Use Bylaw.
2. This information to be used as an internal reference only. In case of discrepancy, refer to certificate of analyses.



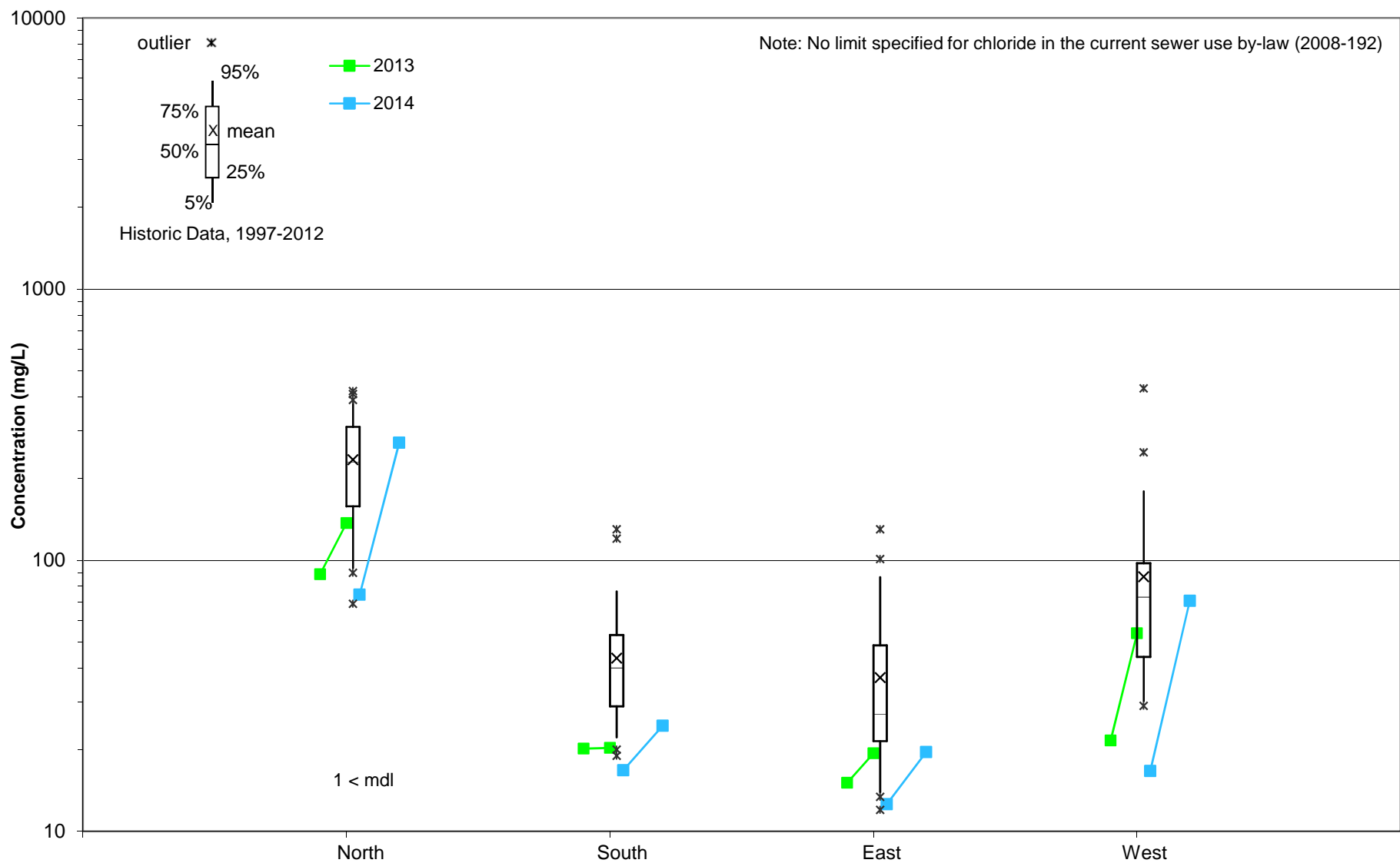
Iron in Wastewater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix D
Figure

D1

Date: 12/2014
File: 218-1847.25



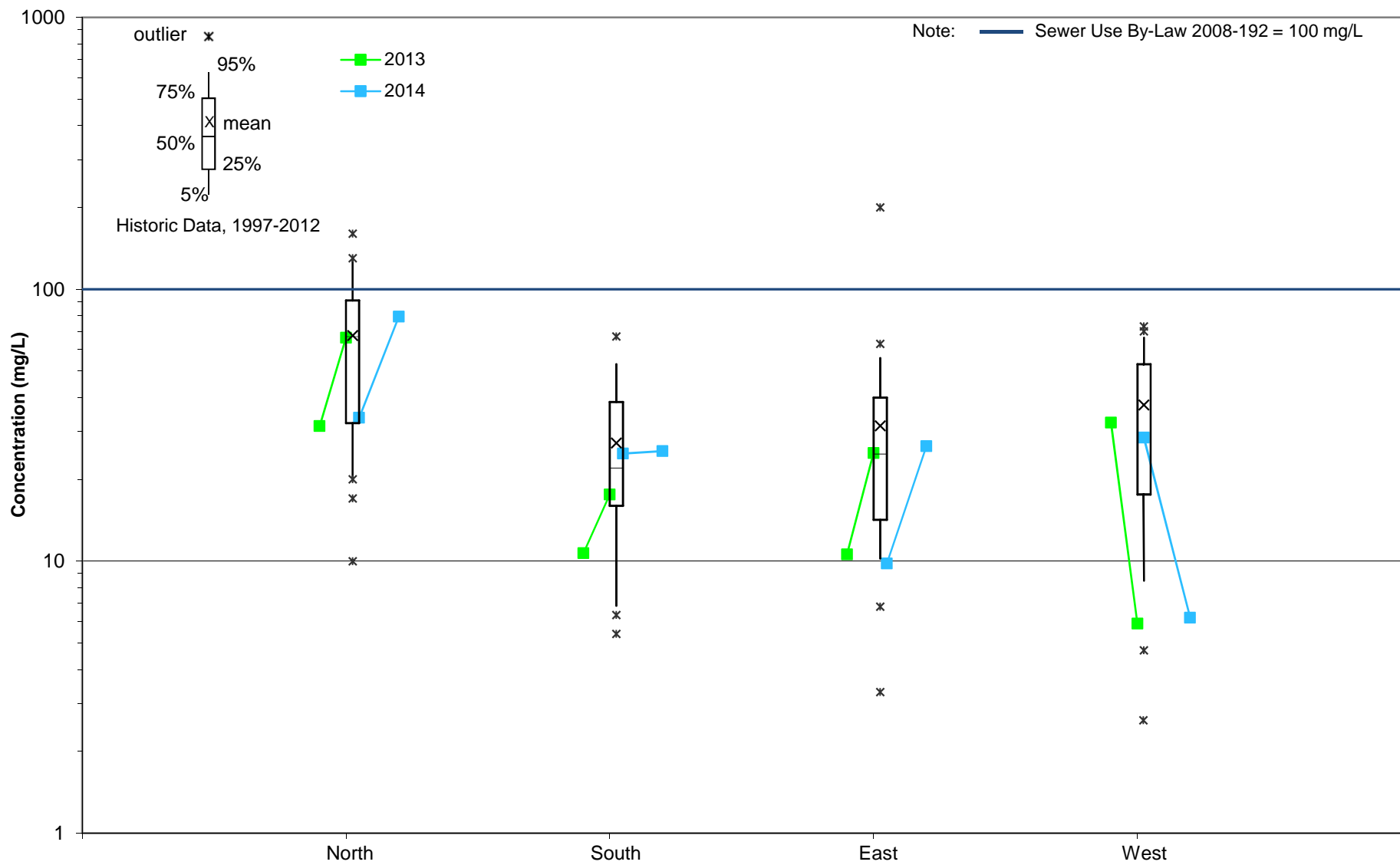
Chloride in Wastewater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix D
Figure

D2

Date: 12/2014
File: 218-1847.25



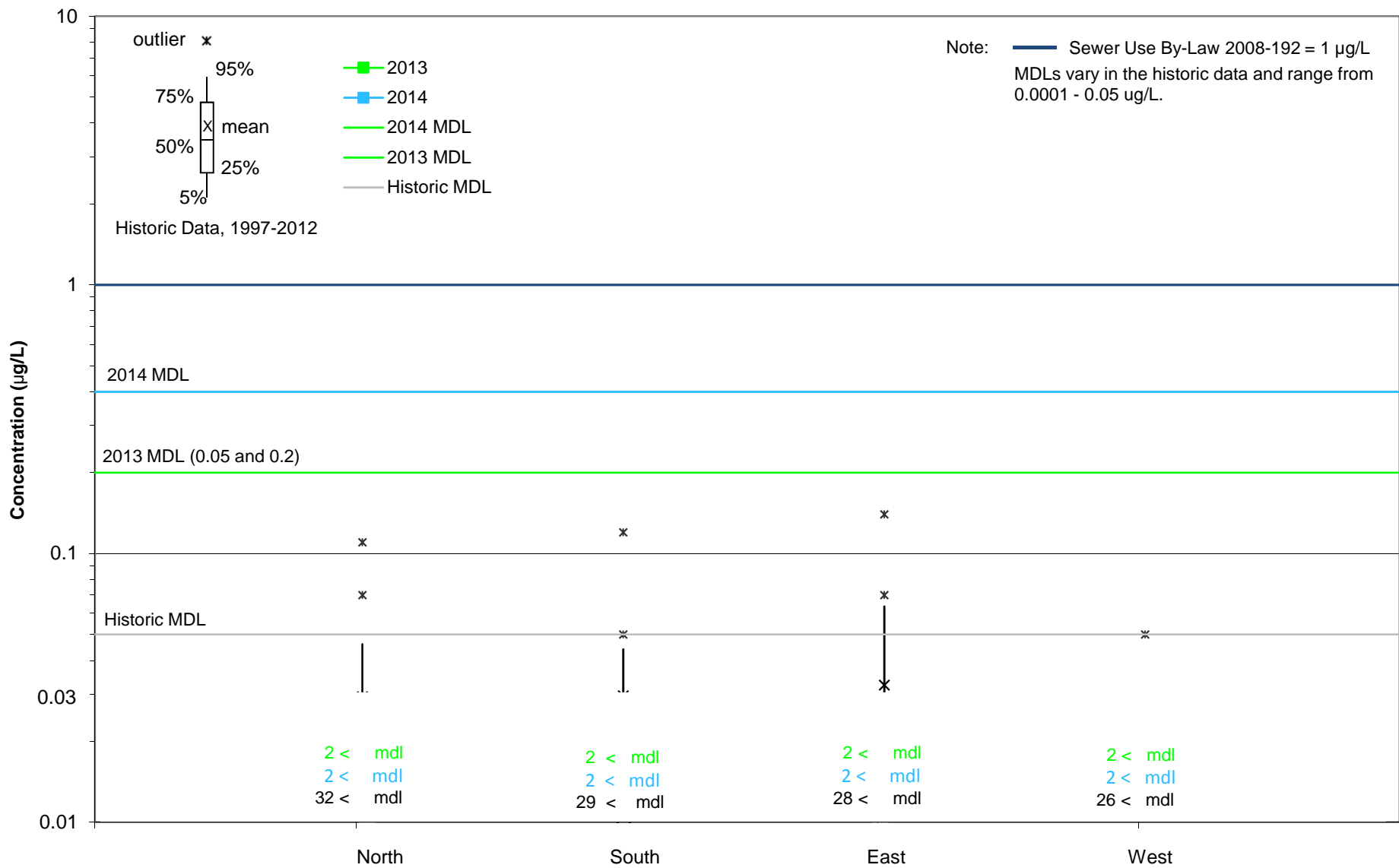
TKN in Wastewater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix D
Figure

D3

Date: 12/2014
File: 218-1847.25



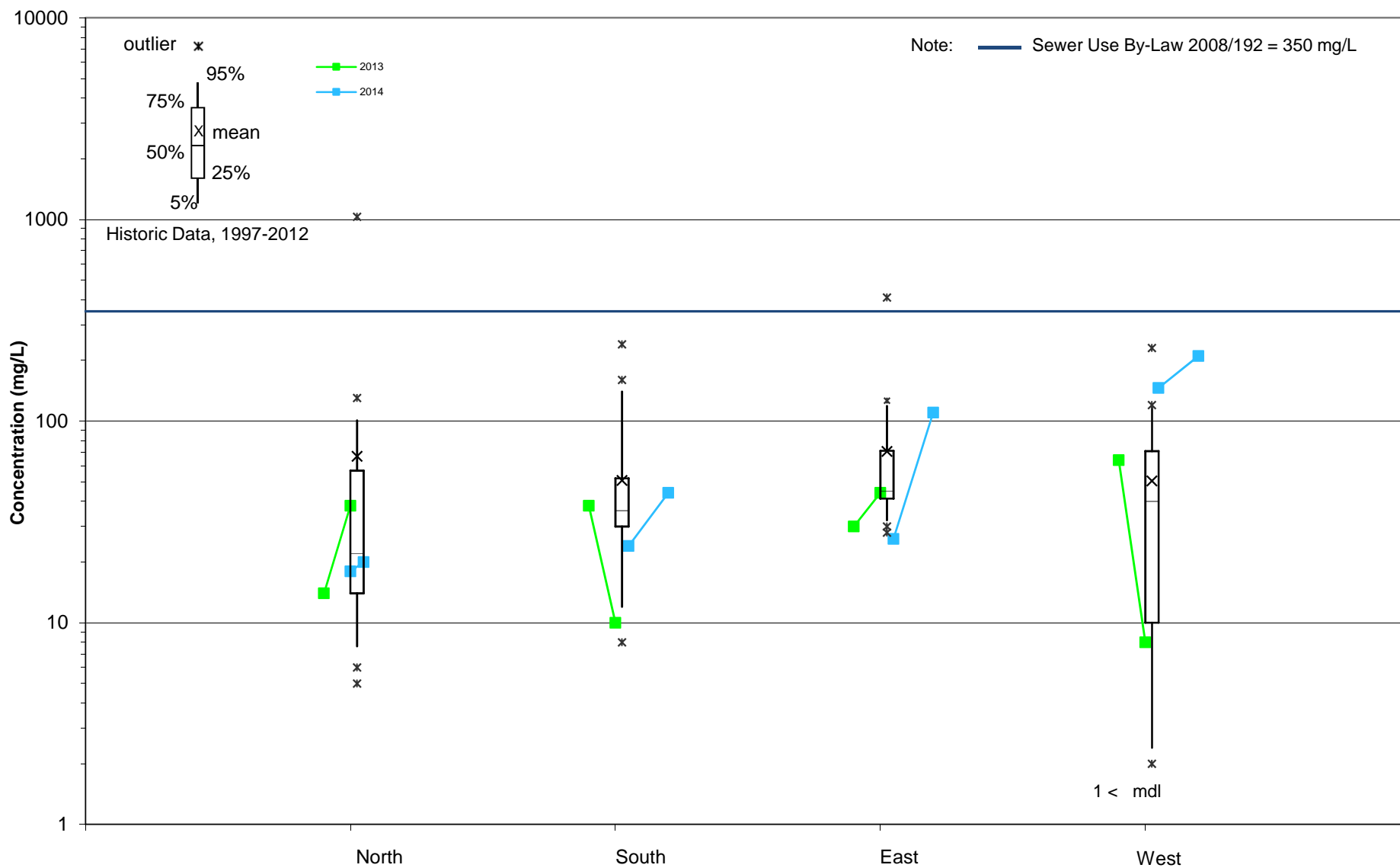
PCBs in Wastewater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix D
Figure

D4

Date: 12/2014
File: 218-1847.25



Total Suspended Solids in Wastewater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix D
Figure

D5

Date: 12/2014
File: 218-1847.25

APPENDIX E
SEEP & GROUNDWATER ANALYSES TABLES & FIGURES

Table E1
Summary of Seep Analyses

		Parameter				
Seep ID and Date Sampled	Sample ID	pH	Ammonia (N)-Total	Field Temperature	Field pH	Un-ionized Ammonia
		pH Units	mg/L	°C	pH Units	ug/L
Provincial Water Quality Objectives		6.5 - 8.5			6.5 - 8.5	20
Assessment Criteria for Waste Disposal Sites and Aquatic Protection Values ^a		6.0 - 9.0			6.0 - 9.0	100
MDL			0.005			
SD009.5						
March 28, 2013	13-W003	7.14	25.7	1.77	6.99	24.0
March 28, 2013	13-W004*	7.19	25.5	1.77	6.99	23.8
April 15, 2013	13-W009	7.40	16.7	7.14	8.10	36.8
April 15, 2013	13-W010*	7.40	16.9	7.14	8.10	37.2
June 13, 2013	13-W039	7.40	10.5	16.2	7.54	113.9
June 13, 2013	13-W040*	7.40	10.1	16.5	7.58	120.0
April 1, 2014	14-W001	7.10	24.8	3.40	6.86	19.6
April 1, 2014	14-W002*	7.11	25.3	3.40	6.86	20.0
May 22, 2014	14-W028	7.79	9.47	17.13	7.58	114.0
May 22, 2014	14-W029*	7.77	10.0	17.13	7.58	120.4
SD009.55						
April 4, 2014	14-W003	7.09	8.21	0.40	6.54	2.4
April 4, 2014	14-W004*	7.11	8.11	0.40	6.54	2.4
SD011						
April 9, 2014	14-W011	6.87	6.14	3.90	6.27	1.3
April 9, 2014	14-W012*	6.88	6.27	3.90	6.27	1.3
May 22, 2014	14-W026	6.81	13.8	13.69	6.87	25.2
May 22, 2014	14-W027*	6.81	12.7	13.69	6.87	23.2
SD044.4						
January 15, 2013	13-W001	6.92	4.56	7.7	7.73	37.6
January 15, 2013	13-W002*	6.90	4.68	7.7	7.73	38.6
SD056.8						
April 7, 2014	14-W005	7.14	10.8	4.60	6.29	2.5
April 7, 2014	14-W006*	7.16	11.2	4.60	6.29	2.6
SD062						
March 28, 2013	13-W005	7.04	1.78	5.86	6.92	2.0
March 28, 2013	13-W006*	6.96	1.79	5.86	6.92	2.0
April 7, 2014	14-W007	7.09	1.46	3.70	6.60	0.7
April 7, 2014	14-W008*	7.10	1.53	3.70	6.60	0.7
SD064						
April 9, 2014	14-W009	7.11	0.69	3.6	6.22	0.1
April 9, 2014	14-W010*	7.11	0.69	3.6	6.22	0.1

Red highlighting indicates result is above the Provincial Water Quality Objectives (PWQO)

Data Input: BC

Orange highlighting indicates the result is above the Aquatic Protection Value

Data Check: EG

* duplicate sample

^aSources: Table A: Assessment Criteria for Waste Disposal Sites, Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water, Ministry of the Environment, November 2010

and Table 3.1: Aquatic Protection Values (APV) to Protect Aquatic Biota Exposed to Contaminants from Migration of Contaminated Groundwater to Surface Water, Rationale for the Development of Soil and Ground Water Standards for use at Contaminated Sites in Ontario, Ontario Ministry of the Environment, December 2009

Table E2
Summary of Seep Analyses

Parameter	Units	MDL	Sample ID	13-W007	13-W008	13-W011	13-W012	13-W041	13-W042	Provincial Water Quality Objectives	Assessment Criteria for Waste Disposal Sites and Aquatic Protection Values ^a
			Sample Location ID	SD009.5	SD009.5 (duplicate)	SD009.5	SD009.5 (duplicate)	SD009.5	SD009.5 (duplicate)		
Date Collected				1-Apr-13	1-Apr-13	16-Apr-13	16-Apr-13	17-Jun-13	17-Jun-13		
pH	pH Units			7.20	7.26	7.34	7.33	7.60	7.58	6.5 - 8.5	6.0 - 9.0
Alkalinity(CaCO ₃)	mg/L	3		695	693	691	690	600	594	note ¹	
Conductivity	µmho/cm	1		1410	1370	1510	1500	1290	1290		
Turbidity	NTU	0.2		4.3	4.3	2.5	2.3	71.9	77.8	note ²	
Chloride	mg/L	0.5		24.8	24.8	33.0	33.0	23.3	23.1		180
Nitrite (N)	mg/L	0.1		0.2	0.2	0.4	0.4	0.5	0.6		0.06 ⁴
Nitrate (N)	mg/L	0.1		4.3	4.3	17.0	17.0	13.9	13.3		2.9 ⁴
Total Suspended Solids	mg/L	2		6	6	8	4	120	168		
Phosphorus-Total	mg/L	0.01		0.04	0.04	0.04	0.04	0.41	0.46	0.030 ³	
Total Kjeldahl Nitrogen	mg/L	0.1		19.8	20.2	16.1	16.2	16.9	17.8		
Ammonia (N)-Total	mg/L	0.005		19.4	19.1	15.4	14.5	10.8	10.7		
Total Dissolved Solids	mg/L	3		777	753	828	826	710	711		
Hardness (as CaCO ₃)	mg/L	1		577	569	682	687	566	573		
Aluminum	mg/L	0.01		0.05	0.04	0.06	0.06	0.05	0.05	0.075 ³	0.100 ^{4,5}
Cadmium	mg/L	0.00002		0.00012	0.00013	0.00017	0.00017	0.00015	0.00015	0.0005 ³	0.00021
Cobalt	mg/L	0.0001		0.0027	0.0029	0.0023	0.0023	0.0020	0.0020	0.0009	0.0052
Copper	mg/L	0.0001		0.0029	0.0030	0.0050	0.0051	0.0064	0.0061	0.005	0.0069
Iron	mg/L	0.005		0.521	0.545	0.102	0.106	0.145	0.132	0.300	1.000
Lead	mg/L	0.00002		0.00013	0.00014	0.00013	0.00014	0.00048	0.00042	0.005 ³	0.002
Zinc	mg/L	0.005		0.016	0.016	0.010	0.013	0.014	0.013	0.020 ³	0.089
Field Temperature	°C	-		4.79	4.79	5.1	5.1	15.7	15.7		
Field pH	pH Units	-		7.18	7.18	7.10	7.10	7.80	7.80	6.5 - 8.5	6.0 - 9.0
Un-ionized Ammonia	ug/L	-		35.9	35.4	24.4	22.9	192.6	190.9	20	100
Poly-Chlorinated Biphenyls (PCB's)	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.001	0.014
Acenaphthene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		520
Acenaphthylene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05		0.14
Anthracene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.0008 ³	0.1
Benzo(a)anthracene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.08	0.08	0.0004 ³	0.18
Benzo(a)pyrene	µg/L	0.01		< 0.01	< 0.01	< 0.01	< 0.01	0.072	0.075		0.21
Benzo(b)fluoranthene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	0.11	0.11		0.42
Benzo(b+k)fluoranthene	µg/L	0.1		< 0.1	< 0.1	< 0.1	< 0.1	0.15	0.14		
Benzo(g,h,i)perylene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.07	0.08	0.00002 ³	0.02
Benzo(k)fluoranthene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.0002 ³	0.14
Chrysene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.08	0.08	0.0001 ³	0.07
Dibenzo(a,h)anthracene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.002 ³	0.04
Fluoranthene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	0.15	0.16	0.0008 ³	7.3
Fluorene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.2 ³	29
Indeno(1,2,3,-cd)pyrene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.06		0.14
Methylnaphthalene,1-	µg/L	0.05		0.09	0.09	0.07	0.07	< 0.05	< 0.05	2 ³	
Methylnaphthalene,2-	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	2 ³	146
Naphthalene	µg/L	0.05		0.09	0.10	0.13	0.12	< 0.05	0.05	7 ³	620
Phenanthrene	µg/L	0.05		<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	<u>< 0.05</u>	0.06	0.06	0.03 ³	38
Pyrene	µg/L	0.05		< 0.05	< 0.05	< 0.05	< 0.05	0.14	0.14		0.57

Data Input: KK
Data Check: EG

Red highlighting indicates result is above the Provincial Water Quality Objectives (PWQO)

Orange highlighting indicates the result is above the Aquatic Protection Value

Black, bold and underline indicates MDL greater than criteria

^aSources: Table A: Assessment Criteria for Waste Disposal Sites, Monitoring and Reporting for Waste Disposal Sites Groundwater and Surface Water, Ministry of the Environment, November 2010 and Table 3.1: Aquatic Protection Values (APV) to Protect Aquatic Biota Exposed to Contaminants from Migration of Contaminated Groundwater to Surface Water, Rationale for the Development of Soil and Ground Water Standards for use at Contaminated Sites in Ontario, Ontario Ministry of the Environment, December 2009

¹ Alkalinity should not be decreased by more than 25% of the natural concentration

² Suspended matter should not be added to surface water in concentrations that will change the natural Secchi disc reading by more than 10 percent

³ Interim PWQO

⁴ Where no Assessment Criteria for Waste Disposal Sites or APV value exists, Canadian Water Quality Guideline values have been used

⁵ Aluminum guideline = 0.005 mg/L at pH < 6.5; = 0.100 at pH ≥ 6.5

Table E3
Groundwater Elevations for Monitoring Wells

Elevation	MW1 75.929		MW2		MW3 77.101		MW4 77.261		MW5 75.335		MW6 75.697		MW7 75.765		MW16 75.707	
DATE	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV
May 27-28, 2013	1.27	74.66	1.47	-	2.02	75.08	1.93	75.33	0.57	74.77	0.89	74.81	0.86	74.91	0.89	74.82
November 20, 2013	1.26	74.67	1.41	-	1.99	75.11	2.02	75.24	0.87	74.47	1.26	74.44	1.00	74.77	1.10	74.61
May 22-23, 2014	1.24	74.69	na	-	1.59	75.51	1.80	75.46	0.35	74.99	0.81	74.89	0.51	75.26	0.62	75.09
November 28, 2014	1.81	74.12	na	-	2.35	74.75	2.39	74.87	1.01	74.33	1.34	74.36	1.20	74.57	1.46	74.25

Elevation	MW17 na		MW26 76.604		MW27 79.511		MW28D 83.081		MW28S 83.089		MW29D 79.453		MW29S 79.463		MW30D 75.379	
DATE	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV
May 27-28, 2013	destroyed	na	0.94	75.66	2.84	76.67	6.97	76.11	6.74	76.35	2.51	76.94	2.31	77.14	0.61	74.77
November 20, 2013	destroyed	na	1.19	75.41	3.41	76.10	6.96	76.12	7.61	75.48	2.84	76.61	2.75	76.70	0.64	74.74
May 22-23, 2014	destroyed	na	0.73	75.87	2.43	77.08	6.78	76.30	6.30	76.79	2.26	77.19	1.64	77.82	0.29	75.09
November 28, 2014	destroyed	na	1.29	75.31	3.56	75.95	7.00	76.08	7.86	75.23	2.87	76.58	2.92	76.54	0.77	74.61

Elevation	MW30S 75.419		MW31D 76.118		MW31S 76.087		MW34D 76.630		MW34S 76.608		MW35D na		MW35S na		MW36D 94.853	
DATE	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV
May 27-28, 2013	0.60	74.82	1.01	75.11	1.04	75.05	2.15	74.48	1.52	75.09	destroyed	na	destroyed	na	17.24	77.61
November 20, 2013	0.70	74.72	1.07	75.05	1.02	75.07	1.73	74.90	1.55	75.06	destroyed	na	destroyed	na	17.74	77.11
May 22-23, 2014	0.28	75.14	0.79	75.33	0.78	75.31	1.86	74.77	1.17	75.44	destroyed	na	destroyed	na	16.88	77.97
November 28, 2014	0.83	74.59	1.14	74.98	1.09	75.00	1.96	74.67	1.80	74.81	destroyed	na	destroyed	na	18.00	76.85

Elevation	MW36S 94.856		MW37D 75.526		MW37S 75.525		MW38D 76.339		MW38S 76.313		MW38I 76.292		MW39D 76.674		MW39S 76.621	
DATE	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV
May 27-28, 2013	17.92	76.94	0.76	74.77	0.77	74.76	1.23	75.11	1.25	75.06	1.16	75.13	1.40	75.27	1.42	75.20
November 20, 2013	18.58	76.28	0.94	74.59	0.83	74.70	1.37	74.97	1.32	74.99	1.30	74.99	1.51	75.16	1.42	75.20
May 22-23, 2014	17.50	77.36	0.47	75.06	0.46	75.07	0.94	75.40	0.83	75.48	0.83	75.46	0.97	75.70	0.92	75.70
November 28, 2014	18.61	76.25	1.09	74.44	0.96	74.57	1.52	74.82	1.55	74.76	1.35	74.94	1.68	74.99	1.70	74.92

Elevation	MW39I 76.617		MW40D 75.492		MW40S 75.452		MW41 76.578		MW42D 76.574		MW42S 76.578		MW43D 76.930		MW43S 76.921	
DATE	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV	DTW	GW ELEV
May 27-28, 2013	1.39	75.23	0.90	74.59	0.86	74.59	1.09	75.49	1.03	75.54	0.73	75.85	1.03	75.90	1.16	75.76
November 20, 2013	1.43	75.19	1.23	74.26	1.24	74.21	1.08	75.50	0.85	75.72	0.72	75.86	1.31	75.62	1.24	75.68
May 22-23, 2014	0.93	75.69	0.49	75.00	0.47	74.98	0.54	76.04	0.59	75.98	0.34	76.24	0.67	76.26	0.57	76.35
November 28, 2014	1.69	74.93	1.36	74.13	1.35	74.10	1.38	75.20	1.17	75.40	1.00	75.58	1.44	75.49	1.53	75.39

Elevation	Culvert A 76.703		Culvert B 77.204		Culvert C 76.894		Culvert D 75.991		Culvert E 77.302	
DATE	DTW	SW ELEV	DTW	SW ELEV	DTW	SW ELEV	DTW	SW ELEV	DTW	SW ELEV
May 27-28, 2013	0.71	75.99	0.47	76.73	1.09	75.80	1.76	74.23	1.46	-
November 20, 2013	0.82	75.88	0.38	76.82	2.07	74.82	2.03	73.96	1.44	-
May 22-23, 2014	0.71	75.99	0.42	76.78	1.80	75.09	1.44	74.55	1.54	-
November 28, 2014	1.15	75.55	0.40	76.80	1.98	74.91	2.15	73.84	1.52	-

Note:

1. "na" denotes measurement not available
2. "GW Elev" measured in metres above sea level (masl), from September 2014 AECOM survey results (with the exception of MW30 S/D)
3. MW2 not located during 2014 monitoring events

Data Input: EG
Data Checked: BH

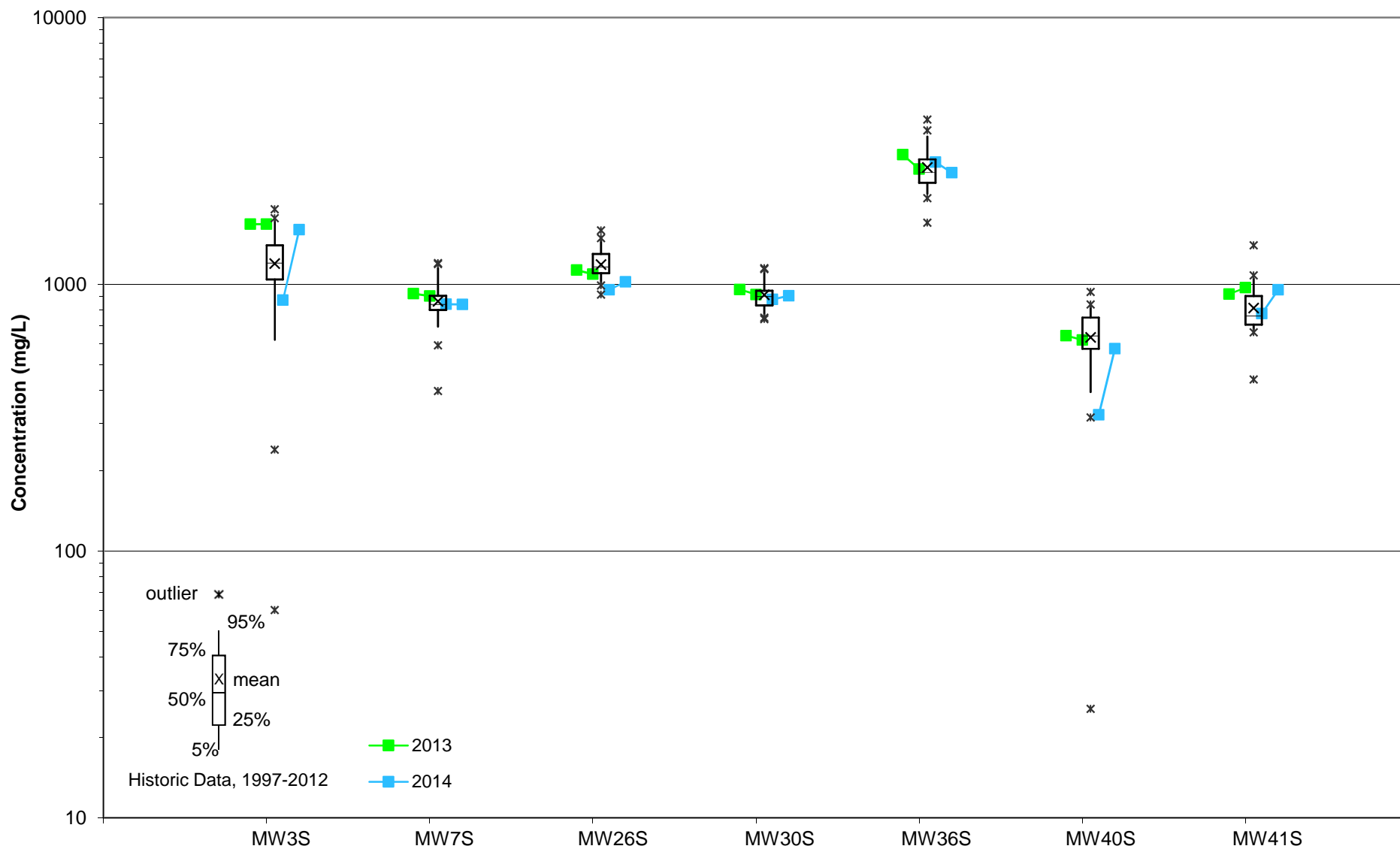
Table E4
Summary of Groundwater Analyses

Sample Location ID & Date	Sample ID	Ammonia-N mg/L	Chloride mg/L	Iron mg/L	pH pH Units	Total Dissolved Solids mg/L
Non-Potable Groundwater Standards						
M3S						
May 29, 2013	13-W026	119	243.0	16.0	6.72	1680
November 21, 2013	13-W056	65.1	133.0	5.31	7.04	1680
May 23, 2014	14-W033	13.7	44.1	0.555	7.19	872
November 28, 2014	14-W056	65.4	204	13.8	7.08	1600
M7S						
May 29, 2013	13-W032	54.5	23.3	48.1	6.53	923
November 21, 2013	13-W062	40.4	24.2	37.7	6.88	903
May 23, 2014	14-W036	44.0	18.5	47.9	6.78	842
November 28, 2014	14-W062	42.3	29.5	29.6	6.88	840
M26S						
May 29, 2013	13-W027	66.8	31.1	61.4	6.51	1130
May 29, 2013	13-W028*	69.2	31.0	61.2	6.51	1130
November 21, 2013	13-W057	44.4	28.1	13.2	6.82	1090
November 21, 2013	13-W058*	44.3	28.0	13.4	6.83	1090
May 23, 2014	14-W030	40.2	18.8	46.1	6.84	954
May 23, 2014	14-W031*	41.7	18.4	46.4	6.81	941
November 28, 2014	14-W057	59.6	30.7	36.8	6.80	1020
November 28, 2014	14-W058*	57.6	29.3	39.8	6.80	1020
M30S						
May 29, 2013	13-W031	55.5	8.5	49.9	6.49	955
November 21, 2013	13-W061	36.3	15.0	36.0	6.80	914
May 23, 2014	14-W035	40.2	11.1	43.9	6.76	877
November 28, 2014	14-W061	47.7	15.3	31.8	6.73	905
M36S						
May 29, 2013	13-W030	323	500	24.9	6.92	3060
November 21, 2013	13-W060	239	367	20.0	7.16	2700
May 23, 2014	14-W034	284	484	1.83	7.18	2870
November 28, 2014	14-W060	258	404	17.0	7.11	2620
M40S						
May 29, 2013	13-W033	19.1	10.5	33.0	6.56	641
November 21, 2013	13-W063	12.7	11.1	30.6	6.90	618
May 23, 2014	14-W037	1.07	1.07	0.268	7.23	324
November 28, 2014	14-W063	13.9	14.1	15.8	7.23	573
M41S						
May 29, 2013	13-W034	90	20.9	41.9	6.53	919
November 21, 2013	13-W064	80	24	30.6	6.85	972
May 23, 2014	14-W038	45.6	19.0	31.7	6.87	777
November 28, 2014	14-W064	89.0	23.9	32.5	6.85	953
Field Blank						
May 29, 2013	13-W029	0.028	<0.5	0.01	6.04	<3
November 21, 2013	13-W059	0.013	<0.5	<0.005	5.94	<3
May 23, 2014	14-W032	0.070	<0.5	<0.005	5.91	<3
November 28, 2014	14-W059	0.070	<0.5	<0.005	6.15	<3

Note:

1. Grey shading indicates concentrations higher than the Non-Potable Groundwater Standards.
2. This information to be used as an internal reference only. In case of discrepancy, refer to certificate of analyses.

* duplicate sample



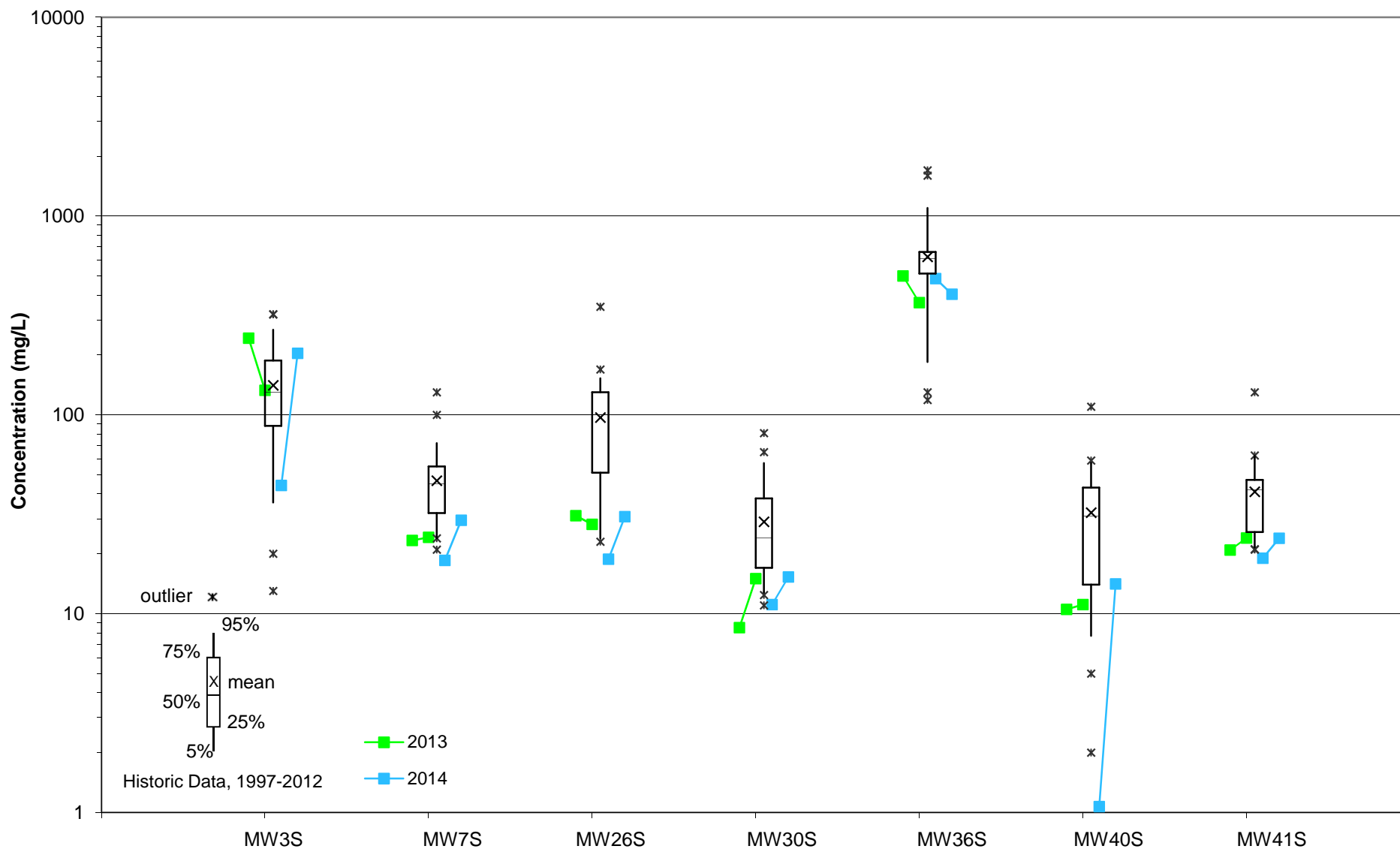
TDS in Groundwater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix E
Figure

E1

Date: 12/2014
File: 218-1847.25



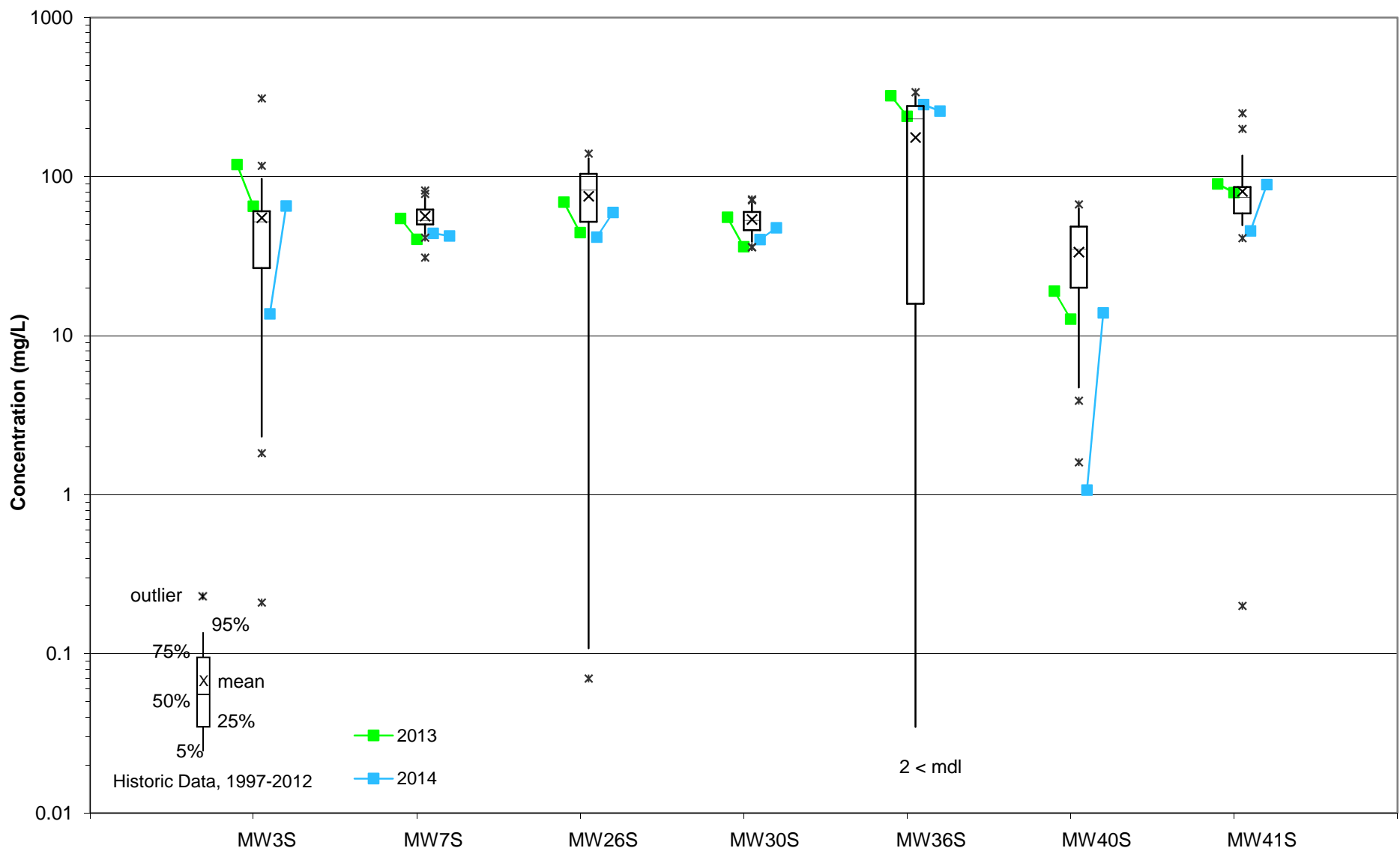
Chloride in Groundwater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix E
Figure

E2

Date: 12/2014
File: 218-1847.25



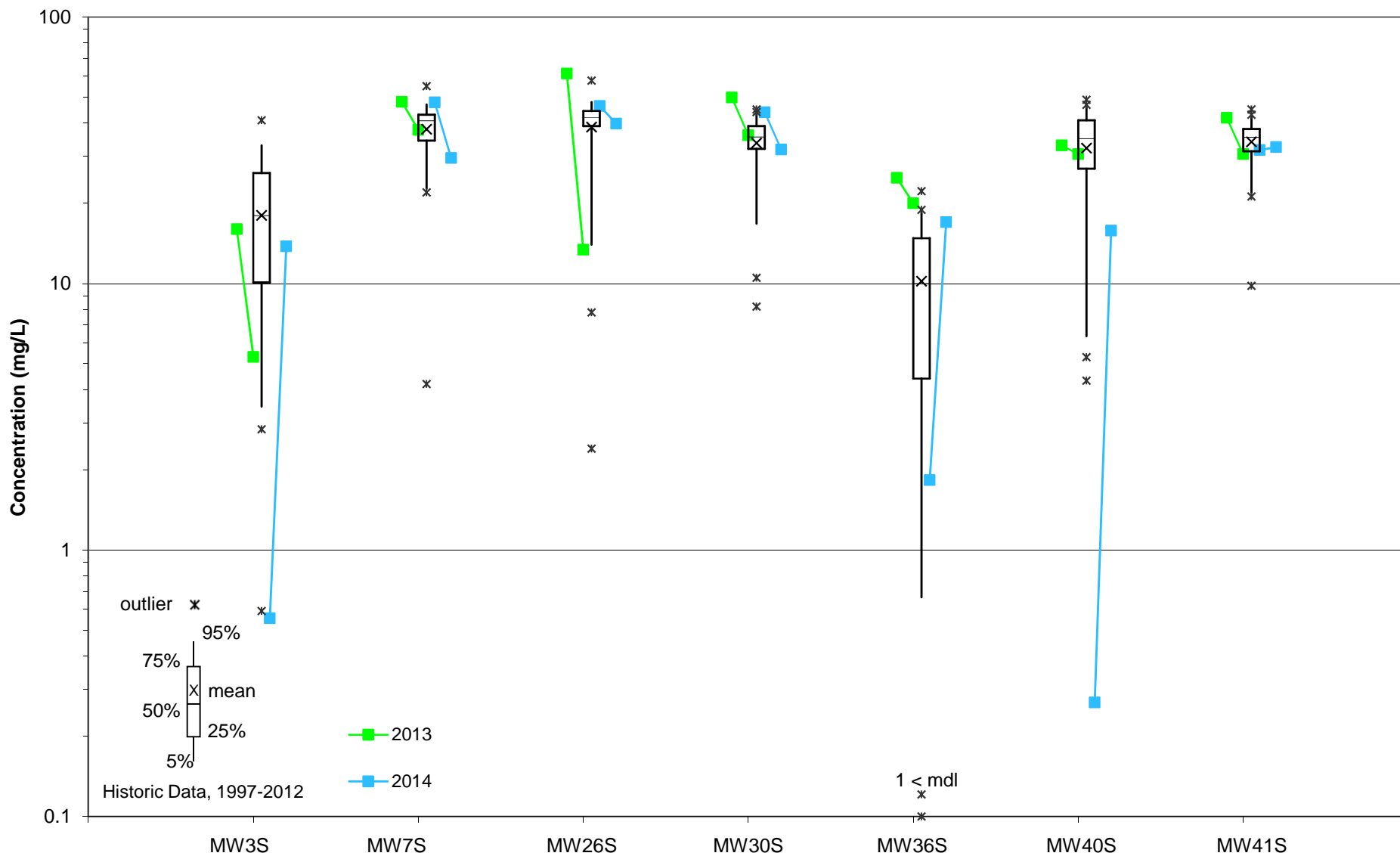
Ammonia in Groundwater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix E
Figure

E3

Date: 12/2014
File: 218-1847.25



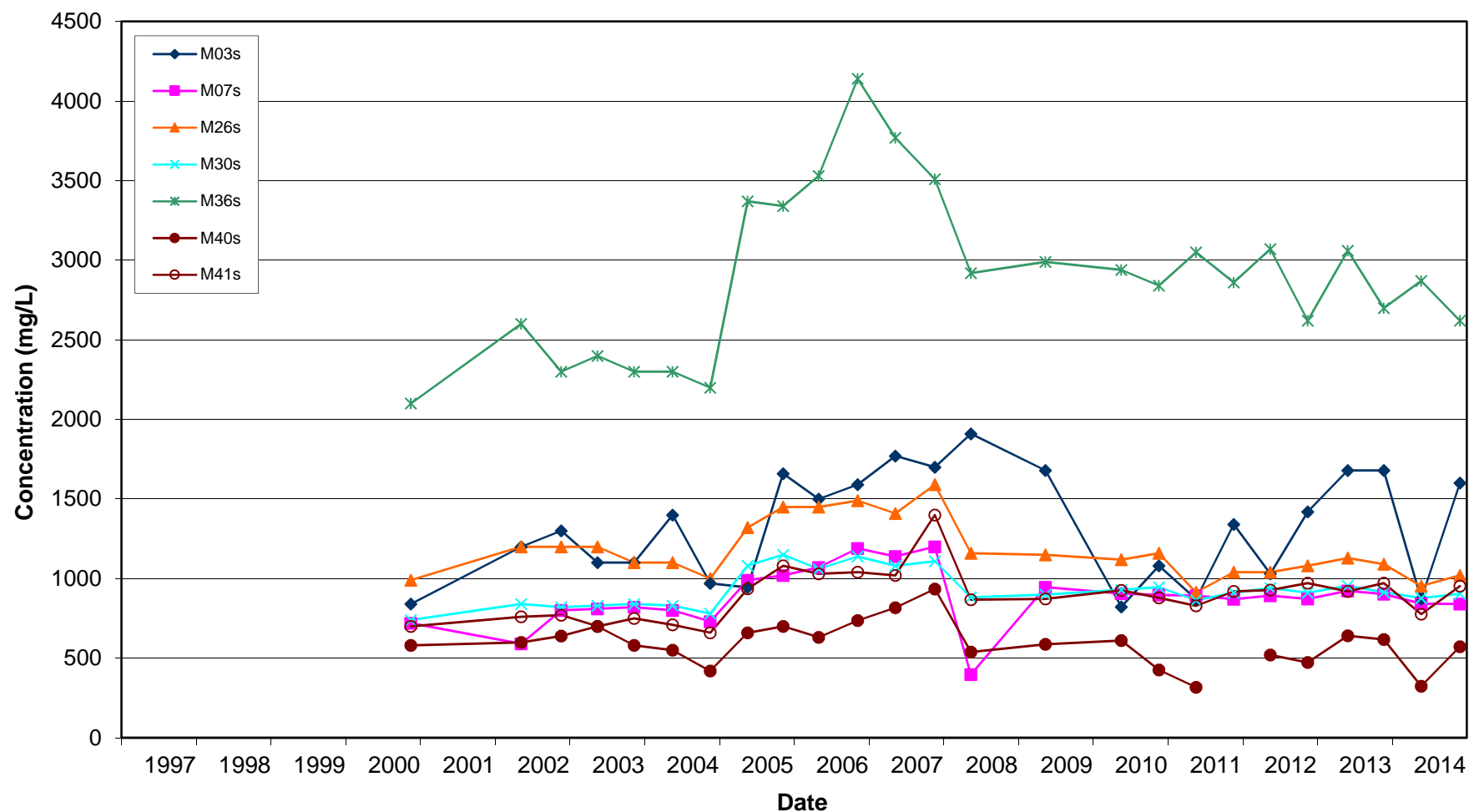
Iron in Groundwater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix E
Figure

E4

Date: 12/2014
File: 218-1847.25



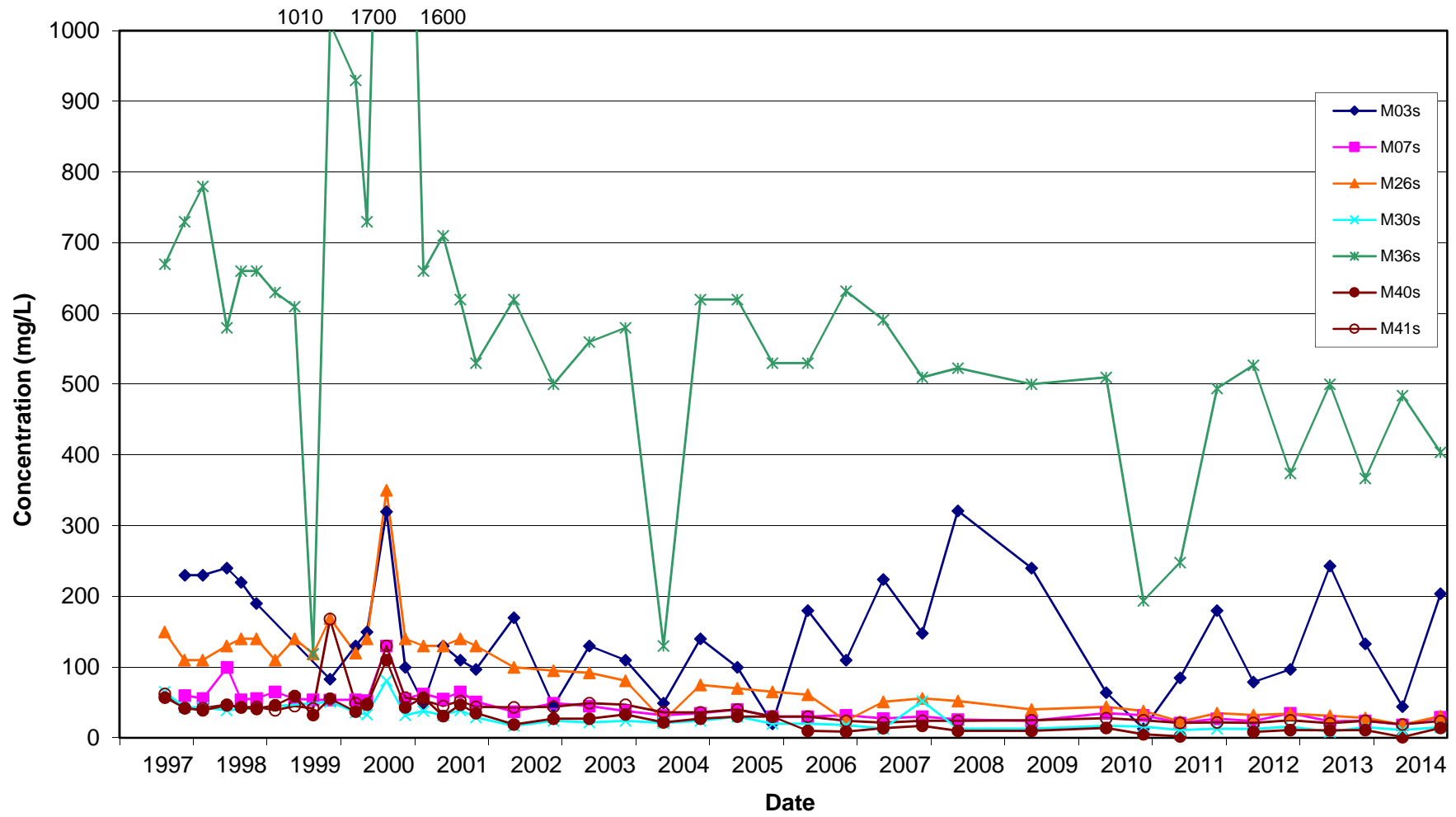
TDS Trends in Groundwater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix E
Figure

E5

Date: 12/2014
File: 218-1847.25



Chloride Trends in Groundwater

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix E
Figure

E6

Date: 12/2014
File: 218-1847.25

APPENDIX F
SURFACE WATER ANALYSES TABLES & FIGURES

Table F1
Summary of Surface Water Analyses

Sample Location ID & Date	Sample ID	Alkalinity as CaCO ₃ mg/L	Ammonia-N mg/L	Un-Ionized Ammonia mg/L	Bicarbonate as CaCO ₃ mg/L	Carbonate as CaCO ₃ mg/L	Chloride mg/L	Conductivity umho/cm	Hardness as CaCO ₃ mg/L	Nitrate-N mg/L	Nitrite-N mg/L	pH pH Units	Total Dissolved Solids mg/L	Total Kjeldahl Nitrogen mg/L	Total Suspended Solids mg/L	Turbidity NTU
Provincial Water Quality Objectives				0.02								6.5-8.5				
GCR010																
May 28, 2013	13-W013	97	0.028	0.0050	84	12	18.3	275	123	<0.1	<0.1	8.78	151	0.8	11	5.8
May 28, 2013	13-W014*	96	0.025	0.0040	87	10	18.2	277	115	0.1	<0.1	8.72	152	1.1	12	5.7
November 20, 2013	13-W043	124	0.020	0.0003	124	<3	20.7	354	140	0.2	<0.1	8.23	195	0.5	7	3.4
November 20, 2013	13-W044*	124	0.017	0.0003	124	<3	20.6	352	132	0.2	<0.1	8.22	194	0.5	7	3.1
May 22, 2014	14-W013	93	0.06	0.0031	93	<3	11.2	236	119	<0.1	<0.1	8.10	130	1.0	7	4.1
May 22, 2014	14-W014*	92	0.03	0.0016	92	<3	11.1	236	111	<0.1	<0.1	8.10	130	0.9	6	3.6
November 27, 2014	14-W043	131	0.10	0.0018	131	<3	30.5	385	145	0.2	<0.1	8.20	212	0.4	3	3.0
November 27, 2014	14-W044*	130	0.10	0.0018	130	<3	15.7	385	151	<0.1	<0.1	8.20	212	0.5	<3	3.4
GCR040																
May 28, 2013	13-W020	95	0.031	0.0043	87	8	18.3	273	135	<0.1	<0.1	8.62	150	13.5	28	10.7
November 20, 2013	13-W050	194	0.553	0.0038	194	<3	29.0	502	223	0.2	<0.1	7.90	276	4.5	144	71.9
May 22, 2014	14-W018	100	0.05	0.0050	95	5	23.9	302	119	0.1	<0.1	8.45	166	1.1	7	3.0
November 27, 2014	14-W050	203	0.64	0.0056	203	<3	32.2	526	216	0.1	<0.1	7.96	289	1.3	78	30.9
GCR060																
May 28, 2013	13-W022	98	0.057	0.0059	93	5	13.4	258	125	<0.1	<0.1	8.46	142	1.2	52	16.1
November 20, 2013	13-W052	115	0.048	0.0007	115	<3	14.0	302	128	0.1	<0.1	8.19	166	1.3	48	30.3
May 22, 2014	14-W022	92	0.05	0.0057	89	3	14.4	246	117	<0.1	<0.1	8.41	135	0.8	10	4.7
November 27, 2014	14-W051	139	0.19	0.0020	139	<3	16.4	352	144	0.1	<0.1	8.09	194	1.6	200	157
GCR110																
May 28, 2013	13-W023	81	0.028	0.0030	76	5	14.5	235	105	<0.1	<0.1	8.51	129	0.9	14	7.5
November 20, 2013	13-W054	112	0.139	0.0029	112	<3	15.5	309	118	0.2	<0.1	8.25	170	2.0	11	10.0
May 22, 2014	14-W023	92	0.13	0.0057	92	<3	9.5	231	118	<0.1	<0.1	7.96	127	1.2	20	4.9
November 27, 2014	14-W052	106	0.19	0.0023	106	<3	21.1	316	117	0.2	<0.1	8.13	174	0.6	18	18.3
GCR130																
May 28, 2013	13-W024	102	0.096	0.0034	102	<3	25.6	329	137	0.2	<0.1	7.98	181	1.6	72	33.7
November 20, 2013	13-W053	187	0.145	0.0013	187	<3	43.5	581	223	0.6	<0.1	7.93	320	2.0	64	28.1
May 22, 2014	14-W024	100	0.06	0.0038	100	<3	16.7	274	126	<0.1	<0.1	8.13	151	1.4	26	7.4
November 27, 2014	14-W054	180	0.20	0.0038	180	<3	67.0	660	223	1.1	<0.1	8.12	363	0.5	30	21.5
GCR160																
May 28, 2013	13-W021	80	0.036	0.0077	69	11	20.0	260	106	<0.1	<0.1	8.84	143	0.8	14	5.3
November 20, 2013	13-W051	100	0.041	0.0008	100	<3	14.0	279	113	0.2	<0.1	8.24	153	0.6	26	14.8
May 22, 2014	14-W020	103	0.05	0.0067	98	5	20.1	292	130	<0.1	<0.1	8.46	161	0.9	9	4.2
November 27, 2014	14-W055	105	0.11	0.0014	105	<3	22.4	324	104	0.3	<0.1	8.15	178	0.5	12	12.2
SST030																
May 28, 2013	13-W025	121	0.141	0.0051	121	<3	31.4	389	180	0.3	<0.1	8.01	214	1.4	188	43.4
November 20, 2013	13-W055	212	0.169	0.0023	212	<3	53.6	670	244	1.1	<0.1	7.94	369	2.1	24	9.3
May 22, 2014	14-W025	111	0.04	0.0024	111	<3	24.0	325	143	0.1	<0.1	8.13	179	1.0	10	5.8
November 27, 2014	14-W053	182	0.11	0.0013	182	<3	66.7	664	222	1.2	<0.1	8.03	365	0.4	5	5.1
WST010																
May 28, 2013	13-W016	307	0.017	0.0005	307	<3	125	1060	408	1.5	<0.1	8.05	582	0.5	34	11.9
November 20, 2013	13-W046	270	0.018	0.0004	270	<3	99.4	915	308	1.3	<0.1	8.12	503	0.8	21	8.5
May 22, 2014	14-W015	212	0.02	0.0005	212	<3	80.6	738	304	0.7	<0.1	8.04	406	0.5	3	0.9
November 27, 2014	14-W046	319	0.04	0.0008	319	<3	173	1250	462	1.7	<0.1	8.07	689	0.1	7	1.9
WST040																
May 28, 2013	13-W017	328	0.14	0.0034	328	<3	143	1120	446	0.6	<0.1	7.82	616	7.8	12	9.3
November 20, 2013	13-W047	295	0.141	0.0013	295	<3	103	976	371	0.7	<0.1	7.94	537	0.2	6	2.8
May 22, 2014	14-W016	285	0.07	0.0011	285	<3	42.3	949	386	0.3	<0.1	7.79	522	0.7	5	2.8
November 27, 2014	14-W047	313	0.15	0.0016	313	<3	191	1290	405	0.8	<0.1	7.98	708	0.3	16	3.5
WST045																
May 28, 2013	13-W018	253	0.014	0.0008	248	5	137	1020	334	1.3	<0.1	8.34	560	0.4	3	1.0
November 20, 2013	13-W048	205	0.029	0.0009	204	<3	55.5	682	219	1.2	<0.1	8.30	375	0.2	7	1.5
May 22, 2014	14-W017	201	0.04	0.0013	201	<3	126	856	306	1.3	<0.1	8.21	471	0.4	3	0.8
November 27, 2014	14-W048	172	0.03	0.0008	172	<3	69.3	643	224	0.9	<0.1	8.27	354	0.2	<3	1.3
WST070																
May 28, 2013	13-W019	300	0.346	0.0077	300	<3	159	1180	409	1.5	<0.1	7.93	651	1.1	4	3.9
November 20, 2013	13-W049	259	0.147	0.0027	259	<3	89.7	901	312	1.3	<0.1	8.07	496	0.3	7	2.0
May 22, 2014	14-W019	254	0.30	0.0071	254	<3	143	1020	374	1.3	<0.1	7.95	560	0.8	4	1.7
November 27, 2014	14-W049	230	0.33	0.0046	230	<3	119	926	302	1.1	<0.1	8.01	509	0.5	6	4.1
Field Blank																
May 28, 2013	13-W015	<3	0.006	-	<3	<3	<0.5	1	<1	<0.1	<0.1	5.89	<3	0.1	<2	0.3
November 20, 2013	13-W045	<3	0.010	-	<3	<3	<0.5	1	<1	<0.1	<0.1	5.98	<3	<0.1	3	0.4
May 22, 2014	14-W021	<3	0.02	-	<3	<3	<0.5	1	<1	<0.1	<0.1	5.93	<3	0.1	<3	<0.2
November 27, 2014	14-W045	<3	0.06	-	<3	<3	<0.5	1	<1	<0.1	<0.1	5.89	<3	<0.1	<3	<0.2

Note:

1. Grey shading indicates concentrations higher than the Provincial Water Quality Objectives.
 2. This information to be used as an internal reference only. In case of discrepancy, refer to certificate of analyses.
- * duplicate sample

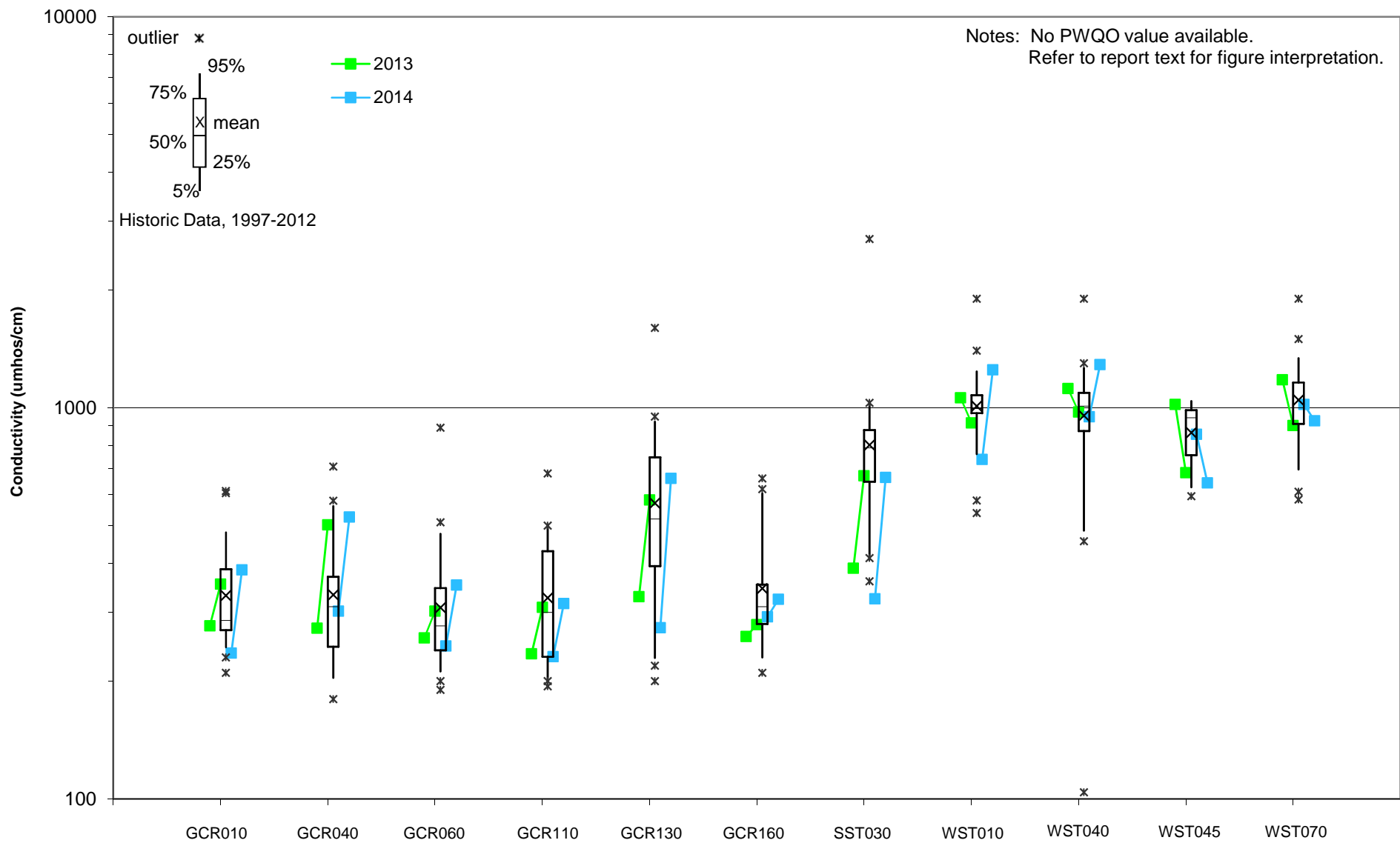
(continued)

Table F1 (continued)
Summary of Surface Water Analyses

Sample Location ID & Date	Sample ID	Cadmium mg/L	Calcium mg/L	Cobalt mg/L	Copper mg/L	Iron mg/L	Lead mg/L	Magnesium mg/L	Zinc mg/L
Provincial Water Quality Objectives		0.0002		0.0009	0.005	0.3	Alk > 80 = 0.025 Alk 40-80 = 0.020		0.03
GCR010									
May 28, 2013	13-W013	<0.00002	33.9	<0.0001	0.0015	0.145	0.00077	9.28	0.006
May 28, 2013	13-W014*	<0.00002	31.7	0.0001	0.0015	0.149	0.00119	8.66	0.006
November 20, 2013	13-W043	<0.00002	40.6	<0.0001	0.0008	0.074	0.00031	9.41	0.021
November 20, 2013	13-W044*	<0.00002	38.3	<0.0001	0.0008	0.052	0.00037	8.86	0.014
May 22, 2014	14-W013	<0.00002	34.6	<0.0001	0.0007	0.257	0.00024	7.84	0.011
May 22, 2014	14-W014*	<0.00002	32.5	<0.0001	0.0006	0.096	0.00024	7.37	0.012
November 27, 2014	14-W043	0.00046	41.8	<0.0001	0.0006	0.112	0.00244	9.86	0.012
November 27, 2014	14-W044*	<0.00002	43.4	<0.0001	0.0006	0.103	0.00027	10.2	0.014
GCR040									
May 28, 2013	13-W020	0.00007	38.3	0.0002	0.0031	0.641	0.00365	9.6	0.033
November 20, 2013	13-W050	0.00024	65.6	0.0004	0.0043	3.94	0.0270	14.4	0.056
May 22, 2014	14-W018	<0.00002	33.8	<0.0001	0.0012	0.159	0.00131	8.38	0.015
November 27, 2014	14-W050	0.00014	62.5	<0.0001	0.0116	0.498	0.00478	14.7	0.052
GCR060									
May 28, 2013	13-W022	<0.00002	35.2	0.0002	0.0014	0.532	0.00076	8.86	0.031
November 20, 2013	13-W052	<0.00002	37.1	0.0002	0.0013	0.451	0.00156	8.66	0.009
May 22, 2014	14-W022	<0.00002	33.7	<0.0001	0.0006	0.138	0.00044	7.97	0.009
November 27, 2014	14-W051	0.00012	41.3	0.0007	0.0145	1.220	0.00619	10.0	0.021
GCR110									
May 28, 2013	13-W023	<0.00002	28.2	<0.0001	0.0009	0.142	0.00038	8.48	0.007
November 20, 2013	13-W054	<0.00002	33.9	<0.0001	0.0008	0.244	0.00074	8.01	<0.005
May 22, 2014	14-W023	<0.00002	34.6	<0.0001	0.0008	0.432	0.00053	7.67	0.022
November 27, 2014	14-W052	0.00023	34.0	<0.0001	0.0013	0.360	0.00282	7.86	0.011
GCR130									
May 28, 2013	13-W024	0.00003	39.7	0.0003	0.0037	0.885	0.00555	9.32	0.014
November 20, 2013	13-W053	0.00002	68.6	0.0003	0.0027	0.724	0.00445	12.4	0.021
May 22, 2014	14-W024	<0.00002	37.5	0.0002	0.0020	0.459	0.00362	7.84	0.018
November 27, 2014	14-W054	0.00004	68.1	<0.0001	0.0033	0.793	0.00657	12.8	0.016
GCR160									
May 28, 2013	13-W021	<0.00002	28.4	<0.0001	0.0013	0.157	0.00087	8.58	0.009
November 20, 2013	13-W051	<0.00002	32.2	0.0001	0.0010	0.268	0.00087	7.81	<0.005
May 22, 2014	14-W020	0.00008	37.8	<0.0001	0.0011	0.180	0.00070	8.52	0.013
November 27, 2014	14-W055	<0.00002	29.8	<0.0001	0.0013	0.255	0.00115	7.08	0.024
SST030									
May 28, 2013	13-W025	0.00004	53.6	0.0003	0.0051	1.33	0.00576	11.2	0.032
November 20, 2013	13-W055	<0.00002	74.9	0.0001	0.0018	1.09	0.00209	13.8	0.006
May 22, 2014	14-W025	<0.00002	42.6	<0.0001	0.0011	0.282	0.00102	8.91	0.019
November 27, 2014	14-W053	0.00010	67.6	<0.0001	0.0092	0.423	0.00279	13.0	0.011
WST010									
May 28, 2013	13-W016	0.00006	117	0.0002	0.004	0.218	0.00294	28.1	0.037
November 20, 2013	13-W046	0.00034	89.5	0.0007	0.0029	0.283	0.0227	20.4	0.037
May 22, 2014	14-W015	0.00063	90.9	0.0003	0.0023	0.027	0.00939	18.7	0.055
November 27, 2014	14-W046	0.00007	132	<0.0001	0.0015	0.055	0.00213	32.3	0.015
WST040									
May 28, 2013	13-W017	0.00005	128	0.0002	0.0025	1.41	0.00095	30.8	0.010
November 20, 2013	13-W047	0.00004	106	0.0001	0.0011	1.00	0.00229	25.6	0.024
May 22, 2014	14-W016	0.00002	114	0.0002	0.0013	0.562	0.00071	24.7	0.018
November 27, 2014	14-W047	0.00005	114	<0.0001	0.0014	0.540	0.00221	29.4	0.015
WST045									
May 28, 2013	13-W018	0.00016	98.4	0.0001	0.0018	0.030	0.00334	21.4	0.035
November 20, 2013	13-W048	0.00017	66.3	<0.0001	0.0014	0.036	0.00583	13.1	0.014
May 22, 2014	14-W017	0.00044	91.9	<0.0001	0.0017	0.041	0.00626	18.6	0.028
November 27, 2014	14-W048	0.00013	66.9	<0.0001	0.0016	0.047	0.00392	13.9	0.017
WST070									
May 28, 2013	13-W019	0.00009	118	0.0002	0.002	0.449	0.0019	28.1	0.013
November 20, 2013	13-W049	0.00010	91.2	<0.0001	0.0015	0.181	0.0027	20.4	0.010
May 22, 2014	14-W019	0.00022	110	0.0001	0.0017	0.314	0.00277	24.3	0.036
November 27, 2014	14-W049	0.00015	87.6	<0.0001	0.0018	0.321	0.00592	20.2	0.017
Field Blank									
May 28, 2013	13-W015	<0.00002	<0.02	<0.0001	0.0006	0.008	0.00002	<0.01	<0.005
November 20, 2013	13-W045	<0.00002	<0.02	<0.0001	0.0002	<0.005	0.00005	<0.01	<0.005
May 22, 2014	14-W021	<0.00002	<0.02	<0.0001	0.0025	<0.005	0.00003	<0.01	0.008
November 27, 2014	14-W045	<0.00002	<0.02	<0.0001	<0.0001	<0.005	<0.00002	<0.01	<0.005

Note:

1. Grey shading indicates concentrations higher than the Provincial Water Quality Objectives.
 2. This information to be used as an internal reference only. In case of discrepancy, refer to certificate of analyses.
- * duplicate sample



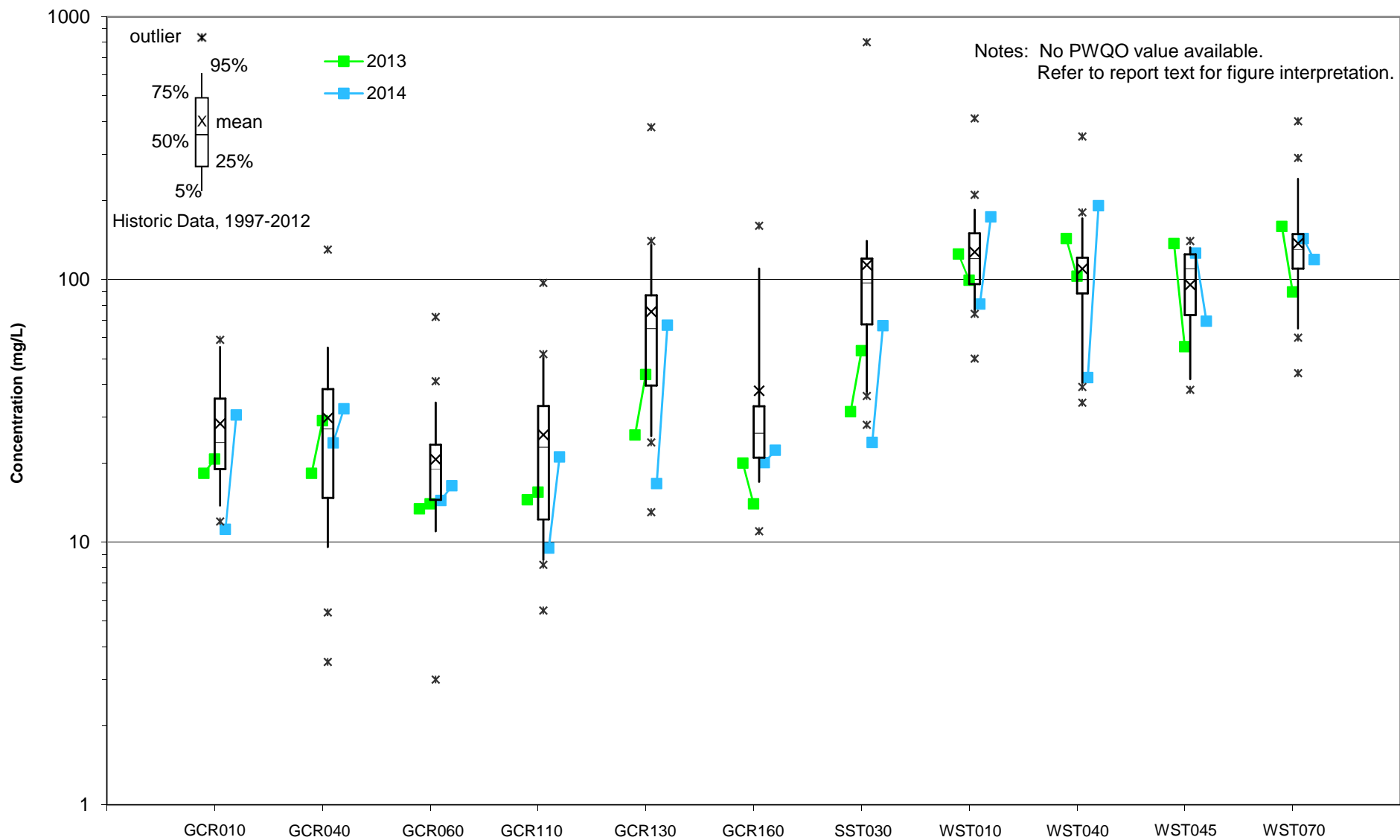
Conductivity in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F1

Date: 12/2014
File: 218-1847.25



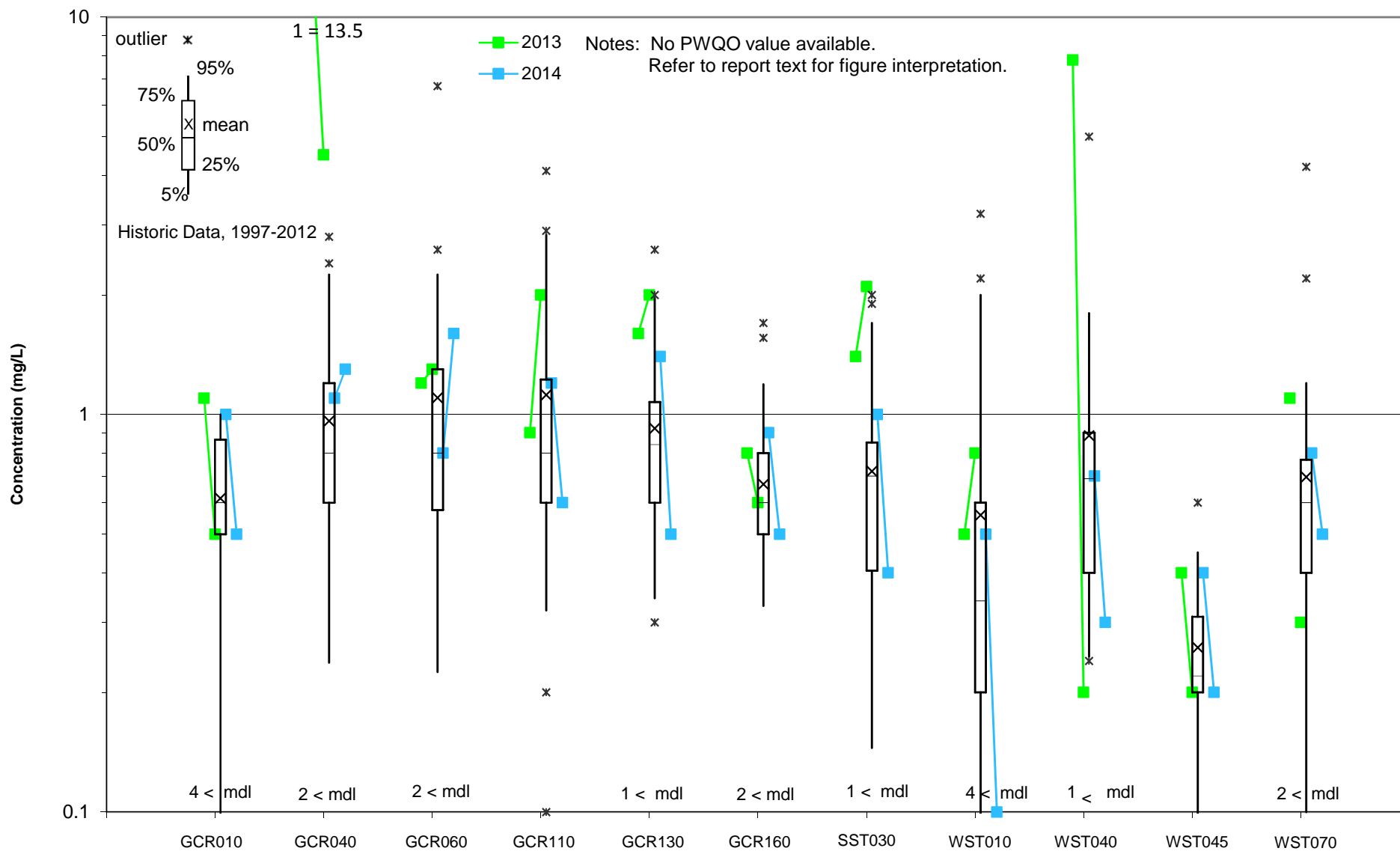
Chloride in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F2

Date: 12/2014
File: 218-1847.25



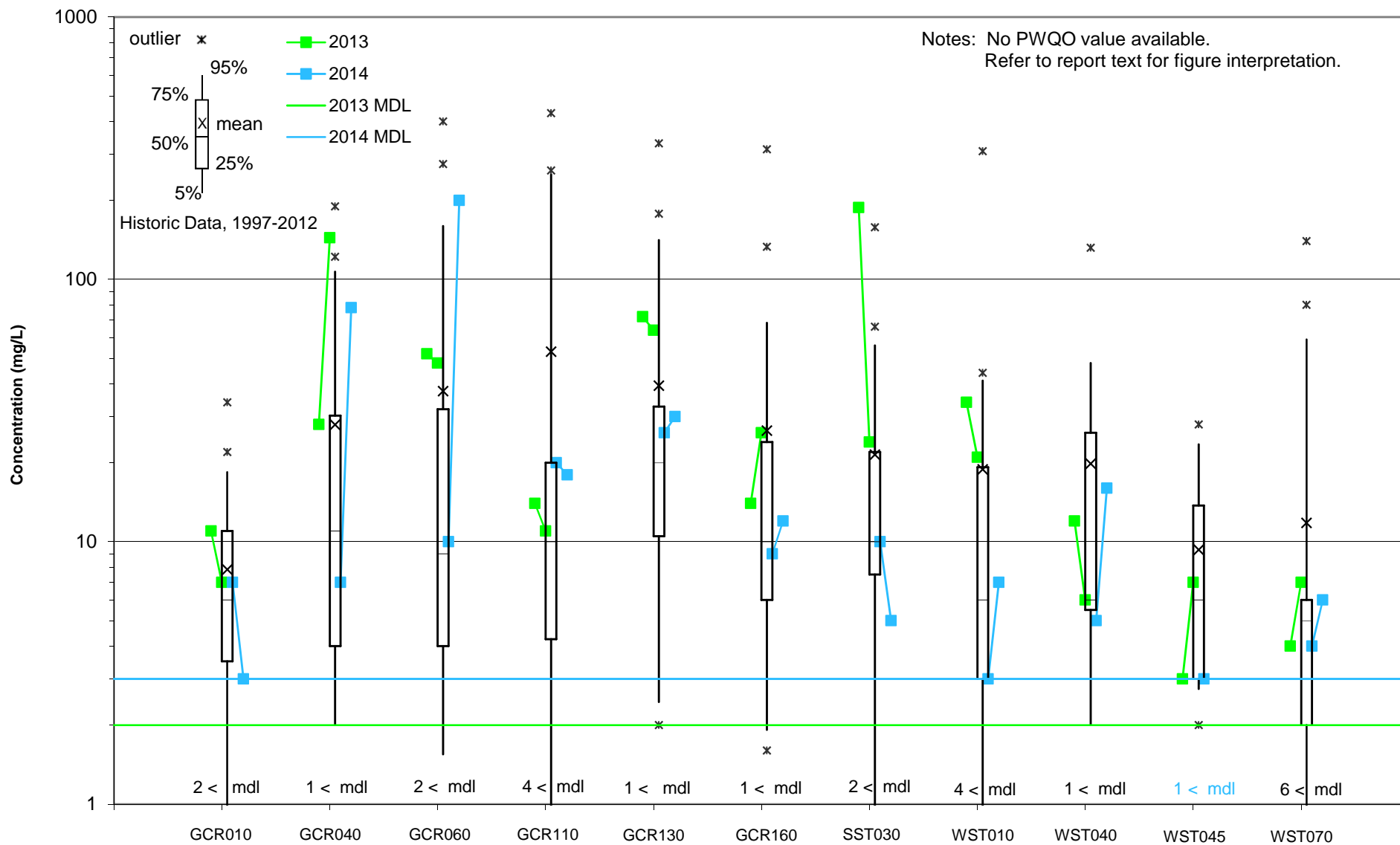
TKN in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F3

Date: 12/2014
File: 218-1847.25



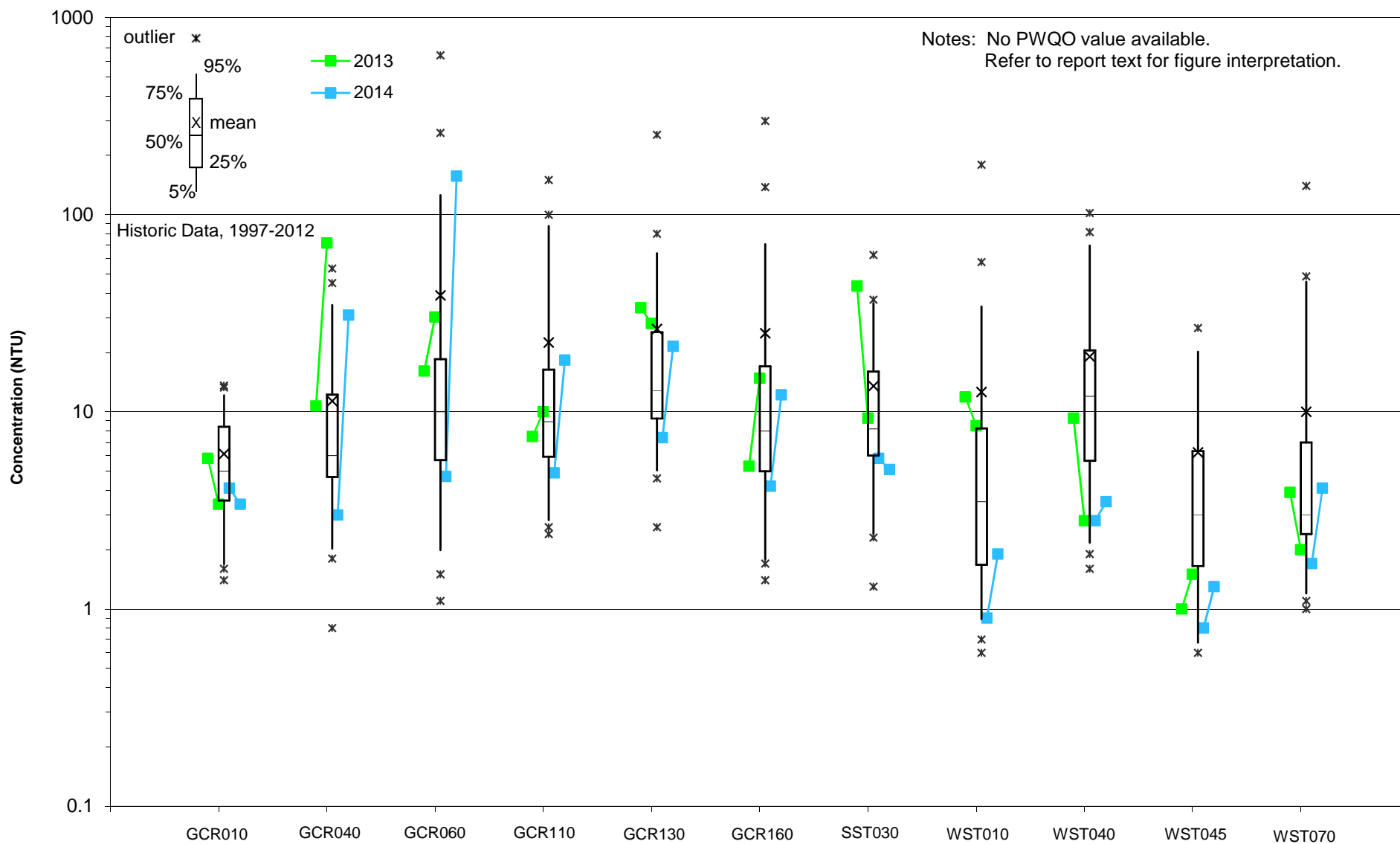
Total Suspended Solids in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F4

Date: 12/2014
File: 218-1847.25



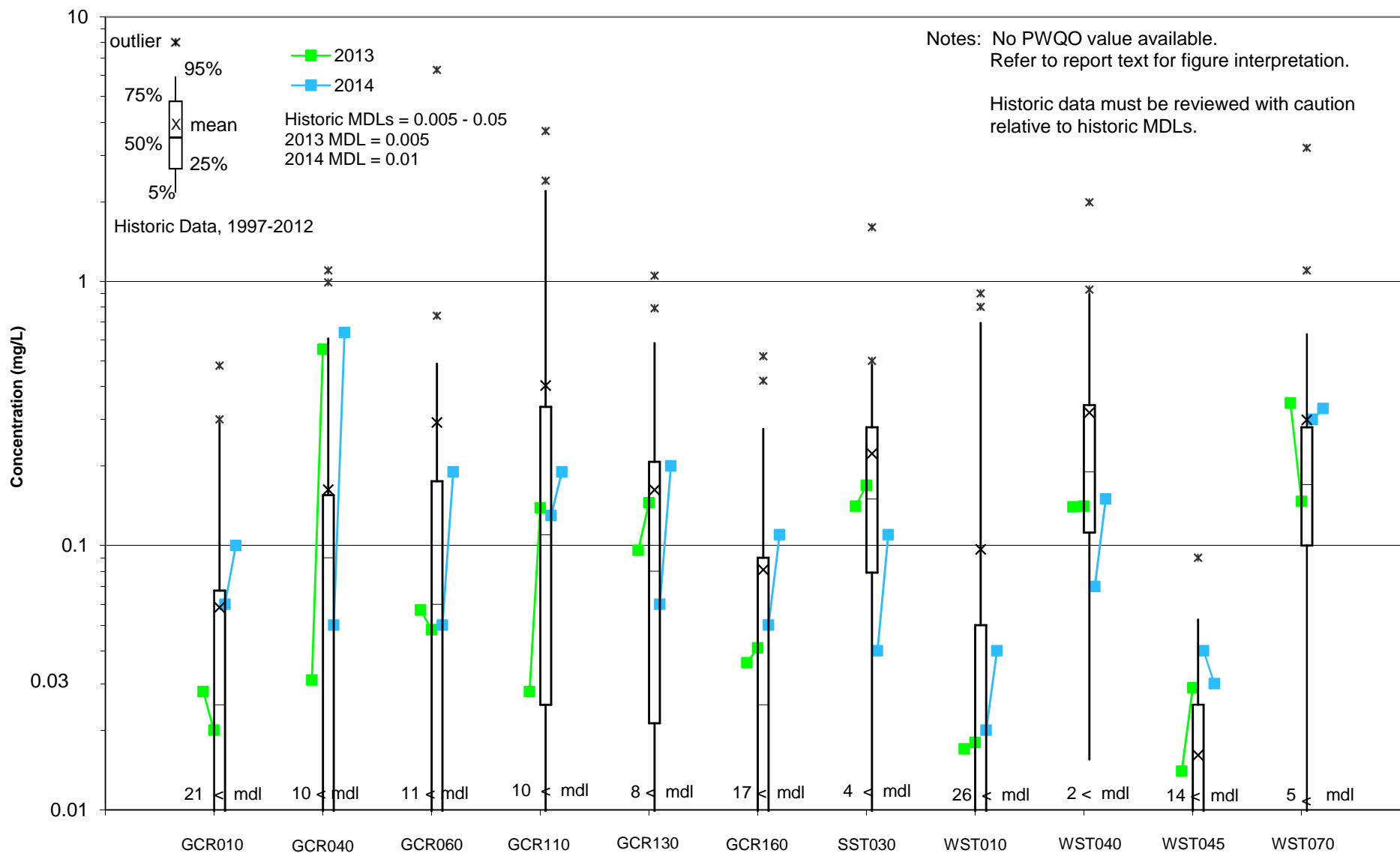
Turbidity in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F5

Date: 12/2014
File: 218-1847.25



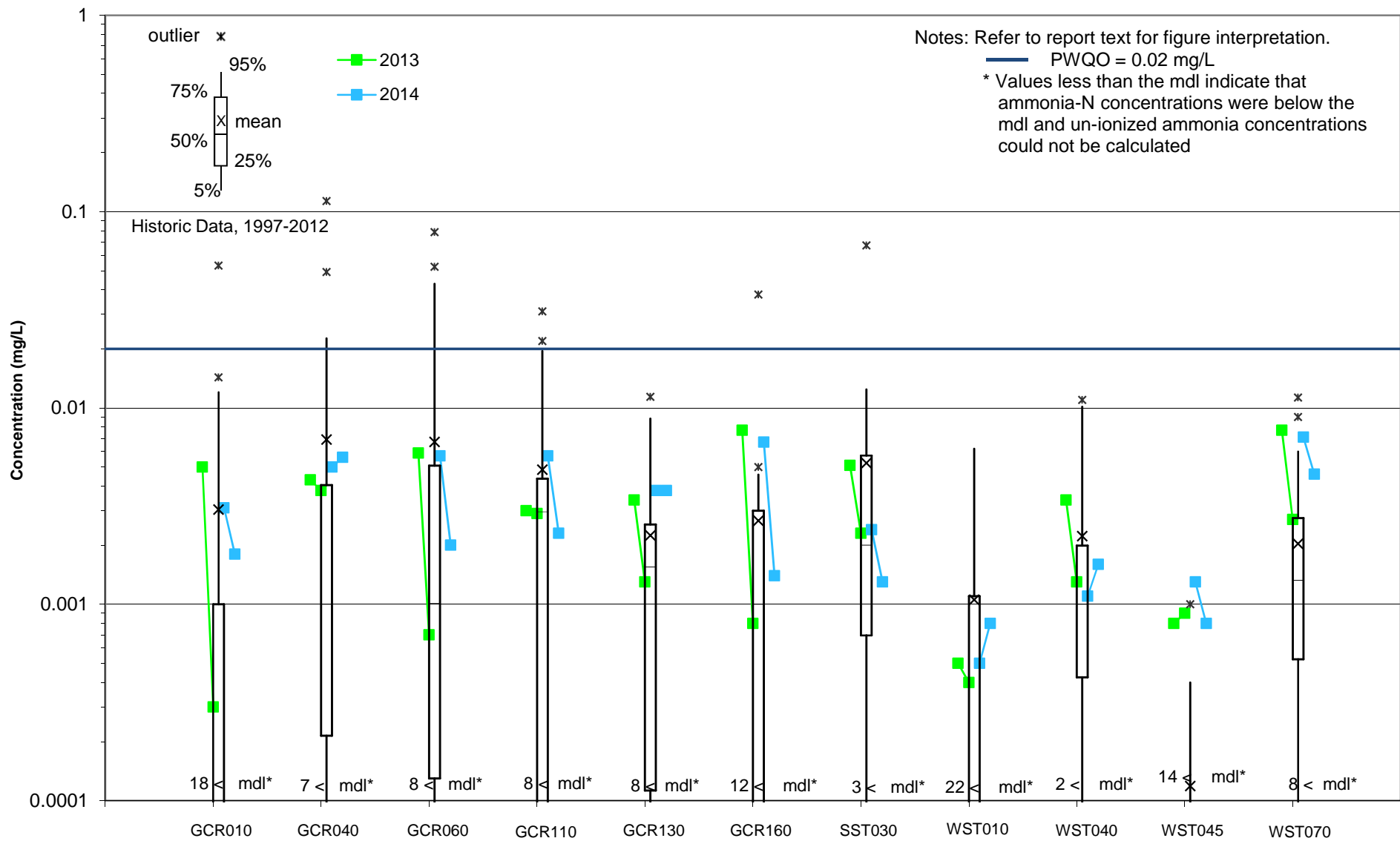
Ammonia-N in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F6

Date: 12/20124
File: 218-1847.25



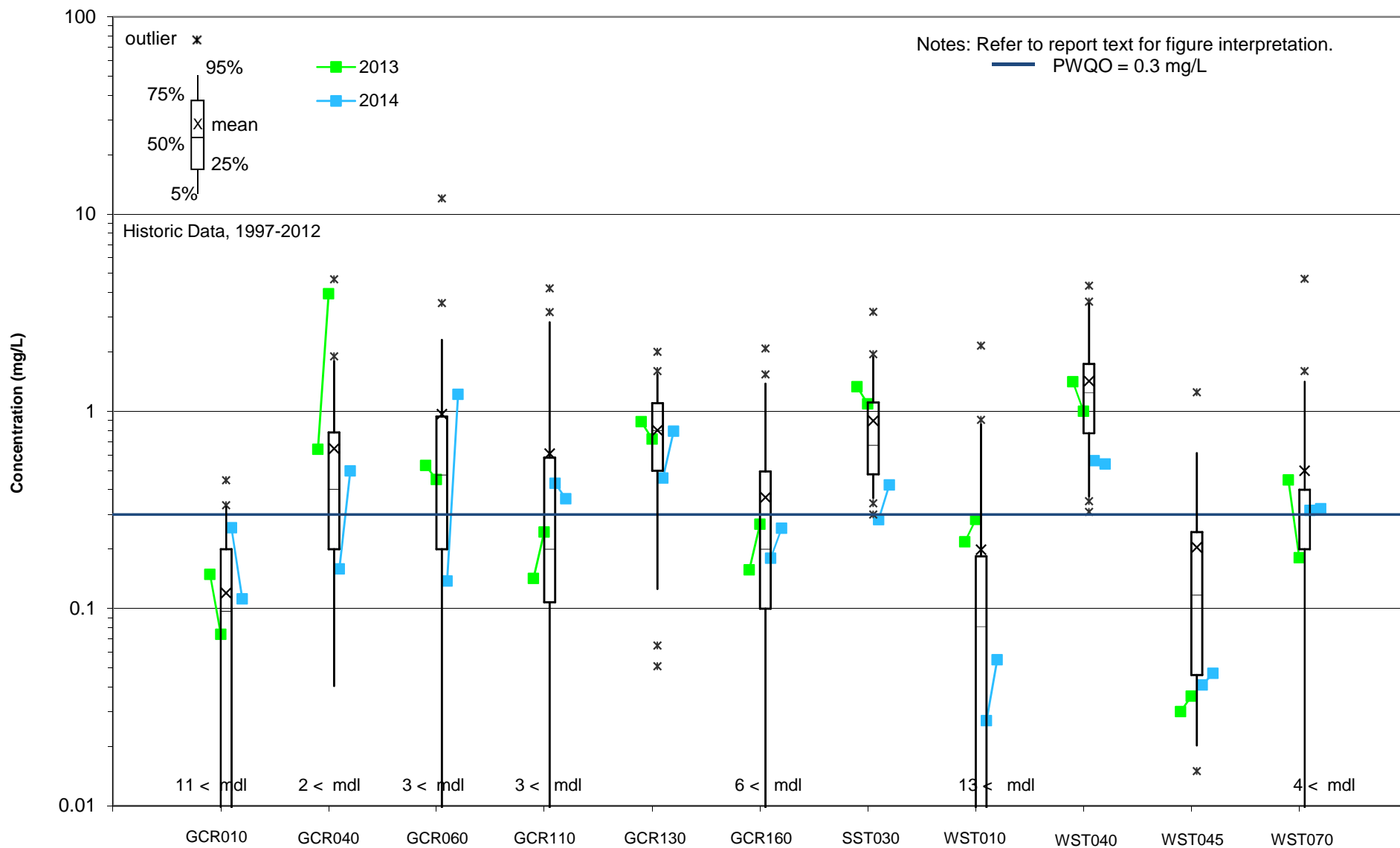
Un-ionized Ammonia in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F7

Date: 12/2014
File: 218-1847.25



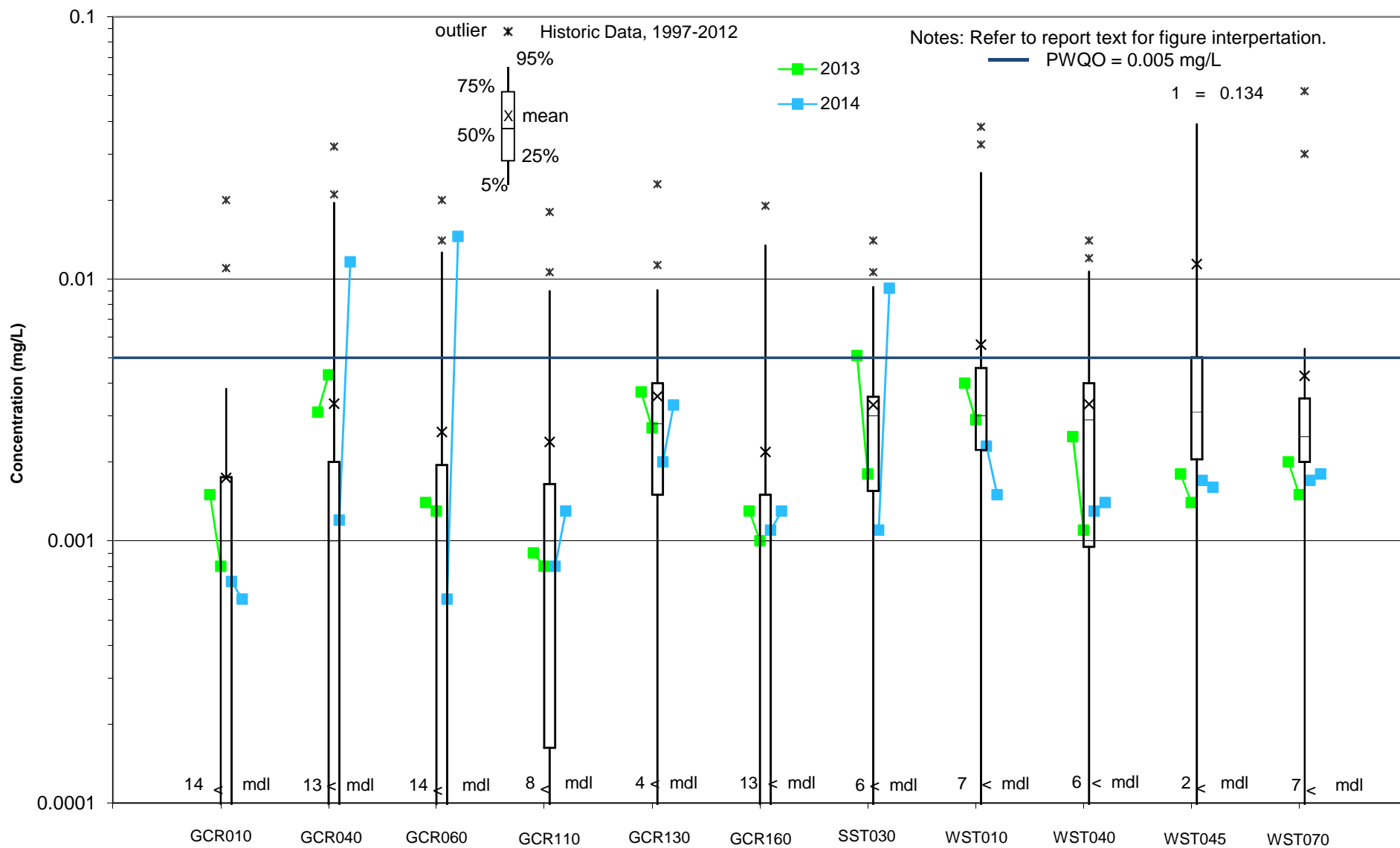
Iron in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F8

Date: 12/2014
File: 218-1847.25



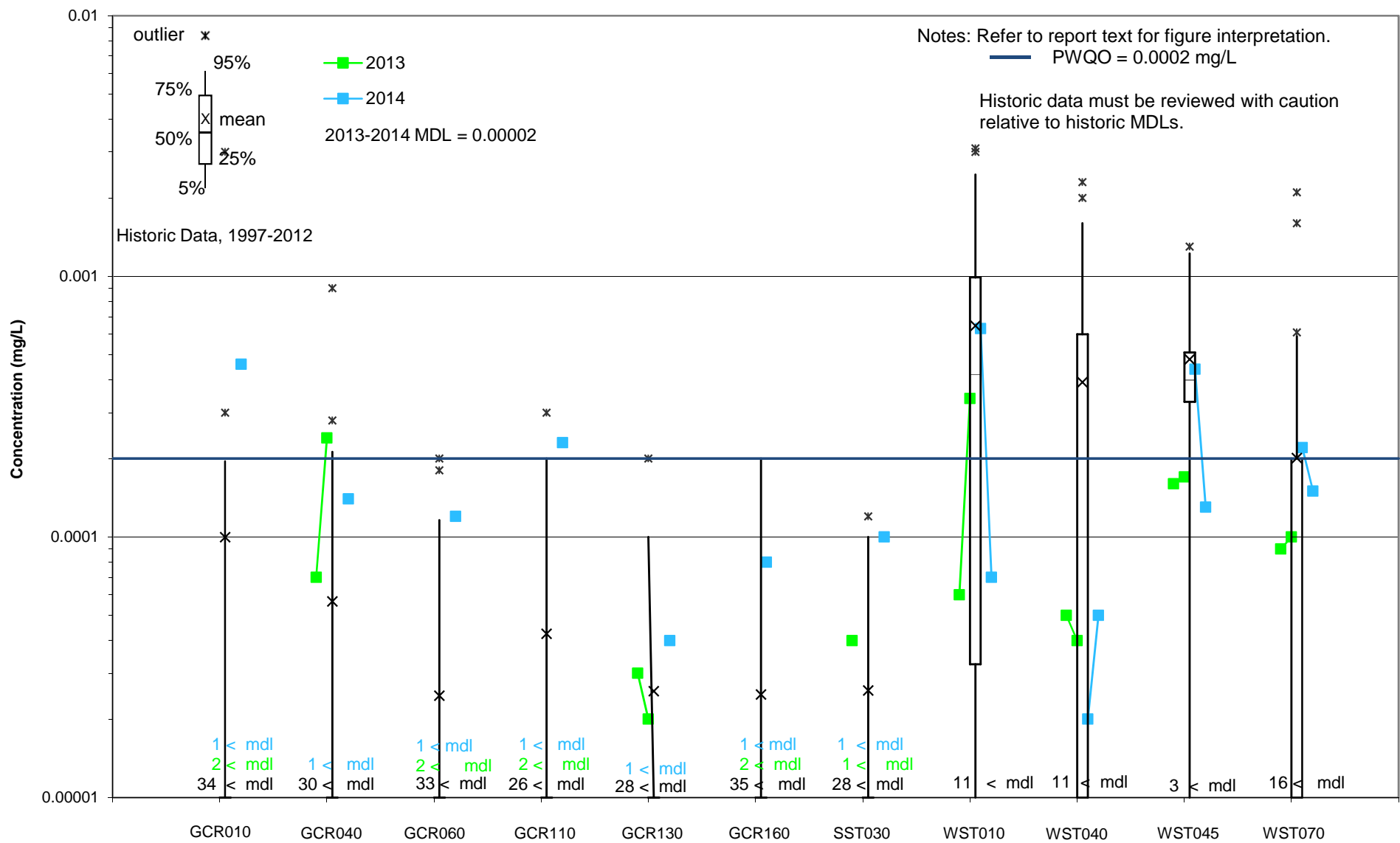
Copper in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F9

Date: 12/2014
File: 218-1847.25



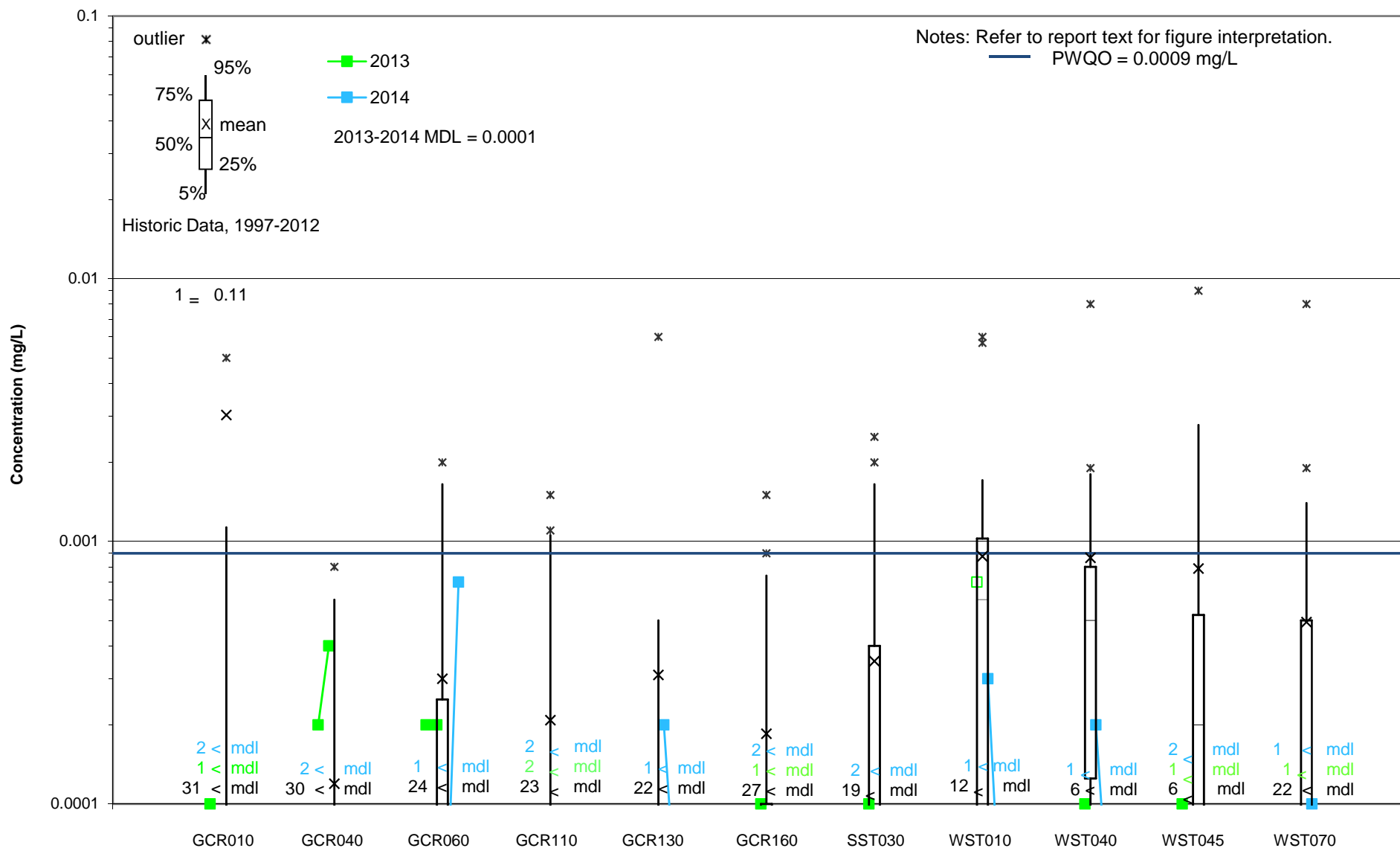
Cadmium in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F10

Date: 12/2014
File: 218-1847.25



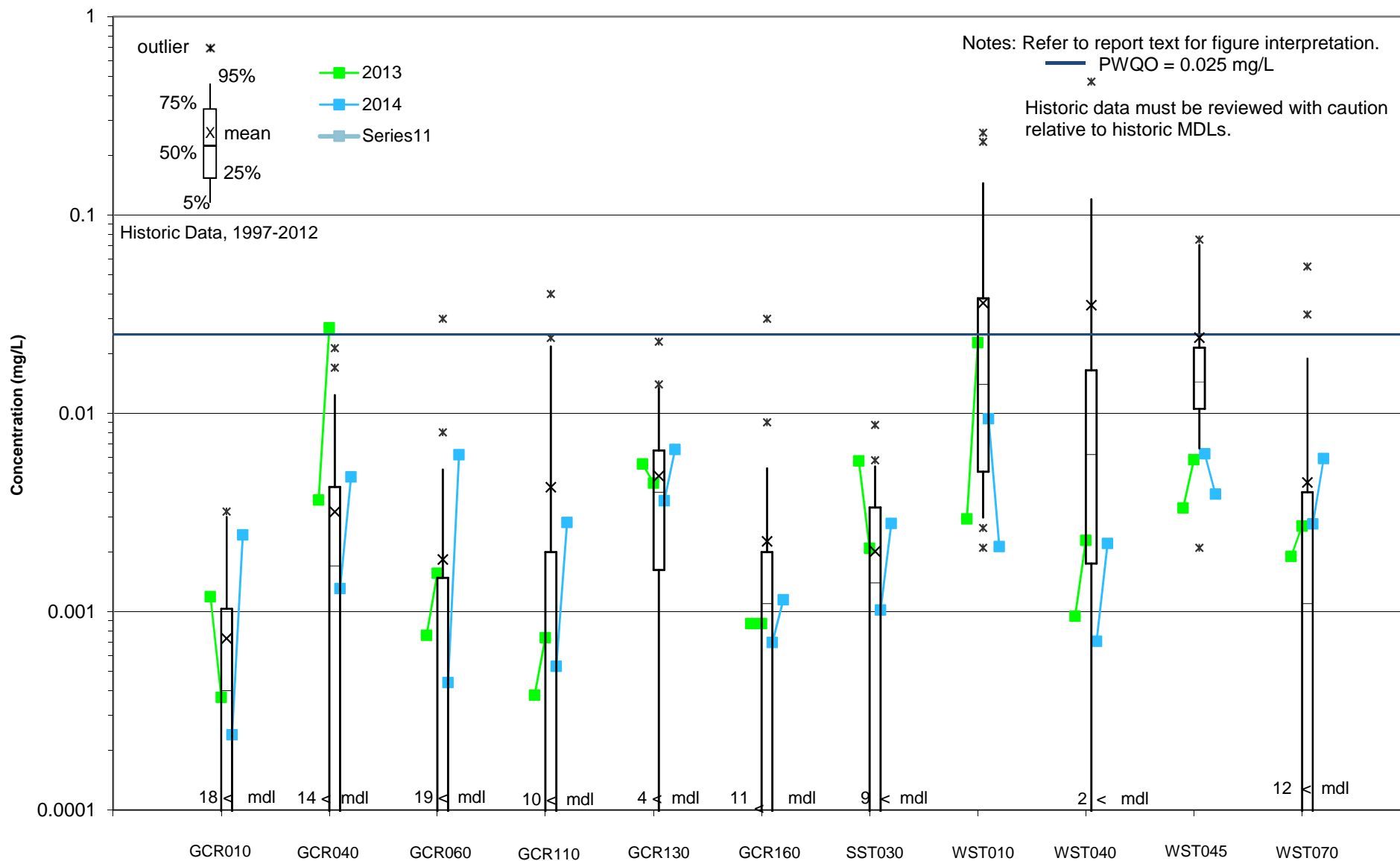
Cobalt in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F11

Date: 12/2014
File: 218-1847.25



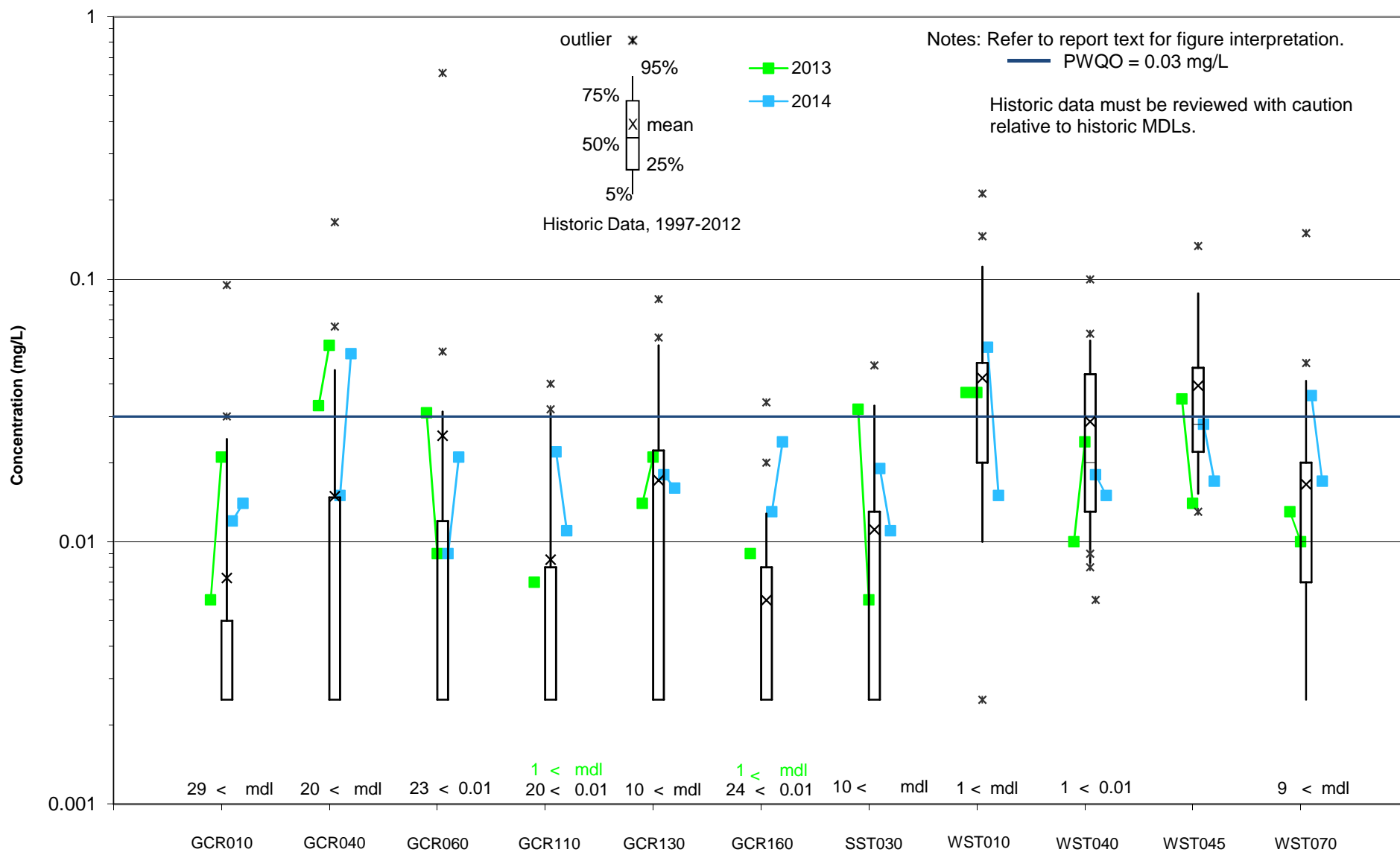
Lead in Surface Water

Environmental Operations and Monitoring 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F12

Date: 12/2014
File: 218-1847.25



Zinc in Surface Water

Environmental Operations and Monitoring Report 2013 - 2014
Belle Park Landfill Site

Appendix F
Figure

F13

Date: 12/2014
File: 218-1847.25