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Whitelee Windfarm

Post Construction Groundwater Quality Monitoring Report

November 2009

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Project: Whitelee Windfarm
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Jacobs Engineering U.K. Limited

Contents

Scottish Power
Whitelee Windfarm
Post Construction Groundwater Quality Monitoring, Report – November 2009

1 Introduction

1.1 Jacobs was commissioned by ScottishPower plc to undertake a programme of groundwater monitoring and sampling, laboratory testing and subsequent assessment and reporting at Whitelee Windfarm site, Eaglesham Moor, near East Kilbride. The aim of the work was to provide data to assist in the assessment of whether the windfarm development was having any impact on local groundwater quality.

1.2 Monitoring started in July 2006 prior to any construction work (access track construction first commenced in October 2006 and turbine foundation construction in December 2006) and continued on a monthly basis until September 2008.

1.3 Construction works have since been completed and the windfarm was officially opened and became operational in May 2009. Following the completion of the construction works, ScottishPower commissioned Jacobs to undertake a further round of groundwater sampling and laboratory testing for comparison with the previously collected data.

2 Previous Monthly Groundwater Monitoring

2.1 The monthly monitoring of boreholes was undertaken over a period of 26 months. Over the monitoring period, a number of boreholes were added and removed by Scottish Power as the site activities developed. The details of the locations monitored throughout the construction period are provided within the Jacobs Whitelee Windfarm, Groundwater Quality Monitoring Report – July 06 to September 08.

2.2 A location plan for all the boreholes monitored during the work is provided as Figure 1 in this report.

2.3 The laboratory analysis requirements were stipulated by ScottishPower at the outset of the project, however, in response to comments from the Planning Monitoring Officer, additional analytes were added to the testing schedule in August and September 2007.

2.4 Groundwater samples were submitted from each monitoring round for the following laboratory analysis by Scientific Analysis Laboratories Ltd, East Kilbride:

- Aluminium
- Calcium
- Sodium
- Magnesium
- Iron
- Chloride
- Total petroleum hydrocarbons (TPH)
- Volatile organic compounds (VOCs)
- Semi-volatile organic compounds (SVOCs).
- pH (added in August 2007)

- Electrical conductivity (added in August 2007)
- Alkalinity (added in August 2007)
- Total sulphate (added in August 2007)
- Total organic carbon (added in September 2007)

2.5 Prior to sampling, all boreholes were first dipped to record groundwater levels and the level of the base. They were then purged to 3 well volumes, with field monitoring of pH, electrical conductivity and temperature taken prior to water sampling into laboratory supplied bottles for subsequent analysis.

2.6 From November 2007, groundwater samples scheduled for metal analysis were filtered through a 0.45 micron filter on site.

2.7 Weather conditions for the site monitoring visits were recorded and are provided in Appendix C.

3 Previous Monthly Groundwater Monitoring Conclusions

3.1 Monitoring boreholes are located mainly within peaty strata, underlain by clayey glacial alluvium. One borehole is installed with wellscreen open only to a sand and gravel aquifer beneath the peat. This borehole has different chemistry to water from boreholes that have wellscreen across both shallower peat horizons and underlying clayey alluvium (and are assumed to provide mixed samples from both horizons).

No seasonal or spatial patterns were identified in the groundwater monitoring data from the monthly monitoring.

3.2 Aluminium and iron were noted to exceed the adopted generic assessment criteria (GAC) on occasion although this was not correlated to identifiable site activities or other changes in conditions at the site. Measured iron and aluminium concentrations were considered to represent normal background levels for the monitored groundwater bodies.

3.3 A number of SVOC compounds were detected at low levels during various monitoring rounds. The detection of these SVOC compounds is thought to have been caused by cross contamination within the laboratory and the contaminants are not considered to be present on the site.

3.4 From the data collected during the monthly groundwater monitoring, it was concluded that groundwater quality at the Whitelee site did not appear to have been impacted by the construction of the windfarm.

4 Post Construction Groundwater Monitoring

4.1 The post construction monitoring of boreholes was undertaken on 17th September 2009. Monitoring and subsequent sampling was carried out at the remaining five boreholes, CP02 and WP01 – WP04.

4.2 Boreholes WP01 – WP04 are screened across both peat and the deeper alluvial deposits of mainly silt and clay whereas CP02 is the borehole screened across deposits of sand and gravel only below the peat horizon.

4.3 Groundwater samples were obtained from each of the boreholes and were analysed for the same parameters as the final monthly monitoring round in September 2008.

4.4 As with all other monitoring rounds, the boreholes were first dipped to record groundwater levels and the level of the base. They were then purged to 3 well volumes, with field monitoring of pH and temperature taken prior to water sampling for subsequent laboratory testing. Electrical conductivity readings were not recorded in the field due to instrument failure.

5 Groundwater Levels

5.1 Boreholes WP01 – WP04 had groundwater levels between 0.13mbgl and 0.33mbgl whereas the groundwater level at CP02 was recorded at 2.97mbgl. The groundwater levels taken during the post construction monitoring round appear to be fairly consistent with the levels previously recorded during the monthly monitoring.

5.2 All monitored boreholes were clear to the base of the response zone with no signs of blockage or siltation.

6 In situ water quality data

6.1 Water quality indicators are recorded in situ using a water quality kit capable of measuring pH, electrical conductivity, and temperature. Full water quality results for all rounds of monitoring are contained within Appendix C.

6.2 Ranges for pH, electrical conductivity, and temperature for all monitoring locations are detailed within graphs contained in Appendix C. It should be noted that pH data is not available for December 2007 and conductivity data for September 2009 due to instrument failure.

6.3 Ranges for laboratory tested electrical conductivity and pH parameters are also detailed graphically within Appendix C.

6.4 No trends or patterns were evident from the conductivity or temperature results, however, the deeper groundwater samples obtained from CP02 do as expected have consistently higher conductivity values. For pH values, a decreasing trend is evident with the post construction monitoring round recording the lowest pH values at each of the monitored boreholes.

7 Groundwater Laboratory Results and Trends

7.1 The results of the analyses are compared with the previously adopted GAC, drawn from selected Drinking Water Standards (DWS) or Environmental Quality Standards (EQS) for freshwater where no DWS values are available. The results from the analysis of the latest samples have been combined with all monthly monitoring rounds and are graphically summarised in Appendix A and tabulated in Appendix B. The laboratory analytical certificates can be found in Appendix E.

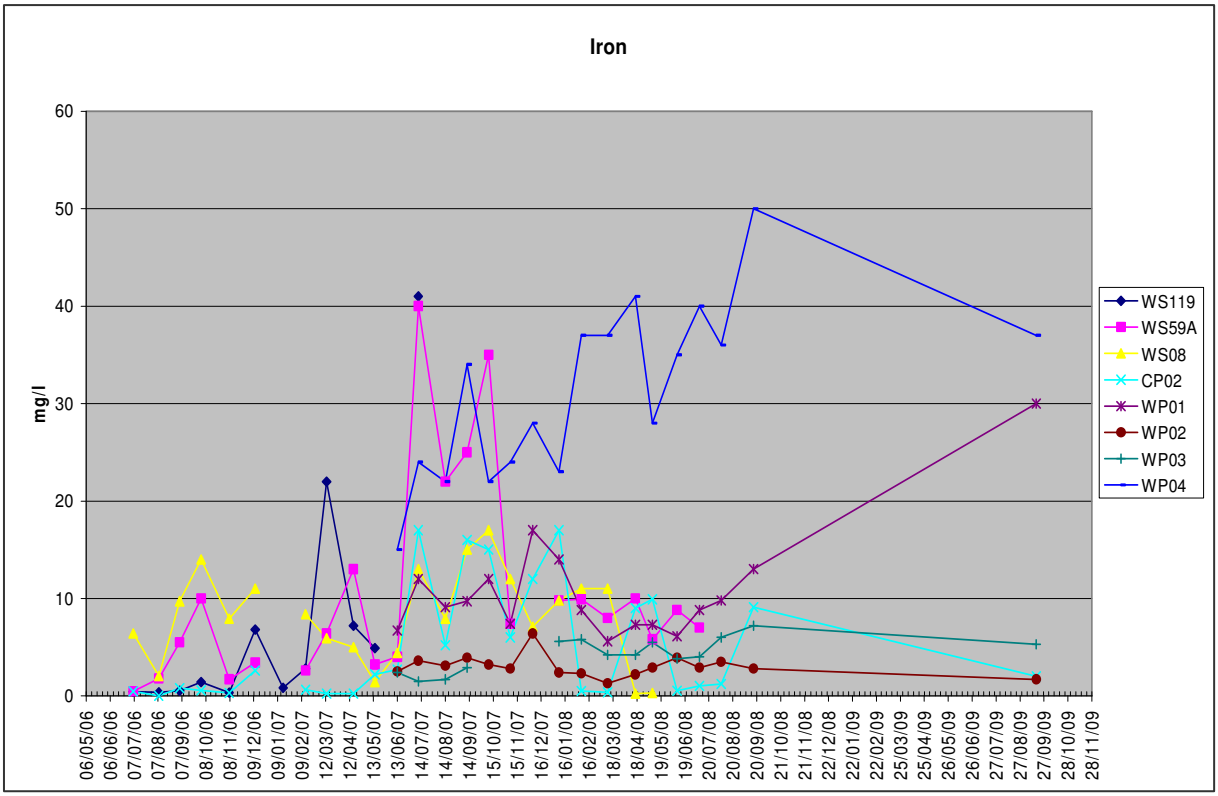
7.2 Groundwater quality recorded during the period of July 2006 to September 2006 has been considered as baseline groundwater quality for this site, as it was carried out prior to the commencement of construction. As previously noted, aluminium and iron concentrations have been recorded in all boreholes at concentrations in exceedence of the relevant GAC throughout the period of monitoring.

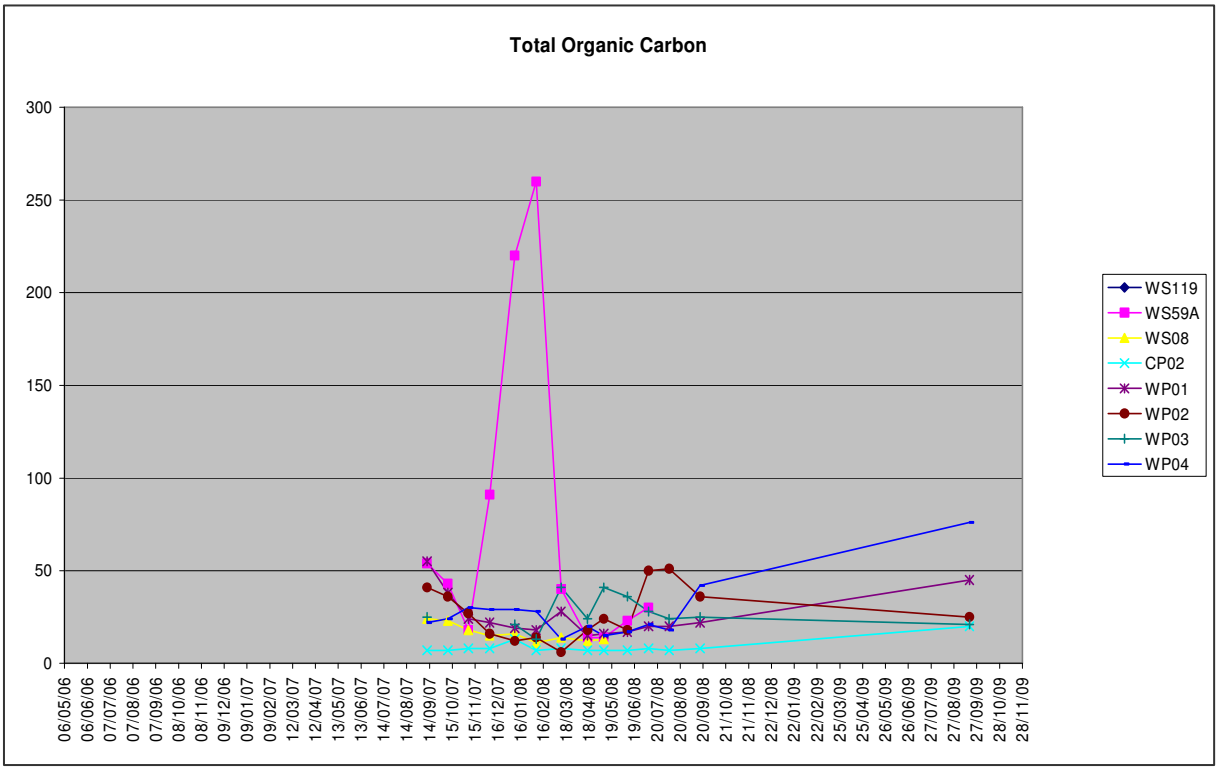
7.3 Comparison of post construction data against the historical dataset showed no increasing or decreasing trends for calcium, magnesium and aluminium at any of the boreholes with the graphs showing the results at each borehole being relatively steady across the monitoring rounds. The graphs also showed that sodium and chloride concentrations across all boreholes were slightly decreasing with time, a trend that appears to have continued into 2009.

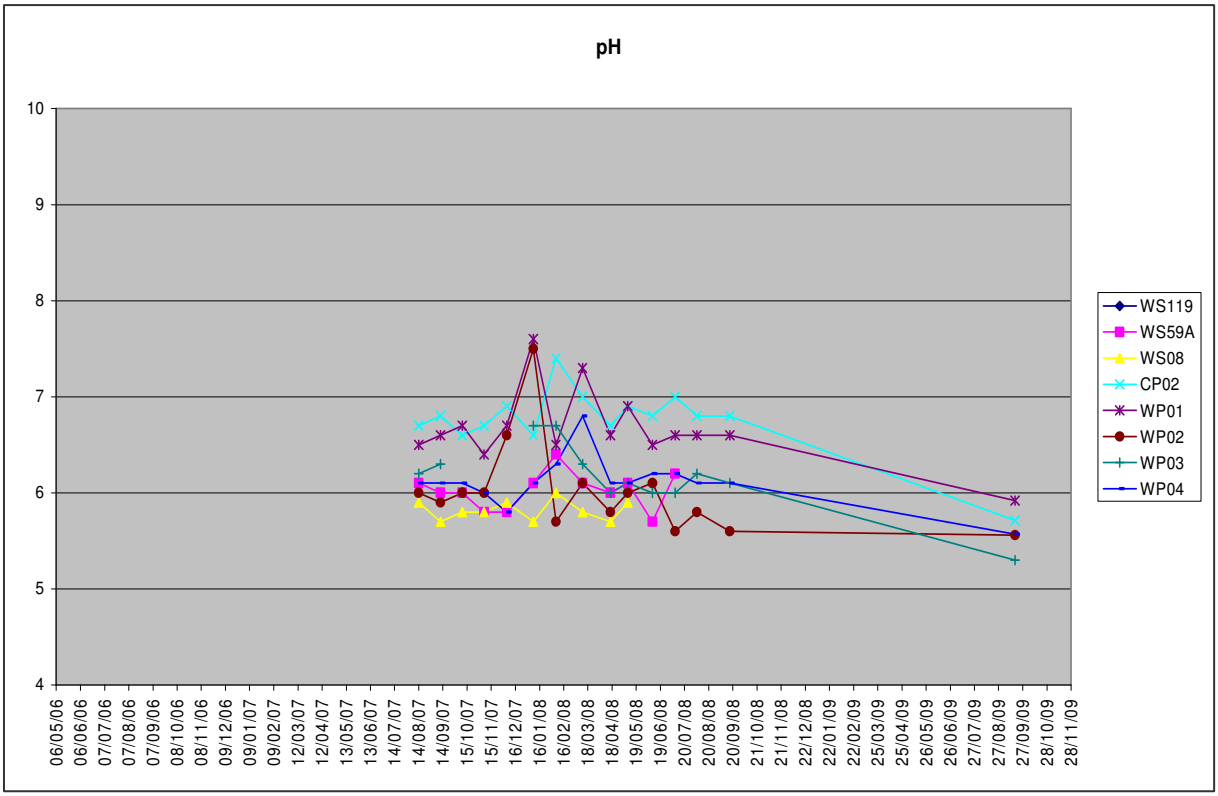
7.4 Conversely, the highest total petroleum hydrocarbons (TPH) concentration was recorded in the post construction monitoring round at WP04, with TPH concentrations across all the boreholes having increased in this round compared with the previous round. It is noted that this increase in TPH concentration was not part of an established trend and it is therefore possible that these elevated results are a one off event (as has been observed for a number of parameters during the historical monitoring work).

7.5 A number of phenols, chlorinated phenols and plasticizers have been detected in WP01 over the course of the monthly monitoring with 3/4-methylphenol being detected since May 2008 and also being detected at this location during this post construction monitoring round. The maximum concentration of 3/4-methylphenol was recorded during the post construction monitoring with a value of 120ug/l being recorded which is above the EQS for phenol of 30ug/l. An increasing trend of 3/4-methylphenol values was observed at WP01.

7.6 The maximum concentration of iron at WP01 and TOC at WP04 was recorded during the post construction monitoring round. Iron and total organic carbon (TOC) were both observed at WP01 and WP04 to have an increasing trend and a decreasing trend of pH values was observed across all boreholes. These trends are illustrated in the graphs below.







8 Conclusions and recommendations

8.1 Throughout the monthly monitoring period and from the post construction monitoring, localised increases in the concentration of contaminants have been observed, but cannot be correlated to identifiable site activities or other changes in conditions at the site. It is noted that such peaks and troughs in the concentration of dissolved species are not limited to particular parts of the site and are assumed to represent the intrinsic variability of the sampling and analytical procedures adopted, coupled with any natural variations due to changes in infiltration, percolation through the soil and sub-surface water flow.

8.2 Nevertheless, the post construction samples did show continuation of increasing trends of iron and total organic carbon at both WP01 and WP04 and a decreasing trend of pH values across all boreholes. An increasing trend for 3/4-methylphenol was also recorded at WP01. An increase in TPH concentrations was also observed, with higher levels of TPH being recorded at each borehole in this round compared to the previous round.

8.3 No record or visible signs of oil contamination were noted during the latest monitoring visit. Boreholes WP01 to WP04 are screened across peat and it is possible that the increased TOC and iron concentrations along with the decreasing pH concentration may be indicative of local increases of peat rich water into these boreholes. With this in mind, it is also possible that the elevated TPH concentrations recorded during the post construction monitoring may be due to the high levels of TOC associated with the peaty water (quantified as TPH during the solvent extraction based TPH analysis). 3/4-methylphenol was only recorded at WP01. The reason for its presence within this borehole is unknown but has not been attributed to any site activities which have taken place within this vicinity.

8.4 In the light of the unexplained trends and changes noted above, it is recommended that the available monitoring data and information is assessed against the predictions made in the original Environmental Impact Assessment (EIA) for the windfarm development. The significance of the observed groundwater quality information should be assessed and consideration given to the need for revising existing impact predictions and associated mitigation / precautionary requirements.

8.5 It is understood that a second phase of the Whitelee Windfarm is planned for construction and groundwater monitoring will again be undertaken to establish baseline conditions and monitor any construction impacts. It is recommended that during any such Phase 2 groundwater monitoring, bi-annual monitoring of the boreholes within the Phase 1 area is also undertaken and the data reassessed on a yearly basis. During this monitoring it is recommended that phenols at WP01 are specifically targeted and subjected to further assessment and review.

Figure 1
Monitoring Hole Location Plan

Drawing number / Rev
B0627819/GI/01 - Rev 0

Key:

Monitoring Hole Location

N

Rev	Rev. Date	Purpose of revision	Drawn	Checked	Approved
0	Nov 09	Final Issue	CC	SE	SJD

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Client
SCOTTISHPOWER RENEWABLES

Project
WHITELEE WINDFARM

Drawing title
MONITORING HOLE LOCATION PLAN

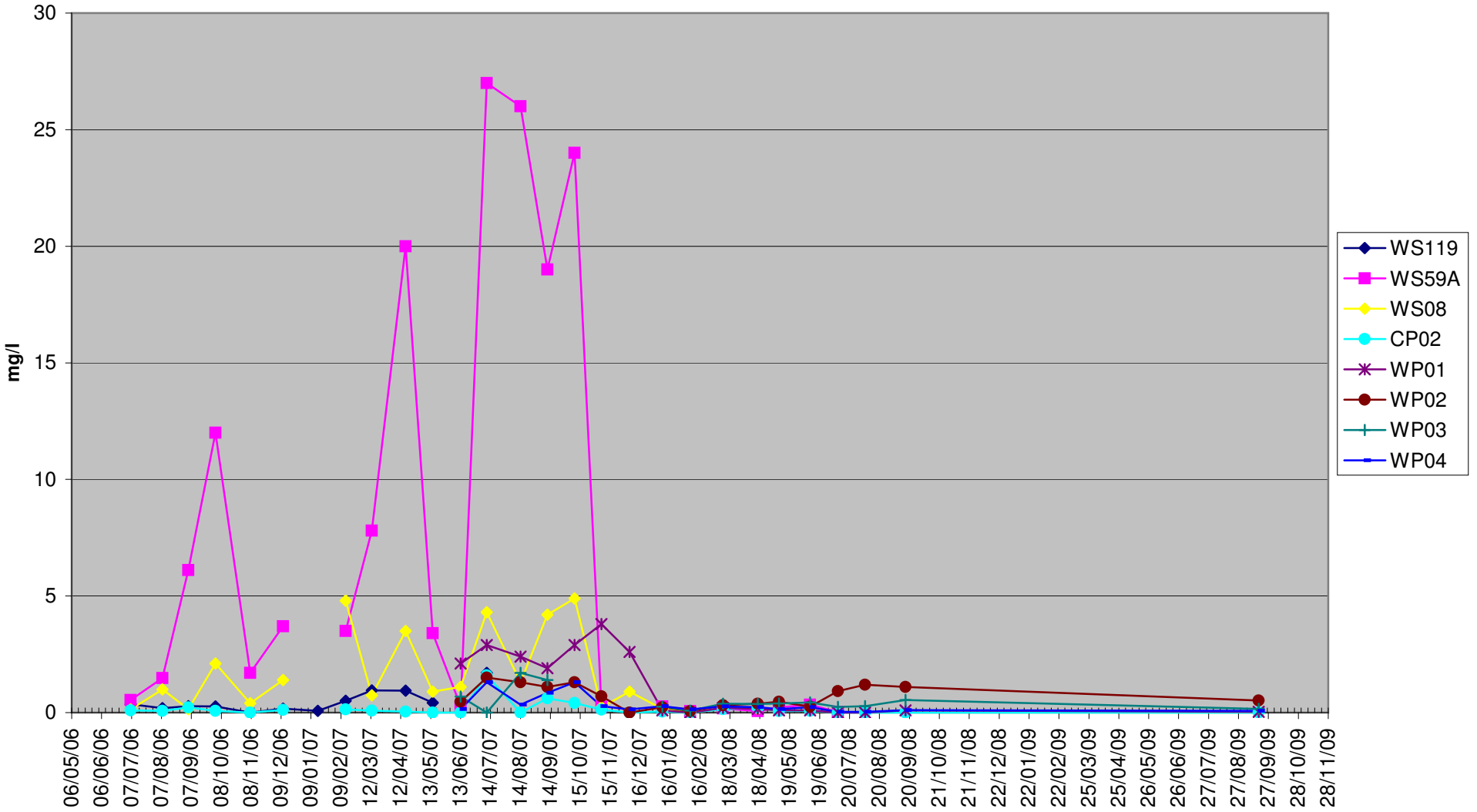
Drawing status
FINAL

Scale	N.T.S
Jacobs No.	B0627819
Client no.	

Drawing number: B0627819/GI/01 Rev 0

Appendix A – Graphs

Aluminium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10
5
0
mg/l
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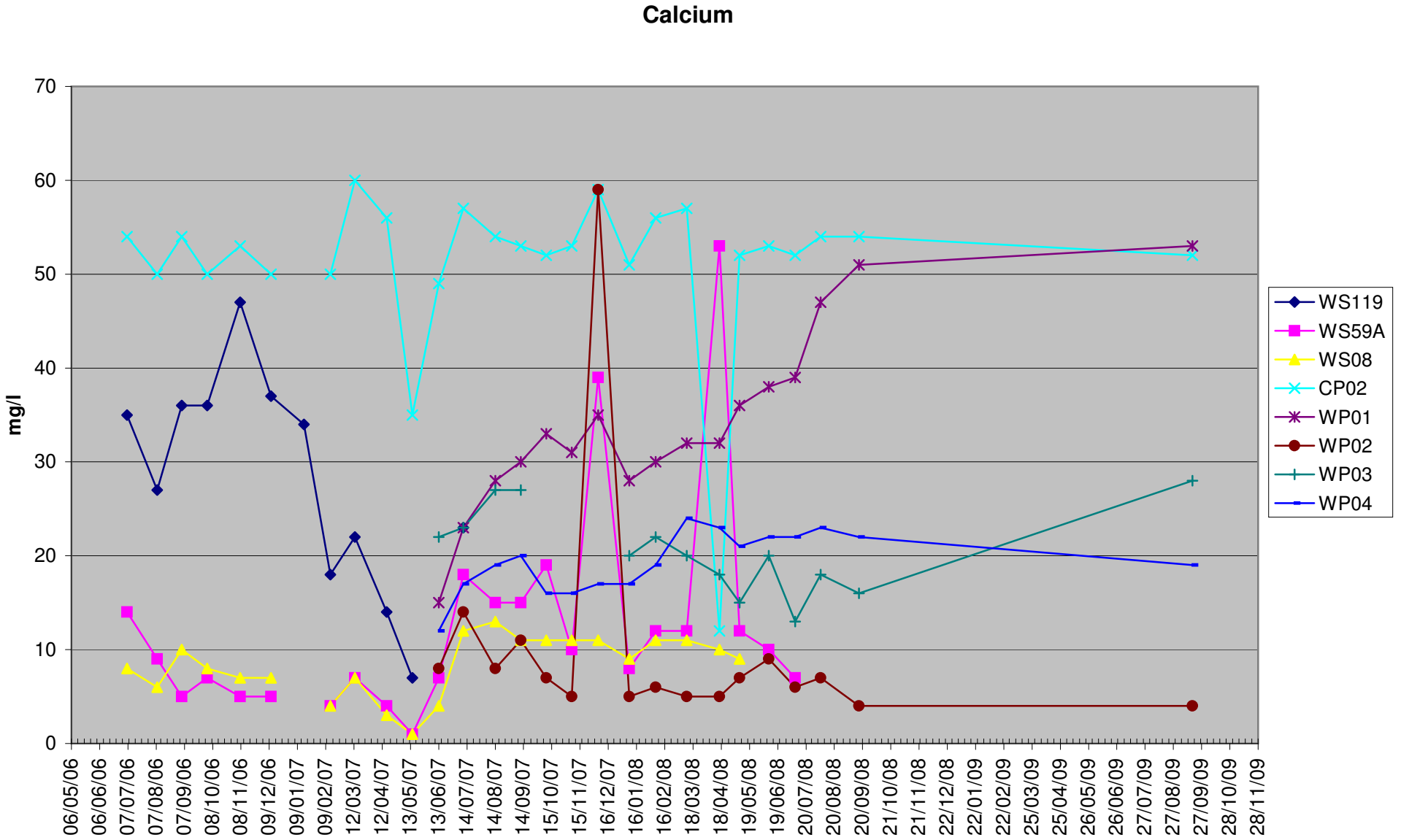
WS119
WS59A
WS08
CP02
WP01
WP02
WP03
WP04


Calcium
mg/l
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60
50
40
30
20
10
0
06/05/06
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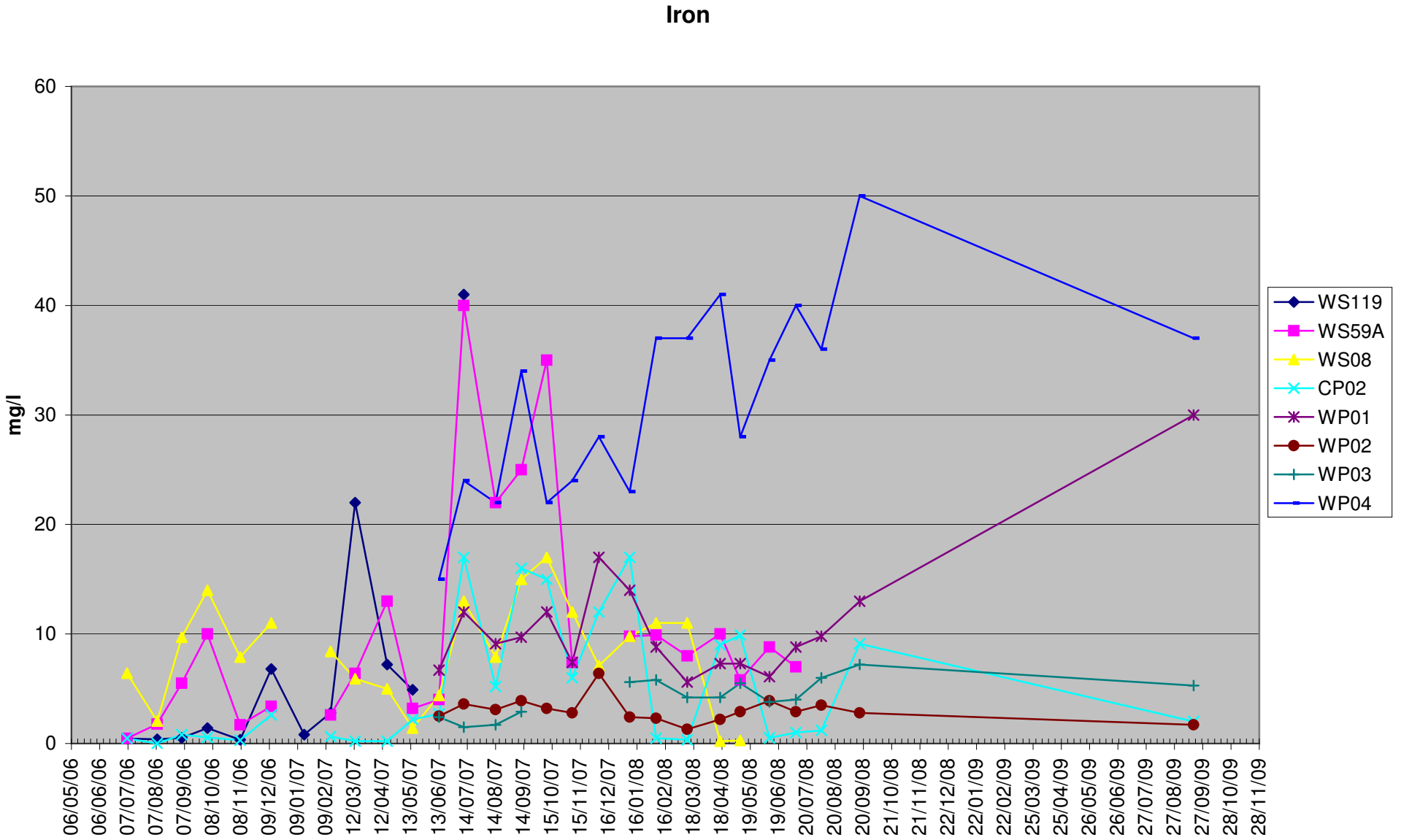
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mg/l
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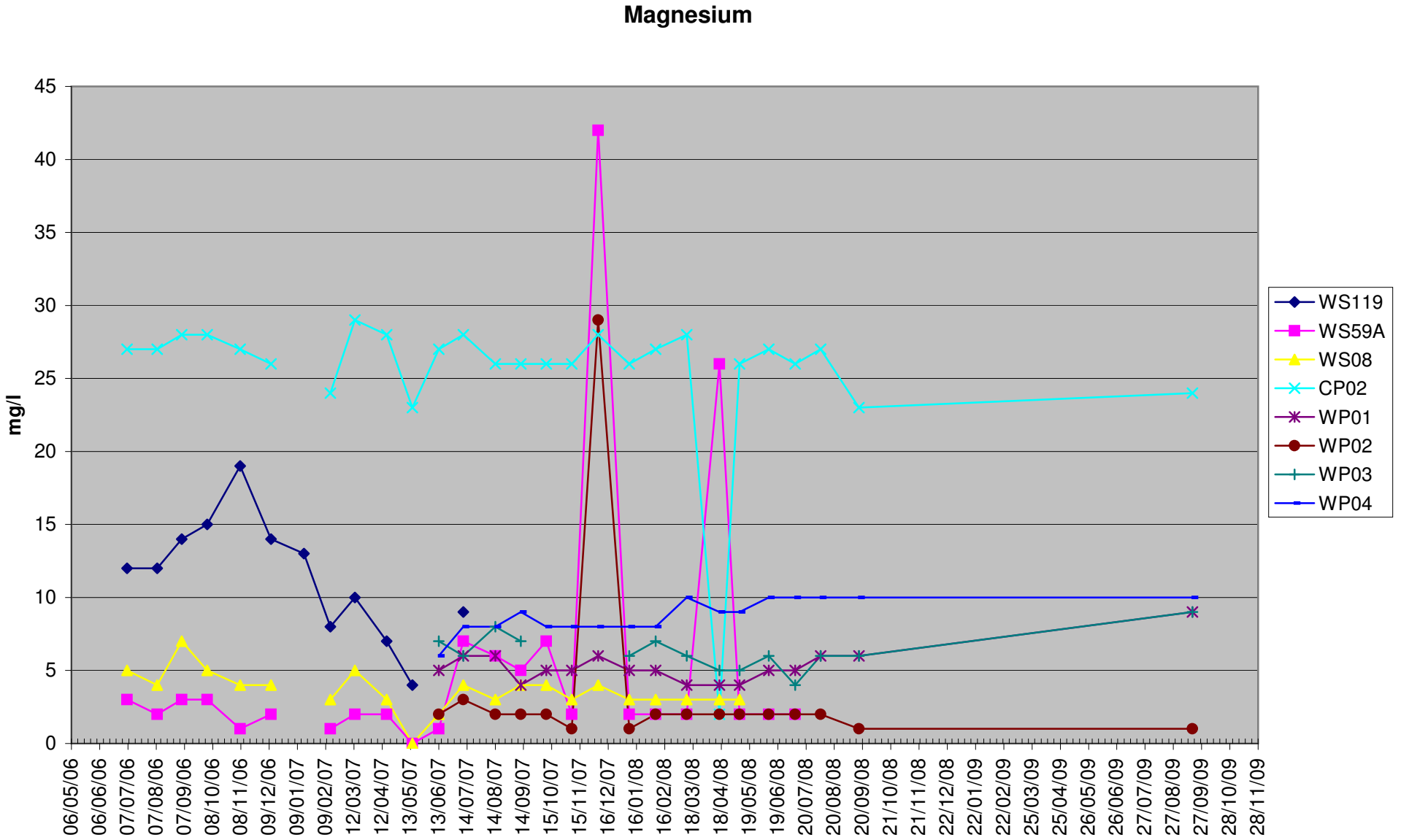
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mg/l
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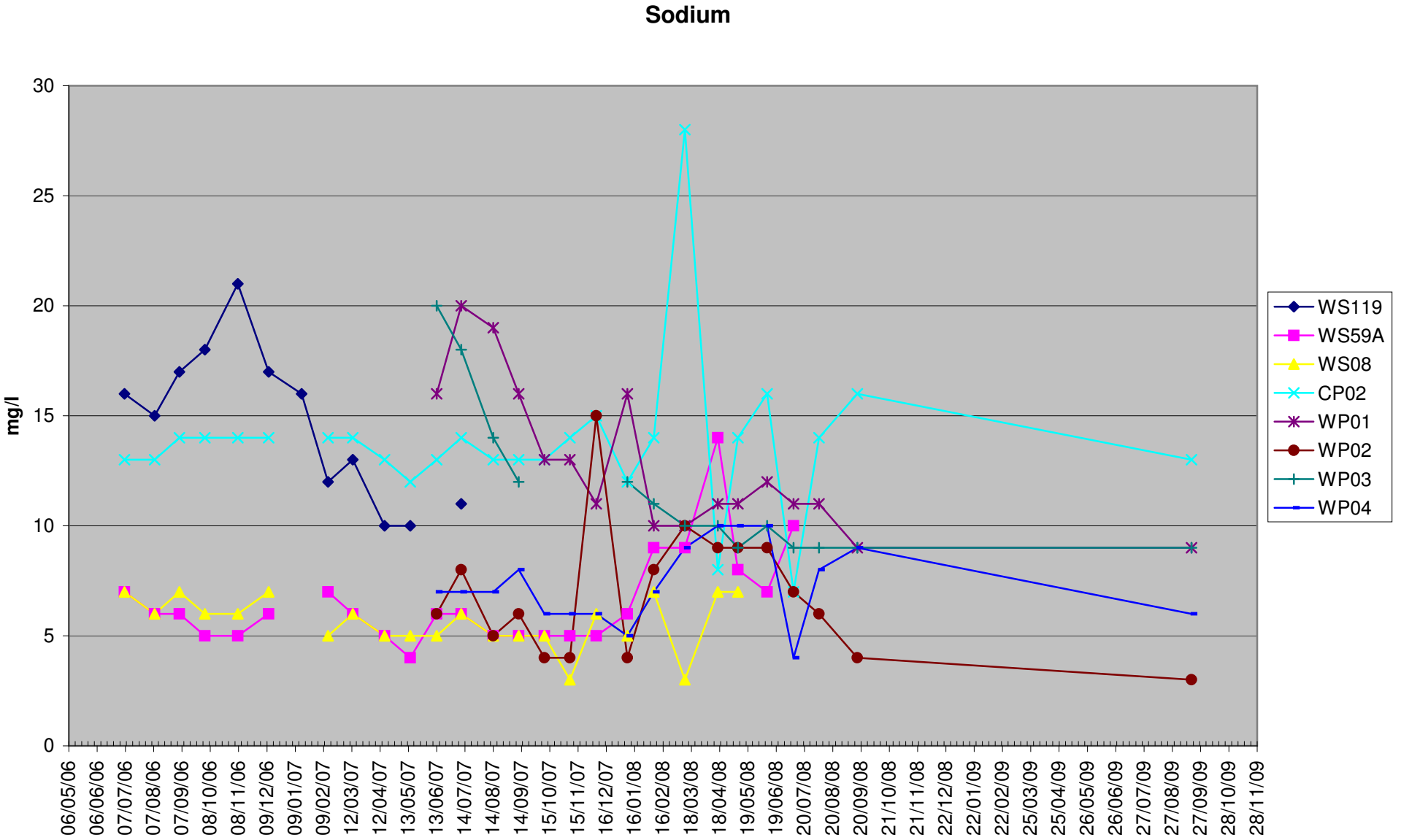
Sodium
mg/l
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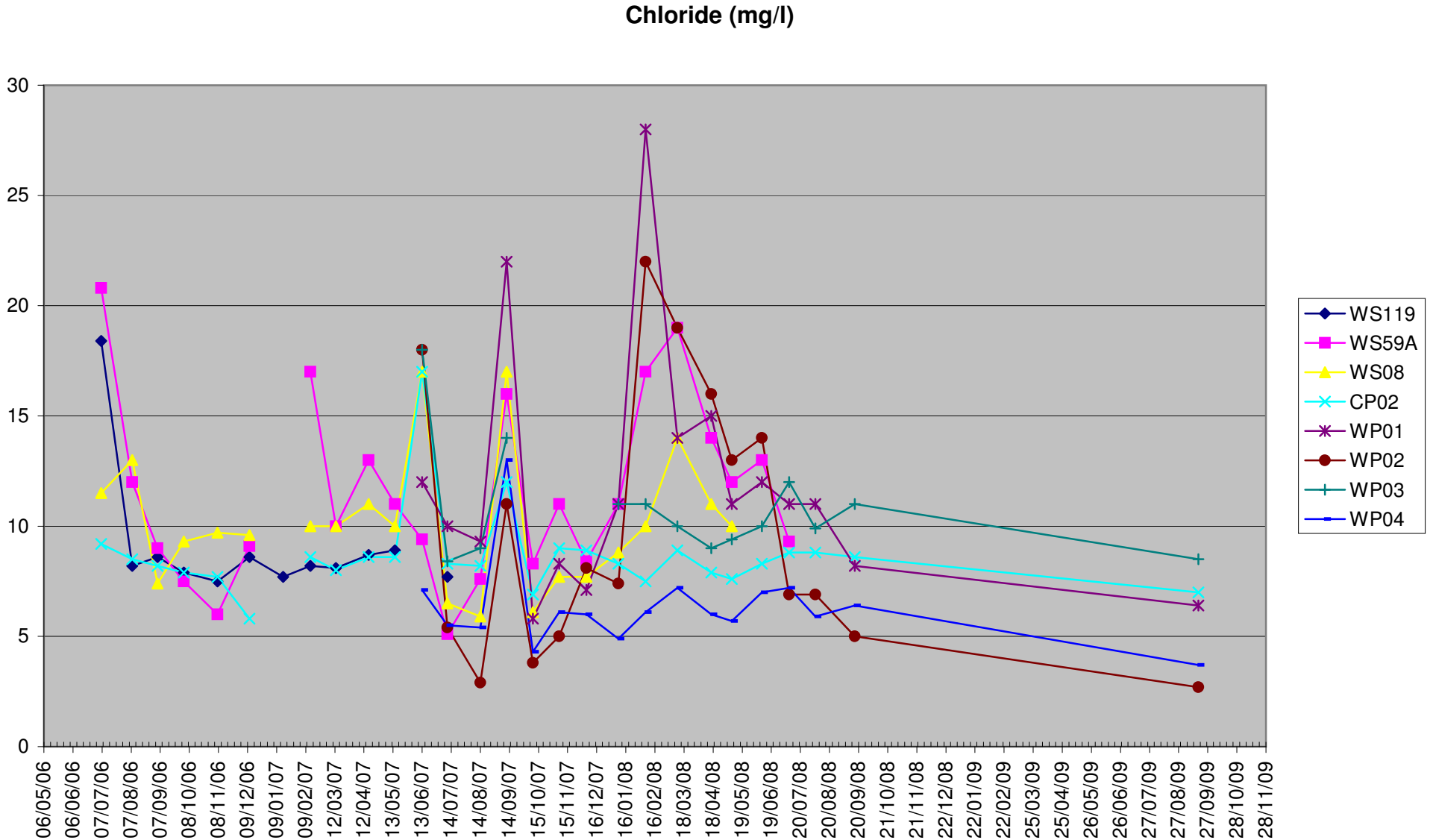
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25
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15
10
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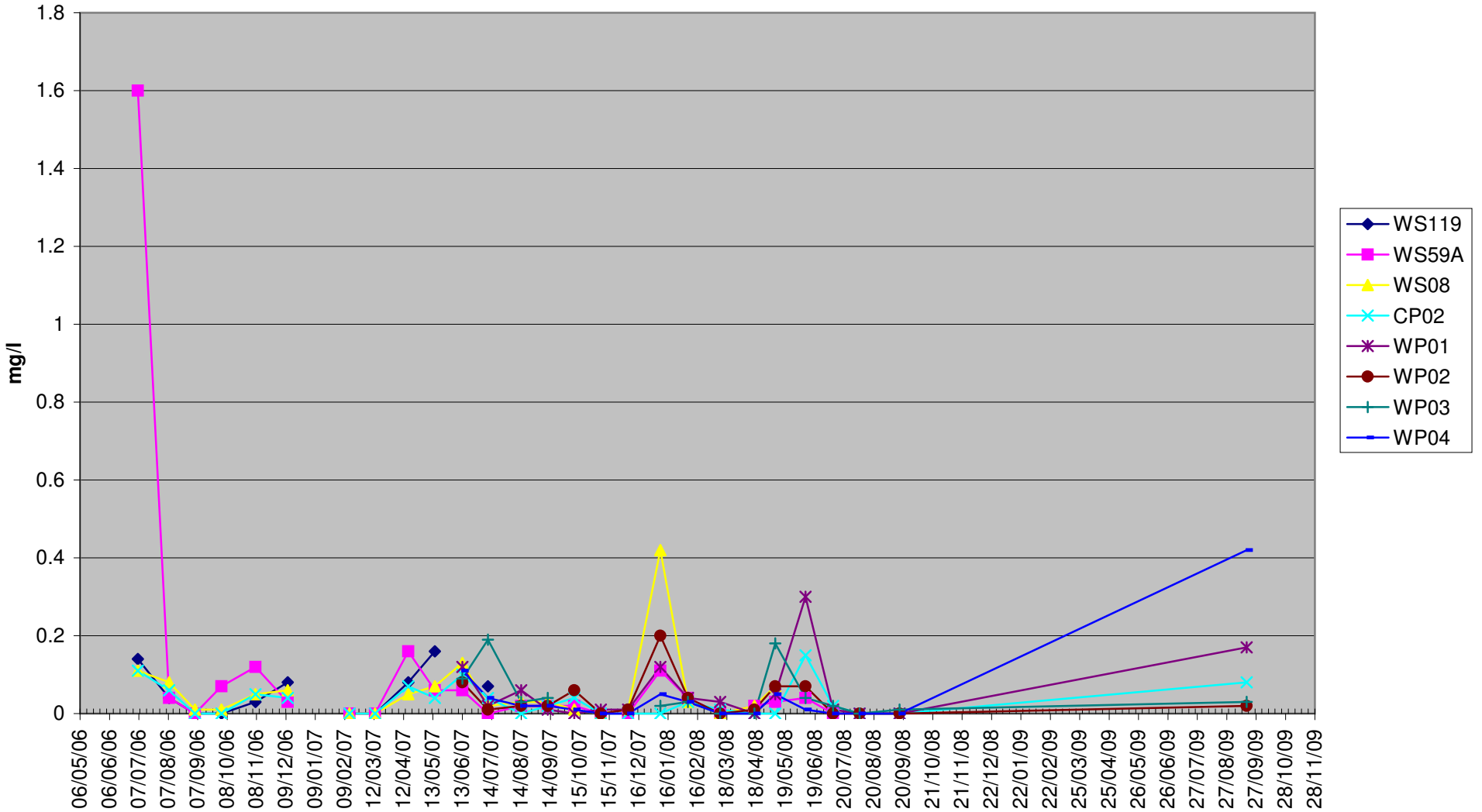
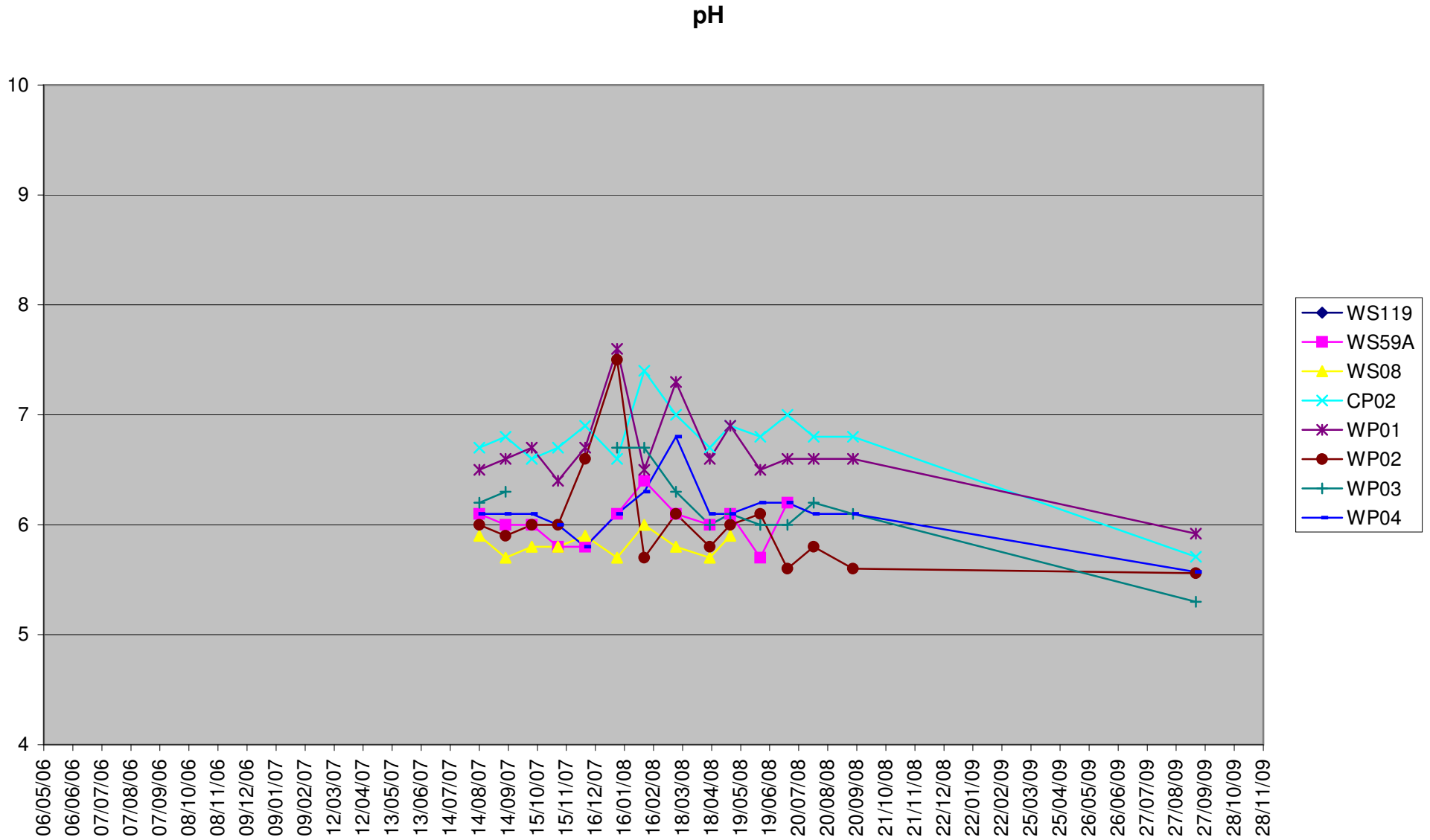
CP02
WP01
WP02
WP03
WP04

Total Petroleum Hydrocarbons

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WS119
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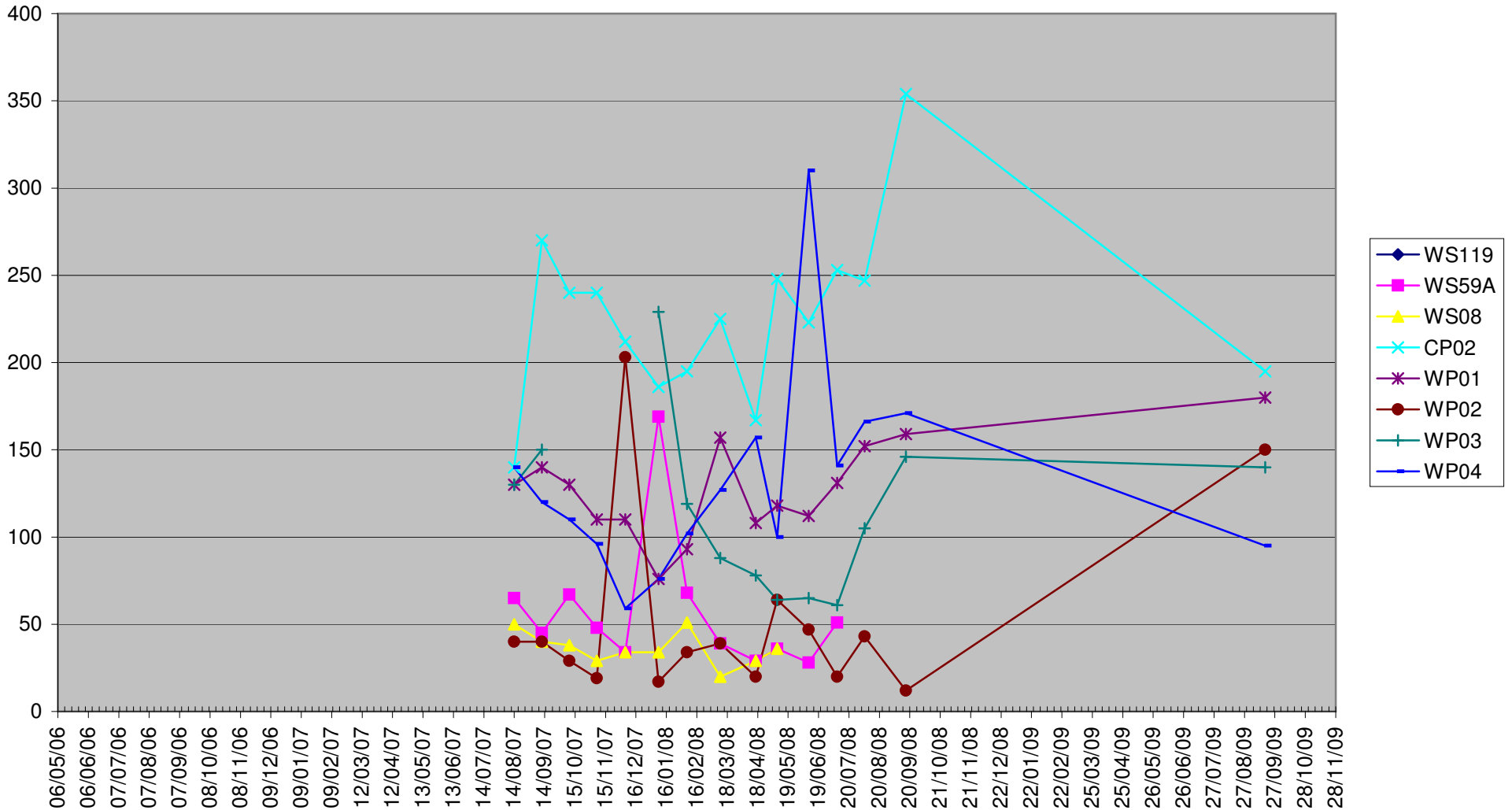
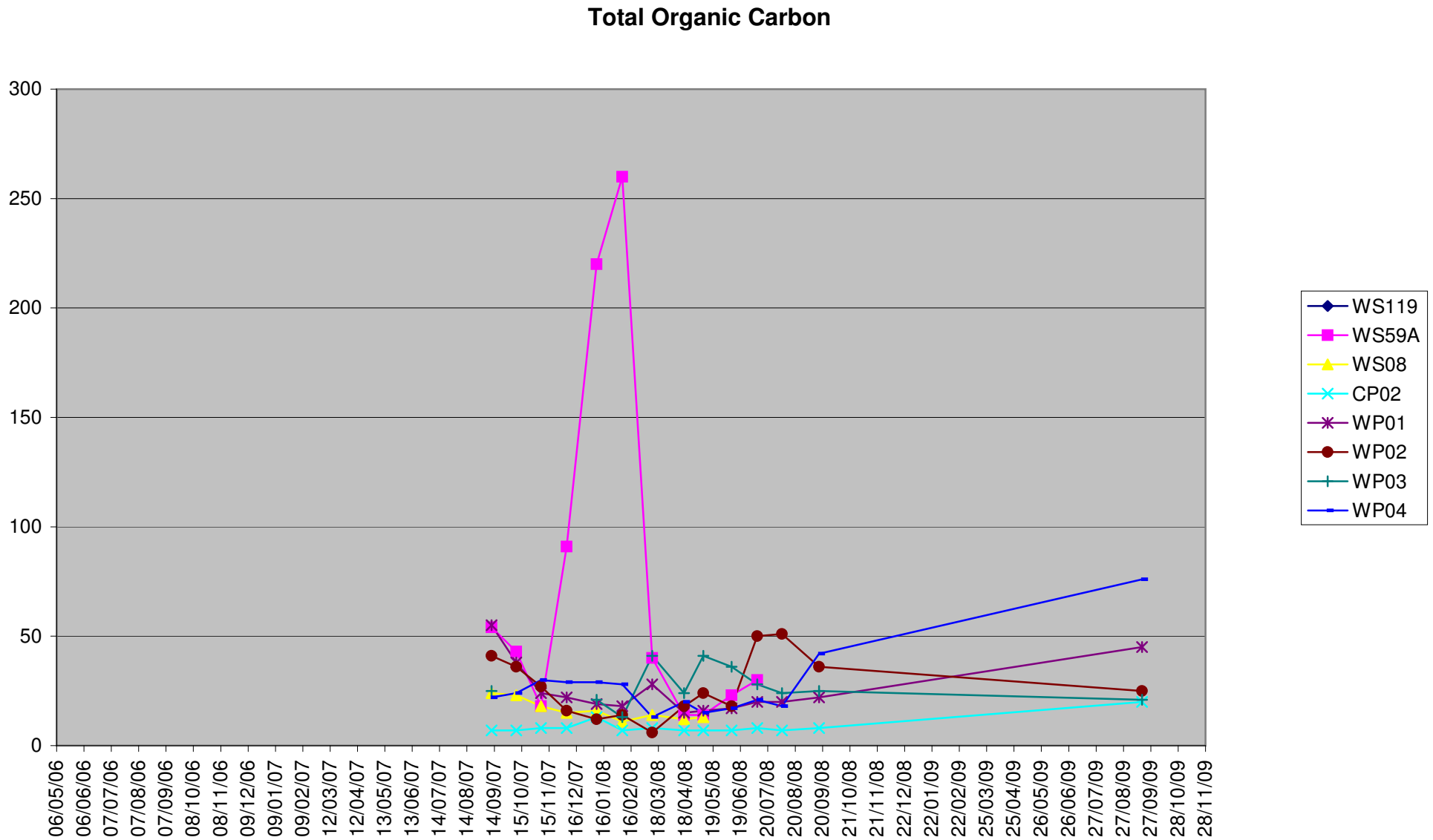
CP02
WP01
WP02
WP03
WP04

Alkalinity expressed as Calcium Carbonate (mg/l)

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WP01
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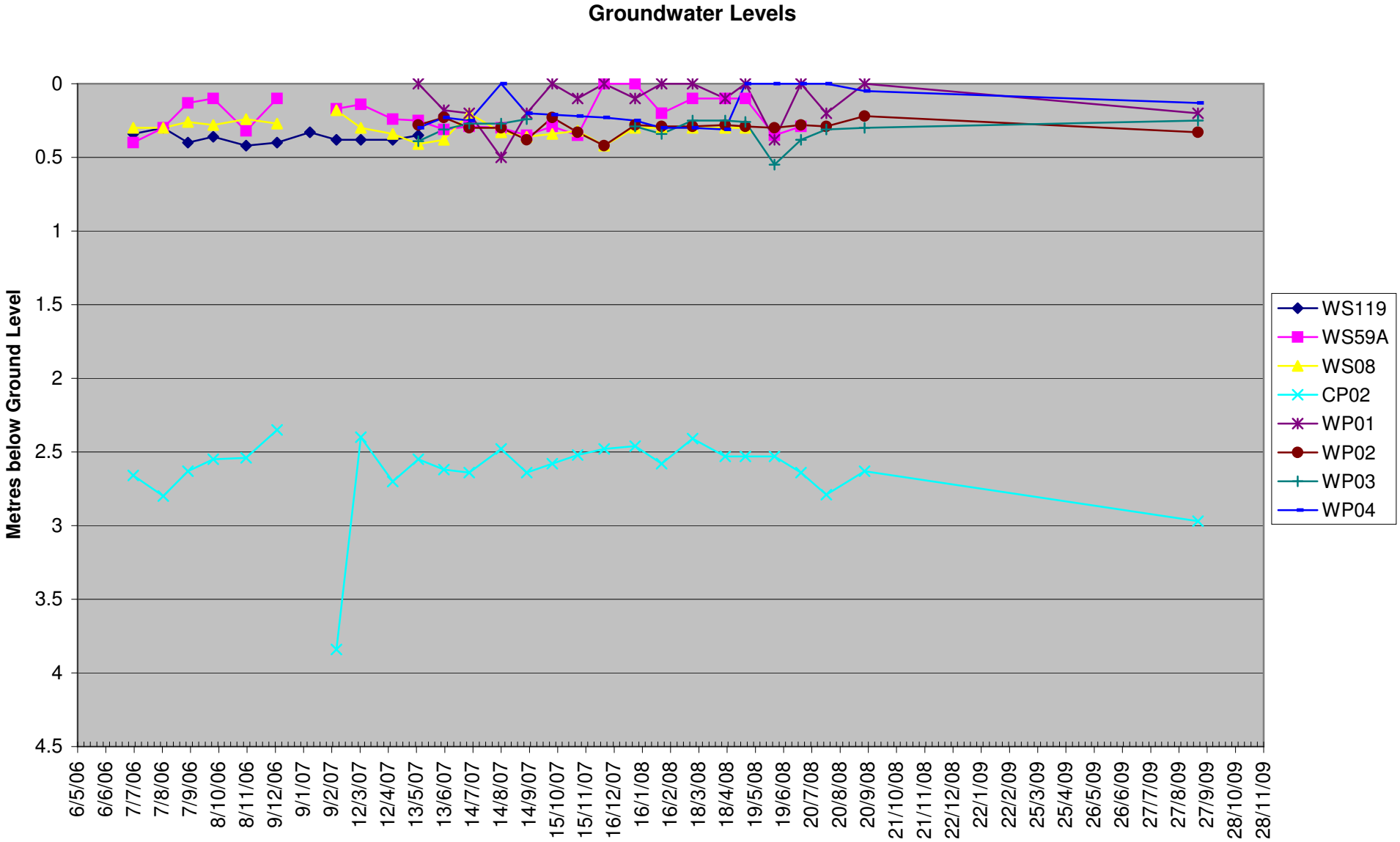
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3.5
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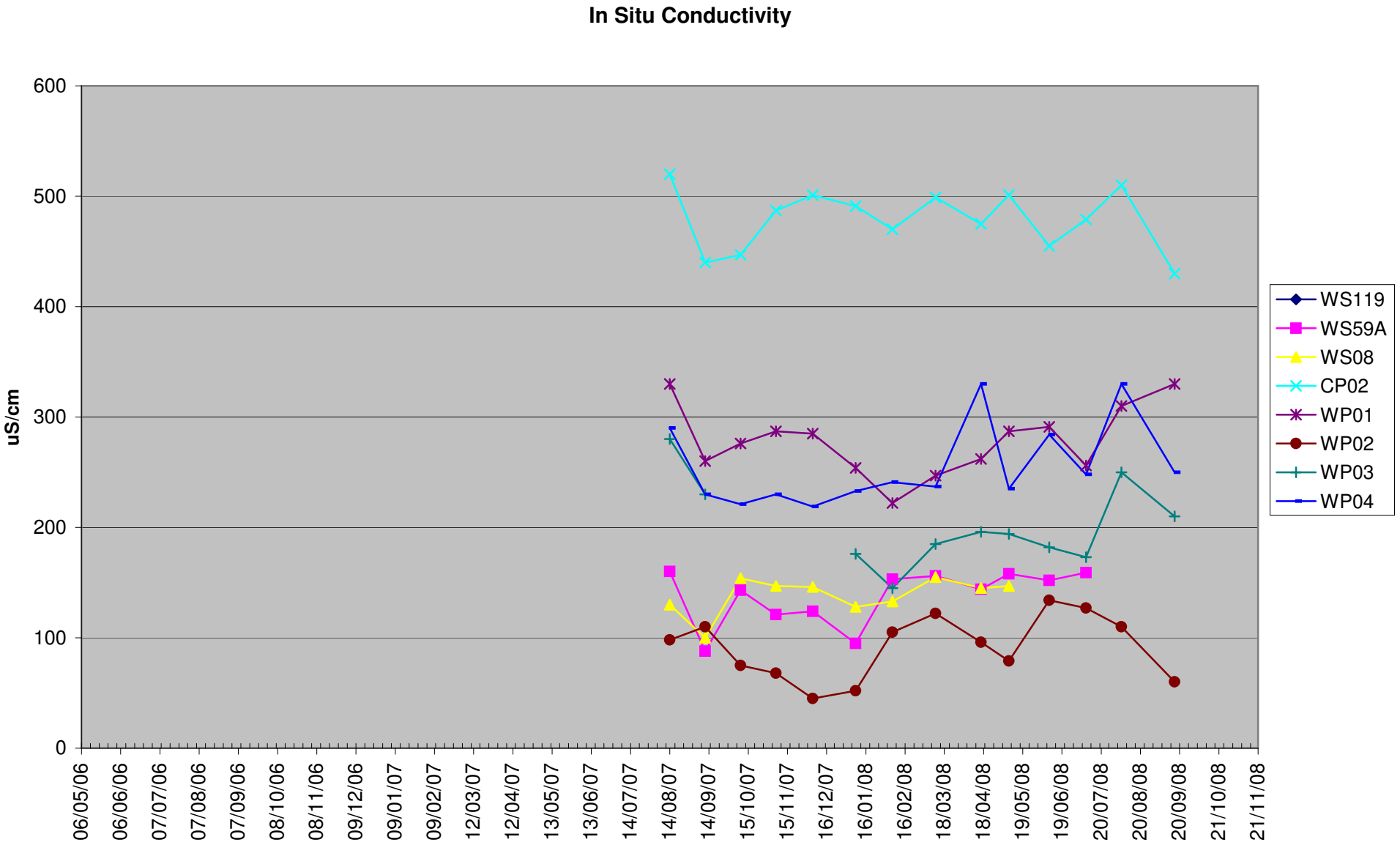
WP03
WP04


In Situ Conductivity
uS/cm
600
500
400
300
200
100
0
06/05/06
06/06/06
07/07/06
07/08/06
07/09/06
08/10/06
08/11/06
09/12/06
09/01/07
09/02/07
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18/04/08
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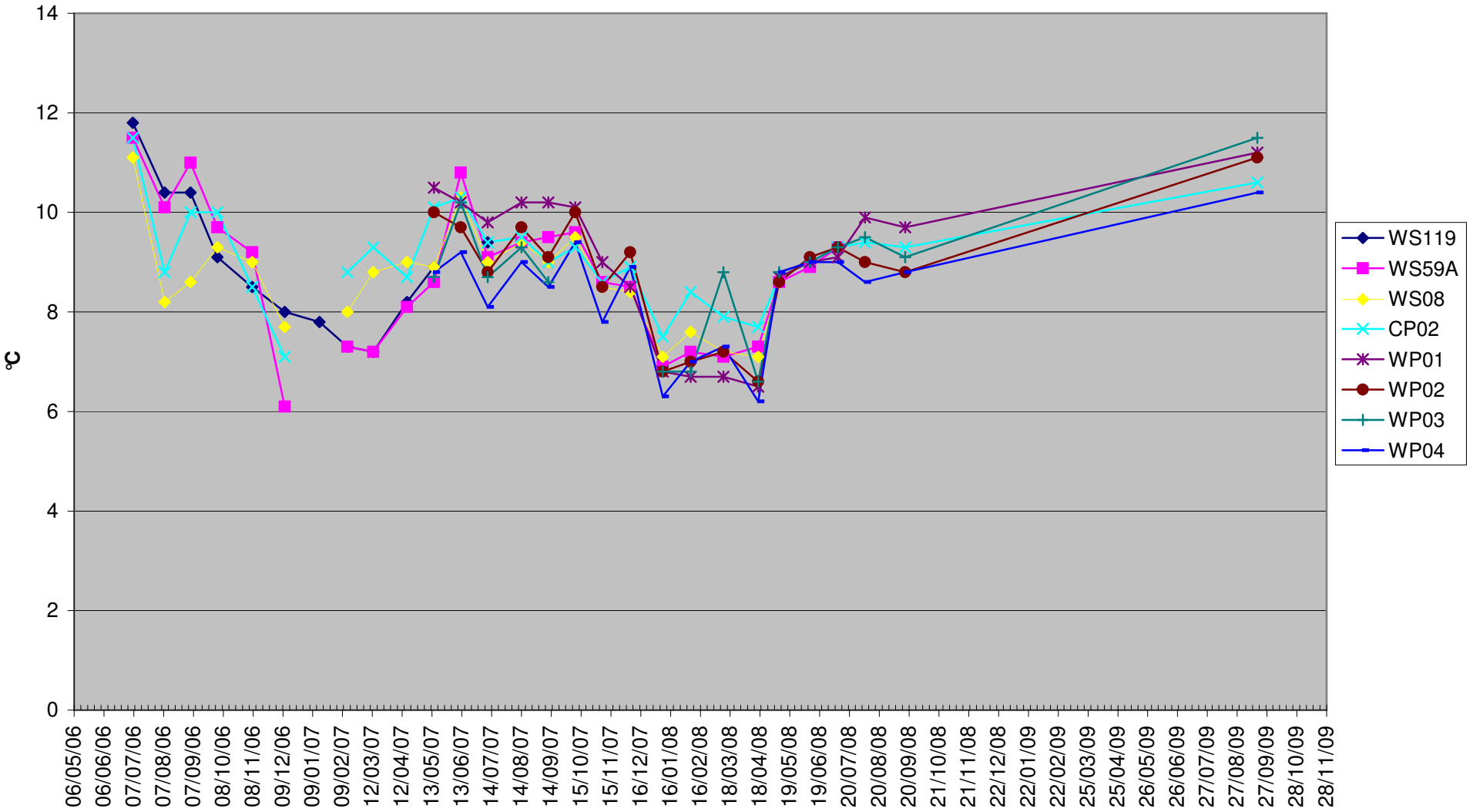
WS119
WS59A
WS08
CP02
WP01
WP02
WP03
WP04

In Situ Temperature



Appendix B – Laboratory Data Summary Tables

Aluminium (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	0.36	0.54	0.14	0.1	N/A	N/A	N/A	N/A	0.2 (DWS)
08/08/2006	0.19	1.48	0.99	0.07	N/A	N/A	N/A	N/A	0.2 (DWS)
04/09/2006	0.28	6.11	0.15	0.22	N/A	N/A	N/A	N/A	0.2 (DWS)
02/10/2006	0.26	12	2.1	0.07	N/A	N/A	N/A	N/A	0.2 (DWS)
07/11/2006	<0.02	1.7	0.4	<0.02	N/A	N/A	N/A	N/A	0.2 (DWS)
11/12/2006	0.17	3.7	1.4	0.12	N/A	N/A	N/A	N/A	0.2 (DWS)
16/01/2007	0.07	I	I	I	N/A	N/A	N/A	N/A	0.2 (DWS)
14/02/2007	0.51	3.5	4.8	0.14	N/A	N/A	N/A	N/A	0.2 (DWS)
13/03/2007	0.95	7.8	0.74	0.08	N/A	N/A	N/A	N/A	0.2 (DWS)
17/04/2007	0.94	20	3.5	0.04	N/A	N/A	N/A	N/A	0.2 (DWS)
15/05/2007	0.42	3.4	0.9	<0.01	N/A	N/A	N/A	N/A	0.2 (DWS)
13/06/2007	I	0.28	1.1	<0.01	2.1	0.47	0.69	0.15	0.2 (DWS)
10/07/2007	1.7	27	4.3	1.6	2.9	1.5	<0.01	1.3	0.2 (DWS)
14/08/2007	R	26	1.3	<0.01	2.4	1.3	1.7	0.34	0.2 (DWS)
11/09/2007	R	19	4.2	0.61	1.9	1.1	1.4	0.85	0.2 (DWS)
09/10/2007	R	24	4.9	0.41	2.9	1.3	I	1.3	0.2 (DWS)
06/11/2007	R	0.25	0.23	0.13	3.8	0.70	I	0.28	0.2 (DWS)
05/12/2007	R	270	0.90	<0.01	2.6	<0.01	I	0.14	0.2 (DWS)
08/01/2008	R	0.26	0.16	0.04	0.09	0.23	0.25	0.28	0.2 (DWS)
06/02/2008	R	0.06	0.05	<0.01	<0.01	0.06	0.08	0.14	0.2 (DWS)
11/03/2008	R	0.18	0.30	0.15	0.20	0.32	0.38	0.26	0.2 (DWS)
16/04/2008	R	0.06	0.16	0.21	0.16	0.38	0.37	0.23	0.2 (DWS)
08/05/2008	R	0.22	0.15	0.06	0.09	0.47	0.39	0.15	0.2 (DWS)
09/06/2008	R	0.34	R	0.07	0.10	0.25	0.43	0.23	0.2 (DWS)
08/07/2008	R	0.02	R	<0.01	<0.01	0.92	0.24	0.03	0.2 (DWS)
05/08/2008	R	R	R	<0.01	<0.01	1.2	0.28	0.03	0.2 (DWS)
16/09/2008	R	R	R	<0.01	0.09	1.1	0.54	0.11	0.2 (DWS)
17/09/2009	R	R	R	<0.01	0.03	0.52	0.16	0.07	0.2 (DWS)

Calcium (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	35	14	8	54	N/A	N/A	N/A	N/A	250 (DWS)
08/08/2006	27	9	6	50	N/A	N/A	N/A	N/A	250 (DWS)
04/09/2006	36	5	10	54	N/A	N/A	N/A	N/A	250 (DWS)
02/10/2006	36	7	8	50	N/A	N/A	N/A	N/A	250 (DWS)
07/11/2006	47	5	7	53	N/A	N/A	N/A	N/A	250 (DWS)
11/12/2006	37	5	7	50	N/A	N/A	N/A	N/A	250 (DWS)
16/01/2007	34	I	I	I	N/A	N/A	N/A	N/A	250 (DWS)
14/02/2007	18	4	4	50	N/A	N/A	N/A	N/A	250 (DWS)
13/03/2007	22	7	7	60	N/A	N/A	N/A	N/A	250 (DWS)
17/04/2007	14	4	3	56	N/A	N/A	N/A	N/A	250 (DWS)
15/05/2007	7	1	1	35	N/A	N/A	N/A	N/A	250 (DWS)
13/06/2007	I	7	4	49	15	8	22	12	250 (DWS)
10/07/2007	23	18	12	57	2.9	14	23	17	250 (DWS)
14/08/2007	R	15	13	54	28	8	27	19	250 (DWS)
11/09/2007	R	19	4.2	53	30	11	27	20	250 (DWS)
09/10/2007	R	19	11	52	33	7	I	16	250 (DWS)
06/11/2007	R	10	11	53	31	5	I	16	250 (DWS)
05/12/2007	R	39	11	59	35	59	I	17	250 (DWS)
08/01/2008	R	8	9	51	28	5	20	17	250 (DWS)
06/02/2008	R	12	11	56	30	6	22	19	250 (DWS)
11/03/2008	R	12	11	57	32	5	20	24	250 (DWS)
16/04/2008	R	53	10	12	32	5	18	23	250 (DWS)
08/05/2008	R	12	9	52	36	7	15	21	250 (DWS)
09/06/2008	R	10	R	53	38	9	20	22	250 (DWS)
08/07/2008	R	17	R	52	39	6	13	22	250 (DWS)
05/08/2008	R	R	R	54	47	7	18	23	250 (DWS)
16/09/2008	R	R	R	54	51	4	16	22	250 (DWS)
17/09/2009	R	R	R	52	53	4	28	19	250 (DWS)

Iron (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	0.45	0.47	6.42	0.46	N/A	N/A	N/A	N/A	1 (EQS)
08/08/2006	0.38	1.78	2.04	0.01	N/A	N/A	N/A	N/A	1 (EQS)
04/09/2006	0.52	5.5	9.7	0.8	N/A	N/A	N/A	N/A	1 (EQS)
02/10/2006	1.4	10	14	0.55	N/A	N/A	N/A	N/A	1 (EQS)
07/11/2006	0.34	1.7	7.9	0.3	N/A	N/A	N/A	N/A	1 (EQS)
11/12/2006	6.8	3.4	11	2.6	N/A	N/A	N/A	N/A	1 (EQS)
16/01/2007	0.82	I	I	I	N/A	N/A	N/A	N/A	1 (EQS)
14/02/2007	2.8	2.6	8.4	0.64	N/A	N/A	N/A	N/A	1 (EQS)
13/03/2007	22	6.4	5.9	0.22	N/A	N/A	N/A	N/A	1 (EQS)
17/04/2007	7.2	13	5	0.21	N/A	N/A	N/A	N/A	1 (EQS)
15/05/2007	4.9	3.2	1.4	2.2	N/A	N/A	N/A	N/A	1 (EQS)
13/06/2007	I	4	4.4	2.7	6.7	2.5	2.4	15	1 (EQS)
10/07/2007	41	40	13	17	12	3.6	1.5	24	1 (EQS)
14/08/2007	R	22	7.9	5.2	9.1	3.1	1.7	22	1 (EQS)
11/09/2007	R	25	15	16	9.7	3.9	2.9	34	1 (EQS)
09/10/2007	R	35	17	15	12	3.2	I	22	1 (EQS)
06/11/2007	R	7.4	12	6.0	7.4	2.8	I	24	1 (EQS)
05/12/2007	R	220	7.1	12	17	6.4	I	28	1 (EQS)
08/01/2008	R	9.8	9.8	17	14	2.4	5.6	23	1 (EQS)
06/02/2008	R	9.9	11	0.48	8.8	2.3	5.8	37	1 (EQS)
11/03/2008	R	8.0	11	0.36	5.6	1.3	4.2	37	1 (EQS)
16/04/2008	R	10	0.21	9.0	7.3	2.2	4.2	41	1 (EQS)
08/05/2008	R	5.8	0.28	9.9	7.3	2.9	5.5	28	1 (EQS)
09/06/2008	R	8.8	R	0.52	6.1	3.9	3.8	35	1 (EQS)
08/07/2008	R	7.0	R	1.0	8.8	2.9	4.0	40	1 (EQS)
05/08/2008	R	R	R	1.2	9.8	3.5	6.0	36	1 (EQS)
16/09/2008	R	R	R	9.1	13	2.8	7.2	50	1 (EQS)
17/09/2009	R	R	R	2	30	1.7	5.3	37	1 (EQS)

Magnesium (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	12	3	5	27	N/A	N/A	N/A	N/A	50 (DWS)
08/08/2006	12	2	4	27	N/A	N/A	N/A	N/A	50 (DWS)
04/09/2006	14	3	7	28	N/A	N/A	N/A	N/A	50 (DWS)
02/10/2006	15	3	5	28	N/A	N/A	N/A	N/A	50 (DWS)
07/11/2006	19	1	4	27	N/A	N/A	N/A	N/A	50 (DWS)
11/12/2006	14	2	4	26	N/A	N/A	N/A	N/A	50 (DWS)
16/01/2007	13	I	I	I	N/A	N/A	N/A	N/A	50 (DWS)
14/02/2007	8	1	3	24	N/A	N/A	N/A	N/A	50 (DWS)
13/03/2007	10	2	5	29	N/A	N/A	N/A	N/A	50 (DWS)
17/04/2007	7	2	3	28	N/A	N/A	N/A	N/A	50 (DWS)
15/05/2007	4	<1	<1	23	N/A	N/A	N/A	N/A	50 (DWS)
13/06/2007	I	1	2	27	5	2	7	6	50 (DWS)
10/07/2007	9	7	4	28	6	3	6	8	50 (DWS)
14/08/2007	R	6	3	26	6	2	8	8	50 (DWS)
11/09/2007	R	5	4	26	4	2	7	9	50 (DWS)
09/10/2007	R	7	4	26	5	2	I	8	50 (DWS)
06/11/2007	R	2	3	26	5	1	I	8	50 (DWS)
05/12/2007	R	42	4	28	6	29	I	8	50 (DWS)
08/01/2008	R	2	3	26	5	1	6	8	50 (DWS)
06/02/2008	R	2	3	27	5	2	7	8	50 (DWS)
11/03/2008	R	2	3	28	4	2	6	10	50 (DWS)
16/04/2008	R	26	3	2	4	2	5	9	50 (DWS)
08/05/2008	R	2	3	26	4	2	5	9	50 (DWS)
09/06/2008	R	2	R	27	5	2	6	10	50 (DWS)
08/07/2008	R	2	R	26	5	2	4	10	50 (DWS)
05/08/2008	R	R	R	27	6	2	6	10	50 (DWS)
16/09/2008	R	R	R	23	6	1	6	10	50 (DWS)
17/09/2009	R	R	R	24	9	1	9	10	50 (DWS)

Sodium (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	15	7	7	13	N/A	N/A	N/A	N/A	200 (DWS)
08/08/2006	15	6	6	13	N/A	N/A	N/A	N/A	200 (DWS)
04/09/2006	17	6	7	14	N/A	N/A	N/A	N/A	200 (DWS)
02/10/2006	18	5	6	14	N/A	N/A	N/A	N/A	200 (DWS)
07/11/2006	21	5	6	14	N/A	N/A	N/A	N/A	200 (DWS)
11/12/2006	17	6	7	14	N/A	N/A	N/A	N/A	200 (DWS)
16/01/2007	16	I	I	I	N/A	N/A	N/A	N/A	200 (DWS)
14/02/2007	12	7	5	14	N/A	N/A	N/A	N/A	200 (DWS)
13/03/2007	13	6	6	14	N/A	N/A	N/A	N/A	200 (DWS)
17/04/2007	10	5	5	13	N/A	N/A	N/A	N/A	200 (DWS)
15/05/2007	10	4	5	12	N/A	N/A	N/A	N/A	200 (DWS)
13/06/2007	I	6	5	13	16	6	20	7	200 (DWS)
10/07/2007	11	6	6	14	20	8	18	7	200 (DWS)
14/08/2007	R	5	5	13	19	5	14	7	200 (DWS)
11/09/2007	R	5	5	13	16	6	12	8	200 (DWS)
09/10/2007	R	5	5	13	13	4	I	6	200 (DWS)
06/11/2007	R	5	3	14	13	4	I	6	200 (DWS)
05/12/2007	R	5	6	15	11	15	I	6	200 (DWS)
08/01/2008	R	6	5	12	16	4	12	5	200 (DWS)
06/02/2008	R	9	7	14	10	8	11	7	200 (DWS)
11/03/2008	R	9	3	28	10	10	10	9	200 (DWS)
16/04/2008	R	14	7	8	11	9	10	10	200 (DWS)
08/05/2008	R	8	7	14	11	9	9	10	200 (DWS)
09/06/2008	R	7	R	16	12	9	10	10	200 (DWS)
08/07/2008	R	10	R	7	11	7	9	4	200 (DWS)
05/08/2008	R	R	R	14	11	6	9	8	200 (DWS)
16/09/2008	R	R	R	16	9	4	9	9	200 (DWS)
17/09/2009	R	R	R	13	9	3	9	6	200 (DWS)

Chloride (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	18.4	20.8	11.5	9.2	N/A	N/A	N/A	N/A	250 (DWS)
08/08/2006	8.2	12	13	8.5	N/A	N/A	N/A	N/A	250 (DWS)
04/09/2006	8.6	9	7.4	8.2	N/A	N/A	N/A	N/A	250 (DWS)
02/10/2006	7.9	7.5	9.3	7.9	N/A	N/A	N/A	N/A	250 (DWS)
07/11/2006	7.58	6	9.7	7.7	N/A	N/A	N/A	N/A	250 (DWS)
11/12/2006	8.6	9.1	9.6	5.8	N/A	N/A	N/A	N/A	250 (DWS)
16/01/2007	7.7	I	I	I	N/A	N/A	N/A	N/A	250 (DWS)
14/02/2007	8.2	17	10	8.6	N/A	N/A	N/A	N/A	250 (DWS)
13/03/2007	8.1	10	10	8	N/A	N/A	N/A	N/A	250 (DWS)
17/04/2007	8.7	13	11	8.6	N/A	N/A	N/A	N/A	250 (DWS)
15/05/2007	8.9	11	10	8.6	N/A	N/A	N/A	N/A	250 (DWS)
13/06/2007	I	9.4	17	17	12	18	18	7.1	250 (DWS)
10/07/2007	7.7	5.1	6.5	8.3	10	5.4	8.4	5.5	250 (DWS)
14/08/2007	R	7.6	5.9	8.2	9.3	2.9	9.0	5.4	250 (DWS)
11/09/2007	R	16	17	12	22	11	14	13	250 (DWS)
09/10/2007	R	8.3	6.1	6.9	5.8	3.8	I	4.3	250 (DWS)
06/11/2007	R	11	7.7	9	8.3	5	I	6.1	250 (DWS)
05/12/2007	R	8.4	7.7	8.9	7.1	8.1	I	6	250 (DWS)
08/01/2008	R	11	8.8	8.3	11	7.4	11	4.9	250 (DWS)
06/02/2008	R	17	10	7.5	28	22	11	6.1	250 (DWS)
11/03/2008	R	19	14	8.9	14	19	10	7.2	250 (DWS)
16/04/2008	R	14	11	7.9	15	16	9.0	6.0	250 (DWS)
08/05/2008	R	12	10	7.6	11	13	9.4	5.7	250 (DWS)
09/06/2008	R	13	R	8.3	12	14	10	7.0	250 (DWS)
08/07/2008	R	9.3	R	8.8	11	6.9	12	7.2	250 (DWS)
05/08/2008	R	R	R	8.8	11	6.9	9.9	5.9	250 (DWS)
16/09/2008	R	R	R	8.6	8.2	5.0	11	6.4	250 (DWS)
17/09/2009	R	R	R	7	6.4	2.7	8.5	3.7	250 (DWS)

Total Petroleum Hydrocarbons (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	0.14	1.6	0.11	0.011	N/A	N/A	N/A	N/A	N/A
08/08/2006	0.04	0.04	0.08	0.06	N/A	N/A	N/A	N/A	N/A
04/09/2006	<0.01	<0.01	0.01	<0.01	N/A	N/A	N/A	N/A	N/A
02/10/2006	<0.01	0.07	0.01	<0.01	N/A	N/A	N/A	N/A	N/A
07/11/2006	0.03	0.12	0.05	0.05	N/A	N/A	N/A	N/A	N/A
11/12/2006	0.08	0.03	0.06	0.04	N/A	N/A	N/A	N/A	N/A
16/01/2007	<0.01	I	I	I	N/A	N/A	N/A	N/A	N/A
14/02/2007	<0.01	<0.01	<0.01	<0.01	N/A	N/A	N/A	N/A	N/A
13/03/2007	<0.01	<0.01	<0.01	<0.01	N/A	N/A	N/A	N/A	N/A
17/04/2007	0.08	0.16	0.05	0.07	N/A	N/A	N/A	N/A	N/A
15/05/2007	0.16	0.06	0.07	0.04	N/A	N/A	N/A	N/A	N/A
13/06/2007	I	0.06	0.13	0.1	0.12	0.08	0.09	0.11	N/V
10/07/2007	0.07	<0.01	0.02	0.04	0.02	0.01	0.19	0.04	N/V
14/08/2007	R	0.02	0.03	<0.01	0.06	0.02	0.03	0.02	N/V
11/09/2007	R	0.02	0.03	0.02	0.01	0.02	0.04	0.02	N/V
09/10/2007	R	0.02	0.01	0.04	<0.01	0.06	I	0.01	N/V
06/11/2007	R	<0.01	<0.01	<0.01	0.01	<0.01	I	<0.01	N/V
05/12/2007	R	<0.01	0.01	<0.01	0.01	0.01	I	<0.01	N/V
08/01/2008	R	0.11	0.42	<0.01	0.12	0.20	0.02	0.05	N/V
06/02/2008	R	0.04	0.03	0.03	0.04	0.04	0.03	0.03	N/V
11/03/2008	R	<0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01	N/V
16/04/2008	R	0.02	0.02	<0.01	<0.01	0.01	<0.01	<0.01	N/V
08/05/2008	R	0.03	0.07	<0.01	0..05	0.07	0.18	0.05	N/V
09/06/2008	R	0.04	R	0.15	0.30	0.07	0.04	0.01	N/V
08/07/2008	R	<0.01	R	0.02	0.01	<0.01	0.02	<0.01	N/V
05/08/2008	R	R	R	<0.01	<0.01	<0.01	<0.01	<0.01	N/V
16/09/2008	R	R	R	<0.01	<0.01	<0.01	0.01	<0.01	N/V
17/09/2009	R	R	R	0.08	0.17	0.02	0.03	0.42	N/V

pH

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
14/08/2007	R	6.1	5.9	6.7	6.5	6.0	6.2	6.1	95% between the range of pH6-pH9 (DWS)
11/09/2007	R	6.0	5.7	6.8	6.6	5.9	6.3	6.1	95% between the range of pH6- pH9 (DWS)
09/10/2007	R	6.0	8.5	6.6	6.7	6.0	I	6.1	95% between the range of pH6-pH9 (DWS)
06/11/2007	R	5.8	5.8	6.7	6.4	6.0	I	6.0	95% between the range of pH6- pH9 (DWS)
05/12/2007	R	5.8	5.9	6.9	6.7	6.6	I	5.8	95% between the range of pH6-pH9 (DWS)
08/01/2008	R	6.1	5.7	6.6	7.6	7.5	6.7	6.1	95% between the range of pH6- pH9 (DWS)
06/02/2008	R	6.4	6.0	7.4	6.5	5.7	6.7	6.3	95% between the range of pH6-pH9 (DWS)
11/03/2008	R	6.1	5.8	7.0	7.3	6.1	6.3	6.8	95% between the range of pH6- pH9 (DWS)
16/04/2008	R	6.0	5.7	6.7	6.6	5.8	6.0	6.1	95% between the range of pH6-pH9 (DWS)
08/05/2008	R	6.1	5.9	6.9	6.9	6.0	6.1	6.1	95% between the range of pH6- pH9 (DWS)
09/06/2008	R	5.7	R	6.8	6.5	6.1	6.0	6.2	95% between the range of pH6-pH9 (DWS)
08/07/2008	R	6.2	R	7.0	6.6	5.6	6.0	6.2	95% between the range of pH6- pH9 (DWS)
05/08/2008	R	R	R	6.8	6.6	5.8	6.2	6.1	95% between the range of pH6-pH9 (DWS)
16/09/2008	R	R	R	6.8	6.6	5.6	6.1	6.1	95% between the range of pH6- pH9 (DWS)
17/09/2009	R	R	R	5.71	5.92	5.56	5.3	5.57	95% between the range of pH6- pH9 (DWS)

Total Organic Carbon (mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
11/09/2007	R	54	24	7	55	41	25	22	No abnormal change (DWS)
09/10/2007	R	43	23	7	38	36	I	24	No abnormal change (DWS)
06/11/2007	R	18	18	8	24	27	I	30	No abnormal change (DWS)
05/12/2007	R	91	15	8	22	16	I	29	No abnormal change (DWS)
08/01/2008	R	220	16	13	19	12	21	29	No abnormal change (DWS)
06/02/2008	R	260	11	7	18	14	13	28	No abnormal change (DWS)
11/03/2008	R	40	14	8	28	6	41	13	No abnormal change (DWS)
16/04/2008	R	14	12	7	15	18	24	20	No abnormal change (DWS)
08/05/2008	R	14	13	7	16	24	41	15	No abnormal change (DWS)
09/06/2008	R	23	R	7	17	18	36	17	No abnormal change (DWS)
08/07/2008	R	30	R	8	20	50	28	21	No abnormal change (DWS)
05/08/2008	R	R	R	7	20	51	24	18	No abnormal change (DWS)
16/09/2008	R	R	R	8	22	36	25	42	No abnormal change (DWS)
17/09/2009	R	R	R	20	45	25	21	76	No abnormal change (DWS)

Electrical Conductivity (µS/cm)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
14/08/2007	R	160	130	520	330	98	280	290	2500µS/cm Water Supply (Scotland) Regs
11/09/2007	R	88	100	440	260	110	230	230	2500µS/cm Water Supply (Scotland) Regs
09/10/2007	R	160	120	1300	340	82	I	250	2500µS/cm Water Supply (Scotland) Regs
06/11/2007	R	110	120	430	230	86	I	210	2500µS/cm Water Supply (Scotland) Regs
05/12/2007	R	110	110	480	260	450	I	180	2500µS/cm Water Supply (Scotland) Regs
08/01/2008	R	67	94	320	180	170	150	200	2500µS/cm Water Supply (Scotland) Regs
06/02/2008	R	110	200	200	130	75	210	110	2500µS/cm Water Supply (Scotland) Regs
11/03/2008	R	110	1300	470	250	99	200	310	2500µS/cm Water Supply (Scotland) Regs
16/04/2008	R	110	140	440	220	100	170	300	2500µS/cm Water Supply (Scotland) Regs
08/05/2008	R	120	150	410	230	100	160	230	2500µS/cm Water Supply (Scotland) Regs
09/06/2008	R	110	R	420	310	140	170	310	2500µS/cm Water Supply (Scotland) Regs
08/07/2008	R	180	R	510	370	98	210	370	2500µS/cm Water Supply (Scotland) Regs
05/08/2008	R	R	R	510	310	110	250	330	2500µS/cm Water Supply (Scotland) Regs
16/09/2008	R	R	R	430	330	60	210	250	2500µS/cm Water Supply (Scotland) Regs
17/09/2009	R	R	R	410	480	73	250	240	2500µS/cm Water Supply (Scotland) Regs

Alkalinity expressed as Calcium Carbonate ($mgHCO_3/l$)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
14/08/2007	R	65	50	140	130	40	130	140	30 Water Supply (Scotland) Regs
11/09/2007	R	45	40	270	140	40	150	120	30 Water Supply (Scotland) Regs
09/10/2007	R	67	38	240	130	29	I	110	30 Water Supply (Scotland) Regs
06/11/2007	R	48	29	240	110	19	I	96	30 Water Supply (Scotland) Regs
05/12/2007	R	34	34	212	110	203	I	59	30 Water Supply (Scotland) Regs
08/01/2008	R	169	34	186	76	17	229	76	30 Water Supply (Scotland) Regs
06/02/2008	R	68	51	195	93	34	119	102	30 Water Supply (Scotland) Regs
11/03/2008	R	39	20	225	157	39	88	127	30 Water Supply (Scotland) Regs
16/04/2008	R	29	29	167	108	20	78	157	30 Water Supply (Scotland) Regs
08/05/2008	R	36	36	248	118	64	64	100	30 Water Supply (Scotland) Regs
09/06/2008	R	28	R	223	112	47	65	310	30 Water Supply (Scotland) Regs
08/07/2008	R	51	R	253	131	20	61	141	30 Water Supply (Scotland) Regs
05/08/2008	R	R	R	247	152	43	105	166	30 Water Supply (Scotland) Regs
16/09/2008	R	R	R	354	159	12	146	171	30 Water Supply (Scotland) Regs
17/09/2009	R	R	R	195	180	150	140	95	30 Water Supply (Scotland) Regs

Sulphate (Total)(mg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
14/08/2007	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
11/09/2007	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
09/10/2007	R	<10	<10	<10	<10	<10	|	<10	250 (DWS)
06/11/2007	R	<10	<10	<10	<10	<10	|	<10	250 (DWS)
05/12/2007	R	<10	<10	<10	<10	<10	|	<10	250 (DWS)
08/01/2008	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
06/02/2008	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
11/03/2008	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
16/04/2008	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
08/05/2008	R	<10	<10	<10	<10	<10	<10	<10	250 (DWS)
09/06/2008	R	<10	R	<10	<10	<10	<10	<10	250 (DWS)
08/07/2008	R	<10	R	<10	<10	<10	<10	<10	250 (DWS)
05/08/2008	R	R	R	<10	<10	<10	<10	<10	250 (DWS)
16/09/2008	R	R	R	<10	<10	<10	<10	<10	250 (DWS)
17/09/2009	R	R	R	<10	<10	<10	<10	<10	250 (DWS)

SVOC(µg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
08/08/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
04/09/2006	**57** Bis (2-ethylhexyl)-phthalate	**65** Bis (2-ethylhexyl)-phthalate	**67** Bis (2-ethylhexyl)-phthalate	**61** Bis (2-ethylhexyl)-phthalate	N/A	N/A	N/A	N/A	N/V
02/10/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
07/11/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
11/12/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
16/01/2007	N/D	I	I	I	N/A	N/A	N/A	N/A	N/V
14/02/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
13/03/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
17/04/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
15/05/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
13/06/2007	I	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
10/07/2007	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
14/08/2007	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
11/09/2007	R	N/D	N/D	**12** (Di-n-butylphthalate**)** **45** Phenol	N/D	N/D	N/D	N/D	N/V
09/10/2007	R	**23** Bis (2-ethylhexyl)-phthalate	**31** Bis (2-ethylhexyl)-phthalate	**15** Bis (2-ethylhexyl)-phthalate	**180** 3/4-Methylphenol **35** Bis (2-ethylhexyl)-Phthalate **93** Phenol	**55** Bis (2-ethylhexyl)-phthalate	I	**14** Bis (2-ethylhexyl)-phthalate	N/V
06/11/2007	R	N/D	N/D	N/D	N/D	N/D	I	N/D	N/V
05/12/2007	R	**470** Bis (2-ethylhexyl)-Phthalate	**590** Bis (2-ethylhexyl)-Phthalate	**1000** Bis (2-ethylhexyl)-Phthalate	**120** Bis (2-ethylhexyl)-Phthalate	**440** Bis (2-ethylhexyl)-Phthalate	I	**320** Bis (2-ethylhexyl)-Phthalate	N/V
08/01/2008	R	**67** Bis (2-ethylhexyl)-Phthalate	**83** Bis (2-ethylhexyl)-Phthalate	**89** Bis (2-ethylhexyl)-Phthalate	**2400** Bis (2-ethylhexyl)-Phthalate	**200** Bis (2-ethylhexyl)-Phthalate	**2300** Bis (2-ethylhexyl)-Phthalate	**3200** Bis (2-ethylhexyl)-Phthalate	N/V
06/02/2008	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
11/03/2008	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
16/04/2008	R	**94** Bis (2-ethylhexyl)-Phthalate	**68** Bis (2-ethylhexyl)-Phthalate	**57** Bis (2-ethylhexyl)-Phthalate	**120** Bis (2-ethylhexyl)-Phthalate	**80** Bis (2-ethylhexyl)-Phthalate	**58** Bis (2-ethylhexyl)-Phthalate	**70** Bis (2-ethylhexyl)-Phthalate	N/V

SVOC(µg/l)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
08/05/2008	**R**	**81** Bis (2-ethylhexyl)-Phthalate	**87** Bis (2-ethylhexyl)-Phthalate	**65** Bis (2-ethylhexyl)-Phthalate	**11** 2-methyl phenol **28** 3/4-methyl phenol **12** 2,4-Dichloro-3-methyl phenol **14** 4-chloro-3- methyl phenol **12** 2,4,6-Trichlorophenol **100** Bis (2-ethylhexyl)-Phthalate	**79** Bis (2-ethylhexyl)-Phthalate	**100** Bis (2-ethylhexyl)-Phthalate	**100** Bis (2-ethylhexyl)-Phthalate	**N/V**
09/06/2008	**R**	**N/D**	**R**	**N/D**	**13** 2-methyl phenol **23** 3/4-methyl phenol **11** 2,4-Dichloro-3-methyl phenol **12** 4-chloro-3- methyl phenol **10** 2,4,5-Trichlorophenol **11** Bis (2-ethylhexyl)-Phthalate **13** Isophorone **13** Dimethyl phthalate **10** Diethyl phthalate **11** Benzo(b/k0Fluoranthene	**N/D**	**N/D**	**N/D**	**N/V**
08/07/2008	**R**	**N/D**	**R**	**N/D**	**29** 3/4-Methylphenol	**N/D**	**N/D**	**N/D**	**N/V**
05/08/2008	**R**	**R**	**R**	**N/D**	**19** 3/4-Methylphenol	**N/D**	**N/D**	**N/D**	**N/V**
16/09/2008	**R**	**R**	**R**	**N/D**	**100** 3/4-Methylphenol	**N/D**	**N/D**	**N/D**	**N/V**
17/09/2009	**R**	**R**	**R**	**N/D**	**140** 3/4-Methylphenol	**N/D**	**N/D**	**N/D**	**N/V**

	VOCs (µg/l)								
BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04	GAC Value and Source
06/07/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
08/08/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
04/09/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
02/10/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
07/11/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
11/12/2006	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
16/01/2007	N/D	I	I	I	N/A	N/A	N/A	N/A	N/V
14/02/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
13/03/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
17/04/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
15/05/2007	N/D	N/D	N/D	N/D	N/A	N/A	N/A	N/A	N/V
13/06/2007	I	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
10/07/2007	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
14/08/2007	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
11/09/2007	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
09/10/2007	R	N/D	N/D	N/D	N/D	N/D	I	N/D	N/V
06/11/2007	R	N/D	N/D	N/D	N/D	N/D	I	N/D	N/V
05/12/2007	R	N/D	N/D	N/D	N/D	N/D	I	N/D	N/V
08/01/2008	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
06/02/2008	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
11/03/2008	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
16/04/2008	R	N/D	N/D	N/D	N/D	1 (Chloroform)	N/D	1 (Chloroform)	N/V
08/05/2008	R	N/D	N/D	N/D	N/D	N/D	N/D	N/D	N/V
09/06/2008	R	N/D	R	N/D	N/D	N/D	N/D	N/D	N/V
08/07/2008	R	N/D	R	N/D	N/D	N/D	N/D	N/D	N/V
05/08/2008	R	R	R	N/D	N/D	N/D	N/D	N/D	N/V
16/09/2008	R	R	R	N/D	19 (Toluene)	N/D	N/D	N/D	N/V
17/09/2009	R	R	R	N/D	7 (Toluene)	N/D	N/D	N/D	N/V

Notes:

N/A = Not available,

N/D = Not Detected

I = Inaccessible,

R = Removed

N/V = No Value.

Appendix C –In situ water quality results and weather conditions

In Situ Conductivity (mS/cm)

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04
06/07/2006	372	188	162	536	N/A	N/A	N/A	N/A
08/08/2006	345	149	168	527	N/A	N/A	N/A	N/A
04/09/2006	405	140	163	518	N/A	N/A	N/A	N/A
02/10/2006	399	120	153	524	N/A	N/A	N/A	N/A
07/11/2006	412	130	169	527	N/A	N/A	N/A	N/A
11/12/2006	419	109	181	529	N/A	N/A	N/A	N/A
16/01/2007	300	I	I	I	N/A	N/A	N/A	N/A
14/02/2007	360	156	184	529	N/A	N/A	N/A	N/A
13/03/2007	312	118	166	549	N/A	N/A	N/A	N/A
17/04/2007	292	124	137	498	N/A	N/A	N/A	N/A
15/05/2007	292	120	124	477	N/A	N/A	N/A	N/A
13/06/2007	I	148	149	501	246	177	278	214
10/07/2007	329	158	146	515	306	128	280	245
14/08/2007	R	165	151	502	284	84	237	282
11/09/2007	R	160	160	502	303	122	246	293
9/10/2007	R	143	154	447	276	75	I	221
06/11/2007	R	121	147	487	287	68	I	230
05/12/2007	R	124	146	501	285	45	I	219
08/01/2008	R	95	128	491	254	52	176	233
06/02/2008	R	153	133	470	222	105	145	241
11/03/2008	R	156	155	499	247	122	185	237
16/04/2008	R	144	145	475	262	96	196	330
08/05/2008	R	158	147	501	287	79	194	235
09/06/2008	R	152	R	455	291	134	182	284
08/07/2008	R	159	R	479	256	127	173	248
05/08/2008	R	R	R	486	268	153	187	316
16/09/2008	R	R	R	482	273	126	191	312
17/09/2009	R	R	R	meter failure	meter failure	meter failure	meter failure	meter failure

In Situ pH

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04
06/07/2006	5.3	6.07	5.1	4.1	N/A	N/A	N/A	N/A
08/08/2006	5.2	4.08	5.92	7.13	N/A	N/A	N/A	N/A
04/09/2006	6.15	5.45	5.61	5.51	N/A	N/A	N/A	N/A
02/10/2006	6.61	6.19	3.86	4.04	N/A	N/A	N/A	N/A
07/11/2006	6.6	6.1	5.5	6.7	N/A	N/A	N/A	N/A
11/12/2006	4.72	5.85	5.41	6.13	N/A	N/A	N/A	N/A
16/01/2007	5.42	I	I	I	N/A	N/A	N/A	N/A
14/02/2007	6.11	4.31	3.55	5.37	N/A	N/A	N/A	N/A
13/03/2007	3.18	5.57	3.03	3.19	N/A	N/A	N/A	N/A
17/04/2007	5.85	5.47	5.55	6.47	N/A	N/A	N/A	N/A
15/05/2007	5.96	5.85	5.53	6.38	N/A	N/A	N/A	N/A
13/06/2007	I	4.18	3.22	3.49	3.69	4.65	4.07	6.9
10/07/2007	3.06	3.7	3.22	3.16	3.4	3.52	3.66	3.08
14/08/2007	R	3.46	3.21	3.1	3.57	4.4	4.12	4.29
11/09/2007	R	3.45	3.05	2.8	3.15	3.54	3.56	3.85
9/10/2007	R	3.39	2.52	2.61	2.99	3.95	I	4.45
06/11/2007	R	5.5	1.31	4.42	3.77	5.6	I	0.27
05/12/2007	R	pH meter failure	pH meter failure	pH meter failure	pH meter failure	pH meter failure	I	pH meter failure
08/01/2008	R	2.32	7.22	6.8	2.52	2.19	2.76	3.85
06/02/2008	R	6.02	5.37	3.31	6.19	5.2	5.83	6.9
11/03/2008	R	3.25	2.20	3.14	3.26	3.58	4.05	4.42
16/04/2008	R	2.74	3.10	4.68	3.17	4.12	3.39	4.12
08/05/2008	R	3.15	3.24	5.70	5.84	5.40	5.27	4.79
09/06/2008	R	4.24	R	5.47	5.42	4.87	5.05	4.26
08/07/2008	R	4.92	R	5.38	5.60	4.95	5.10	4.07
05/08/2008	R	R	R	5.41	5.39	4.45	5.34	4.10
16/09/2008	R	R	R	5.50	5.48	4.63	5.38	4.12
17/09/2009	R	R	R	5.71	5.92	5.56	5.3	5.57

In Situ Temperature ℃

BH / Date	WS119	WS59A	WS08	CP02	WP01	WP02	WP03	WP04
06/07/2006	11.8	11.5	11.1	11.5	N/A	N/A	N/A	N/A
08/08/2006	10.4	10.1	8.2	8.8	N/A	N/A	N/A	N/A
04/09/2006	10.4	11	8.6	10	N/A	N/A	N/A	N/A
02/10/2006	9.1	9.7	9.3	10	N/A	N/A	N/A	N/A
07/11/2006	8.5	9.2	9	8.5	N/A	N/A	N/A	N/A
11/12/2006	8	6.1	7.7	7.1	N/A	N/A	N/A	N/A
16/01/2007	7.8	I	I	I	N/A	N/A	N/A	N/A
14/02/2007	7.3	7.3	7.8	8.7	N/A	N/A	N/A	N/A
13/03/2007	7.2	7.1	8.6	9	N/A	N/A	N/A	N/A
17/04/2007	7.8	7.7	8.5	9	N/A	N/A	N/A	N/A
15/05/2007	8.6	8.3	8.6	10	N/A	N/A	N/A	N/A
13/06/2007	I	10.1	10.1	10	10.1	9.1	9.9	9
10/07/2007	9.4	9.1	9	9.4	9.8	8.8	8.7	8.1
14/08/2007	R	9.4	9.4	9.5	10.2	9.7	9.3	9
11/09/2007	R	9.5	9.0	9.0	10.2	9.1	8.6	8.5
9/10/2007	R	9.6	9.5	9.3	10.1	10	I	9.4
06/11/2007	R	8.6	8.5	8.6	9	8.5	I	7.8
05/12/2007	R	8.5	8.4	8.9	8.5	9.2	I	8.9
08/01/2008	R	6.9	7.1	7.5	6.8	6.8	6.8	6.3
06/02/2008	R	7.2	7.6	8.4	6.7	7	6.8	7
11/03/2008	R	7.1	7.2	7.9	6.7	7.2	8.8	7.3
16/04/2008	R	7.3	7.1	7.7	6.5	6.6	6.6	6.2
08/05/2008	R	8.6	8.6	8.7	8.7	8.6	8.8	8.8
09/06/2008	R	8.9	R	9.0	9.0	9.1	9.0	9.0
08/07/2008	R	9.3	R	9.3	9.1	9.3	9.3	9.0
05/08/2008	R	R	R	9.4	9.9	9.0	9.5	8.6
16/09/2008	R	R	R	9.3	9.7	8.8	9.1	8.8
17/09/2009	R	R	R	10.6	11.1	11.1	11.5	10.4

Notes:

N/A = Not available,

N/D = Not Detected

I = Inaccessible,

R = Removed

Month	Weather Conditions
July 2006	Dry and warm
August 2006	Dry and warm
September 2006	Dry and mild
October 2006	Dry and mild
November 2006	Dry and cold
December 2006	Dry and cold
January 2007	Dry and cold
February 2007	Dry and cold
March 2007	Dry and mild
April 2007	Dry and mild
May 2007	Dry and mild
June 2007	Sunshine and mild
July 2007	Dry and sunny
August 2007	Overcast with showers
September 2007	Overcast
October 2007	Dry and sunny
November 2007	Mist and fog
December 2007	Mist and fog
January 2008	Overcast with showers
February 2008	Dry and sunny
March 2008	Overcast with showers
April 2008	Dry and sunny
May 2008	Dry and sunny
June 2008	Dry and sunny
July 2008	Dry and sunny
August 2008	Dry and overcast
September 2008	Overcast with showers
September 2009	Dry and sunny

Appendix D – Borehole Logs

Status
Final
03/02/2003

ritchies

BOREHOLE LOG

Borehole No
CP02
Information

Whitelee Windfarm, Eaglesham

Client: CRE Energy Ltd.

Job No: 8497

Consultant: Arup Scotland

Date Started	22/10/2002	Initial Boring Diameter:	150mm	Coordinates:	E 252700.00
Date Complete:	23/10/2002	Initial Core Diameter			N 648700.00
Hole Type:	CP	Rotary Casing Type		Ground Level:	271.00 m OD
Equipment:	2.0T Pilcon	Core Barrel:		Plunge:	90 °
		Core Bit:			

PROGRESS

Date	Time	Hole Depth	Casing Depth	Water Depth	Remarks
22/10/2002	17:00	1.50	1.50	-	Dry
23/10/2002	07:30	1.50	1.50	-	Dry
10/2002	17:00	4.80	4.70	-	Dry

DRILLING DETAILS

CP Chiselling			Rotary				
From	To	Hours	From	To	Hole Dia	Core Dia	Flush
4.70	4.80	1.00					

WATER STRIKES

Date	Time	Strike	Risen To	After n Minutes	Casing Depth	Flow	Sealed
10/2002		3.20	-	-	3.15	Seepage	-

IN SITU SPT TEST DETAILS

Depth	Blows for 75mm Increments
2.70	1,0,0,1,0,0
3.20	1,1,4,4,3,4
4.10	1,4,3,4,3,5
4.70	50,50 for no penetration

NOTES

All depth in metres; all diameters in millimetres.

Groundwater levels are subject to seasonal, tidal and other fluctuations and should not be taken as constant

1.0 hour hand excavating inspection pit, plan area 1.00m x 0.50m to 1.00m deep. 50mm dia. standpipe installed to 4.50m complete with upright locking security cover set in concrete at ground level.

PERSONNEL

Driller: JMCH	Logged by: WRS	Checked by: SMCQ

Status		Borehole No
Final	BOREHOLE LOG	CP02
03/02/2003		Sheet 1 of 1

Whitelee Windfarm, Eaglesham

Client: CRE Energy Ltd.

Job No: 8497

Consultant: Arup Scotland

Date Started	22/10/2002	Initial Boring Diameter:	150mm	Coordinates:	E 252700.00
Date Complete:	23/10/2002	Initial Core Diameter			N 648700.00
Hole Type:	CP	Rotary Casing Type		Ground Level:	271.00 m OD
Equipment:	2.0T Pilcon	Core Barrel:		Plunge:	90 °
		Core Bit:		Scale:	1:50

Description of Strata	Legend	Depth	OD Level	Sampling/ Core Run		U	In Situ Testing Test	In Situ Testing Result	TCR (SCR) RQD	FI	Install -ation
Very soft plastic brown pseudo-fibrous PEAT (Alluvium).				B	0.50						
				U	1.00-1.45	2					
				B	1.70-2.20	1					
				UNR	1.70-2.15						
				U	2.30-2.65	3					
				-	2.70-3.15		S	1			
Medium dense grey clayey fine to coarse SAND and fine to coarse angular to sub angular GRAVEL.		3.20	267.80	D	3.20-3.65		S	15			
				B	3.90						
				D	4.10-4.55		S	15			
		4.70	266.30	-	4.70		S	100/75#			
Very dense dark grey fine to coarse sub angular GRAVEL and occasional cobbles (possible weathered rock).		4.80	266.20	D	4.70						
End of Borehole at 4.80 m											

U	Undisturbed U100 Sample		Core Run	S	Standard Penetration Test	CP	Cable Percussion
P	Piston Sample	TCR	Total Core Recovery	C	Cone Penetration Test	RO	Rotary Open Hole
TW	Thin Wall Sample	SCR	Solid Core Recovery	32	N for full 300mm penetration	RC	Rotary Cored
D	Small Disturbed Sample	RQD	Rock Quality Designation	/175	For given penetration (mm)		
B	Bulk Disturbed Sample	FI	Fracture Index	/25#	Seating blows only (mm)	Installation	
LB	Large Bulk Disturbed Sample	FI	Fracture Log	NP	No Penetration		Slotted Pipe / Sand Filter
W	Water Sample	NI	Non Intact	PR	Pressuremeter Test		Piezometer Tip / Bentonite Seal
G	Gas Sample	U*	Blows to drive U100 /U86	K	Permeability Test (m/s)		Grout / Gravel Filter
C	Core			V	Insitu Vane Test		Concrete
NR	No Recovery			L	Packer Test (Lugeons)		

PART B: SITE WORK

Land-Drill Geotechnics Limited

www.land-drill.com

PART B
TABLE OF CONTENTS

Boring

The standard method of boring in soil for ground investigation is known as the cable percussion method. It uses various tools worked on a wire cable, typically a shell in non-cohesive soils, and a clay cutter in cohesive soils. Very dense soils, boulders or other hard obstructions are disturbed or broken up by chiselling and the fragments removed with the shell. To prevent the borehole falling in, the borehole is normally lined with driven steel casings of such sizes that the bottom of the borehole is not less than 125mm diameter.

Where there are constraints upon access, alternative methods of soft ground boring are available. However, each has limitations that need to be taken into account when assessing their suitability and the ground conditions inferred from their results.

Rotary Drilling

Rotary drilling is employed to extend ground investigation beyond the practical limit of cable tool boring in hard formations, commonly rock. Core drilling is used to obtain continuous intact samples of the formation and is generally undertaken with double tube swivel type core barrels fitted with tungsten or diamond bits as appropriate to formation type and hardness. Open-hole rotary drilling using, tricone rock roller bits or tungsten insert drag bits, or down-the-hole hammers, is carried out where core is not required, strata identification being made from cuttings only. Open-hole rotary drilling methods may also be employed for fast penetration of soils where sampling is not required, prior to coring at depth. Air or water is the flushing medium normally used with rotary drilling methods. The borehole is normally lined with inserted or drilled-in casing through the soils, and into the bedrock, where ground conditions require.

Samples and In-situ Tests

Tube samples of cohesive soils are generally taken with a 100mm internal diameter open drive sampler known as a U100, with an area ratio of 30%. The sampler is driven into the soil at the bottom of the borehole by a sliding hammer. After a sample is taken, the drive head and cutting shoe are unscrewed from the sample tube and any wet or disturbed soil removed from either end. The sample tube is then sealed with wax and fitted with plastic end caps.

A range of more specialised equipment, e.g. piston samplers, may be used to obtain higher quality samples in conditions where conventional open drive sampling is unsatisfactory.

Disturbed samples are taken from the boring tools at regular intervals. The samples are sealed in airtight containers. Bulk samples are larger disturbed samples from the boring tools, or from trial pits.

The Standard Penetration Test (SPT) carried out in accordance with BS1377:1990:Part 9:Clause 3.3, determines the resistance of soil to the penetration of a split barrel sampler. A 50mm diameter split barrel sampler is driven 450mm into the soil using a 63.5kg hammer with a 760mm drop, and the penetration resistance recorded. This "N" value is expressed as the number of blows required to achieve 300mm penetration (the "test drive") below an initial penetration of 150mm (the "seating drive") through any disturbed soil at the bottom of the borehole.

In coarse soils, the Cone Penetration Test (CPT) is conducted in the same manner as the SPT but using a 50mm diameter 60 degree apex solid cone point to replace the split barrel sampler.

Groundwater

Borehole water levels are recorded, together with the depths at which seepages or inflows of groundwater are detected and the observations noted on the borehole records. These observations may not give an accurate indication of groundwater conditions, for the following reasons:

(a) The borehole is rarely left standing at the relevant depth for sufficient time for the water level to reach equilibrium.
(b) A permeable stratum may have been sealed off by the borehole casing.
(c) It may have been necessary to add water to the borehole to facilitate progress.
(d) There may be seasonal, tidal or other effects at the site.

A more accurate assessment of groundwater behaviour may be obtained from standpipes or standpipe piezometers.

Gases

Determination and measurement of gases in the ground, commonly in relation to landfills, may be made directly from the ground surface, where a hole is formed by driving a solid and rigid steel spike to depths normally in the range 1.0 to 1.5m. Gas emissions are analysed using an appropriate portable analyser. However, research has shown that the small sample hole size and smearing effects can give a false negative result. Accordingly, the method is now generally used in isolation.A more accurate assessment of ground-gas emissions may be obtained from standpipes installed in boreholes.

PI Statement

Certified that the above mentioned samples/parts/materials have been tested/examined in accordance with the terms of the contract/order applicable and unless otherwise stated conform fully to the standards/specifications quoted. This does not however, guarantee the balance of production from which the tested samples/parts/materials have been taken to be of equal quality.

SOIL SAMPLES

U (X)	General purpose tube sample; X No of blows to drive sampler
UP	Piston sample
	NOTE: Tube samples are 100mm diameter unless otherwise specified in the remarks.
	Suffix 'a' indicates sample not recovered.
	Suffix 'b' indicates partial recovery.
J/T	Jar/Tub sample
B/LB	Bag/Large Bag sample
V	Volatile Vial

CORE RECOVERY AND ROCK QUALITY

TCR	Total Core Recovery: The total core recovered expressed as a percentage of the core run length
SCR	Solid Core Recovery: The core recovered as solid cylinders expressed as a percentage of the core run length
RQD	Rock Quality Designation: The core recovered as solid cylinders of length 100mm or more expressed as a percentage of core run length.
RO-S/RO-R	Rotary Open Hole Drilling through Soil / Rotary Open Hole Drilling through Rock
If	Fracture Index: The number of discontinuities expressed as fractures per metre

Flush: "Depth" indicates depth down to which recorded "Returns" relate

GROUND-WATER

W	Ground-water sample
▼	Ground-water encountered
▼	Depth to which ground-water rose
▽	Ground-water cut off by the casing

IN SITU AND FIELD TESTS

SPT=X a/b (pen) or CPT=X a/b (pen)	Standard penetration test (split barrel sampler(SPT)or cone (CPT)); X is the penetration (N) value; 'a' is blow/75mm for seating drive; 'b' is blows/75mm for test drive; (pen) is test drive penetration if less than 300mm.
CBR	California bearing ratio test
MCV	Moisture condition value test
K	Permeability test
HP	Hand penetrometer test
FV	Field vane test
HV	Hand vane test
ID	Density test

LEGENDS

Material legends are in accordance with BS 5930:1999

before a description indicates that it is based on the Driller's record.

INSTALLATIONS (BACKFILL)


Concrete


Bentonite


Spoil


Bentonite/cement grout


Sand


Solid pipe


Gravel


Slotted pipe


Porous element


Wooden plug

ROTARY DRILLING SIZES

Designation	Nominal Diameter (mm)	
	Borehole	Core
N	76	54
H	100	76
P	121	92
S	146	113
412	108	75

DIMENSIONS

All dimensions in metres unless otherwise stated.

Contract No: 2557

Land-Drill Geotechnics Ltd
Pardovan Works
Philpstoun
Linlithgow
EH49 6QZ

info@land-drill.com
01506-830044

KEY TO BOREHOLE AND TRIAL PIT RECORDS

Part B

WHITELEE WIND WARM

Exploration Point	Co-ordinates		Ground Level	Method	Figure No	Installation	Remarks
	Easting (m)	Northing (m)	(mO.D.)				
WP01	254575.0	646552.0	-	CP	B1	S'pipe(50mm)	
WP02	256166.0	645580.0	-	CP	B2	S'pipe(50mm)	
WP03	259088.0	646961.0	-	CP	B3	S'pipe(50mm)	
WP04	261552.0	645881.0	-	CP	B4	S'pipe(50mm)	

CP **Cable Percussion**

Contract No: 2557

	Originator	SCHEDULE OF SITE WORKS	Part B
	GGH		Fig. No.
Chk & App	Status	WHITELEE WIND WARM	B0
LKR	Final		Sheet 1 of 1

Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
4/5 2007							# PEAT				0.30
						2.20	# Grey SILT				
						3.10	# Grey brown sandy gravelly CLAY with cobbles and boulders				5.00
4/5						6.00	END OF BOREHOLE				6.00

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing
						3.10	6.00					150	6.00	3.50

Location: E 254575.0 N 646552.0

Level: -

Orientation: Vertical

Remarks:

Equipment: Pilcon Wayfarer

Method: Cable Percussion to 6.00m

Borehole No: WP01

Contract No: 2557

Driller: MK

Originator:

Chk & App: GGH

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WHITELEE WIND WARM

Part B

Fig. No. B1

Sheet 1 of 1

Land-Drill Geotechnics Ltd, Pardovan Works, Linlithgow EH49 6QZ E-mail: info@land-drill.com Tel: 01506-830044

Printed: 23/05/2007 08:57:30 File: P:\GINT\PROJECTS\2557.GPJ Style: LDG_BOREHOLE

Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth	Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
4/5 2007							# PEAT				0.30
											1.00
						4.60	# Grey SILT				
						6.50	# Grey brown sandy gravelly CLAY with cobbles and boulders				
4/5						7.20	END OF BOREHOLE				7.20

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing
						6.50	7.20					150	7.20	6.50

Location: E 256166.0 N 645580.0

Level: -

Orientation: Vertical

Remarks:

Equipment: Pilcon Wayfarer

Method: Cable Percussion to 7.20m

Borehole No: WP02

Contract No: 2557

Driller: MK

Originator:

Chk & App: GGH

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WHITELEE WIND WARM

Part B

Fig. No. B2

Sheet 1 of 1

Land-Drill Geotechnics Ltd, Pardovan Works, Linlithgow EH49 6QZ E-mail: info@land-drill.com Tel: 01506-830044

Printed: 23/05/2007 08:57:38 File: P:\GINT\PROJECTS\2557.GPJ Style: LDG_BOREHOLE

Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
8/5 2007								# PEAT				0.30
							3.40	# Grey brown SILT				
							4.50	# Grey brown sandy gravelly CLAY with cobbles and boulders				5.00
8/5							6.00	END OF BOREHOLE				6.00

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing
						4.50	6.00					150	6.00	5.00

Location: E 259088.0 N 646961.0

Level: -

Orientation: Vertical

Remarks:

Equipment: Pilcon Wayfarer

Method: Cable Percussion to 6.00m

Borehole No: WP03

Contract No: 2557

Driller: MK

Originator:

Chk & App: GGH

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WHITELEE WIND WARM

Part B

Fig. No. B3

Sheet 1 of 1

Progress	Sample Depth	Samples and Tests: Type	Samples and Tests: Result	Casing Depth		Level (mOD)	Depth	Description of Strata	Legend	Water Depth	Backfill: Symbol	Backfill: Depth
8/5 2007								# PEAT				0.30
							3.40	# Soft grey brown SILT				
							4.70	# Grey brown sandy gravelly CLAY with cobbles and boulders				5.00
8/5							6.00	END OF BOREHOLE				6.00

Flush: Returns	Flush: Type	Flush: To Depth	Chiselling: From	Chiselling: To	Chiselling: Time(hr)	Water Added: From	Water Added: To	Ground-water: Struck	Ground-water: Rose To	Ground-water: Time(mins)	Ground-water: Cut Off	Diam	To Depth: Boring	To Depth: Casing
						4.80	6.00	1.90	1.60	20	4.70	150	6.00	5.00

Location: E 261552.0
N 645881.0

Level: -

Orientation: Vertical

Remarks:

Equipment:
Pilcon Wayfarer

Method:
Cable Percussion to 6.00m

Borehole No:
WP04

Contract No: 2557

Driller: MK

Originator:

Chk & App: GGH

Status: **Final**

BOREHOLE RECORD

Scale 1:50

WHITELEE WIND WARM

Part B
Fig. No.
B4
Sheet 1 of 1

Land-Drill Geotechnics Ltd, Pardovan Works, Linlithgow EH49 6QZ E-mail: info@land-drill.com Tel: 01506-830044

Printed: 23/05/2007 08:57:49 File: P:\GINT\PROJECTS\2557.GPJ Style: LDG_BOREHOLE

Appendix E Laboratory Results (September 2009)

Scientific Analysis Laboratories is a limited company registered in England and Wales (No 2514788) whose address is at Hadfield House, Hadfield Street, Manchester M16 9FE

Scientific Analysis Laboratories

Certificate of Analysis

11 Law Place
Nerston Mains
East Kilbride
G74 4QL
Tel : 01355 230001
Fax : 01355 230002

Report Number: 177418-1

Date of Report: 02-Oct-2009

Customer: Jacobs
95 Bothwell Street
Glasgow
G2 7HX

Customer Contact: Mr Stewart Easton

Customer Job Reference: BO627819
Customer Site Reference: Whitelee Windfarm
Date Job Received at SAL: 17-Sep-2009
Date Analysis Started: 22-Sep-2009
Date Analysis Completed: 02-Oct-2009

The results reported relate to samples received in the laboratory
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
Tests covered by this certificate were conducted in accordance with SAL SOPs

UKAS TESTING
1977

Report checked and authorised by :
Miss Jeanette Abbott
Project Manager

Issued by :

Index to symbols used in 177418-1

Value	Description
F	Filtered
AR	As Received
13	Results have been blank corrected.
U	Analysis is UKAS accredited
N	Analysis is not accredited

Method Index

Value	Description
T22	Titration
T147	Filter(0.45um)ICP/OES(Sim)
T373	ICP/OES (Filtered)
T16	GC/MS
T54	GC/MS (Headspace)
T121	Filter (0.45um) ICP/OES
T7	Probe
T285	ICP/OES (SIM) (Filtered)
T253	IC(EID299)
T21	OX/IR
T81	GC/FID (LV)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Aluminium	T121	AR	0.01	mg/l	N	001-005
Calcium	T121	AR	1	mg/l	N	001-005
Iron	T121	AR	0.01	mg/l	N	001-005
Mg (Dissolved)	T373	AR	1	mg/l	N	001-005
Sodium	T147	AR	1	mg/l	N	001-005
Dissolved SO4(Total)	T285	AR	10	mg/l	N	001-005
Alkalinity expressed as CaCO3	T22	AR	10	mg/l	N	001-005
Chloride	T253	F	0.2	mg/l	U	001-005
Electrical Conductivity	T7	AR	10	µS/cm	N	001-005
pH	T7	AR			U	001-005
Total Organic Carbon	T21	AR	1	mg/l	N	001-005
Total Petroleum Hydrocarbons	T81	AR	0.01	mg/l	U	001-005
Phenol	T16	AR	10	µg/l	U	001-006
Bis (2-chloroethyl) ether	T16	AR	10	µg/l	U	001-006
2-Chlorophenol	T16	AR	10	µg/l	U	001-006
1,3-Dichlorobenzene	T16	AR	10	µg/l	U	001-006
1,4-Dichlorobenzene	T16	AR	10	µg/l	U	001-006
1,2-Dichlorobenzene	T16	AR	10	µg/l	U	001-006
Bis (2-chloroisopropyl) ether	T16	AR	10	µg/l	U	001-006
2-methyl phenol	T16	AR	10	µg/l	U	001-006
3/4-Methylphenol	T16	AR	10	µg/l	U	001-006
Hexachloroethane	T16	AR	10	µg/l	U	001-006
Nitrobenzene	T16	AR	10	µg/l	U	001-006
Isophorone	T16	AR	10	µg/l	U	001-006
2-Nitrophenol	T16	AR	10	µg/l	U	001-006
2,4-Dimethylphenol	T16	AR	10	µg/l	U	001-006
Bis (2-chloroethoxy) methane	T16	AR	10	µg/l	U	001-006
2,4-Dichlorophenol	T16	AR	10	µg/l	U	001-006
1,2,4-Trichlorobenzene	T16	AR	10	µg/l	U	001-006
Naphthalene	T16	AR	10	µg/l	U	001-006
4-Chloroaniline	T16	AR	10	µg/l	U	001-006
Hexachlorobutadiene	T16	AR	10	µg/l	U	001-006
4-Chloro-3-methylphenol	T16	AR	10	µg/l	U	001-006
2-Methylnaphthalene	T16	AR	10	µg/l	U	001-006
Hexachlorocyclopentadiene	T16	AR	10	µg/l	U	001-006
2,4,6-Trichlorophenol	T16	AR	10	µg/l	U	001-006
2,4,5-Trichlorophenol	T16	AR	10	µg/l	U	001-006
2-Chloronaphthalene	T16	AR	10	µg/l	U	001-006
2-Nitroaniline	T16	AR	10	µg/l	U	001-006
Dimethyl phthalate	T16	AR	10	µg/l	U	001-006
2,6-Dinitrotoluene	T16	AR	10	µg/l	U	001-006

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Acenaphthylene	T16	AR	10	µg/l	U	001-006
Acenaphthene	T16	AR	10	µg/l	U	001-006
3-Nitroaniline	T16	AR	10	µg/l	U	001-006
2,4-Dinitrophenol	T16	AR	10	µg/l	U	001-006
Dibenzofuran	T16	AR	10	µg/l	U	001-006
2,4-Dinitrotoluene	T16	AR	10	µg/l	U	001-006
4-Nitrophenol	T16	AR	10	µg/l	U	001-006
Diethyl phthalate	T16	AR	10	µg/l	U	001-006
Fluorene	T16	AR	10	µg/l	U	001-006
4-Chlorophenyl phenylether	T16	AR	10	µg/l	U	001-006
4-Nitroaniline	T16	AR	10	µg/l	U	001-006
Azobenzene	T16	AR	10	µg/l	U	001-006
4-Bromophenyl phenylether	T16	AR	10	µg/l	U	001-006
Hexachlorobenzene	T16	AR	10	µg/l	U	001-006
Pentachlorophenol	T16	AR	10	µg/l	U	001-006
Phenanthrene	T16	AR	10	µg/l	U	001-006
Anthracene	T16	AR	10	µg/l	U	001-006
Carbazole	T16	AR	10	µg/l	U	001-006
Di-n-butylphthalate	T16	AR	10	µg/l	U	001-006
Fluoranthene	T16	AR	10	µg/l	U	001-006
Pyrene	T16	AR	10	µg/l	U	001-006
Butyl benzylphthalate	T16	AR	10	µg/l	U	001-006
Benzo(a)Anthracene	T16	AR	10	µg/l	U	001-006
Chrysene	T16	AR	10	µg/l	U	001-006
Bis (2-ethylhexyl)phthalate	T16	AR	10	µg/l	U	001-006
Di-n-octylphthalate	T16	AR	10	µg/l	U	001-006
Benzo(b/k)Fluoranthene	T16	AR	10	µg/l	U	001-006
Benzo(a)Pyrene	T16	AR	10	µg/l	U	001-006
Indeno(123-cd)Pyrene	T16	AR	10	µg/l	U	001-006
Dibenzo(ah)Anthracene	T16	AR	10	µg/l	U	001-006
Benzo(ghi)Perylene	T16	AR	10	µg/l	U	001-006
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l	U	001-005
1,1,1-Trichloroethane	T54	AR	1	µg/l	U	001-005
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l	U	001-005
1,1,2-Trichloroethane	T54	AR	1	µg/l	U	001-005
1,1,2-Trichloroethylene	T54	AR	1	µg/l	U	001-005
1,1-Dichloroethane	T54	AR	1	µg/l	U	001-005
1,1-Dichloroethylene	T54	AR	1	µg/l	U	001-005
1,1-Dichloropropene	T54	AR	1	µg/l	U	001-005
1,2,3-Trichloropropane	T54	AR	1	µg/l	U	001-005
1,2,4-Trimethylbenzene	T54	AR	1	µg/l	U	001-005
1,2-dibromoethane	T54	AR	1	µg/l	U	001-005
1,2-Dichlorobenzene	T54	AR	1	µg/l	U	001-005
1,2-Dichloroethane	T54	AR	1	µg/l	U	001-005
1,2-Dichloropropane	T54	AR	1	µg/l	U	001-005
1,3,5-Trimethylbenzene	T54	AR	1	µg/l	U	001-005
1,3-Dichlorobenzene	T54	AR	1	µg/l	U	001-005
1,3-Dichloropropane	T54	AR	1	µg/l	U	001-005
1,4-Dichlorobenzene	T54	AR	1	µg/l	U	001-005
2,2-Dichloropropane	T54	AR	1	µg/l	U	001-005
2-Chlorotoluene	T54	AR	1	µg/l	U	001-005
4-Chlorotoluene	T54	AR	1	µg/l	U	001-005
Benzene	T54	AR	1	µg/l	U	001-005
Bromobenzene	T54	AR	1	µg/l	U	001-005
Bromochloromethane	T54	AR	1	µg/l	U	001-005
Bromodichloromethane	T54	AR	1	µg/l	U	001-005
Bromoform	T54	AR	1	µg/l	U	001-005
Bromomethane	T54	AR	1	µg/l	U	001-005
Carbon tetrachloride	T54	AR	1	µg/l	U	001-005
Chlorobenzene	T54	AR	1	µg/l	U	001-005
Chlorodibromomethane	T54	AR	1	µg/l	U	001-005
Chloroethane	T54	AR	1	µg/l	U	001-005
Chloroform	T54	AR	1	µg/l	U	001-005
Chloromethane	T54	AR	1	µg/l	U	001-005
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l	U	001-005
Cis-1,3-Dichloropropene	T54	AR	1	µg/l	U	001-005
Dibromomethane	T54	AR	1	µg/l	U	001-005
Dichlorodifluoromethane	T54	AR	1	µg/l	U	001-005
Dichloromethane	T54	AR	50	µg/l	N	001-005
EthylBenzene	T54	AR	1	µg/l	U	001-005

Determinand	Method	Test Sample	LOD	Units	Symbol	SAL References
Isopropyl benzene	T54	AR	1	µg/l	U	001-005
M/P Xylene	T54	AR	1	µg/l	U	001-005
n-Propylbenzene	T54	AR	1	µg/l	U	001-005
O Xylene	T54	AR	1	µg/l	U	001-005
p-Isopropyltoluene	T54	AR	1	µg/l	U	001-005
S-Butylbenzene	T54	AR	1	µg/l	U	001-005
Styrene	T54	AR	1	µg/l	U	001-005
T-Butylbenzene	T54	AR	1	µg/l	U	001-005
Tetrachloroethylene	T54	AR	1	µg/l	U	001-005
Toluene	T54	AR	1	µg/l	U	001-005
Trans-1,2-Dichloroethene	T54	AR	1	µg/l	U	001-005
Trans-1,3-Dichloropropene	T54	AR	1	µg/l	U	001-005
Trichlorofluoromethane	T54	AR	1	µg/l	U	001-005
Vinyl chloride	T54	AR	1	µg/l	U	001-005

SAL Reference: 177418
Project Site: Whitelee Windfarm
Customer Reference: BO627819

Water Analysed as Water
Miscellaneous

	SAL Reference	177418 001	177418 002	177418 003	177418 004	177418 005
	Customer Sample Reference	WP01	WP02	WP03	WP04	CP02
Determinand	**Method** / **Test Sample** / **LOD** / **Units**					
Aluminium	T121 AR 0.01 mg/l	**0.03**	**0.52**	**0.16**	**0.07**	<0.01
Calcium	T121 AR 1 mg/l	**53**	**4**	**28**	**19**	**52**
Iron	T121 AR 0.01 mg/l	**30**	**1.7**	**5.3**	**37**	**2.0**
Mg (Dissolved)	T373 AR 1 mg/l	**9**	**1**	**9**	**10**	**24**
Sodium	T147 AR 1 mg/l	**9**	**3**	**9**	**6**	**13**
Dissolved SO4(Total)	T285 AR 10 mg/l	<10	<10	<10	<10	<10
Alkalinity expressed as CaCO3	T22 AR 10 mg/l	**180**	**150**	**140**	**95**	**195**
Chloride	T253 F 0.2 mg/l	**6.4**	**2.7**	**8.5**	**3.7**	**7.0**
Electrical Conductivity	T7 AR 10 µS/cm	**480**	**73**	**250**	**240**	**410**
pH	T7 AR	**6.6**	**5.8**	**6.3**	**6.0**	**6.8**
Total Organic Carbon	T21 AR 1 mg/l	**45**	**25**	**21**	**76**	**20**
Total Petroleum Hydrocarbons	T81 AR 0.01 mg/l	(13) **0.17**	(13) **0.02**	(13) **0.03**	(13) **0.42**	(13) **0.08**

SAL Reference: 177418
Project Site: Whitelee Windfarm
Customer Reference: BO627819

Water Analysed as Water
Semi-Volatile Organic Compounds (USEPA 625)

					SAL Reference	177418 001	177418 002	177418 003	177418 004	177418 005
					Customer Sample Reference	WP01	WP02	WP03	WP04	CP02
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
Phenol	T16	AR	10	µg/l		**19**	<10	<10	<10	<10
Bis (2-chloroethyl) ether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Chlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
1,3-Dichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
1,4-Dichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
1,2-Dichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-chloroisopropyl) ether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-methyl phenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
3/4-Methylphenol	T16	AR	10	µg/l		**140**	<10	<10	<10	<10
Hexachloroethane	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Nitrobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Isophorone	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Nitrophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dimethylphenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-chloroethoxy) methane	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dichlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Naphthalene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Chloroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Hexachlorobutadiene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Chloro-3-methylphenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Methylnaphthalene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4,6-Trichlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4,5-Trichlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Chloronaphthalene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2-Nitroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Dimethyl phthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,6-Dinitrotoluene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Acenaphthylene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Acenaphthene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
3-Nitroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dinitrophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Dibenzofuran	T16	AR	10	µg/l		<10	<10	<10	<10	<10
2,4-Dinitrotoluene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Nitrophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Diethyl phthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Fluorene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Chlorophenyl phenylether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Nitroaniline	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Azobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
4-Bromophenyl phenylether	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Hexachlorobenzene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Pentachlorophenol	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Phenanthrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Anthracene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Carbazole	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Di-n-butylphthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Fluoranthene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Pyrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Butyl benzylphthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(a)Anthracene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Chrysene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Bis (2-ethylhexyl)phthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Di-n-octylphthalate	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(b/k)Fluoranthene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(a)Pyrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Indeno(123-cd)Pyrene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Dibenzo(ah)Anthracene	T16	AR	10	µg/l		<10	<10	<10	<10	<10
Benzo(ghi)Perylene	T16	AR	10	µg/l		<10	<10	<10	<10	<10

SAL Reference: 177418
Project Site: Whitelee Windfarm
Customer Reference: BO627819

Water Analysed as Water

Semi-Volatile Organic Compounds (USEPA 625)

				SAL Reference	**177418 006**
				Customer Sample Reference	**lab Blank**
Determinand	**Method**	**Test Sample**	**LOD**	**Units**	
Phenol	T16	AR	10	µg/l	<10
Bis (2-chloroethyl) ether	T16	AR	10	µg/l	<10
2-Chlorophenol	T16	AR	10	µg/l	<10
1,3-Dichlorobenzene	T16	AR	10	µg/l	<10
1,4-Dichlorobenzene	T16	AR	10	µg/l	<10
1,2-Dichlorobenzene	T16	AR	10	µg/l	<10
Bis (2-chloroisopropyl) ether	T16	AR	10	µg/l	<10
2-methyl phenol	T16	AR	10	µg/l	<10
3/4-Methylphenol	T16	AR	10	µg/l	<10
Hexachloroethane	T16	AR	10	µg/l	<10
Nitrobenzene	T16	AR	10	µg/l	<10
Isophorone	T16	AR	10	µg/l	<10
2-Nitrophenol	T16	AR	10	µg/l	<10
2,4-Dimethylphenol	T16	AR	10	µg/l	<10
Bis (2-chloroethoxy) methane	T16	AR	10	µg/l	<10
2,4-Dichlorophenol	T16	AR	10	µg/l	<10
1,2,4-Trichlorobenzene	T16	AR	10	µg/l	<10
Naphthalene	T16	AR	10	µg/l	<10
4-Chloroaniline	T16	AR	10	µg/l	<10
Hexachlorobutadiene	T16	AR	10	µg/l	<10
4-Chloro-3-methylphenol	T16	AR	10	µg/l	<10
2-Methylnaphthalene	T16	AR	10	µg/l	<10
Hexachlorocyclopentadiene	T16	AR	10	µg/l	<10
2,4,6-Trichlorophenol	T16	AR	10	µg/l	<10
2,4,5-Trichlorophenol	T16	AR	10	µg/l	<10
2-Chloronaphthalene	T16	AR	10	µg/l	<10
2-Nitroaniline	T16	AR	10	µg/l	<10
Dimethyl phthalate	T16	AR	10	µg/l	<10
2,6-Dinitrotoluene	T16	AR	10	µg/l	<10
Acenaphthylene	T16	AR	10	µg/l	<10
Acenaphthene	T16	AR	10	µg/l	<10
3-Nitroaniline	T16	AR	10	µg/l	<10
2,4-Dinitrophenol	T16	AR	10	µg/l	<10
Dibenzofuran	T16	AR	10	µg/l	<10
2,4-Dinitrotoluene	T16	AR	10	µg/l	<10
4-Nitrophenol	T16	AR	10	µg/l	<10
Diethyl phthalate	T16	AR	10	µg/l	<10
Fluorene	T16	AR	10	µg/l	<10
4-Chlorophenyl phenylether	T16	AR	10	µg/l	<10
4-Nitroaniline	T16	AR	10	µg/l	<10
Azobenzene	T16	AR	10	µg/l	<10
4-Bromophenyl phenylether	T16	AR	10	µg/l	<10
Hexachlorobenzene	T16	AR	10	µg/l	<10
Pentachlorophenol	T16	AR	10	µg/l	<10
Phenanthrene	T16	AR	10	µg/l	<10
Anthracene	T16	AR	10	µg/l	<10
Carbazole	T16	AR	10	µg/l	<10
Di-n-butylphthalate	T16	AR	10	µg/l	<10
Fluoranthene	T16	AR	10	µg/l	<10
Pyrene	T16	AR	10	µg/l	<10
Butyl benzylphthalate	T16	AR	10	µg/l	<10
Benzo(a)Anthracene	T16	AR	10	µg/l	<10
Chrysene	T16	AR	10	µg/l	<10
Bis (2-ethylhexyl)phthalate	T16	AR	10	µg/l	<10
Di-n-octylphthalate	T16	AR	10	µg/l	<10
Benzo(b/k)Fluoranthene	T16	AR	10	µg/l	<10
Benzo(a)Pyrene	T16	AR	10	µg/l	<10
Indeno(123-cd)Pyrene	T16	AR	10	µg/l	<10
Dibenzo(ah)Anthracene	T16	AR	10	µg/l	<10
Benzo(ghi)Perylene	T16	AR	10	µg/l	<10

SAL Reference: 177418
Project Site: Whitelee Windfarm
Customer Reference: BO627819

Water Analysed as Water
Volatile Organic Compounds (USEPA 624)

					SAL Reference	177418 001	177418 002	177418 003	177418 004	177418 005
					Customer Sample Reference	WP01	WP02	WP03	WP04	CP02
Determinand	**Method**	**Test Sample**	**LOD**	**Units**						
1,1,1,2-Tetrachloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1,1-Trichloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1,2,2-Tetrachloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1,2-Trichloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1,2-Trichloroethylene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1-Dichloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1-Dichloroethylene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,1-Dichloropropene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,2,3-Trichloropropane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,2-dibromoethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,2-Dichlorobenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,2-Dichloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,2-Dichloropropane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,3-Dichlorobenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,3-Dichloropropane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
1,4-Dichlorobenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
2,2-Dichloropropane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
2-Chlorotoluene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
4-Chlorotoluene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Benzene	T54	AR	1	µg/l		(13) <1	(13) <1	(13) <1	(13) <1	(13) <1
Bromobenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Bromochloromethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Bromodichloromethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Bromoform	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Bromomethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Carbon tetrachloride	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Chlorobenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Chlorodibromomethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Chloroethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Chloroform	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Chloromethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Cis-1,2-Dichloroethylene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Cis-1,3-Dichloropropene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Dibromomethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Dichlorodifluoromethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Dichloromethane	T54	AR	50	µg/l		<50	<50	<50	<50	<50
EthylBenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Isopropyl benzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
M/P Xylene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
n-Propylbenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
O Xylene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
p-Isopropyltoluene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
S-Butylbenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Styrene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
T-Butylbenzene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Tetrachloroethylene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Toluene	T54	AR	1	µg/l		**7**	<1	<1	<1	<1
Trans-1,2-Dichloroethene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Trans-1,3-Dichloropropene	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Trichlorofluoromethane	T54	AR	1	µg/l		<1	<1	<1	<1	<1
Vinyl chloride	T54	AR	1	µg/l		<1	<1	<1	<1	<1