Veolia Environmental Services (Australia) Pty Ltd.

Re: EPL– Annual Assessment of Woodlawn Bioreactor & Intermodal Facility Monitoring Data.

Report – 8 April 2010. **(Ref: E2W-083 R001)**

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Project: EPL - Annual Assessment of Woodlawn Bioreactor and Intermodal Facility Monitoring Data

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1.0 INTRODUCTION

Earth2Water Pty Ltd (E2W) was engaged by Veolia Environmental Services Pty Ltd (Veolia) to review and assess the 2008 and 2009 monitoring data for the Woodlawn Bioreactor and Intermodal Facility sites in relation to the annual Environmental Protection Licence (EPL) requirements.

Veolia operates the Woodlawn Bioreactor site (WB) under EPL number 11436, while the Intermodal Facility (IMF) is separate and under EPL number 11455. These EPL's are combined in this annual report (2008-09), which is the third annual monitoring period for the WB and IMF EPL's.

The WB site occupies approximately 3,000 hectares and encompasses the Woodlawn Mine Lease, which is governed and reported separately by E2W for the Site Mine Lease (SML 20, Figures 1 and 2).

This EPL report provides a review and assessment of the dust, air, surface and groundwater monitoring data obtained from Veolia's Bioreactor and Intermodal Facility from 6 September 2008 to 5 September 2009. The report includes historic and recent monitoring data, conceptual models, data assessment, conclusions and where required, recommendations to improve future monitoring.

2.0 BACKGROUND

The NSW Department of Environment and Climate Change (DECC) regulates numerous waste management and disposal facilities in NSW. The DECC issues licenses which both permit and regulate waste disposal activities. Licence conditions typically include requirements to monitor leachate quality, surface and groundwater quality in and around landfill sites.

This report provides Veolia with an independent technical review of the monitoring data and results obtained to date (2004 to 2009).

E2W's scope of work included the review of available technical reports, historic and current monitoring data (dust, air and water), well monitoring networks, surface water storages, hydrogeology and other related environmental information. This scope of work has enabled an assessment of the monitoring data from both the Woodlawn Bioreactor and Intermodal Facility.

In November 2007, E2W provided Veolia with a comprehensive assessment of the site's water monitoring systems, entitled *Status of Water Monitoring Systems at the Woodlawn Bioreactor Site*. This report sub-divided the site into ten 'systems' or sub-sites to simplify the large and complex site (e.g. mine void, South, North and West Tailing Dams, Evaporation Dams 1, 2 and 3, Waste Rock Dump, Plant Area and Intermodal Facility) based on local landform aspects (Figure 1).

3.0 LANDFILL DESIGN, OPERATIONS AND HISTORY

The Woodlawn Mine was a typical large-scale open cut and underground mine operation. The mine infrastructure included the construction, operation and maintenance of the following:

- Waste Rock Dump (WRD)
- Tailings Dams

- On-site ore processing facilities (Plant Area)
- Evaporation Dams (ED1, 2 and 3)
- Underground operations
- Open-pit operations

The former mining components at Woodlawn still exist and are illustrated on Figures 1 and 2. A summary of the site history is outlined in Table 3.1.

The Woodlawn Bioreactor occupies the mine void (to 200 mbgl) and comprises approximately 25 million cubic metres of landfill space. Landfilling and gas collection commenced in late 2004.

Table 3.1 Milestones and History

Date	Event
1978	Woodlawn open cut mine activities commence.
22.12.1982 (aerial)	Plant Area and dams present. North and South Tailings are constructed and used for tailings/water storage. West Tailings Dam is under construction, together with the Waste Rock Dump. Plant Collection Dam/Lagoon is full of water - irregular area.
9.06.1987 (aerial)	North, South Tailings Dams full of water, tailings comprising ~20% of avail. area. ED1 under construction, with Waste Rock Dam being raised (several benches visible) and includes leachate sump. Dolerite stockpile is visible on west side of mine void. Bunding structure visible at Plant Collection Dam with minor water. Raw Water Dam has been constructed and is full of water. The ED3 area comprises a series of small dams.
1989	Expansion and development of plant infrastructure. Open cut mine workings reach ~ 200 m depth, underground mining commenced.
15.07.1989 (aerial)	ED1 construction complete and full of water. Construction of ED3 South is a work in progress. Dolerite stockpile is increasing in size. West Tailings Dam has been constructed and is full of water. Plant Collection Dam is full of water.
11.09.1990 (aerial)	West Tailings Dam larger, full of water, tailings occupy approx. 10% of avail. area. ED2 has been constructed and now full of water. ED3 construction practically completed (dry). Plant Collection Dam is enlarged and full of water.
30.09.1991	Tailings in the North and South Tailings Dams cover approx. 50% of the available surface area. A new section is being added to the SW corner of the West Tailings Dam. Lower benches of Waste Rock Dam appear revegetated. ED3 North is being constructed and nearly completed (dry).
11.09.1994 (aerial)	ED3 North and South are complete and full of water. New SW addition to West Tailings Dam is complete and full of water. North Tailings Dam is subdivided in smaller cells on west side and through centre. ED2 has a defined internal bund on the NW corner (visible from 1990). Waste Rock Dump is being rehabilitated and revegetated. Water visible at the bottom of the mine void.
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Date	Event
5.10.1995 (aerial)	Rehabilitation/revegetation of Waste Rock Dump is nearing completion.
11.11.1996 (aerial)	ED1 and 2 have high water levels. ED3 is also full.
March 1998	Administrators appointed to Denehurst Ltd.
17.09.2004 (aerial)	Water in ED1, 2 and 3 at low levels. Tailings in North, South and West Tailings Dams have consolidated.
October 1999	Commission of Inquiry - Woodlawn Waste Management Facility.
November 2000	Minister grants consent for Woodlawn.
February 2002	Revised EIS prepared.
August 2002	Minister grants Development Approval for Clyde Transfer Terminal.
February 2003	Land and Environment Court Hearing into Clyde Transfer Terminal.
September 2003	Construction of Bioreactor and Intermodal Facility complete.
December 2003	Clyde Waste Transfer Terminal (Special Provisions) Act (2003) passed by State Government.
Jan - June 2004	Construction of the Clyde Transfer Terminal.
October 2004	Wind Farm DA and EIS lodged.
September 2004	**Landfill gas collection system installed at base of void.** **First waste load delivered to site.**
February 2005	Mining operations plan (MOP) approved.
May 2005	Planning focus meeting held on the Alternative Waste Technology proposal.
June 2005	First stage of gas extraction system and flaring initiated.
October 2005	Wind Farm DA approved.
November 2005	Mixing of acid mine drainage and landfill leachate in the void sump, discharged to ED3 North and South.
January 2006	Construction of first power generator hub commenced.
April 2006	Environment, Safety and Quality accreditation gained.
August 2006	Power generator hub completed.
July 2007	Application for temporary storage of leachate in ED3 from void. Construction of segregated dams (ED3 lagoons) within ED3 for temporary storage. Bioreactor has received 970,000 tonnes of waste since commencement.
September 2007	Approximately 40 m of waste placed in landfill since commencement. (pit base from 200 to 160 m below perimeter). Leachate level of approximately 10 - 15 m below waste level.
November 2007	Comprehensive assessment of water monitoring programs submitted by E2W. AWT DA Approved. Gold medal - WMAA National Landfill Excellence Awards.
February 2008	Commissioning of first landfill gas generator - power generation commenced.
April 2008	Woodlawn Bioreactor Energy official opening.
November 2008	Commissioning of second landfill gas generator.
June 2009	Sealing of the northern portal.
August 2009	Woodlawn Bioreactor presented the Society of Chemical Industry Australia 2009 Plant of the Year.

Note: aerial = historical information sourced from an aerial photograph.

4.0 ENVIRONMENTAL SETTING

The environmental setting of the site, including topography, soils, hydrology, geology and hydrogeology are described in the following sub-sections.

The main site features and hydrogeology are also included in Figures 1, 2, 3A, 4 and 5.

4.1 Site Location

Woodlawn Mine is located ~7 km west of Tarago, approximately 8.5 km south-west of Lake Bathurst and around 7.5 km east of Lake George. Situated 250 km south-west of Sydney, the mine site is approximately midway between Goulburn and Canberra. The land is situated within the Mulwaree Local Government Area (Woodward-Clyde, February 1999).

The Woodlawn Mine is situated on a property formerly owned by Denehurst Pty Ltd, which has a land area of approximately 3,000 hectares. The property includes the mine void, waste rock dump, tailings dams, evaporation ponds, disused mining infrastructure and surrounding rural land and pine forest. The area surrounding the property is characterised by large rural holdings which are lightly timbered with stands of woodland. A sewerage treatment plant is located on Collector Road adjacent to the site.

The closest township to the mine site is Tarago. It is a small rural service centre consisting of a railway station, school, hotel, small commercial centre and a number of residences.

4.2 Climate

The long-term climatic data at Woodlawn indicates that evaporation exceeds rainfall on an annual basis. The total rainfall recorded between July 2008 and June 2009 was 608 mm; which is lower than the 22 year average for the July to June period of 642 mm. The total rainfall for 2008 was 604 mm.

The average evaporation (17 year average) at the site is 1420 mm/year (AEMR, 2003). The evaporation rates significantly exceed annual rainfall, making evaporation processes very effective for onsite water management.

4.3 Topography

The natural ground surface surrounding the mine void lies at an elevation of approximately 800 m AHD, with the base elevation of the mine void at approximately 630 m AHD. The landfill site is situated on a ridge which forms part of the Great Dividing Range (GDR). The topography of the surrounding area comprises rounded hills that rise up to approximately 1,000 m AHD, particularly to the north and south of the landfill site (Figures 1 and 3A).

The Woodlawn Mine property lies at the head of the Allianoyonyiga and Crisps Creek catchments. Allianoyonyiga Creek is upstream of the Lake George catchment, while Crisps Creek connects to the Mulwaree River.

4.4 The Landfill/Void Area

The Bioreactor lies within the former Woodlawn Mine site and is located ~500 m south of Collector Road on top of a ridge line which forms part of the GDR (Figure 1).

The landfill site occupies an area of approximately 38 ha of Woodlawn's 3,000 ha. The landfill site comprises the open cut mine void, the access road into the site and an area to the north-east of the void where the associated site facilities (i.e. weighbridge and site office) are located. A waste rock dump and a number of tailings dams are located to the south and south-east of the landfill site. Hickory's Paddock lies to the east and disused mine facilities are located to the north-east. Evaporation ponds are located to the north-west of the landfill site (Figure 1).

The open cut mine void, where land filling has commenced, has an approximate volume of 25 million cubic metres and a depth of ~200 m. The void consists of several benches, a haul road and sediment ponds. The base of the void contains highly acidic sulphate-rich water.

The base of the void is at approximately 630 m relative to the Australian Height Datum (AHD), while the lowest point of the void rim is around 800 m AHD (Woodward-Clyde, February 1999).

4.5 Geology and Hydrogeology

The hydrogeology of the site is dominated by the hard rock geology and mine/landfill activities. The regional groundwater flow regime has been altered by the mine void, which induces large inward hydraulic gradients. The various water storages (i.e. Tailings and Evaporation Dams) also influence the flow regime by recharging and mounding the water table.

The inferred groundwater flow regime for the site is presented in Figure 1. The geology and inferred hydrogeology is presented in Figures 1, 4 and 5.

The regional geological setting comprises volcanic rocks which form part of the Lachlan Fold Belt of south-eastern NSW. The geological sequence of the site itself includes Ordovician and Siluro-Devonian lithified volcanogenics, volcanoclastics, as well as sedimentary shales and sandstones. These units are regionally faulted and jointed with a synclinorial-anticlinorial fold pattern, which results in a significant lack of continuity in the horizontal plane (URS, November 2004).

The hydrogeology of the mine void and surrounding area is largely dominated by volcanic rocks within which the mineralised zone occurs. The rock mass is generally of low permeability but fractures and joints, where interconnected, create minor storage areas and some secondary permeability. These provide a modest water supply to horizontal drains drilled around the mine void and some exploration drill holes. Pre-mining regional groundwater gradients were not established, but investigations show the regional water table to be a subdued reflection of surface topography with gradients away from the GDR towards Crisps Creek and Lake George (Woodward-Clyde, February 1999).

The basement rocks generally exhibit low hydraulic conductivity. Rock permeability is due almost entirely to fractures. The low bedrock surrounding the mine void exhibits low bulk permeability due to the action of metamorphism and hydrothermal fluids, which have sealed the primary porosity of the bedrock. It has been observed that seepages from the base of the open cut primarily occur through two fault/fracture zones (the 690 etc.) located on opposite ends of the pit. Seepage is also known to occur via old exploration drill holes and horizontal drain holes, which were designed to relive hydraulic pressures from the pit walls.

Secondary permeability potentially exists where the rocks have been sheared by faulting, or where the rock exhibits cooling fractures (dolerites). However, the secondary porosity has been largely sealed by clays formed during the weathering of mineral compounds in the basement rocks.

Aquifer tests have been carried out in selected horizontal bores, piezometers and monitoring bores within the void and surrounding area to determine the permeability and transmissivity of the bedrock. The results indicate low to extremely low values of transmissivity, with some of the monitoring bores taking a week or more to fully recover after purging of a single bore volume (Woodward-Clyde, February 1999).

Despite the fact that the mine void is over 180 m deep and extends for at least 160 m below the natural water table, the total groundwater inflow into the mine void is approximately 1 - 2 L/sec, seasonally fluctuating. The main seepage locations are shown in Figure 1, together with the location of the fault zones through the void (i.e. 760 and 750/790).

The inferred directions of groundwater flow in the bedrock aquifer are presented in Figure 1. Dewatering associated with mining operations has created a steep cone of depression in the void area (Woodward-Clyde, February 1999). The steep hydraulic gradients into the void are indicative of the impervious bedrock and slow seepage velocities into it (Figure 5).

Overlying the basement fractured rock aquifer on some hill-sides, are recent deposits of hillwash (colluvium) sediments, which grade laterally into alluvial sediments in the valleys. This alluvial aquifer may form a conduit through which groundwater discharges to the downstream environment.

Figure 1 shows the inferred direction of groundwater flow within the alluvial aquifer in the Crisps and Allianoyonyiga Creek catchments, based on the surface water flow system. The approximate extent of the alluvial aquifer is also presented in Figure 1.

The sedimentary deposits show highly variable permeability and generally have confined conditions at the head of the catchment. Down catchment the aquifer becomes unconfined, with discharge to the creek surface water system and boggy areas adjacent to the streams. Relatively high permeability aquifers exist where sediments occur in valley bases, and to a lesser degree, on the slopes.

Figure 4 provides a schematic view of the aquifer units present at the site. At present, the void acts as a hydraulic trap due to the steep inward hydraulic gradients (Figure 5). As the void is filled with waste, there will be a reduction to the steepness of the inward hydraulic gradients. Once the waste produces a mound, the 'void' will no longer be a hydraulic trap and gradients no longer inward.

4.6 Groundwater Recharge and Discharge Areas

Groundwater recharge to the bedrock primarily occurs through direct rainfall infiltration to open fractures and joints in areas where bedrock is exposed at the ground surface. Enhanced recharge has been observed immediately south of the mine void (adjacent to the waste rock dump) and seeps after rainfall in the southern portal (Woodward-Clyde, February 1999).

Evidence of recharge in the void is illustrated with groundwater level changes in existing piezometers located on the batters and perimeter of the void. Several piezometers (i.e. 44A and 110A) are potentially located on a fault zone and show moderate fluctuations (~10 m) during rainfall recharge. These piezometers are also in proximity to seepage locations (Figure 1, Appendix D).

The low bulk permeability of the bedrock in the mine area means significant groundwater discharge will only occur where open fracture conduits exist and permeability is sufficient to produce a significant flow rate in the context of local catchment vegetation and hydrology.

E2W interpret that Crisps Creek (one of two primary receptors) is ephemeral and generally a losing stream (in text Figure 4.6b) during dry seasons. The stream would revert to a gaining stream (in text Figure 4.6a) during wet seasons. The type of creek system will determine the discharge regime, fate and transport of groundwater pollution.

a)

b)

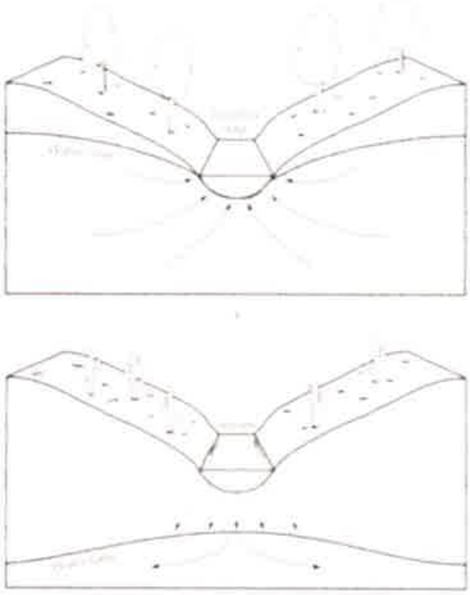

Figure 4.6: Gaining (a) and losing streams (b) typically associated with wet and dry seasons.

4.7 Hydrology

Allianoyonyiga and Crisps Creek are considered to be the primary receptors for discharges occurring from the Woodlawn site. The GDR bisects the void and diverts flows to south (via Allianoyonyiga Creek) to Lake George catchment and north (via Crisps Creek) to Wollondilly catchment (Figure 1 and in text Figure 4.7).

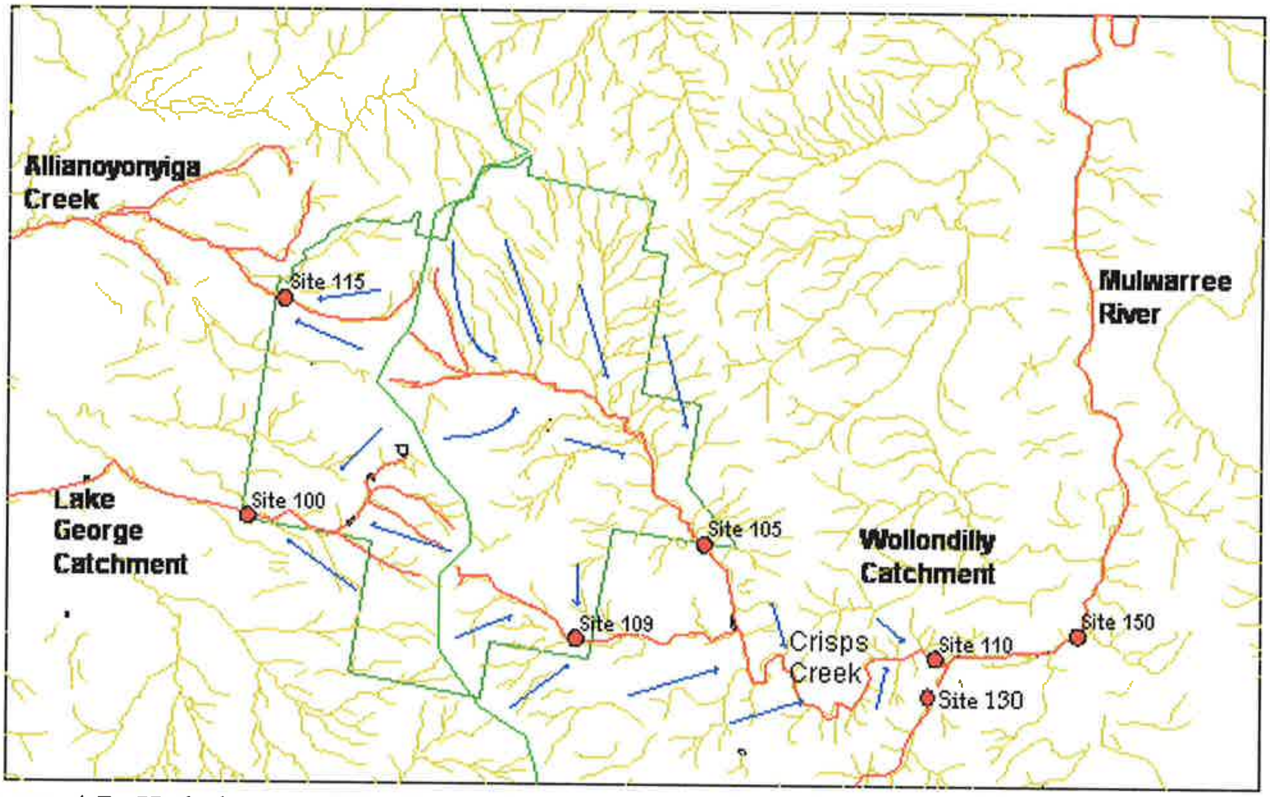

Figure 4.7: Hydrology at Woodlawn. Arrows indicate flow directions, while the light green line represents the GDR and the dark green line the site boundary. *Source: Veolia AEMR, 2006/07.*

Surface water management strategies are implemented by Veolia to proactively manage any adverse impacts on the receiving waters of the Lake George and Wollondilly catchments. Routine monitoring of surface waters is undertaken to measure the effectiveness of water management systems. Six locations are monitored (flow, water quality) along Crisps Creek as summarised below and in Figure 3B.

- Site 100: Woodlawn/Willeroo boundary south,
- Site 105: Crisps Creek/Pylara Boundary (Bioreactor EPL requirement),
- Site 109: Pylara boundary below South Tailings Dam,
- Site 110: Crisps Creek, downstream at bridge (Intermodal EPL requirement),
- Site 115: Woodlawn/Willeroo boundary north (Bioreactor EPL requirement); and
- Site 150: Crisps Creek, downstream (Intermodal EPL requirement).

5.0 AVAILABLE MONITORING DATA AND REPORTS

The majority of the laboratory data is from Ecowise Pty Ltd (Ecowise). Veolia staff undertook the monitoring and sampling activities in the 2008/2009 reporting period.

Some early monitoring data is available from the late 1980s when the site was an operational mine. The availability of data has expanded through to present. Additional locations have been installed and added to the monitoring program when required or deemed appropriate. Additional monitoring locations were added when landfill activities commenced (e.g. mine void, Intermodal Facility), while some locations were decommissioned and/or sampling frequencies reduced due to the cessation of mining activities.

5.1 Available Water Monitoring Data and Assessment Strategy

A review and statistical analyses of the available data was undertaken. It included the following:

- Review of the quality of laboratory and field data sets. Some anomalies were identified and corrected in the electronic data set. Negative results and data reported <LOR were adjusted (i.e. negatives were changed to positives and the '<' was removed and bolded, respectively) and zero values removed from results when no data was collected (held in Veolia's computer spreadsheet files).
- Calculation of minimums, maximums, averages and standard deviations of selected laboratory[1] and field[2] results from each monitoring location. The statistics were designed to highlight trends and anomalies, as well as to characterise the data population and range of results. The statistics (e.g. standard deviation) were aimed to support the water quality criteria adopted for the site (i.e. no significant change to water quality, nil discharge). The statistics were provided for mining conditions (late 1970s to 2004) and landfilling activities (2005 to date) to assess water quality changes before and after landfill operations (where possible).
- Statistics (minimum, maximum, average and standard deviations) were calculated for the data collected in the 2008/2009 reporting period (6 September 2008 - 5 September 2009). The statistics would continue to be undertaken in the following reporting periods to allow comparison between years, and enable rapid identification of anomalies and trends developing from year to year.

The water and trend analyses are outlined below.

[1] Major ions, metals, nutrients.
[2] pH, EC, water level.

Based on the statistical and data analyses, selected parameters for selected monitoring locations were transferred onto time-series graphs using Microsoft Excel[3].

Analyte concentrations are graphically presented in order to assess water quality trends over time. Consistent rising trends of some parameters (i.e. Zn and Cd) are considered to reflect expanding plume(s) and/or mobilisation of polluted water. It is considered the locations exhibiting decreasing trends (e.g. salinity, neutralising pH, lower heavy metals) result from the diminishing effects associated with the cessation of mining activities (e.g. storage of water in the tailings or evaporation dams).

The key analytes included in the graphs are pH, sulphate, iron, EC, ammonia, zinc and TOC. Where water quality parameters show a sympathetic rising trend (e.g. Zn, Cl and conductivity) it is interpreted evapo-concentration processes are occurring, reflecting natural salinisation of the water body due to containment (i.e. water storage). TOC and ammonia is a good indication of landfill leachate.

5.2 Assessment of Noise and Air Monitoring Data

Dust laboratory testing is carried out by Australian Laboratory Services Pty Ltd. Air and gas monitoring is conducted onsite by Veolia Environmental Services. The dust results are presented in Appendix G.

Noise monitoring is currently not undertaken at the Woodlawn Bioreactor or Intermodal Facility because no noise complaints have been received. If and when a complaint is lodged, Veolia will implement the relevant controls and/or monitoring program.

5.3 Information Review

The information reviewed by E2W for the Woodlawn Bioreactor site included numerous reports and investigations by other consultants:

- Woodward Clyde Pty Ltd, July 1997. *Site Hydrogeological Evaluation, Woodlawn Mines, NSW* (included in Volume 3).
- Woodward Clyde Pty Ltd, February 1999. *Woodlawn Waste Management Facility Environmental Impact Statement* (Volume 1 - Main Report) (included in Volume 3).
- Woodward Clyde Pty Ltd, February 1999. *Woodlawn Waste Management Facility Environmental Impact Statement* (included in Volume 3).
- Douglas Partners Pty Ltd, September 1999. *Report on Quarterly Water Quality Monitoring.*
- Woodward Clyde Pty Ltd, January 2000. *Water Management Plan Woodlawn Waste Facility* (included in Volume 3).
- Woodlawn Mines Pty Ltd, 2 August 2001. *Annual Environmental Management Report for the Year Ending 30 June 2001.*
- Collex Pty Ltd, April 2003. *Woodlawn Bioreactor Alliance Report, 08/04/2003.*
- Woodlawn Mines Pty Ltd, 2004. *Annual Environmental Management Report for the Year Ending 30 June 2004.*
- Collex Pty Ltd, November 2005. *Annual Environmental Management Report (SML20) 2004-2005.*
- Golder Associates Pty Ltd, August 2006. *Phase I Environmental Site Assessment Former Woodlawn* (included in Volume 3).
- Veolia Environmental Services Pty Ltd, 2006. *Annual Environmental Management Report (SML20) 2005-2006.*

[3] Not all graphs could be produced using Excel due to the inconsistent data format.

- Eath2Water Pty Ltd, January 2008. *EPL - Annual Assessment of Monitoring Data at the Woodlawn Bioreactor and Intermodal Facility, 2006/07.*
- Earth2Water Pty Ltd, November 2007. *Status of Water Monitoring Systems at the Woodlawn Bioreactor Site.*
- Earth2Water Pty Ltd and Veolia Environmental Service Pty Ltd, September 2008. *Annual Environmental Management Report SML20, 2007/08.*

A summary of the monitoring locations, frequency and laboratory testing suite is provided in the EPL (summarised in Appendix A and C).

6.0 LICENSING AND MONITORING OBJECTIVES - WOODLAWN BIOREACTOR

The Woodlawn Bioreactor is controlled by EPL 11436, which applies to Lots 5 - 6, DP 830765, Lots 8 - 9 in DP 534616, Lots 19 in DP 827588 and Lots 14, 25, 30, 70, 86, 88, 91 and 92 in DP 754919. The monitoring locations (water, dust, gas) are presented in Appendix A and Figures 3A and 3B.

The key parts of Veolia's monitoring activities for the Woodlawn Bioreactor (WB) are summarised below.

6.1 Surface and Groundwater Monitoring

The objective of water monitoring is to ascertain if there are any changes occurring in groundwater or surface waters that may indicate contamination which can be directly attributed to the site.

As the site is located in a mineralised area (i.e. a massive sulphide ore body), naturally elevated concentrations of heavy metals and acidic water are likely in the surface and groundwater systems. Therefore, establishment of water quality trends over time is fundamental to assess compliance with the criteria (i.e. no change, nil discharge).

L1.2 of EPL 11436 states 'there is to be no pollution of surface water or groundwater'. Thus, the objective of the WB water monitoring program is to monitor any change, rather than individual levels/concentrations against set limits.

Thirty-three groundwater monitoring points and nine surface water monitoring points are registered on the EPL. These are listed below.

Groundwater:

- MB1 - MB8, MB10 - MB17
- ED3B
- WM1, WM3 - WM7
- P38, P44, P45, P58, P59, P100
- MW8S, MW8D, MW9S, MW10S

Surface Water:

- Site 115, Site 105
- Spring 2

- WM200 to WM203
- Pond 2, Pond 3

Over the past 5 years monitoring has taken place as outlined in the Landfill Environmental Management Plan (LEMP) and Environmental Protection Licenses for Woodlawn and Crisps Creek. Veolia's environmental monitoring schedule for the two licensed sites is attached in Appendix C.

According to the EPL, the Annual Return is to include a graphical representation of all monitoring data as well as an analysis of the data to determine whether activities at the premises are impacting on the environment. Groundwater quality graphs are presented in Appendix D and surface water quality graphs in Appendix E.

6.2 Leachate Management

The mine void must be managed to ensure the groundwater gradient directs groundwater flows toward the mine void, unless otherwise approved in writing by the DECC.

Veolia is permitted to transfer up to 40 megalitres of acid mine drainage (AMD) and leachate mixture from the landfilled waste for storage in the purpose-built dams named ED3N-1, ED3N-2 and ED3N-3 (O5.6). 16.6 ML of AMD/leachate has been extracted from the void and has been stored in the ED3 North lagoon system during the 2008/2009 reporting period.

In accordance with O6.1, water from the west ridge catchment does not drain into the landfill void.

Other aspects of leachate management detailed in the EPL include:

- O6.2: ED3 must not receive water stored in the Waste Rock Dam (WRD).
- O6.3: Stormwater in the mine void must only be discharged into ED3, or used for operational purposes within the landfill, such as Bioreactor water and dust suppression as approved in writing by the DECC.

6.2.1 Volumes in ED3

Whenever the volume of water stored in ED3 exceeds 323 ML, the licensee must notify the EPA in accordance with the requirements of R2 and provide a written report to the EPA within 1 month (R6.1). This has not occurred since operations began in 2004. The stored volumes in the Evaporation Dam 3 (ED3) system are presented in Appendix J.

6.3 Air and Dust Monitoring

It is a condition of the EPL that three sub-surface gas monitoring points and one surface gas monitoring point be monitored quarterly (methane, % by volume). Two air discharge monitoring points (landfill gas flare and landfill gas engine) are also required. The results are attached in Appendix H (surface and sub-surface gas) and I (flare and gas engine).

The landfill gas engine was commissioned in February 2008 and full operation did not commence until June 2008. The required pollutants are monitored on a yearly basis.

6.4 Landfill Gas Collection and Monitoring

It is the responsibility of the licensee (Veolia) to ensure that as much landfill gas as is practicable is collected and treated by flaring, or beneficially used in the landfill gas-fired power station.

- O11.2: The flare system must provide a destruction efficiency of volatile organic compounds, air toxics and odours of no less than 98%. The flare must be at ground-level and shrouded. The flare must be provided with automatic combustion air control, automatic shut-off gas valve and an automatic restart system.
- O11.3: The landfill gas-fired power station must provide a minimum destruction efficiency of 98% for volatile organic compounds, air toxics and odour, and the discharge point(s) must be designed (i.e. stack height, diameter, discharge velocity etc.) to ensure that the design ground-level concentration criteria are not exceeded at any location at or beyond the boundary of the premises.

6.5 Noise Monitoring

The noise limits for the Woodlawn Bioreactor are as follows:

- L6.1: Noise from the premises must not exceed 35 dB(A) $L_{Aeq\ (15\ minute)}$ at the most affected residential receiver. Where L_{Aeq} means the equivalent continuous noise level - the level of noise equivalent to the energy-average of noise levels occurring over a measurement period.

Since commissioning of the Woodlawn Bioreactor noise monitoring has not been conducted, as no complaints have been received. If a complaint were to be lodged, Veolia would perform noise monitoring at the locations specified in the EPL.

6.6 Metereological Monitoring

Meteorological monitoring (wind speed and direction, sigma theta, temperature, solar radiation and rainfall) must be undertaken continuously for the reporting period. The data is available upon request.

The site's meterological station, which constantly monitors the aforementioned, is situated adjacent to the main administration building

All conditions have been complied with by Veolia.

7.0 LICENSING AND MONITORING OBJECTIVES - INTERMODAL FACILITY

The Crisps Creek Intermodal Facility is controlled by EPL 11455, which applies to Part Lot 10 in DP 703260 and Part Lot 3 in DP 754894. The monitoring locations (surface water, air) are presented in Appendix A and Figure 3B.

The key parts of Veolia's monitoring activities for the Intermodal Facility (IMF) are summarised below.

7.1 Surface Water Monitoring

Surface water monitoring is conducted at three locations, 2 up-gradient and 1 down-gradient of the Intermodal Facility (i.e. Site 110, Site 130 and Site 150). Some of the surface water control measures for the site are as follows:

- O4.1: Paved and sealed areas must be provided with a first flush stormwater management system designed to capture the first 15 millimetres of stormwater for each square metre of catchment area. The paved and sealed areas must also extend to include any rail unloading areas.
- O4.2: All areas that involve the handling of containerised waste including container transfer and handling areas, clean container storage areas and internal roadways must be sealed.
- O4.3: Contaminated storm water and any sludges collected at the premises must be disposed of at the Woodlawn Bioreactor Facility (EPL 11436).
- O4.4: There must be no vehicle or container wash down at the premises.
- O4.5: All sewage generated on the premises must be disposed of into the sewerage system at the Woodlawn Bioreactor Facility (EPL 11436).
- O4.6: Uncontaminated storm water collected by the first flush system may be applied to vegetated areas at the premises in a manner that does not exceed the capacity of the areas to effectively utilise the storm water.

All conditions have been complied with by Veolia in the 2008/2009 reporting period.

7.2 Air

Air monitoring is required at the nearest sensitive residential receptor to the premises, which is a residential property. No limits are provided, however any changes are to be investigated. The dust (and noise) monitoring locations are presented in Figure 3B.

7.3 Waste

- L5.1: The licensee must not cause, permit or allow any waste generated outside the premises to be received at the premises for storage, treatment, processing, reprocessing or disposal or any waste generated at the premises to be disposed of at the premises, except as expressly permitted by the licence.
- L5.2: This condition only applies to the storage, treatment, processing, reprocessing or disposal of waste at the premises if those activities require an environment protection licence.

All conditions relating to waste have been complied with by Veolia in the 2008/2009 reporting period.

7.4 Noise Limits

- L6.1: Except as provided in condition L6.2, noise from the premises must not exceed an $L_{Aeq\ (15\ minute)}$ noise emission criterion of 35 dB(A) at the most affected residential receiver.
- L6.2: Noise emissions from freight trains entering and leaving the premises must not exceed the noise limit of 45 dB(A) $L_{Aeq\ (15\ minutes)}$ prior to 7:00 am and 50 dB(A) $L_{Aeq\ (15\ minutes)}$ after 7:00 am. These limits apply only where there are no more than two freight trains entering and leaving the premises per day, otherwise the limit in condition L6.1 applies.

All conditions have been complied with by Veolia since commissioning of the site and no noise monitoring has been conducted as no complaints have been received. If a complaint were to be lodged, the appropriate action would be undertaken.

7.5 Dust Control

- O3.1: All operations and activities occurring at the premises must be carried out in a manner that minimise dust at the boundary of the premises.

All conditions relating to dust control have been complied with by Veolia in the 2008/2009 reporting period.

8.0 WATER MANAGEMENT - WOODLAWN BIOREACTOR

Woodlawn is a 'zero discharge site', which means that water in contact with disturbed areas such as the mine void and plant area must be captured and contained onsite. A detailed description of the water management system is contained in the Landfill Environmental Management Plan (LEMP) for the Woodlawn Bioreactor (Collex, 2004).

Within the Woodlawn site there are two areas requiring water management - the area under the Site Mine Lease (SML20) and the area governed by the Environment Protection Licence (EPL 11436). Water within these areas can be split into three main types:

1. Acid mine drainage (AMD) - Low pH with high salinity and metals
2. Landfill leachate - High organics and nutrients
3. Clean water - Comprises rain and fresh bore water

Within the area under the SML20, clean water is directed offsite, while waters from contaminated areas are stored onsite prior to being evaporated. The long term climatic data for Woodlawn indicates evaporation (~1400 mm) annually exceeds rainfall (~600 mm). Thus, the climate at Woodlawn supports the evaporation strategy implemented at the site.

Rainfall flowing down the walls of the void that becomes contaminated with AMD is pumped to one of two holding ponds (Ponds 2 and 3, part of EPL requirement) constructed on the haul road in the void. AMD is then pumped out of the ponds to Evaporation Dam 3 (ED3). In 2005, the water contained in ED3 inadvertently became contaminated with landfill leachate. Since the contamination event, ED3 has been split into three sections: ED3N, which contains leachate contaminated AMD; ED3S, which now contains stormwater AMD from the walls of the void; and ED3N Lagoon 1, which is temporarily storing AMD leachate from within the waste.

The onsite surface water storage volumes are summarised in Table 8.1 (from 2008/2009 AEMR).

Table 8.1: Onsite Water Storage Volumes

Water Storage	Quality	Volumes held (ML)		
		July 2008	June 2009	Storage Capacity
Plant Collection Dam	Varying quality (contaminated)	10.93	7.36	60
Evaporation Dam 1	Contaminated	<200	<200	1345
Evaporation Dam 2	Contaminated	<150	<150	846
Evaporation Dam 3 (N)	Contaminated	53.6	40.6	183
Evaporation Dam 3 (S)	Contaminated	50	50	183

Reference: AEMR 2008/09. Storage in ED3 was below the 323 ML EPL requirement from 2004 to 2009.

8.1 Void

Water management within the mine void has changed due to the construction of the Bioreactor in 2004.

Inflows into the void include incident rainfall, landfill materials and groundwater seepage. Recent seepage monitoring undertaken by Veolia indicate approximately 1 - 2 L/sec of inflows consistently occurs consistently at two primary locations (Figure 1). The location of the seeps is interpreted to correlate with fault zones identified during former mining activities.

Outflows from the mine void include evaporation and frequent pumping of stormwater to ED3. Recirculation and management of leachate from the landfill/void is required to lower water levels and maximise gas production.

Stormwater collection within the void is a key aspect of Bioreactor operations, as acid rock drainage is prevalent within the mine void due to exposed sulfides. The contact of this low pH water with the waste in the Bioreactor can be detrimental to Bioreactor performance.

Two large ponds (Ponds 2 and 3) provide temporary storage for short duration high intensity storm events, while pumps are used for longer duration rainfall events. Additional smaller interception sumps and pumping systems are located below Pond 2. The LEMP contains a full description of the mine void water management system.

Water collected in Ponds 2 and 3 is automatically pumped to ED3.

9.0 THE WOODLAWN BIOREACTOR SYSTEM AND MONITORING NETWORKS

The monitoring locations (air, noise, surface water and groundwater) are shown on Figures 3A and 3B. The details of the void and ED3 area are presented in the sub-sections below and in Figures 1 and 5.

9.1 Void

The landfill void is a distinctive large scale open cut mine with unique hydrogeological conditions (i.e. inward hydraulic gradients, Figures 3A and 5).

The mine void acts as a hydraulic trap (or groundwater sink) for groundwater due to the depth of the void (200 m). The surrounding discharge creek systems are much shallower (~100 m). Flow into the void is primarily through fractures/faults and seepage ports (horizontal bores through the slopes).

Once the void is filled with waste and leachate extraction ceases, the groundwater flow system will recover and merge with the prevailing regional flow regime. Rehabilitation of the void (in ~50 years time) and subsequent leachate management measures (e.g. pumping) will determine the extent of groundwater migration from the void.

9.1.2 Monitoring Well Network

Four deep groundwater monitoring wells (WM1, WM3, WM4 and WM7) were installed within the mine void perimeter in order to assess groundwater quality and water levels prior to and during Bioreactor operations (August 2003). WM5 and WM6 were installed outside the void. These wells are sampled quarterly as per EPL conditions to determine baseline water quality data and monitor impacts from landfilling operations.

Sampling of the four wells began in August 2003. The analytical suite is presented in EPL 11436. Well construction details are summarised in Appendix B for all EPL wells (where available).

Water levels of twelve piezometers are also monitored in the void:

- P100A/B, P44A/B, P45A/B, P38A/B, P58A/B and P59A/B (where A = shallow, B = deep); (*no borelogs are available for the piezometers*).

9.1.3 Surface Water (Void)

Catch drains run either side of the length of the haul road. During a rainfall event, water collects in these drains and is carried to either Pond 2, Pond 3 or a constructed clay pond at the northern end of the void. Water is then progressively pumped via Pond 2/Pond 3 to a holding tank and then on to ED3 (Woodlawn Bioreactor Alliance Report, April 2003).

9.2 Evaporation Dam 3 (ED3)

Evaporation Dam 3 was created around 1991 with the construction of several low embankments and diversion drains around the perimeter of an area which had been used to source clay for the capping of the Woodlawn spoil piles (URS, November 2001).

The total storage capacity of the three cells is 366 ML (as of 2001, Figure 3A). The storage at ED3 is subdivided into three cells (northern cell - 7 ha, central cell - 8 ha, southern cell - 2.8 ha).

Veolia modified the extraction system (landfill leachate and acid mine drainage) from the landfill void to improve Bioreactor performance and gas generation from the waste. This included the additional storage lagoons within the ED3 System (i.e. the ED3N Lagoons), which were constructed mid to late 2007.

The 3 lagoons are approximately 0.5 ha, and located on the eastern side of ED3 North (ED3N). Each of the lagoons are used for additional storage potential, and all are clay lined. An updated leachate treatment system (aeration and chemical treatment) was developed for the long term leachate and AMD management (late 2007).

9.2.1 Monitoring Well Network

Wells located in the vicinity of ED3 are:

- Shallow wells (<6 m): MB10, MW6, MW7, ED3B
- Deep wells (~25 m): MB1, MB4, MB6, MB7

MW6 was damaged and replaced in November 2007 (i.e. MW-6R). An additional four wells (MW8S/MW8D, MW9S and MW10S) were installed down-gradient of ED3N during October and November 2007 by E2W.

9.2.2 *Surface Water Monitoring Locations*

Surface water monitoring is undertaken at two locations within ED3:

- ED3 North (WM203)
- ED3 South (WM202)

Surface water is monitored down-gradient of ED3 South and dolerite stockpile, and west of the rehabilitated waste rock dump at location WM200 (i.e. Raw Water Dam). ED1 is the surface water receptor downstream of ED3.

Surface water samples are routinely collected from two locations at the (disused) Plant Area (i.e. WM201), which reflect modified drainage systems. The Plant Area comprises the demolished remains of the former plant area (i.e. mine processing equipment and associated infrastructure).

- Location 'Spring 2' is upstream of the Bioreactor and opposite Crisps Creek, and flows during wet weather.

Surface water sample locations which may receive discharges from the void or ED3 (and part of EPL requirements) are:

- Site 105 - Crisps Creek/Pylara Boundary, which is downstream of the void and tailings impoundments.
- Site 115 - Woodlawn/Willeroo boundary to the north, is situated downstream of ED2 and part of ED1 and ED3N water storage systems.

9.3 Air and Gas Monitoring Locations

The air and noise monitoring locations are presented on Figures 3A and 3B.

- Dust monitoring is performed at two locations (DG22, DG24) onsite (i.e. east and west of the void respectively) and one offsite location (DG28) at nearby Pylara Farm.
- Surface gas monitoring is conducted on the landfill surface within the mine void.
- Sub-surface gas monitoring is conducted at three locations around the perimeter of the void. GMBH1 is located on the northern side of the void, GMBH2 on the eastern side of the mine void and GMBH4 on the western side of the void (Figure 3A).
- Noise monitoring locations are not situated within the Woodlawn Bioreactor site (i.e. only required near neighbouring residences).
- The Landfill Gas Flare is situated at the edge of the disused Plant Area, adjacent to the current Power Generation Hub. This flare destroys landfill gas generated by the Bioreactor.
- The Landfill Gas Engine is situated at the edge of the disused Plant Area, within the Power Generation Hub.

10.0 INTERMODAL FACILITY SYSTEM AND MONITORING NETWORK

The Intermodal Facility (IMF) is designed to transfer containers of waste (27 tonnes) from the railway to trucks. The trucks transport the waste to the Woodlawn Bioreactor. All containers (54 per day) are shifted by container handler forklift onto the trucks and back onto the rail when they have been emptied.

The IMF covers a length of approximately 500 m along an existing railway. The surface water, noise and air monitoring locations are shown on Figure 3B and in the sub-sections below. Monitoring wells are not available at the IMF and are not a requirement of the EPL 11455.

10.1 Surface Water

The site is well downstream of the mine and is influenced by many general factors. The hill slopes surrounding Crisps Creek feed a confined alluvial aquifer, which further downstream becomes unconfined, with discharges to the creek surface water system and boggy areas adjacent to the creek.

Surface water samples are routinely collected from three downstream locations (i.e. Sites 110, 130 and 150).

- Site 110 is situated on Crisps Creek, approximately eight kilometres downstream of the mine and immediately upstream from the Crisps Creek/Mulwaree River confluence and Intermodal Facility.
- Sites 110 and 130 are identified as upstream monitoring points for the Intermodal Facility.
- Site 150 is situated on the Mulwaree River, approximately 2.5 km down-gradient of the IMF (Figure 3B).

10.2 Dust

- Dust monitoring was formerly performed at one location (DG18). It was situated at the nearest residential building to the Intermodal Facility. Due to the low dust depositions recorded and as construction of the IMF has been completed, the DECC determined DG18 was no longer a licence requirement. As of February 2007, the gauge was removed from the monitoring schedule.

10.3 Noise

- Noise monitoring is assessed when required at the nearest residential receptor, which is situated north of the IMF. Noise monitoring is only performed if complaints are received; and none were received in the 2008/2009 reporting period.

11.0 ASSESSMENT OF WOODLAWN BIOREACTOR MONITORING RESULTS

11.1 Woodlawn Bioreactor

The Woodlawn Bioreactor is assessed with regard to the pollutant source, pollution migration and adequacy of associated monitoring activities. The location of the void and associated monitoring network is presented on Figures 1, 3A and 5. Assessment of the monitoring data is summarised in Appendix D (time-series graphs) to Appendix K, and in the sub-sections below.

11.2 Review of Current Groundwater Monitoring Data

The groundwater monitoring wells WM1, WM3 to WM7, MB1, MB4, MB6 and ED3B are monitored by Veolia on a quarterly basis to assess baseline water quality data and levels in the void. Four of the monitoring wells (WM1, WM3, WM4 and WM7) are located within the void and target the floor area (~200 m depth) containing landfill waste (approximately 50 m thick in 2009).

The wells (MW9S, MW-8S, MW-8D, MW-10S[4], and WM5, WM6, MB6 and ED3B) are located in the vicinity of ED3. Peripheral down-gradient wells MB1 and MB4 are located between the void and Crisps Creek (Figures 3 and 6, Appendix D).

11.2.1 Hydraulics and Flow Regime

Wells in the void are interpreted to be down-gradient locations given they are in an (artificial) regional discharge area which is below the surrounding creek levels.

The depth to water (mbgl and RL) measured in the piezometers and wells are graphically presented in Appendix D and Tables 1A and 1B. Selected water level time-series trends for MB wells are also presented in Appendix D. The reduced water levels and inferred groundwater contours are presented in Figure 3A.

It is noted that perched groundwater and/or mounded groundwater levels are likely to be present in the vicinity of the water storages (e.g. ED3 and ED2), or where wells are screened within the weathered regolith or alluvium.

Differences in water depth are apparent in the 12 piezometers (piezo) and selected MB wells (MB5, MB7, MB8, MB15 to MB17). The depths reflect well location and position on the steep drawdown halo surrounding the void (Figure 5). The water levels are hosted in variable bedrock formations which may be stratified and/or slightly fractured/faulted, which causes a higher secondary permeability and greater connection with dewatering activities in the void.

The 12 piezometer and 6 monitoring wells show variable water level fluctuations, but generally a slight response to rainfall recharge. The time-series graphs are indicative of the (tight) bedrock geology and generally low groundwater recharge conditions.

The piezometers P44A and P58B show a pronounced (>10 m over time, Appendix D) water level change from rainfall recharge and are interpreted to intersect localized faulting/fracturing. Fault planes and increased rainfall recharge are interpreted to cause the fluctuating water levels in the wells and piezometers (Figure 1).

The water table RL in the 12 piezometers located in the void range from 700 m AHD (P100B) to 790 m AHD (P59A). The water level in piezometers is approximately 20 to 100 m above the waste (680 m AHD) and elevation of leachate (~670 m AHD).

The location of seepage points (from the base of the void and through horizontal conduits) and depth to water (piezometers/wells) shows hydraulic containment and an inward cone of depression centered around the floor of the void (Figures 1 and 5).

The water levels in the 12 piezometers and surrounding wells indicate the pumping from the base of void and/or fluctuating leachate levels (waste ~40 m thick) have no obvious effect on the local water levels. The current data supports the impervious nature of the bedrock and limited hydraulic connection of local groundwater and landfill leachate levels.

[4] dry well

The inferred groundwater flow regime at the void is presented in Figures 1 and 5. The flow regime is based on a previous assessment by URS (1999) and E2W's 2007 review of current (average) water levels from existing piezometers and monitoring wells (Tables 1A and 1B).

The groundwater levels measured in wells outside of the void (e.g. MB1 - MB8, MB10 - MB17) show variable trends, ranging from relatively stable (MB15, MB16) to variable and fluctuating (MB3, MB4). However, most wells show an overall deepening of the water table reflecting the prevailing rainfall patterns and recharge.
The deepening of the water at some locations (MB10, MB2, MB5) are interpreted to relate to the depletion of water storages (ED1 or WRD), and/or mine cessation/rehabilitation works. The drought conditions in the past few years would generally deepen the water table on a regional scale.

11.2.2 Groundwater Quality and Trends

Multi-parameter time-series graphs for the four wells in the void (WM1, WM3, WM4 and WM7) are presented in Appendix D. The hydrochemical fingerprint from each well is generally different, indicating the contrasting hydrogeology in the void (i.e. tuff, dolerite, schist, sulfide ore body).

A summary of groundwater chemistry from 2005 to present (i.e. post mining operations and during landfilling operations) is summarized as follows[5] (Table 1A):

- WM1: Ca-SO_4 water type, brackish (1.9 mS/cm), near-neutral pH (7.15),
- WM3: Ca/Mg-SO_4 water type and relatively acidic (pH = 3.99) and brackish (6.9 mS/cm),
- WM4: Ca-SO_4 water type, fresh - brackish (1.6 mS/cm) and slightly acidic (pH = 6.85),
- WM5: Na-Cl water type, brackish (5.8 mS/cm) and pH 7.04,
- WM6: Na-Cl water type, brackish (11.1 mS/cm) and pH 6.15,
- WM7: Ca-SO_4 water type, brackish (4.3 mS/cm) and slightly acidic (6.74),
- MB1: Ca-SO_4 water type, fresh (0.94 mS/cm) and pH 7.20,
- MB2: Ca/Mg-SO_4 water type, brackish (6.2 mS/cm) and pH 6.81,
- MB3: Ca/Mg-Cl water type, brackish (2.2 mS/cm) and pH 6.96,
- MB4: Na-Cl water type, fresh (1.2 mS/cm) and pH 6.12,
- MB5: Mg-SO_4 water type, brackish (8.1 mS/cm) and acidic pH (3.99),
- MB6: Na-Cl water type, brackish (3.9 mS/cm) and pH 6.14,
- MB7: Na-Cl water type, brackish (7.7 mS/cm) and pH 6.83,
- MB8: Na-Cl water type, brackish (4.0 mS/cm) and pH neutral (7.02),
- MB10: Mg-SO_4 water type, brackish (6.7 mS/cm) and neutral (pH = 7.01),
- MB11: Mg-SO_4 water type, brackish to nearly saline (24.7 mS/cm) and pH 4.96,
- MB12: Mg-SO_4 water type, brackish to nearly saline (28.3 mS/cm) and pH 4.18,
- MB13: Na-Cl water type, brackish (2.8 mS/cm) and pH 6.87,
- MB14: Ca/Mg-SO_4 water type, brackish (4.6 mS/cm) and pH 6.67,
- MB15: Mg-SO_4 water type, brackish (6.4 mS/cm) and pH 6.56,
- MB16: Mg-SO_4 water type, brackish to nearly saline (25.8 mS/cm) and acidic pH (3.82),
- MB17: Mg-SO_4 water type, brackish (10.7 mS/cm) and pH 6.43,
- ED3B: Na-Cl water type, brackish (7.4 mS/cm) and pH 6.77,
- MW-8S: MW-8S: magnesium sulphate water type, brackish (EC = 12.1 mS/cm) , neutral pH (6.55),
- MW-8D: magnesium sulphate water type, brackish (EC = 11.5 mS/cm) and near neutral pH (6.65),

[5] pH and EC measurements are averages from 2005 to present.

- MW-9S: sodium chloride water type, brackish (EC = 8.0 mS/cm) and near neutral pH (6.37),
- MW-10S: no data as well continually dry.

Discussion of Results and Trends

One well (MW7) shows a larger scatter of data (i.e. EC, zinc and iron levels, Appendix D), indicating potential mixing of water types (e.g. run-off, leachate, AMD). The data may also indicate the ingress of surface water around the well head works and influence from storm water. An inspection of the well head-works and local drainage issues are recommended.

Groundwater quality from the MB wells (MB1 - MB8, MB10 - MB17) is generally variable. While sulphate levels are consistently elevated they are considered to reflect background or seasonal variation. Evaporation and precipitation/dissolution of surface salts (NA-Cl, sulfur) is likely to influence recharge waters and effect sulphate and conductivity trends in the groundwater. Groundwater quality from the WM wells (WM1, WM3 - WM7) is generally variable over the monitoring period.

The water quality trends presented in the time-series graphs indicate various trends and fluctuations, with the significant water quality changes described below:

- MB1: Iron is fluctuating, but generally follows an increasing trend while EC is decreasing. The borelog for MB1 indicates that a fracture within dolerite bedrock was encountered at 21.5 mbgl.
- MB2: Iron levels are variable, zinc concentrations are decreasing and sulphate levels are stable around 4000 mg/L.
- MB3: Iron and zinc levels are variable while sulphate concentrations are stable around 35 mg/L.
- MB4: Iron, ammonia and TOC levels are variable.
- MB6: Sulphate, iron and conductivity levels are variable but generally increasing, while zinc and ammonia concentrations are fluctuating.
- MB7: EC is increasing and zinc and iron levels are variable.
- MB8 and MB10: Zinc and iron levels are variable.
- MB11 and MB12: low pH, EC, zinc and sulphate levels are increasing while iron is fluctuating.
- MB13: Iron, zinc and EC levels are variable.
- MB14: Zinc and EC levels are variable.
- MB15 and MB17: Sulphate and zinc concentrations are generally decreasing, while iron levels are variable but increasing.
- MB16: Zinc levels are decreasing while sulphate levels appear to be slightly increasing.
- WM3: In late 2005, a change occurred in the water quality as evidenced by a rise in sulphate, conductivity and ammonia levels. The water quality trends pre-and-post 2005 monitoring are generally more stable, however decreasing trends are noted for conductivity, iron, zinc with increasing alkalinity (rising PH). The late 2005 water data may relate to earthworks in the void and leachate dispersion. The removal of the waste rock also affected the water level in MW3 during 2006.
- WM7: Also in late 2005, the water quality trend changed with a decrease in sulphate and a sharp rise in conductivity, and a slight (temporary) rise in zinc. The water quality trends pre-and-post 2005 monitoring are generally more stable, however decreasing trends are noted for zinc, and TOC.
- WM1: Ammonia concentrations have gradually increased since monitoring commenced in 2004 (note: ammonia levels reach a maximum of 0.67 mg/L in September 2009). WM1 is located in the void, with trends reflecting potentially dispersion of leachate. The pH and conductivity levels of groundwater collected from WM1 have been stable since October 2006.

The depth to water in groundwater wells (MB wells and piezometers) has increased over time (Appendix D).

Slight variations observed in key analytes (ammonia, iron, zinc, sulphate, pH, EC) shown in the time-series graphs is interpreted to relate to the precision of the sampling procedures, difficulty in purging deep wells, low yield wells and/or collecting unstable anaerobic groundwater from the void. Other similar variations in water quality are also anticipated from seasonal changes and rainfall recharge effects.

The water quality trends from MB-11 and MB-12 indicate that a leachate plume (zinc, sulphate, increasing conductivity) is migrating from ED-2. The plume has the potential to impact water quality in the downgradient creek. The results from MB-19[6] (with rising Zn and sulphate, located 50 m downgradient of MB-11/12) and surface water quality in the downstream Allianoyonyiga creek sample (115) shows elevated and fluctuating parameters (Zn, EC, sulphate) which may reflect plume discharges via baseflow (e.g. 115 results for Zn concentrations ranges from 0.01 mg/L to almost 1mg/L).

Based on the water quality trends (time-series graphs of TDS, K, BOD, TOC, ammonia, SWL) in surface water and available groundwater wells at ED3 area, E2W interpret that groundwater pollution has not occurred from landfill leachate to areas to the south, north and east of the ED3 evaporation dams.

The status of groundwater conditions and trends down-gradient of ED-3N is in progress given that monitoring wells were only recently installed (November 2007). The recent data from MW9S indicates an increasing trend for TOC and conductivity. An increasing conductivity and TOC trend is also evident in MW8D which is downgradient of ED-3N (Appendix D). The trends in MW-9S and MW8D may indicate the potential for leachate breakthrough at those locations, however natural attenuation may minimize the increasing trends for other pollutants such as ammonia, zinc or iron.

All pesticide results (OC/OP) from the surface and groundwater water monitoring locations were reported below laboratory detection limits.

11.2.3 Well Construction Issues

Construction details for the monitoring wells are presented in Appendix B (where available). It is noted that the floor of the mine is at 640 m AHD (240 mbgl), while the depth of waste is approximately 685 m AHD (45 m deep). The void monitoring wells are generally terminated at 85 - 115 m depth and target the base of the mine void.

The bore depths and well construction designs are considered suitable for the early stages of Bioreactor monitoring (e.g. 60 m of waste). However, as the void is progressively filled with waste and above (e.g. 30 m) the existing well screen intervals, additional stratigraphic (intermediate wells) may be proposed for monitoring potential or actual groundwater pollution migrating from the void. However, it is well recognised that the potential for leachate escape from the void with the existing inward hydraulic gradient is very low (Figure 5).

11.2.4 Adequacy of the Groundwater Monitoring Network

[6] MB-19 and MB20 are located downgradient of MB11 and MB12 however are not part of the EPL requirements.

The monitoring of water quality within the void system is considered to be adequate (Figure 5). This interpretation is based on the void invert being below the water table. The hydraulic pressure differential between the leachate and groundwater system induces a steep inward hydraulic gradient that produces a hydraulic trap (i.e. no escape of landfill leachate from the void). As the flow is inwards, the wells need to demonstrate that the inward gradient exists, which is very clear based on the water level graphs, survey waste levels and inferred flow regime (Figures 3A).

The monitoring network within the void demonstrates the inward hydraulic gradient (i.e. a hydraulic trap) and containment of leachate within the void (Figures; 3A, 5).

The monitoring network outside of the void and ED3 is considered adequate, given that an additional 4 wells (MW8S/8D, MW9S, MW10S and a replacement for WM6) were installed down-gradient of ED3N in November 2007. Refer to E2W's June 2007 report entitled *Woodlawn Evaporation Dam 3 and Monitoring Issues*.

11.2.5 Analytical Testing and Monitoring Issues

The analytical and field testing procedures are considered appropriate for the wells and surface water in the landfill. Some technical issues for future monitoring include:

- Calibration of field instruments. Address the pH variations between field and lab measurements (up to 1 unit difference). Due to the anaerobic, aggressive and reduced nature of the deep groundwater in and around the void, the short holding times for pH are difficult to overcome when laboratories are located offsite. Priority should be given to use of calibrated field instruments and measurements.
- The brief review of laboratory quality control results indicates laboratory QA/QC results are generally within acceptable range for all analyses, including the ionic balances, where undertaken. Any anomalous results or LOR issues should be addressed as part of a quarterly data review process.
- A quality control program (sampling protocol) should be implemented to check the laboratory data, which is to include re-analyses of anomalous data (as appropriate). The inclusion of blind field duplicates (1 per 20 samples or per batch) and decontamination procedures would be beneficial to assess laboratory performance.

EPL Non-Compliances in the 2008/09 Reporting Period

The 2008/2009 non-compliances for the EPL are summarised in Appendix K. All WM (WM1, WM3 - WM7) and MW groundwater wells (MW8S/D, MW9S, MW10S) were sampled as per the EPL in the 2008/09 reporting period.

Veolia are discussing the monitoring requirements for monitoring points MB1 - MB8 and MB10 - MB17 with the DECC, with the aim of reducing the number of analyses. Thus, it is noted the full suite of parameters listed in the EPL for MB1 - MB8 and MB10 - MB17 were not consistently analysed in the past two reporting periods. This non-compliance is planned to be resolved by the end of the next reporting period once discussion with the DECC are finalised.

11.2.6 Recommendations (Groundwater)

The existing well network and analytical program is generally satisfactory for groundwater monitoring at the Woodlawn Bioreactor, however further investigations are recommended at MB-11/MB-12/MB-19 where an expanding leachate plume (Zn, sulphate) is inferred. The polluted groundwater has potential to impact on surface water (115) systems.

A review of the water storage practices is proposed at ED-2 as the dam is underlain by alluvial sediments (some sands) with possible leakage of leachate.

As the landfill waste level rises over time additional stratigraphic wells (e.g. intermediate depth) are required to monitor water quality with regard to the prevailing waste level. Intermediate wells to monitor the groundwater at the void are proposed when the tip face is greater than ~30 m above the existing wells screens intervals.

E2W offer the following suggestions for improving the monitoring and laboratory results for the site:

- Low pH (WM3, MB5, MB11, MB12) - include all carbon species (carbonic acid is dominant at pH <4) for acidic groundwater conditions. Alkalinity, carbonate and bicarbonate species are not present in acidic pH.
- Field filtering and preserving of heavy metal samples in the field is required to ensure representative dissolved metal concentrations (i.e. metals precipitate rapidly in deep anaerobic groundwater). Appropriate containers should be provided by the laboratory, which includes preservatives for unstable analytes (heavy metals and nutrients).
- Monitoring wells should be purged of 3 bore volumes (if possible) or when field measurements (pH, EC etc.) are stable before sampling. Low flow purging techniques may improve the consistency of the monitoring results with the deep, low yielding wells and or well development procedures to remove any accumulated silt or precipitates in the well bottom/sump.
- Veolia to obtain documentation from Ecowise/Ecomanagers Pty Ltd that all analytical testing meets the required standards, analytical methodology according to NATA registration, EPL conditions, and NEPM (1999) protocols.

11.3 Assessment of Surface Water Monitoring Data

The requirements for the surface water monitoring are outlined in Appendix C (Environmental Monitoring Schedule) and shown on Figures 3A, 3B and Appendix E. Surface water is collected from within the void and surrounding water bodies and creeks:

- Site 115 (Allianoyonyiga Creek)
- Spring 2 and Site 105 (Crisps Creek)
- WM200 (surface water collected from the Raw Water Dam, which is located west of the rehabilitated waste rock dump)
- WM201 (existing mine building)
- ED3 South (WM202, ponded water in ED3S)
- ED3 North (WM203, ponded water in ED3N)
- Ponds 2 and 3 (lined sediment ponds capturing runoff entering the void)

Two water bodies require monitoring for leachate quality:

- Leachate Dam (used to collect and treat leachate at the top of the void)
- Leachate Recirculation System

11.3.1 Surface Water Quality Results

A summary of the surface water chemistry is as follows[7] (Tables 2 and 3):

- Site 115: Na-Cl water type, fresh (1.2 mS/cm) and pH 7.15,
- Spring 2: Ca-SO_4 water type, fresh (1.3 mS/cm), pH 5.99,
- Site 105: Na/Mg-Cl water type, brackish (1.7 mS/cm) and pH near-neutral (7.20),
- WM200: Na/Mg-Cl/SO_4 water type, brackish (2.8 mS/cm) and pH 6.74,
- WM201: Na-SO_4/Cl water type, fresh (0.6 mS/cm) and pH 6.77,
- ED3S (WM202): Mg-SO_4 water type, brackish (9.5 mS/cm), acidic at pH 3.88,
- ED3N (WM203): Mg-SO_4 water type, brackish (13.9 mS/cm), acidic at pH 3.95,
- Pond 2: Mg-SO_4 water type, brackish (9.2 mS/cm) and acidic pH (4.14),
- Pond 3: Mg-SO_4 water type, brackish (10.9 mS/cm) and acidic pH (4.16).

The surface water monitoring data and statistics (minimum, maximum, average, standard deviation) are presented in Tables 2 and 3 and on time-series graphs in Appendix E.

11.3.2 Discussion of Results

Similar to the groundwater trends at the Woodlawn Bioreactor, the surface water quality is variable (Appendix E) reflecting seasonal changes. All pesticide results (OC/OP) from the surface water monitoring locations were reported below laboratory detection limits.

- Water quality in Ponds 2 and 3 show variable but generally stable trends for ammonia, pH, iron, zinc and sulphate levels over time. The variations may reflect runoff from waste/weathered rock (containing pyrite) is entering the void and holding ponds.
- Site 115 (surface water at downstream area) results also show a fluctuating trend for EC, zinc, sulphate, iron and ammonia. The trend is interpreted to reflect variable flow conditions due to climate. The creek system is ephemeral and primarily considered to be a losing stream. Impacted groundwater may be migrating from the base of ED-2 (as indicated from groundwater data from MB-11, MB-12, MB-19) and influencing surface water quality due to baseflow contributions.
- All graphed parameters for Spring 2 exhibit an overall declining trend (pH, EC, ammonia, sulphate, zinc, iron, TOC). The water has become slightly acidic (~1 pH unit) over time. As Spring 2 is upstream of the dams and void, it is likely to represent background changes due to drought.
- The time-series graph for Site 105 indicates levels of key parameters are fluctuating (but generally stable), reflecting the contribution of runoff, evaporation processes and groundwater baseflow.
- E2W understand the discharge into ED3N and ED3S from 2005 represent a combination of acid mine drainage (AMD) and landfill leachate. Generally, the two water types are separated in the evaporation dams, however it is understood that the programmed pumping from the under liner drainage sump in the landfill void resulted in the mixing of leachate and AMD, which was inadvertently pumped into the ED3 system. The mixing of AMD/leachate (high nutrients/TOC) is indicated in ED3S (early 2005) and ED3N (late 2005, Appendix E).

The time-series graph for location WM200 indicates rising sulphate and zinc trends from 2004 to mid-late 2007, however since 2007, concentrations have stabilised and/or decreased.

The dolerite stockpile drainage lines drain into Evaporation Dam 1. A breach was discovered in this drain during the 2005/2006 reporting period and it is likely some acidic water entered the Raw Water

[7] pH and EC measurements are averages from 2005 to present.

Dam (WM200) as a result (refer to the 2007/08 SML20 report). The breach has since been repaired, which is reflected by the decreasing iron, zinc and sulphate concentrations and trends at WM200 in 2008.

Leachate quality monitoring is undertaken yearly on the leachate pond and leachate recirculation system (see Appendix E for graphs). The pH has risen in the latest reporting period while EC steadily increased in the leachate pond, whilst levels of ammonia, sulphate, zinc, iron and TOC are consistently elevated.

11.3.3 Adequacy of the surface water monitoring network

The monitoring network is considered to be generally satisfactory, however associated environmental data is required to compliment testing location, sample type and results achieved.

Due to the dynamic and large scale nature of the surface water monitoring the site specific details are required for all the sampling events (climate, flow rates, turbidity, springs flows). The sampling locations are generally considered satisfactory, however timing of the sampling events should be coordinated with representative dry and wet periods to better characterise the nature of potential pollutant source(s).

EPL Non-Compliances in the 2008/09 Reporting Period

The 2008/09 non-compliances are summarised in Appendix K. Three surface water sites (105, 115, WM201) were not sampled quarterly in the 2008/09 reporting period due to insufficient water.

EPL No. 11436 for the Woodlawn Bioreactor states redox potential is to be analysed quarterly for the surface water monitoring points. Redox was not measured enough at Sites 115, 105, Spring 2, WM200, WM202, WM203, Pond 2 and Pond 3 (Appendix K), however is not considered to be a critical parameter.

11.3.4 Recommendations (Surface Water)

- The sampling staff to include additional sampling details regarding the climate and flow regime at time of surface water sampling.
- Continue to monitor the water quality trends of WM200 to verify the cause of increased iron, zinc and sulphate concentrations between 2004 and 2007 was most likely associated with the breach in the drainage line linking the dolerite stockpile with ED1 (identified in 2006).

11.4 Dust

- Dust Gauge 24 is on the western side of the mine void and in close proximity to where earthworks have occurred during previous reporting periods. The average total solids concentration for the 2008-09 reporting period (4.88 $g/m^2/mth$) is higher than that reported in 2007-08 (1.81 $g/m^2/mth$). This slight increase in dust is associated with the exposed soil and lack of rain.
- Dust Gauge 22 is downwind of DG24, situated on the eastern side of the mine void. This gauge had slightly higher readings than DG24 during the 2008-09 period (average = 5.25 $g/m^2/mth$), indicating dust originating from the earthworks is also heading downwind.
- The offsite sampling location (Pylara, DG28) 2008-09 average of 5.1 g/m2/mth was the highest reported since the 2002-03 period (5.8 g/m2/mth). All sites reported their highest (DG22) or second highest average (DG24, DG28) since Veolia took over monitoring in 2002. While it is interpreted

this is associated with exposed soils and a lack of rain, dust levels will be closely monitored in the next reporting period and the appropriate actions undertaken if levels continue to rise.

11.5 Landfill Gas Management

A key aspect to the Woodlawn Bioreactor is the control and utilisation of landfill gas. Landfill gas is produced as a by-product of the decomposition of organic matter in waste. Methane production typically begins 6 to 12 months after waste placement and may last for decades.

Landfill gas generally contains methane, carbon dioxide, nitrogen and trace elements of hydrogen sulphide and oxygen. Landfill gas migration and emissions are assessed by Veolia at varying locations to determine the correct method of control and ensure that emissions do not pose adverse risks to public health and safety (Collex, August 2004).

Gas extraction infrastructure developed at Woodlawn is used to mitigate the effect of gas emissions into the surrounding environment. Monitoring locations around the site are used to determine the effectiveness of the extraction system.

11.5.1 Sub-surface Gas

Sub-surface gas monitoring is conducted at 3 locations around the perimeter of the void, and is used to assess if landfill gas is migrating through the soil and rock profile beyond the mine void. As methane is the main constituent of landfill gas, assessing concentrations of this gas is monitored and recorded. Monitoring is conducted quarterly as per the guidelines specified in the approved methods for sampling and analysis of air pollutants in NSW.

Methane concentrations achieved this reporting period show minimal landfill gas has been detected prior to purging (GMBH1 28/11/08 and 6/01/09 methane = 0.3 and 0.1%, respectively; GMBH2 20/08/09 methane = 0.1%), with no methane detected after purging, indicating that gas migration is not occurring (Appendix H1).

11.5.2 Surface Gas

Surface gas monitoring at the Woodlawn Bioreactor is used to assess gas migration out of the waste mass and into the surrounding environment. Monitoring is conducted quarterly as per the guidelines specified in the approved methods for sampling and analysis of air pollutants in NSW.

Similar to sub-surface gas monitoring, methane is the measurable pollutant, as determined by the DECC. Results achieved during this reporting period are below the notifiable level of 1.25% by volume. The highest reading recorded was 0.5% (Appendix H2).

During the 2006/07 reporting period, an independent analysis was conducted by GHD to assess the level of gas extraction and efforts to mitigate the migration of methane into the atmosphere. GHD calculated that 92% of the methane is captured, which is a good outcome considering that a conventional landfill gas capture is 70 - 75% (Inside Waste, WMAA, Sept/Oct 2007, page 23).

11.5.3 Landfill Gas Flare

The landfill gas is collected by active extraction and combusted through an enclosed high temperature flare. The flare system provides a means of destroying the landfill gas compounds. Gas flow and temperature are recorded in accordance with the approved methods specified by the DECC.

With the increase in gas production from the Bioreactor, the ability to burn more landfill gas through the flare has been possible. Additional burners have been progressively installed in the flare to increase the operational potential. A gas flow meter was installed in August 2007, to accurately measure gas flow volumes delivered to the flare, at full operational capacity is designed to burn 1,500 m^3/hr of landfill gas.

Landfill gas production from the bioreactor reached a suitable volume for power generation in February 2008. The data recorded during the reporting period has shown that use of the flare has been minimal, as the utilisation of the landfill gas for power generation has become the main focus for the site. The flare is operated periodically when the generators are offline for maintenance activities.

11.5.4 Landfill Gas Fired Generator

The Woodlawn Bioreactor is designed to encourage the decomposition of waste, which in turn promotes the development of landfill gas production. When suitable volumes of gas are achieved, power generation becomes feasible and thus landfill gases will be converted to electricity utilising the landfill gas fired engine. Landfill gas will be delivered by a positive displacement blower, which will then filter the gas prior to being used as a fuel in the generator.

During the last reporting period (2007/08), the first landfill gas generator was commissioned to generate electricity to export to the grid. This commissioning process occurred in February 2008, with full operational capacity beginning in June 2008. Veolia officially launched the Woodlawn Bioreactor Energy project on the 14th of April 2008. The second landfill gas generator was commissioned in November 2008.

The monitoring results for both Generator indicate that the oxidization process of the methane during the combustion process is performing as per the specifications of the engines. On a regular basis the generators are tuned to ensure that the combustion efficiencies are within the EPL limits.

12.0 ASSESSMENT OF THE INTERMODAL FACILITY MONITORING RESULTS

The Intermodal Facility (IMF) is assessed with regard to the pollutant source, pollution migration and adequacy of associated monitoring activities. The location of the IMF is presented on Figure 3B. The monitoring data is limited to three surface water monitoring locations (Sites 110, 130 and 150) on Crisps Creek. The monitoring data and graphs are presented in Appendix F, Table 4 (statistics) and in the sub-sections below.

12.1 Review of Current Surface Water Monitoring Data

Monitoring wells are not available at the IMF. The surface water monitoring locations are as follows:

- Site 130 was commissioned in 2002 to assess water quality upstream from the IMF in the Mulwaree River, before the confluence at Crisps Creek. The site was sampled twice during 2008/09 for a wide range of parameters.
- Site 150 is located on the Mulwaree River, approximately 2 km downstream of the Intermodal Facility. Quarterly monitoring has been undertaken from 1998 to 2008 for a broad range of analyses. In the 2008/09 reporting period the site was sampled twice.
- Site 110 is located on Crisps Creek, downstream of the IMF, at the bridge crossing on Bungendore Road. Quarterly monitoring has been undertaken from 1993 to 2008 for a broad range of analyses. In the 2008/09 reporting period the site was sampled twice.
- IMF First Flush is situated at the Crisp Creek Intermodal Facility, designed to intercept rainfall runoff from the hardstand prior to discharge to the Mulwaree River.

12.1.1 Water Quality and Trends (Surface Water)

The statistics and time-series graphs for the IMF monitoring data are presented in Table 4 and Appendix F. The water chemistry for the surface water locations is summarised below[8]:

- Site 150: Na-Cl water type, fresh (1.2 mS/cm) and pH 7.34. The water monitoring data indicate EC, sulphate, iron, ammonia, zinc and TOC are fluctuating. The highest ammonia concentration (0.84 mg/L) was recorded in January 2007.
- Site 110: Na-Cl water type, fresh (1.1 mS/cm) and pH 7.12. Key parameters are variable and the highest ammonia concentration (0.82 mg/L) was recorded in January 2007.
- Site 130: Na-Cl water type, fresh (0.5 mS/cm) and pH 7.37. The monitoring data indicates slightly overall decreasing yet variable trends for zinc, ammonia, iron and TOC.

The surface water monitoring indicate potential nutrient pollution from the IMF. The highest ammonia concentration (but still below 0.9 mg/L) recorded from Sites 110 and 150 (both downstream of the IMF) was not matched with an elevated reading at the upstream sampling location (Site 130).

Other sources of nutrients however, may arise from the agricultural catchment (farming activities) and evaporation processes. The monitoring data should be observed closely in the near future to assess the nutrient sources in the catchment (e.g. fertiliser application). The first flush monitoring results from the IMF indicate that nutrient levels (ammonia, TOC) are low with relatively stable trends.

12.1.2 Adequacy of the Monitoring (IMF)

The monitoring at the IMF is generally adequate due to the nature of the sampling locations (i.e. up and down-gradient of the IMF). However, the downstream location (Site 150) could be situated closer to the IMF site (e.g. 200 m downstream) to minimise nutrient contribution by the surrounding agricultural areas.

Monitoring at the IMF should be undertaken during dry and wet periods to assess potential impacts to the aquatic environment. Potential leakage from the waste containers would be picked up in the first flush system, however is so far not evident in water quality testing (Appendix F).

[8] pH and EC measurements are averages from 2005 to present.

12.1.3 Analytical Testing and Monitoring Issues (IMF)

Analytical and field testing suites are provided for the IMF from the 1990s to 2007 for Sites 110 and 150, while monitoring at Site 130 commenced in 2004. The monitoring program currently includes major ions, metals, nutrients, pH and EC, which are appropriate parameters for the IMF.

E2W offer the following suggestions for improving the monitoring and laboratory results for the site:

- Provide QA/QC for pH and EC field measurements (calibration records, instrument models etc.).
- Record flow, climate and water conditions (algae, turbidity etc.) at each location and compare with the first flush water quality.
- Include total metal concentrations for surface water analyses (dissolved metals are for groundwater).

EPL Non-Compliances in the 2008/09 Reporting Period

The 2008/09 non-compliances are summarised in Appendix K. The EPL No. 11455 indicates Sites 110, 130 and 150 should be sampled at 'Special Frequency 1', which is 'a monitoring frequency of six times per year, evenly spaced throughout the year depending on the occurrence of rainfall events of sufficient magnitude to generate flow'. In the 2008/2009 reporting period, the sites were sampled twice (September and November 2008) only. Between December 2008 and September 2009 the three surface water sites (110, 130 and 150) contained insufficient water for monitoring, i.e. no rainfall was recorded to enable suitable flows.

Four analytes stipulated for monitoring in the EPL were not tested for in the two rounds (oil and grease, phosphorous, total suspended solids and total Kjeldahl nitrogen); these were last analysed in March 2007.

12.2 Noise and Dust

Dust monitoring was formerly performed at one location (DG18). It was situated at the nearest residential building to the Intermodal Facility. Due to the low dust depositions recorded and as construction of the IMF has been completed, the DECC determined DG18 is no longer a licence requirement. As of February 2007, the gauge was removed from the monitoring schedule (Appendix G).

Noise measurements were not undertaken during the operation stage given that there were no registered noise complaints from neighbours. However, should any construction occur at the facility, noise monitoring would be conducted as per the LEMP and conditions of consent.

As Veolia has not received any complaints associated with noise, no monitoring has occurred, showing that IMF operations are having minimal impact on the surrounding community.

12.3 Recommendations (IMF)

The recommendations for the IMF are as follows:

- Samples should be collected according to climate (dry/wet) as much as possible with details recorded regarding the nature of flows and any observations (algae, odour, turbidity, debris content).
- It is recommended that the monitoring location Site 150 is moved closer to the IMF (i.e. 200 m downstream of the IMF) to minimise nutrient contribution by the surrounding agricultural areas.

13.0 COMPLAINTS

Six complaints were received regarding the Woodlawn Bioreactor during the 2008/09 reporting period, however no complaints were reported for the Crisp's Creek Intermodal Facility. These complaints concerned odour being detected locally. Meteorological data was used to establish prevailing wind conditions and assess the Bioreactor's potential to have impinged upon the local ambient air quality.

Table 13.1: Complaints Register 2008/09

Date	Time	Complaint	Location	Veolia response
17/12/08	9.15am	Odour	Tarago	Complainant was called by Veolia
17/12/09	9.00am	Odour	Tarago	Complainant is working with Veolia to notify any incidents of odour
23/12/09	9.00am	Odour	Tarago	Complainant was called by Veolia
28/1/09	10.00am	Odour	Taylors Creek Rd	Complainant is working with Veolia to notify any incidents of odour
20/2/09	9.00am	Odour	Taylors Creek Rd	Complainant is working with Veolia to notify any incidents of odour
5/6/09	4.15pm	Odour	Tarago	Complainant is working with Veolia to notify any incidents of odour

In light of the previous odour incidents recorded in previous reporting periods, Veolia is still working with local residents in identifying when an odour is detected and types of odour. Veolia is encouraging locals to visit or call the Bioreactor directly, or voice their concerns to the Community Liaison Committee, which regularly meet to discuss various operations. Each complaint was investigated and details were formally recorded on the complaints register and Hippo Station, and followed up in accordance with the pollution complaints procedure, both of which are part of VES' National Integrated Management System.

With the development of the leachate treatment system Veolia will continue with open communications with the local community. Improved communications with local residents will occur by placing articles in the local paper, keeping them informed of site activities.

14.0 POLLUTION STUDIES AND REDUCTION PROGRAMS

With reference to the conditions outlined in the *Pollution Studies and Reduction Programs for the Woodlawn Bioreactor*, EPL 11436, the following provides an update for the reporting period:

- U1 - Barrier System for the Adits/Portals
  - U1.1 - VES submitted design and construction program to the DECCW

- U1.2 - VES completed the sealing of the northern portal within the mine void.. CQA report submitted June 2009 upon completion of sealing works.

- U2 - Groundwater Monitoring
  - U2.1 - Submission due on the 1st of December 2008 or once filling reaches the upper height of these bores

- U3 - Trial of Alternative Daily Cover
  - U3.1 - In Progress - trial for 12 months
  - U3.2 - Trial concluded on the 31st December 2008
  - U3.3 - VES trialing various products
  - U3.4 - Submission to be provided by the 31st January 2009. VES to confirm status of this project.

- U4 - Acid Mine Drainage (AMD) and Leachate Mixture Management Works
  - U4.1 - Completed November 2007
  - U4.2 - Completed November 2007
  - U4.3 - Completed February 2008
  - U4.4 - Completed January 2008
  - U4.5 - Submission in January 2008, treatment and storage trial continuing

VES received confirmation from DECCW that the submissions have been received. VES is awaiting further response and decision on the Leachate/AMD management system. VES intends to submit a Leachate Management Plan in 2010.

15.0 LIMITATIONS

Earth2Water Pty Ltd has prepared this report with assistance and for Veolia in accordance to the standard terms and conditions of the consulting profession. This report is prepared with regard to Veolia's agreed scope of work. The methodology adopted and sources of information used by E2W are outlined in this report.

E2W has made no independent verification of the monitoring or technical information provided by the laboratory or client. E2W assumes no responsibility for any inaccuracies or omissions in the data.

This report was prepared by E2W from October 2009 to March 2010 and is based on the information reviewed at the time of preparation. This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties.

The precision with which site conditions are indicated depends largely on the frequency and method of sampling, and the uniformity of conditions as constrained by the project budget limitations. The behaviour of surface water and groundwater and some aspects of the contaminants in the environment are complex. Our professional interpretation and conclusions of the data and technical information are based upon experience and review of available reports.

Where conditions encountered at the site are subsequently found to differ significantly from those anticipated in this report, E2W should be notified of any such findings and be provided with an opportunity to review our assessment.

16.0 REFERENCES

Woodward-Clyde (1999), *Woodlawn Waste Management Facility Environmental Impact Statement*, February 1999.

URS (2001), *Woodlawn Mine, Evaporation Dam No. 3 Surveillance Report*, November 2001.

Collex (2003), *Woodlawn Bioreactor Alliance Report 08/04/2003,* April 2003.

Collex (2004), *Local Environmental Management Plan,* August 2004.

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E2W (2007), *Woodlawn Evaporation Dam 3 and Monitoring Issues*, June 2007.

WMAA (2007), *Inside Waste*, page 23, September/October 2007.

E2W, VES (2008), *Annual Environmental Management Report SML20, 2007/08,* October 2008.

TABLES

Table 1A: Summary Statistics for Groundwater Monitoring Points on EPL 11436

		MB1		MB2		MB3		MB4		MB5		MB6	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	Min	5.07	6.22	5.76	5.94	5.39	5.95	3.68	4.90	2.74	2.72	4.74	4.77
	Max	7.38	8.19	7.23	7.58	7.15	7.78	6.77	7.83	4.92	5.98	6.08	7.53
	Ave	6.77	7.20	6.61	6.81	6.58	6.96	5.43	6.12	4.19	3.99	5.58	6.14
	StdDev	0.51	0.44	0.23	0.45	0.30	0.51	0.47	0.82	0.34	0.88	0.22	0.72
EC (uS/cm)	Min	1010.00	280.00	5060.00	5050.00	1520.00	1679.00	1220.00	404.00	5240.00	6150.00	1210.00	593.00
	Max	2490.00	1558.00	7190.00	6810.00	2520.00	2441.00	1790.00	1581.00	8960.00	12300.00	2980.00	7270.00
	Ave	1462.65	941.50	6277.81	6194.95	2253.53	2172.05	1527.03	1169.20	7759.06	8104.39	2053.76	3871.20
	StdDev	362.00	302.77	547.89	547.04	201.36	202.74	171.51	368.14	951.89	1325.42	490.87	1371.89
SWL (mtoc)	Min	0.00	27.33	0.00	2.16	0.00	1.65	0.00	11.47	0.00	4.50	0.00	7.75
	Max	30.60	30.01	3.49	4.28	1.84	5.95	11.57	20.80	5.55	6.38	13.24	12.03
	Ave	25.63	28.36	2.08	3.46	0.87	2.55	9.61	12.27	3.43	5.81	10.73	9.63
	StdDev	9.40	0.85	0.65	0.52	0.52	0.94	2.85	1.98	1.41	0.62	3.39	1.14
Sulphate (mg/L)	Min	152.00	136.00	661.00	33.00	29.20	34.00	178.00	150.00	4970.00	5220.00	215.00	300.00
	Max	1130.00	498.00	5062.00	4520.00	50.00	4100.00	515.00	309.00	7660.00	6000.00	490.00	967.00
	Ave	302.00	220.19	4046.38	3213.25	37.67	1052.50	213.11	201.17	5847.30	5706.67	327.43	544.63
	StdDev	197.41	120.59	790.44	2127.72	5.44	2031.67	52.60	31.16	610.79	424.42	75.96	182.23
Ammonia (mg/L)	Min	0.21	0.01		0.01		0.08	0.01	0.01		0.21	0.02	0.01
	Max	1.75	1.20		0.01		0.08	0.76	0.80		0.21	0.23	0.65
	Ave	0.98	0.16		0.01		0.08	0.13	0.10		0.21	0.09	0.14
	StdDev	1.09	0.34		#DIV/0!		#DIV/0!	0.28	0.21		#DIV/0!	0.08	0.19
Iron (mg/L)	Min	0.01	0.10	0.01	0.02	0.01	0.03	0.01	0.05	189.00	120.00	0.01	0.04
	Max	1.79	4.90	4.00	1.40	0.08	0.42	0.60	2.70	382.00	310.00	1.10	1.70
	Ave	0.16	1.35	0.34	0.53	0.03	0.27	0.13	0.73	336.73	215.00	0.18	0.52
	StdDev	0.34	1.21	0.96	0.76	0.02	0.18	0.16	0.89	41.44	134.35	0.25	0.50
Zinc (mg/L)	Min	0.01	0.13	0.12	0.02	0.01	0.01	0.46	0.62	121.00	150.00	0.10	0.20
	Max	1.04	0.92	1.00	0.10	0.60	0.11	2.30	1.10	582.00	240.00	11.10	9.20
	Ave	0.29	0.31	0.51	0.05	0.17	0.05	0.82	0.87	282.83	196.67	5.08	6.32
	StdDev	0.26	0.21	0.21	0.04	0.14	0.04	0.29	0.13	79.57	45.09	1.60	2.20

		MB7		MB8		MB10		MB11		MB12		MB13		MB14	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	Min	6.09	6.24	6.18	5.86	5.60	6.22	4.78	3.40	3.70	3.78	6.36	5.99	6.03	3.72
	Max	7.50	7.55	7.00	7.79	7.44	7.74	6.50	5.60	5.67	4.93	7.47	7.44	7.44	7.77
	Ave	6.70	6.83	6.75	7.02	6.68	7.01	5.94	4.96	4.71	4.18	7.00	6.87	6.97	6.67
	StdDev	0.28	0.33	0.22	0.42	0.30	0.38	0.42	0.60	0.40	0.30	0.22	0.44	0.27	0.90
EC (uS/cm)	Min	6340.00	1590.00	3390.00	2990.00	5360.00	5330.00	5990.00	16190.00	9860.00	18300.00	2440.00	1610.00	2500.00	3560.00
	Max	11600.00	9610.00	5180.00	4680.00	7420.00	7310.00	14900.00	33800.00	20500.00	36100.00	3690.00	3210.00	6520.00	5640.00
	Ave	8974.69	7677.50	4489.12	3990.63	6677.50	6651.29	9887.11	24714.06	14111.71	28328.39	3188.06	2815.78	4971.00	4582.39
	StdDev	1152.54	1752.19	424.78	492.02	525.34	538.07	2914.29	5867.31	3151.67	5131.54	298.85	414.71	980.34	684.67
SWL (mtoc)	Min	0.00	3.68	0.00	3.05	0.00	3.41	0.00	1.10	0.00	2.05	0.00	2.41	0.00	8.57
	Max	6.67	10.70	5.45	5.50	3.36	5.18	2.27	3.40	3.46	3.70	3.95	3.95	9.71	10.51
	Ave	2.89	4.86	3.45	4.14	1.39	4.01	1.15	2.11	1.33	2.70	2.55	2.97	7.49	9.76
	StdDev	1.29	1.65	1.49	0.73	0.85	0.44	0.66	0.48	0.82	0.44	0.82	0.44	1.79	0.50
Sulphate (mg/L)	Min	136.00	172.00	45.00	130.00	3710.00	3800.00	1000.00	45000.00	9950.00	0.40	55.70	56.00	1440.00	2100.00
	Max	294.00	210.00	166.00	130.00	5210.00	4000.00	11600.00	45000.00	21000.00	49000.00	5600.00	71.00	5610.00	3200.00
	Ave	180.61	190.67	114.13	130.00	4525.17	3900.00	6484.04	45000.00	13976.58	30566.80	327.17	62.67	3025.43	2775.00
	StdDev	33.85	19.01	24.02	0.00	414.10	115.47	2362.85	#DIV/0!	3207.72	26558.04	1177.90	7.64	908.33	478.71
Ammonia (mg/L)	Min		0.06		0.03		0.03		0.21		0.27		0.02		0.01
	Max		0.06		0.03		0.03		0.21		0.27		0.02		0.01
	Ave		0.06		0.03		0.03		0.21		0.27		0.02		0.01
	StdDev		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!		#DIV/0!
Iron (mg/L)	Min	0.01	2.70	0.01	0.20	0.01	0.05	0.01	0.29	0.01	0.16	0.01	0.02	0.01	0.14
	Max	1.46	5.30	0.21	0.30	0.60	0.71	6.81	0.29	3.62	2.30	121.00	0.48	127.00	1.60
	Ave	0.18	4.00	0.05	0.26	0.06	0.39	0.32	0.29	0.29	1.45	5.83	0.20	6.40	0.87
	StdDev	0.35	1.84	0.06	0.06	0.11	0.33	1.31	0.00	0.66	1.14	26.39	0.25	28.39	1.03
Zinc (mg/L)	Min	0.24	0.35	0.01	0.01	0.23	0.01	9.30	210.00	650.00	220.00	0.01	0.05	0.14	0.01
	Max	9.00	2.70	1.00	0.09	1.33	0.64	618.00	4140.00	2450.00	6360.00	152.00	1.30	207.00	0.13
	Ave	1.20	1.78	0.19	0.04	0.56	0.19	168.15	2175.00	1360.42	3012.50	7.48	0.63	11.99	0.05
	StdDev	2.08	1.26	0.19	0.04	0.23	0.30	195.56	2778.93	547.84	3235.69	32.28	0.63	44.97	0.06

Notes:
^ Statistics during mining (1978 to 2004)
^^ Statistics post mining (from 2005 to present)
* = no samples collected - well dry
NA = not available
-- = established post mining operations

The '<' was removed from <LOR values and negative values were adjusted to positive values

All measurements are from laboratory analyses, with the exception of SWL from all wells, and pH and EC from MB2, MB3, MB5, MB7 landfill, MB8 landfill, MB10 landfill, MB11 landfill, MB12 landfill, MB13 landfill, MB14 mine (EC only), MB14 landfill, MB15 landfill, MB16 landfill, MB17, which are field measurements

Prepared by: AH
Checked by:

Table 1A: Summary Statis

		MB15		MB16		MB17		ED3B		WM1	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	Min	6.26	5.44	3.15	2.47	5.30	5.84	6.17	6.18	6.84	6.37
	Max	6.90	7.37	3.86	6.11	6.81	7.32	7.73	7.38	8.00	7.98
	Ave	6.68	6.56	3.41	3.82	6.16	6.43	6.85	6.77	7.27	7.15
	StdDev	0.17	0.49	0.13	0.77	0.29	0.47	0.27	0.32	0.42	0.39
EC (uS/cm)	Min	4500.00	4183.00	13220.00	17690.00	7080.00	8280.00	685.00	4230.00	1815.00	1500.00
	Max	9650.00	7910.00	29200.00	31000.00	12500.00	11930.00	8870.00	9000.00	2464.00	2470.00
	Ave	7162.07	6438.00	23318.97	25784.68	10923.79	10663.72	7673.19	7360.11	2080.17	1949.24
	StdDev	1103.63	964.27	4453.87	3416.39	1241.07	1018.28	1084.69	1059.86	299.71	242.40
SWL (mtoc)	Min	0.00	0.00	0.00	2.46	0.00	3.80	0.00	2.41	48.79	47.97
	Max	0.48	2.25	2.85	2.61	4.46	5.39	3.64	3.96	49.30	49.45
	Ave	0.03	0.57	2.47	2.54	3.74	4.25	2.16	2.89	49.08	48.61
	StdDev	0.11	1.00	0.47	0.05	0.74	0.41	1.01	0.41	0.21	0.55
Sulphate (mg/L)	Min	3720.00	4000.00	29700.00	0.40	3670.00	8000.00	36.00	471.00	592.00	580.00
	Max	9692.00	4700.00	42800.00	48000.00	10800.00	8600.00	992.00	930.00	933.00	1030.00
	Ave	5290.14	4306.67	37013.76	31333.47	8597.52	8200.00	670.68	740.00	691.40	696.00
	StdDev	1722.30	357.96	3724.39	27153.65	1673.03	346.41	116.23	110.23	137.14	110.50
Ammonia (mg/L)	Min							0.02	0.01	0.01	0.02
	Max							0.25	0.19	0.14	0.76
	Ave							0.12	0.05	0.06	0.44
	StdDev							0.09	0.04	0.06	0.21
Iron (mg/L)	Min	0.01	4.20	22.80	38.00	0.04	0.39	0.01	0.05	0.09	0.05
	Max	1.05	9.80	129.00	52.00	1.80	0.44	4.40	9.10	0.90	6.54
	Ave	0.22	7.00	81.31	44.67	0.33	0.42	0.35	1.61	0.35	1.26
	StdDev	0.27	3.96	24.72	7.02	0.40	0.04	0.74	2.25	0.35	2.03
Zinc (mg/L)	Min	0.30	0.15	2820.00	180.00	14.00	2.80	0.01	0.02	0.01	0.01
	Max	2.60	0.80	6670.00	260.00	210.00	9.20	1.50	0.71	1.33	2.10
	Ave	1.48	0.39	5498.60	220.00	59.01	5.14	0.38	0.07	0.31	0.28
	StdDev	0.65	0.36	922.69	40.00	55.43	3.53	0.28	0.16	0.57	0.53

		WM3		WM4		WM5		WM6		WM7	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	Min	3.40	2.62	6.04	5.80	5.99	6.57	6.05	5.40	3.60	5.95
	Max	3.72	5.38	7.20	7.75	7.35	7.67	6.40	6.87	4.34	7.35
	Ave	3.53	3.99	6.70	6.85	6.64	7.04	6.26	6.15	4.01	6.74
	StdDev	0.11	0.74	0.45	0.65	0.45	0.31	0.14	0.37	0.31	0.45
EC (uS/cm)	Min	9360.00	16.82	1640.00	1038.00	4670.00	3680.00	8280.00	3560.00	2922.00	1197.00
	Max	21000.00	11380.00	5520.00	1940.00	8920.00	9530.00	13700.00	14090.00	7250.00	12220.00
	Ave	15568.33	6883.75	2518.50	1638.88	6610.00	5787.83	10935.00	11058.35	4823.25	4277.80
	StdDev	3721.05	3339.05	1491.73	234.62	1659.95	1585.90	1750.30	2559.53	1905.41	2327.50
SWL (mtoc)	Min	27.41	13.86	97.90	101.87	1.48	2.10	3.62	2.00	4.73	4.57
	Max	30.10	29.75	102.40	102.95	3.07	3.91	4.40	5.47	5.17	8.42
	Ave	29.30	25.80	101.26	102.27	2.29	2.79	4.04	4.64	4.95	6.02
	StdDev	0.97	4.55	1.72	0.29	0.72	0.44	0.29	0.80	0.23	1.20
Sulphate (mg/L)	Min	1360.00	1430.00	801.00	144.00	120.00	40.00	420.00	52.00	1420.00	381.00
	Max	21300.00	17100.00	1590.00	1000.00	178.00	340.00	478.00	3300.00	8550.00	5820.00
	Ave	14965.00	6403.33	1015.40	755.94	147.40	179.11	449.00	548.50	4353.33	2600.44
	StdDev	9167.96	3952.23	334.50	175.43	25.30	77.82	21.26	702.68	3729.11	1192.80
Ammonia (mg/L)	Min	0.49	0.16	0.01	0.00	0.04	0.04	0.50	0.01	0.14	0.01
	Max	1.84	5.20	0.30	0.21	0.35	0.35	0.68	0.66	0.60	0.46
	Ave	1.15	1.46	0.17	0.08	0.21	0.13	0.60	0.20	0.41	0.10
	StdDev	0.58	1.44	0.12	0.07	0.13	0.08	0.08	0.18	0.24	0.11
Iron (mg/L)	Min	102.00	12.00	1.30	0.05	2.00	0.22	0.07	0.07	150.00	0.05
	Max	767.00	680.00	3.20	30.00	6.05	30.00	0.12	23.50	290.00	14.00
	Ave	475.40	211.19	2.53	5.90	3.87	8.88	0.10	4.02	215.33	3.23
	StdDev	335.12	251.06	0.76	9.21	1.76	8.81	0.02	6.46	70.47	4.47
Zinc (mg/L)	Min	2110.00	70.00	0.03	0.07	0.04	0.01	0.07	0.15	166.00	0.11
	Max	3310.00	2300.00	2.28	2.80	0.33	0.33	4.58	0.95	1060.00	14.40
	Ave	2622.00	814.38	1.37	1.08	0.13	0.13	1.13	0.31	509.67	2.39
	StdDev	437.57	815.08	0.91	0.92	0.12	0.10	1.94	0.25	481.50	3.75

		P38A		P38B		P44A		P44B		P4
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^
pH	Min									
	Max									
	Ave									
	StdDev									
EC (uS/cm)	Min									
	Max									
	Ave									
	StdDev									
SWL (mtoc)	Min	—	38.96	—	40.19	—	14.54	—	21.57	—
	Max	—	39.64	—	55.33	—	26.32	—	30.07	—
	Ave	—	39.21	—	44.68	—	19.15	—	23.49	—
	StdDev	—	0.16	—	3.00	—	3.73	—	2.00	—
Sulphate (mg/L)	Min									
	Max									
	Ave									
	StdDev									
Ammonia (mg/L)	Min									
	Max									
	Ave									
	StdDev									
Iron (mg/L)	Min									
	Max									
	Ave									
	StdDev									
Zinc (mg/L)	Min									
	Max									
	Ave									
	StdDev									

Notes:
^ Statistics during mining (1976 to 2004)
^^ Statistics post mining (from 2005 to pr
* = no samples collected - well dry
NA = not available
— = established post mining operations

Prepared by: AH
Checked by:

Table 1A: Summary Statis

		5A	P45B		P58A		P58B		P59A		P59B		P100A		P100B		MW8S		MW8D		MW9S		MW10S*	
		Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	Min																—	6.54	—	6.21	—	5.43	—	NA
	Max																—	6.69	—	6.78	—	6.61	—	NA
	Ave																—	6.60	—	6.49	—	6.37	—	NA
	StdDev																—	0.07	—	0.23	—	0.42	—	NA
EC (uS/cm)	Min																—	11810.00	—	8700.00	—	710.00	—	NA
	Max																—	12900.00	—	11820.00	—	9570.00	—	NA
	Ave																—	12517.50	—	10944.29	—	7998.57	—	NA
	StdDev																—	515.28	—	1062.84	—	3223.04	—	NA
SWL (mtoc)	Min	13.24	—	15.11	—	41.57	—	62.90	—	14.89	—	18.07	—	20.61	—	75.92	—	5.27	—	4.91	—	3.73	—	NA
	Max	19.61	—	28.97	—	43.98	—	73.80	—	21.67	—	29.00	—	34.44	—	78.95	—	7.25	—	8.03	—	5.00	—	NA
	Ave	15.31	—	18.95	—	42.10	—	66.34	—	18.90	—	20.62	—	30.50	—	78.02	—	6.44	—	6.41	—	4.26	—	NA
	StdDev	1.67	—	3.34	—	0.43	—	2.45	—	1.44	—	2.75	—	2.47	—	0.62	—	0.75	—	1.15	—	0.46	—	NA
Sulphate (mg/L)	Min																—	3100.00	—	2800.00	—	1300.00	—	NA
	Max																—	4800.00	—	4400.00	—	2100.00	—	NA
	Ave																—	4220.00	—	4028.57	—	1771.43	—	NA
	StdDev																—	749.67	—	567.79	—	281.15	—	NA
Ammonia (mg/L)	Min																—	0.01	—	0.01	—	0.01	—	NA
	Max																—	0.07	—	0.08	—	0.12	—	NA
	Ave																—	0.03	—	0.04	—	0.03	—	NA
	StdDev																—	0.02	—	0.02	—	0.04	—	NA
Iron (mg/L)	Min																—	2.20	—	0.17	—	1.50	—	NA
	Max																—	31.00	—	47.00	—	17.00	—	NA
	Ave																—	9.44	—	10.91	—	5.81	—	NA
	StdDev																—	12.23	—	17.71	—	5.37	—	NA
Zinc (mg/L)	Min																—	4.50	—	22.00	—	0.07	—	NA
	Max																—	24.00	—	31.00	—	0.19	—	NA
	Ave																—	16.90	—	25.00	—	0.14	—	NA
	StdDev																—	7.72	—	2.94	—	0.04	—	NA

Notes:
^ Statistics during mining (1978 to 2004)
^^ Statistics post mining (from 2005 to pr
* = no samples collected - well dry
NA = not available
— = established post mining operations

Prepared by: AH
Checked by:

Table 1B: Woodlawn Groundwater MB Levels

MB1		MB2		MB3		MB4		MB5		MB6		MB7		MB8		MB10	
Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00	6/12/1996	0.00
17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00	17/06/1997	0.00
7/08/1997	30.38	7/08/1997	1.65	7/08/1997	0.54	7/08/1997	10.14	7/08/1997	2.74	7/08/1997	11.98	7/08/1997	2.51	7/08/1997	3.46	7/08/1997	0.70
11/11/1997	26.60	11/11/1997	1.57	11/11/1997	0.39	11/11/1997	10.12	11/11/1997	2.53	11/11/1997	11.84	11/11/1997	2.14	11/11/1997	3.22	11/11/1997	0.60
																3/12/1997	0.78
																5/02/1998	1.00
																5/03/1998	1.16
26/03/1998	26.74	26/03/1998	2.07	26/03/1998	0.64	26/03/1998	10.29	26/03/1998	2.84	26/03/1998	12.54	26/03/1998	3.08	26/03/1998	5.34	26/03/1998	1.25
																11/05/1998	1.20
9/06/1998	25.95	9/06/1998	2.07	9/06/1998	0.68	9/06/1998	10.52	9/06/1998	3.02	9/06/1998	12.48	9/06/1998	3.39	9/06/1998	4.77	9/06/1998	1.31
																11/07/1998	1.22
																10/08/1998	0.00
7/09/1998	26.78	7/09/1998	1.38	7/09/1998	0.33	7/09/1998	10.43	7/09/1998	2.74	7/09/1998	10.35	7/09/1998	1.82	7/09/1998	2.00	7/09/1998	0.80
																5/10/1998	0.00
																6/11/1998	0.81
1/12/1998	27.90	1/12/1998	1.61	1/12/1998	0.15	1/12/1998	10.05	1/12/1998	2.67	1/12/1998	10.42	1/12/1998	2.07	1/12/1998	3.01	1/12/1998	0.85
																3/02/1999	1.03
1/03/1999	28.20	1/03/1999	1.81	1/03/1999	0.27	1/03/1999	10.01	1/03/1999	2.81	1/03/1999	11.51	1/03/1999	2.76	1/03/1999	4.54	1/03/1999	1.06
4/06/1999	28.10	4/06/1999	1.92	4/06/1999	0.41	4/06/1999	10.08	4/06/1999	3.08	4/06/1999	11.83	4/06/1999	2.94	4/06/1999	4.00	4/06/1999	1.24
10/09/1999	28.48	10/09/1999	1.82	10/09/1999	0.53	10/09/1999	10.21	10/09/1999	3.18	10/09/1999	12.24	10/09/1999	2.55	10/09/1999	3.15	10/09/1999	1.18
3/12/1999	29.04	3/12/1999	1.84	3/12/1999	0.57	3/12/1999	10.02	3/12/1999	3.12	3/12/1999	11.70	3/12/1999	2.39	3/12/1999	3.23	3/12/1999	1.15
6/03/2000	28.77	6/03/2000	2.07	6/03/2000	0.67	6/03/2000	9.91	6/03/2000	3.17	6/03/2000	11.89	6/03/2000	2.80	6/03/2000	4.37	6/03/2000	1.33
2/06/2000	29.05	2/06/2000	2.09	2/06/2000	0.76	2/06/2000	9.99	2/06/2000	3.31	2/06/2000	12.11	2/06/2000	2.93	2/06/2000	3.85	2/06/2000	1.38
4/09/2000	29.13	4/09/2000	2.05	4/09/2000	0.85	4/09/2000	10.15	4/09/2000	3.46	4/09/2000	12.60	4/09/2000	2.65	4/09/2000	3.14	4/09/2000	1.84
5/12/2000	29.60	5/12/2000	1.89	5/12/2000	0.86	5/12/2000	9.91	5/12/2000	3.12	5/12/2000	12.06	5/12/2000	2.18	5/12/2000	2.96	5/12/2000	1.20
2/03/2001	29.13	2/03/2001	2.09	2/03/2001	0.89	2/03/2001	9.74	2/03/2001	3.23	2/03/2001	12.04	2/03/2001	2.64	2/03/2001	3.70	2/03/2001	1.36
8/06/2001	29.73	8/06/2001	2.34	8/06/2001	0.95	8/06/2001	9.89	8/06/2001	3.51	8/06/2001	12.68	8/06/2001	3.14	8/06/2001	4.52	8/06/2001	1.62
21/08/2001	29.61					21/08/2001	10.19			21/08/2001	13.05						
10/09/2001	30.10	10/09/2001	2.23	10/09/2001	1.03	10/09/2001	10.31	10/09/2001	3.79	10/09/2001	13.24	10/09/2001	2.94	10/09/2001	2.97	10/09/2001	1.62

MB1		MB2		MB3		MB4		MB5		MB6		MB7		MB8		MB10	
Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
10/01/2002	29.31	10/01/2002	2.45	10/01/2002	1.13	10/01/2002	10.26	10/01/2002	3.86	10/01/2002	12.81	10/01/2002	3.08	10/01/2002	4.34	10/01/2002	1.77
6/03/2002	29.31	6/03/2002	2.45	6/03/2002	1.13	6/03/2002	10.26	6/03/2002	3.86	6/03/2002	12.81	6/03/2002	3.08	6/03/2002	4.34	6/03/2002	1.77
9/05/2002	30.60					9/05/2002	10.37			9/05/2002	11.58						
17/06/2002	29.90	17/06/2002	2.14	17/06/2002	1.13	17/06/2002	10.28	17/06/2002	3.82	17/06/2002	12.21	17/06/2002	3.00	17/06/2002	3.44	17/06/2002	1.51
21/08/2002						21/08/2002				21/08/2002							
19/09/2002	29.95	19/09/2002	2.42	19/09/2002	1.13	19/09/2002	10.61	19/09/2002	4.38	19/09/2002	10.97	19/09/2002	3.22	19/09/2002	3.46	19/09/2002	1.80
		4/12/2002	2.62	4/12/2002	1.25	4/12/2002	10.75	4/12/2002	4.49	4/12/2002	10.96	4/12/2002	3.48	4/12/2002	4.64	4/12/2002	2.05
						18/02/2003	10.93			18/02/2003	11.10						
		18/03/2003	2.75	18/03/2003	1.34	18/03/2003	11.00	18/03/2003	4.80	18/03/2003	11.10	18/03/2003	3.88	18/03/2003	4.25	18/03/2003	2.25
23/06/2003	28.22	23/06/2003	2.80	23/06/2003	1.35	23/06/2003	11.04	23/06/2003	4.80	23/06/2003	10.52	23/06/2003	3.90	23/06/2003	3.92	23/06/2003	2.30
12/08/2003	29.20					12/08/2003	11.06			12/08/2003	10.64						
		3/09/2003	2.68	3/09/2003	1.40			3/09/2003	4.84			3/09/2003	3.67	3/09/2003	3.62	3/09/2003	2.36
3/11/2003	28.54					3/11/2003	11.07			3/11/2003	10.55						
		26/11/2003	2.75	26/11/2003	1.46			26/11/2003	4.89			26/11/2003	3.56	26/11/2003	3.51	26/11/2003	2.40
18/02/2004	29.86					18/02/2004	10.93			18/02/2004							
		18/03/2004	3.04	18/03/2004	1.57			18/03/2004	4.83			18/03/2004	4.04	18/03/2004	5.03	18/03/2004	2.67
12/05/2004	29.48					12/05/2004	10.90			12/05/2004	10.19						
		22/06/2004	3.38	22/06/2004	1.69			22/06/2004	5.29			22/06/2004	6.67	22/06/2004	5.45	22/06/2004	3.19
18/08/2004	30.08					18/08/2004	11.37			18/08/2004	10.69						
		6/09/2004	3.49	6/09/2004	1.74			6/09/2004	5.55			6/09/2004	4.78	6/09/2004	5.16	6/09/2004	3.36
17/11/2004	29.67					17/11/2004	11.57			17/11/2004	10.54						
		8/12/2004	3.31	8/12/2004	1.84			8/12/2004	5.54			8/12/2004	4.20	8/12/2004	4.05	8/12/2004	3.16
3/03/2005	29.44					3/03/2005	11.47			3/03/2005	10.13						
		21/03/2005	3.40	21/03/2005	1.90			21/03/2005	5.66			21/03/2005	4.51	21/03/2005	4.28		
28/06/2005	28.92					28/06/2005	11.74			28/06/2005	10.17						
												1/07/2005	4.95				
		6/07/2005	3.36	6/07/2005	1.97			6/07/2005	5.74							6/07/2005	3.705
														8/07/2005	3.48		
12/08/2005	28.69									12/08/2005	9.85						
						15/08/2005	11.67										
		8/09/2005	2.16	8/09/2005	1.97							8/09/2005	4.01	8/09/2005	3.28	8/09/2005	3.41
								15/09/2005	5.70								
		14/11/2005	3.50	14/11/2005	1.97			14/11/2005	5.70			14/11/2005	3.68			14/11/2005	3.73
16/11/2005	29.95					16/11/2005	11.63			16/11/2005	11.50						
9/02/2006	29.04					9/02/2006	11.71			9/02/2006	11.86						
		13/03/2006	3.10	13/03/2006	1.79			13/03/2006	5.67			13/03/2006	4.30	13/03/2006	3.7	13/03/2006	3.71
31/05/2006	29.81					31/05/2006	11.52			31/05/2006	12.03						
		8/06/2006	2.68	8/06/2006	1.65			8/06/2006	5.57			8/06/2006	4.69	8/06/2006	3.81	8/06/2006	3.68
15/08/2006	30.01					15/08/2006	11.60			15/08/2006	10.94						
		4/09/2006	2.84	4/09/2006	1.80			4/09/2006	4.97			4/09/2006	4.57	4/09/2006	3.54	4/09/2006	3.73
														14/11/2006	3.16		
								30/11/2006	6.38			30/11/2006	7.14			30/11/2006	3.91
		13/12/2006	3.60	13/12/2006	2.35									13/12/2006	4.63		
21/12/2006	27.33					21/12/2006	11.80										
										9/01/2007	9.85						
16/02/2007	27.76					16/02/2007	11.86			16/02/2007	9.59						
10/04/2007	28.04	20/04/2007	3.87	20/04/2007	2.48	10/04/2007	11.88			10/04/2007	9.50						
								19/04/2007	6.17			19/04/2007	4.73				
														20/04/2007	4.37	20/04/2007	4.11
28/06/2007	27.93	28/06/2007	3.14	28/06/2007	2.39	28/06/2007	11.71	28/06/2007	5.14	28/06/2007	9.23	28/06/2007	4.49	28/06/2007	4.51	28/06/2007	3.98
16/08/2007	27.75	16/08/2007	3.44					16/08/2007	6.03			16/08/2007	3.70			16/08/2007	3.85
		22/08/2007	3.45	22/08/2007	2.42									22/08/2007	3.05		
31/08/2007	28.56					31/08/2007	12.06			31/08/2007	9.15						

	MB1		MB2		MB3		MB4		MB5		MB6		MB7		MB8		MB10	
	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
			30/10/2007	3.62	30/10/2007	5.95			30/10/2007	4.50			30/10/2007	3.97	30/10/2007	3.66	30/10/2007	3.86
	7/12/2007	28.31					7/12/2007	11.77			7/12/2007	9.14						
			11/12/2007	3.57	11/12/2007	2.53							11/12/2007	3.98	11/12/2007	3.57	11/12/2007	3.8
									12/12/2007	0.00								
									14/12/2007	6.14								
											15/02/2008	8.98						
	26/02/2008	28.38					26/02/2008	11.56										
			15/04/2008	3.88	15/04/2008	2.66			15/04/2008	6.10					15/04/2008	4.89	15/04/2008	4.1
													9/05/2008	4.52				
											27/05/2008	8.84						
	30/05/2008	28.23					30/05/2008	11.60										
					26/06/2008	2.69									26/06/2008	4.62		
	19/08/2008	27.90					19/08/2008	20.80			19/08/2008	8.93						
			30/09/2008	3.66	30/09/2008	2.80											30/09/2008	4.3
									18/11/2008	6.14			18/11/2008	4.06				
															19/11/2008	4.53		
	27/11/2008	27.51									27/11/2008	8.81						
							28/11/2008	11.94										
			6/01/2009	4.03	6/01/2009	2.90							6/01/2009	4.24			6/01/2009	4.31
									9/01/2009	6.26					9/01/2009	4.57		
	3/02/2009	27.67					3/02/2009	12.05			3/02/2009	8.64						
			21/05/2009	4.28	21/05/2009	3.09											21/05/2009	5.18
									28/05/2009	6.38			28/05/2009	10.70				
															29/05/2009	5.5		
			23/06/2009	4.21	23/06/2009	3.10									23/06/2009	5.45	23/06/2009	4.84
									25/06/2009	6.38			25/06/2009	5.17				
	30/06/2009	27.36					30/06/2009	12.34			30/06/2009	8.60						
	7/07/2009	27.47					7/07/2009	12.42			7/07/2009	8.68						
	1/09/2009	27.77									1/09/2009	7.75						
							2/09/2009	12.58										

	MB1	MB2	MB3	MB4	MB5	MB6	MB7	MB8	MB10
OVERALL									
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	30.60	4.28	5.95	20.80	6.38	13.24	10.70	5.50	5.18
Average	27.62	2.64	1.51	10.75	4.27	10.46	3.66	3.84	2.18
StdDev	5.568	0.9389	1.0612	2.5878	1.6407	2.4731	1.6379	1.0981	1.3973
Count	54	51	51	56	51	55	50	51	58
MINING (1978 - 2004)									
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	30.60	3.49	1.84	11.57	5.55	13.24	6.67	5.45	3.36
Average	27.11	2.15	0.90	9.84	3.54	10.98	2.98	3.67	1.42
StdDev	7.2014	0.7742	0.5063	2.4999	1.2928	2.9164	1.2023	1.2444	0.8287
Count	32	32	32	35	32	34	32	32	41
LANDFILL (2005+)									
Minimum	27.33	2.16	1.65	11.47	0.00	7.75	3.68	3.05	3.41
Maximum	30.01	4.28	5.95	20.80	6.38	12.03	10.70	5.50	5.18
Average	28.36	3.46	2.55	12.27	5.51	9.63	4.86	4.14	4.01
StdDev	0.8478	0.5241	0.9383	1.977	1.4272	1.1384	1.6503	0.7336	0.4445
Count	22	19	19	21	19	21	18	19	17

Table 1B: Wo

MB11		MB12		MB13		MB14		MB15		MB16		MB17		MB19		MB20		MB21		MB22	
Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
7/08/1997	0.26	7/08/1997	0.63	7/08/1997	2.25	7/08/1997	6.00	7/08/1997	0.00	7/08/1997	2.85	7/08/1997	4.07								
11/11/1997	0.37	11/11/1997	0.55	11/11/1997	2.32	11/11/1997	5.76	11/11/1997	0.00	11/11/1997	2.72	11/11/1997	3.85								
		27/11/1997	0.00	27/11/1997	0.00									27/11/1997	0.00						
3/12/1997	0.57	3/12/1997	0.76																		
5/02/1998	0.73	5/02/1998	0.94											5/02/1998	0.49	5/02/1998	1.19				
5/03/1998	0.85	5/03/1998	1.06											5/03/1998	0.61	5/03/1998	1.32				
26/03/1998	1.00	26/03/1998	1.15	26/03/1998	3.08	26/03/1998	6.63	26/03/1998	0.00	26/03/1998	2.73	26/03/1998	4.04	26/03/1998	0.74	26/03/1998	1.34				
		11/05/1998	1.00											11/05/1998	0.49	11/05/1998	1.17				
9/06/1998	0.73	9/06/1998	1.04	9/06/1998	2.75	9/06/1998	6.82	9/06/1998	0.00	9/06/1998	2.69	9/06/1998	4.02	9/06/1998	0.44	9/06/1998	0.95				
11/07/1998	0.65	11/07/1998	0.92											11/07/1998	0.25	11/07/1998	0.97				
10/08/1998	0.03	10/08/1998	0.09											10/08/1998	0.00	10/08/1998	0.00				
7/09/1998	0.00	7/09/1998	0.00	7/09/1998	1.72	7/09/1998	5.48	7/09/1998	0.00	7/09/1998	2.46	7/09/1998	3.48	7/09/1998	0.00	7/09/1998	0.00				
5/10/1998	0.22	5/10/1998	0.20											5/10/1998	0.00	5/10/1998	0.00				
6/11/1998	0.47	6/11/1998	0.52											6/11/1998	0.00	6/11/1998	0.29				
1/12/1998	0.60	1/12/1998	0.72	1/12/1998	2.19	1/12/1998	6.32	1/12/1998	0.00	1/12/1998	2.41	1/12/1998	3.39	1/12/1998	0.00	1/12/1998	0.47				
3/02/1999	0.87	3/02/1999	1.03											3/02/1999	0.41	3/02/1999	1.14				
1/03/1999	0.97	1/03/1999	1.12	1/03/1999	2.57	1/03/1999	6.76	1/03/1999	0.00	1/03/1999	2.53	1/03/1999	3.78								
4/06/1999	0.92	4/06/1999	1.17	4/06/1999	2.39	4/06/1999	7.01	4/06/1999	0.00	4/06/1999	2.53	4/06/1999	3.85								
														14/07/1999	0.31	14/07/1999	1.06				
10/09/1999	0.88	10/09/1999	1.10	10/09/1999	2.24	10/09/1999	7.04	10/09/1999	0.00	10/09/1999	2.51	10/09/1999	3.61								
														5/10/1999	0.30	5/10/1999	1.01				
3/12/1999	1.10	3/12/1999	1.25	3/12/1999	2.38	3/12/1999	7.06	3/12/1999	0.00	3/12/1999	2.50	3/12/1999	3.77								
														3/01/2000	0.43	3/01/2000	1.19				
6/03/2000	1.37	6/03/2000	1.52	6/03/2000	2.73	6/03/2000	7.30	6/03/2000	0.00	6/03/2000	2.55	6/03/2000	3.83								
														2/04/2000	0.90	2/04/2000	1.41				
2/06/2000	1.23	2/06/2000	1.48	2/06/2000	2.45	2/06/2000	7.44	2/06/2000	0.00	2/06/2000	2.54	2/06/2000	3.84								
														3/07/2000	0.80	3/07/2000	1.55				
4/09/2000	1.04	4/09/2000	1.33	4/09/2000	2.29	4/09/2000	7.48	4/09/2000	0.00	4/09/2000	2.53	4/09/2000	3.66								
														3/10/2000	0.66	3/10/2000	1.42				
5/12/2000	1.13	5/12/2000	1.34	5/12/2000	2.20	5/12/2000	7.42	5/12/2000	0.00	5/12/2000	2.49	5/12/2000	3.57								
														11/01/2001	1.18	11/01/2001	1.70				
2/03/2001	1.48	2/03/2001	1.66	2/03/2001	2.65	2/03/2001	7.62	2/03/2001	0.00	2/03/2001	2.40	2/03/2001	3.46								
8/06/2001	1.59	8/06/2001	1.78	8/06/2001	2.84	8/06/2001	7.85	8/06/2001	0.00	8/06/2001	2.49	8/06/2001	3.67	5/04/2001	1.43	5/04/2001	1.94				
														2/07/2001	1.43	2/07/2001	1.95				
10/09/2001	1.26	10/09/2001	1.55	10/09/2001	2.38	10/09/2001	7.86	10/09/2001	0.00	10/09/2001	2.47	10/09/2001	3.60								
														12/10/2001	0.75	12/10/2001	1.27				

MB11		MB12		MB13		MB14		MB15		MB16		MB17		MB19		MB20		MB21		MB22	
Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
10/01/2002	1.80	10/01/2002	1.91	10/01/2002	2.92	10/01/2002	8.04	10/01/2002	0.00	10/01/2002	2.47	10/01/2002	3.90	10/01/2002	1.58	10/01/2002	2.32				
6/03/2002	1.80	6/03/2002	1.91	6/03/2002	2.92	6/03/2002	8.04	6/03/2002	0.00	6/03/2002	2.47	6/03/2002	3.90								
														12/04/2002	1.15	12/04/2002	1.66				
17/06/2002	1.26	17/06/2002	1.49	17/06/2002	2.54	17/06/2002	7.91	17/06/2002	0.00	17/06/2002	2.43	17/06/2002	3.81								
														1/07/2002	1.25	1/07/2002	2.01				
19/09/2002	1.52	19/09/2002	1.83	19/09/2002	2.50	19/09/2002	8.26	19/09/2002	0.00	19/09/2002	2.57	19/09/2002	3.77								
														24/10/2002	1.54	24/10/2002	2.28				
4/12/2002	1.90	4/12/2002	2.10	4/12/2002	3.18	4/12/2002	8.51	4/12/2002	0.00	4/12/2002	2.61	4/12/2002	4.08								
														23/01/2003	2.20	23/01/2003	2.50				
18/03/2003	1.91	18/03/2003	2.22	18/03/2003	3.20	18/03/2003	8.77	18/03/2003	0.00	18/03/2003	2.54	18/03/2003	3.84								
23/06/2003	1.94	23/06/2003	2.34	23/06/2003	2.98	23/06/2003	8.92	23/06/2003	0.00	23/06/2003	2.60	23/06/2003	4.02								
3/09/2003	1.77	3/09/2003	2.15	3/09/2003	2.72	3/09/2003	8.82	3/09/2003	0.00	3/09/2003	2.54	3/09/2003	3.92	3/09/2003	1.78	3/09/2003	2.50				
26/11/2003	1.83	26/11/2003	2.21	26/11/2003	2.68	26/11/2003	8.91	26/11/2003	0.00	26/11/2003	2.56	26/11/2003	3.95								
												18/03/2004	4.11	18/03/2004	3.31	18/03/2004	2.93				
18/03/2004	2.14	18/03/2004	3.46	18/03/2004	3.59	18/03/2004	9.22	18/03/2004	0.00	18/03/2004	2.59										
22/06/2004	2.27	22/06/2004	2.68	22/06/2004	3.95	22/06/2004	9.58	22/06/2004	0.38	22/06/2004	2.66	22/06/2004	4.45	22/06/2004	2.53	22/06/2004	3.04				
6/09/2004	2.25	6/09/2004	2.69	6/09/2004	3.78	6/09/2004	9.71	6/09/2004	0.48	6/09/2004	2.66	6/09/2004	4.46	6/09/2004	2.58	6/09/2004	3.28				
8/12/2004	2.17	8/12/2004	2.58	8/12/2004	3.17	8/12/2004	9.60	8/12/2004	0	8/12/2004	2.59	8/12/2004	4.11	8/12/2004	2.45	8/12/2004	9.62				
21/03/2005	2.56	21/03/2005	2.66					21/03/2005	0	21/03/2005	2.58	21/03/2005	4.17	21/03/2005	2.6	21/03/2005	3.11				
				1/07/2005	3.32																
6/07/2005	2.085	6/07/2005	2.65	8/09/2005	2.6	6/07/2005	9.67	8/07/2005	0	8/07/2005	2.48	8/07/2005	3.973	1/07/2005	2.55	6/07/2005	3.03				
8/09/2005	1.69	8/09/2005	2.23			8/09/2005	9.61							8/09/2005	1.865	8/09/2005	2.335				
								15/09/2005	0	15/09/2005	2.48	15/09/2005	3.98								
14/11/2005	2.08	14/11/2005	2.75	14/11/2005	2.42	14/11/2005	8.57	14/11/2005	0	14/11/2005	2.5	14/11/2005	3.96	14/11/2005	1.62	14/11/2005					
13/03/2006	1.85	13/03/2006	2.5	13/03/2006	3.04	13/03/2006	9.4	13/03/2006	0	13/03/2006	2.61	13/03/2006	4.2	13/03/2006	2.16	13/03/2006	5.81				
8/06/2006	2.03	8/06/2006	2.64	8/06/2006	2.87	8/06/2006	9.52	8/06/2006	0	8/06/2006	2.49	8/06/2006	4.08	8/06/2006	2.07	8/06/2006					
4/09/2006	1.93	4/09/2006	2.6	4/09/2006	2.92	4/09/2006	9.08	4/09/2006	0	4/09/2006	2.53	4/09/2006	4.35	4/09/2006	1.83	4/09/2006	4.68				
								13/12/2006	0												
30/11/2006	2.1	30/11/2006	3.7			30/11/2006	9.82			30/11/2006	2.61	30/11/2006	5.39	30/11/2006	2.19	30/11/2006	1.68				
				20/12/2006	3.23																
19/04/2007	2.21	19/04/2007	2.66	19/04/2007	3.24	19/04/2007	10.17	19/04/2007	0	19/04/2007	2.54	19/04/2007	4.21	19/04/2007	2.06	19/04/2007	2.25				
28/06/2007	1.1	28/06/2007	2.05	28/06/2007	2.41	28/06/2007	9.12	28/06/2007	0	28/06/2007	2.57	28/06/2007	4.29	28/06/2007	0.82	28/06/2007	1.34				
		16/08/2007	2.078					16/08/2007	2.245			16/08/2007	4.145	16/08/2007	0.734	4/09/2007	1.42				

Earth2Water Pty Ltd
Table 1B- Woodlawn Groundwater Levels (MB)

MB11		MB12		MB13		MB14		MB15		MB16	
Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
4/09/2007	1.5			4/09/2007	2.46	4/09/2007	9.78			4/09/2007	2.51
3/10/2007	0	3/10/2007	0								
30/10/2007	3.4	30/10/2007	2.4	30/10/2007	2.75	30/10/2007	9.91	30/10/2007	0	30/10/2007	2.56
11/12/2007	1.86	11/12/2007	2.45	11/12/2007	2.56	11/12/2007	9.85				
								14/12/2007	0	14/12/2007	2.48
9/05/2008	2.28	9/05/2008	3.54	9/05/2008	3.26	9/05/2008	10.08	9/05/2008	2.14	9/05/2008	2.53
				26/06/2008	2.84	26/06/2008	10.03			26/06/2008	2.5
						30/09/2008	10.06				
18/11/2008	2.3	18/11/2008	2.77	18/11/2008	2.96			18/11/2008	0	18/11/2008	2.55
6/01/2009	2.26					6/01/2009	10.05				
		7/01/2009	2.83	7/01/2009	2.85						
								9/01/2009	0	9/01/2009	2.46
						21/05/2009	10.51				
28/05/2009	2.41	28/05/2009	3.04	28/05/2009	3.95			28/05/2009	0.21	28/05/2009	2.59
						23/06/2009	10.51				
25/06/2009	2.37	25/06/2009	3.1	25/06/2009	3.8			25/06/2009	0	25/06/2009	2.6

MB17		MB19		MB20		MB21		MB22	
Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)	Date	Depth to water (m)
30/10/2007	4.19	30/10/2007	0	30/10/2007	1.31				
14/12/2007	3.8	11/12/2007	1.47	11/12/2007	2				
						15/04/2008	3.81	15/04/2008	3.73
9/05/2008	5.19	9/05/2008	2.12	9/05/2008	NA				
				26/06/2008	NA	26/06/2008	3.70	26/06/2008	3.63
18/11/2008	4.12	18/11/2008	2.38	18/11/2008	2.89				
						19/11/2008	3.97	19/11/2008	3.91
		7/01/2009	2.51	7/01/2009	3.07				
9/01/2009	3.91					9/01/2009	3.76	9/01/2009	3.64
28/05/2009	4.29	28/05/2009	3.09	28/05/2009	3.77	28/05/2009	4.25	28/05/2009	4.21
25/06/2009	4.19	25/06/2009	3.07	25/06/2009	3.69	25/06/2009	4.16	25/06/2009	4.11

	MB11	MB12	MB13	MB14	MB15	MB16	MB17	MB19	MB20	MB21	MB22
OVERALL											
Minimum	0.00	0.00	0.00	5.48	0.00	2.40	3.39	0.00	0.00	3.70	3.63
Maximum	3.40	3.70	3.95	10.51	2.25	2.85	5.39	3.31	9.62	4.25	4.21
Average	1.45	1.76	2.76	8.50	0.11	2.55	4.01	1.32	2.08	3.94	3.87
StdDev	0.7551	0.9505	0.6283	1.3714	0.4477	0.0852	0.3681	0.9701	1.6287	0.2246	0.2469
Count	57	59	49	48	48	49	48	51	47	6	6
MINING (1978 - 2004)											
Minimum	0.00	0.00	0.00	5.48	0.00	2.40	3.39	0.00	0.00	0.00	0.00
Maximum	2.27	3.46	3.95	9.71	0.48	2.85	4.46	3.31	9.62	0.00	0.00
Average	1.18	1.39	2.63	7.74	0.03	2.56	3.86	0.97	1.73	#DIV/0!	#DIV/0!
StdDev	0.6437	0.7926	0.6917	1.1457	0.1099	0.1018	0.2537	0.882	1.6716	#DIV/0!	#DIV/0!
Count	38	40	31	30	30	30	30	33	32	0	0
LANDFILL (2005+)											
Minimum	0.00	0.00	2.41	8.57	0.00	2.46	3.80	0.00	1.31	3.70	3.63
Maximum	3.40	3.70	3.95	10.51	2.25	2.61	5.39	3.09	5.81	4.25	4.21
Average	2.00	2.56	2.97	9.76	0.26	2.54	4.25	1.95	2.83	3.94	3.87
StdDev	0.6703	0.7516	0.4389	0.496	0.7067	0.0487	0.4075	0.8011	1.2878	0.2246	0.2469
Count	19	19	18	18	18	19	18	18	15	6	6

Prepared by: AH
Checked by: DP

Table 2: Summary Statistics for Surface Water (Site Discharges)

Parameter		Site 105		Site 115		Spring 2		WM201 (Plant)	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	**Min**	5.40	5.78	6	5.51	4.35	4.40	3.94	5.33
	Max	8.90	8.60	8	8.35	7.82	7.62	7.74	7.98
	Ave	7.68	7.20	7.67	7.15	5.81	5.99	5.58	6.77
	StdDev	0.46	0.63	0.41	0.69	1.32	0.87	1.60	0.77
EC (uS/cm)	**Min**	140	193	174	47	336	83	218	30
	Max	5350	4110	3390	2960	5230	10160	1352	1497
	Ave	2184	1691	1879	1150	2222	1291	658	626
	StdDev	959	943	949	868	1341	1951	339	418
Sulphate (mg/L)	**Min**	14	32	36	40	152	31	54	78
	Max	550	320	726	630	3180	548	232	256
	Ave	159	179	226	210	1301	366	122	167
	StdDev	112	83	135	171	811	135	57	56
Ammonia (mg/L)	**Min**	0.02	0.01	0.01	0.01	0.24	0.01	0.01	0.01
	Max	0.70	0.84	0.07	0.93	8.21	4.15	1.41	0.44
	Ave	0.16	0.16	0.05	0.18	4.77	1.43	0.20	0.13
	StdDev	0.20	0.22	0.03	0.21	2.85	1.18	0.41	0.16
Iron (mg/L)	**Min**	0.09	0.05	0.10	0.02	0.47	0.10	0.30	0.50
	Max	3.80	2.00	0.11	12.60	2.60	6.24	1.20	25.00
	Ave	1.01	0.47	0.11	2.01	1.88	1.46	0.77	3.63
	StdDev	1.31	0.44	0.01	3.65	0.67	1.46	0.33	7.13
Zinc (mg/L)	**Min**	0.02	0.04	0.06	0.01	4.88	3.10	0.40	1.76
	Max	1.76	2.02	0.13	0.98	140.00	50.60	12.40	22.00
	Ave	0.77	0.53	0.09	0.29	92.55	24.99	3.19	7.40
	StdDev	0.69	0.45	0.05	0.30	45.22	12.08	3.81	6.69

Notes:
^ Statistics for sites during mining operations (1978 to 2004)
^^ Statistics for sites post mining operations (from 2005 to present)
The '<' was removed from <LOR values and negative values were adjusted to positive values (see original excel spreadsheets in Appendices)

Tables EPL AH 8.10.09.xls

Prepared by: AH
Checked by: DP

Table 3: Summary Statistics for Surface Water (Dams, Site Operations and Creeks)

Parameter		WM202 (ED3S)		WM203 (ED3N)		WM200 (wl)		Pond 2		Pond 3	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	Min	2.31	2.38	2.29	2.49	6.63	5.20	2.56	2.57	2.89	2.58
	Max	4.02	8.87	3.33	5.51	8.71	8.21	4.81	6.61	3.39	6.55
	Ave	2.83	3.88	2.66	3.95	8.04	6.74	3.05	4.14	3.08	4.16
	StdDev	0.25	1.27	0.23	0.72	0.52	0.93	0.72	1.06	0.21	1.10
EC (uS/cm)	Min	533	4840	522	2500	360	1110	3640	3460	2930	3220
	Max	33300	12910	48300	25800	2930	17400	11200	16920	14500	45003
	Ave	16979	9458	24977	13911	1568	2835	7443	9181	6290	10893
	StdDev	6135	2464	15118	7364	476	4046	2660	4046	4741	11542
Sulphate (mg/L)	Min	708	3490	744	785	124	340	2050	1840	2110	2699
	Max	55300	15200	80000	24200	407	1050	16100	15000	15400	17000
	Ave	18346	9818	31884	13591	194	563	8502	8063	8755	6370
	StdDev	8735	3147	23870	4789	73	175	6267	3866	9397	3818
Ammonia (mg/L)	Min	1.02	2.58	1.23	1.40	0.01	0.01	0.11	0.70	0.01	1.01
	Max	16.30	180.00	25.60	1200.00	0.13	0.25	1.38	780.00	6.90	730.00
	Ave	6.39	75.52	13.95	309.04	0.06	0.08	0.72	242.95	2.75	137.57
	StdDev	5.09	59.86	7.75	384.86	0.04	0.08	0.48	260.83	3.66	217.69
Iron (mg/L)	Min	103.00	56.00	100.00	0.34	0.01	0.03	45.10	20.00	27.20	16.00
	Max	258.00	540.00	288.00	610.00	0.10	6.51	366.00	12000.00	204.00	1500.00
	Ave	187.75	245.32	197.00	293.94	0.05	0.70	188.03	1205.79	115.60	357.44
	StdDev	79.00	149.23	94.14	221.60	0.05	1.68	163.29	2382.66	125.02	433.39
Zinc (mg/L)	Min	442.00	120.00	476.00	53.20	0.27	1.00	21.10	20.00	650.00	73.00
	Max	3860	1770	8340	3570	4.19	38.00	1380	1600	2300	1200
	Ave	2266.40	782.24	4082.00	955.87	1.63	14.48	843.53	493.25	1475.00	410.52
	StdDev	1267.87	587.64	3972.34	915.16	2.22	12.71	579.46	407.02	1166.73	288.28

Notes:

^ Statistics for sites during mining operations (1978 to 2004)

^^ Statistics for sites post mining operations (from 2005 to present)

The '<' was removed from <LOR values and negative values were adjusted to positive values (see original excel spreadsheets in Appendices)

Prepared by: AH
Checked by: DP

Table 4: IMF Surface Water Monitoring Results

Parameter		Site 110		Site 130		Site 150	
		Mine^	Landfill^^	Mine^	Landfill^^	Mine^	Landfill^^
pH	**Min**	6.28	5.82	6	6.55	3.89	6.11
	Max	8.20	8.11	8	8.38	8.53	8.36
	Ave	7.50	7.12	7	7.37	7.54	7.34
	StdDev	0.32	0.65	0.67	0.52	0.77	0.59
EC (uS/cm)	**Min**	8	61	395	39	186	77
	Max	3100	4820	764	953	1850	8000
	Ave	1222.64	1136.14	571.46	476.64	961.60	1162.79
	StdDev	586.22	1071.94	99.73	245.46	357.77	1649.37
Sulphate (mg/L)	**Min**	20	13	11	1	16.40	36
	Max	440	220	148	73	140	127
	Ave	117.42	82.30	50.36	28.04	80.41	79.77
	StdDev	61.07	52.71	37.05	20.93	32.83	23.50
Ammonia (mg/L)	**Min**	0.01	0.01	0.01	0.01	0.01	0.01
	Max	0.56	0.82	0.10	0.129	0.20	0.84
	Ave	0.13	0.11	0.04	0.03	0.06	0.11
	StdDev	0.17	0.17	0.04	0.03	0.06	0.18
Iron (mg/L)	**Min**	0.30	0.05	0.20	0.05	0.10	0.05
	Max	5.20	11.00	0.70	4.34	1.03	3.13
	Ave	1.91	1.49	0.42	0.70	0.43	0.76
	StdDev	1.85	2.33	0.17	0.95	0.39	0.69
Zinc (mg/L)	**Min**	0.08	0.02	0.01	0.004	0.01	0.01
	Max	1.40	1.30	0.02	0.109	0.04	6.69
	Ave	0.43	0.22	0.01	0.02	0.02	0.43
	StdDev	0.52	0.26	0.01	0.03	0.01	1.38

Notes:
^ Statistics for sites during mining operations (1978 to 2004)
^^ Statistics for sites post mining operations (from 2005 to present)
The '<' was removed from <LOR values and negative values were adjusted to positive values (see original excel spreadsheets in Appendices)

Prepared by: AH
Checked by: DP

FIGURES

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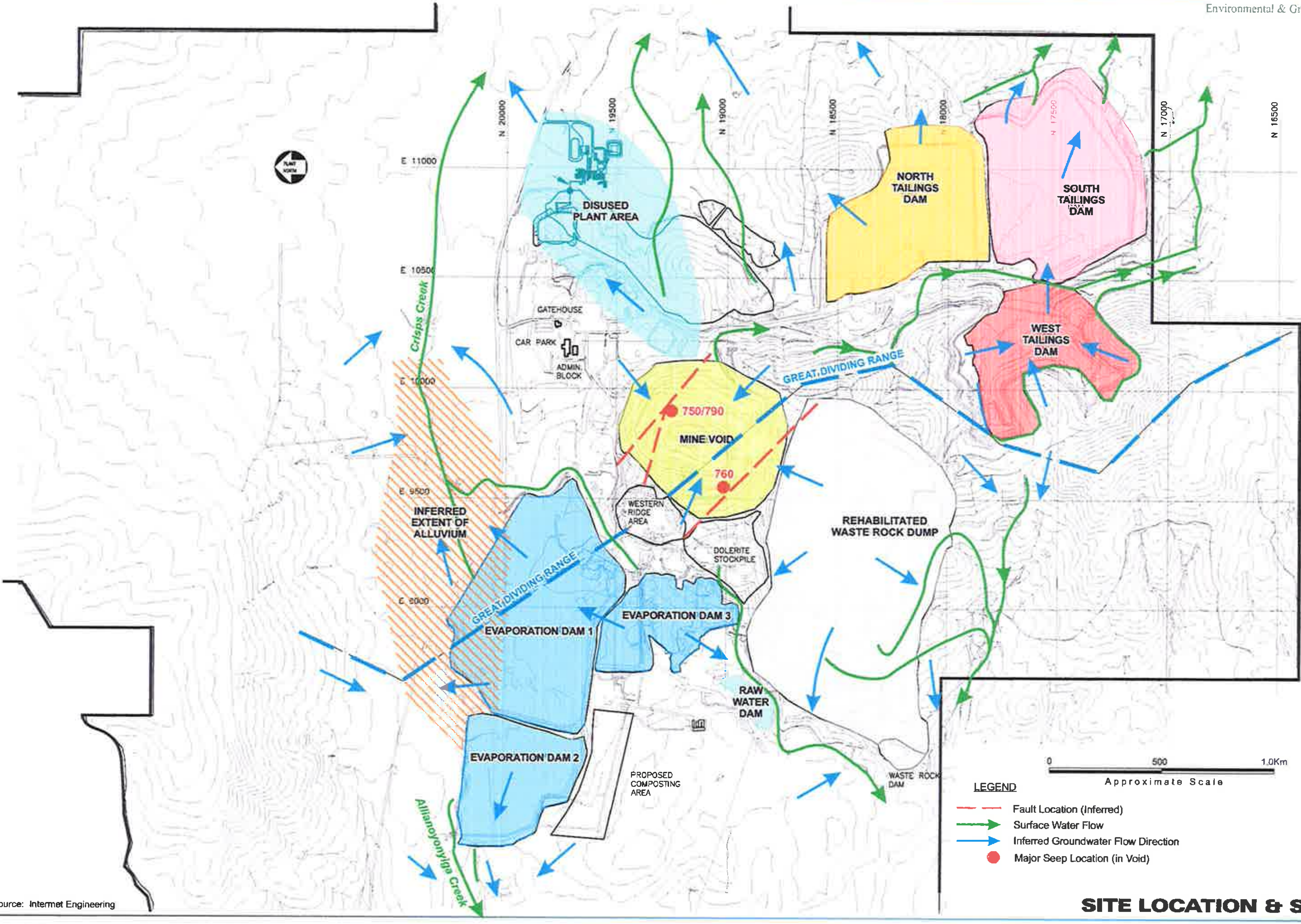


Source: Intermet Engineering

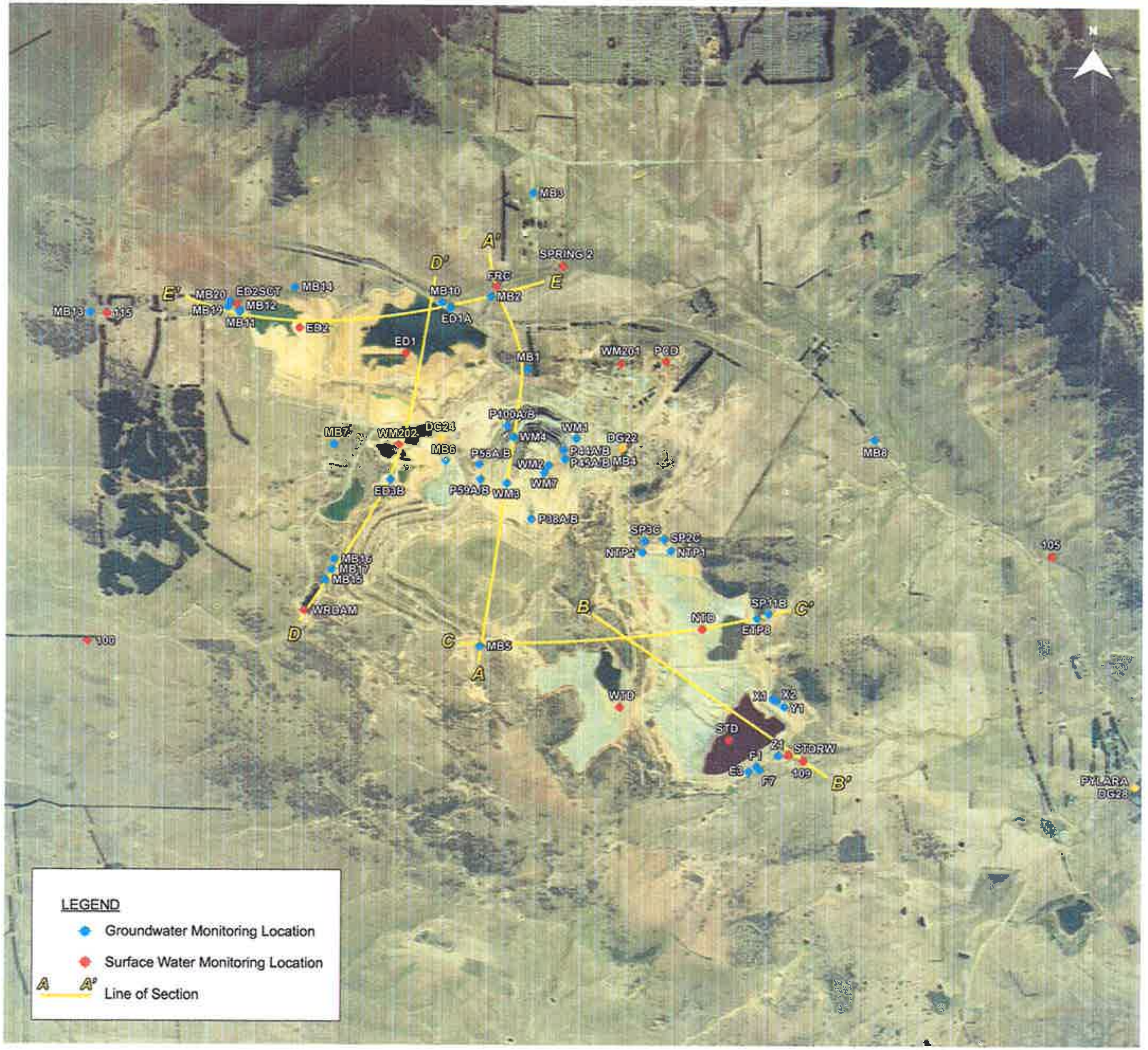
SITE LOCATION & SYSTEMS

VEOLIA ENVIRONMENTAL SERVICES - WOODLAWN BIOREACTOR

Date: 21 October 2007

Reference: E2W_083_01.cdr

Figure 1



Source: Kells Land Development Solutions

SITE LAYOUT & MONITORING LOCATIONS

VEOLIA ENVIRONMENTAL SERVICES - WOODLAWN BIOREACTOR TECHNICAL REVIEW

Date: *21 October 2007*

Reference: *E2W_083_02.cdr*

Figure 2

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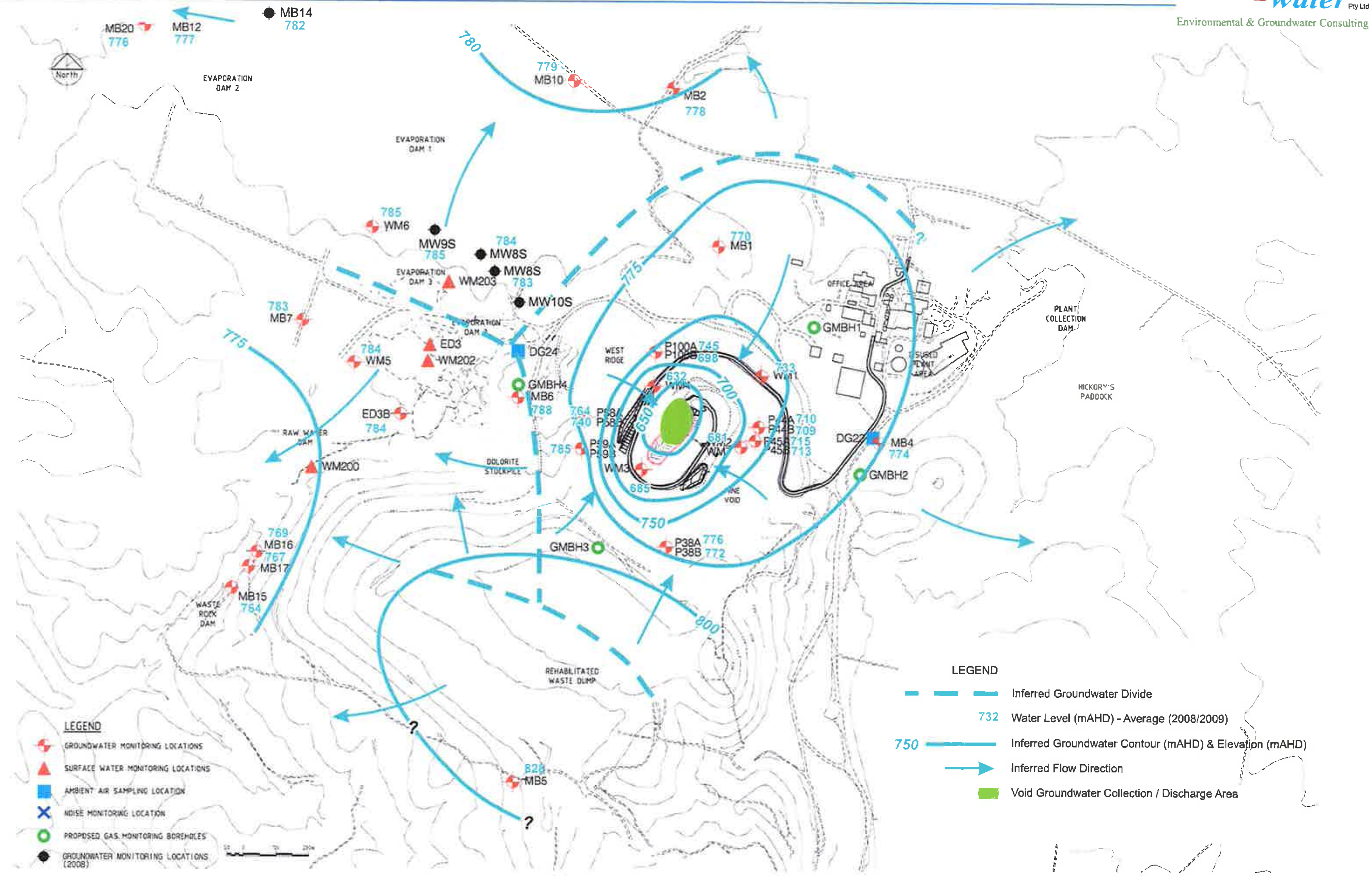


Source: Maunsell

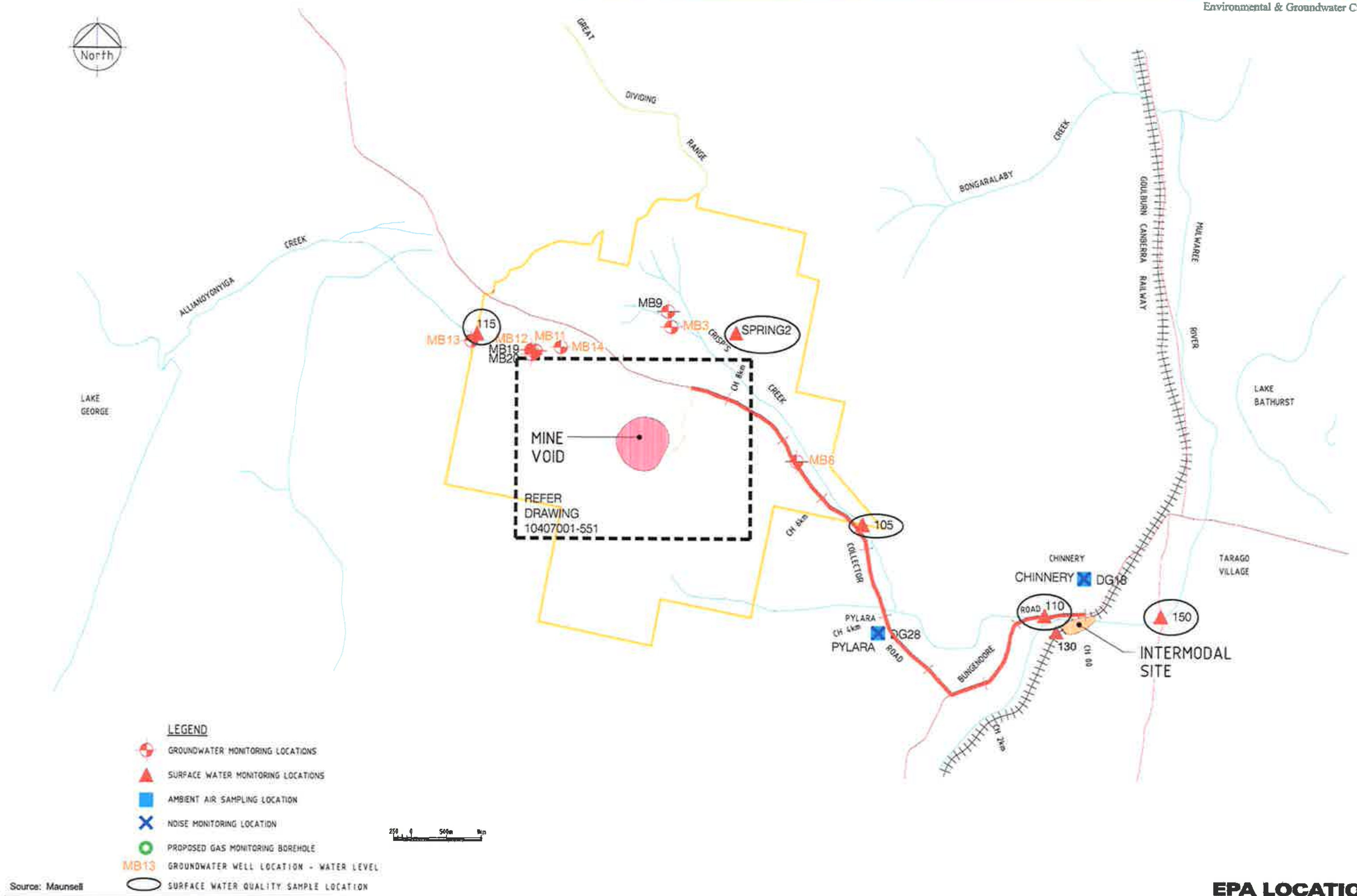
SITE LAYOUT & INFERRED GROUNDWATER FLOW REGIME

Date: 14 October 2009

Reference: E2W_083_14.cdr

WOODLAWN BIOREACTOR - MONITORING REPORT

Figure 3A



Source: Maunsell

EPA LOCATIONS

VEOLIA ENVIRONMENTAL SERVICES - WOODLAWN BIOREACTOR

Figure 3B

Date: 21 October 2007

Reference: E2W_083_11.cdr

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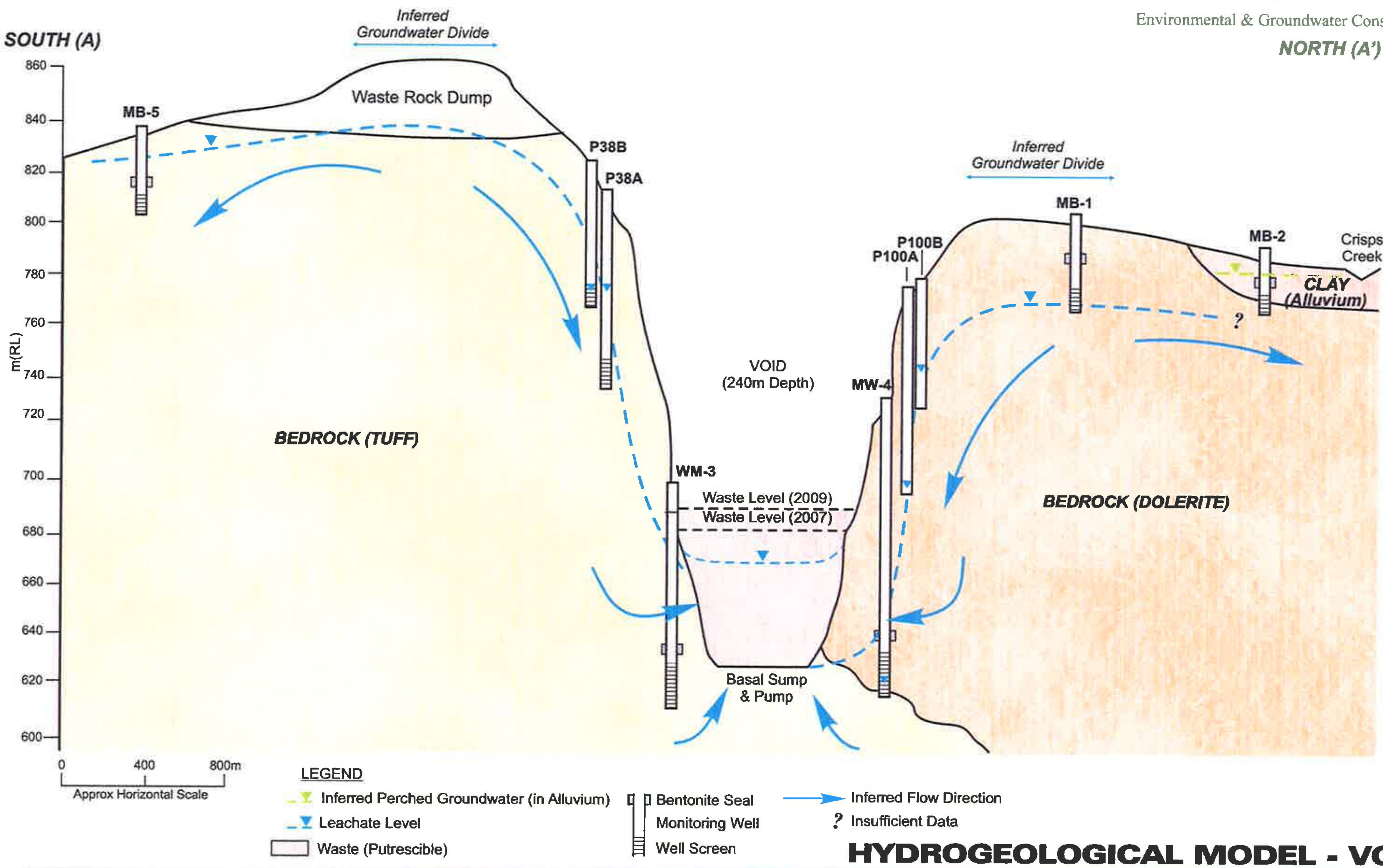
Environmental & Groundwater Consulting



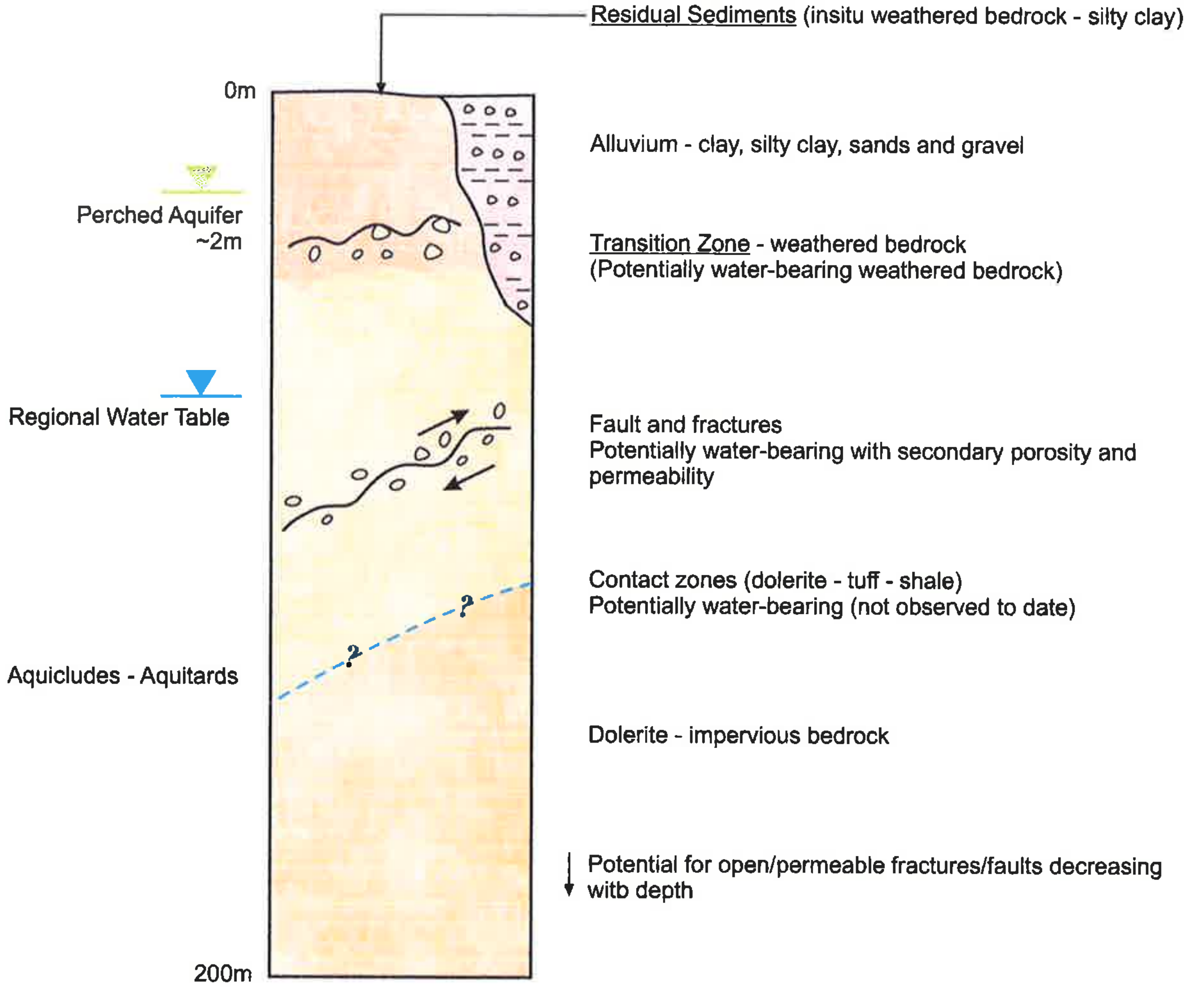
HYDROGEOLOGICAL MODEL - VOID

Date: *18 October 2009*

Reference: *E2W_083_04.cdr*

VEOLIA ENVIRONMENTAL SERVICES - WOODLAWN BIOREACTOR

Figure 5



SUMMARY OF AQUIFER UNITS AT BIOREACTOR SITE

VEOLIA ENVIRONMENTAL SERVICES - WOODLAWN BIOREACTOR

Date: *16 October 2007*

Reference: *E2W_083_03.cdr*

Figure 4

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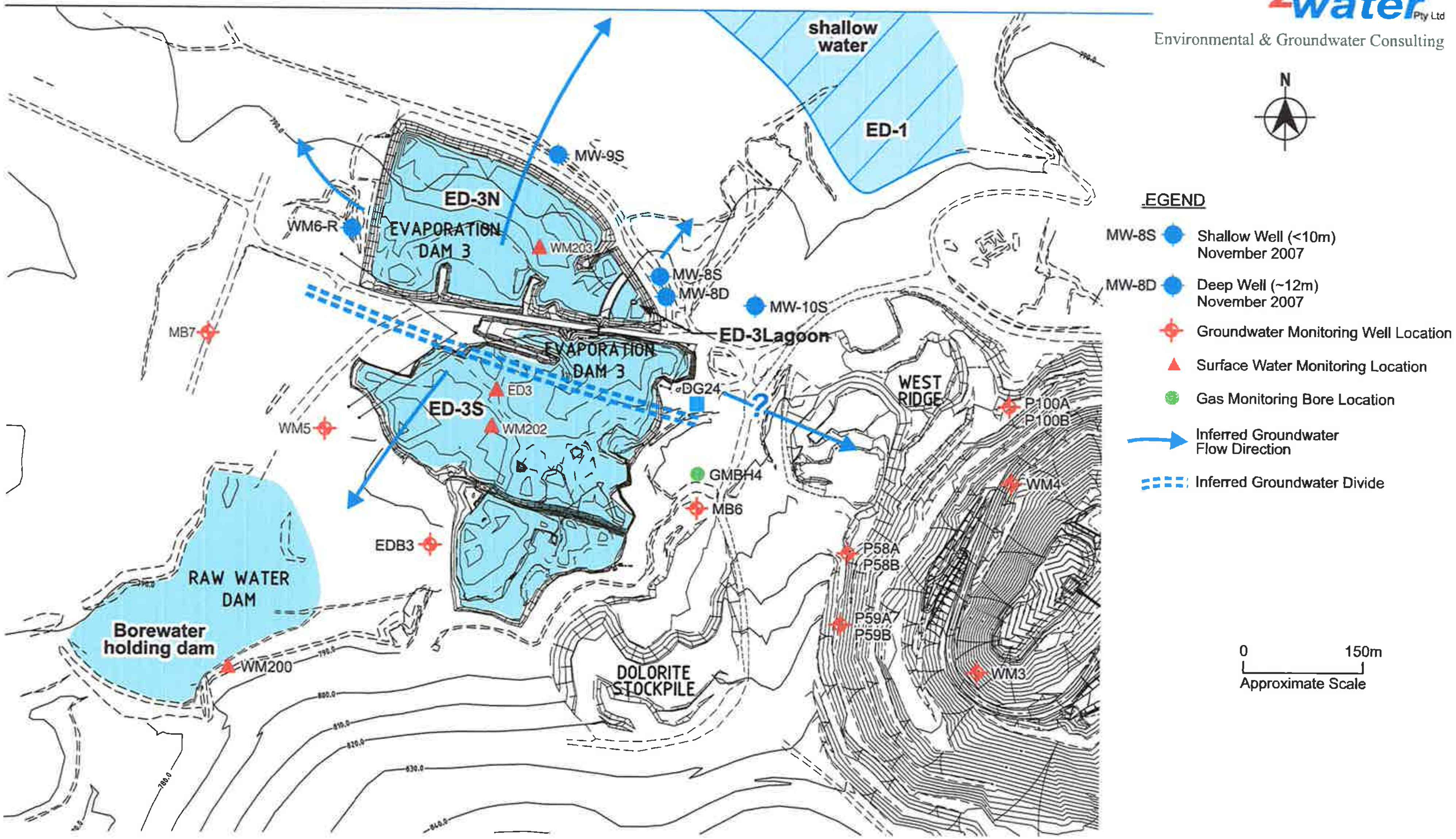


Source: *Baseplan - Maunsell*

Layout of ED-3 and New Well Locations (November 2007)

VEOLIA ENVIRONMENTAL SERVICES - WOODLAWN BIOREACTOR

Date: *15 November2007*

Reference: *E2W_083_13.cdr*

Figure 6

APPENDIX A

Appendix A: Woodlawn Monitoring Locations (EPA and Mine)

SITE CODE	Description	Required by	Licence Number	EASTING	NORTHING	RL (top of casing)	DEPTH (from top of casing) m	CATEGORY
PYLARA	High Volume Air Sampling Location	DECC	EPL 11455	13520.00	7160.00			Air
DG18	Dust Gauge #18 - Radially North of IMF 500m - Chinnery's	No longer required by DECC		16240.00	8510.00			Dust
DG22	Dust Gauge #22 - Radially East of Mine Void 150m	DECC	EPL 11436	10320.000	9270.000			Dust
DG24	Dust Gauge #24 - Radially West of Mine Void 150m	DECC	EPL 11436	9200.000	9320.000			Dust
DG28	Dust Gauge #28 - Pylara West of Homestead	DECC	EPL 11436	13520.00	7160.00			Dust
E3	South Tailings Dam Piezometer - Southern wall	Mine	SML20	11280.00	7320.00	774.52	19.38	Groundwater
ED3B	Evaporation Dam 3 Piezometer	DECC	EPL 11436	8882.70	9062.40	786.80	5.90	Groundwater
ETP8	North Tailings Dam Piezometer - Eastern wall	Mine	SML20	11180.00	8210.00	776.47	9.17	Groundwater
F1	South Tailings Dam Piezometer - Southern wall	Mine	SMIL20	11300.00	7340.00	774.49	23.28	Groundwater
F7	South Tailings Dam Piezometer - Southern wall	Mine	SML20	11300.00	7350.00	773.25	13.90	Groundwater
MB1	1 Monitoring Bore	DECC	EPL 11436	9735.00	9752.10	797.51	32.20	Groundwater
MB2	2 Monitoring Bore	DECC	EPL 11436	9502.90	10201.80	781.86	13.20	Groundwater
MB3	3 Monitoring Bore	DECC	EPL 11436	9762.30	10850.50	793.20	25.80	Groundwater
MB4	4 Monitoring Bore	DECC	EPL 11436	10333.50	9263.20	786.50	25.80	Groundwater
MB5	5 Monitoring Bore	DECC	EPL 11436	9443.70	8025.20	833.98	25.80	Groundwater
MB6	6 Monitoring Bore	DECC	EPL 11436	9224.90	9181.90	796.21	25.80	Groundwater
MB7	7 Monitoring Bore	DECC	EPL 11436	8532.40	9283.10	789.07	29.00	Groundwater
MB8	8 Monitoring Bore	DECC	EPL 11436	11896.10	9322.20	752.57	25.90	Groundwater
MB10	10 Monitoring Bore	DECC	EPL 11436	9200.90	10163.90	783.80	20.80	Groundwater
MB11	11 Monitoring Bore	DECC	EPL 11436	7930.30	10126.50	778.97	5.30	Groundwater
MB12	12 Monitoring Bore	DECC	EPL 11436	7930.30	10129.30	779.95	13.20	Groundwater
MB13	13 Monitoring Bore	DECC	EPL 11436	7004.70	10089.90	748.66	13.20	Groundwater
MB14	14 Monitoring Bore	DECC	EPL 11436	8273.80	10251.60	792.37	12.50	Groundwater
MB15	15 Monitoring Bore	DECC	EPL 11436	8482.70	8438.10	764.86	23.70	Groundwater
MB16	16 Monitoring Bore	DECC	EPL 11436	8535.60	8560.40	771.39	7.30	Groundwater
MB17	17 Monitoring Bore	DECC	EPL 11436	8520.10	8511.20	771.07	15.40	Groundwater
MB19	19 Monitoring Bore	DECC	EPL 11436	7870.00	10130.00	777.52	12.00	Groundwater
MB20	20 Monitoring Bore	DECC	EPL 11436			778.02		Groundwater
NTP1	North Tailings Dam Piezometer - Northern wall	Mine	SML20	10620.00	8620.00	787.87	9.44	Groundwater
NTP2	North Tailings Dam Piezometer - Eastern wall	Mine	SML20	10465.00	8620.00	789.42	10.85	Groundwater
P100A	Pit Piezometer P100 shallow	DECC	EPL 11436	9610.00	9400.00	776.43	41.00	Groundwater
P100B	Pit Piezometer P100 deep	DECC	EPL 11436	9610.00	9400.00	776.43	78.00	Groundwater
P38A	Pit Piezometer P38 shallow	DECC	EPL 11436	9760.00	8820.00	815.31	39.70	Groundwater
P38B	Pit Piezometer P38 deep	DECC	EPL 11436	9760.00	8820.00	815.31	76.50	Groundwater
P44A	Pit Piezometer 44 shallow	DECC	EPL 11436	9965.00	9237.00	731.05	40.50	Groundwater
P44B	Pit Piezometer 44 deep	DECC	EPL 11436	9965.00	9237.00	731.05	73.00	Groundwater
P45A	Pit Piezometer 45 shallow	DECC	EPL 11436	9962.00	9194.00	731.16	40.45	Groundwater
P45B	Pit Piezometer 45 deep	DECC	EPL 11436	9962.00	9194.00	731.11	78.00	Groundwater
P58A	Pit Piezometer 58 shallow	DECC	EPL 11436	9436.36	9162.22	807.39	42.00	Groundwater
P58B	Pit Piezometer 58 deep	DECC	EPL 11436	9436.36	9162.22	807.39	75.00	Groundwater
P59A	Pit Piezometer 59 shallow	DECC	EPL 11436	9445.60	9066.20	804.70	34.00	Groundwater
P59B	Pit Piezometer 59 deep	DECC	EPL 11436	9445.60	9066.20	804.70	77.00	Groundwater

Appendix A: Woodlawn Monitoring Locations (EPA and Mine)

SITE CODE	Description	Required by	Licence Number	EASTING	NORTHING	RL (top of casing)	DEPTH (from top of casing) m	CATEGORY
SP11B	North Tailings Dam Piezometer - Eastern wall	Mine	SML20	11210.00	8220.00	774.24	15.37	Groundwater
SP2C	North Tailings Dam Piezometer - Northern wall	Mine	SML20	10595.00	8695.00	786.87	21.28	Groundwater
SP3C	North Tailings Dam Piezometer - Eastern wall	Mine	SML20	10455.00	8670.00	788.93	11.97	Groundwater
WM1	1 Monitoring Well	DECC	EPL 11436	4690.90	7081.57	781.27	115.00	Groundwater
WM3	3 Monitoring Well	DECC	EPL 11436	4211.97	6891.54	707.62	85.00	Groundwater
WM4	4 Monitoring Well	DECC	EPL 11436	4310.77	7161.86	733.92	108.00	Groundwater
WM5	5 Monitoring Well	DECC	EPL 11436	3378.57	7152.83	786.73	6.00	Groundwater
WM6	6 Monitoring Well	DECC	EPL 11436	3400.82	7469.32	790.34	6.00	Groundwater
WM7	7 Monitoring Well	DECC	EPL 11436	4459.56	6913.17	686.94		Groundwater
X1	South Tailings Dam Piezometer - Eastern wall	Mine	SML20	11300.00	7690.00	781.51	7.95	Groundwater
X2	South Tailings Dam Piezometer - Eastern wall	Mine	SML20	11303.70	7683.70	780.90	7.96	Groundwater
Y1	South Tailings Dam Piezometer - Eastern wall	Mine	SML20	11315.00	7660.00	776.98	7.03	Groundwater
Z1	South Tailings Dam Piezometer - Southern wall	Mine	SML20	11350.00	7360.00	769.52	20.72	Groundwater
WM201	Woodlawn Front Gate	Mine	SML20	10310.00	9790.00			Surface Water
100	Woodlawn/Willeroo Boundary South	Mine	SML20	7000.00	8040.00			Surface Water
105	Crisp's Creek - Pylara Boundary	DECC	EPL 11436	13000.00	8600.00			Surface Water
109	Pylara Boundary-Below South Tailings Dam	Mine	EPL 11436	11460.00	7310.00			Surface Water
110	Crisp's Creek - Bridge	DECC	EPL 11455	16000.00	8250.00			Surface Water
115	Woodlawn/Willeroo Boundary North	DECC	EPL 11436	7100.00	10090.00			Surface Water
130	Creek between bridges	DECC	EPL 11455					Surface Water
150	Mulwarree River at Braidwood Road Crossing	DECC	EPL 11455	17570.00	8690.00			Surface Water
ED1	Evaporation Dam 1	Mine	SML20	8970.00	9850.00	788.50		Surface Water
ED2	Evaporation Dam 2	Mine	SML20	8310.00	10000.00	788.80		Surface Water
ED2SCT	ED2 SeDECCge Collection Trench Overflow Pipe	Mine	SML20	7920.00	10130.00			Surface Water
FRC	Crisp's Creek - Farm Road Culvert	Mine	SML20	9540.00	10260.00			Surface Water
NTD	North Tailings Dam	Mine	SML20	10830.00	8130.00			Surface Water
PCD	Plant Collection Dam	Mine	SML20	10600.00	9800.00			Surface Water
Pond 1	Pond 1 (In Void)	DECC				670.00		Surface Water
Pond 2	Pond 2 (In Void)	DECC	EPL 11436					Surface Water
Pond 3	Pond 3 (In Void)	DECC	EPL 11436					Surface Water
SPRING2	Crisp's Creek - Pond 2 Outflow	DECC	EPL 11436	9950.00	10390.00			Surface Water
STD	South Tailings Dam	Mine	SML20	11000.00	7440.00			Surface Water
STDRW	South Tailings Dam Return Water	Mine	SML20	11370.00	7350.00			Surface Water
WM202	Evaporation Dam 3 South	DECC	EPL 11436	8930.00	9280.00	790.37		Surface Water
WM203	Evaporation Dam 3 North	DECC	EPL 11436	8930.00	9280.00	790.03		Surface Water
WRDAM	Waste Rock Dam	Mine	SML20	8350.00	8240.00	760.50		Surface Water
WTD	West Tailings Dam	Mine	SML20	10320.00	7640.00			Surface Water
IMF FF	IMF First Flush	DECC						Surface Water

APPENDIX B

Appendix B: Woodlawn Monitoring Locations Details

SITE CODE	Location Description	Required by	RL (top of casing)	Date Installed	DEPTH (from top of casing) m	Geology	Well Screen Interval (mbgl)	Bentonite Seal (mbgl)	Notes
ED3B	Evaporation Dam 3 Piezometer	EPA	786.800		5.900				GW - no log
MB1	1 Monitoring Bore	EPA	797.510		32.200	Bedrock Dolerite = 0 - 32 m	26 - 32 m	18 - 19 m	GW
MB10	10 Monitoring Bore	EPA	783.800		20.800	Clay (Brown) = 0 -1 m, Clay (Grey) = 1 - 1.8 m, Gravel = 1.8 - 3.2 m, Sand (Gravel) = 3.2 - 12.2 m, Hard Silicious Band = 12.2 - 12.6 m, Gravel = 12.6 - 19.8 m, Dolerite = 19.8 - 20.8 m	19 - 20.8 m	12.6 - 13 m	GW
MB11	11 Monitoring Bore	EPA	778.970		5.300	Clay = 0 - 1.2 m, Dolerite = 1.2 - 3.3 m, Shale = 3.3 - 5.3 m	2.3 - 5.3 m	0.5 - 1.2 m	GW
MB12	12 Monitoring Bore	EPA	779.950		13.200	Dolerite Floater = 0 - 0.5 m, Dolerite/Shale/Acid Vocanic = 0.5 - 13.2 m	10.3 - 13.2 m	8.6 - 9.4 m	GW
MB13	13 Monitoring Bore	EPA	748.660		13.200	Silty Sand = 0 - 0.8 m, Clay = 0.8 - 1.8 m, Sandy Clay = 1.8 - 3 m, Volcanic (Foliated) = 3 - 9 m, Dolerite = 9 - 13.2 m	10.3 - 13.2 m	6.8 - 7.4 m	GW
MB14	14 Monitoring Bore	EPA	792.370		12.500	Clay = 0 - 1.2 m, Dolerite = 1.2 - 12.5 m, Fracture = 8.1 m	9.5 - 12.5 m	5.2 - 5.8 m	GW
MB15	15 Monitoring Bore	EPA	764.860		23.700	Fill = 0 - 0.4 m, Rhyolite/Volcanic = 0.4 - 23.7 m (Becoming softer)	16.4 - 23.7 m	7.2 - 7.4 m	GW
MB16	16 Monitoring Bore	EPA	771.390		7.300	Fill = 0 - 0.8 m, Clayey Gravel/Gravelly Clay = 0.8 - 4 m, Rhyolite = 4 - 7.3 m	3.2 - 6.2 m	2 - 2.7 m	GW
MB17	17 Monitoring Bore	EPA	771.070		15.400	Fill = 0 - 0.4 m, Sandy Clay = 0.4 - 2.4 m, Volcanics = 2.4 - 6.4 m, Tuff = 6.4 - 8 m, Volcanics = 8 - 15.4 m	9.3 - 15.4 m	8.4 - 9 m	GW
MB2	2 Monitoring Bore	EPA	781.860		13.200	Clay = 0 - 9 m, Dolerite = 9 - 13 m	7.2 - 13.2 m	5.2 - 6 m	GW
MB3	3 Monitoring Bore	EPA	793.200		25.800	Fill = 0 - 0.2 m, Clay = 0.2 - 3.5 m, Siltstone = 3.5 - 6 m, Clay = 6 - 18.5 m, Gravel = 18.5 - 25.8 m	20 - 25.8 m	14 - 16 m	GW
MB4	4 Monitoring Bore	EPA	786.500		25.800	Fill = 0 - 2.5 m, Shale (Grey to Red) = 2.5 - 25.8 m	19.8 - 25.8 m	14 - 16 m	GW
MB5	5 Monitoring Bore	EPA	833.980		25.800	Top Soil = 0 - 0.1 m, Tuff = 0.1 - 1.5 m, Tuff (with weathered zones x 2) = 1.5 - 25.8 m	19.8 - 25.8m	16 - 17 m	GW
MB6	6 Monitoring Bore	EPA	796.210		25.800	Fill (Dolerite & Shale) = 0 - 2.5 m, Shale = 2.5 - 11 m, Clay = 11 - 11.5 m, Shale (Siltstone) = 11.5 - 19 m, Shale = 19 - 25.8 m	19.8 - 25.8 m	13.2 - 15 m	GW
MB7	7 Monitoring Bore	EPA	789.070		29.000	Clay = 0 - 2 m, Shale = 2 - 25 m, Tuff = 25 - 29 m	25 - 29 m	22 - 23 m	GW
MB8	8 Monitoring Bore	EPA	752.570		25.900	**NO DATA**	NA	NA	GW - no log

Appendix B: Woodlawn Monitoring Locations Details

SITE CODE	Location Description	Required by	RL (top of casing)	Date Installed	DEPTH (from top of casing) m	Geology	Well Screen Interval (mbgl)	Bentonite Seal (mbgl)	Notes
WM1	1 Monitoring Well	EPA	781.270	5/06/2003	115.000	Dolerite = 0 - 115 m	NA	NA	GW
WM2	2 Monitoring Well	EPA	686.730	3/06/2003	115.000	Shale = 0 - 2.5 m, Tuff/Tuffaceous Sediment = 2.5 - 47 m, (FeO2 Coatings on Fractures and Joints = 6.0 - 13 m, Decrease in Chip Size = to 34 m, Increase in Talc content = 35 - 47 m), Dolerite = 47 - 48.5 m, Tuff/Tuffaceous Sediment = 48.5 - 115 m	NA	NA	GW
WM3	3 Monitoring Well	EPA	707.620	4/06/2003	85.000	Tuff/Tuffaceous Sediment (Brown) = 0 - 2 m, Tuff/Tuffaceous Sediment (Light Grey) = 2 - 8 m, Tuff = 8 - 49 m, Tuff/Tuffaceous Sediment (Mid/Light Grey), Tuff (Mid Grey) = 59 - 68 m, Tuff/Tuffaceous Sediment (Light Cream) = 68 - 85 m	NA	NA	GW
WM4	4 Monitoring Well	EPA	733.920	5/06/2003	108.000	Unkown = 0 - 60 m, Dolerite (Dark grey green) = 60 - 62 m, Tuff/Tuffaceous Sediment = 62 - 71 m, Dolerite (Olive Green) = 71 - 84 m, Tuff = 84 - 102 m, Dolerite = 102 - 108 m	NA	NA	GW
WM5	5 Monitoring Well	EPA	786.730	7/06/2003	6.000	Clay = 0 - 1 m, Crystal Tuff = 1 - 6 m	NA	NA	GW - no log
WM6	6 Monitoring Well	EPA	790.340	7/06/2003	6.000	Clay = 0 - 2 m, Tuff = 2 - 4 m, Yellow Brown Silicified Volcanics = 4 - 6 m	NA	NA	GW - no log
WM7	7 Monitoring Well	EPA	686.730			**NO DATA**	NA	NA	GW - no log

APPENDIX C

Table 1: Comparison of 2008-2009 Dust Deposition (Recorded Monthly) at Woodlawn to Previous Reporting Periods

Site	No.	Maximum (g/m^2/month)	Minimum (g/m^2/month)	Average ± SD (g/m^2/month)
West Void - DG24				
2002-03	12	6.6	0.3	2.8
2004-05	11	5.6	2.6	4.2
2005-06	11	45.9	0.9	14.4
2006-07	11	9.3	1.3	3.3
2007-08	12	3.2	0.7	1.93 ± 0.86
2008-09	12	14.3	1.3	4.88 ± 3.97
MOP period 2004 - 2007	33	45.9	0.9	7.3
East Void - DG22				
2002-03	12	8.9	0.6	3.7
2004-05	11	5.2	2.2	3.6
2005-06	12	6.6	1.5	3.4
2006-07	11	6.7	1.6	3.1
2007-08	12	5.6	0.7	2.74 ± 1.59
2008-09	12	13.9	2.1	5.25 ± 3.45
MOP period 2004 - 2007	34	6.7	1.5	3.4
Pylara - DG28				
2002-03	12	22	0.8	5.8
2004-05	11	7.5	1.9	4.1
2005-06	11	4.7	1.1	3.1
2006-07	11	3.8	0.6	1.9
2007-08	12	3.9	0.7	2 ± 1.08
2008-09	12	16.5	1.1	5.1 ± 4.74
MOP period 2004 - 2007	33	7.5	0.6	3.0
Chinnery - DG18				
2003-04	12	5	0.5	2.2
2004-05	11	12.7	1.8	4.4
2005-06	12	28.3	0.9	6.7
2006-07	7	4.4	0.9	2.0
MOP period 2004 - 2007	30	28.3	0.9	4.4

Table 2: Average Plant Collection Dam Water Quality Since 1997

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1997/1998	4.42	5178	318	3293
1998/1999	5.68	4198	331	1763
1999/2000	5.22	4495	421	2000
2000/2001	5.22	4495	421	2000
2001/2002	3.83	3683	396	2007
2002/2003	5.66	5107	-	-
2003/2004	4.45	3590	-	-
2004/2005	4.77	3985	-	-
2005/2006	4.46	3829	-	-
2006/2007	6.96	6090	160	1800
2007/2008	4.43	3785	-	-
2008/2009	4.23	4805	-	-

Table 3: South Tailings Dam Collection Trench Average Water Quality Since 1997

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1997/1998	4.58	9234	429.33	4499
1998/1999	4.46	6778	908.13	5994
1999/2000	3.80	6472	436.00	4182
2000/2001	3.84	6397	418.75	4387
2001/2002	3.55	7415	365.25	3864
2002/2003	3.59	8200	240.00	5320
2003/2004	2.96	5085	-	-
2004/2005	3.31	7000	-	-
2005/2006	3.22	6134	-	-
2006/2007	3.36	9116	570.00	6900
2007/2008	3.23	8195	-	-
2008/2009	3.39	16505	-	-

Table 4: Waste Rock Dam Average Water Quality Data

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1997 - 1998	3.13	16511	3428	20643
1998 - 1999	3.01	14537	2980	18498
1999 - 2000	3.21	18350	3177	20000
2000 - 2001	3.01	18625	3102	19325
2001 - 2002	3.07	14653	220	17366
2002 - 2003	3.16	19000	-	-
2003 - 2004	2.24	14085	-	-
2004 - 2005	2.91	20475	-	-
2005 - 2006	2.91	20025	-	-
2006 - 2007	3.32	24130	3700	32000
2007 - 2008	3.02	20465	-	-
2008 - 2009	3.13	25500	-	-

Table 5: Water Quality Comparison - Woodlawn Dam

Analytical Parameter	Feb 2002	Jan 2003	Apr 2003	Jun 2004	Dec 2004	Mar 2005	Jun 2005	Jun 2006	March 2007	Dec 2007	Jun 2008	Sep 2008	Jun 2009	ANZECC (2000)
pH	7.4	8.3	-	7.65	8.19	7.18	7.13	4.9	6.7	7.9	8.2	8.21	6.56	6.5-8.5
EC (µS/cm)	1410	1630	1820	2930	1990	1960	2020	1800	2000	1800	2000	1825	2156	1800 #
Bicarbonate	279	179	157	177	126	92	59	5	34	-	-	-	-	400
Chloride	279	348	322	500	320	338	321	180	280	-	-	-	-	400
Sulphate	182	154	284	268	407	529	678	670	580	540	400	370	650	400
Calcium	39.3	42	55	75	73	89	92	76	87	-	-	-	-	na
Sodium	117	168	124	190	156	144	149	100	130	-	-	-	-	300
Magnesium	68.7	84	95	116	106	127	126	110	110	-	-	-	-	na
Potassium	na	5	4	4	5	5	6	3.6	3.1	3.2	4.2	3.9	3.3	na
Copper	<0.01	0.02	0.23	0.04	0.21	0.91	0.14	1.1	0.069	0.06	0.035	0.063	0.03	1
Lead	<0.03	<0.01	<0.01	<0.01	0.003	na	0.002	0.017	0.002	0.0014	0.0013	0.0006	0.0009	0.05
Zinc	0.53	0.14	8.42	0.42	4.19	10.2	5.02	36	28	8.5	3.7	3.9	1	5

based on Total Dissolved Solids/EC ratio and ANZECC Water Quality Guidelines for raw waters for drinking purposes (1992)

Table 6: Surface Water Quality Results for the 2008/2009 Reporting Period

Site	n	pH			Conductivity (µS/cm)			Sulphate (mg/L)			Total Zinc (mg/L)		
		min	*avg*	*max*	*min*	*avg*	*max*	*min*	*avg*	*max*	*min*	*avg*	*max*
100	1	8.42			1008			NT			NT		
105	2	7.89	7.9	7.91	3520	3815	4110	280	296.7	320	0.074	0.25	0.39
109	1	7.84			2490			NT			NT		
115	1	7.8			3600			630			0.2		
First Flush	4	8.31	8.55	8.79	235	478	721	5.2	7.23	11	0.037	0.1055	0.2
110	4	8.05	8.08	8.11	1984	3402	4820	27	113.5	170	0.043	0.104	0.23
130	4	8.33	8.36	8.38	383	483	583	13	33.25	48	0.005	0.00675	0.012
150	4	8.3	8.33	8.36	1150	4575	8000	51	80	110	0.006	0.032	0.076

NT = not tested

Table 7: Average Water Quality - Site 109

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1996 - 1997	7.38	659	1.66	101
1997 - 1998	7.11	1290	3.55	233
1998 - 1999	5.92	1034	4.43	176
1999 - 2000	7.42	871	1.29	158
2000 - 2001	7.46	1136	1.85	164
2001 - 2002	7.17	1102	2.62	209
2002 - 2003	7.08	1575	-	-
2003 - 2004	6.51	1511	-	-
2004 - 2005	7.01	1681	-	-
2005 - 2006	6.91	905	-	-
2006 - 2007	7.03	1392	4.20	540
2007 - 2008	7.7	920	3.5	220
2008 - 2009	7.84*	2490*	-	-

* Analyte only measured once in reporting period

Table 8: Average Water Quality - Site 110

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1996 - 1997	7.55	1185	0.33	126
1997 - 1998	7.53	1134	0.81	151
1998 - 1999	7.37	817	0.37	77
1999 - 2000	7.57	1390	0.49	124
2000 - 2001	7.56	1204	0.19	103
2001 - 2002	7.55	1342	0.20	131
2002 - 2003	7.21	848	0.56	105
2003 - 2004	6.88	1246	0.16	157
2004 - 2005	6.91	1080	0.35	103
2005 - 2006	7.14	1281	0.23	110
2006 - 2007	7.10	514	0.36	49
2007 - 2008	7.57	1203	0.129	70
2008 - 2009	8.08	3402	0.104	113

Table 9: Average Water Quality - Site 115

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1997 - 1998	7.30	2206	0.17	316
1998 - 1999	7.64	1656	0.13	288
1999 - 2000	7.86	1696	0.35	234
2000 - 2001	7.87	1913	0.41	150
2001 - 2002	7.74	1882	0.21	140
2002 - 2003	7.78	2165	0.23	239
2003 - 2004	7.01	1674	0.13	275
2004 - 2005	6.10	1464	0.07	158
2005 - 2006	7.04	754	0.50	129
2006 - 2007	7.12	1288	0.11	167
2007 - 2008	8.1	2466	0.0673	306
2008 - 2009	7.8*	3600*	0.2*	630*

Table 10: Average Water Quality - Site 130

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
2003 - 2004	6.72	540	0.01	36
2004 - 2005	7.20	635	0.01	46
2005 - 2006	7.35	413	0.04	13
2006 - 2007	7.16	585	0.03	48
2007 - 2008*	7.63	543	0.006	42
2008 - 2009	8.36	483	0.00675	33

* Averages derived from August, November and December 2007 data

Table 11: Average Water Quality - Site 150

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1999 - 2000	7.63	1043	0.10	73
2000 - 2001	7.35	1214	0.07	97
2001 - 2002	7.63	818	0.08	64
2002 - 2003	7.83	794	0.30	60
2003 - 2004	5.88	1112	0.02	100
2004 - 2005	7.22	1059	0.98	97
2005 - 2006	7.43	953	0.40	85
2006 - 2007	7.19	616	0.08	77
2007 - 2008	7.63	676	0.047	43
2008 - 2009	8.33	4575	0.032	80

Table 12: Average ED1 groundwater quality - monitoring bores MB10 and MB2

Year	pH	EC (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
MB10				
1996/1997	6.50	7350	0.49	5095
1997/1998	6.60	6580	0.64	4819
1998/1999	6.60	6650	0.72	4466
1999/2000	6.80	5520	0.51	4212
2000/2001	6.80	7000	0.42	4382
2001/2002	6.80	6940	0.28	4613
2002/2003	6.70	6433	-	-
2003/2004	6.80	6213	-	-
2004/2005	6.75	6464	-	-
2005/2006	7.03	6821	-	-
2006/2007	7.07	6912	0.64*	4000*
2007/2008	6.73	5992	0.056*	3800*
2008/2009	7.25	6882	0.023	3900
MB2				
1996/1997	6.50	6325	0.72	4435
1997/1998	6.48	6013	0.64	4298
1998/1999	6.56	6400	0.62	4139
1999/2000	6.65	6825	0.56	4130
2000/2001	6.67	6645	0.51	4443
2001/2002	6.59	6545	0.22	3962
2002/2003	6.71	5946	0.19	661
2003/2004	6.81	5980	-	-
2004/2005	6.64	5353	-	-
2005/2006	6.51	6180	-	-
2006/2007	6.92	6354	0.10*	4200*
2007/2008	6.57	5848	0.045*	4520*
2008/2009	7.21	6650	0.0305	2066.5

* Analyte only measured once in reporting period

Table 13: Average water quality - Evaporation Dam 2

Year	pH	EC (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1996/1997	2.80	19400	4940	25330
1997/1998	2.70	22200	6104	29174
1998/1999	2.70	25320	7011	33454
1999/2000	2.90	28700	7228	35835
2000/2001	2.70	28550	8087	36925
2001/2002	2.70	25700	6218	40625
2002/2003	2.90	33900	-	-
2003/2004	3.90	29800	-	-
2004/2005	2.71	38850	-	-
2005/2006	2.70	39731	-	-
2006/2007	2.80	41973	10600*	83000*
2007/2008	2.89	37800	-	-
2008/2009	2.81	46950	-	-

* Analyte only measured once in reporting period

Table 14: Average groundwater quality - ED2 monitoring bores

Year	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
MB11				
1997/1998	6.30	6610	13	4775
1998/1999	6.20	7260	41	5838
1999/2000	6.10	9400	114	5735
2000/2001	6.00	11300	351	8975
2001/2002	5.80	13000	487	8203
2002/2003	5.80	13500	-	-
2003/2004	5.10	12453	-	-
2004/2005	5.40	17040	-	-
2005/2006	5.39	19388	-	-
2006/2007	5.05	23781	-	-
2007/2008	4.36	27650	4140*	-
2008/2009	4.79	31500	210*	45000*
MB12				
1997/1998	5.10	10900	899	11072
1998/1999	4.90	12100	1070	12928
1999/2000	4.70	15200	1375	13250
2000/2001	4.50	17300	2030	16525
2001/2002	4.40	18400	2069	19975
2002/2003	4.30	17900	-	-
2003/2004	4.70	13205	-	-
2004/2005	4.06	22510	-	-
2005/2006	4.13	26234	-	-
2006/2007	4.45	26535	260*	<0.4*
2007/2008	3.88	29633	5785	42700
2008/2009	4.25	34825	220*	49000*
MB13				
1997/1998	6.93	3237	0.59	96
1998/1999	7.03	3275	0.75	66
1999/2000	7.06	3390	0.34	59
2000/2001	7.10	3353	0.81	78
2001/2002	6.99	3113	0.23	69
2002/2003	7.04	3170	-	-
2003/2004	6.92	2878	-	-
2004/2005	6.91	2775	-	-
2005/2006	7.14	3025	-	-
2006/2007	6.77	2811	1.30*	61*
2007/2008	6.90	2470	0.052*	56*
2008/2009	6.58	2990	0.54*	71*
MB14				
1997/1998	6.90	4120	8.93	2479
1998/1999	7.10	3480	0.42	1932
1999/2000	7.00	5150	0.37	2910
2000/2001	6.70	4750	0.49	3502
2001/2002	6.90	5620	0.91	4213
2002/2003	6.70	5620	-	-
2003/2004	7.10	4678	-	-
2004/2005	6.98	4746	-	-
(cont. next page)				

Year	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
2005/2006	7.08	4828	-	-
2006/2007	6.49	4040	0.13	2100
2007/2008	6.54	4494	0.014	3200
2008/2009	7.33	4927	0.024	2900
MB19				
1997/1998	6.60	4650	1.55	3032
1998/1999	6.50	4370	0.62	2485
1999/2000	6.70	4880	0.29	2208
2000/2001	6.70	4750	0.25	2327
2001/2002	6.60	4900	0.13	2502
2002/2003	6.60	5090	0.11	2380
2003/2004	6.70	4903	-	-
2004/2005	6.44	5335	-	-
2005/2006	6.69	5183	-	-
2006/2007	6.84	5183	3.10*	2400*
2007/2008	6.98	4616	0.032*	2390*
2008/2009	6.30	5617	3.6*	2500*
MB20				
1997/1998	6.50	4700	0.84	3031
1998/1999	6.60	4190	0.41	2496
1999/2000	6.60	5570	0.35	2968
2000/2001	6.60	5730	0.33	3332
2001/2002	6.50	5660	0.14	3360
2002/2003	6.50	5700	0.51	3200
2003/2004	6.80	5053	-	-
2004/2005	6.77	4945	-	-
2005/2006	6.92	4999	-	-
2006/2007	6.45	5202	-	-
2007/2008	6.13^	5030^	-	-
2008/2009	5.87	5800	0.085*	2600*

* Analyte only measured once in reporting period
^ Average reading from September and October 2007 only

Table 15: ED3 average water quality each reporting period

ED3 North	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
2003/2004	2.56	23734	8300	58355
2004/2005	2.87	17204	2519	10710
2005/2006	3.82	9113	790	9069
2006/2007	3.51	14333	1200	12933
2007/2008	3.65	17000	712.5	15500
2008/2009	4.69	22165	160	16667
ED3 South	**pH**	**Conductivity (µS/cm)**	**Zinc (mg/L)**	**Sulphate (mg/L)**
2003/2004	2.70	9573	2890	22100
2004/2005	2.71	11280	1484	8816
2005/2006	3.00	10744	1101	11337
2006/2007	3.23	6995	490	5850
2007/2008	3.08	8860	450	7425
2008/2009	3.41	11285	153	9833

Table 16: Average groundwater quality - ED3 monitoring bores

Year	pH	Conductivity (µS/cm)	Sulphate (mg/L)	Zinc (mg/L)
ED3B				
1992/1996	6.90	7970	668	0.43
1996/1997	6.70	7890	718	0.47
1997/1998	6.70	7710	646	0.47
1998/1999	6.80	7440	583	0.61
1999/2000	6.80	8240	634	0.31
2000/2001	6.80	8020	700	0.35
2001/2002	7.10	7670	738	0.15
2002/2003	7.00	7480	699	0.15
2003/2004	6.50	7290	646	0.20
2004/2005	6.80	7480	708	0.15
2005/2006	7.00	6011	678	0.20
2006/2007	6.93	7737	813	0.03
2007/2008	7.4	6800	785	0.037
2008/2009	6.96	7810	693	0.028
WM5				
2003/2004	6.40	6143	156	0.08
2004/2005	7.13	6860	121	0.12
2005/2006	7.55	4549	847	0.17
2006/2007	7.10	4423	257	0.09
2007/2008	7.55	8150	197	0.132
2008/2009	6.93	4975	220	0.125
WM6				
2003/2004	6.2	10130	450	1.77
2004/2005	6.21	11295	442	0.168
2005/2006	6.47	10514	352	0.154
2006/2007	6.39	7934	422	0.205
2007/2008	6.45	12075	1135	0.563
2008/2009	6.43	13660	333	0.4425

Table 17: Mine void groundwater quality - average values from 2003/04, 2008/08 and 2008/09

2003/2004	pH	Conductivity (µS/cm)	Ammonia (mg/L)	Sulphate (mg/L)	Zinc (mg/L)
WM1	7.32	2019	0.05	723	0.71
WM7	4.01	4823	0.41	4353	509.67
WM3	3.63	15762	1.01	21300	2693.33
WM4	6.80	2881	0.16	1142	1.62
2007/2008	**pH**	**Conductivity (µS/cm)**	**Ammonia (mg/L)**	**Sulphate (mg/L)**	**Zinc (mg/L)**
WM1	7.53	2100	0.505	675	0.105
WM7	7.53	3875	0.043	2575	0.733
WM3	3.73	4175	1.095	3650	203.33
WM4	7.4	1700	0.04	807	0.873
2008/2009	**pH**	**Conductivity (µS/cm)**	**Ammonia (mg/L)**	**Sulphate (mg/L)**	**Zinc (mg/L)**
WM1	7.26	2001	0.607	650	0.07
WM7	6.34	4020	0.097	2433	0.49
WM3	4.35	5095	1.13	5133	233.33
WM4	7.15	1732	0.02	766	1.27

Table 18: Water Quality Data (Averages) - Waste Rock Dump Bores

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate(mg/L)
MB5				
1997/1998	4.15	7628	271	5840
1998/1999	4.24	7435	354	6601
1999/2000	4.23	8318	242	5275
2000/2001	4.23	8648	273	5820
2001/2002	4.16	8353	278	5872
2002/2003	4.08	7580	-	-
2003/2004	4.40	6215	-	-
2004/2005	4.13	7103	-	-
2005/2006	3.55	7634	-	-
2006/2007	3.15	8333	150*	5900*
2007/2008	4.2	8382	200*	5220*
2008/2009	4.99	8310	240*	6000*
MB15				
1997/1998	6.65	8010	2.28	6142
1998/1999	6.75	8865	1.87	8003
1999/2000	6.71	7125	0.96	4237
2000/2001	6.79	7125	1.27	4372
2001/2002	6.65	6930	0.93	4068
2002/2003	6.74	6293	-	-
2003/2004	6.42	5988	-	-
2004/2005	6.35	5617	-	-
2005/2006	6.58	5431	-	-
2006/2007	6.76	6722	0.15*	4000*
2007/2008	6.34	6477	0.801*	4220*
(cont. over page)				

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate(mg/L)
2008/2009	6.57	7532	0.23*	4700*
MB16				
1997/1998	3.38	22625	6033	37762
1998/1999	3.39	22855	5780	36634
1999/2000	3.45	26350	5405	38050
2000/2001	3.40	27075	5880	36375
2001/2002	3.38	25700	4610	38075
2002/2003	3.54	22867	-	-
2003/2004	3.31	17353	-	-
2004/2005	3.48	15420	-	-
2005/2006	3.57	25626	-	-
2006/2007	3.73	25072	260*	<0.4*
2007/2008	3.6	24980	180*	46000*
2008/2009	4.39	28380	200	47000
MB17				
1997/1998	6.03	11193	147	9965
1998/1999	6.21	10405	34	9736
1999/2000	6.25	11598	21	8332
2000/2001	6.22	11625	49	8875
2001/2002	6.13	11425	49	6510
2002/2003	6.23	10667	-	-
2003/2004	6.21	9995	-	-
2004/2005	6.01	9370	-	-
2005/2006	6.16	10860	-	-
2006/2007	6.25	11015	2.80*	8000*
2007/2008	6.19	9515	3.43*	8600*
2008/2009	7.23	11142.5	9.2*	8000*

* Analyte only measured once in reporting period

Table 19: Surface Water Quality Averages for the North Tailings Dam

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1997/1998	3.20	9960	1004.00	7269
1998/1999	3.19	7545	574.75	6882
1999/2000	3.42	11035	699.75	7107
2000/2001	3.17	12500	660.75	5863
2001/2002	3.12	13375	1150.25	10067
2002/2003	3.22	17733	-	-
2003/2004	2.37	16990	-	-
2004/2005	2.73	27620	-	-
2005/2006	1.99	23706	-	-
2006/2007	2.94	34850	3700.00*	36000*
2007/2008	2.91^	11807^	-	-
2008/2009	3.56	11786	-	-

* Analyte only measured once in reporting period
^ Average reading from December 2007 and May 2008 only

Table 20: Average Water Quality for North Tailings Dam Piezometers

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
NTP1				
1996/1997	6.50	5195	0.22	120
1997/1998	6.60	5200	0.54	120
1998/1999	6.70	4850	0.42	134
1999/2000	6.71	5340	0.43	113
2000/2001	6.78	5045	0.34	113
2001/2002	6.76	5390	0.21	129
2002/2003	6.67	5120	0.13	122
2003/2004	6.48	4075	-	-
2004/2005	6.54	4460	-	-
2005/2006	6.55	4112	-	-
2006/2007	6.83	4824	0.01	140
2007/2008	6.81^	5090^	0.11*	150*
2008/2009	7.60	5055	0.018*	130*
NTP2				
1996/1997	6.65	5080	0.09	120
1997/1998	6.80	2840	0.19	130
1998/1999	6.80	3115	0.29	234
1999/2000	6.89	3580	0.25	96
2000/2001	6.93	2965	0.18	140
2001/2002	6.73	3215	0.12	68
2002/2003	6.99	3050	0.08	53
2003/2004	6.60	4680	-	-
2004/2005	6.79	4575	-	-
2005/2006	6.93	5447	-	-
2006/2007	7.05	3347	0.01	39
2007/2008	6.86^	4940^	-	-
2008/2009	7.24	5530	0.068*	31*
SP2C				
1996/1997	6.25	3605	0.14	215
1997/1998	6.30	3640	0.26	230
1998/1999	6.35	3305	0.27	282
1999/2000	6.44	3660	0.20	268
2000/2001	6.52	3510	0.20	309
2001/2002	6.52	5025	0.15	379
2002/2003	6.50	3650	0.09	353
2003/2004	6.04	2895	-	-
2004/2005	7.08	3393	-	-
2005/2006	6.92	3306	-	-
2006/2007	6.98	3705	<0.005*	560*
2007/2008	6.64	2916	0.005^^	609^^
2008/2009	7.22	3670	0.015*	710*
(cont. over page)				

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
SP3C				
1996/1997	6.55	6890	0.27	45
1997/1998	6.50	6720	0.50	50
1998/1999	6.70	6415	0.54	51
1999/2000	6.85	6925	0.40	41
2000/2001	6.79	6745	0.34	42
2001/2002	6.80	6905	0.30	47
2002/2003	6.93	6710	0.17	45
2003/2004	6.42	5205	-	-
2004/2005	6.73	5965	-	-
2005/2006	6.53	4533	-	-
2006/2007	6.70	6314	<0.005*	45*
2007/2008	6.74^	6460^	0.045*	48*
2008/2009	7.15	6505	0.038*	47*
ETP8				
1996/1997	6.45	1660	0.56	415
1997/1998	6.60	1950	0.37	670
1998/1999	6.65	1445	0.38	710
1999/2000	6.59	2185	0.41	727
2000/2001	6.57	1980	0.22	595
2001/2002	6.58	2040	0.18	524
2002/2003	6.57	1920	0.12	446
2003/2004	6.61	1517	-	-
2004/2005	6.68	1780	-	-
2005/2006	6.42	1865	-	-
2006/2007	5.75	1399	38*	760*
2007/2008	6.73	2441	16.05^^	801^^
2008/2009	7.55	1635	13*	880*
SP11B				
1996/1997	5.95	4550	0.22	70
1997/1998	6.10	4600	0.42	130
1998/1999	5.95	4165	0.43	77
1999/2000	6.14	4405	0.32	110
2000/2001	6.15	4165	0.31	137
2001/2002	6.15	4485	0.27	81
2002/2003	6.04	4360	0.16	73
2003/2004	6.64	3120	-	-
2004/2005	6.45	4773	-	-
2005/2006	6.42	4228	-	-
2006/2007	6.37	4301	0.08*	80*
2007/2008	6.41	2841	0.28^^	79^^
2008/2009	6.82	4155	0.58*	75*

* Analyte only measured once in reporting period
^ Average reading from September 2007 and February 2008 only
^^ Average reading from August 2007 and February 2008 only

Table 21: Average South Tailings Dam Surface Water Quality

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
1997/1998	3.85	5455	1000.00	7825
1998/1999	3.18	10142	1457.60	9290
1999/2000	3.35	10766	1380.00	8226
2000/2001	2.99	11080	1387.80	8834
2001/2002	2.99	12550	1305.00	10522
2002/2003	2.98	12753	-	-
2003/2004	2.07	10875	-	-
2004/2005	2.67	15235	-	-
2005/2006	2.49	10989	-	-
2006/2007	2.68	18700	2500.00	21000
2007/2008	2.62^	15835^	-	-
2008/2009	3.39	16505	-	-

^ Average reading from December 2007 and May 2008 only

Table 22: Average Annual Water Quality - STD Piezometers

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
X1				
1996/1997	5.75	3510	1.69	315
1997/1998	5.60	3330	5.20	370
1998/1999	6.15	2470	7.24	379
1999/2000	5.97	1865	5.47	274
2000/2001	5.94	1580	3.34	248
2001/2002	5.98	1380	3.27	243
2002/2003	6.15	1110	0.85	179
2003/2004	5.93	816	-	-
2004/2005	6.83	3430	-	-
2005/2006	6.44	2077	-	-
2006/2007	6.25	1902	0.83*	210*
2007/2008	6.37^	2965^	45*	1500*
2008/2009	7.25	3335	53*	1600*
X2				
1996/1997	6.45	3565	0.09	120
1997/1998	6.50	3630	0.19	100
1998/1999	6.55	3235	0.37	110
1999/2000	6.62	3515	0.24	84
2000/2001	6.62	3310	0.18	83
2001/2002	5.27	3430	0.10	92
2002/2003	6.62	3350	0.07	87
2003/2004	6.68	2690	-	-
2004/2005	6.98	3190	-	-
2005/2006	7.05	3021	-	-
2006/2007	6.72	3350	0.01*	96*
2007/2008	6.79^	2895^	0.16*	91*
2008/2009	7.08	2975	0.056*	74*
(cont. over page)				

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
Y1				
1996/1997	6.95	5705	0.28	393
1997/1998	6.90	5780	0.30	390
1998/1999	6.95	5345	0.34	655
1999/2000	7.13	5780	0.21	413
2000/2001	7.16	5350	0.18	413
2001/2002	7.11	5625	0.12	455
2002/2003	7.15	5370	0.13	433
2003/2004	6.89	4270	-	-
2004/2005	6.72	6435	-	-
2005/2006	7.09	4866	-	-
2006/2007	6.98	5452	0.70*	840*
2007/2008	6.89^	5690^	5.9*	1100*
2008/2009	7.25	5810	1.3*	330*
Z1				
1996/1997	6.30	3675	0.38	1205
1997/1998	6.40	3600	0.47	1300
1998/1999	6.35	3845	0.46	1506
1999/2000	6.48	3990	0.31	1270
2000/2001	6.53	3860	0.40	1550
2001/2002	6.52	4110	0.33	1715
2002/2003	6.45	4190	0.20	1490
2003/2004	6.58	3160	-	-
2004/2005	6.12	4155	-	-
2005/2006	6.19	3543	-	-
2006/2007	6.82	3803	0.06*	1700*
2007/2008	6.89^	4115^	0.28*	1600*
2008/2009	7.44	4680	0.21*	2200*
E3				
1996/1997	6.80	3430	0.15	715
1997/1998	6.60	3600	0.33	770
1998/1999	6.75	3480	0.32	886
1999/2000	6.91	3745	0.22	850
2000/2001	6.92	3765	0.17	980
2001/2002	6.89	4005	0.18	1225
2002/2003	6.86	4060	0.13	1180
2003/2004	6.78	3155	-	-
2004/2005	6.20	4430	-	-
2005/2006	6.47	4128	-	-
2006/2007	7.32	3877	0.01*	1400*
2007/2008	7.12^	2779^	0.064*	290*
2008/2009	7.39	4960	0.048*	2300*
F1				
1996/1997	6.80	1480	0.05	215
1997/1998	6.80	1520	0.47	200
1998/1999	6.75	1505	0.10	225
1999/2000	6.89	1460	0.09	192
2000/2001	6.97	1505	0.09	202
(cont. over page)				

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
2001/2002	7.05	1410	0.07	192
2002/2003	7.01	4140	0.06	157
2003/2004	6.65	1208	-	-
2004/2005	6.49	1741	-	-
2005/2006	6.85	1638	-	-
2006/2007	6.92	4500	<0.005*	1500*
2007/2008	7.16^	2940^	0.083*	77*
2008/2009	8.01	1731	0.032*	79*
F7				
1996/1997	6.75	2845	0.15	755
1997/1998	6.70	2930	0.19	740
1998/1999	6.80	2800	0.20	783
1999/2000	6.86	2985	0.13	712
2000/2001	6.79	3030	0.13	787
2001/2002	6.94	3010	0.10	906
2002/2003	6.73	1330	0.09	758
2003/2004	6.74	2305	-	-
2004/2005	6.46	2228	-	-
2005/2006	7.28	3301	-	-
2006/2007	7.19	3137	<0.005*	1000*
2007/2008	6.95^	3135^	0.019*	1000*
2008/2009	7.53	3235	0.008*	1000*

* Analyte only measured once in reporting period
^ Average reading from September 2007 and February 2008 only

Table 23: Average Water Quality in New Wells Down-Gradient of the South Tailings Seepage Collection Trench

Date	pH	Conductivity (µS/cm)	Zinc (mg/L)	Sulphate (mg/L)
MB21				
2007/2008	6.53	6180	1.6*	44*
2008/2009	6.63	1971.5	0.15*	25*
MB22				
2007/2008	6.12	8845	0.74*	180*
2008/2009	6.39	3460.5	0.65*	340*

* Analyte only measured once in reporting period

Total Petroleum Hydrocarbon Analysis - 2008-2009

Site	Leachate Pond		MP 23			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<250	<250	<250
TPH C10-C14	ug/L	1	1	4800	4800	4800
TPH C15-C28	ug/L	1	1	12000	12000	12000
TPH C29-C36	ug/L	1	1	760	760	760

Site	Leachate Recirculation System		MP24			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	1900	1900	1900
TPH C10-C14	ug/L	1	1	820000	820000	820000
TPH C15-C28	ug/L	1	1	120000	120000	120000
TPH C29-C36	ug/L	1	1	940	940	940

Site	MB1		MP25			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB2		MP26			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB3		MP27			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB4		MP28			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB5		MP29			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	36	36	36
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB6		MP30			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	290	290	290
TPH C10-C14	ug/L	1	1	3100	3100	3100
TPH C15-C28	ug/L	1	1	1900	1900	1900
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB7		MP31			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	63	63	63
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB8		MP32			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	36	36	36
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB10		MP33			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB11		MP34			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	32	32	32
TPH C15-C28	ug/L	1	1	250	250	250
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB12		MP35			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB13		MP36			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB14		MP37			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB15		MP38			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB16		MP39			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MB17		MP40			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	ED3B		MP41			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	WM1		MP42			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	WM3		MP43			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	WM4		MP44			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	WM5		MP45			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	WM6		MP46			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	WM7		MP47			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MW8S		MP55			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

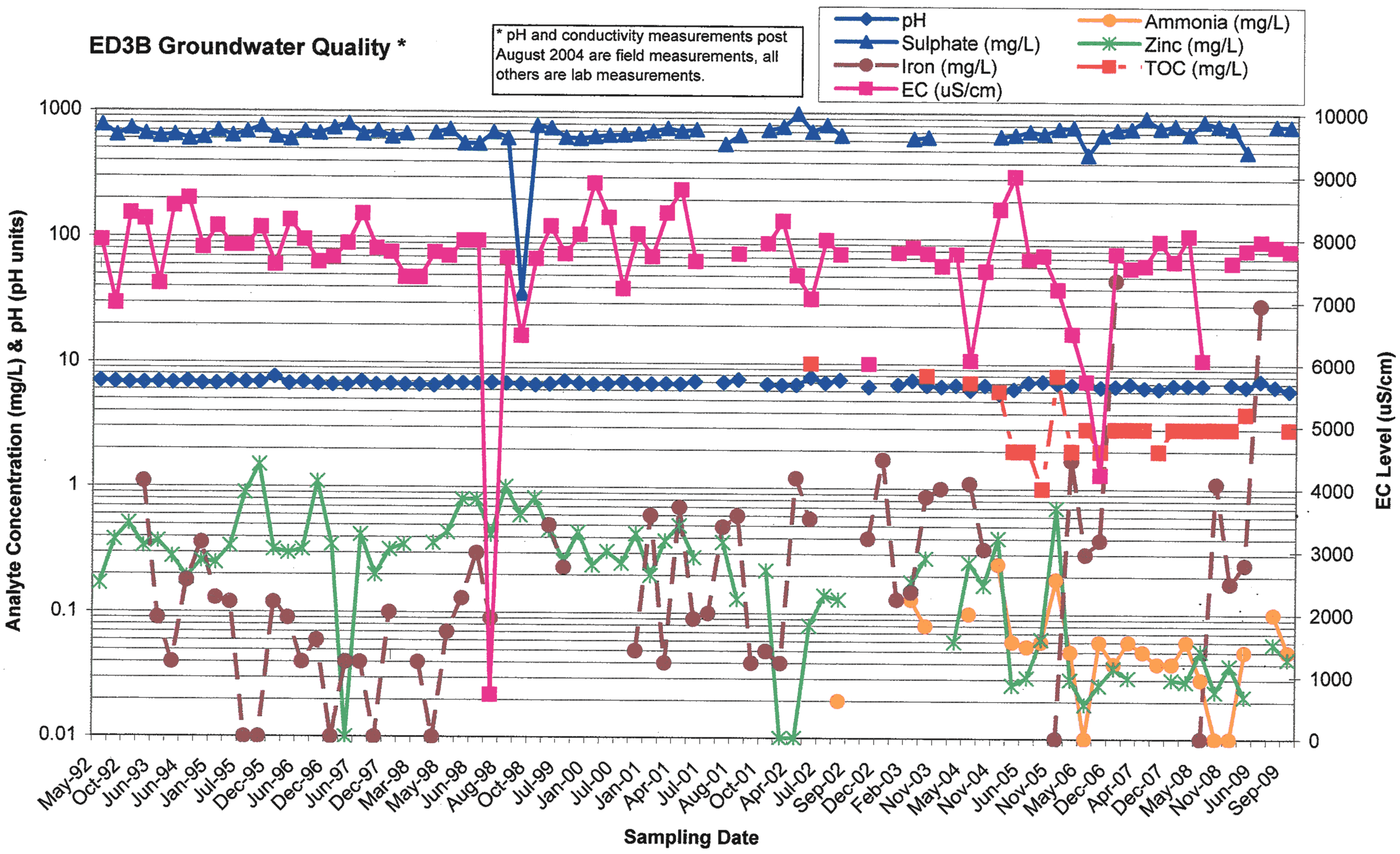
Site	MW8D		MP56			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	MW9S		MP57			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	1	<25	<25	<25
TPH C10-C14	ug/L	1	1	<25	<25	<25
TPH C15-C28	ug/L	1	1	<100	<100	<100
TPH C29-C36	ug/L	1	1	<100	<100	<100

Site	GW10S		MP58			
	Units of Measure	No. of Samples Required by Licence	No. of samples collected	Min	Mean	Max
TPH C6-C9	ug/L	1	0	-	-	-
TPH C10-C14	ug/L	1	0	-	-	-
TPH C15-C28	ug/L	1	0	-	-	-
TPH C29-C36	ug/L	1	0	-	-	-

Monitoring Well Dry - no liquid to sample

APPENDIX D


ED3B Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
EC Level (uS/cm)
Sampling Date
1000
100
10
1
0.1
0.01
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
May-92
Oct-92
Jun-93
Jun-94
Jan-95
Jul-95
Dec-95
Jun-96
Dec-96
Jun-97
Dec-97
Mar-98
May-98
Jun-98
Aug-98
Oct-98
Jul-99
Jan-00
Jul-00
Jan-01
Apr-01
Jul-01
Aug-01
Oct-01
Apr-02
Jul-02
Sep-02
Dec-02
Feb-03
Nov-03
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Dec-07
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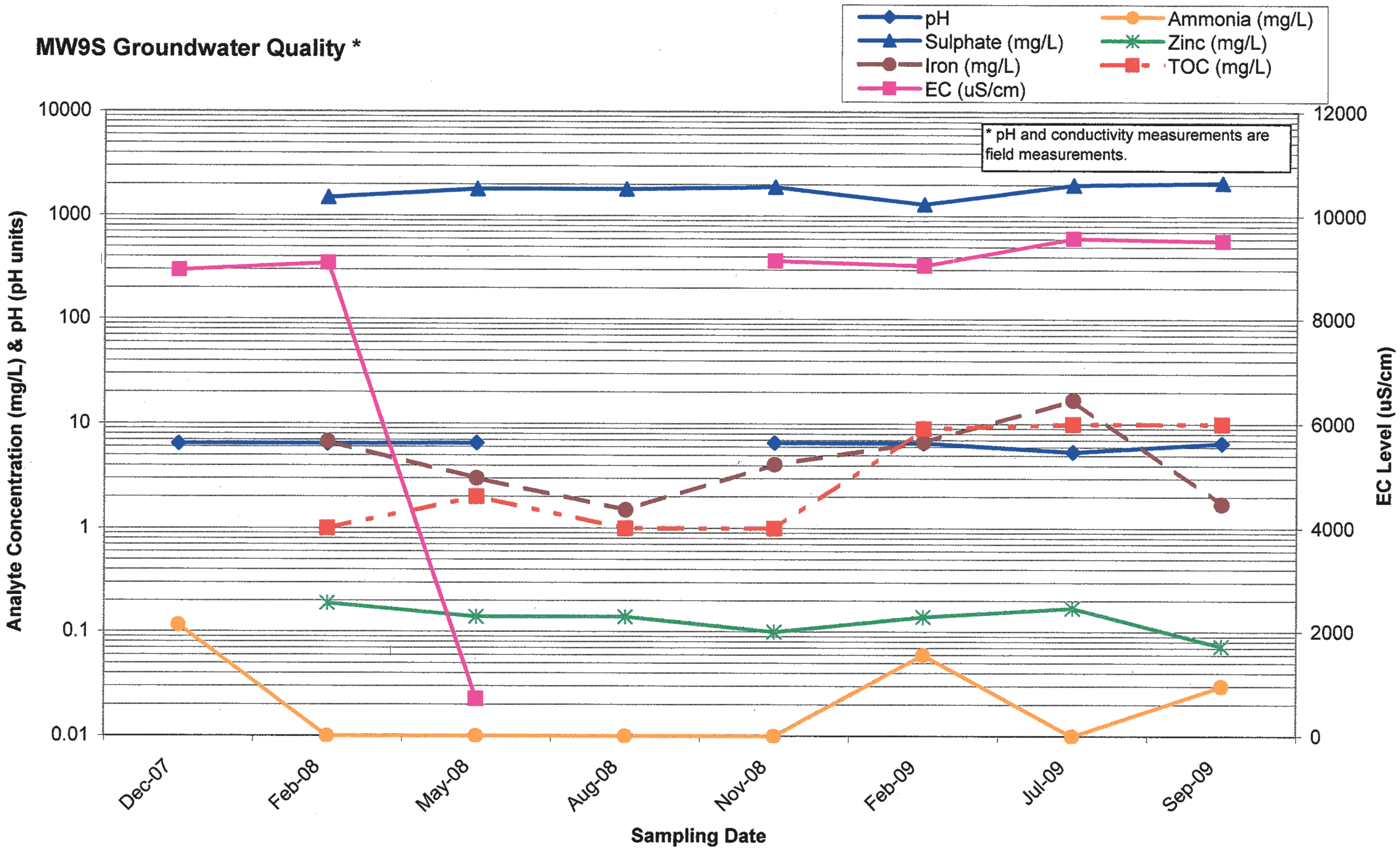
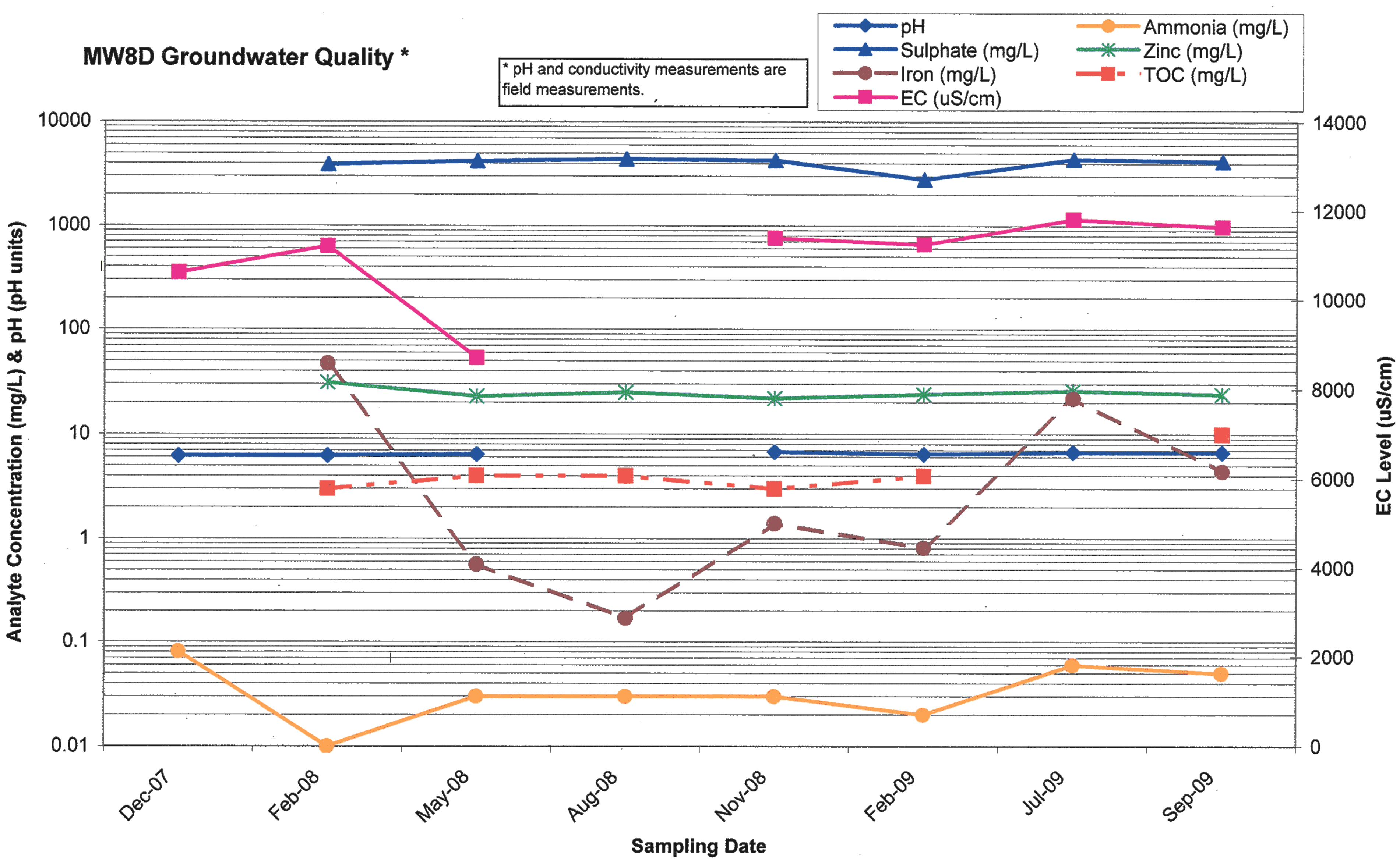
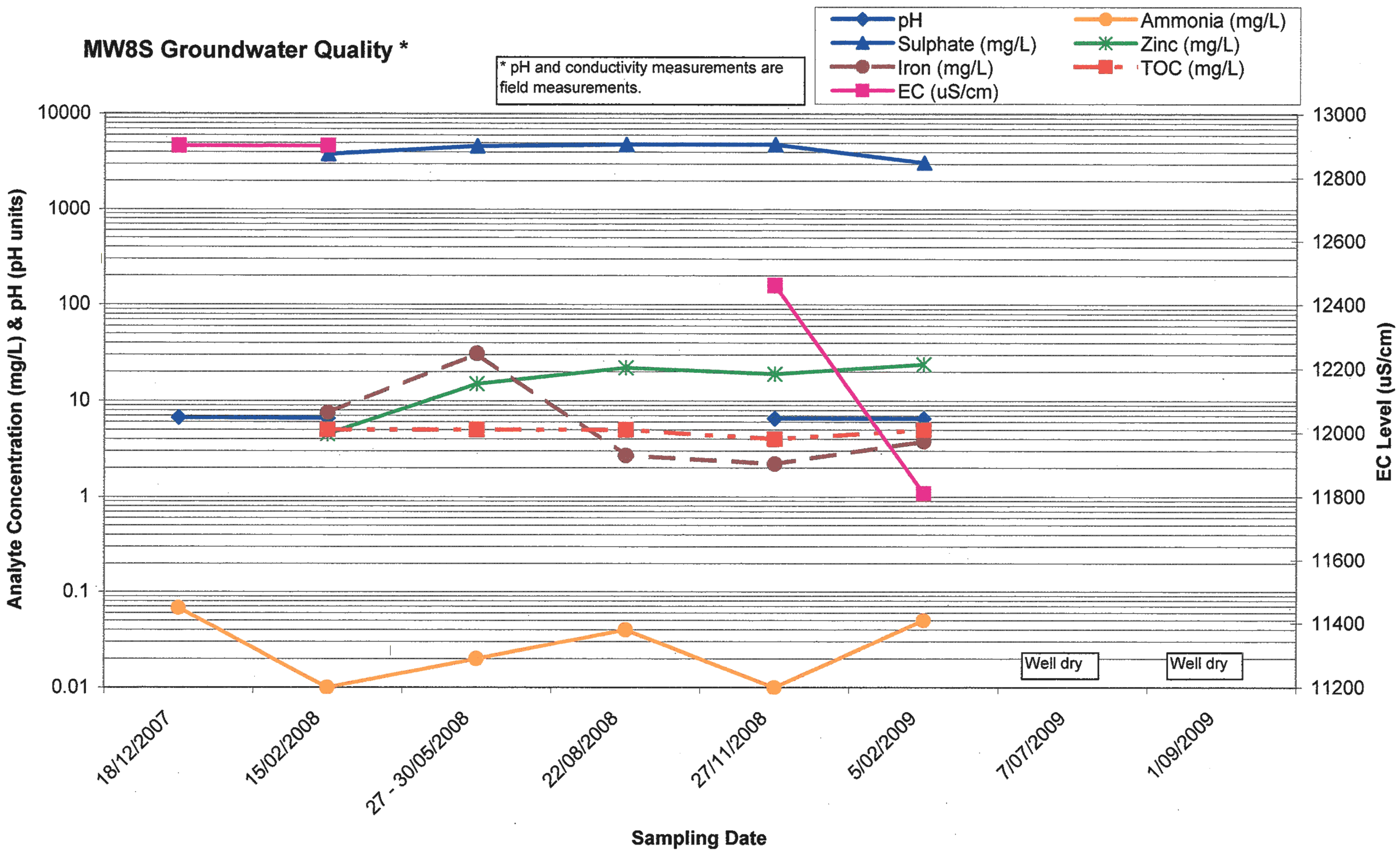
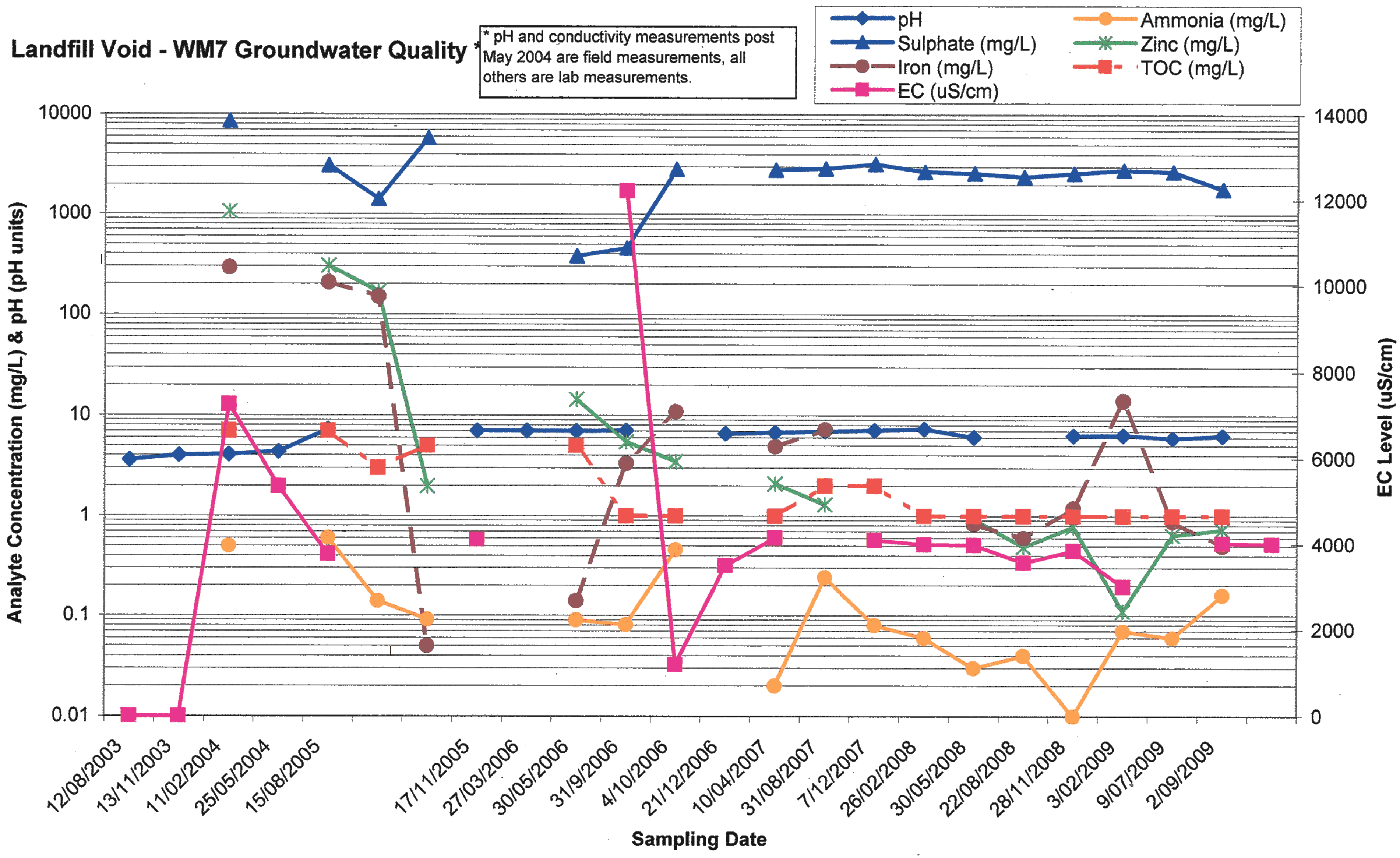
Jun-09
Sep-09

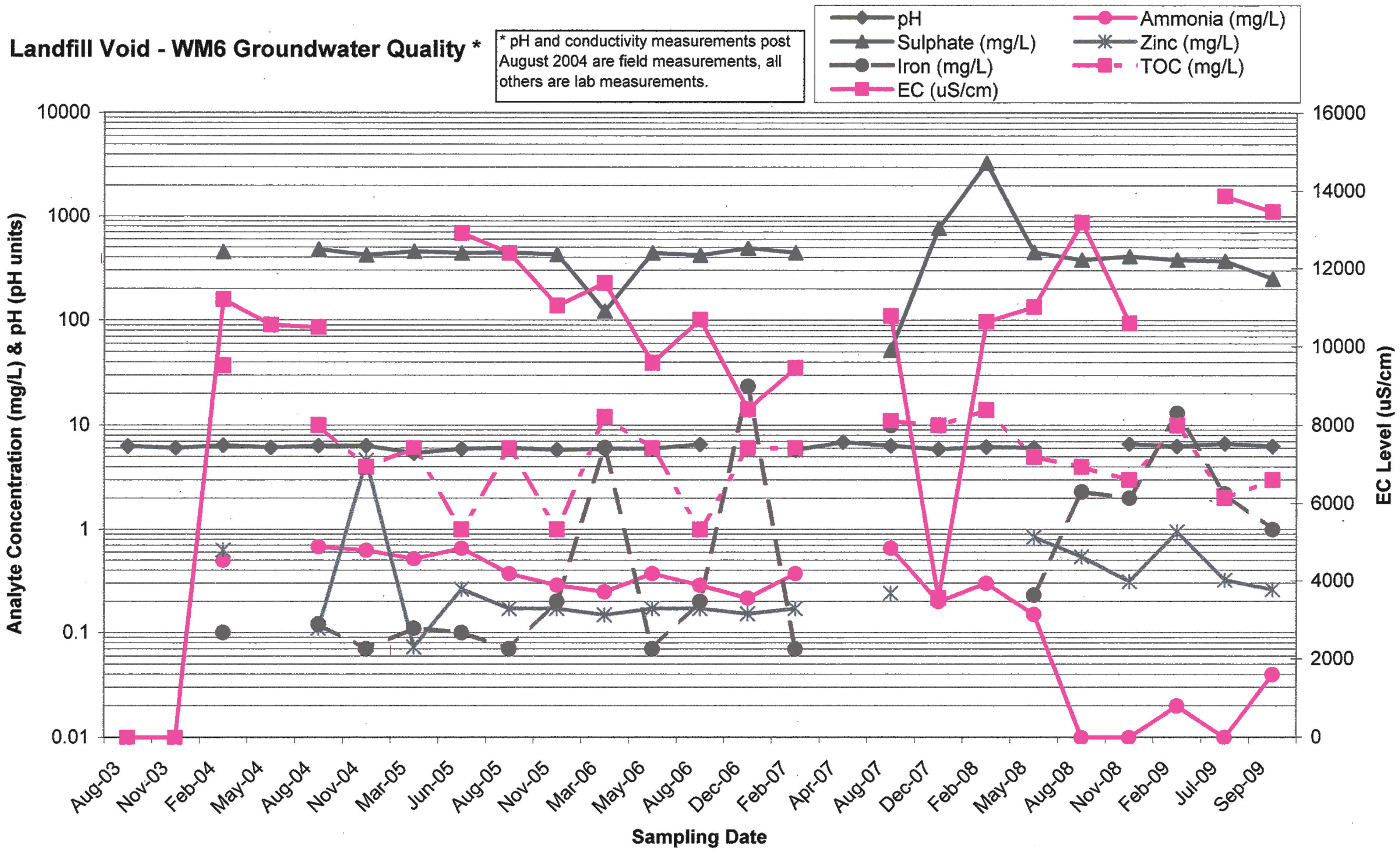

MW9S Groundwater Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity measurements are field measurements.
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
12000
10000
8000
6000
4000
2000
0
Dec-07
Feb-08
May-08
Aug-08
Nov-08
Feb-09
Jul-09
Sep-09
Sampling Date



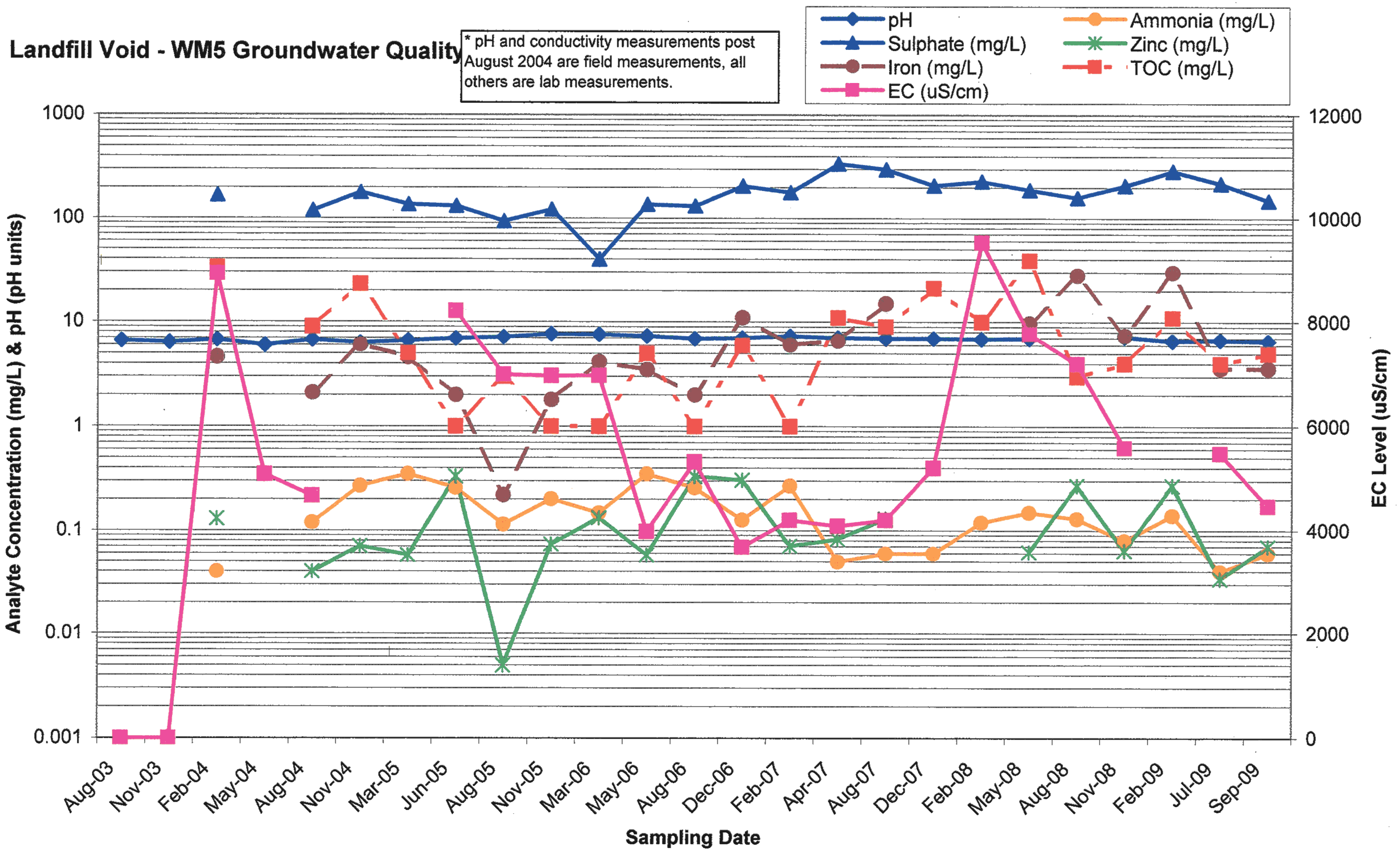
MW8D Groundwater Quality *
* pH and conductivity measurements are field measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
14000
12000
10000
8000
6000
4000
2000
0
Dec-07
Feb-08
May-08
Aug-08
Nov-08
Feb-09
Jul-09
Sep-09
Sampling Date


MW8S Groundwater Quality *
* pH and conductivity measurements are field measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
13000
12800
12600
12400
12200
12000
11800
11600
11400
11200
Well dry
Well dry
18/12/2007
15/02/2008
27 - 30/05/2008
22/08/2008
27/11/2008
5/02/2009
7/07/2009
1/09/2009
Sampling Date

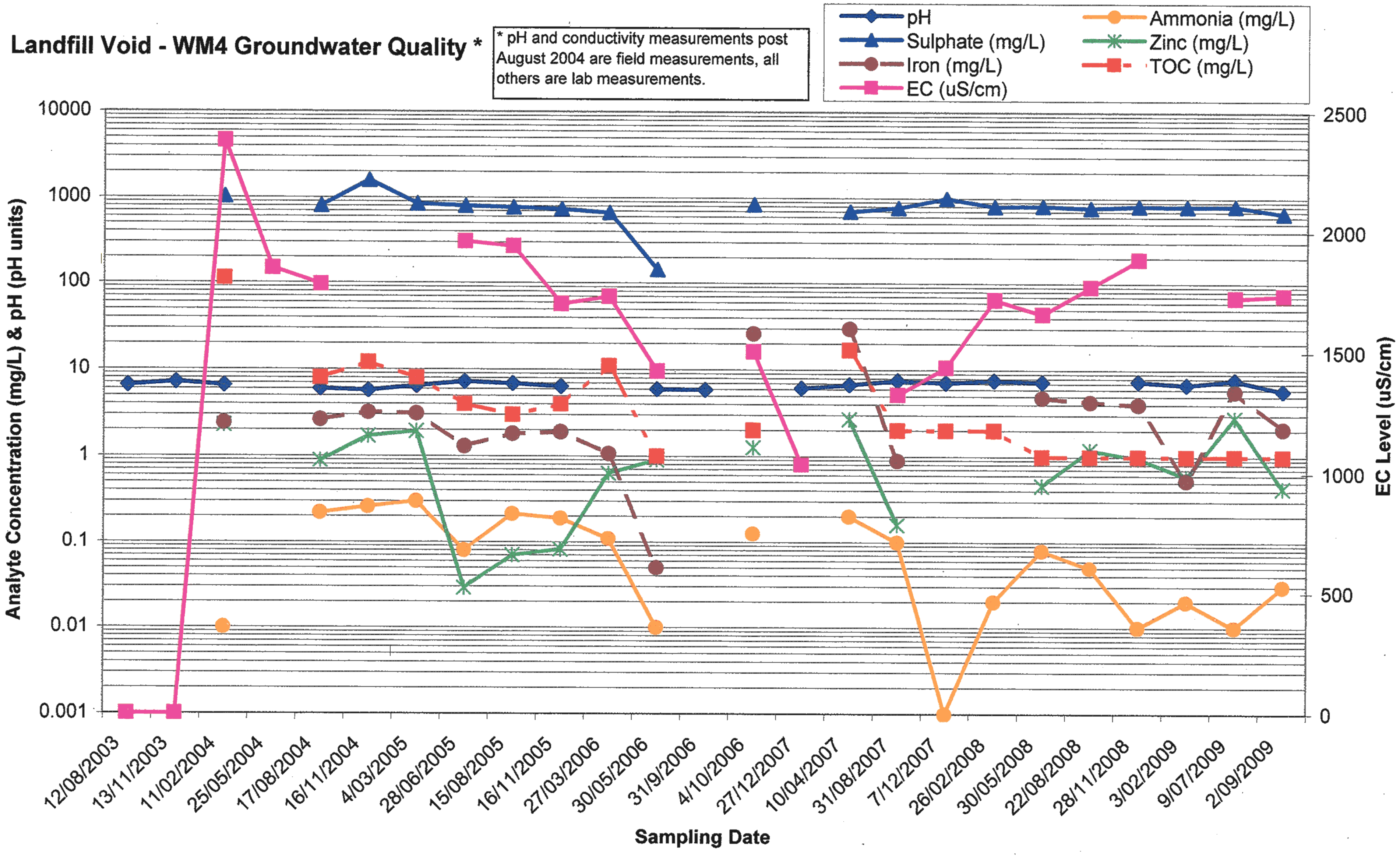

Landfill Void - WM7 Groundwater Quality *
* pH and conductivity measurements post May 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
14000
12000
10000
8000
6000
4000
2000
0
12/08/2003
13/11/2003
11/02/2004
25/05/2004
15/08/2005
17/11/2005
27/03/2006
30/05/2006
31/9/2006
4/10/2006
21/12/2006
10/04/2007
31/08/2007
7/12/2007
26/02/2008
30/05/2008
22/08/2008
28/11/2008
3/02/2009
9/07/2009
2/09/2009
Sampling Date



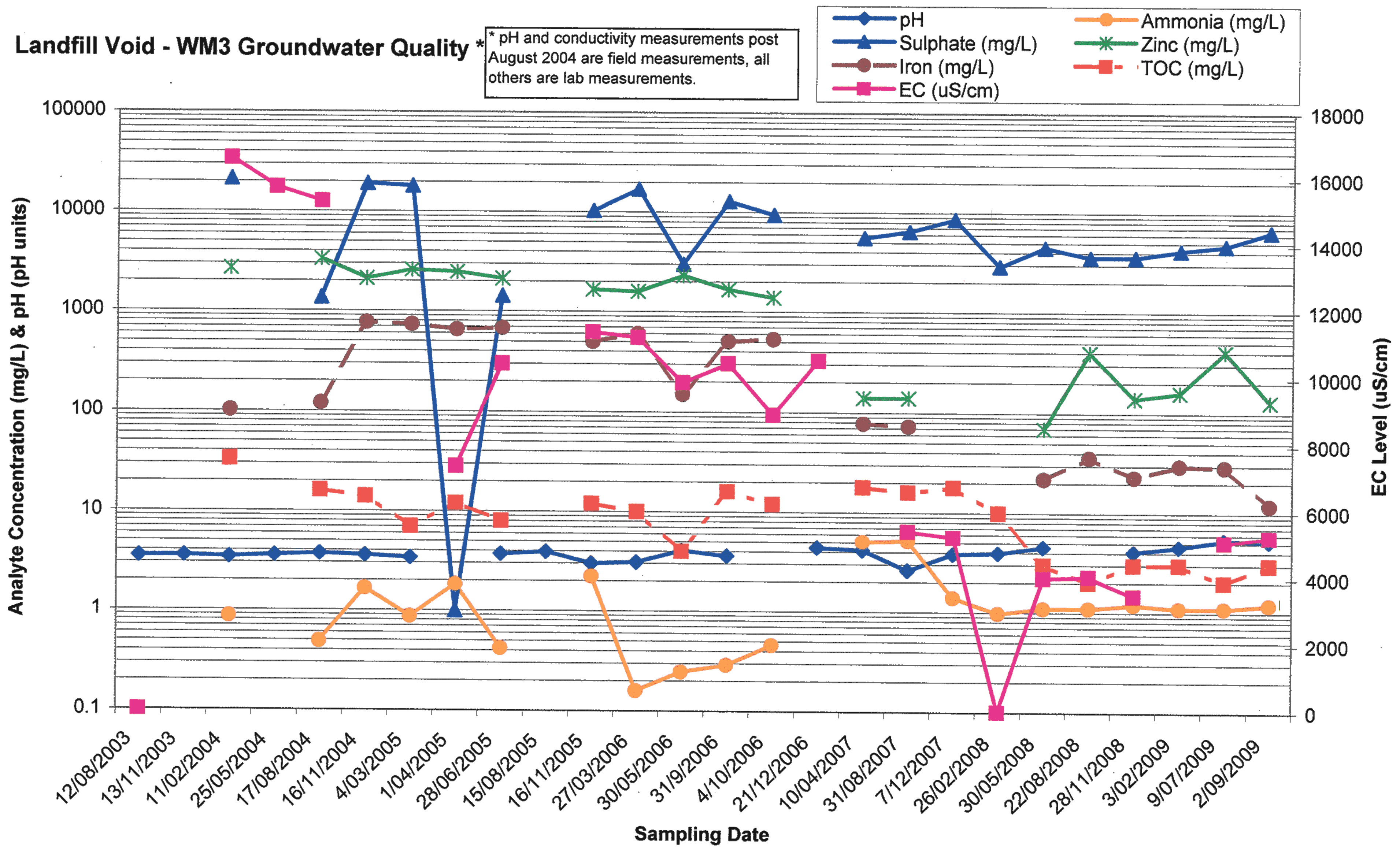
Landfill Void - WM6 Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
16000
14000
12000
10000
8000
6000
4000
2000
0
Aug-03
Nov-03
Feb-04
May-04
Aug-04
Nov-04
Mar-05
Jun-05
Aug-05
Nov-05
Mar-06
May-06
Aug-06
Dec-06
Feb-07
Apr-07
Aug-07
Dec-07
Feb-08
May-08
Aug-08
Nov-08
Feb-09
Jul-09
Sep-09
Sampling Date

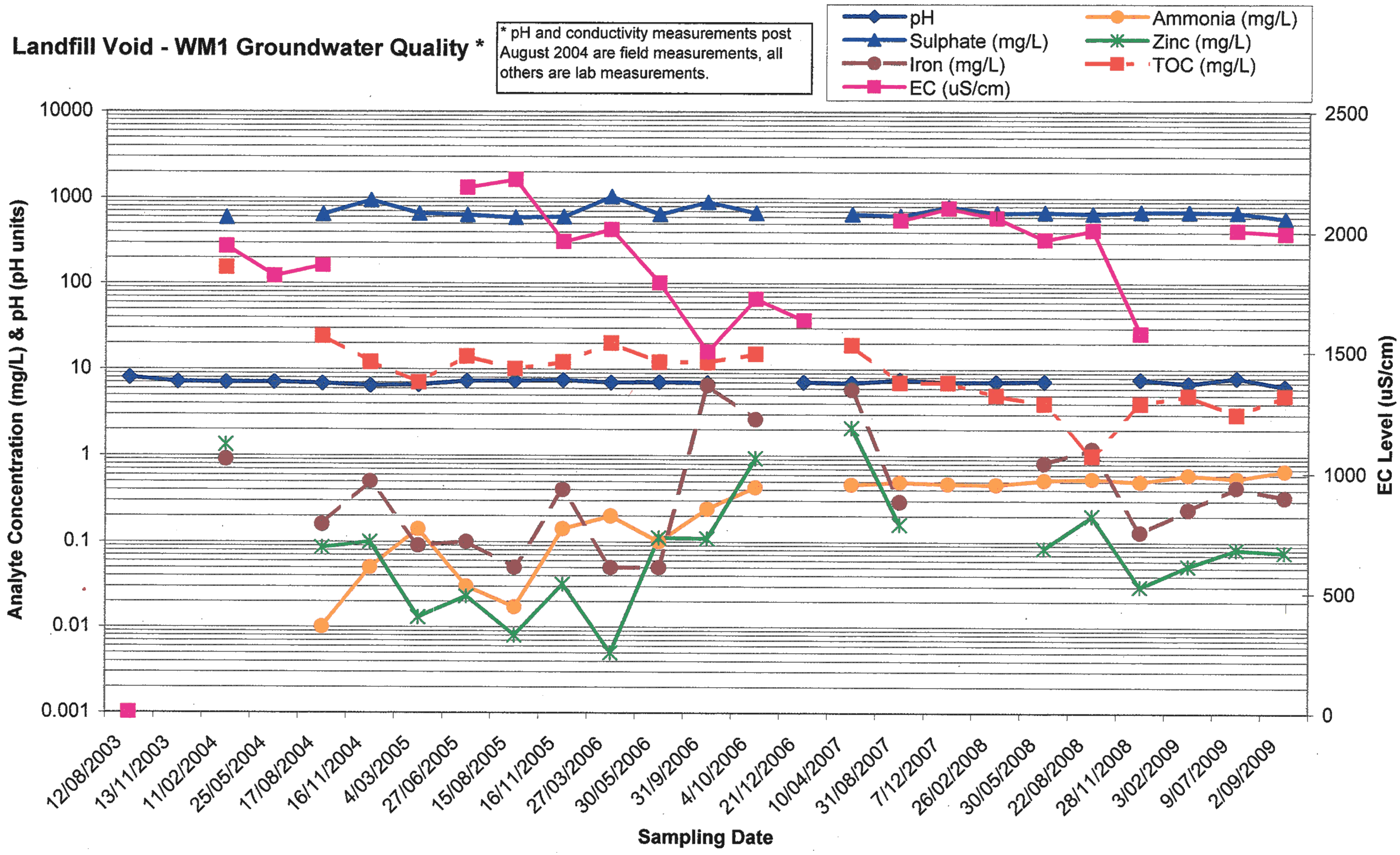


Landfill Void - WM5 Groundwater Quality
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
0.001
EC Level (uS/cm)
12000
10000
8000
6000
4000
2000
0
Aug-03
Nov-03
Feb-04
May-04
Aug-04
Nov-04
Mar-05
Jun-05
Aug-05
Nov-05
Mar-06
May-06
Aug-06
Dec-06
Feb-07
Apr-07
Aug-07
Dec-07
Feb-08
May-08
Aug-08
Nov-08
Feb-09
Jul-09
Sep-09
Sampling Date



Landfill Void - WM4 Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
0.001
EC Level (uS/cm)
2500
2000
1500
1000
500
0
12/08/2003
13/11/2003
11/02/2004
25/05/2004
17/08/2004
16/11/2004
4/03/2005
28/06/2005
15/08/2005
16/11/2005
27/03/2006
30/05/2006
31/9/2006
4/10/2006
27/12/2007
10/04/2007
31/08/2007
7/12/2007
26/02/2008
30/05/2008
22/08/2008
28/11/2008
3/02/2009
9/07/2009
2/09/2009
Sampling Date


Landfill Void - WM3 Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
EC Level (uS/cm)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
12/08/2003
13/11/2003
11/02/2004
25/05/2004
17/08/2004
16/11/2004
4/03/2005
1/04/2005
28/06/2005
15/08/2005
16/11/2005
27/03/2006
30/05/2006
31/9/2006
4/10/2006
21/12/2006
10/04/2007
31/08/2007
7/12/2007
26/02/2008
30/05/2008
22/08/2008
28/11/2008
3/02/2009
9/07/2009
2/09/2009
Sampling Date


Landfill Void - WM1 Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
0.001
EC Level (uS/cm)
2500
2000
1500
1000
500
0
12/08/2003
13/11/2003
11/02/2004
25/05/2004
17/08/2004
16/11/2004
4/03/2005
27/06/2005
15/08/2005
16/11/2005
27/03/2006
30/05/2006
31/9/2006
4/10/2006
21/12/2006
10/04/2007
31/08/2007
7/12/2007
26/02/2008
30/05/2008
22/08/2008
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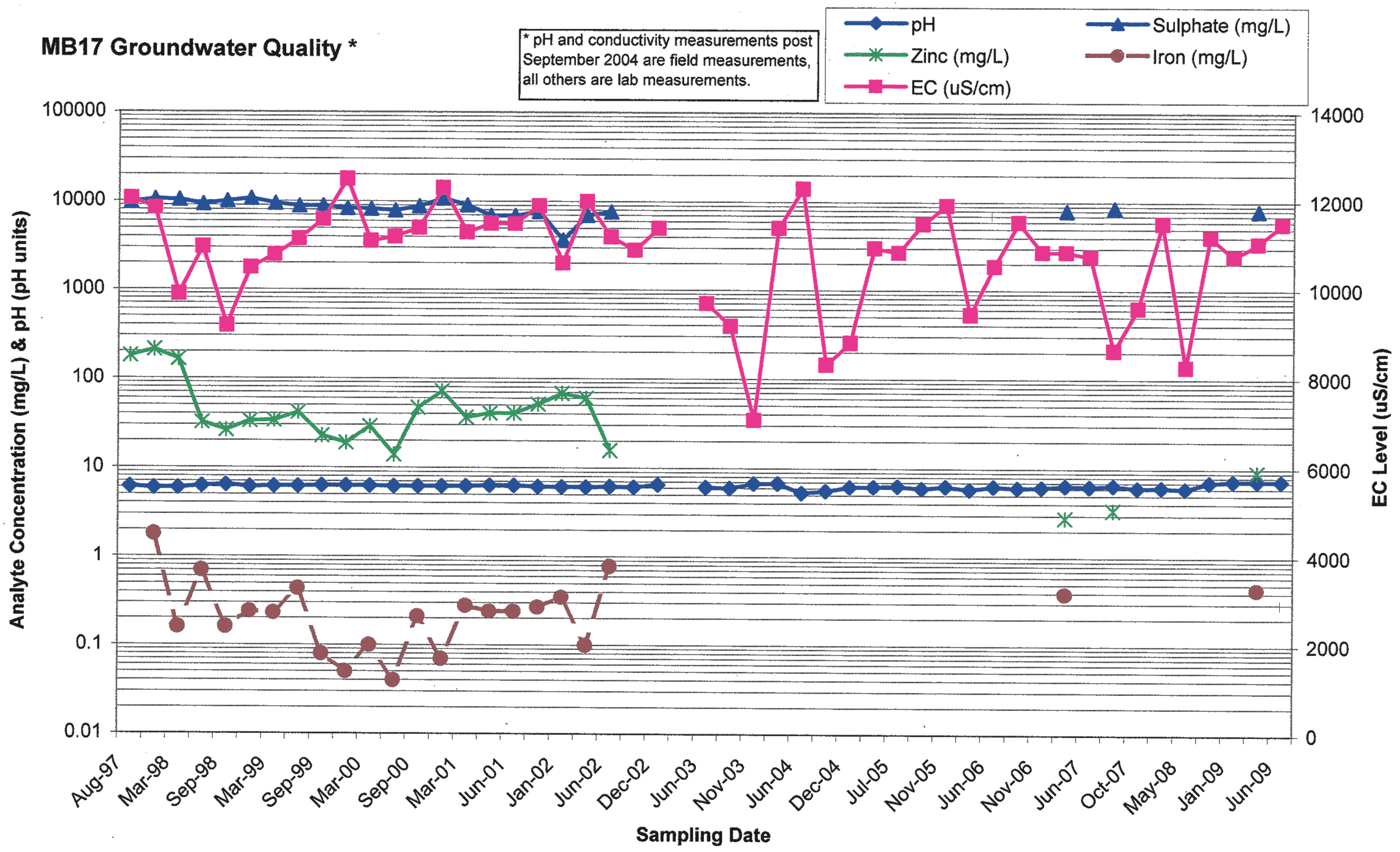
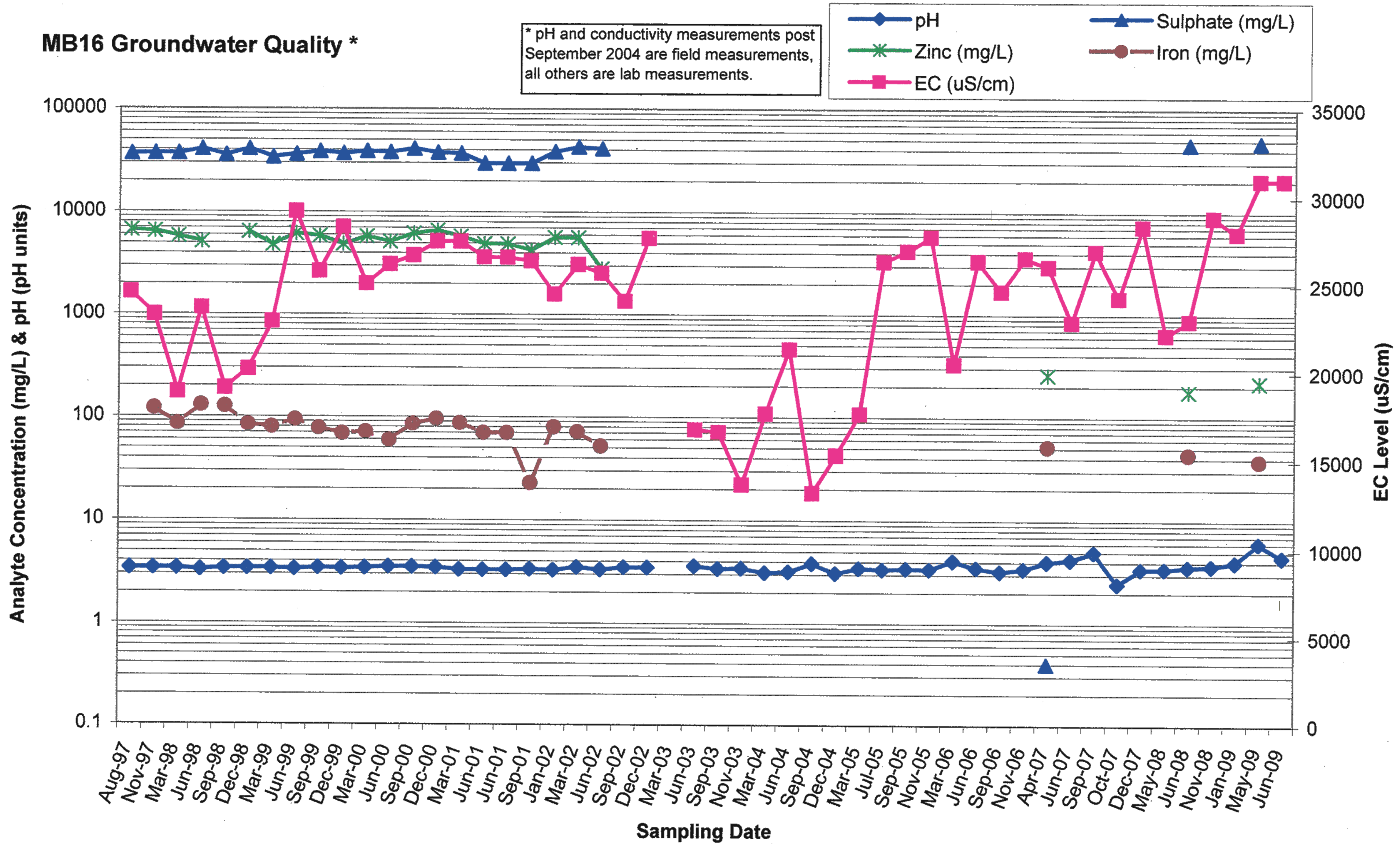
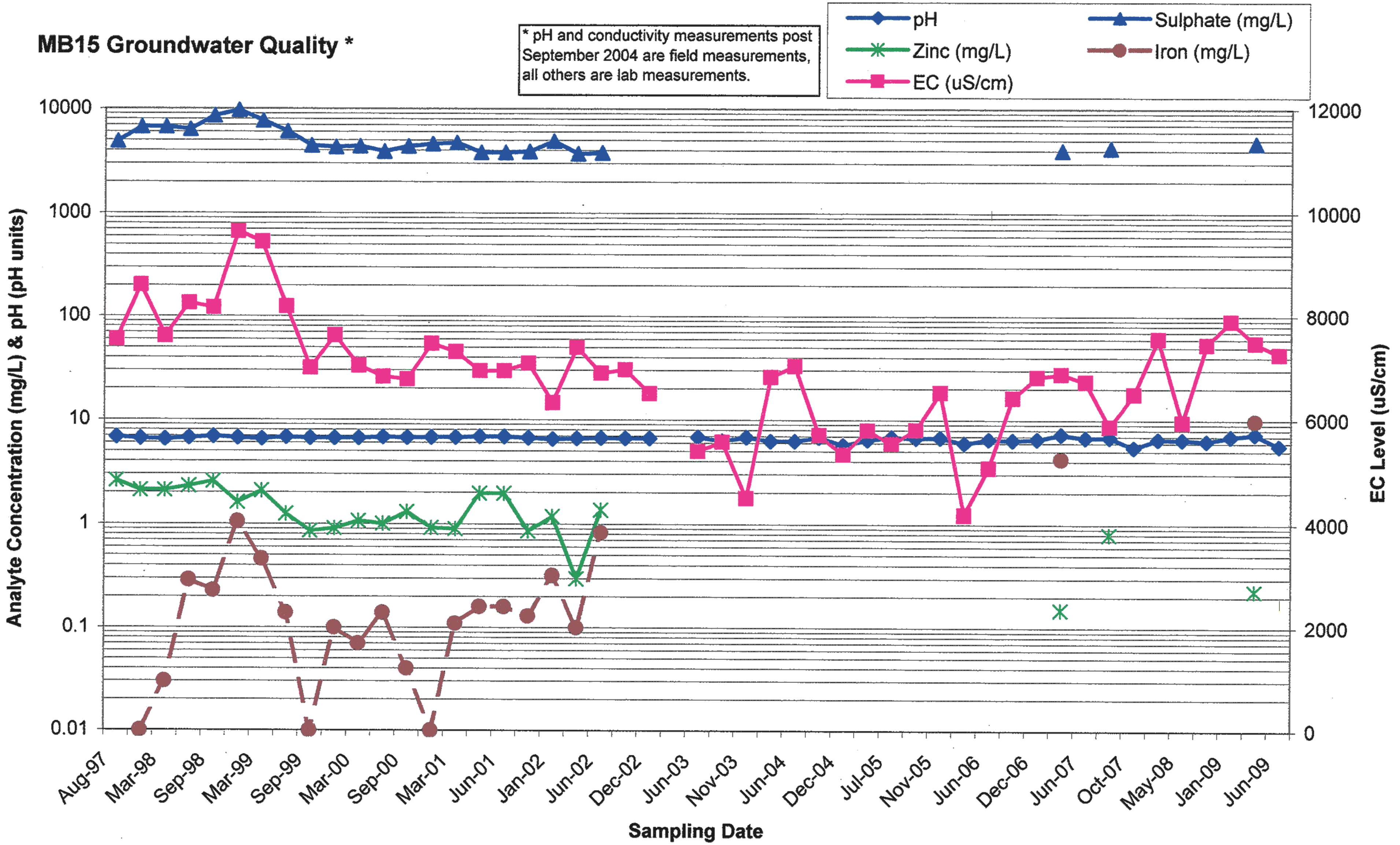
3/02/2009
9/07/2009
2/09/2009
Sampling Date

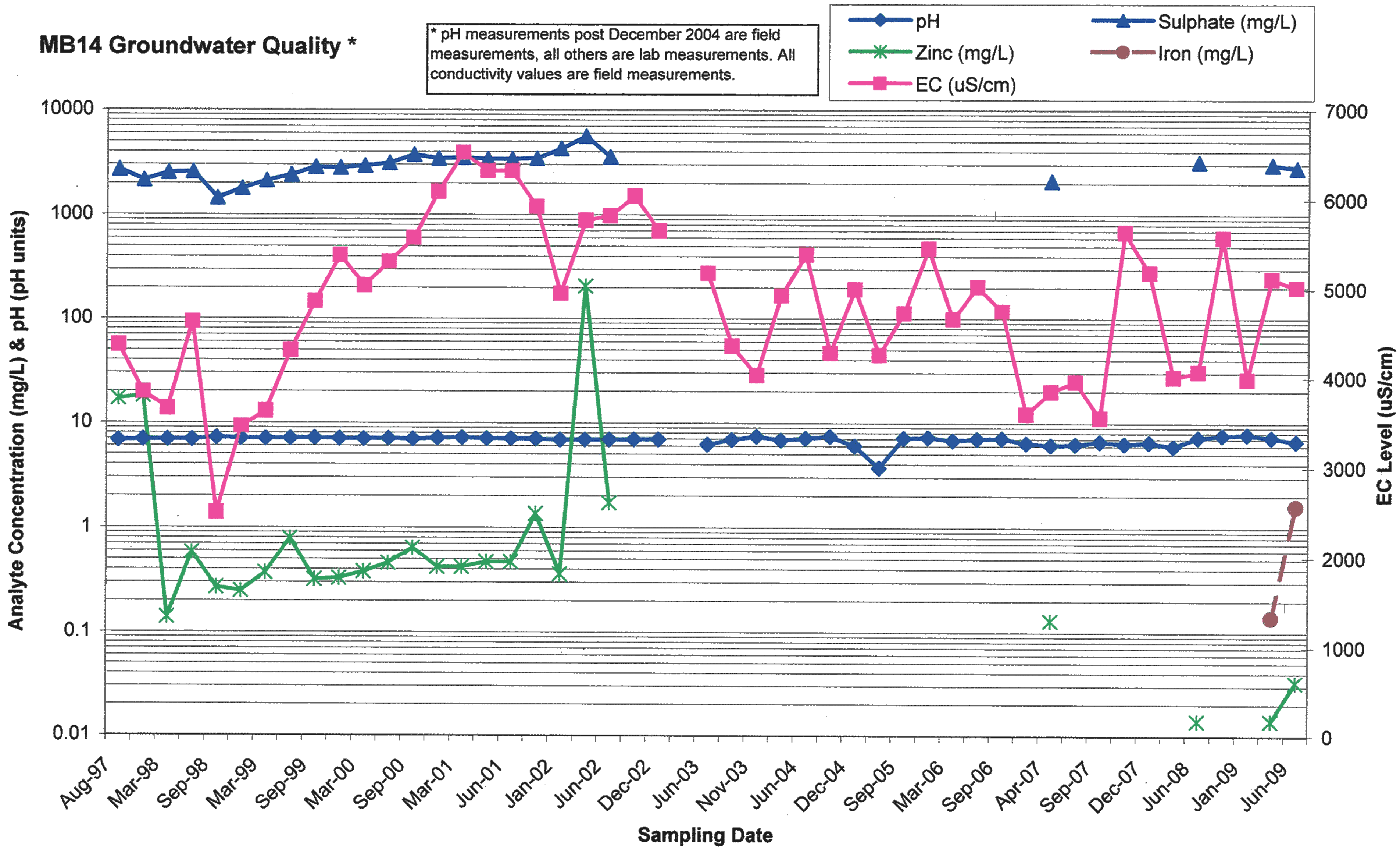


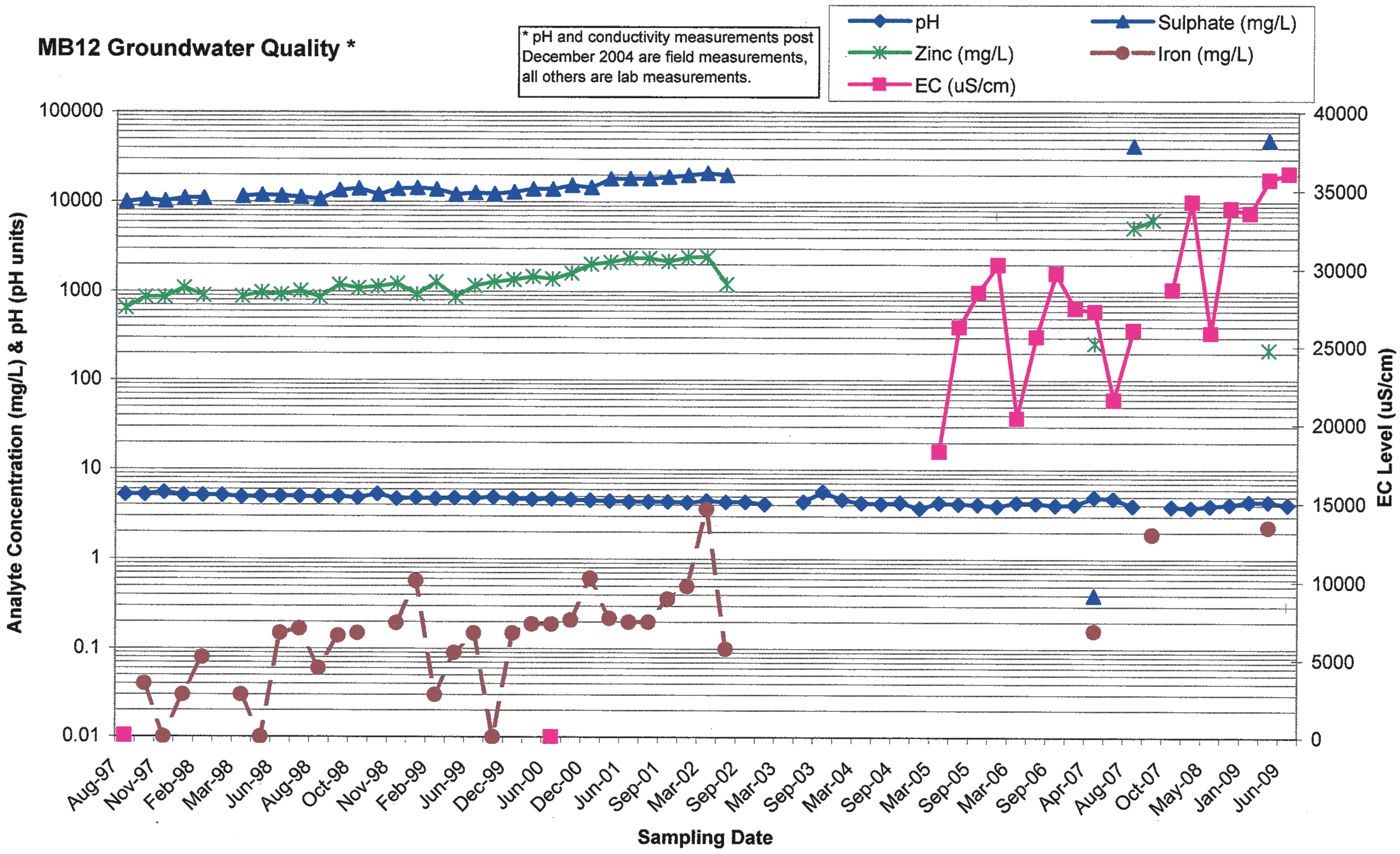
MB17 Groundwater Quality *
* pH and conductivity measurements post September 2004 are field measurements, all others are lab measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
14000
12000
10000
8000
6000
4000
2000
0
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Jan-02
Jun-02
Dec-02
Jun-03
Nov-03
Jun-04
Dec-04
Jul-05
Nov-05
Jun-06
Nov-06
Jun-07
Oct-07
May-08
Jan-09
Jun-09
Sampling Date

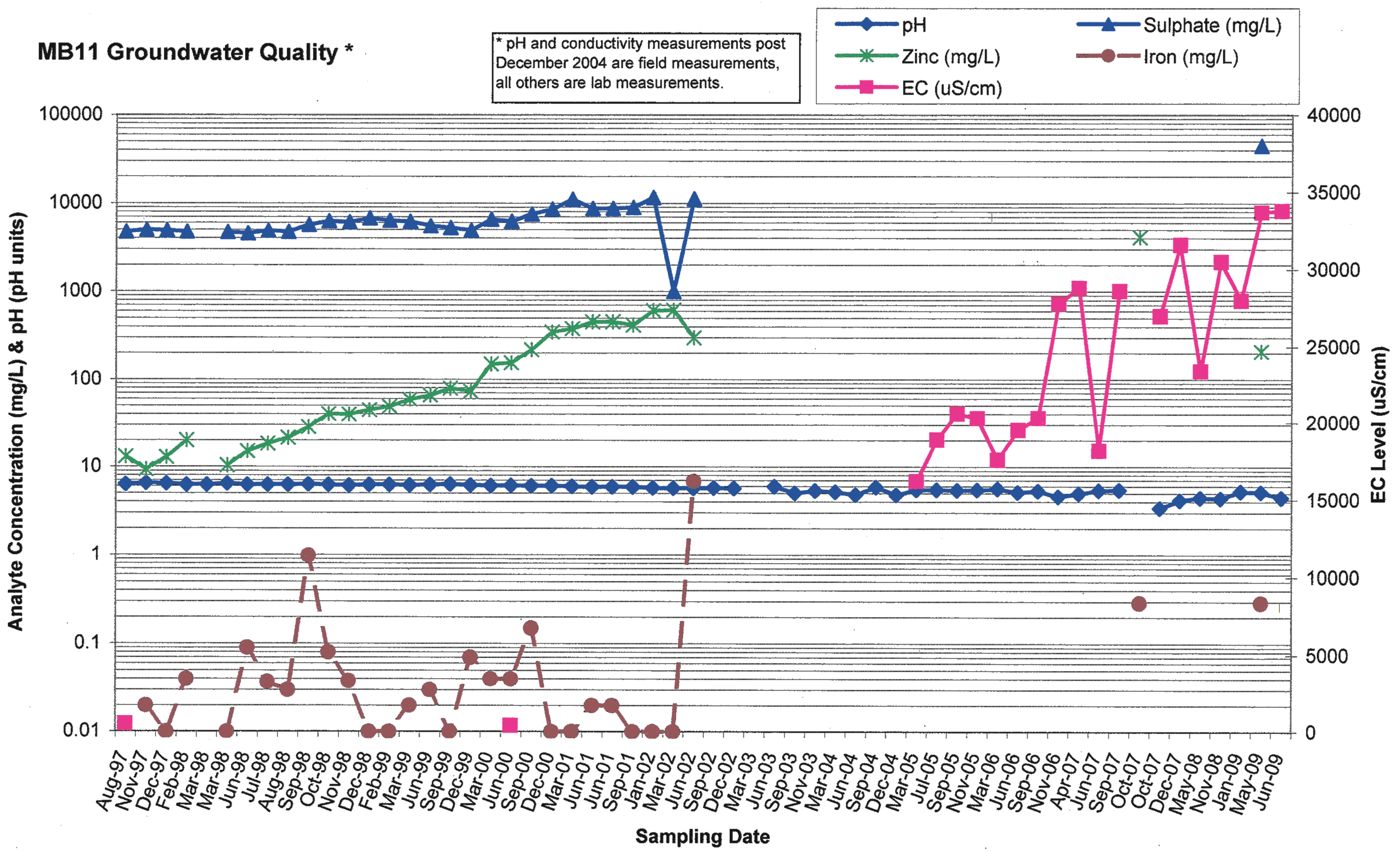

MB16 Groundwater Quality *
* pH and conductivity measurements post September 2004 are field measurements, all others are lab measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
EC Level (uS/cm)
35000
30000
25000
20000
15000
10000
5000
0
Aug-97
Nov-97
Mar-98
Jun-98
Sep-98
Dec-98
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Jun-01
Sep-01
Jan-02
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jul-05
Sep-05
Nov-05
Mar-06
Jun-06
Sep-06
Nov-06
Apr-07
Jun-07
Sep-07
Oct-07
Dec-07
May-08
Jun-08
Nov-08
Jan-09
May-09
Jun-09
Sampling Date



MB15 Groundwater Quality *
* pH and conductivity measurements post September 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Zinc (mg/L)
Iron (mg/L)
EC (uS/cm)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
12000
10000
8000
6000
4000
2000
0
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Jan-02
Jun-02
Dec-02
Jun-03
Nov-03
Jun-04
Dec-04
Jul-05
Nov-05
Jun-06
Dec-06
Jun-07
Oct-07
May-08
Jan-09
Jun-09
Sampling Date


MB14 Groundwater Quality *
* pH measurements post December 2004 are field measurements, all others are lab measurements. All conductivity values are field measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
7000
6000
5000
4000
3000
2000
1000
0
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Jan-02
Jun-02
Dec-02
Jun-03
Nov-03
Jun-04
Dec-04
Sep-05
Mar-06
Sep-06
Apr-07
Sep-07
Dec-07
Jun-08
Jan-09
Jun-09
Sampling Date


MB12 Groundwater Quality *
* pH and conductivity measurements post December 2004 are field measurements, all others are lab measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
40000
35000
30000
25000
20000
15000
10000
5000
0
Aug-97
Nov-97
Feb-98
Mar-98
Jun-98
Aug-98
Oct-98
Nov-98
Feb-99
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
Sep-01
Mar-02
Sep-02
Mar-03
Sep-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Apr-07
Aug-07
Oct-07
May-08
Jan-09
Jun-09
Sampling Date


MB11 Groundwater Quality *
* pH and conductivity measurements post December 2004 are field measurements, all others are lab measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
40000
35000
30000
25000
20000
15000
10000
5000
0
Aug-97
Nov-97
Dec-97
Feb-98
Mar-98
Mar-98
Jun-98
Jul-98
Aug-98
Sep-98
Oct-98
Nov-98
Dec-98
Feb-99
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Jun-01
Sep-01
Jan-02
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jul-05
Sep-05
Nov-05
Mar-06
Jun-06
Sep-06
Nov-06
Apr-07
Jun-07
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Oct-07
Oct-07
Dec-07
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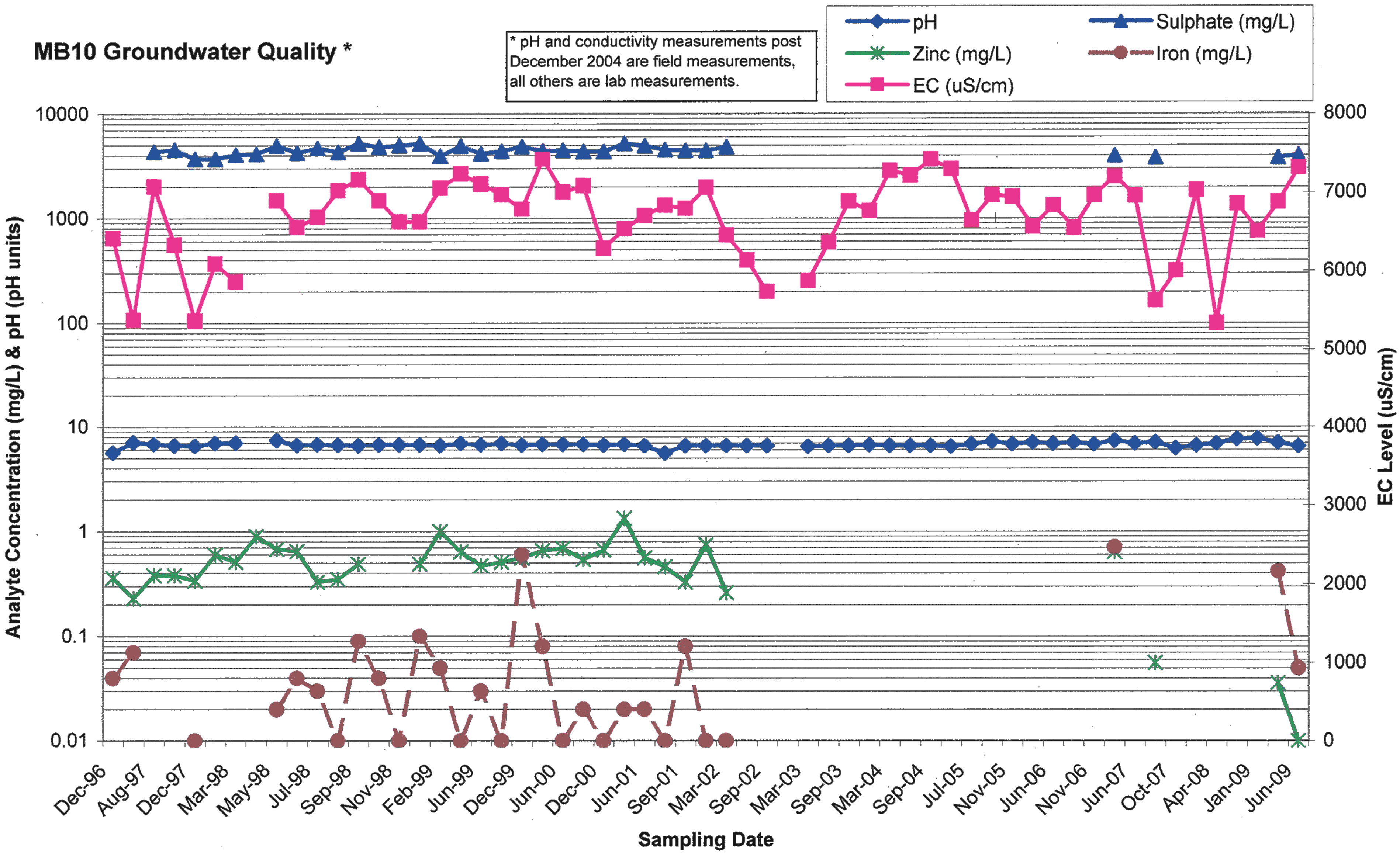
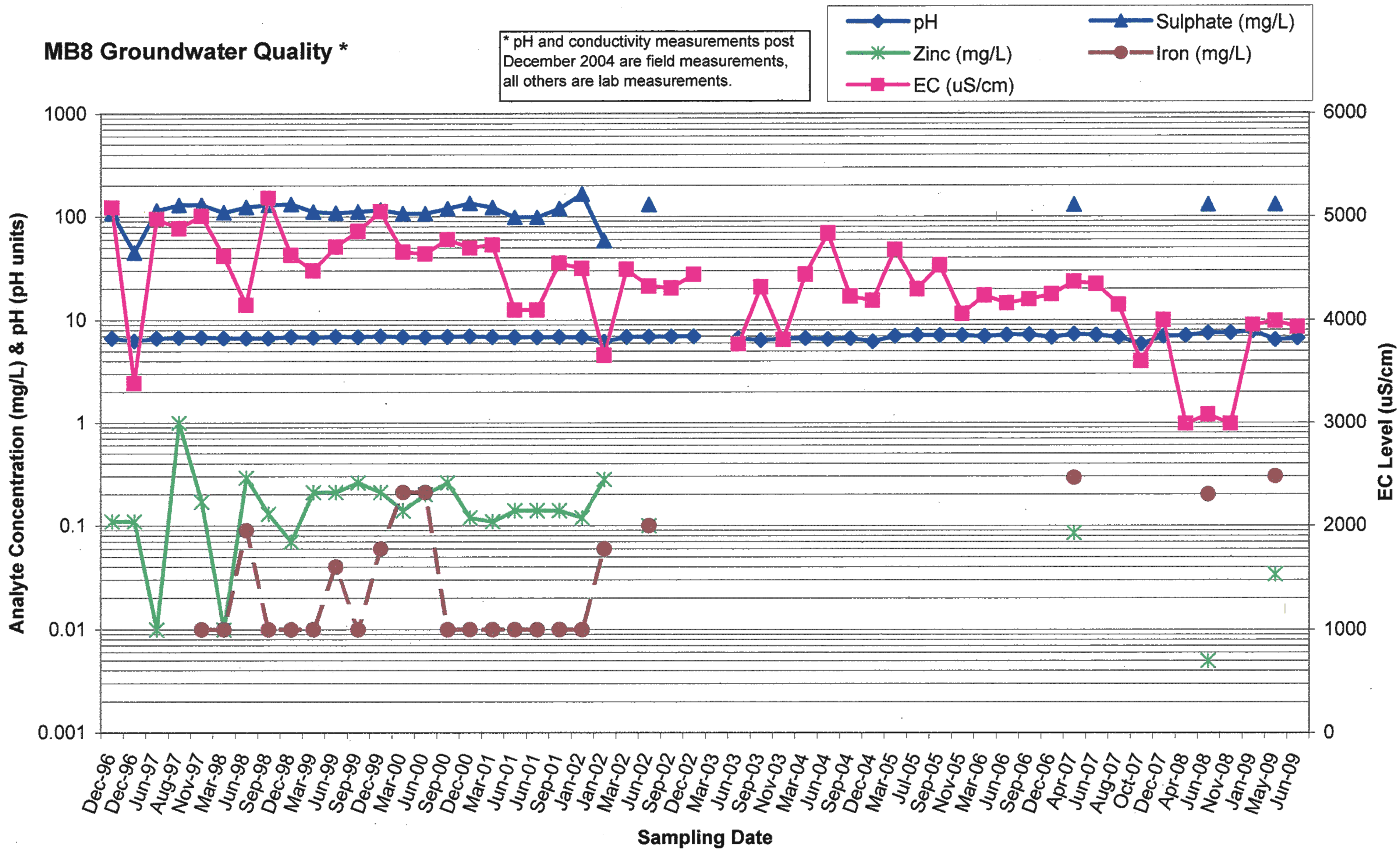
Nov-08
Jan-09
May-09
Jun-09
Sampling Date



MB10 Groundwater Quality *
* pH and conductivity measurements post December 2004 are field measurements, all others are lab measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
8000
7000
6000
5000
4000
3000
2000
1000
0
Dec-96
Aug-97
Dec-97
Mar-98
May-98
Jul-98
Sep-98
Nov-98
Feb-99
Jun-99
Dec-99
Jun-00
Dec-00
Jun-01
Sep-01
Mar-02
Sep-02
Mar-03
Sep-03
Mar-04
Sep-04
Jul-05
Nov-05
Jun-06
Nov-06
Jun-07
Oct-07
Apr-08
Jan-09
Jun-09
Sampling Date



MB8 Groundwater Quality *
* pH and conductivity measurements post December 2004 are field measurements, all others are lab measurements.
pH
Zinc (mg/L)
EC (uS/cm)
Sulphate (mg/L)
Iron (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
0.001
EC Level (uS/cm)
6000
5000
4000
3000
2000
1000
0
Sampling Date
Dec-96
Dec-96
Jun-97
Aug-97
Nov-97
Mar-98
Jun-98
Sep-98
Dec-98
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Jun-01
Sep-01
Jan-02
Jan-02
Mar-02
Jun-02
Sep-02
Dec-02
Mar-03
Jun-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Dec-04
Mar-05
Jul-05
Sep-05
Nov-05
Mar-06
Jun-06
Sep-06
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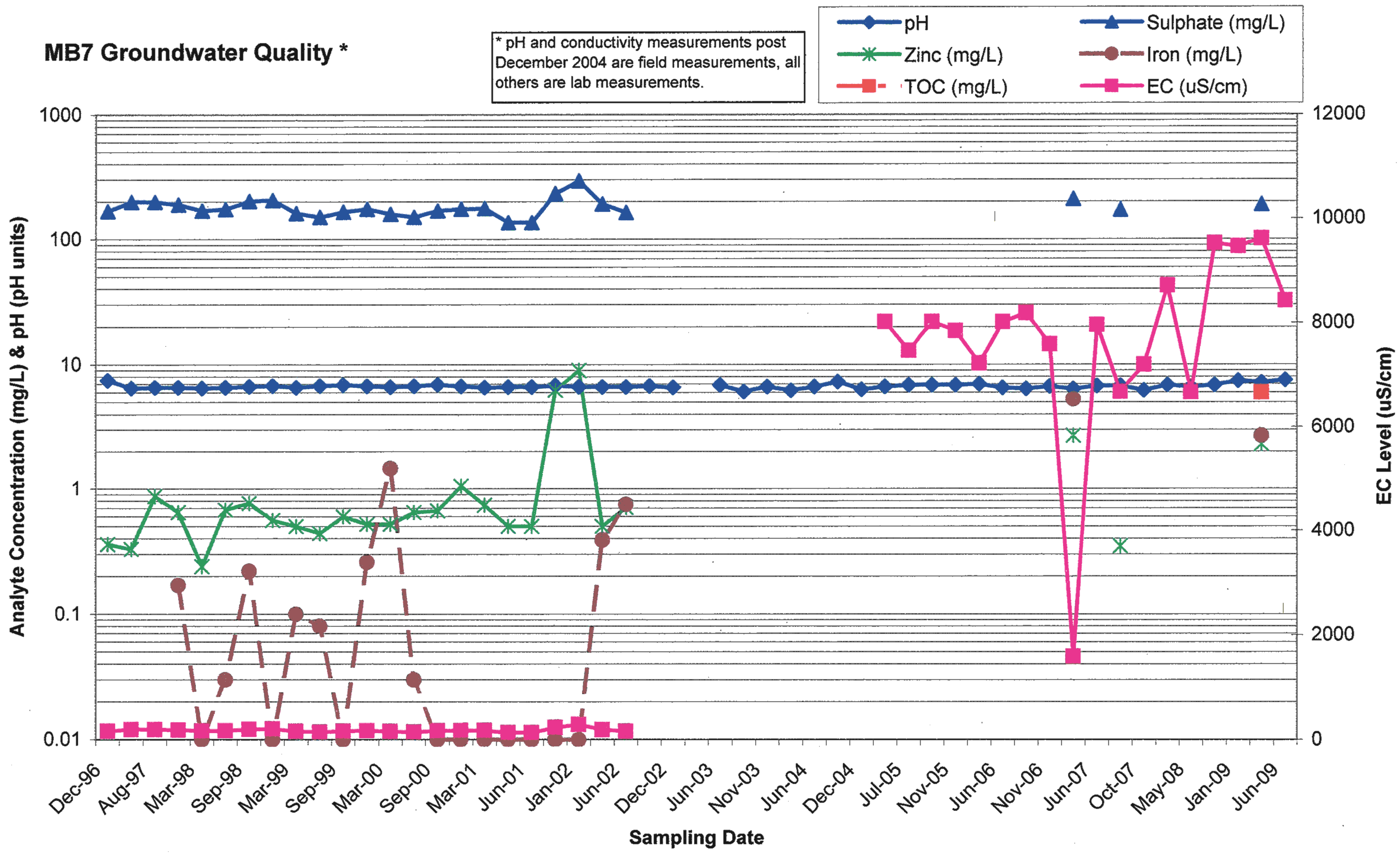
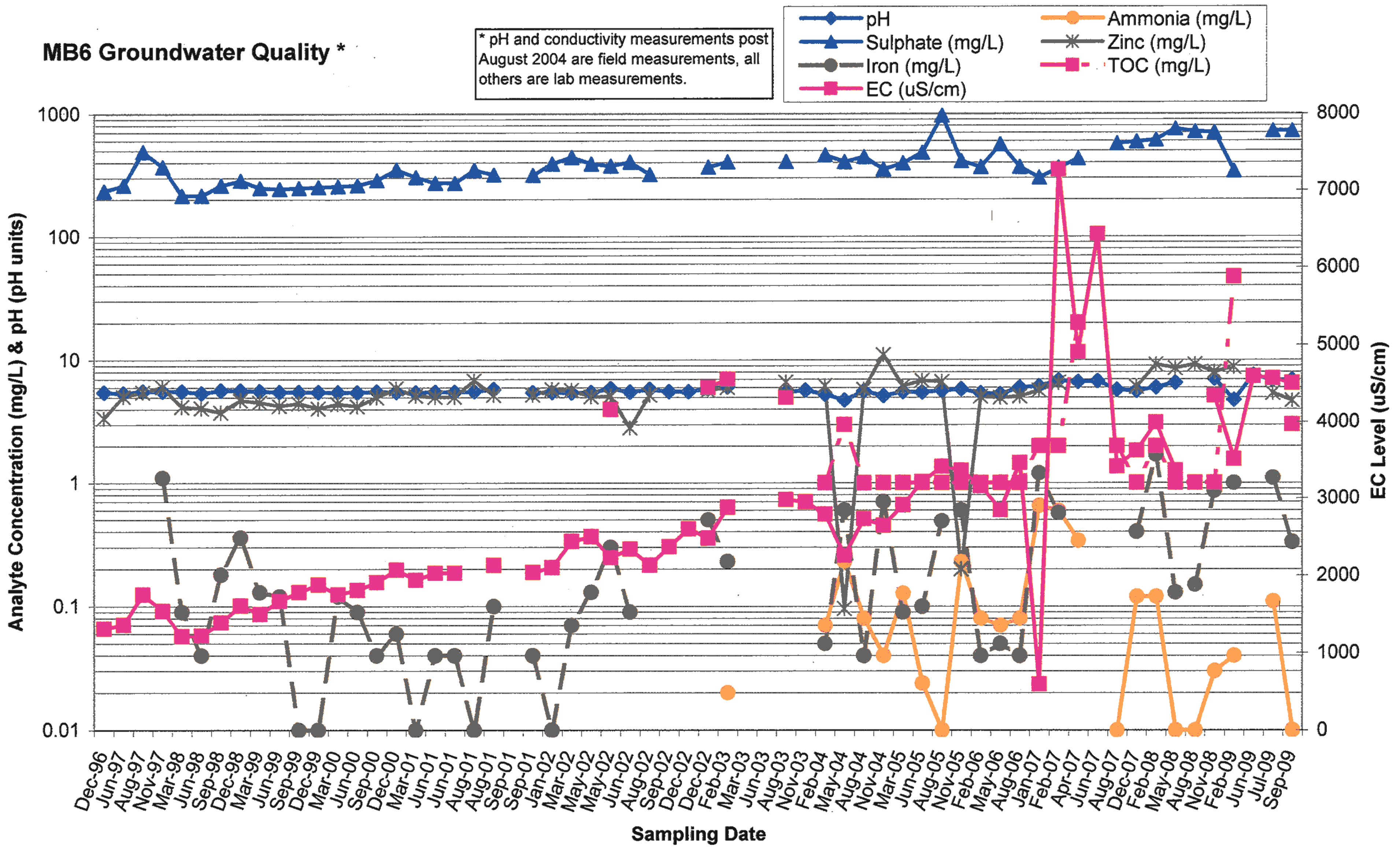
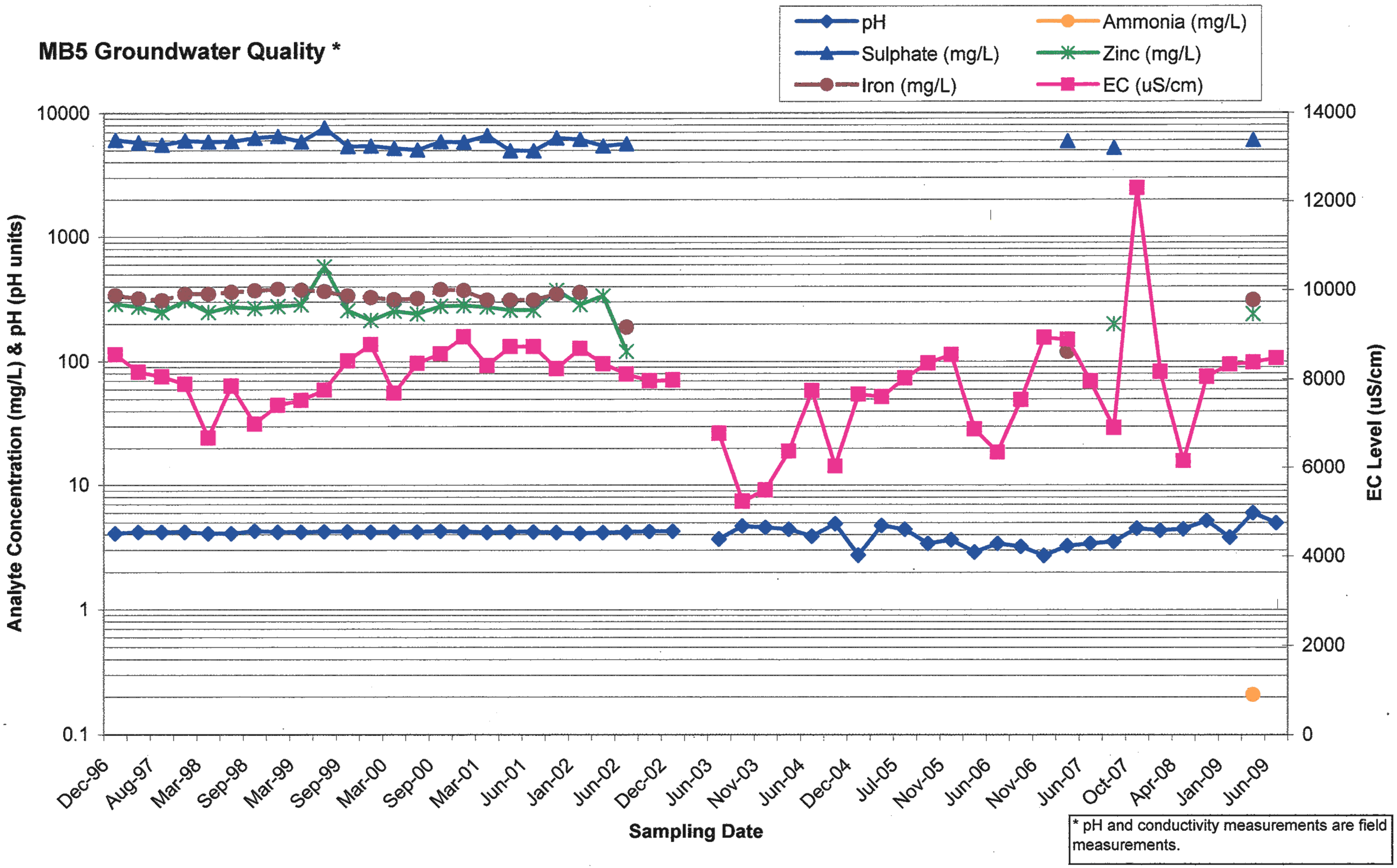
Jan-09
May-09
Jun-09

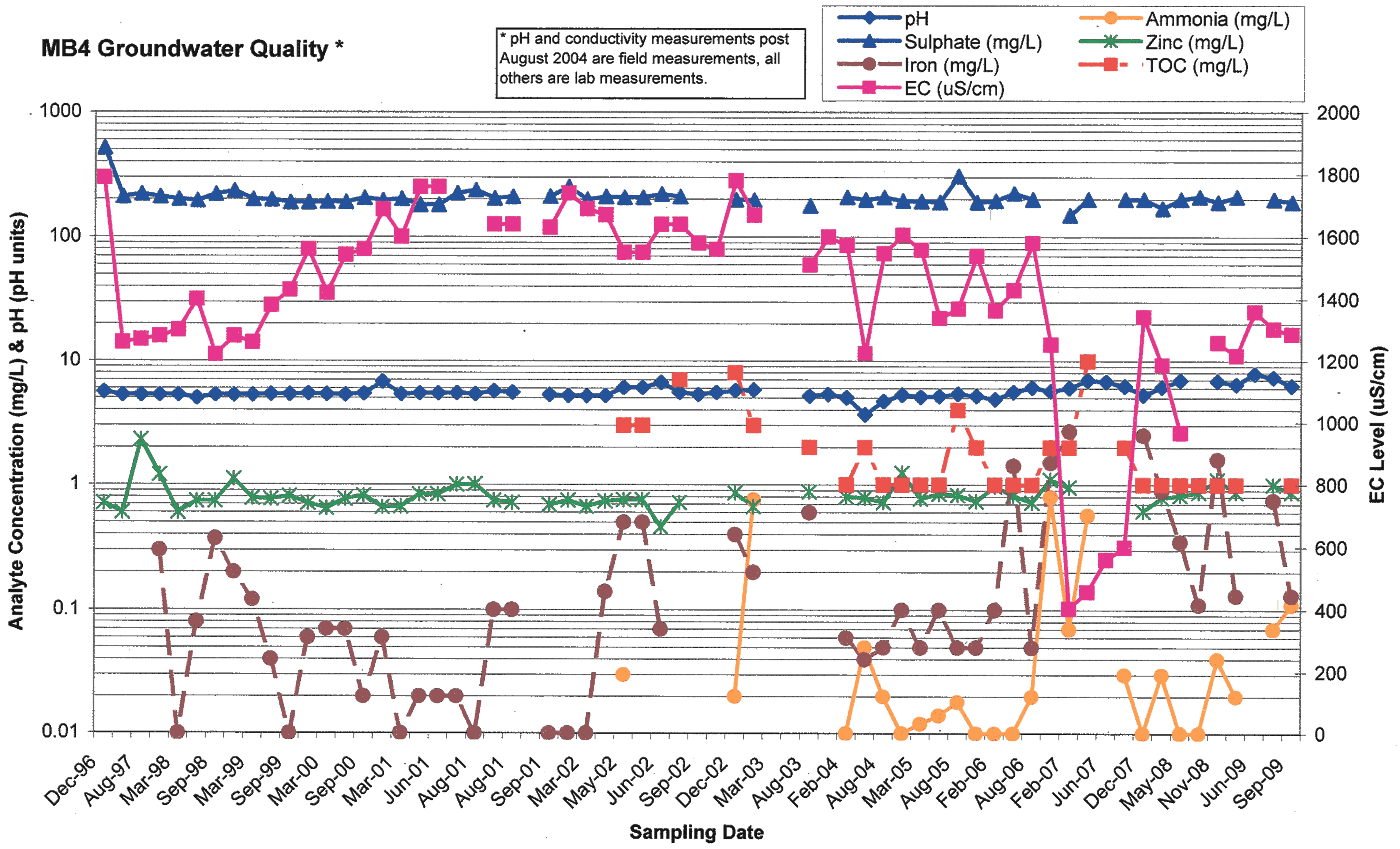


MB7 Groundwater Quality *
* pH and conductivity measurements post December 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Zinc (mg/L)
Iron (mg/L)
TOC (mg/L)
EC (uS/cm)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
12000
10000
8000
6000
4000
2000
0
Dec-96
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Jan-02
Jun-02
Dec-02
Jun-03
Nov-03
Jun-04
Dec-04
Jul-05
Nov-05
Jun-06
Nov-06
Jun-07
Oct-07
May-08
Jan-09
Jun-09
Sampling Date

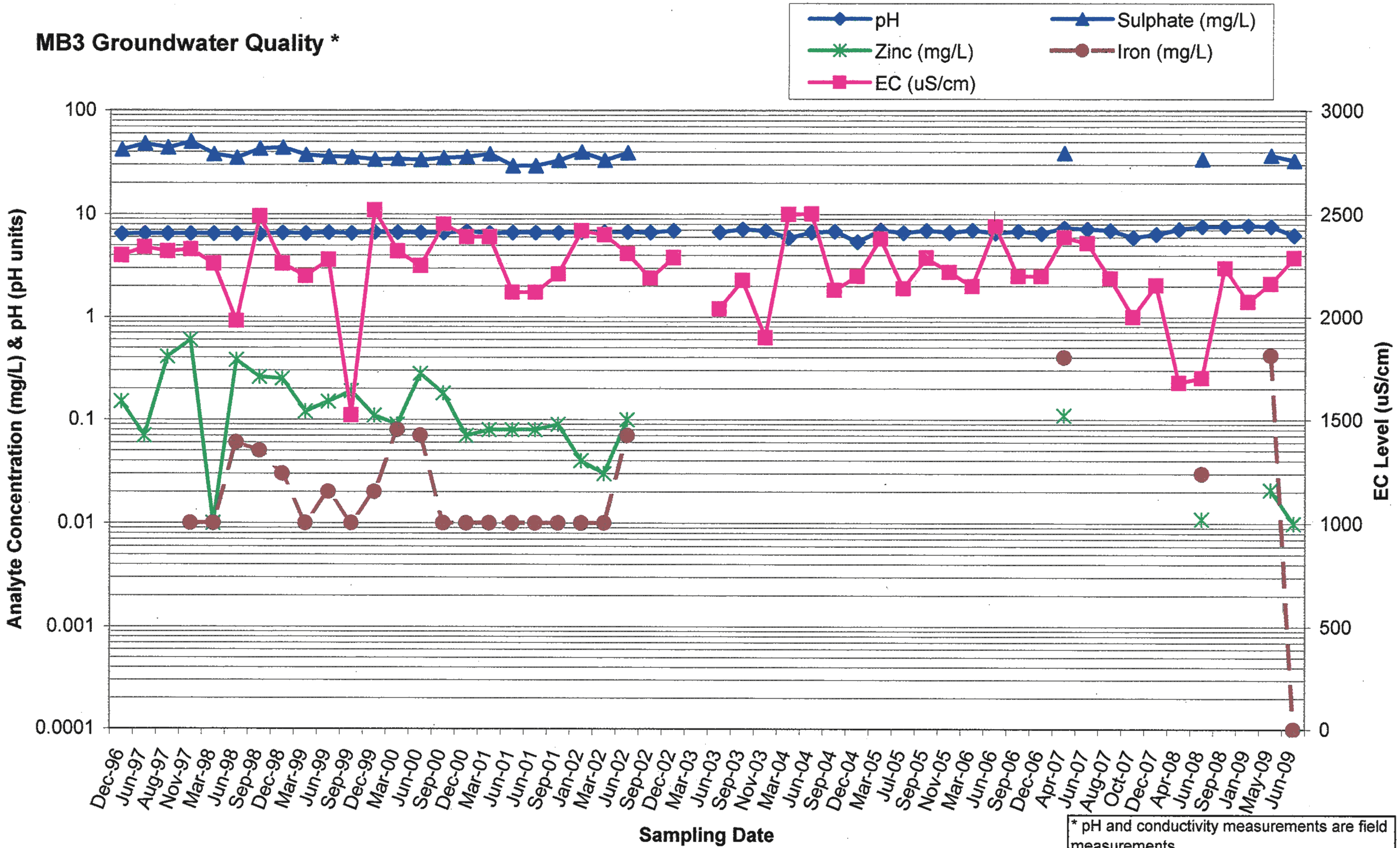


MB6 Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
8000
7000
6000
5000
4000
3000
2000
1000
0
Sampling Date
Dec-96
Jun-97
Aug-97
Nov-97
Mar-98
Jun-98
Sep-98
Dec-98
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Jun-01
Aug-01
Aug-01
Sep-01
Sep-01
Jan-02
Mar-02
May-02
May-02
Jun-02
Aug-02
Sep-02
Dec-02
Dec-02
Feb-03
Mar-03
Jun-03
Aug-03
Nov-03
Feb-04
May-04
Aug-04
Nov-04
Mar-05
Jun-05
Aug-05
Nov-05
Feb-06
May-06
Aug-06
Jan-07
Feb-07
Apr-07
Jun-07
Aug-07
Dec-07
Feb-08
May-08
Aug-08
Nov-08
Feb-09
Jun-09
Jul-09
Sep-09

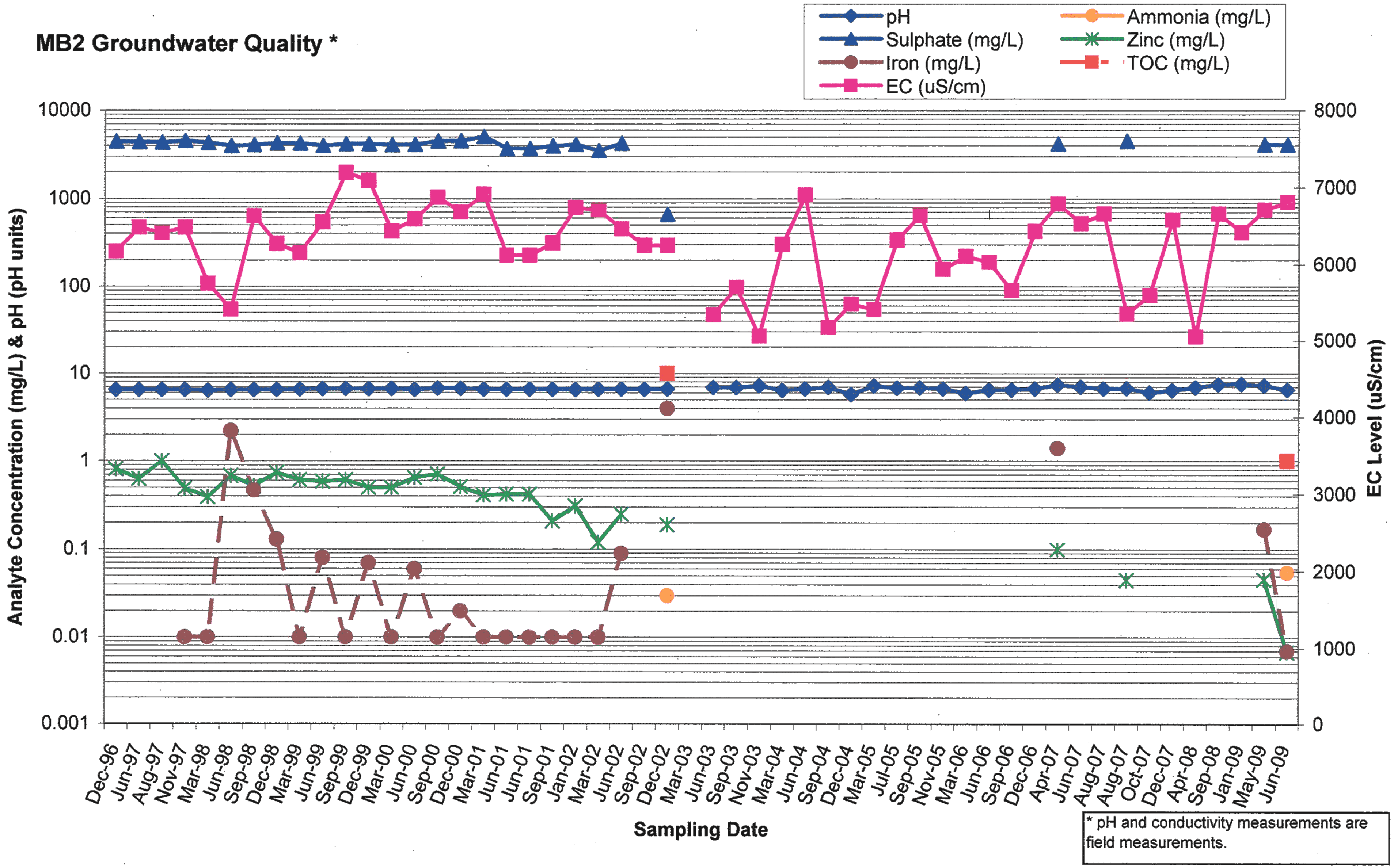

MB5 Groundwater Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
Ammonia (mg/L)
Zinc (mg/L)
EC (uS/cm)
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
EC Level (uS/cm)
14000
12000
10000
8000
6000
4000
2000
0
Dec-96
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Jan-02
Jun-02
Dec-02
Jun-03
Nov-03
Jun-04
Dec-04
Jul-05
Nov-05
Jun-06
Nov-06
Jun-07
Oct-07
Apr-08
Jan-09
Jun-09
Sampling Date
* pH and conductivity measurements are field measurements.

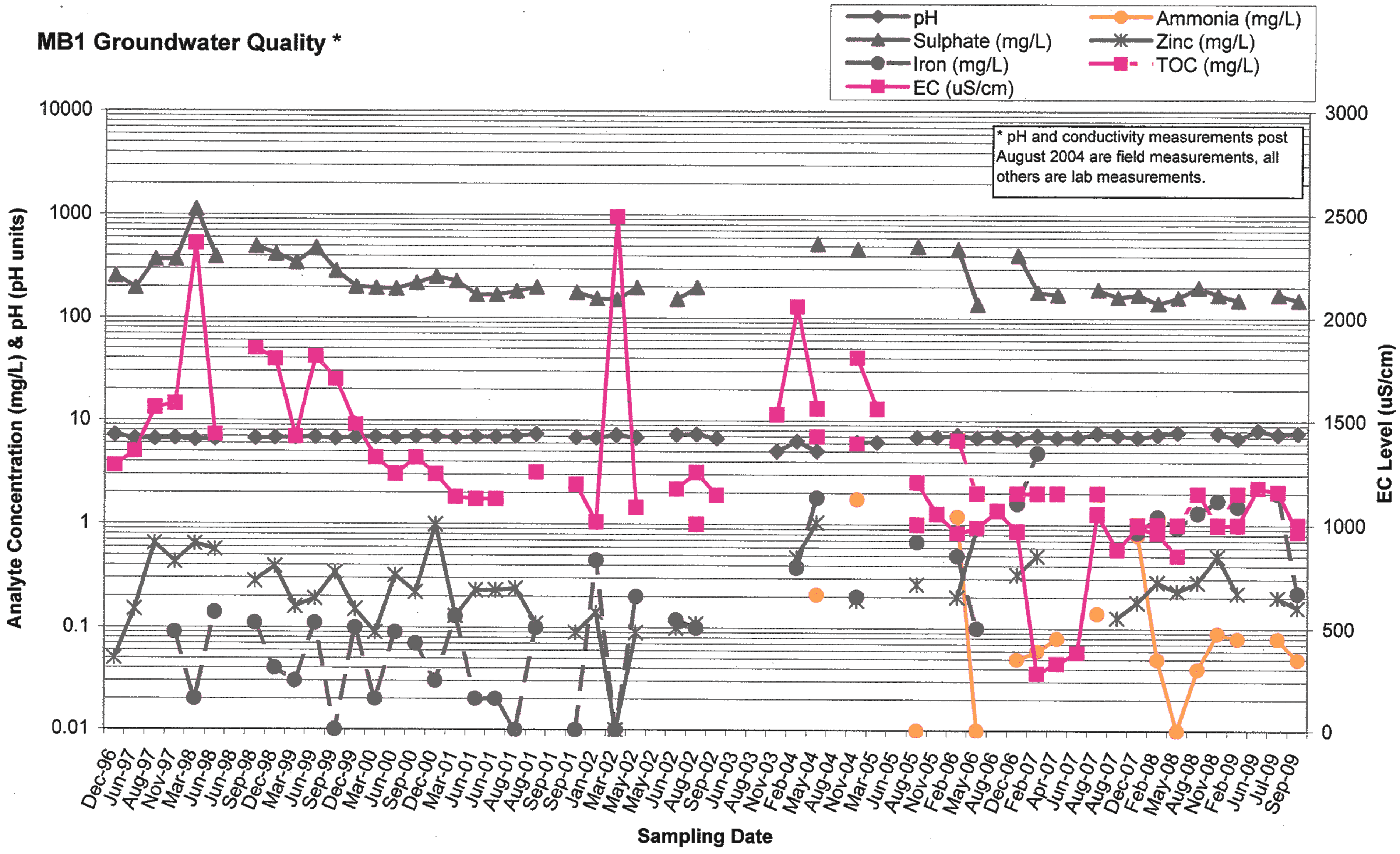


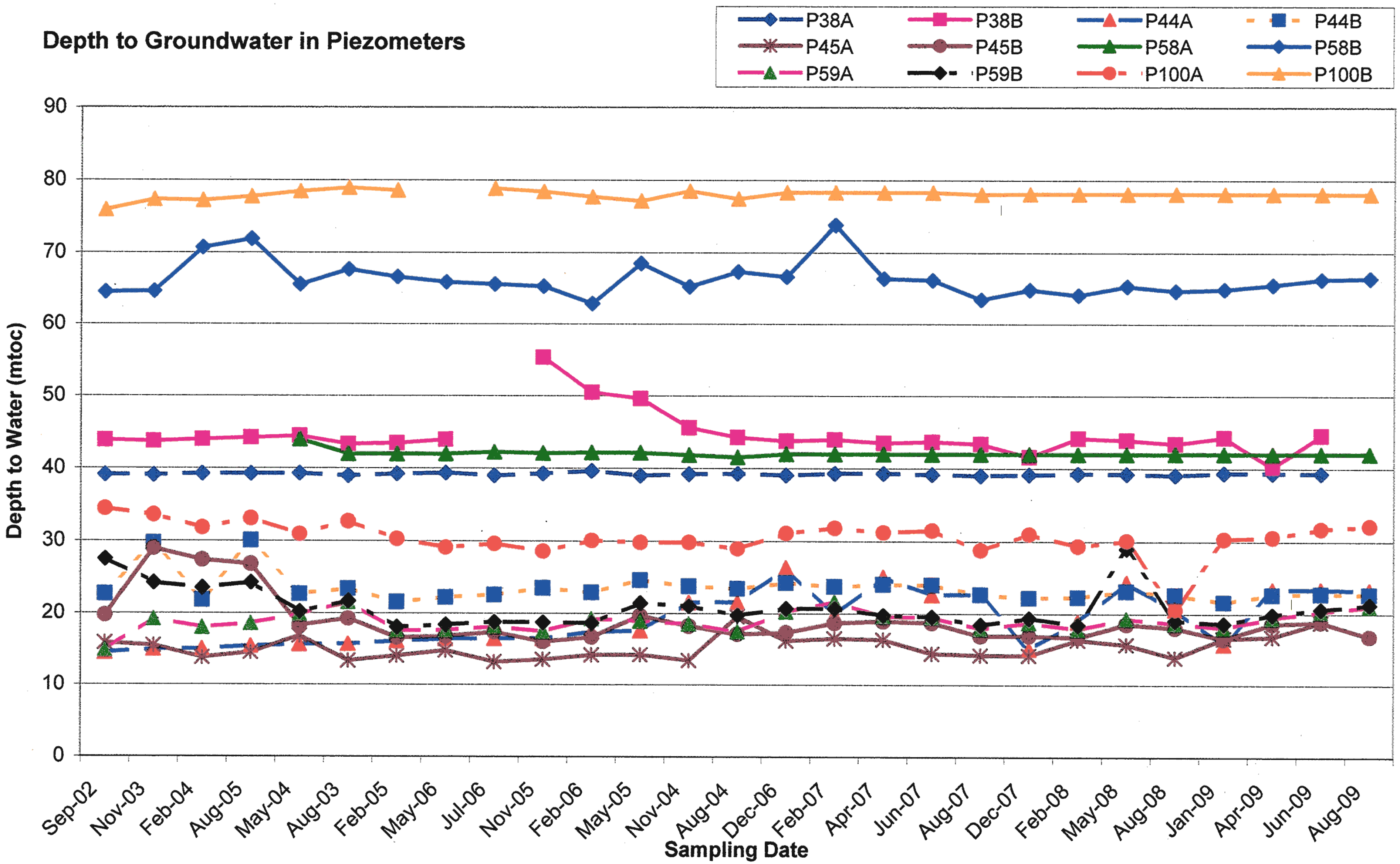
MB4 Groundwater Quality *
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Sampling Date
Dec-96
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Aug-01
Aug-01
Sep-01
Mar-02
May-02
Jun-02
Sep-02
Dec-02
Mar-03
Aug-03
Feb-04
Aug-04
Mar-05
Aug-05
Feb-06
Aug-06
Feb-07
Jun-07
Dec-07
May-08
Nov-08
Jun-09
Sep-09



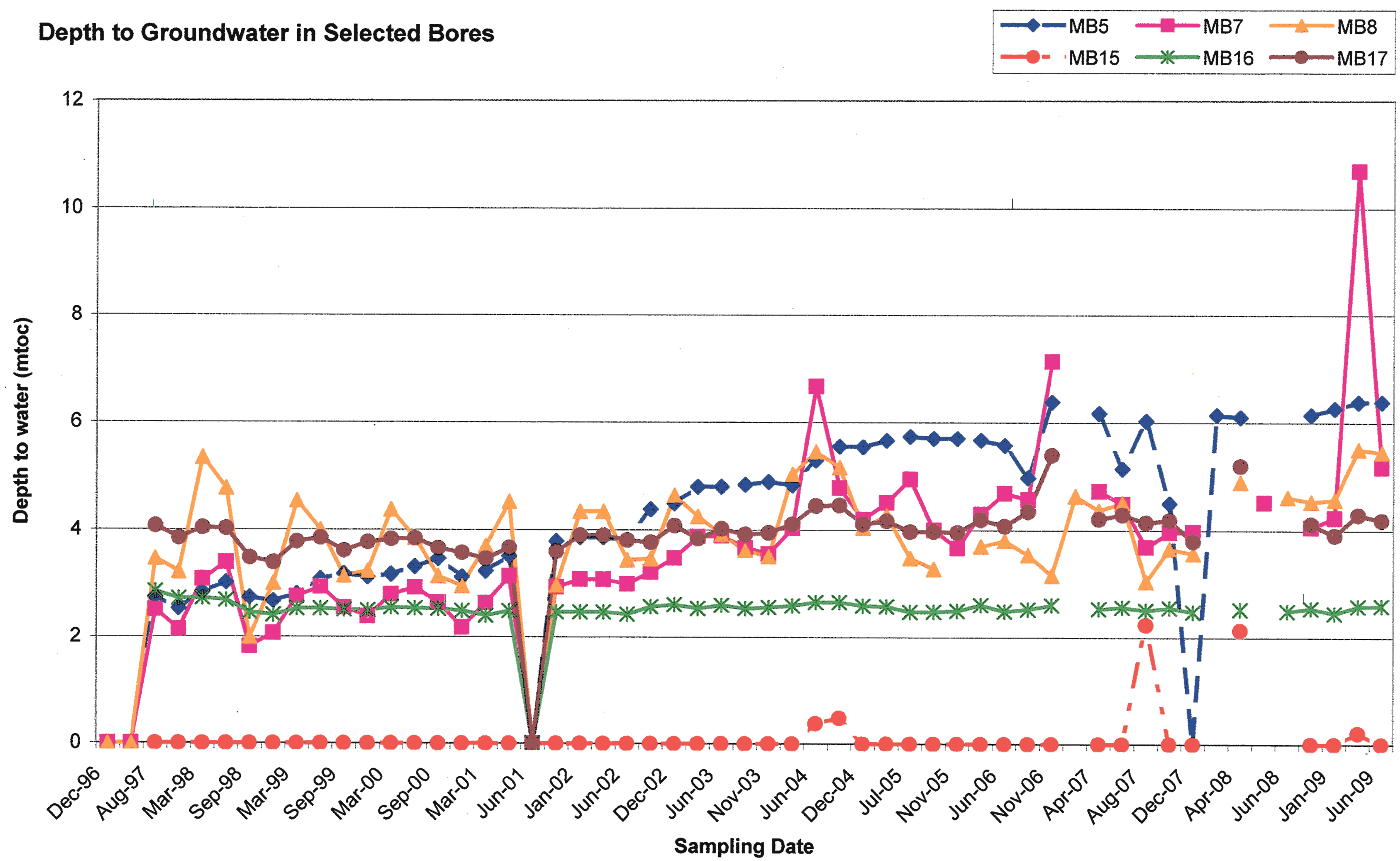
* pH and conductivity measurements are field measurements.


MB2 Groundwater Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
EC Level (uS/cm)
Sampling Date
* pH and conductivity measurements are field measurements.

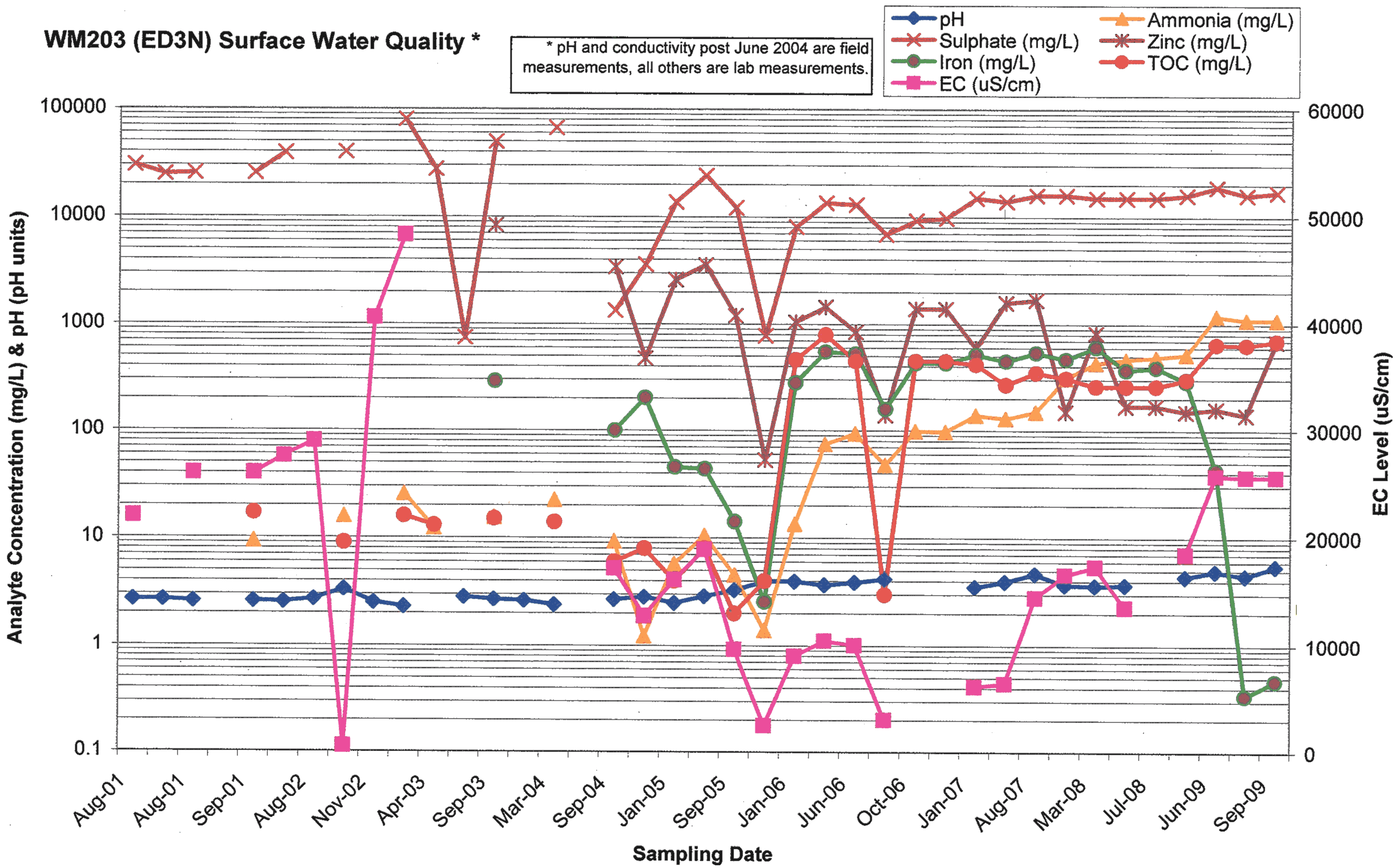

MB1 Groundwater Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity measurements post August 2004 are field measurements, all others are lab measurements.
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
3000
2500
2000
1500
1000
500
0
Dec-96
Jun-97
Aug-97
Nov-97
Mar-98
Jun-98
Jun-98
Sep-98
Dec-98
Mar-99
Jun-99
Sep-99
Dec-99
Mar-00
Jun-00
Sep-00
Dec-00
Mar-01
Jun-01
Jun-01
Aug-01
Aug-01
Sep-01
Sep-01
Jan-02
Mar-02
May-02
May-02
Jun-02
Aug-02
Sep-02
Jun-03
Aug-03
Nov-03
Feb-04
May-04
Aug-04
Nov-04
Mar-05
Jun-05
Aug-05
Nov-05
Feb-06
May-06
Aug-06
Dec-06
Feb-07
Apr-07
Jun-07
Aug-07
Aug-07
Dec-07
Feb-08
May-08
Aug-08
Nov-08
Feb-09
Jun-09
Jul-09
Sep-09
Sampling Date



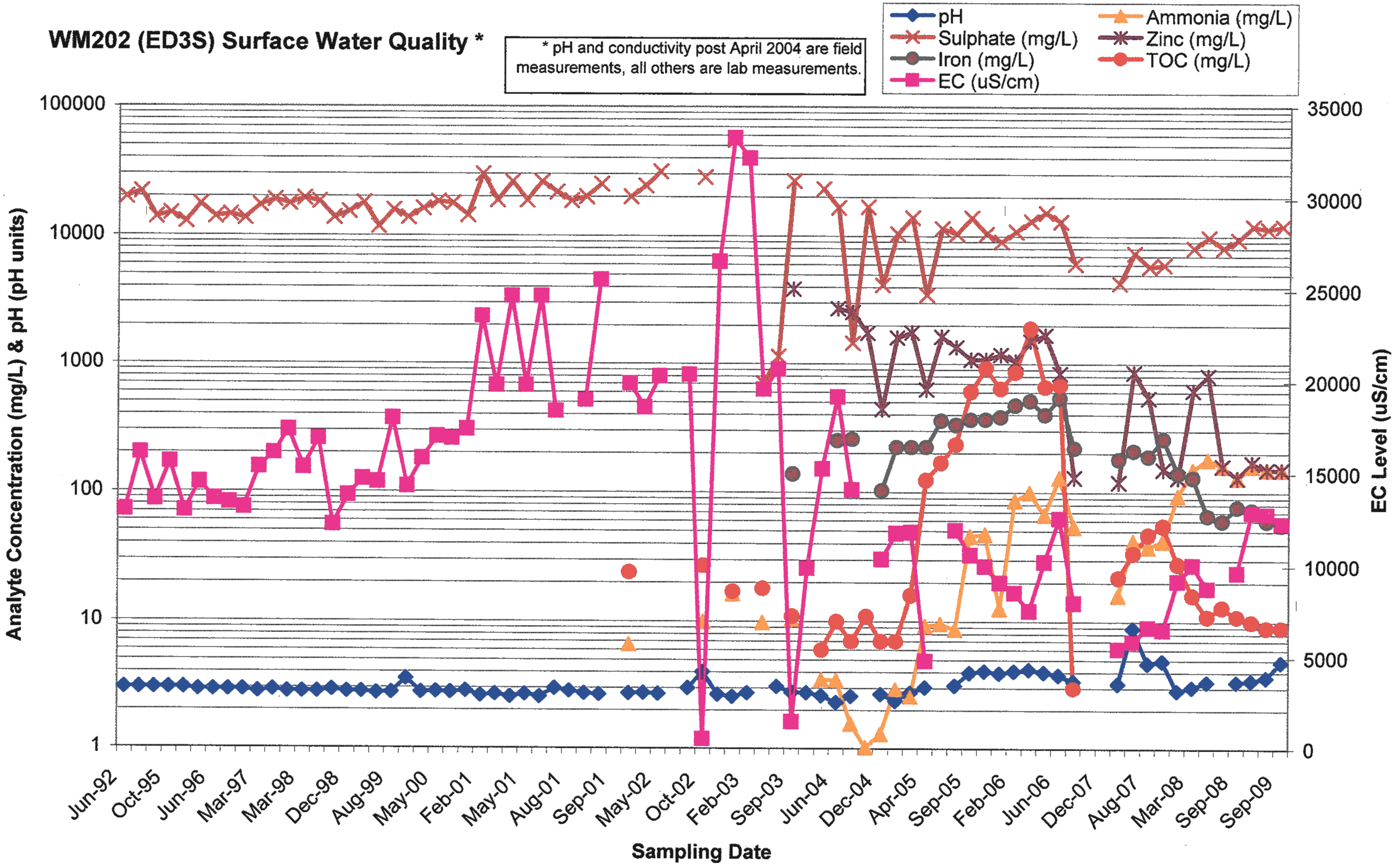
Depth to Groundwater in Piezometers
P38A
P38B
P44A
P44B
P45A
P45B
P58A
P58B
P59A
P59B
P100A
P100B
Depth to Water (mtoc)
0
10
20
30
40
50
60
70
80
90
Sep-02
Nov-03
Feb-04
Aug-05
May-04
Aug-03
Feb-05
May-06
Jul-06
Nov-05
Feb-06
May-05
Nov-04
Aug-04
Dec-06
Feb-07
Apr-07
Jun-07
Aug-07
Dec-07
Feb-08
May-08
Aug-08
Jan-09
Apr-09
Jun-09
Aug-09
Sampling Date

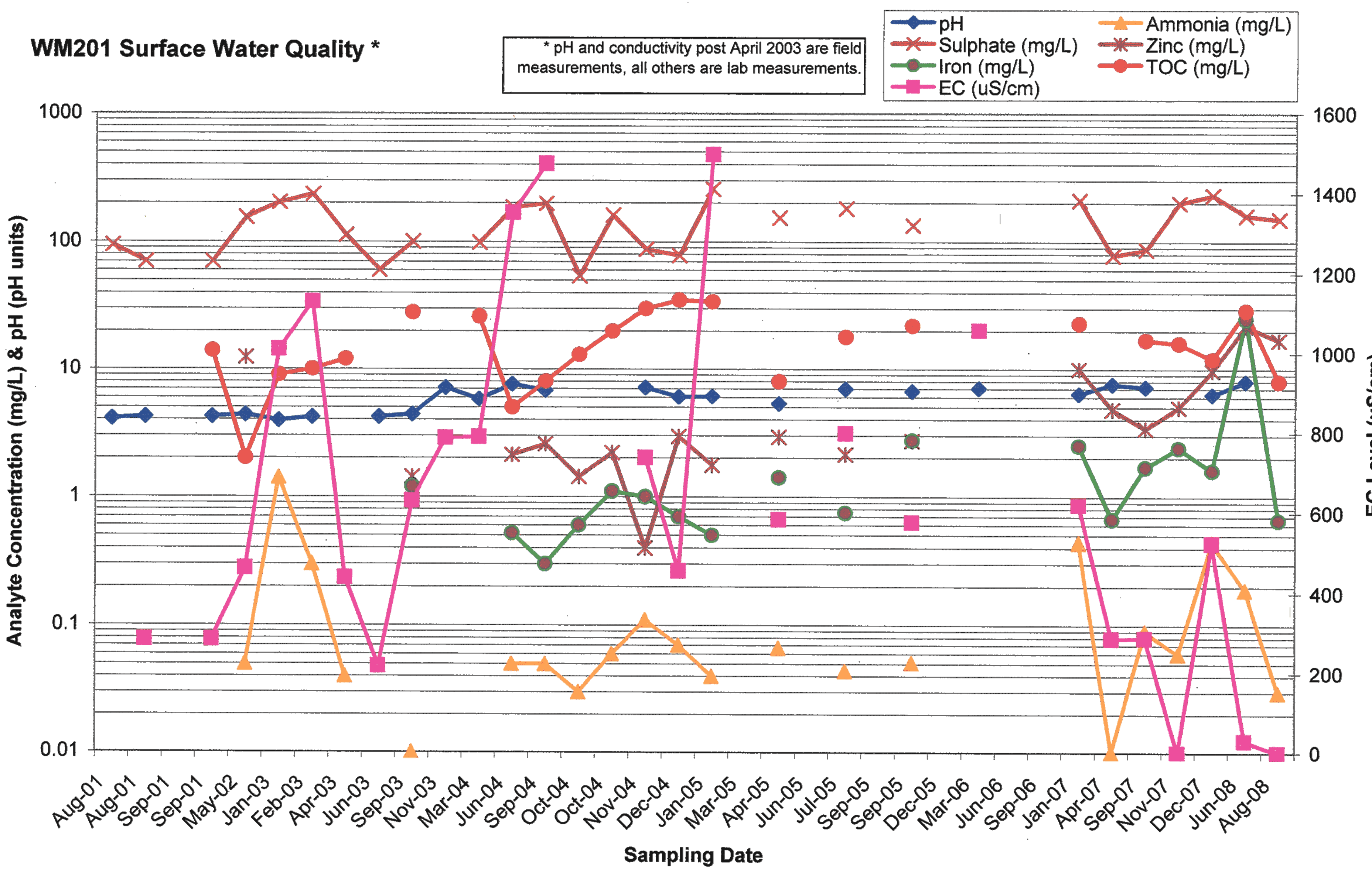

Depth to Groundwater in Selected Bores
MB5
MB7
MB8
MB15
MB16
MB17
Depth to water (mtoc)
12
10
8
6
4
2
0
Dec-96
Aug-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Jun-01
Jan-02
Jun-02
Dec-02
Jun-03
Nov-03
Jun-04
Dec-04
Jul-05
Nov-05
Jun-06
Nov-06
Apr-07
Aug-07
Dec-07
Apr-08
Jun-08
Jan-09
Jun-09
Sampling Date

APPENDIX E



WM203 (ED3N) Surface Water Quality *
* pH and conductivity post June 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
EC Level (uS/cm)
60000
50000
40000
30000
20000
10000
0
Aug-01
Aug-01
Sep-01
Aug-02
Nov-02
Apr-03
Sep-03
Mar-04
Sep-04
Jan-05
Sep-05
Jan-06
Jun-06
Oct-06
Jan-07
Aug-07
Mar-08
Jul-08
Jun-09
Sep-09
Sampling Date


WM202 (ED3S) Surface Water Quality *
* pH and conductivity post April 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
EC Level (uS/cm)
35000
30000
25000
20000
15000
10000
5000
0
Jun-92
Oct-95
Jun-96
Mar-97
Mar-98
Dec-98
Aug-99
May-00
Feb-01
May-01
Aug-01
Sep-01
May-02
Oct-02
Feb-03
Sep-03
Jun-04
Dec-04
Apr-05
Sep-05
Feb-06
Jun-06
Dec-07
Aug-07
Mar-08
Sep-08
Sep-09
Sampling Date


WM201 Surface Water Quality *
* pH and conductivity post April 2003 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
1600
1400
1200
1000
800
600
400
200
0
Aug-01
Aug-01
Sep-01
Sep-01
May-02
Jan-03
Feb-03
Apr-03
Jun-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Oct-04
Oct-04
Nov-04
Dec-04
Jan-05
Mar-05
Apr-05
Jun-05
Jul-05
Sep-05
Sep-05
Dec-05
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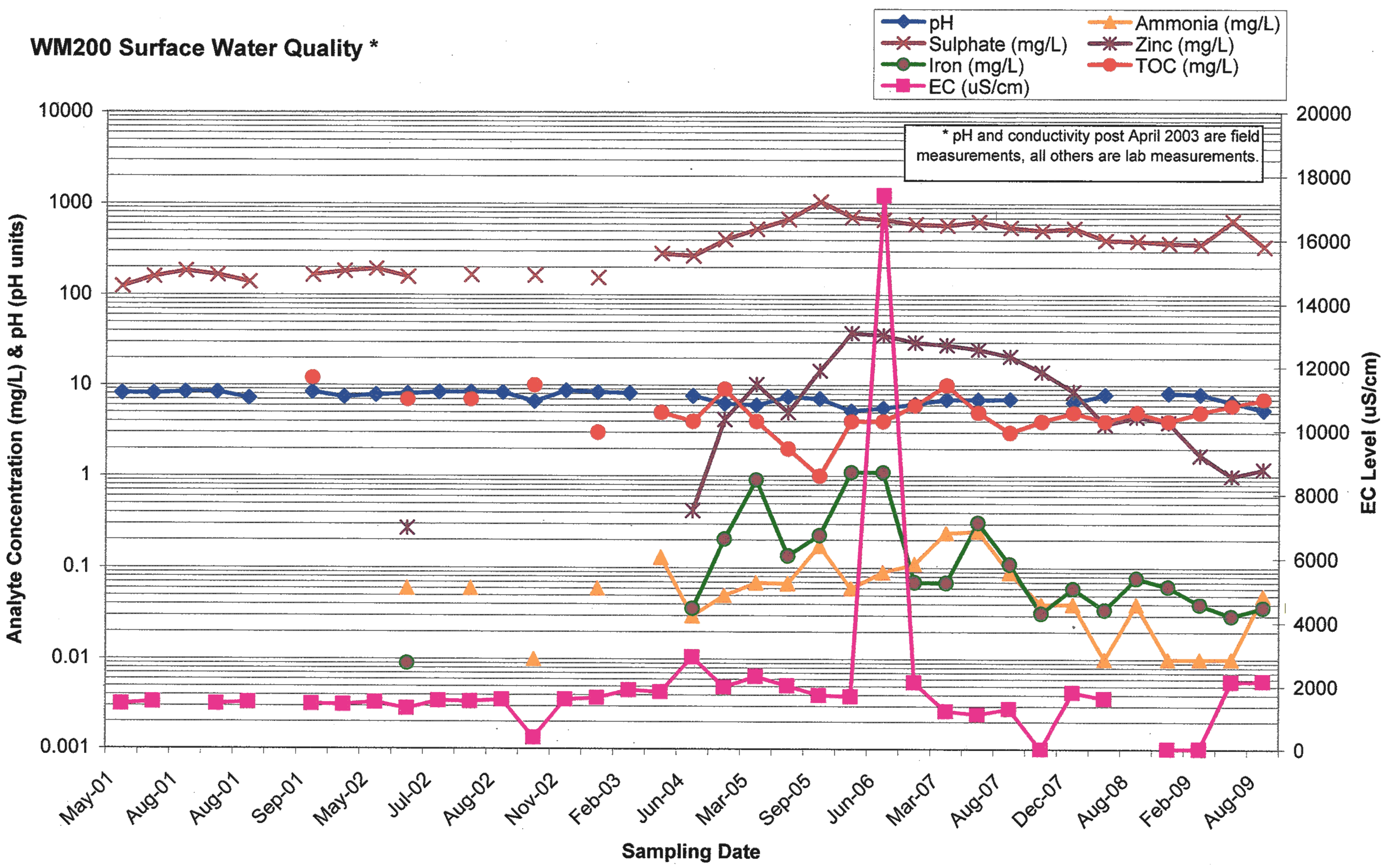
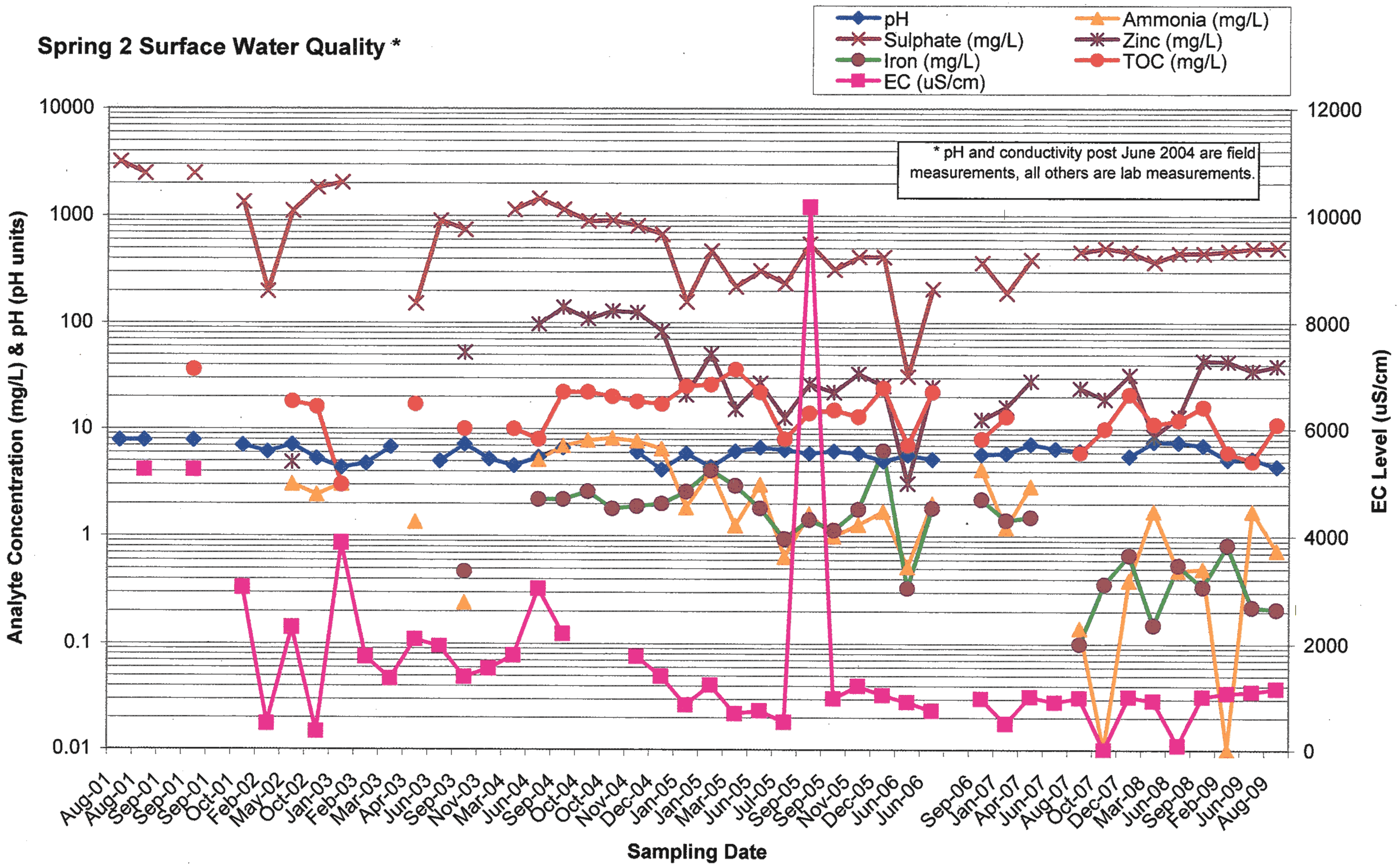
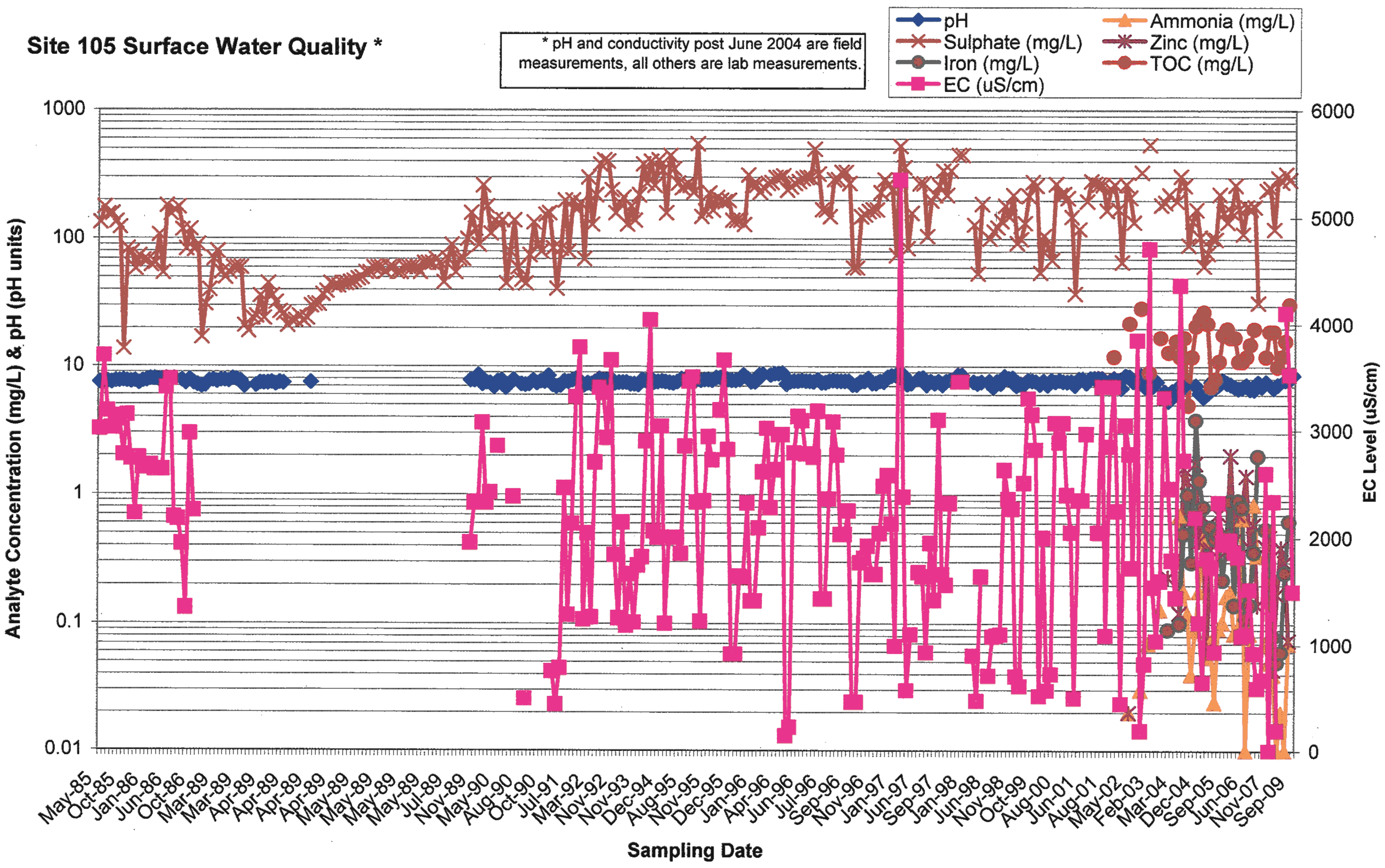
Dec-07
Jun-08
Aug-08
Sampling Date

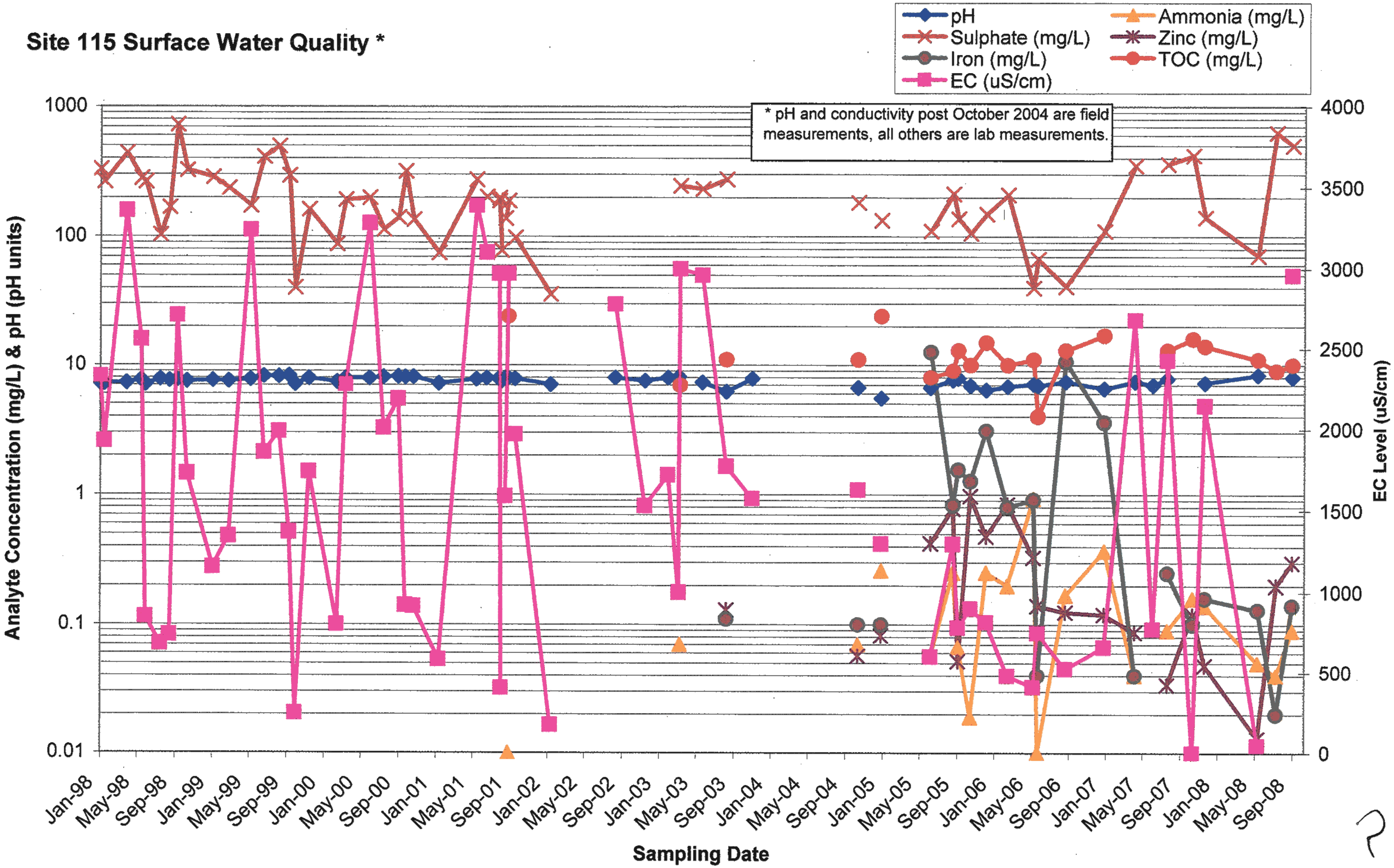


WM200 Surface Water Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity post April 2003 are field measurements, all others are lab measurements.
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
0.001
EC Level (uS/cm)
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
May-01
Aug-01
Aug-01
Sep-01
May-02
Jul-02
Aug-02
Nov-02
Feb-03
Jun-04
Mar-05
Sep-05
Jun-06
Mar-07
Aug-07
Dec-07
Aug-08
Feb-09
Aug-09
Sampling Date

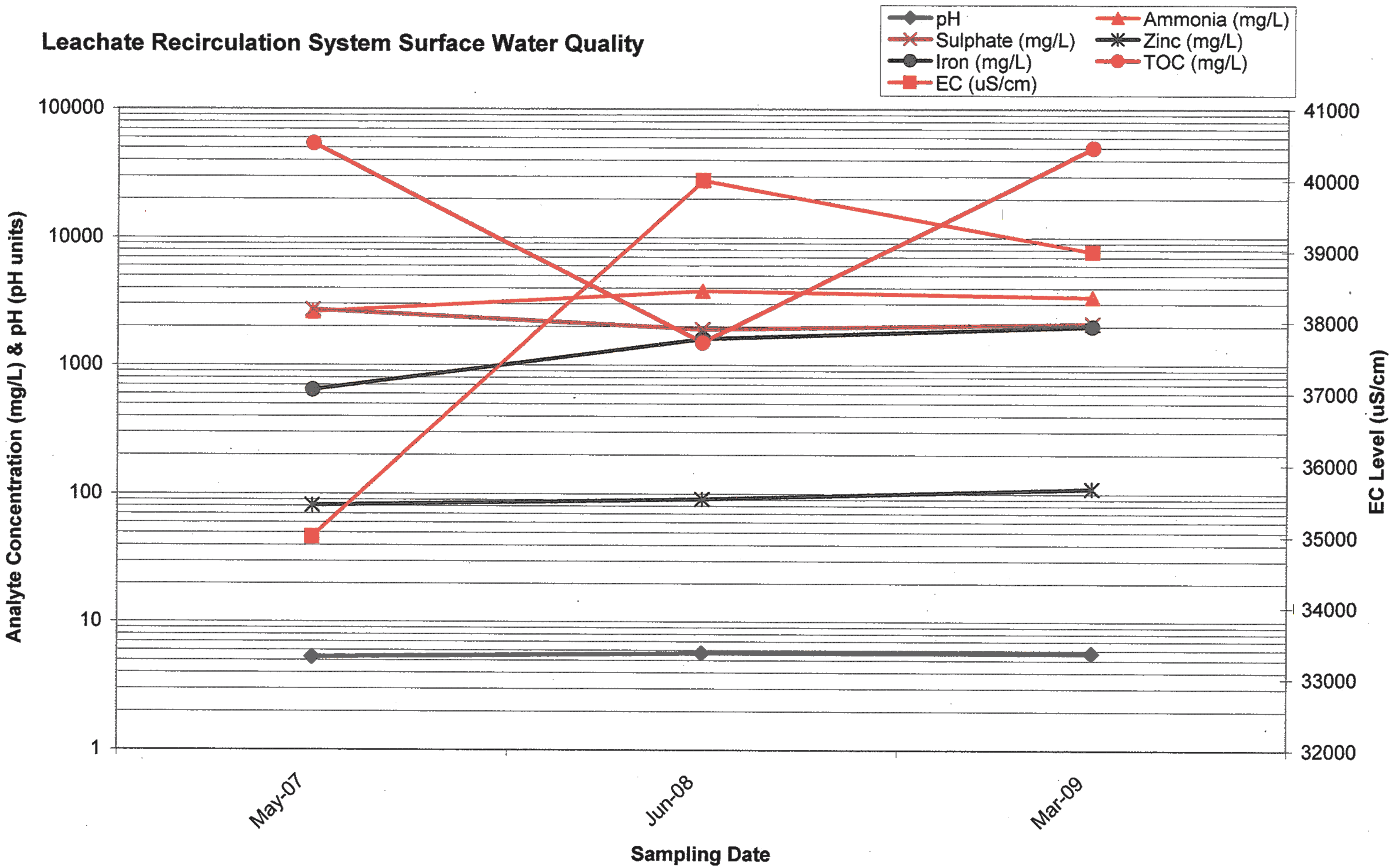


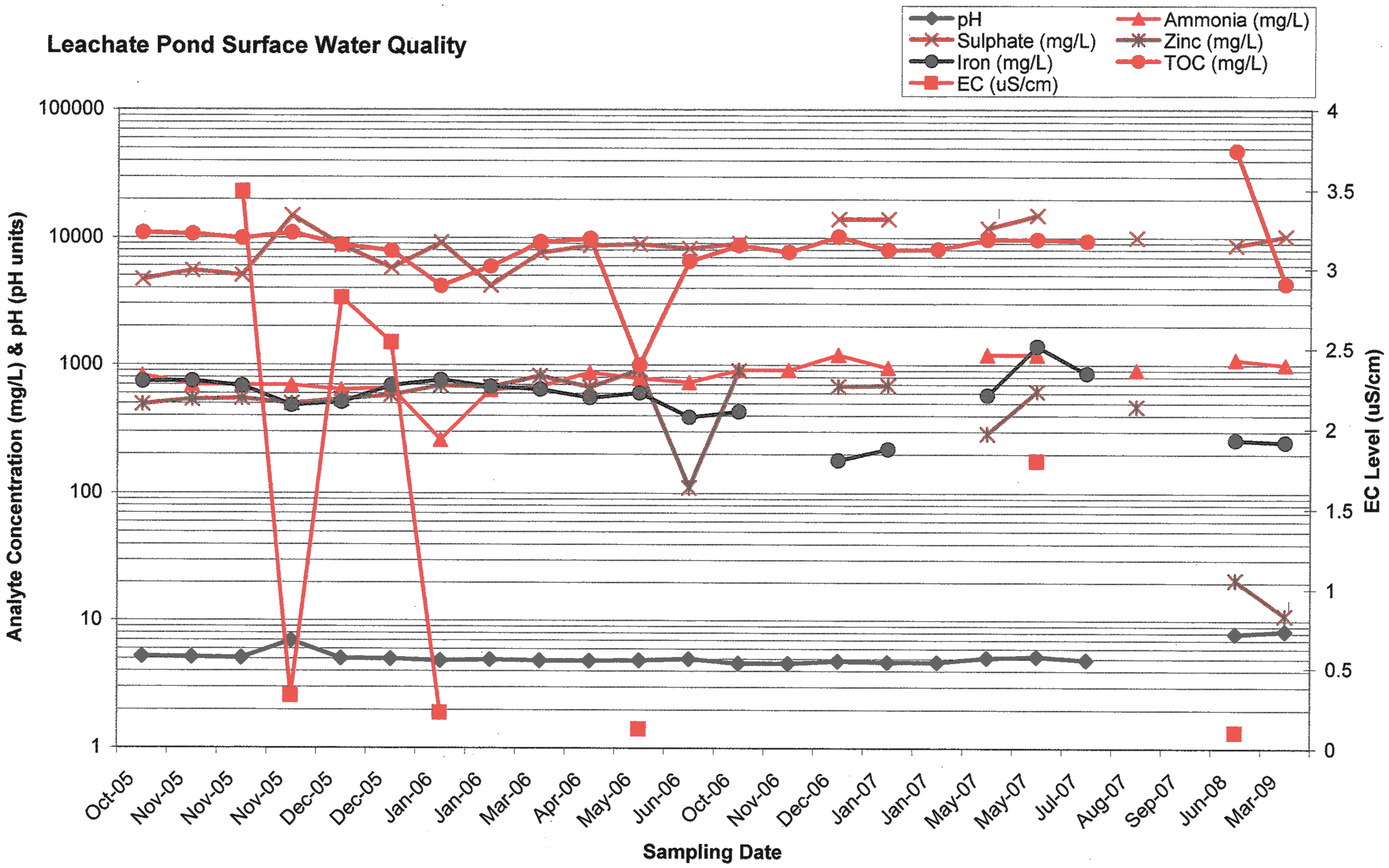
Spring 2 Surface Water Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity post June 2004 are field measurements, all others are lab measurements.
Analyte Concentration (mg/L) & pH (pH units)
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
12000
10000
8000
6000
4000
2000
0
Aug-01
Aug-01
Sep-01
Sep-01
Sep-01
Oct-01
Feb-02
May-02
Oct-02
Jan-03
Feb-03
Mar-03
Apr-03
Jun-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Oct-04
Oct-04
Nov-04
Dec-04
Jan-05
Jan-05
Mar-05
Jun-05
Jul-05
Sep-05
Sep-05
Nov-05
Dec-05
Jun-06
Jun-06
Sep-06
Jan-07
Apr-07
Jun-07
Aug-07
Oct-07
Dec-07
Mar-08
Jun-08
Sep-08
Feb-09
Jun-09
Aug-09
Sampling Date


Site 105 Surface Water Quality *
* pH and conductivity post June 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
6000
5000
4000
3000
2000
1000
0
May-85
Oct-85
Jan-86
Jun-86
Oct-86
Mar-89
Mar-89
Apr-89
Apr-89
Apr-89
Apr-89
May-89
May-89
May-89
May-89
Jul-89
Nov-89
May-90
Aug-90
Oct-90
Jul-91
Mar-92
Nov-92
Nov-93
Dec-94
Aug-95
Nov-95
Dec-95
Jan-96
Apr-96
Jun-96
Jul-96
Sep-96
Nov-96
Jan-97
Jun-97
Sep-97
Jan-98
Jun-98
Nov-98
Oct-99
Aug-00
Jun-01
Aug-01
May-02
Feb-03
Mar-04
Dec-04
Sep-05
Jun-06
Nov-07
Sep-09
Sampling Date

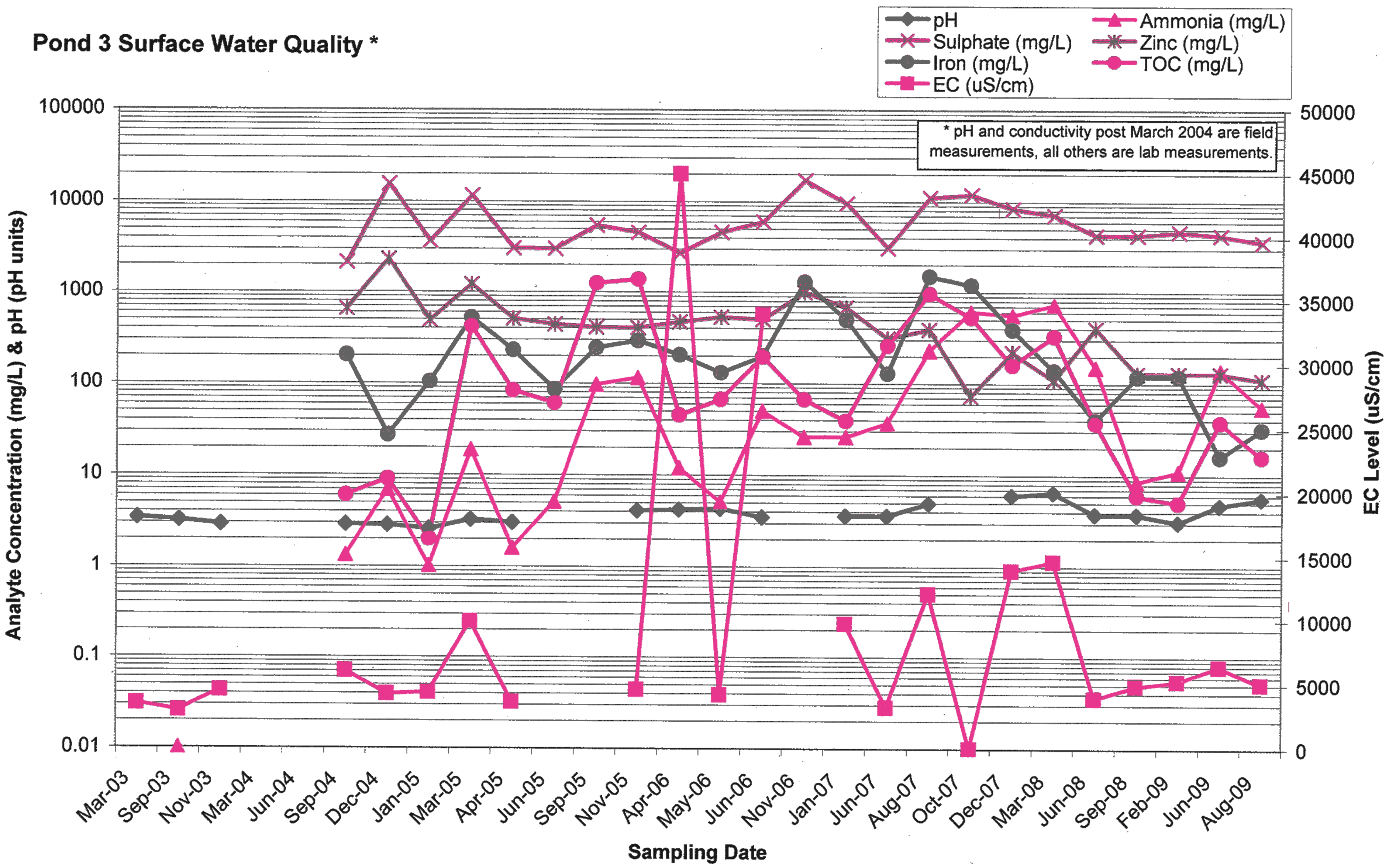


? Suspect. direct ED-2 storage

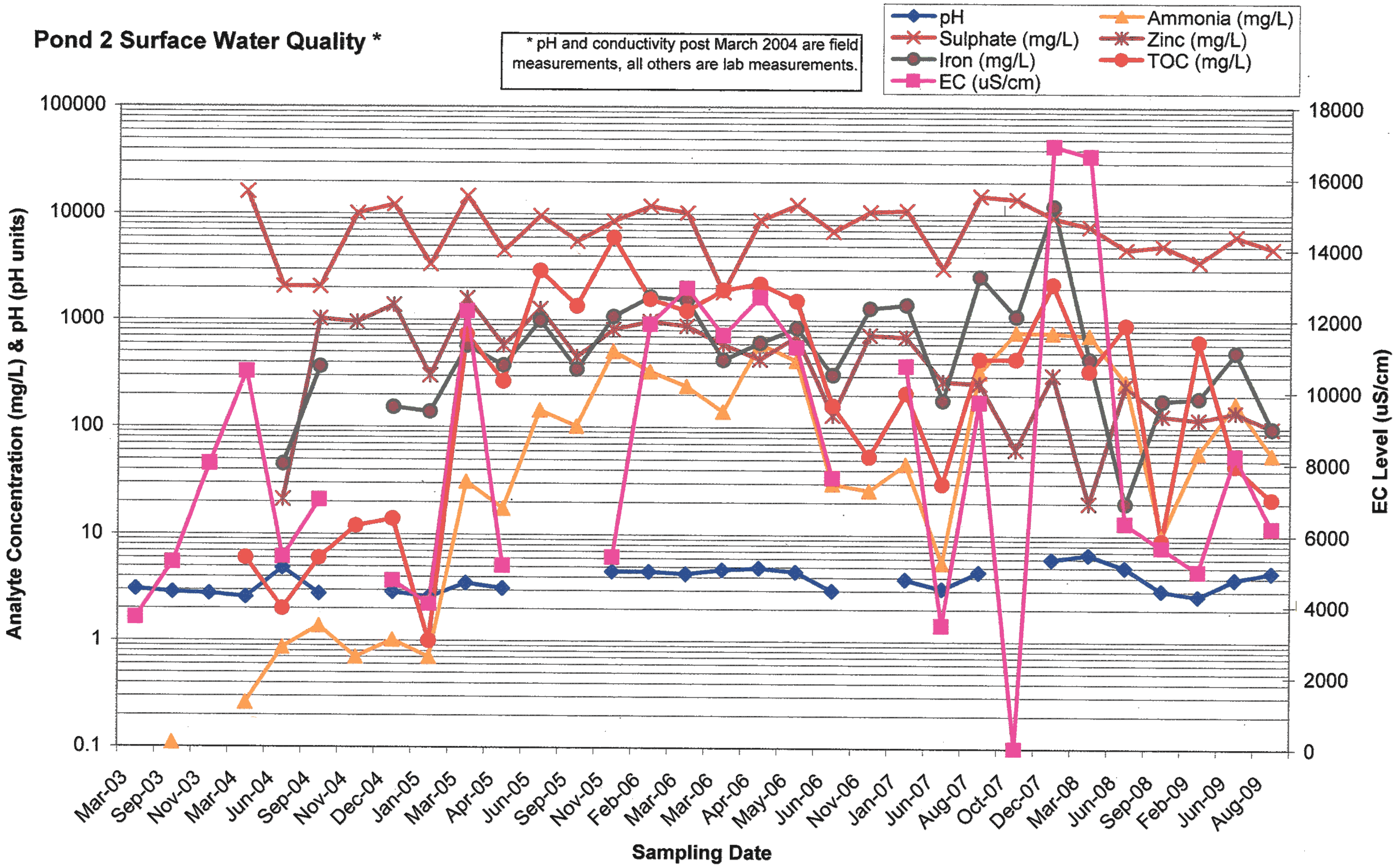

Leachate Recirculation System Surface Water Quality
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
EC Level (uS/cm)
41000
40000
39000
38000
37000
36000
35000
34000
33000
32000
May-07
Jun-08
Mar-09
Sampling Date



Leachate Pond Surface Water Quality
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
EC Level (uS/cm)
4
3.5
3
2.5
2
1.5
1
0.5
0
Oct-05
Nov-05
Nov-05
Nov-05
Dec-05
Dec-05
Jan-06
Jan-06
Mar-06
Apr-06
May-06
Jun-06
Oct-06
Nov-06
Dec-06
Jan-07
Jan-07
May-07
May-07
Jul-07
Aug-07
Sep-07
Jun-08
Mar-09
Sampling Date

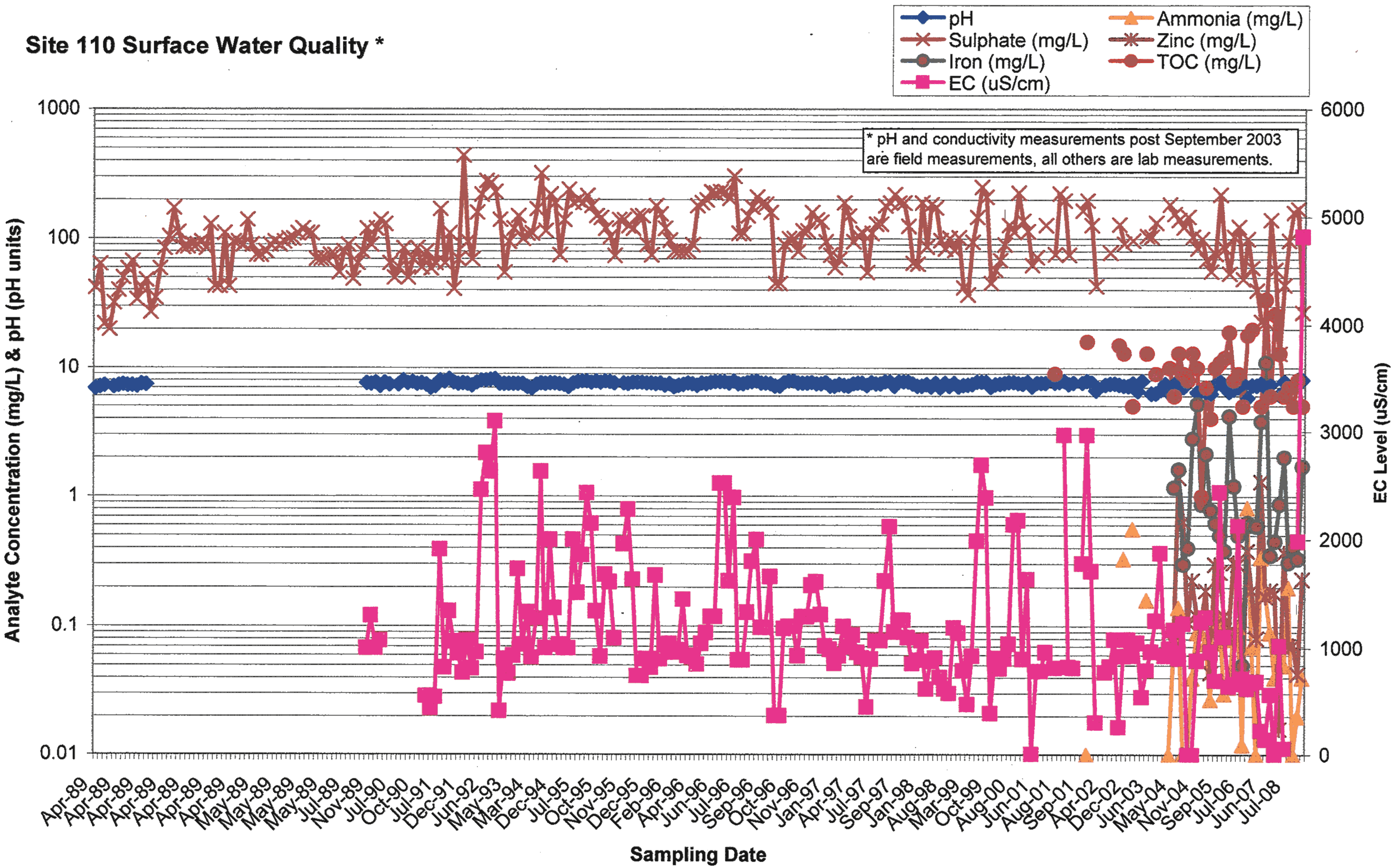


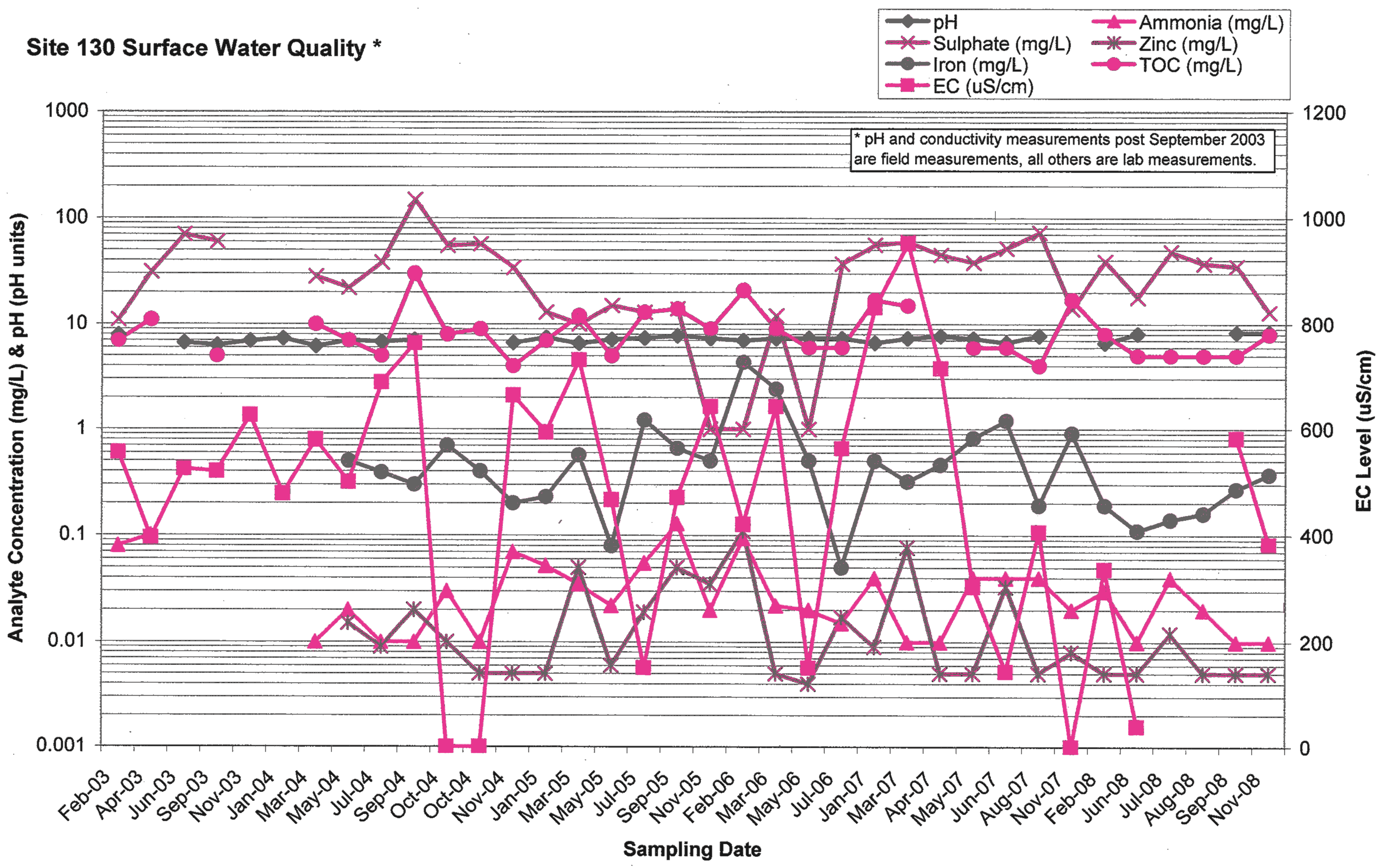
Pond 3 Surface Water Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity post March 2004 are field measurements, all others are lab measurements.
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
Mar-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Dec-04
Jan-05
Mar-05
Apr-05
Jun-05
Sep-05
Nov-05
Apr-06
May-06
Jun-06
Nov-06
Jan-07
Jun-07
Aug-07
Oct-07
Dec-07
Mar-08
Jun-08
Sep-08
Feb-09
Jun-09
Aug-09
Sampling Date



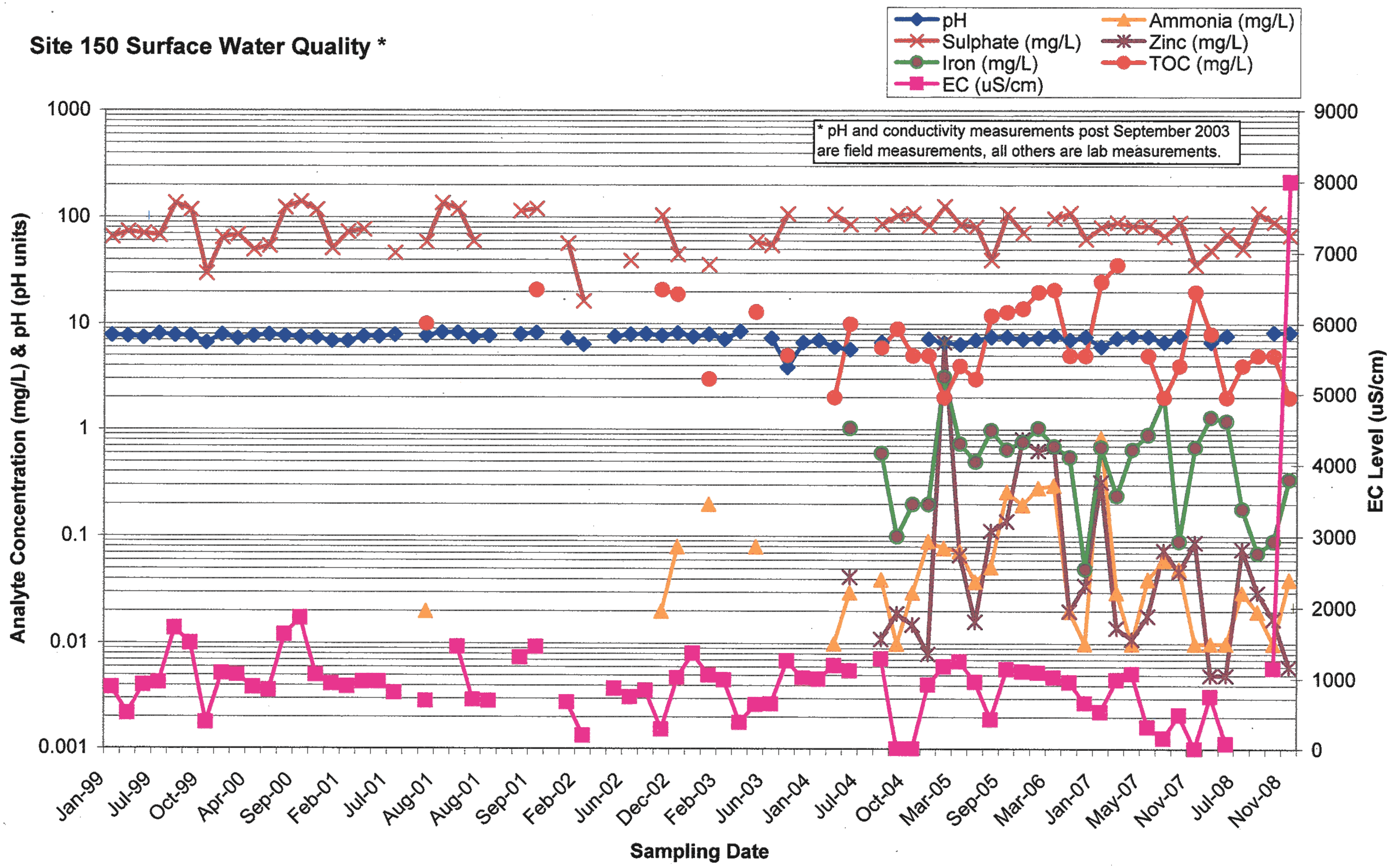
Pond 2 Surface Water Quality *
* pH and conductivity post March 2004 are field measurements, all others are lab measurements.
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
Analyte Concentration (mg/L) & pH (pH units)
100000
10000
1000
100
10
1
0.1
EC Level (uS/cm)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
Mar-03
Sep-03
Nov-03
Mar-04
Jun-04
Sep-04
Nov-04
Dec-04
Jan-05
Mar-05
Apr-05
Jun-05
Sep-05
Nov-05
Feb-06
Mar-06
Mar-06
Apr-06
May-06
Jun-06
Nov-06
Jan-07
Jun-07
Aug-07
Oct-07
Dec-07
Mar-08
Jun-08
Sep-08
Feb-09
Jun-09
Aug-09
Sampling Date

APPENDIX F


Site 110 Surface Water Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity measurements post September 2003 are field measurements, all others are lab measurements.
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
EC Level (uS/cm)
6000
5000
4000
3000
2000
1000
0
Apr-89
Apr-89
Apr-89
Apr-89
Apr-89
Apr-89
Apr-89
May-89
May-89
May-89
May-89
Jul-89
Nov-89
Jul-90
Oct-90
Jul-91
Dec-91
Jun-92
May-93
Mar-94
Dec-94
Jul-95
Oct-95
Nov-95
Dec-95
Feb-96
Apr-96
Jun-96
Jul-96
Sep-96
Oct-96
Nov-96
Jan-97
Apr-97
Jul-97
Sep-97
Jan-98
Aug-98
Mar-99
Oct-99
Aug-00
Jun-01
Aug-01
Sep-01
Apr-02
Dec-02
Jun-03
May-04
Nov-04
Sep-05
Jul-06
Jun-07
Jul-08
Sampling Date


Site 130 Surface Water Quality *
pH
Sulphate (mg/L)
Iron (mg/L)
EC (uS/cm)
Ammonia (mg/L)
Zinc (mg/L)
TOC (mg/L)
* pH and conductivity measurements post September 2003 are field measurements, all others are lab measurements.
Analyte Concentration (mg/L) & pH (pH units)
1000
100
10
1
0.1
0.01
0.001
EC Level (uS/cm)
1200
1000
800
600
400
200
0
Feb-03
Apr-03
Jun-03
Sep-03
Nov-03
Jan-04
Mar-04
May-04
Jul-04
Sep-04
Oct-04
Oct-04
Nov-04
Jan-05
Mar-05
May-05
Jul-05
Sep-05
Nov-05
Feb-06
Mar-06
May-06
Jul-06
Jan-07
Mar-07
Apr-07
May-07
Jun-07
Aug-07
Nov-07
Feb-08
Jun-08
Jul-08
Aug-08
Sep-08
Nov-08
Sampling Date

Site 150 Surface Water Quality *



APPENDIX G

Appendix G:
Summary Particulate Dust Monitoring 2008 - 2009

	Site Name	ALS Batch Code	Date	Total Solids g/m2/mth	Soluble Matter g/m2/mth	Insoluble Solids g/m2/mth	Combustibles g/m2/mth	Ash Residue g/m2/mth	Calculated Rainfall mm
East Void	DG22	EN0801870	Sep-08	13.9	2.3	11.6	1.1	10.5	40
	DG22	EN0802072	Oct-08	3.5	1.4	2.1	0.1	2	57
	DG22	EN0802344	Nov-08	4.2	0.3	3.9	1.1	2.8	62
	DG22	EN0900009	Dec-08	5.6	1.2	4.4	0.6	3.8	103
	DG22	EN0900247	Jan-09	9.7	2.3	7.4	0.9	6.5	61
	DG22	EN0900376	Feb-09	3.6	1.5	2.1	0.4	1.7	20
	DG22	EN0900580	Mar-09	2.8	0.4	2.4	0.3	2.1	24
	DG22	EN0900794	Apr-09	5.7	1.9	3.8	1	2.8	65
	DG22	EN0900941	May-09	3.3	0.5	2.8	0.6	2.2	27
	DG22	EN0901177	Jun-09	2.4	0.4	2	0.4	1.6	45
	DG22	EN0901375	Jul-09	2	1.2	0.8	0.1	0.8	27
	DG22	EN0901602	Aug-09	6.1	1.8	4.3	0.6	3.7	32
			Minimum	***2***	***0.3***	***0.8***	***0.1***	***0.8***	***20***
			Maximum	***13.9***	***2.3***	***11.6***	***1.1***	***10.5***	***103***
			Average	***5.2***	***1.3***	***4.0***	***0.6***	***3.4***	***46.9***
			StdDev	***3.5***	***0.7***	***2.9***	***0.4***	***2.7***	***24.0***
West Void	DG24	EN0801870	Sep-08	14.3	1.8	12.5	1.3	11.2	41
	DG24	EN0802072	Oct-08	4.4	3.3	1.1	0.1	1	58
	DG24	EN0802311	Nov-08	3.5	0.9	2.6	0.6	2	62
	DG24	EN0900009	Dec-08	5.4	1.6	3.8	0.5	3.3	107
	DG24	EN0900247	Jan-09	11.2	3.4	7.8	1	6.8	44
	DG24	EN0900376	Feb-09	2.9	1	1.9	0.4	1.5	20
	DG24	EN0900580	Mar-09	3.1	0.6	2.5	0.3	2.2	23
	DG24	EN0900794	Apr-09	5.6	2.2	3.4	1.1	2.3	63
	DG24	EN0900941	May-09	3.3	0.9	2.4	0.8	1.6	35
	DG24	EN0901177	Jun-09	2	0.4	1.6	0.4	1.2	41
	DG24	EN0901375	Jul-09	1.8	0.5	1.3	0.3	1	29
	DG24	EN0901602	Aug-09	4.3	1.4	2.9	0.5	2.4	31
			Minimum	**1.8**	**0.4**	**1.1**	**0.1**	**1**	**20**
			Maximum	**14.3**	**3.4**	**12.5**	**1.3**	**11.2**	**107**
			Average	**5.2**	**1.5**	**3.7**	**0.6**	**3.0**	**46.2**
			StdDev	**3.8**	**1.0**	**3.3**	**0.4**	**3.0**	**23.9**
Pylara	DG28	EN0801870	Sep-08	9.1	1.8	7.3	2.2	5.1	29
	DG28	EN0802072	Oct-08	3.2	0.4	2.8	0.1	2.7	53
	DG28	EN0802311	Nov-08	10.7	4.5	6.2	3	3.2	63
	DG28	EN0900009	Dec-08	1.9	0.3	1.6	0.6	1	96
	DG28	EN0900247	Jan-09	16.5	2.2	14.3	9.6	4.7	64
	DG28	EN0900376	Feb-09	3.2	0.7	2.5	0.7	1.8	17
	DG28	EN0900580	Mar-09	6.5	2.4	4.1	1.5	2.6	24
	DG28	EN0900794	Apr-09	3.4	1.7	1.7	0.9	0.8	53
	DG28	EN0900941	May-09	1.4	0.4	1	0.5	0.5	19
	DG28	EN0901177	Jun-09	2.4	0.4	2	0.9	1.1	38
	DG28	EN0901375	Jul-09	2.9	0.7	2.2	0.3	1.9	28
	DG28	EN0901602	Aug-09	1.4	0.4	1	0.4	0.6	26
			Minimum	***1.4***	***0.3***	***1***	***0.1***	***0.5***	***17***
			Maximum	***16.5***	***4.5***	***14.3***	***9.6***	***5.1***	***96***
			Average	***5.2***	***1.3***	***3.9***	***1.7***	***2.2***	***42.5***
			StdDev	***4.7***	***1.3***	***3.8***	***2.6***	***1.5***	***23.7***
Chinnery	DG18	Decommissioned in early 2007 as per EPA advice - construction of Intermodal Facility complete							

'<' removed from <LOR values

APPENDIX H

Appendix H1: 2008/09 sub-surface gas monitoring

GMBH1		Methane	Carbon Dioxide	Oxygen	Balance	Depth to Water
		%	%	%		m
28/11/2008	Before purge	0.3	13.3	2.5	83.5	8.79
	After purge	0.0	0.0	20.5	79.6	
6/01/2009	Before purge	0.1	10.0	20.7	82.7	8.83
	After purge	0.0	0.0	20.9	79.1	
11/06/2009	Before purge	0.0	0.0	21.3	78.6	9.4
	After purge	0.0	0.0	20.8	79.0	
20/08/2009	Before purge	0.0	0.0	20.3	79.6	9.73
	After purge	0.0	0.0	21.0	78.9	

GMBH2		Methane	Carbon Dioxide	Oxygen	Balance	Depth to Water
		%	%	%		m
28/11/2008	Before purge	0.0	2.6	18.0	79.3	14.4
	After purge	0.0	0.0	20.0	80.0	
6/01/2009	Before purge	0.0	2.6	18.1	79.2	14.64
	After purge	0.0	0.0	20.4	79.5	
11/06/2009	Before purge	0.0	0.1	21.2	78.6	14.98
	After purge	0.0	0.0	21.8	78.2	
20/08/2009	Before purge	0.1	2.2	18.4	79.3	15.11
	After purge	0.0	0.0	20.1	80.0	

GMBH4		Methane	Carbon Dioxide	Oxygen	Balance	Depth to Water
		%	%	%		m
28/11/2008	Before purge	0.0	4.9	0.3	94.7	13.95
	After purge	0.0	0.0	20.7	79.2	
6/01/2009	Before purge	0.0	4.9	0.0	95.1	13.65
	After purge	0.0	0.0	20.4	79.5	
11/06/2009	Before purge	0.0	0.0	0.2	78..5	13.45
	After purge	0.0	0.0	21.0	79.0	
20/08/2009	Before purge	0.0	0.0	19.9	79.7	13.58
	After purge	0.0	0.0	20.2	79.7	

H-2

Surface Gas Monitoring 2008-09

Date: 24/09/2008

	1	2	3	4	5
A	0.2	0.4	0	0.2	0.1
B	0	0.3	0.1	0.2	0.2
C	0.2	0.3	0.1	0.5	0.1
D	0.2	0.1	0.4	0.5	0.3
E	0.1	0.1	0.1	0.1	0.1

Average	0.20
Min	0
Max	0.5

Date: 18/02/2009

	1	2	3	4	5
A	0	0.1	0	0.1	0
B	0.1	0	0.2	0.1	0
C	0.1	0.2	0.2	0	0.1
D	0.4	0.1	0.3	0.2	0.2
E	0.1	0.1	0.2	0.2	0.5

Average	0.14
Min	0
Max	0.5

Date: 4/06/2009

	1	2	3	4	5
A	0	0	0.1	0	0.1
B	0.2	0.1	0	0.2	0.3
C	0.2	0.1	0	0.3	0.4
D	0.3	0.1	0.1	0.4	0.2
E	0.2	0.2	0.2	0.1	0.4

Average	0.17
Min	0
Max	0.4

Date: 2/09/2009

	1	2	3	4	5
A	0	0.2	0.1	0.2	0.2
B	0.2	0.4	0.2	0.2	0.2
C	0.3	0.3	0.1	0.2	0.3
D	0.1	0.4	0.1	0.3	0.1
E	0.2	0.1	0.1	0.1	0.2

Average	0.19
Min	0
Max	0.4

Note: A-1 etc is grid reference and results are CH_4 by % volume

Yearly	
Minimum	**0**
Mean	**0.17**
Maximum	**0.5**

APPENDIX I

Monitoring Point 5 – Gas Extraction Booster – Prior to LFG Destruction

Pollutant	Units of measure	Frequency	Mean
Carbon dioxide	mg/m3	Yearly	42.4
Dry Gas Density	%	Yearly	99
Moisture Content	%	Yearly	29.7
Molecular weight of stack gases	gr/grmole	Yearly	Not Applicable
Oxygen	%	Yearly	0
Temperature	Deg C	Yearly	21.56
Volatile Organic Compounds	mg/m3	Yearly	8.009
Volumetric Flow rate	m3/sec	Yearly	682

Monitoring Point 7 – Landfill Gas Flare

Pollutant	Units of measure	Frequency	Mean
Temperature	Deg C	Yearly	894.15
Residence Time	Seconds	Continuous	3

Monitoring Point 8 – Landfill Gas Engine Exhaust Point

Generator 1

Pollutant	Units of measure	Frequency	Mean
Carbon dioxide	%	Yearly	11.6
Carbon monoxide	mg/m3	Yearly	962
Dry Gas Density	mg/m3	Yearly	1.35
Moisture Content	%		5.6
Molecular Weight of Stack Gases	gr/grmole	Yearly	30.2
Nitrogen Oxides	mg/m3	Yearly	318
Oxygen	%	Yearly	8.2
Sulfuric acid mist as SO3	mg/m3	Yearly	6.58
Sulphur dioxide	mg/m3	Yearly	21
Temperature	Deg C	Yearly	455
Velocity	m/sec	Yearly	50.5
Volatile Organic Compounds	mg/m3	Yearly	<3.62
Volumetric Flow rate	m3/sec	Yearly	1.71

Generator 2

Pollutant	Units of measure	Frequency	Mean
Carbon dioxide	%	Yearly	9.3
Carbon monoxide	mg/m3	Yearly	674
Dry Gas Density	mg/m3	Yearly	1.31
Moisture Content	%		6.2
Molecular Weight of Stack Gases	gr/grmole	Yearly	29.4
Nitrogen Oxides	mg/m3	Yearly	449
Oxygen	%	Yearly	10
Sulfuric Acid mist as SO3	mg/m3	Yearly	7.88
Sulphur dioxide	mg/m3	Yearly	10
Temperature	Deg C	Yearly	437
Velocity	m/sec	Yearly	44.7
Volatile Organic Compounds	mg/m3	Yearly	<4.17
Volumetric Flow rate	m3/sec	Yearly	1.55

APPENDIX J

Monitoring Point 54 - ED3 Volumes 2008 - 2009

Date	ED3S	ED3N	ED3N Lagoon 1	ED3N Lagoon 2	ED3N Lagoon 3	Total Volume ED3 System ML
	Volume ML	Volume ML	Volume ML	Volume ML	Volume ML	
Sep-08	50	38.79	6.95	11.86	0.03	107.63
Oct-08	50	36.59	6.41	10.73	0.03	103.76
Nov-08	50	34.59	6.66	9.94	0.00	101.19
Dec-08	50	33.75	5.96	11.97	0.00	101.68
Jan-09	50	29.33	6.02	10.67	0.00	96.02
Feb-09	50	28.85	4.88	8.05	0.00	91.78
Mar-09	50	27.67	4.03	6.69	0.00	88.39
Apr-09	50	27.91	3.56	5.71	0.00	87.18
May-09	50	28.05	3.28	5.56	0.00	86.89
Jun-09	50	29.87	5.07	5.71	0.00	90.65
Jul-09	50	31.47	7.92	5.57	0.00	94.96
Aug-09	50	31.47	9.78	5.39	0.00	96.64
Minimum	50	27.67	3.28	5.39	0.00	86.89
Mean	50.00	31.53	5.88	8.15	0.01	95.56
Maximum	50	38.79	9.78	11.97	0.034	107.634

App J.

APPENDIX K

VEOLIA ENVIRONMENTAL SERVICES

WOODLAWN BIOREACTOR

Woodlawn EPL 11436: C2 – Details of Non-Compliance with Licence

Licence condition number not complied with
M2.1 Requirement to monitor concentration of pollutants specified. The licensee must use the sampling method, units of measure, and sample at the frequency specified.
Summary of particulars of the non-compliance
Monitoring Points 13, 15, 17, 26, 27, 29, 31, 32, 33, 34, 35, 36, 37, 38, 38, 39, 40, 55, 58 did not meet the sampling frequency requirements during the reporting period
If required, further details on particulars of non-compliance
N/A
Date(s) when non-compliance occurred, if applicable
2008-2009 Reporting period
If relevant, precise location where the non-compliance occurred
Woodlawn Bioreactor site.
If applicable, registration number of any vehicle or the chassis number of any mobile plant involved in the non-compliance
NA
Cause of non-compliance
Monitoring Points – 13, 15, 17. Sampling frequency was not achieved due to the lack of precipitation to cause adequate surface water flows to take a sample. Monitoring Points - 26, 27, 29, 31, 32, 33, 34, 35, 36, 37, 38, 38, 39, 40. These sites were monitored to satisfy the annual groundwater sampling requirements of the EPL. VES waiting on clarification from NSW DECCW on the justification for the increased monitoring parameter requirements for these groundwater locations. (letter sent asking for clarification 23/5/2008). Monitoring Points 55 and 58. Sampling frequency was not achieved, as these groundwater monitoring wells were dry, which meant no liquid to sample and analyse.
Action taken or that will be taken to mitigate any adverse effects of the non-compliance
Discussions are in progress as to the relevance of the changes made to the mine site groundwater monitoring. With reference to the types of parameters that should be monitored from these points in order to effectively monitor potential pollutants associated with mine contamination rather than landfill. contamination.
Action taken or that will be taken to prevent a recurrence of the non-compliance
Veolia to pursue finalisation of review of mine bore monitoring requirements. However, until officially advised we will continue to monitor as per current licence requirements and ensure all monitoring schedules and checklist are in line with the current licence requirements. In relation to non-compliance due to low groundwater or surface water flows Veolia will continue to monitor flows and ensure samples are taken when flows return.

VEOLIA
ENVIRONMENTAL SERVICES

Woodlawn EPL 11455

C2 – Details of Non-Compliance with Licence

Licence condition number not complied with
M2.1 Requirement to monitor concentration of pollutants specified. The licensee must use the sampling method, units of measure, and sample at the frequency specified.
Summary of particulars of the non-compliance
Monitoring Point 1-3 did not meet the sampling frequency for scheduled pollutants during the reporting period due to insufficient flows in the creek. **Monitoring Point 4** Particulates – deposited matter receptor ceased operation as per advice from the EPA in March 2007.
If required, further details on particulars of non-compliance
N/A
Date(s) when non-compliance occurred, if applicable
Reporting period
If relevant, precise location where the non-compliance occurred
Crisps Creek Intermodal Facility, Bungendore Rd, Tarago
If applicable, registration number of any vehicle or the chassis number of any mobile plant involved in the non-compliance
N/A
Cause of non-compliance
All sample pollutants of EPL 11455, as advised by the EPA in 2007, where brought in line with the monitoring schedule review for the Woodlawn Bioreactor EPL 11436. Sampling frequency for Monitoring Points 1-3 was not achieved due to the lack of precipitation to cause surface water flows.
Action taken or that will be taken to mitigate any adverse effects of the non-compliance
Discussions with the EPA to update the monitoring requirements in the licence.
Action taken or that will be taken to prevent a recurrence of the non-compliance
Discussions are in progress with the DECCW to finalise the surface water and particulates monitoring requirements in the EPL, However we will continue to monitor as per current licence requirements and ensure all monitoring schedules and checklist are in line with the current licence requirements. In relation to non-compliance due to low groundwater or surface water flows Veolia will continue to monitor flows and ensure samples are taken when flows return.