



EP-01/097/2001/C

**Provision of EM&A Services at
Water Recreation Centre**

**Monthly EM&A Report No.9
(16 April to 15 May 2006)**

May 2006

	Name	Signature
Reviewed & Checked:	Y T Tang	
Approved:	Alan Kwok	

Version:	Revision 0	Date:	26 May 2006
----------	------------	-------	-------------

The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and MEMCL accepts no responsibility for its use by others.

This report is copyright and may not be reproduced in whole or in part without prior written permission.

MAUNSELL ENVIRONMENTAL MANAGEMENT CONSULTANTS LTD

11/F, Grand Central Plaza, Tower 2, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong

Tel: (852) 2893 1551 Fax: (852) 2891 0305 Email: mem@maunsell.aecom.com

**Hong Kong Disneyland Theme Park
Water Recreation Centre (Monthly EM&A Report No.9)**

**Submitted by Maunsell Environmental Management
Consultant Ltd on 25 May 2006**

This is to verify that:

The Water Recreation Centre Monthly EM&A Report No. 9

**Submitted by: Maunsell Environmental Management
Consultant Ltd**

On: 25 May 2006

Has been verified by the undersigned.

Signed



Ir Dr Anne Watker-Zeris
Independent Environmental Checker (IECK)
Retained by Hong Kong International Theme Parks Ltd
pursuant to FEP No. EP-138/2002/A

Date



Company Chop



TABLE OF CONTENTS

EXECUTIVE SUMMARY

Environmental Monitoring Works
Implementation Status of Environmental Mitigation Measures
Environmental Complaints and Prosecution
Future Key Issues

1. INTRODUCTION

Background
Project Organisation
Summary of the EM&A Requirements

2. WATER QUALITY

Monitoring Requirements
Monitoring Equipment
Monitoring Parameters, Frequency and Duration
Monitoring Locations
Monitoring Methodology
Laboratory Analysis
QA/QC Procedure
Results and Observations

3. ENVIRONMENTAL AUDIT

Implementation Status of Environmental Mitigation Measures
Status of Environmental Licensing and permitting
Implementation Status of Event and Action Plans
Waste Management
Implementation Status of Environmental Complaint Handling Procedures

4. CONCLUSIONS AND RECOMMENDATIONS

Conclusions
Recommendations

List of Tables

Table 2.1	Water Quality Monitoring Equipment
Table 2.2	Water Quality Monitoring Parameters, Period and Frequency
Table 2.3	Water Quality Monitoring Locations
Table 2.4	Analytical Methods to be applied to Water Quality Samples
Table 2.5	Summary of Water Quality Monitoring Results
Table 2.6	Summary of Water Quality Exceedances
Table 3.1	Summary of Environmental Notification, Licensing and Permit Status

List of Figures

Figure 1.1	Location of Water Recreation Centre
Figure 1.2	Project Organisation
Figure 2.1	Locations of Water Quality Monitoring Stations

List of Appendices

Appendix A	Contact of Key Environmental Personnel
Appendix B	Action and Limit Levels
Appendix C	Calibration Records
Appendix D	Environmental Monitoring Schedule
Appendix E	Water Quality Monitoring Results
Appendix F	Quality Control Reports
Appendix G	Summary of Environmental Mitigation Implementation Schedule
Appendix H	Event and Action Plans
Appendix I	Complaint Flow Diagram and Complaint Log

EXECUTIVE SUMMARY

This is the ninth monthly Environmental Monitoring and Audit (EM&A) report prepared by Maunsell Environmental Management Consultant Ltd. (MEMCL), the designated Environmental Team (ET), for the project "Provision of EM&A Services at Water Recreation Centre". The Water Recreation Centre (WRC) commenced operation on 16 August 2005.

This report presents the results of EM&A works conducted between 16 April and 15 May 2006.

Environmental Monitoring Works

Water Quality

For water quality monitoring, no exceedance was recorded for all parameters during the reporting period.

Environmental Licensing and Permitting

Environmental permit no. EP-01/097/2001/C was issued to the Hongkong International Theme Parks Limited (HKITP) for the operation of WRC. HKITP has been registered as chemical waste producer (Waste Producer No. 9499-973-H3095-01). Information on these permits is provided in Table 3.1.

Implementation Status of Environmental Mitigation Measures

Monthly environmental site inspection was carried out on 12 May 2006. Environmental mitigation measures as recommended in the EIA report, Operational EM&A Plan and EP-01/097/2001/C were properly implemented.

Environmental Complaints and Prosecution

No complaint, summon or prosecution related to environmental issues was made against the Project in the reporting period.

Future Key Issues

The operator of WRC is reminded to continue to implement measures as recommended in the EIA report, Operational EM&A Plan and EP-01/097/2001/C.

1. INTRODUCTION

Background

- 1.1 Maunsell Environmental Management Consultants Ltd. (MEMCL) (hereinafter referred as the "ET") was appointed by Hongkong International Theme Park Ltd. (HKITP) (hereinafter referred as the "Operator") to carry out operational Environmental Monitoring and Audit at the Water Recreation Centre since its operation on 16 August 2005. Under the requirements of Section 4 of the Further Environmental Permits EP-01/097/2001/C, EM&A programme is required to be implemented in accordance with the Operational EM&A Plan approved by the Environmental Protection Department (EPD) on 31 August 2005.
- 1.2 The WRC is a portion of the Contract for "Theme Park and Associated Infrastructures at Penny's Bay", which encompasses an area of approximately 12 ha and contains a multi-function artificial lake, water-based and land-based recreational facilities and ancillary facilities. Apart from recreation purpose, the lake water is a source of irrigation water for the entire Penny's Bay. The location of the WRC is given in Figure 1.1.
- 1.3 Following approval of the EIA, an Environmental Permit (EP) was issued to the Civil Engineering Department (CED) (now Civil and Engineering Development Department (CEDD) and the subsequent variation of the permit no. EP-097/2001/B and EP-138/2002/C contain the requirements and obligations on the Environmental Monitoring and Audit (EM&A) during the operation of the WRC. Under the Contract for "Theme Park and Associated Infrastructures at Penny's Bay", the WRC and ancillary facilities were designed and constructed under the supervision of CEDD and the WRC would be turned over from CEDD to HKITP for operation upon completion of construction. Environmental permit no. EP-01/097/2001/C was issued to the HKITP for the operation of WRC.
- 1.4 This report summarises the environmental monitoring and audit works for the Project between 16 April and 15 May 2006.

Project Organisation

- 1.5 The structure of the environmental management team is shown in Figure 1.2. Contacts of key environmental staff of the Project are shown in Appendix A.

Summary of the EM&A Requirements

- 1.6 The EM&A programme requires environmental monitoring for water quality within the WRC. The EM&A requirements for each item are described in subsequent sections, including:
 - Monitoring parameters;
 - Action and Limit Levels;
 - Event-Action Plans;
 - Environmental mitigation measures, as recommended in the EIA report, Operational EM&A Plan and EP-01/097/2001/C.
- 1.7 Site audits and the status of environmental licensing and permits are described in Section 3.
- 1.8 Summary of the advise on the implementation status of environmental protection and pollution control/mitigation measures is summarised in Section 3 of the Report.

2. WATER QUALITY

Monitoring Requirements

- 2.1 Water quality monitoring was conducted at five monitoring stations. Appendix B shows the established Action and Limit Levels (AL Levels) for water quality parameters.

Monitoring Equipment

- 2.2 Water samples were collected at three depths at all sampling locations: (1) 1m below the water surface, (2) mid depth, and (3) 1m above the bottom of the lake. The parameters of water depth, dissolved oxygen (as % saturation), turbidity, temperature, and pH were measured in-situ. Water samples were collected for analysis by a HOKLAS accredited laboratory. The water quality monitoring equipment deployed is described in Table 2.1.

Table 2.1 Water Quality Monitoring Equipment

Equipment	Model and Make
Dissolved Oxygen Measuring Meter	YSI 85D
Turbidimeter	HACH 2100P
pH Meter	Hanna HI9023
Water Sampler	Wildco Alpha Water Bottle (Vertical)
Differential Global Positioning System (DGPS)	MLR FX412
Water depth echo sounder	Cuda 168

Monitoring Parameters, Frequency and Duration

- 2.3 Table 2.2 summarised the monitoring parameters, frequencies and duration of the water quality monitoring.

Table 2.2 Water Quality Monitoring Parameters, Period and Frequency

Monitoring Station	Parameters, unit	Frequency	No. of Depths
WM1-WM5	¹ Dissolved Oxygen Saturation, % ¹ Water depth, m ¹ pH value ¹ Temperature, °C ¹ Turbidity, NTU Dissolved Oxygen, mg/L Conductivity, µS/cm Salinity, g/L Copper (Cu), µg/L Chromium (Cr), µg/L Lead (Pb), µg/L Zinc (Zn), µg/L Tributyl Tin (TBT), ng Sn/L Suspended Solids, mg/L Total Nitrogen, mg/L Total Phosphorous, mg/L Total Silica, mg/L 5-day BOD, mg/L COD, mg/L Ammonia, mg/L Chlorophyll a, mg/L <i>E. Coli</i> , cfu/100mL	Once per week	3 (Surface, Mid-Depth, Bottom)

Note:

1. Parameters to be measured *in-situ*.

Monitoring Locations

- 2.4 Five stations were designated for water quality monitoring. The locations of these monitoring stations are summarized in Table 2.3 and depicted in Figure 2.1.

Table 2.3 Water Quality Monitoring Locations

Location	HK Metric Grid E	HK Metric Grid N
WM1	821 821.66	820 493.99
WM2	822 034.44	820 369.10
WM3	821 839.52	820 377.60
WM4	821 932.82	820 278.32
WM5	821 915.76	820 184.51

Monitoring Methodology

- 2.5 Dissolved Oxygen saturation, water depth, pH value, temperature and turbidity were measured in-situ at the designated water quality monitoring stations. General observation, weather conditions, with the sampling time, date and location were marked on a field record sheet.
- 2.6 Water samples were taken from each monitoring station with a water sampler for laboratory analysis. The sample was then poured into a pre-labelled bottle. The label contained the sample identification number, sample location, date, time, project name and analyses required.
- 2.7 The samples were placed in a cooler with ice (to 4°C without being frozen) and kept away from sunlight. Samples were submitted to a Hong Kong Accreditation Scheme (HOKLAS) laboratory for analysis within 24 hours of sampling.

Operating/Analytical Procedures

- 2.8 A Differential Global Positioning System (DGPS) was used to ensure that the correct location was selected prior to sample collection.
- 2.9 A portable, battery-operated echo sounder was used for the determination of water depth at each designated monitoring station.
- 2.10 All in-situ measurements and samples for analysis were taken at three water depths, namely 1m below water surface, mid-depth and 1m above lake bottom.
- 2.11 At each measurement/sampling depth, two consecutive measurements for each in-situ parameters were taken. Where the difference in the value between the first and second readings of each set was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.
- 2.12 Water samples were collected using the water sampler and the samples were stored in pre-labelled bottles. Water samples collected were well-mixed in the water sampler prior to transferring to sample bottles. The sample bottles were then packed in cool-boxes (cooled at 4°C without being frozen), and delivered to ALS Technichem (HK) Pty Ltd. for the laboratory analysis.

Maintenance and Calibration

- 2.13 The dissolved oxygen meter, which also measures temperature, was calibrated by the wet bulb method before each monitoring day. Before the routine calibration, the sensor for dissolved oxygen was thermally equilibrated in water-saturated air. The calibration cup served as a calibration chamber and it was loosened from airtight condition before it was used for the calibration. Calibration was also carried out in a water sample with a known concentration of dissolved oxygen at 3-month intervals. The sensor was immersed in the water and after thermal equilibration, the known mg/L value was keyed in and the calibration was carried out automatically.
- 2.14 The turbidimeter has already been calibrated at 3-month intervals. Before the measurement, a zero check in distilled water was performed with the turbidimeter. The turbidimeter was calibrated with a solution of known NTU.
- 2.15 The pH meter was calibrated at 3-month intervals. Before the measurement, a zero check in distilled

water was performed with the meter. The probe was calibrated with a solution of known salinity. A similar procedure was carried out for pH value calibration.

2.16 Calibration records are presented in Appendix C.

Laboratory Analysis

2.17 All laboratory work was carried out by ALS Technichem Pty. Ltd. The determination work started within 24 hours after collection of the water samples. The analyses followed the standard methods according to Table 2.4 and as described in APHA Standard Methods for the Examination of Water and Wastewater.

Table 2.4 Analytical Methods to be applied to Water Quality Samples

Determinant, unit	Reference Method Used ¹ (APHA 20 th ed)	Reporting Limits
Dissolved Oxygen, mg/L	4500O: G	0.1 mg/L
Conductivity, μ S/cm	2510B	1 μ S/cm
Salinity, g/L	2520B	0.1 g/L
Copper, μ g/L	3125 / ICPMS	1 μ g/L
Chromium, μ g/L		1 μ g/L
Lead, μ g/L		1 μ g/L
Zinc, μ g/L		10 μ g/L
Tributyl Tin, ng Sn/L		5 ng Sn/L
Suspended Solids, mg/L	2540D	2 mg/L
Total Nitrogen, mg/L	4500Norg: B 4500NO ₃ : F	0.1 mg/L
Total Phosphorus, mg/L	4500P: B4, F	0.1 mg/L
Total Silica, mg/L	4500Si: F	0.01 mg/L
5-day BOD, mg/L	5210B	2 mg/L
COD, mg/L	5220B	2 mg/L
Ammonia Nitrogen, mg/L	4500NH ₃ : G	0.01 mg/L
Chlorophyll-a, mg/L	10200H2	5 mg/L
<i>E. Coli.</i> cfu/100mL	DoE Section 7.9.4.2 & 4	1 cfu/100mL

Note:

1. All testing conducted by the laboratory are In-House methods based on the method stated in the "Standard Methods for the Testing of Water and Wastewater, 19th & 20th ed" (APHA) or the USEPA SW846.

QA/QC Procedure

2.18 *ALS Technichem* has comprehensive quality assurance and quality control programmes. The QA/QC procedures for each analytical batch:

- At least 1 reagent blank solution was prepared and analyzed;
- At least 1 duplicate sample analysis was performed in every 10 samples;
- At least 1 in every 10 samples was spiked with a known concentration of the analyte to determine the matrix effect of the sample.

Results and Observations

2.19 Monitoring of water quality was carried out at the 5 designated monitoring stations on 5 occasions during the reporting period (21 April, 27 April, 3 May, 9 May and 15 May 2006). The monitoring schedule is presented in Appendix D. All monitoring data and graphical presentation of the monitoring results are provided in Appendix E and summarised in Table 2.5.

Table 2.5 Summary of Water Quality Monitoring Results

Parameters	Monitoring Data (Depth Averaged Data)				
	WM1	WM2	WM3	WM4	WM5
Temperature, °C	24.4 – 27.3 (24.5 – 27.3)	24.4 – 27.6 (24.4 – 27.6)	24.4 – 27.6 (24.5 – 27.6)	24.4 – 28.1 (24.4 – 28.1)	24.4 – 27.4 (24.4 – 27.3)
Daily Temperature Difference ¹ , °C	0.1 – 0.4				
Turbidity, NTU	1.7 – 2.7	2.0 – 3.0	2.2 – 3.0	2.3 – 2.7	1.9 – 3.1
pH	7.4 – 8.2 (7.5 – 8.2)	7.2 – 8.2 (7.4 – 8.2)	7.2 – 8.3 (7.5 – 8.3)	7.5 – 8.3 (7.6 – 8.3)	7.3 – 8.3 (7.4 – 8.3)
Dissolved Oxygen, mg/L	5.2 – 8.9 (6.9 – 8.7)	5.8 – 8.9 (6.4 – 8.7)	6.8 – 9.0 (7.7 – 8.7)	7.0 – 9.1 (7.6 – 8.7)	7.3 – 9.5 (7.4 – 9.1)
Conductivity, µS/cm	94 – 109	96 – 201	95 – 109	97 – 109	94 – 110
Salinity, g/L	all <0.1	all <0.1	all <0.1	all <0.1	all <0.1
Copper, µg/L	<1 – 4	<1 – 4	<1 – 4	<1 – 4	<1 – 4
Chromium, µg/L	all <1	all <1	all <1	all <1	all <1
Lead, µg/L	all <1	all <1	all <1	all <1	all <1
Zinc, µg/L	all <10	all <10	<10 - 12	all <10	all <10
Tributyl Tin, ng Sn/L	all <5	all <5	all <5	all <5	all <5
Suspended Solids ² , mg/L	all <2	all <2	all <2	all <2	all <2
Total Nitrogen, mg/L	0.5 – 0.7 (0.5 – 0.6)	0.4 – 0.7 (0.5 – 0.7)	0.4 – 0.7 (0.4 – 0.7)	0.4 – 0.7 (0.4 – 0.7)	0.4 – 0.7 (0.4 – 0.6)
Total Phosphorous ¹ , mg/L	all <0.02	all <0.02	all <0.02	all <0.02	all <0.02
Silicate, mg/L	0.8 – 1.8 (0.9 – 1.8)	0.9 – 1.7 (1.0 – 1.7)	0.9 – 1.7 (0.9 – 1.6)	0.9 – 1.7 (0.9 – 1.7)	0.9 – 1.8 (0.9 – 1.7)
Ammonia Nitrogen, mg/L	<0.01 – 0.08	0.01 – 0.09	<0.01 – 0.06	<0.01 – 0.08	<0.01 – 0.06
Unionised Ammonia ³ , mg/L	<0.00044 - <0.00053	<0.00032 – <0.00041	<0.00033 – <0.00040	<0.00031 – <0.00041	<0.00035 – <0.00040
BOD ₅ , mg/L	all <2	all <2	all <2	all <2	all <2
COD, mg/L	11 – 15 (13 – 15)	10 – 17 (12 – 16)	10 – 15 (11 – 14)	11 – 15 (12 – 14)	12 – 15 (12 – 14)
Chlorophyll-a, mg/L	3 – 39	4 – 36	4 – 36	4 – 38	3 – 31
<i>E. Coli</i> ⁴ , cfu/100mL	all <1	all <1	all <1	all <1	all <1

Note: 1. Present as depth average 2. Present as annual median
3. Present as annual median 4. Present as geometric mean for last 5 measurements

- 2.20 The QA/QC results for laboratory testing in the reporting period were acceptable. The QA/QC results are summarised in Appendix F.
- 2.21 All recorded levels during the reporting period were below the AL Levels. Table 2.6 summarises water quality exceedances in the reporting period.

Table 2.6 Summary of Water Quality Exceedances

Parameters	WM1		WM2		WM3		WM4		WM5		Total	
	Action	Limit	Action	Limit	Action	Limit	Action	Limit	Action	Limit	Action	Limit
Dissolved Oxygen	0	0	0	0	0	0	0	0	0	0	0	0
pH	0	0	0	0	0	0	0	0	0	0	0	0
Temperature	-	0	-	0	-	0	-	0	-	0	-	0
Suspended Solids	0	0	0	0	0	0	0	0	0	0	0	0
Ammonia Nitrogen	0	0	0	0	0	0	0	0	0	0	0	0
<i>E. Coli</i>	0	0	0	0	0	0	0	0	0	0	0	0
BOD ₅	0	0	0	0	0	0	0	0	0	0	0	0
COD	0	0	0	0	0	0	0	0	0	0	0	0

Note: Assessment criteria applied to depth averaged results at each location.

- 2.22 Water temperatures measured ranged from 24.4 – 27.5 °C. The maximum daily variation between each station was 0.4 °C on 27 April 2006. The variation was within the AL Levels. Salinity measurements at all stations were below detection limit, indicating no intrusion of saline water was present in WRC. DO level at all stations were above the *Theme Park EIA* proposed standard of 4.2 mg/L.
- 2.23 BOD₅ levels at all stations were below detection limit while COD levels measured from 10 – 17 mg/L. Depth averaged results of both parameters complied with the standards proposed in the *Theme Park EIA* (5 and 30 mg/L respectively). The medians of SS measurements during the same period also observed to comply with the proposed standards (25 mg/L). Low levels of SS measurements (annual median all <2 mg/L) correlate with the low in-situ turbidity measurements (1.7 – 3.1 NTU).
- 2.24 Conductivity measured ranged from 94 to 201 µ S/cm, while minor variations in silicate concentration ranged from 0.8 to 1.8 was measured. The relatively constant range of conductivity indicated that a discharge or some other source of pollution was not present.
- 2.25 The unionised ammonia levels, derived from Ammonia Nitrogen, temperature, pH and salinity levels, were substantially lower than the proposed standard of 0.021 mg/L. Together with other measurements in terms of Total Nitrogen and Total Phosphorus, nutrient levels within the WRC were relatively low.
- 2.26 For heavy metals (Cu, Cr, Pb, Zn), majority of the readings were below the detection limit. All TBT readings were below the detection limit and AL Levels.
- 2.27 For chlorophyll-a, measurements recorded in the reporting period were still high but were lower than those recorded in the previous month. Higher chlorophyll-a concentration would be recorded when temperature and humidity were high. High chlorophyll-a recorded in the reporting period is thus a natural phenomena.
- 2.28 For *E.Coli*, majority of measurements were below the detection limit of 1 cfu/100mL. The geometric mean of last five readings at all monitoring locations were below the AL Levels.

3. ENVIRONMENTAL AUDIT

Implementation Status of Environmental Mitigation Measures

- 3.1 Site audit was carried out on a monthly basis to monitor environmental issues to ensure that all mitigation measures were implemented timely and properly.
- 3.2 Monthly site inspection was carried out on 12 May 2006. Environmental mitigation measures for water quality, waste management, landscape and visual, as recommended in the EIA report, Operational EM&A Plan and EP-01/097/2001/C were properly implemented. The findings of the site audit include:
- Water in the lake appeared clearer when comparing with the observation in March 2006.
 - No floating refuse was observed.
 - Further Environmental Permit was posted at vehicle site entrance.
- 3.3 A summary of the Environmental Mitigation Implementation Schedule (EMIS) is presented in Appendix G.

Status of Environmental Licensing and permitting

- 3.4 All permits/licences/notifications obtained as of the reporting period are summarised in Table 3.1

Table 3.1 Summary of Environmental Notification, Licensing and Permit Status

Permit No.	Valid Period		Description	Status
	From	To		
Environmental Permit				
EP-01/097/2001/C	19 Oct. 05	-	Operation of an approximately 32 ha water recreation centre with a 12 ha multi-function artificial lake, water-based and land-based recreational facilities and ancillary facilities	Valid
Chemical Waste Registration				
9499-973-H3095-01	29 Jul. 05	-	Theme Park at Penny's Bay	Valid

Implementation Status of Event and Action Plans

- 3.5 The Event and Action Plans for water quality are presented in Appendix H.
- 3.6 No exceedance of AL Levels for water quality was recorded.

Waste Management

- 3.7 Waste management of WRC was implemented as stipulated in the Waste Management Plan.
- 3.8 As Waste Management of WRC was undertaken as part of the overall Theme Park Resort waste management scheme, records of waste handling and disposal would be reported in the Theme Park EM&A report.

Implementation Status of Environmental Complaint Handling Procedures

- 3.9 Appendix I presents the environmental complaint flow diagram of the Project.
- 3.10 No complaint, summons or prosecution related to environmental issues was received or made against the Project in the reporting period.

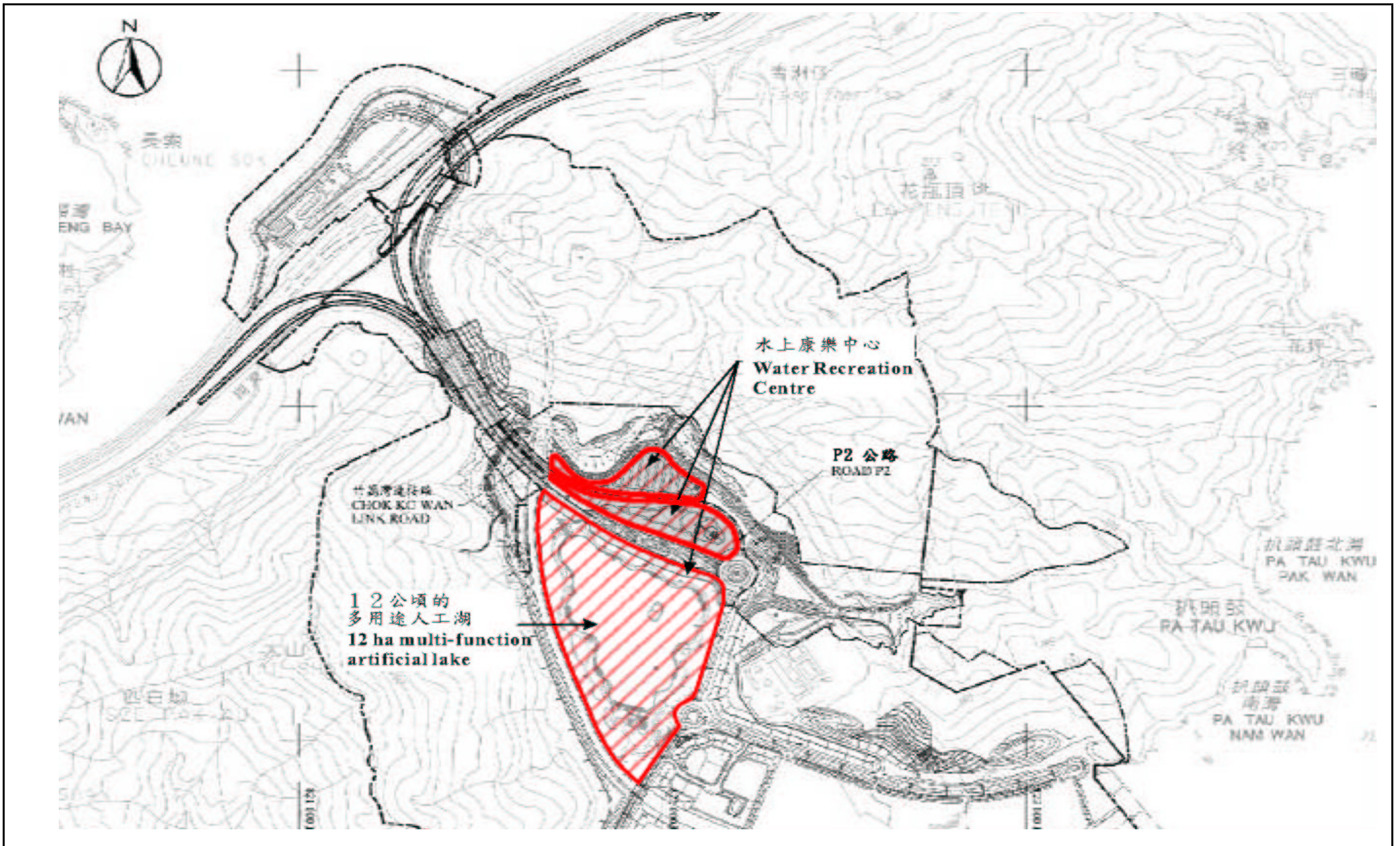
4. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

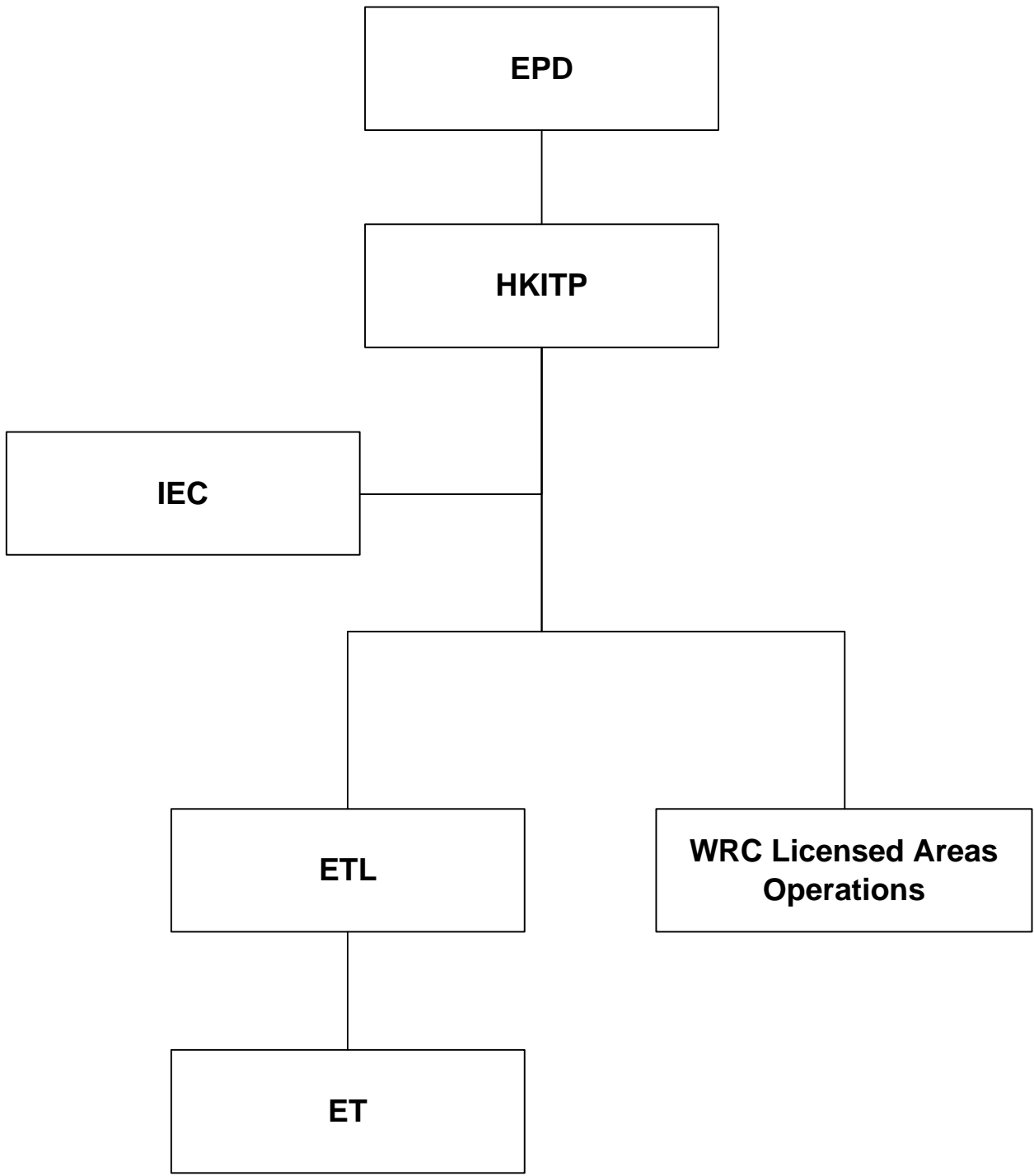
- 4.1 Environmental monitoring was performed between 16 April and 15 May 2006. All monitoring results in the reporting period were checked and reviewed.
- 4.2 All water quality measurements in the reporting period were below the Action and Limit (AL) Levels.
- 4.3 Environmental mitigation measures as recommended in the EIA report, Operational EM&A Plan and EP-01/097/2001/C were properly implemented.
- 4.4 No complaint, summon or prosecution related to environmental issues was made against the Project in the reporting period.

Recommendations

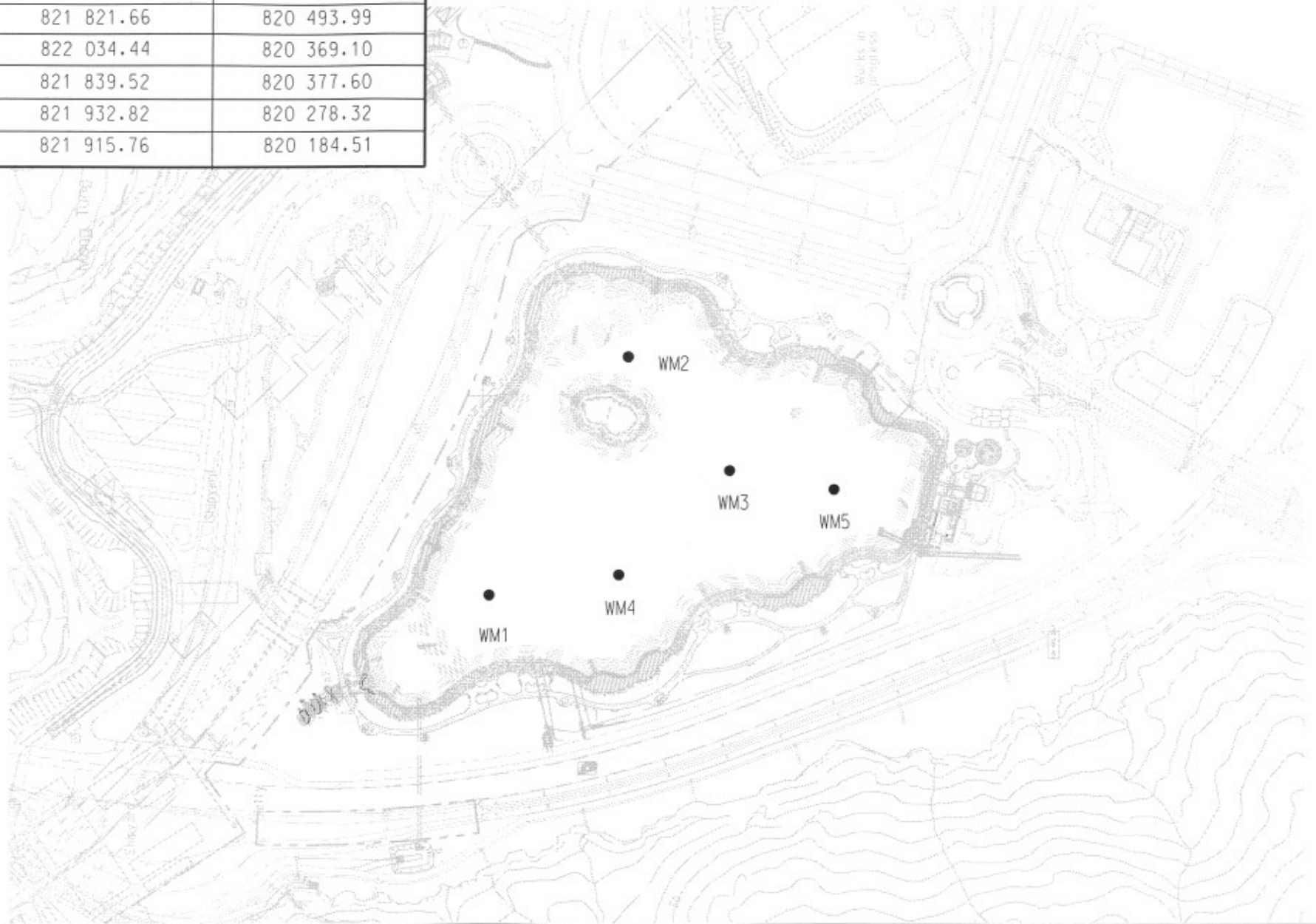
- 4.5 The operator of WRC is reminded to continue to implement measures as recommended in EIA Report and EP.



SCALE	N.T.S.	DATE	2005
CHECK	KCHC	DRAWN	LLMC
JOB NO.	S07105	FIGURE NO.	1.1
			Rev -



Location	HK Metric Grid E	HK Metric Grid N
WM1	821 821.66	820 493.99
WM2	822 034.44	820 369.10
WM3	821 839.52	820 377.60
WM4	821 932.82	820 278.32
WM5	821 915.76	820 184.51



MAUNSELL | AECOM

Maunsell Environmental
Management Consultants Ltd

FEP-01/097/2001/B
PROVISION OF ENVIRONMENTAL MONITORING & AUDIT SERVICES FOR WATER RECREATION CENTRE

LOCATIONS OF WATER QUALITY MONITORING STATIONS

SCALE	A4 1:5000	DATE	2005
CHECK	KCHC	DRAWN	YPK
JOB No.	S07105	DRAWING No.	2.1
		REV	-

Appendix A: Contacts of Key Environmental Staff

	<u>Name</u>	<u>Telephone</u>	<u>Fax</u>
<u>IEC</u>			
Mott MacDonald			
Independent Environmental Checker	Dr. Anne Watker-Zeris	2828 5757	2827 1823
<u>ET</u>			
Maunsell Environmental Management Consultants Limited			
Environmental Team Leader	Mr. Alan Kwok	2893 1551	2891 0305
Environmental Scientist	Ms. Florence Yuen	2893 1551	2891 0305

Appendix B – Action and Limit Levels

Action and Limit Levels for Water Quality Monitoring

Parameter, unit	Action	Limit
Dissolved Oxygen	<4.2 mg/L	<2.0 mg/L
pH	<6.3 or >8.5	<6 or >9
Temperature	Not applicable	Within a daily range of 2°C
Suspended Solids	>23.75 mg/L, measured as annual median	>25 mg/L, measured as annual median
Ammonia Nitrogen	>0.01995 mg/L for unionized form, as annual average	>0.021 mg/L for unionized form, as annual average
E. coli	>171 cfu per 100mL, geometric mean for last 5 measurements	>180 cfu per 100mL, geometric mean for last 5 measurements
5-day BOD	>4.75 mg/L	>5 mg/L
COD	>28.5 mg/L	>30 mg/L

Appendix C Calibration Details

Equipment Type	Equipment No.	Calibration Date	Next Calibration Date
HANNA pH Meter HI9023	W.003.05A	21 Feb. 2006	21 May 2006
Turbidimeter HACH 2100P	W.001.05	15 Mar. 2006	15 Jun. 2006
YSI Multimeter YSI 85D	W.015.02	21 Feb. 2006	21 May 2006

**Environmental Monitoring and Audit Services for Water Recreation Centre
Environmental Monitoring and Audit Schedule for April/May 2006**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
16-Apr	17-Apr	18-Apr	19-Apr	20-Apr	21-Apr	22-Apr
					Weekly Water Quality Monitoring	
23-Apr	24-Apr	25-Apr	26-Apr	27-Apr	28-Apr	29-Apr
				Weekly Water Quality Monitoring		
30-Apr	1-May	2-May	3-May	4-May	5-May	6-May
			Weekly Water Quality Monitoring			
7-May	8-May	9-May	10-May	11-May	12-May	13-May
		Weekly Water Quality Monitoring				
14-May	15-May	16-May	17-May	18-May	19-May	20-May
	Weekly Water Quality Monitoring				Monthly Site Inspection	

Water Quality Monitoring Results at WM1

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		In-situ Monitoring										Laboratory Analysis																
						Temperature (°C)		DO Saturation (%)		Turbidity (NTU)			pH			Dissolved Oxygen (mg/L)		Conductivity (mS/cm)		Salinity (g/L)		Copper (mg/L)		Chromium (mg/L)		Lead (mg/L)		Zinc (mg/L)				
						Value	Average	Value	Average	Value	Average	DA	Value	Average	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA			
21-Apr-06	Fine	Calm	9:02	Surface	1	24.5 24.5	24.5	72.6 72.8	72.7	2.1 2.2	2.2	2.5	8.2 8.2	8.2	8.2	8	8.3	107.0	108.0	<0.1	<0.1	1	<1	<1	<1	<1	<1	<10	<10			
				Middle	2.2	24.4 24.5	24.5	73.0 72.1	72.6	2.7 2.7	2.7		8.2 8.2	8.2		9		109.0		<0.1		<0.1		1		<1		<1		<1	<1	<10
				Bottom	3.4	24.5 24.4	24.5	67.6 70.4	69.0	2.6 2.5	2.6		8.2 8.2	8.2		8		109.0		<0.1		<0.1		<1		<1		<1		<1	<1	<10
27-Apr-06	Sunny	Calm	8:56	Surface	1	27.3 27.3	27.3	75.8 76.3	76.1	2.3 2.3	2.3	2.6	7.6 7.6	7.6	7.5	8	7.9	105.0	105.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10			
				Middle	2.2	27.1 27.1	27.1	76.7 76.1	76.4	2.7 2.8	2.8		7.5 7.4	7.5		8		106.0		<0.1		<0.1		<1		<1		<1		<1	<1	<10
				Bottom	3.5	27.0 26.9	27.0	76.4 77.2	76.8	2.6 2.5	2.6		7.4 7.5	7.5		8		105.0		<0.1		<0.1		1		<1		<1		<1	<1	<10
3-May-06	Cloudy	Calm	9:45	Surface	1	26.8 26.8	26.8	94.1 94.7	94.4	2.4 2.4	2.4	2.6	7.6 7.6	7.6	7.6	8	8.7	94.0	96.0	<0.1	<0.1	4	4.0	<1	<1	<1	<1	<10	<10			
				Middle	2.2	26.7 26.7	26.7	96.3 93.9	95.1	2.6 2.6	2.6		7.5 7.6	7.6		9		97.0		<0.1		<0.1		4		<1		<1		<1	<1	<10
				Bottom	3.4	26.6 26.7	26.7	93.8 93.5	93.7	2.7 2.8	2.8		7.5 7.5	7.5		9		96.0		<0.1		<0.1		4		<1		<1		<1	<1	<10
9-May-06	Sunny	Calm	8:54	Surface	1	27.3 27.1	27.2	96.3 95.5	95.9	2.6 2.7	2.7	2.7	7.5 7.6	7.6	7.7	8	8.2	101.0	101.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10			
				Middle	2.2	27.0 27.0	27.0	93.2 93.1	93.2	2.8 2.8	2.8		7.6 7.6	7.6		8		101.0		<0.1		<0.1		<1		<1		<1		<1	<1	<10
				Bottom	3.4	26.9 26.9	26.9	90.8 90.5	90.7	2.5 2.5	2.5		7.8 7.8	7.8		8		101.0		<0.1		<0.1		<1		<1		<1		<1	<1	<10
15-May-06	Fine	Calm	8:47	Surface	1	26.7 26.7	26.7	89.6 91.8	90.7	1.5 1.7	1.6	1.7	7.8 7.8	7.8	7.8	8	6.9	102.0	102.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10			
				Middle	2.2	26.6 26.6	26.6	90.6 92.1	91.4	1.7 1.6	1.7		7.7 7.7	7.7		7		103.0		<0.1		<0.1		<1		<1		<1		<1	<1	<10
				Bottom	3.4	26.7 26.6	26.7	80.4 81.2	80.8	1.8 2.0	1.9		7.8 7.8	7.8		5		102.0		<0.1		<0.1		<1		<1		<1		<1	<1	<10

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM1

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		Laboratory Analysis																						
						Tributyltin (ng Sn/L)		Suspended Solid (mg/L)			Total Nitrogen (mg/L)		Total Phosphorous (mg/L)		Silica (mg/L)		5-day BOD (mg/L)		COD (mg/L)		Ammonia Nitrogen (mg/L)		Unionised Ammonia (mg/L)	chlorophyll-a (mg/L)		E.Coli (cfu/100mL)		
						Value	DA	Value	DA	AM	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	AA	Value	DA	Value	DA	Value
21-Apr-06	Fine	Calm	9:02	Surface	1	<5		11.0			0.6		<0.02		1.8		<2		15.000		0.03			39		<1		
				Middle	2.2	<5	<5	7.0	8.0	<2.00	0.6	0.6	<0.02	<0.02	1.8	1.8	<2	<2	15.000	15.0	0.05	0.033	<0.00044	38	36.7	<1	<1	<1
				Bottom	3.4	<5		7.0			0.6		<0.02		1.8		<2		15.000		0.02			33		<1		
27-Apr-06	Sunny	Calm	8:56	Surface	1	<5		6.0			0.6		<0.02		1.6		<2		14.000		0.02			23		2		
				Middle	2.2	<5	<5	5.0	5.0	<2.00	0.6	0.6	<0.02	<0.02	1.6	1.6	<2	<2	13.000	13.0	0.02	0.027	<0.00045	27	24.5	1	<1	<1
				Bottom	3.5	<5		5.0			0.6		<0.02		1.6		<2		13.000		0.04			24		<1		
3-May-06	Cloudy	Calm	9:45	Surface	1	<5		5.0			0.6		<0.02		1.1		<2		13.000		0.03			20		1		
				Middle	2.2	<5	<5	6.0	5.0	<2.00	0.6	0.6	<0.02	<0.02	1.0	1.0	<2	<2	13.000	13.0	0.03	0.027	<0.00046	22	20.6	1	3.0	<1
				Bottom	3.4	<5		3.0			0.7		<0.02		1.0		<2		12.000		0.02			20		6		
9-May-06	Sunny	Calm	8:54	Surface	1	<5		4.0			0.5		<0.02		0.9		<2		11.000		0.04			12		<1		
				Middle	2.2	<5	<5	4.0	4.0	<2.00	0.5	0.5	<0.02	<0.02	0.9	0.9	<2	<2	13.000	13.0	0.02	0.040	<0.00049	13	12.6	<1	<1	<1
				Bottom	3.4	<5		4.0			0.6		<0.02		0.9		<2		14.000		0.06			13		<1		
15-May-06	Fine	Calm	8:47	Surface	1	<5		2.0			0.5		<0.02		0.8		<2		13.000		0.06			5		<1		
				Middle	2.2	<5	<5	2.0	2.0	<2.00	0.5	0.5	<0.02	<0.02	1.0	0.9	<2	<2	13.000	13.0	<0.01000	<0.05000	<0.00053	4	3.8	<1	<1	<1
				Bottom	3.4	<5		2.0			0.5		<0.02		0.9		<2		12.000		0.08			3		<1		

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM2

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		In-situ Monitoring										Laboratory Analysis															
						Temperature (°C)		DO Saturation (%)		Turbidity (NTU)			pH			Dissolved Oxygen (mg/L)		Conductivity (mS/cm)		Salinity (g/L)		Copper (mg/L)		Chromium (mg/L)		Lead (mg/L)		Zinc (mg/L)			
						Value	Average	Value	Average	Value	Average	DA	Value	Average	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA
21-Apr-06	Fine	Calm	9:20	Surface	1	24.4 24.4	24.4	68.5 70.2	69.4	2.8 2.7	2.8	2.7	8.2 8.2	8.2	8.2	9	8.7	112.0	110.0	<0.1	<0.1	1	1.0	<1	<1	<1	<1	<10	<10		
				Middle	2.3	24.4 24.4	24.4	67.3 69.7	68.5	2.7 2.7	2.7		8.2 8.2	8.2		9		109.0		<0.1		<0.1		1		<1		<1		<1	<10
				Bottom	3.6	24.5 24.4	24.5	69.7 69.4	69.6	2.7 2.7	2.7		8.2 8.2	8.2		9		108.0		<0.1		<0.1		1		<1		<1		<1	<10
27-Apr-06	Sunny	Calm	9:14	Surface	1	27.6 27.6	27.6	73.8 73.0	73.4	2.3 2.3	2.3	2.3	7.5 7.6	7.6	7.5	7	7.0	106.0	106.0	<0.1	<0.1	1	1.0	<1	<1	<1	<1	<10	<10		
				Middle	2.3	27.4 27.3	27.4	72.6 72.1	72.4	2.1 2.1	2.1		7.4 7.4	7.4		7		106.0		<0.1		<0.1		2		<1		<1		<1	<10
				Bottom	3.6	27.3 27.2	27.3	72.5 73.4	73.0	2.3 2.4	2.4		7.4 7.4	7.4		7		106.0		<0.1		<0.1		1		<1		<1		<1	<10
3-May-06	Cloudy	Calm	9:57	Surface	1	26.7 26.7	26.7	90.6 91.7	91.2	3.0 3.0	3.0	2.9	7.6 7.5	7.6	7.6	8	8.4	97.0	96.0	<0.1	<0.1	4	4.0	<1	<1	<1	<1	<10	<10		
				Middle	2.3	26.6 26.7	26.7	92.1 93.0	92.6	2.8 2.7	2.8		7.5 7.6	7.6		8		96.0		<0.1		<0.1		4		<1		<1		<1	<10
				Bottom	3.5	26.6 26.6	26.6	91.1 91.7	91.4	2.8 2.7	2.8		7.5 7.5	7.5		8		96.0		<0.1		<0.1		4		<1		<1		<1	<10
9-May-06	Sunny	Calm	9:12	Surface	1	26.9 26.9	26.9	94.0 94.6	94.3	2.9 2.8	2.9	3.0	7.3 7.2	7.3	7.4	8	8.0	99.0	102.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.2	26.9 26.7	26.8	93.8 91.7	92.8	2.8 3.0	2.9		7.4 7.4	7.4		8		99.0		<0.1		<0.1		<1		<1		<1		<1	<10
				Bottom	3.5	26.6 26.6	26.6	91.3 91.4	91.4	3.0 3.1	3.1		7.6 7.6	7.6		8		108.0		<0.1		<0.1		<1		<1		<1		<1	<10
15-May-06	Fine	Calm	9:05	Surface	1	26.6 26.6	26.6	83.6 84.7	84.2	1.7 1.8	1.8	2.0	7.7 7.8	7.8	7.8	6	6.4	201.0	136.0	<0.1	<0.1	2	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.4	26.5 26.6	26.6	82.1 83.2	82.7	1.9 2.1	2.0		7.7 7.6	7.7		7		104.0		<0.1		<0.1		<1		<1		<1		<1	<10
				Bottom	3.7	26.4 26.5	26.5	80.2 81.1	80.7	2.1 2.3	2.2		7.8 7.7	7.8		7		103.0		<0.1		<0.1		<1		<1		<1		<1	<10

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM2

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		Laboratory Analysis																						
						Tributyltin (ng Sn/L)		Suspended Solid (mg/L)			Total Nitrogen (mg/L)		Total Phosphorous (mg/L)		Silica (mg/L)		5-day BOD (mg/L)		COD (mg/L)		Ammonia Nitrogen (mg/L)		Unionised Ammonia (mg/L)	chlorophyll-a (mg/L)		E.Coli (cfu/100mL)		
						Value	DA	Value	DA	AM	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	AA	Value	DA	Value	DA	GM
21-Apr-06	Fine	Calm	9:20	Surface	1	<5		6.0			0.6		<0.02		1.7		<2		15.000		0.03			32		<1		
				Middle	2.3	<5	<5	7.0	6.0	<2.00	0.7	0.7	<0.02	<0.02	1.7	1.7	<2	<2	15.000	16.0	0.03	0.030	<0.00032	30	32.8	<1	<1	<1
				Bottom	3.6	<5		5.0			0.7		<0.02		1.7		<2		17.000		0.03			36		<1		
27-Apr-06	Sunny	Calm	9:14	Surface	1	<5		6.0			0.6		<0.02		1.6		<2		15.000		0.09			24		1		
				Middle	2.3	<5	<5	6.0	6.0	<2.00	0.6	0.6	<0.02	<0.02	1.6	1.6	<2	<2	10.000	12.0	0.09	0.083	<0.00036	26	26.1	<1	<1	<1
				Bottom	3.6	<5		6.0			0.6		<0.02		1.6		<2		11.000		0.07			29		<1		
3-May-06	Cloudy	Calm	9:57	Surface	1	<5		4.0			0.7		<0.02		1.1		<2		12.000		0.02			19		3		
				Middle	2.3	<5	<5	4.0	4.0	<2.00	0.6	0.6	<0.02	<0.02	1.0	1.0	<2	<2	12.000	12.0	0.03	0.033	<0.00038	20	20.5	<1	<2	<1
				Bottom	3.5	<5		4.0			0.5		<0.02		1.0		<2		13.000		0.05			23		1		
9-May-06	Sunny	Calm	9:12	Surface	1	<5		4.0			0.5		<0.02		1.0		<2		12.000		0.02			14		<1		
				Middle	2.2	<5	<5	3.0	4.0	<2.00	0.5	0.5	<0.02	<0.02	1.0	1.0	<2	<2	12.000	12.0	0.02	0.017	<0.00038	13	12.9	<1	<1	<1
				Bottom	3.5	<5		4.0			0.4		<0.02		0.9		<2		13.000		0.01			12		<1		
15-May-06	Fine	Calm	9:05	Surface	1	<5		3.0			0.5		<0.02		1.1		<2		14.000		0.02			4		1		
				Middle	2.4	<5	<5	3.0	3.0	<2.00	0.6	0.5	<0.02	<0.02	0.9	1.0	<2	<2	13.000	13.0	0.01	0.037	<0.00041	4	4.0	1	<1	<1
				Bottom	3.7	<5		2.0			0.5		<0.02		1.0		<2		13.000		0.08			5		<1		

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM3

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		In-situ Monitoring										Laboratory Analysis															
						Temperature (°C)		DO Saturation (%)		Turbidity (NTU)			pH			Dissolved Oxygen (mg/L)		Conductivity (mS/cm)		Salinity (g/L)		Copper (mg/L)		Chromium (mg/L)		Lead (mg/L)		Zinc (mg/L)			
						Value	Average	Value	Average	Value	Average	DA	Value	Average	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA
21-Apr-06	Fine	Calm	9:37	Surface	1	24.5 24.4	24.5	67.5 69.4	68.5	2.7 2.8	2.8	2.8	8.3 8.3	8.3	8.3	9	8.7	108.0	108.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.3	24.5 24.5	24.5	68.7 67.3	68.0	2.8 2.8	2.8		8.3 8.3	8.3		9		108.0		<0.1		<1		1		<1		<1		<1	<10
				Bottom	3.6	24.5 24.4	24.5	71.0 69.2	70.1	2.6 2.7	2.7		8.3 8.3	8.3		9		109.0		<0.1		<1		1		<1		<1		<1	<10
27-Apr-06	Sunny	Calm	9:31	Surface	1	27.6 27.6	27.6	74.0 73.2	73.6	2.9 2.9	2.9	3.0	7.8 7.8	7.8	7.8	7	7.7	106.0	106.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.2	27.4 27.3	27.4	75.6 73.7	74.7	3.1 3.0	3.1		7.8 7.8	7.8		8		105.0		<0.1		<1		<1		<1		<1		<10	
				Bottom	3.5	27.1 26.9	27.0	75.5 72.1	73.8	2.9 2.9	2.9		7.8 7.9	7.9		8		106.0		<0.1		<1		<1		<1		<1		<10	
3-May-06	Cloudy	Calm	10:10	Surface	1	26.6 26.6	26.6	89.4 90.4	89.9	2.5 2.6	2.6	2.5	7.7 7.7	7.7	7.7	9	8.6	95.0	96.0	<0.1	<0.1	4	4.0	<1	<1	<1	<1	<10	<10		
				Middle	2.2	26.6 26.5	26.6	88.7 89.2	89.0	2.5 2.5	2.5		7.7 7.7	7.7		8		96.0		<0.1		<1		4		<1		<1		<10	
				Bottom	3.3	26.5 26.5	26.5	90.2 88.6	89.4	2.3 2.2	2.3		7.7 7.7	7.7		9		97.0		<0.1		<1		4		<1		<1		<10	
9-May-06	Sunny	Calm	9:30	Surface	1	27.2 27.3	27.3	94.7 94.6	94.7	2.5 2.5	2.5	2.5	7.5 7.5	7.5	7.5	8	8.1	99.0	100.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.3	27.0 27.0	27.0	92.5 92.7	92.6	2.2 2.3	2.3		7.3 7.2	7.3		8		100.0		<0.1		<1		<1		<1		<10			
				Bottom	3.6	27.0 26.9	27.0	91.3 91.0	91.2	2.6 2.6	2.6		7.6 7.6	7.6		8		100.0		<0.1		<1		<1		<1		<10			
15-May-06	Fine	Calm	9:22	Surface	1	26.6 26.7	26.7	87.2 86.4	86.8	2.2 2.3	2.3	2.2	7.8 7.8	7.8	7.7	8	7.9	105.0	103.0	<0.1	<0.1	1	<1	<1	<1	<1	<1	12.0	<11		
				Middle	2.3	26.6 26.7	26.7	86.9 85.1	86.0	2.3 2.3	2.3		7.8 7.7	7.8		9		102.0		<0.1		<1		<1		<1		<10			
				Bottom	3.5	26.5 26.6	26.6	88.1 86.7	87.4	1.9 2.1	2.0		7.6 7.6	7.6		7		102.0		<0.1		<1		<1		<1		<10			

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM3

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		Laboratory Analysis																						
						Tributyltin (ng Sn/L)		Suspended Solid (mg/L)			Total Nitrogen (mg/L)		Total Phosphorous (mg/L)		Silica (mg/L)		5-day BOD (mg/L)		COD (mg/L)		Ammonia Nitrogen (mg/L)		Unionised Ammonia (mg/L)	chlorophyll-a (mg/L)		E.Coli (cfu/100mL)		
						Value	DA	Value	DA	AM	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	AA	Value	DA	Value	DA	GM
21-Apr-06	Fine	Calm	9:37	Surface	1	<5		7.0			0.7		<0.02		1.6		<2		14.000		0.04			36		<1		
				Middle	2.3	<5	<5	6.0	7.0	<2.00	0.7	0.7	<0.02	<0.02	1.7	1.6	<2	<2	14.000	14.0	0.03	0.037	<0.00033	34	32.8	<1	<1	<1
				Bottom	3.6	<5		7.0			0.7		<0.02		1.6		<2		15.000		0.04			29		<1		
27-Apr-06	Sunny	Calm	9:31	Surface	1	<5		6.0			0.6		<0.02		1.5		<2		10.000		0.05			25		1		
				Middle	2.2	<5	<5	6.0	6.0	<2.00	0.6	0.6	<0.02	<0.02	1.7	1.6	<2	<2	11.000	11.0	0.01	0.027	<0.00036	24	24.6	3	3.0	<1
				Bottom	3.5	<5		5.0			0.6		<0.02		1.7		<2		11.000		0.02			25		4		
3-May-06	Cloudy	Calm	10:10	Surface	1	<5		4.0			0.5		<0.02		1.0		<2		13.000		0.06			20		1		
				Middle	2.2	<5	<5	5.0	4.0	<2.00	0.4	0.4	<0.02	<0.02	1.0	1.0	<2	<2	13.000	13.0	0.05	0.047	<0.00040	22	21.6	<1	<1	<1
				Bottom	3.3	<5		3.0			0.4		<0.02		1.0		<2		12.000		0.03			23		1		
9-May-06	Sunny	Calm	9:30	Surface	1	<5		3.0			0.5		<0.02		0.9		<2		13.000		0.04			12		<1		
				Middle	2.3	<5	<5	3.0	3.0	<2.00	0.5	0.5	<0.02	<0.02	0.9	0.9	<2	<2	14.000	13.0	0.02	<0.02333	<0.00040	13	12.2	<1	<1	<1
				Bottom	3.6	<5		3.0			0.4		<0.02		0.9		<2		13.000		<0.01000			11		<1		
15-May-06	Fine	Calm	9:22	Surface	1	<5		2.0			0.5		<0.02		1.0		<2		12.000		<0.01000			4		<1		
				Middle	2.3	<5	<5	2.0	2.0	<2.00	0.7	0.6	<0.02	<0.02	1.0	1.0	<2	<2	12.000	12.0	0.02	<0.01333	<0.00040	5	4.4	<1	<1	<1
				Bottom	3.5	<5		2.0			0.5		<0.02		0.9		<2		12.000		<0.01000			4		<1		

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM4

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		In-situ Monitoring										Laboratory Analysis														
						Temperature (°C)		DO Saturation (%)		Turbidity (NTU)			pH			Dissolved Oxygen (mg/L)		Conductivity (mS/cm)		Salinity (g/L)		Copper (mg/L)		Chromium (mg/L)		Lead (mg/L)		Zinc (mg/L)		
						Value	Average	Value	Average	Value	Average	DA	Value	Average	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	
21-Apr-06	Fine	Calm	9:52	Surface	1	24.4 24.4	24.4	70.5 72.3	71.4	2.7 2.7	2.7	2.6	8.3 8.3	8.3	8.3	8	8.5	106.0	108.0	<0.1	<0.1	1	<1	<1	<1	<1	<1	<10	<10	
				Middle	2.3	24.4 24.5	24.5	71.9 71.7	71.8	2.7 2.7	2.7		8.3 8.3	8.3		9		109.0		<0.1		<1		<1		<1		<1		<10
				Bottom	3.6	24.4 24.5	24.5	70.3 70.3	70.7	2.5 2.5	2.5		8.3 8.3	8.3		9		108.0		<0.1		<1		<1		<1		<10		
27-Apr-06	Sunny	Calm	9:46	Surface	1	28.0 28.1	28.1	73.4 75.4	74.4	2.6 2.7	2.7	2.7	7.7 7.7	7.7	7.7	9	8.7	105.0	106.0	<0.1	<0.1	1	1.0	<1	<1	<1	<1	<10	<10	
				Middle	2.3	27.6 27.3	27.5	70.1 72.3	71.2	2.7 2.8	2.8		7.7 7.7	7.7		8		106.0		<0.1		<1		2		<1		<1		<10
				Bottom	3.6	27.0 26.9	27.0	69.6 70.5	70.1	2.6 2.5	2.6		7.7 7.7	7.7		9		106.0		<0.1		<1		1		<1		<1		<10
3-May-06	Cloudy	Calm	10:23	Surface	1	26.7 26.8	26.8	93.6 94.0	93.8	2.7 2.8	2.8	2.7	7.6 7.6	7.6	7.6	9	8.6	97.0	97.0	<0.1	<0.1	4	4.0	<1	<1	<1	<1	<10	<10	
				Middle	2.3	26.7 26.7	26.7	94.2 92.1	93.2	2.6 2.5	2.6		7.6 7.6	7.6		9		97.0		<0.1		<1		4		<1		<1		<10
				Bottom	3.5	26.7 26.7	26.7	95.1 93.9	94.5	2.6 2.6	2.6		7.5 7.6	7.6		9		97.0		<0.1		<1		4		<1		<1		<10
9-May-06	Sunny	Calm	9:45	Surface	1	27.4 27.2	27.3	93.6 91.8	92.7	2.4 2.4	2.4	2.3	7.7 7.8	7.8	7.8	8	8.2	99.0	100.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10	
				Middle	2.3	27.0 26.8	26.9	92.0 91.5	91.8	2.2 2.3	2.3		7.7 7.8	7.8		8		100.0		<0.1		<1		<1		<1		<10		
				Bottom	3.7	26.8 26.9	26.9	90.3 90.0	90.2	2.2 2.3	2.3		7.8 7.8	7.8		8		100.0		<0.1		<1		<1		<1		<10		
15-May-06	Fine	Calm	9:38	Surface	1	26.4 26.5	26.5	84.3 88.2	86.3	2.5 2.3	2.4	2.3	7.5 7.5	7.5	7.6	7	7.6	104.0	103.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10	
				Middle	2.3	26.5 26.6	26.6	85.0 86.3	85.7	2.3 2.3	2.3		7.6 7.7	7.7		7		103.0		<0.1		<1		<1		<1		<10		
				Bottom	3.6	26.4 26.4	26.4	86.1 85.0	85.6	2.1 2.1	2.1		7.6 7.7	7.7		8		103.0		<0.1		<1		<1		<1		<10		

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM4

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		Laboratory Analysis																						
						Tributyltin (ng Sn/L)		Suspended Solid (mg/L)			Total Nitrogen (mg/L)		Total Phosphorous (mg/L)		Silica (mg/L)		5-day BOD (mg/L)		COD (mg/L)		Ammonia Nitrogen (mg/L)		Unionised Ammonia (mg/L)	chlorophyll-a (mg/L)		E.Coli (cfu/100mL)		
						Value	DA	Value	DA	AM	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	AA	Value	DA	Value	DA	GM
21-Apr-06	Fine	Calm	9:52	Surface	1	<5		7.0			0.7		<0.02		1.6		<2		12.000		0.04			38		<1		
				Middle	2.3	<5	<5	7.0	7.0	<2.00	0.7	0.7	<0.02	<0.02	1.7	1.7	<2	<2	15.000	14.0	0.02	0.027	<0.00031	36	35.4	<1	<1	<1
				Bottom	3.6	<5		7.0			0.7		<0.02		1.7		<2		15.000		0.02			33		<1		
27-Apr-06	Sunny	Calm	9:46	Surface	1	<5		5.0			0.6		<0.02		1.6		<2		11.000		0.05			28		<1		
				Middle	2.3	<5	<5	5.0	5.0	<2.00	0.6	0.6	<0.02	<0.02	1.5	1.5	<2	<2	13.000	12.0	0.07	0.047	<0.00035	24	26.1	<1	<1	<1
				Bottom	3.6	<5		6.0			0.6		<0.02		1.5		<2		12.000		0.02			27		<1		
3-May-06	Cloudy	Calm	10:23	Surface	1	<5		4.0			0.4		<0.02		1.0		<2		13.000		0.08			23		<1		
				Middle	2.3	<5	<5	3.0	4.0	<2.00	0.4	0.4	<0.02	<0.02	1.1	1.1	<2	<2	13.000	13.0	0.03	0.047	<0.00038	24	24.3	1	<2	<1
				Bottom	3.5	<5		5.0			0.5		<0.02		1.1		<2		14.000		0.03			26		3		
9-May-06	Sunny	Calm	9:45	Surface	1	<5		3.0			0.4		<0.02		0.9		<2		12.000		0.01			12		<1		
				Middle	2.3	<5	<5	3.0	3.0	<2.00	0.4	0.4	<0.02	<0.02	0.9	0.9	<2	<2	14.000	13.0	0.06	0.033	<0.00041	13	12.6	<1	<1	<1
				Bottom	3.7	<5		3.0			0.5		<0.02		0.9		<2		13.000		0.03			13		<1		
15-May-06	Fine	Calm	9:38	Surface	1	<5		3.0			0.4		<0.02		0.9		<2		12.000		<0.01000			4		<1		
				Middle	2.3	<5	<5	2.0	3.0	<2.00	0.4	0.4	<0.02	<0.02	0.9	1.0	<2	<2	13.000	12.0	<0.01000	<0.01000	<0.00040	4	4.2	<1	<1	<1
				Bottom	3.6	<5		3.0			0.5		<0.02		1.0		<2		12.000		<0.01000			4		<1		

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

Water Quality Monitoring Results at WM5

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		In-situ Monitoring											Laboratory Analysis														
						Temperature (°C)		DO Saturation (%)		Turbidity (NTU)			pH			Dissolved Oxygen (mg/L)		Conductivity (mS/cm)		Salinity (g/L)		Copper (mg/L)		Chromium (mg/L)		Lead (mg/L)		Zinc (mg/L)			
						Value	Average	Value	Average	Value	Average	DA	Value	Average	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA		
21-Apr-06	Fine	Calm	10:06	Surface	1	24.4	24.4	70.6	70.4	2.7	2.8	2.8	8.3	8.3	8.3	9	9.1	108.0	108.0	<0.1	<0.1	1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.3	24.5	24.5	72.6	72.0	2.7	2.8		8.3	8.3		10		107.0		<0.1		<1		1		<1		<1		<1	<10
				Bottom	3.6	24.5	24.5	72.3	71.4	2.7	2.7		8.3	8.3		9		110.0		<0.1		<1		<1		<1		<10			
27-Apr-06	Sunny	Calm	10:02	Surface	1	27.2	27.3	78.3	76.5	2.1	2.1	2.5	7.5	7.5	7.5	9	8.2	106.0	106.0	<0.1	<0.1	1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.3	26.9	27.0	73.6	72.6	2.6	2.6		7.6	7.6		8		106.0		<0.1		<1		1		<1		<1		<1	<10
				Bottom	3.6	26.8	27.0	72.7	71.7	2.8	2.9		7.3	7.4		8		106.0		<0.1		<1		<1		<1		<10			
3-May-06	Cloudy	Calm	10:30	Surface	1	26.9	27.0	92.1	91.6	2.9	3.0	3.1	7.6	7.6	7.6	9	8.8	98.0	97.0	<0.1	<0.1	4	4.0	<1	<1	<1	<1	<10	<10		
				Middle	2.3	26.9	26.9	89.6	88.4	3.1	3.1		7.6	7.6		9		99.0		<0.1		<1		4		<1		<1		<1	<10
				Bottom	3.6	26.8	26.9	87.1	86.6	3.1	3.1		7.6	7.6		8		94.0		<0.1		<1		4		<1		<1		<10	
9-May-06	Sunny	Calm	9:59	Surface	1	27.3	27.3	92.6	92.8	2.5	2.5	2.7	7.3	7.3	7.4	8	8.4	98.0	99.0	<0.1	<0.1	<1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.3	27.0	27.1	91.7	90.6	2.7	2.8		7.4	7.3		8		99.0		<0.1		<1		<1		<1		<1		<10	
				Bottom	3.6	26.8	26.8	88.6	88.6	2.7	2.8		7.5	7.5		9		100.0		<0.1		<1		<1		<1		<10			
15-May-06	Fine	Calm	9:51	Surface	1	26.2	26.3	79.7	80.4	1.8	1.8	1.9	7.7	7.7	7.8	7	7.4	102.0	103.0	<0.1	<0.1	1	<1	<1	<1	<1	<1	<10	<10		
				Middle	2.3	26.4	26.4	80.2	81.4	1.9	2.0		7.8	7.7		7		104.0		<0.1		<1		<1		<1		<1		<10	
				Bottom	3.6	26.4	26.4	81.3	82.3	1.8	1.8		7.8	7.9		8		103.0		<0.1		<1		<1		<1		<10			

Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

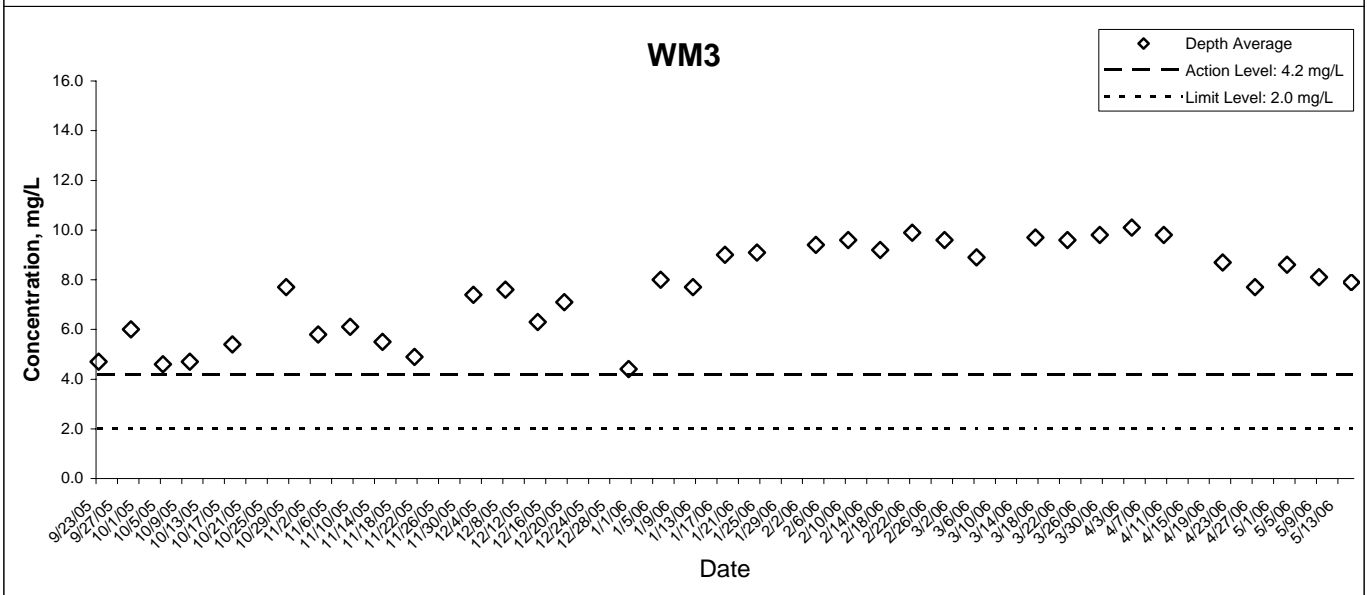
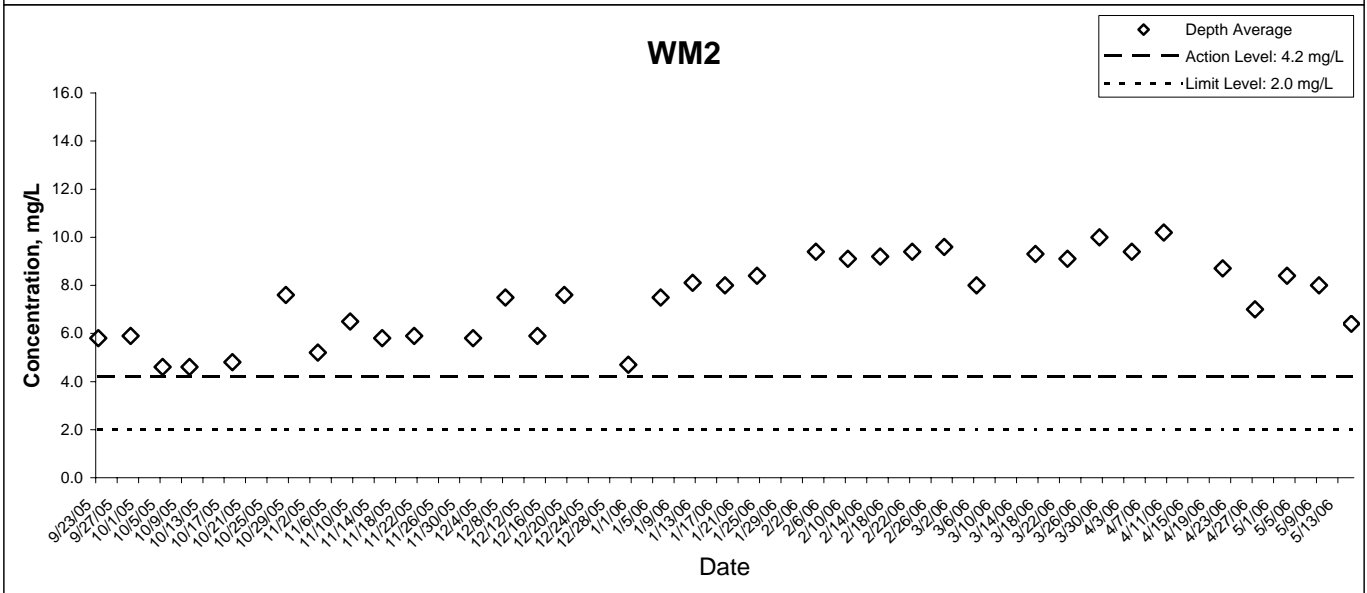
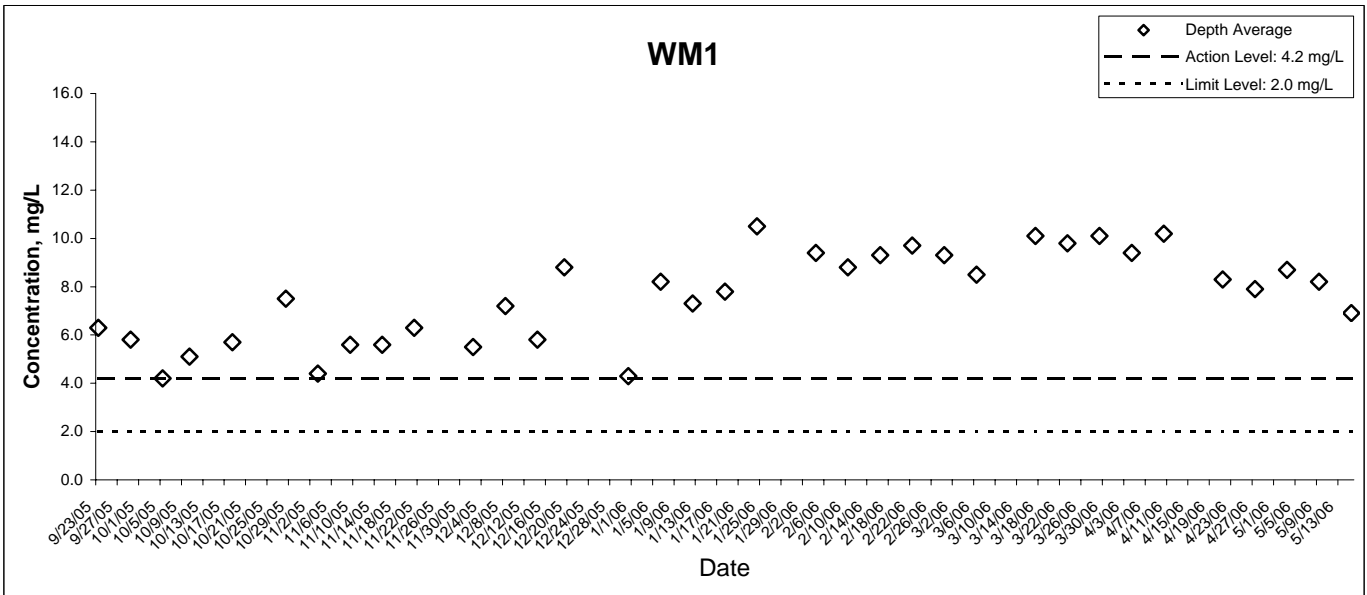
Water Quality Monitoring Results at WM5

Date	Weather Condition	Lake Condition	Sampling Time	Depth (m)		Laboratory Analysis																						
						Tributyltin (ng Sn/L)		Suspended Solid (mg/L)			Total Nitrogen (mg/L)		Total Phosphorous (mg/L)		Silica (mg/L)		5-day BOD (mg/L)		COD (mg/L)		Ammonia Nitrogen (mg/L)		Unionised Ammonia (mg/L)	chlorophyll-a (mg/L)		E.Coli (cfu/100mL)		
						Value	DA	Value	DA	AM	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	Value	DA	AA	Value	DA	Value	DA	Value
21-Apr-06	Fine	Calm	10:06	Surface	1	<5		5.0			0.7		<0.02		1.7		<2		14.000		0.06			30		<1		
				Middle	2.3	<5	<5	6.0	6.0	<2.00	0.6	0.6	<0.02	<0.02	1.8	1.7	<2	<2	14.000	14.0	0.04	0.050	<0.00035	31	29.4	<1	<1	<1
				Bottom	3.6	<5		7.0			0.6		<0.02		1.7		<2		15.000		0.05			28		<1		
27-Apr-06	Sunny	Calm	10:02	Surface	1	<5		5.0			0.6		<0.02		1.5		<2		14.000		0.04			26		<1		
				Middle	2.3	<5	<5	5.0	5.0	<2.00	0.6	0.6	<0.02	<0.02	1.5	1.5	<2	<2	14.000	14.0	0.06	0.053	<0.00037	24	26.1	<1	<1	<1
				Bottom	3.6	<5		6.0			0.5		<0.02		1.5		<2		13.000		0.06			28		<1		
3-May-06	Cloudy	Calm	10:30	Surface	1	<5		5.0			0.4		<0.02		1.1		<2		13.000		0.02			26		2		
				Middle	2.3	<5	<5	5.0	5.0	<2.00	0.4	0.4	<0.02	<0.02	1.1	1.1	<2	<2	12.000	12.0	0.02	0.027	<0.00039	24	24.5	<1	<1	<1
				Bottom	3.6	<5		4.0			0.4		<0.02		1.1		<2		12.000		0.04			24		1		
9-May-06	Sunny	Calm	9:59	Surface	1	<5		3.0			0.5		<0.02		0.9		<2		13.000		0.05			13		<1		
				Middle	2.3	<5	<5	4.0	4.0	<2.00	0.5	0.5	<0.02	<0.02	0.9	0.9	<2	<2	13.000	14.0	0.05	0.037	<0.00039	13	13.1	<1	<1	<1
				Bottom	3.6	<5		4.0			0.5		<0.02		0.9		<2		15.000		0.01			13		<1		
15-May-06	Fine	Calm	9:51	Surface	1	<5		2.0			0.7		<0.02		0.9		<2		12.000		0.04			5		<1		
				Middle	2.3	<5	<5	2.0	2.0	<2.00	0.4	0.5	<0.02	<0.02	0.9	0.9	<2	<2	12.000	12.0	<0.01000	<0.02000	<0.00040	3	4.0	1	<1	<1
				Bottom	3.6	<5		3.0			0.5		<0.02		1.0		<2		12.000		0.01			4		<1		

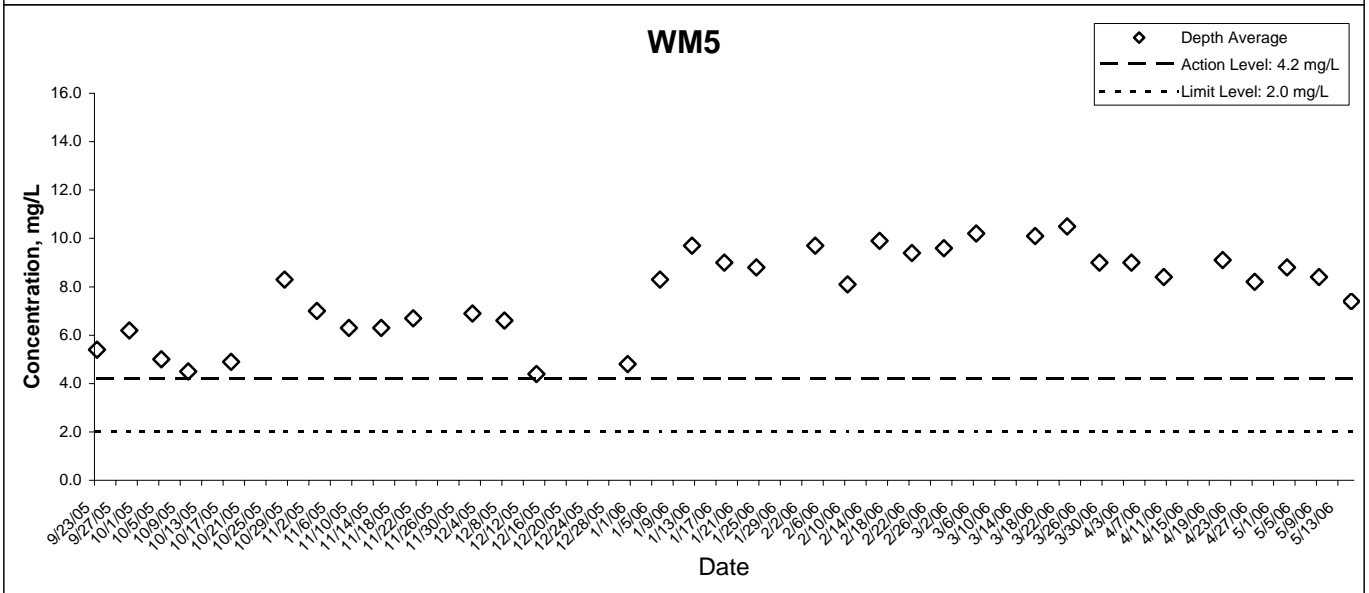
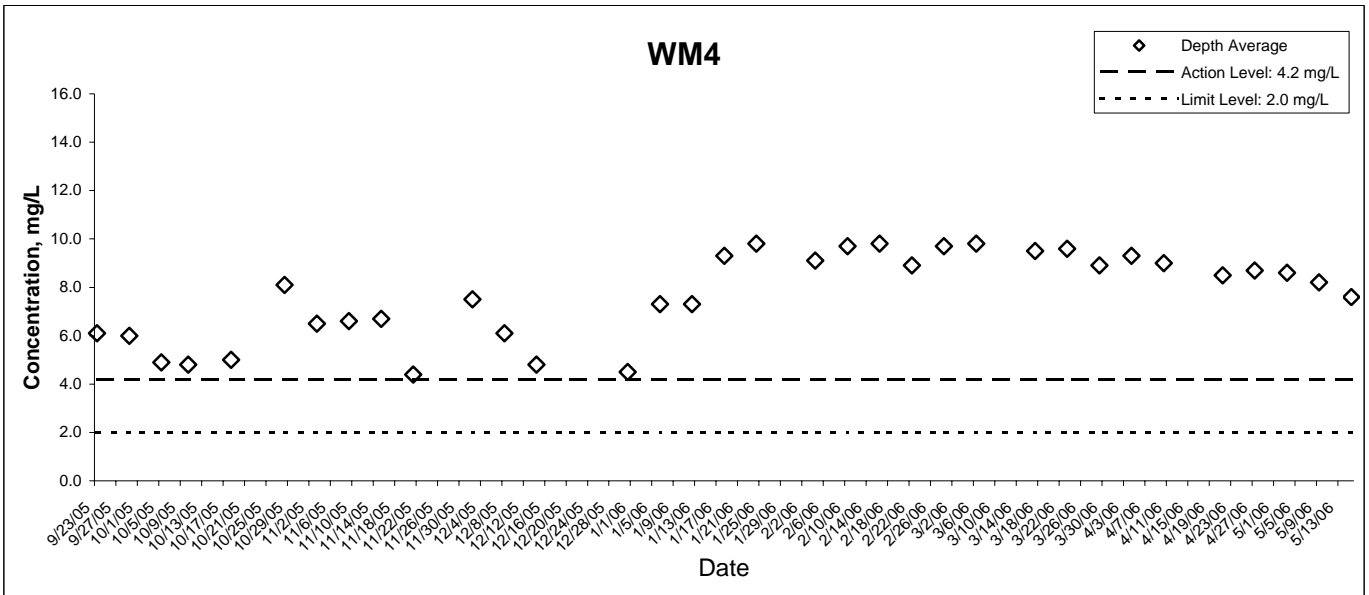
Note:
 Lake Condition - Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher
 DA - Depth Average
 AA - Annual Average
 AM - Annual Median
 GM - Geometric Mean for last 5 measurements

Remarks: * Calm: Small or no wave; Moderate: Between calm and rough; Rough : White capped or rougher

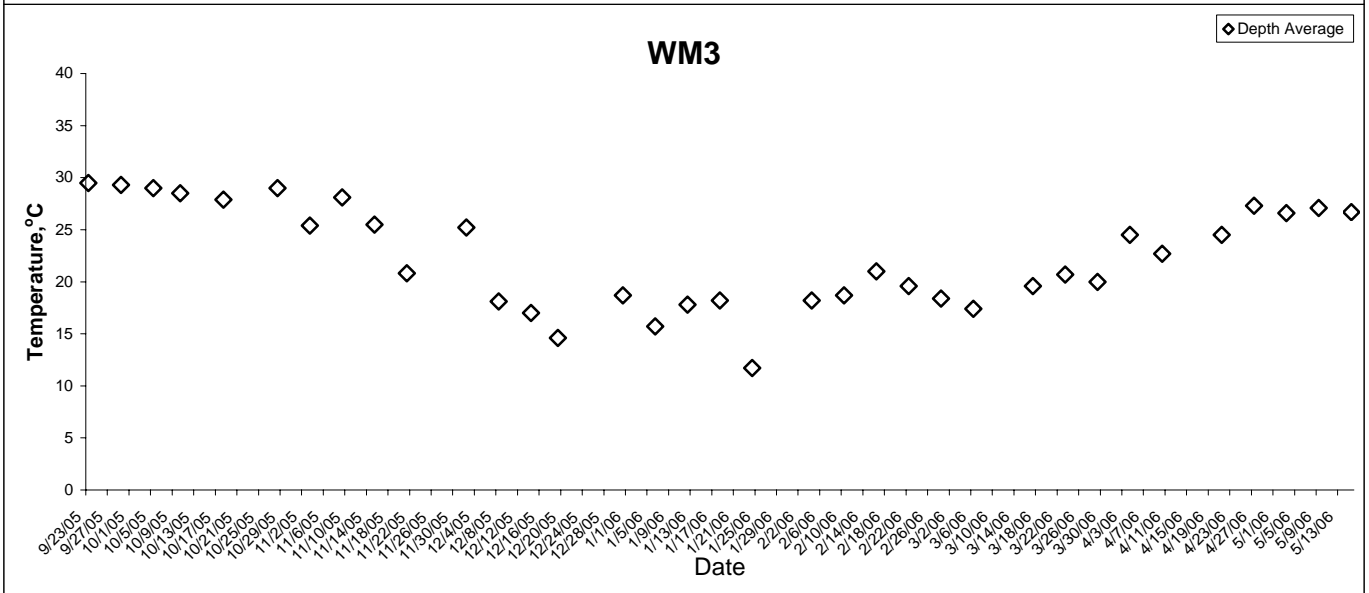
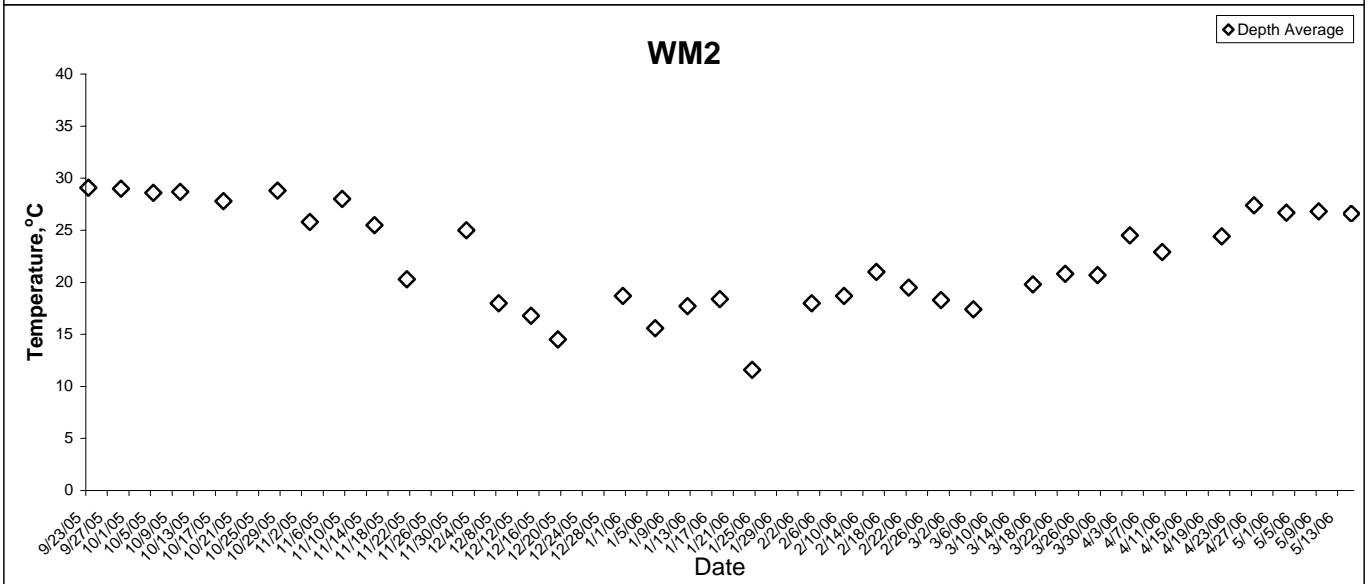
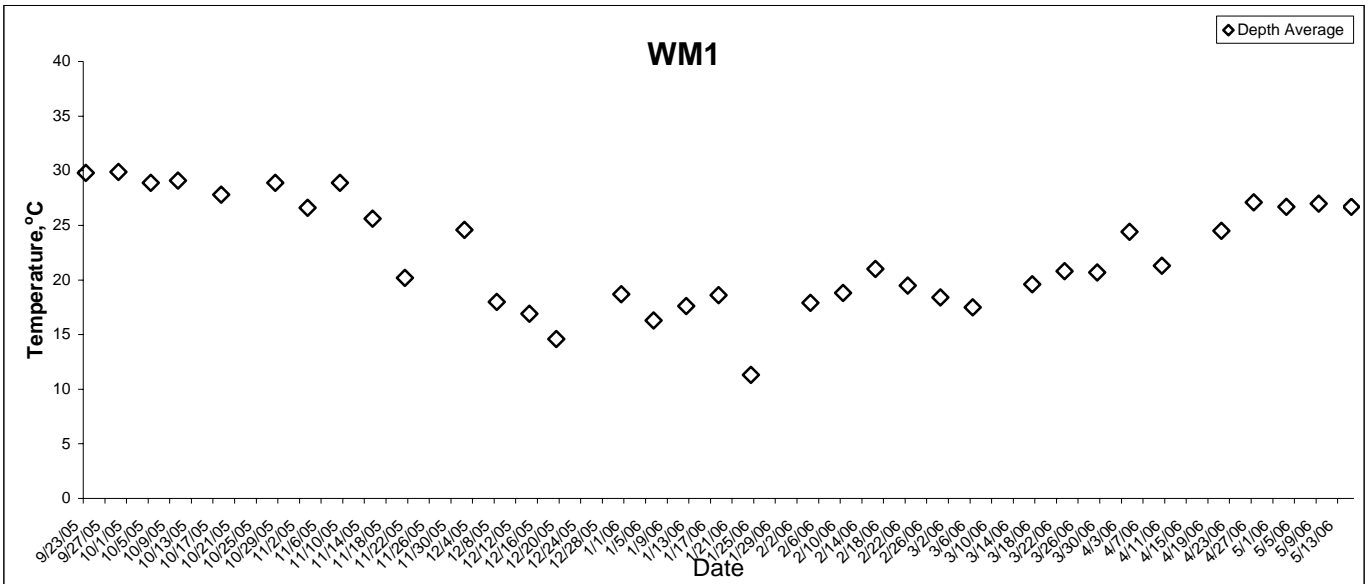
Dissoved Oxygen



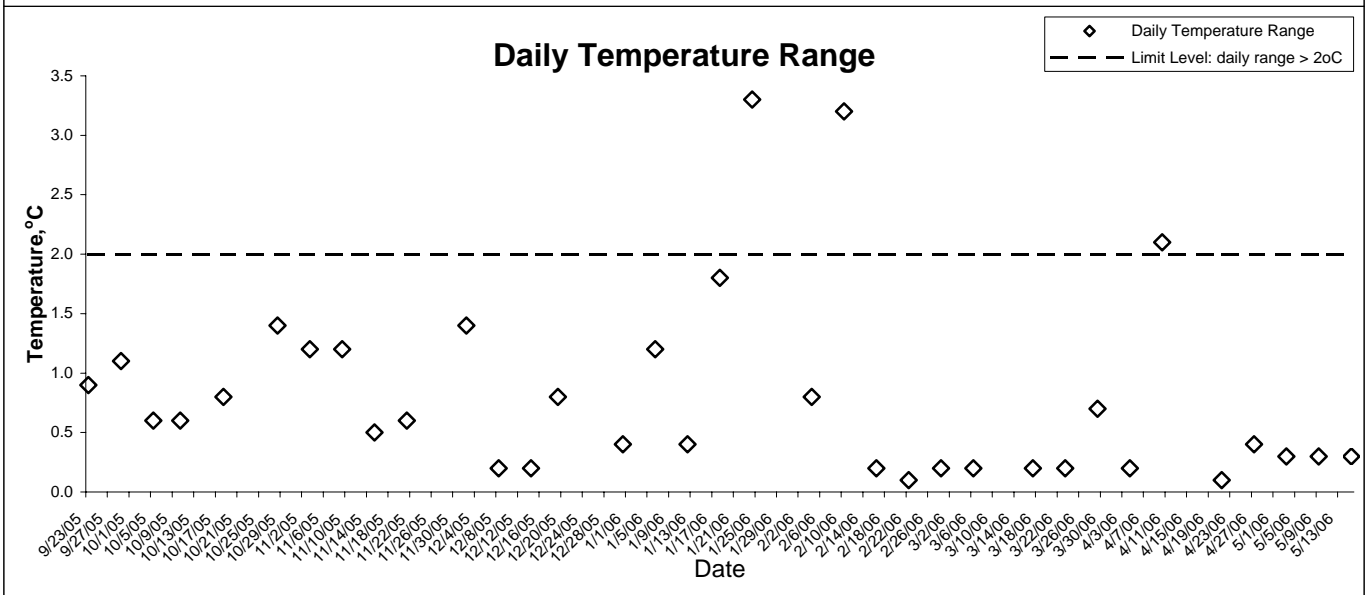
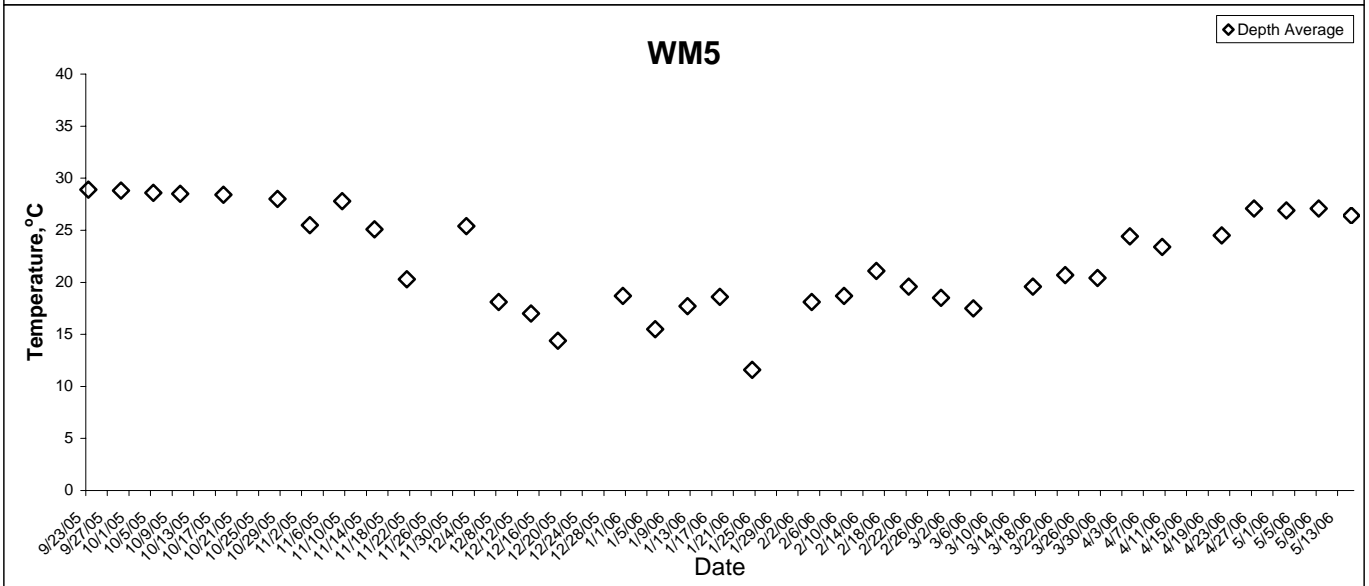
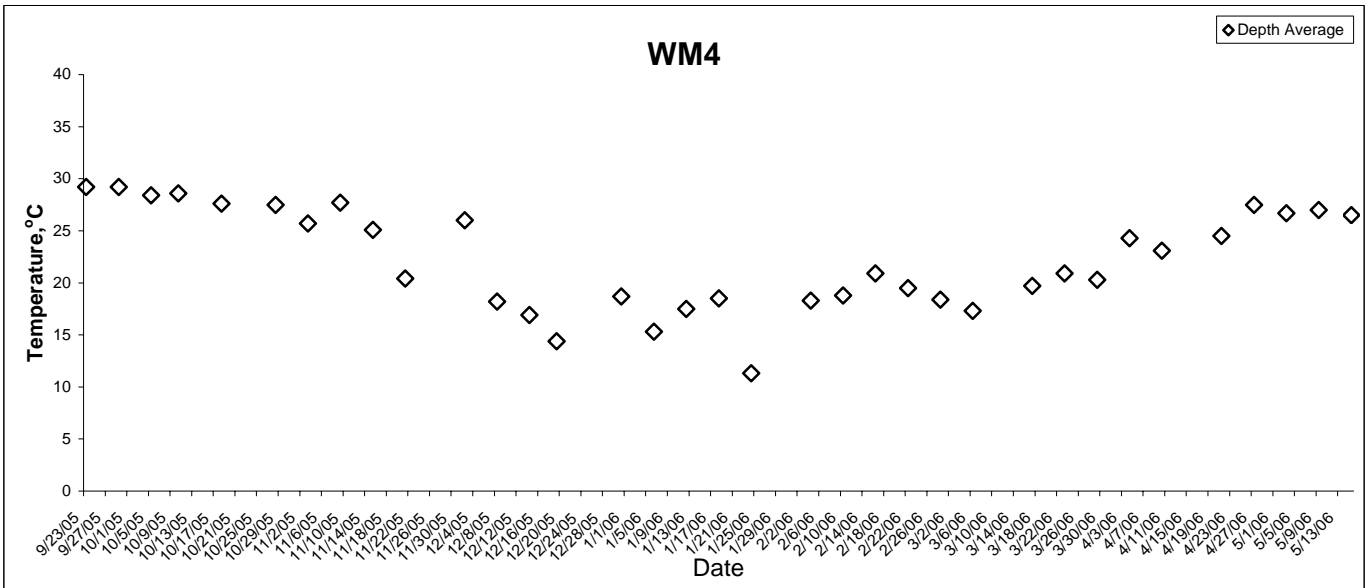
Dissoved Oxygen



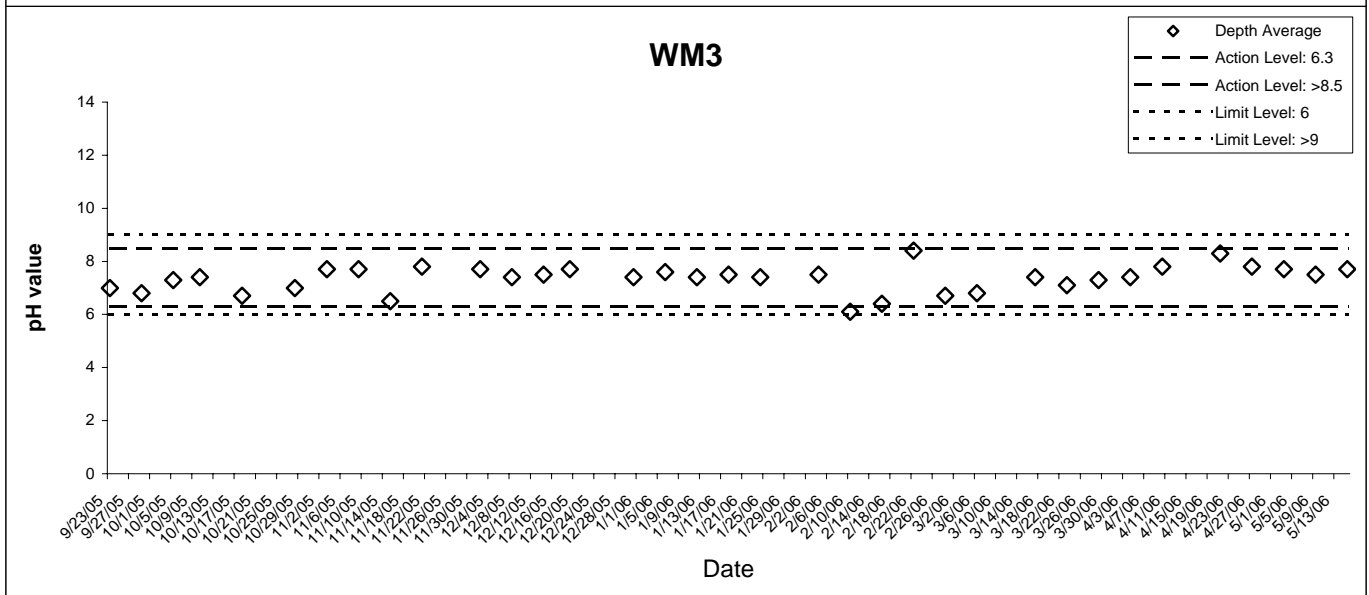
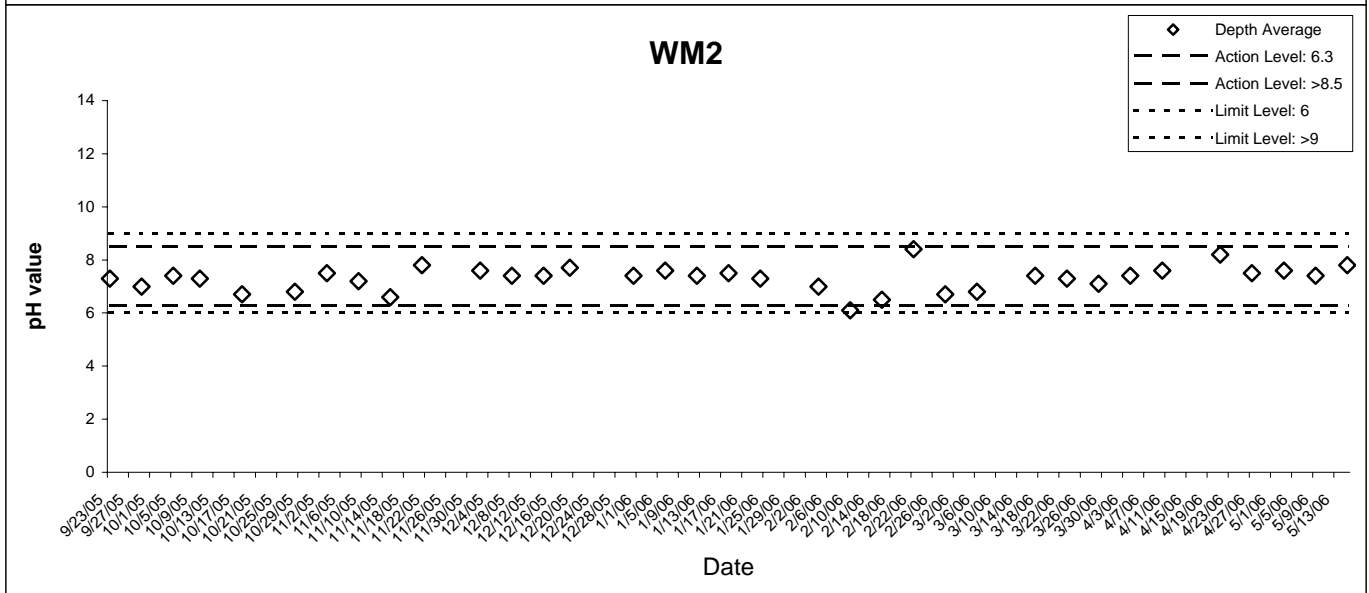
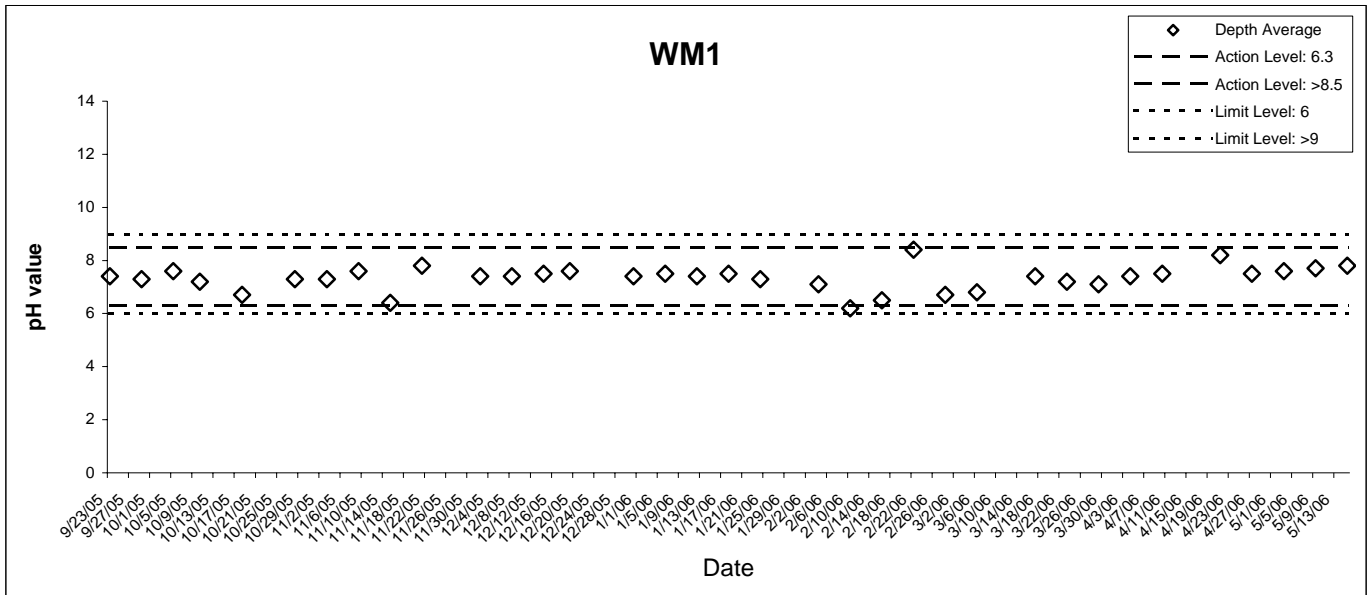
Temperature



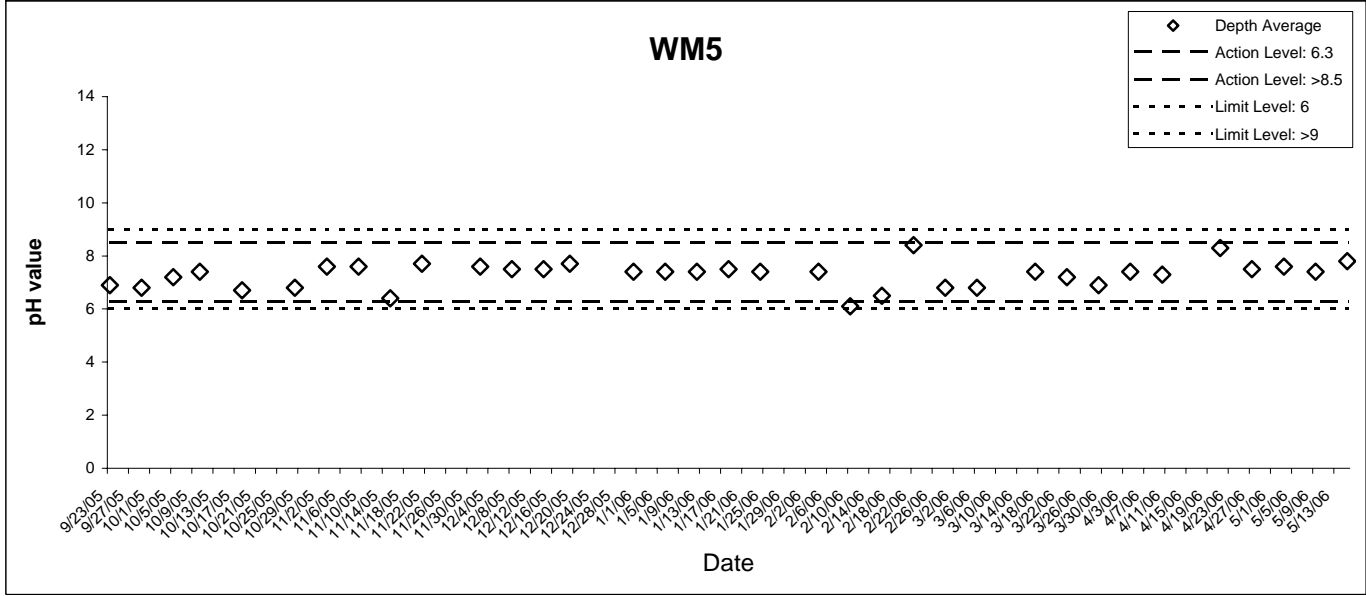
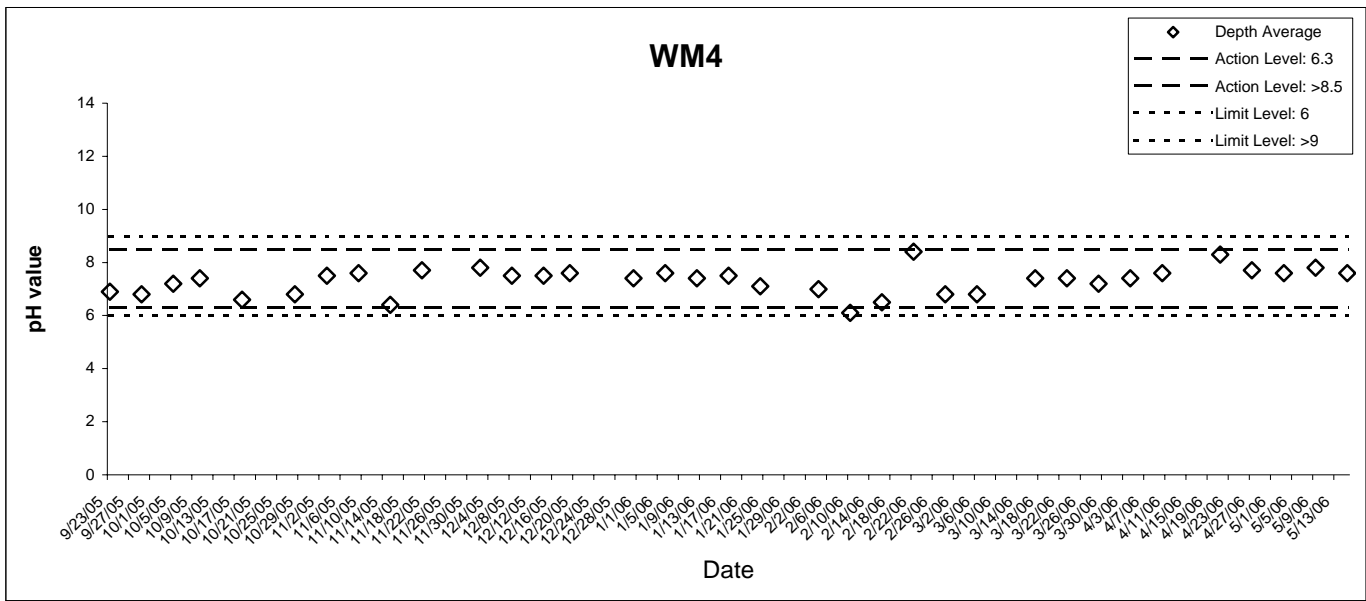
Temperature



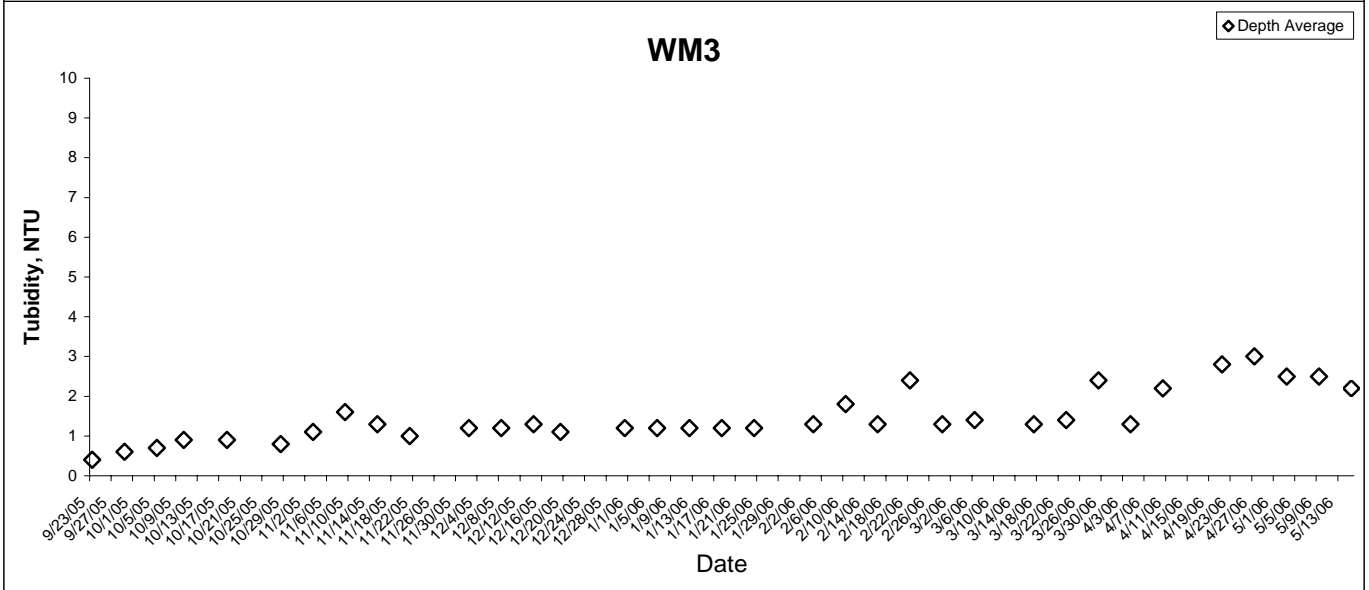
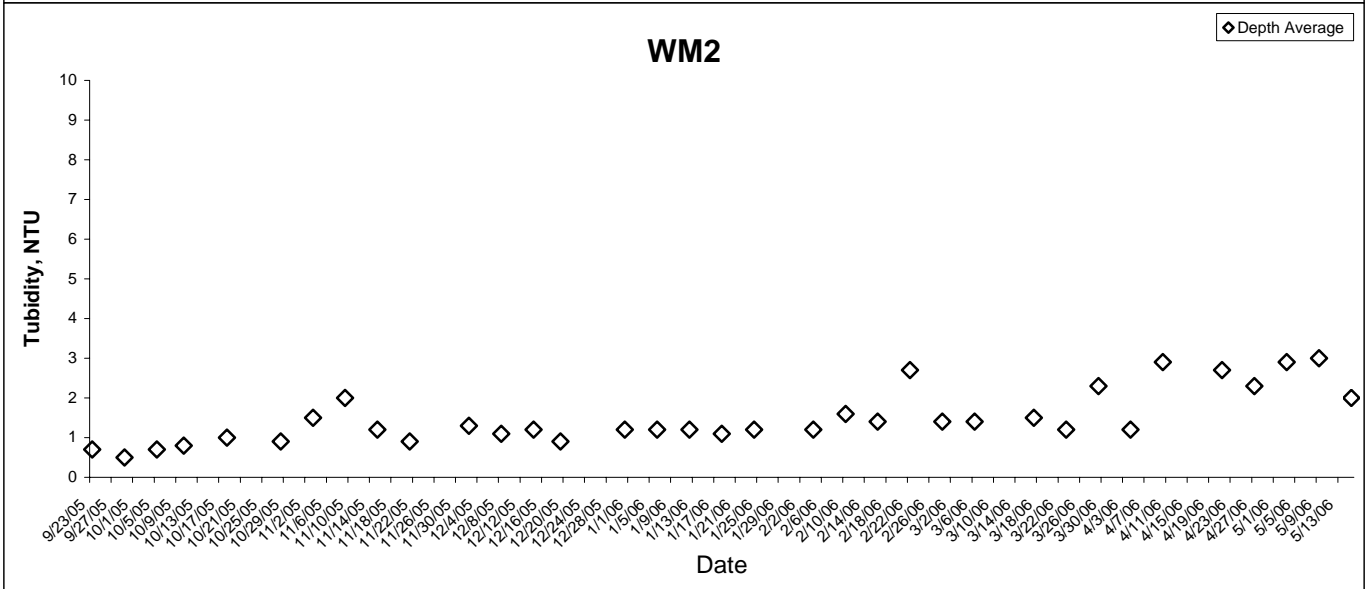
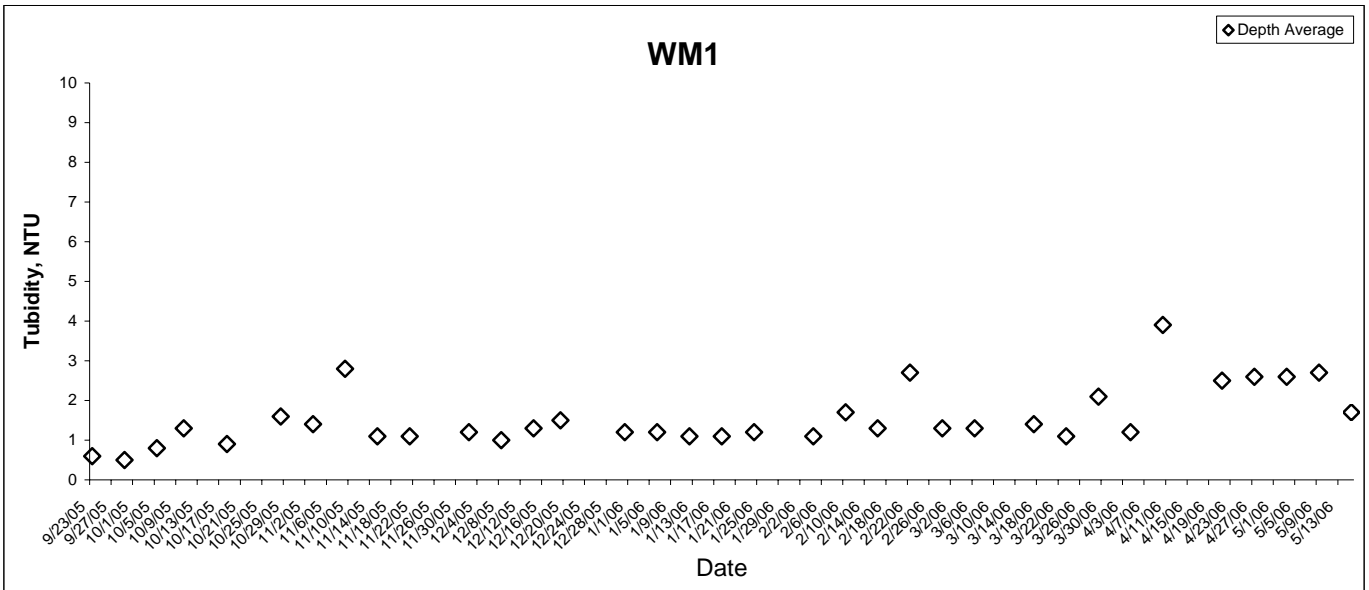
pH



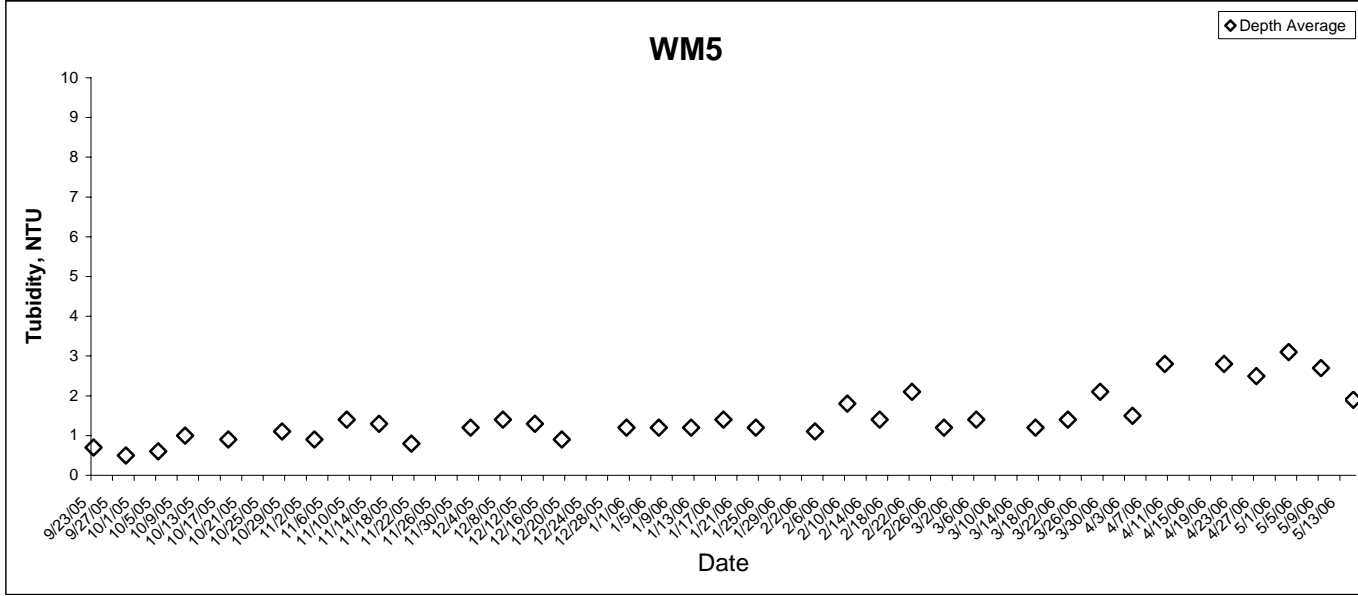
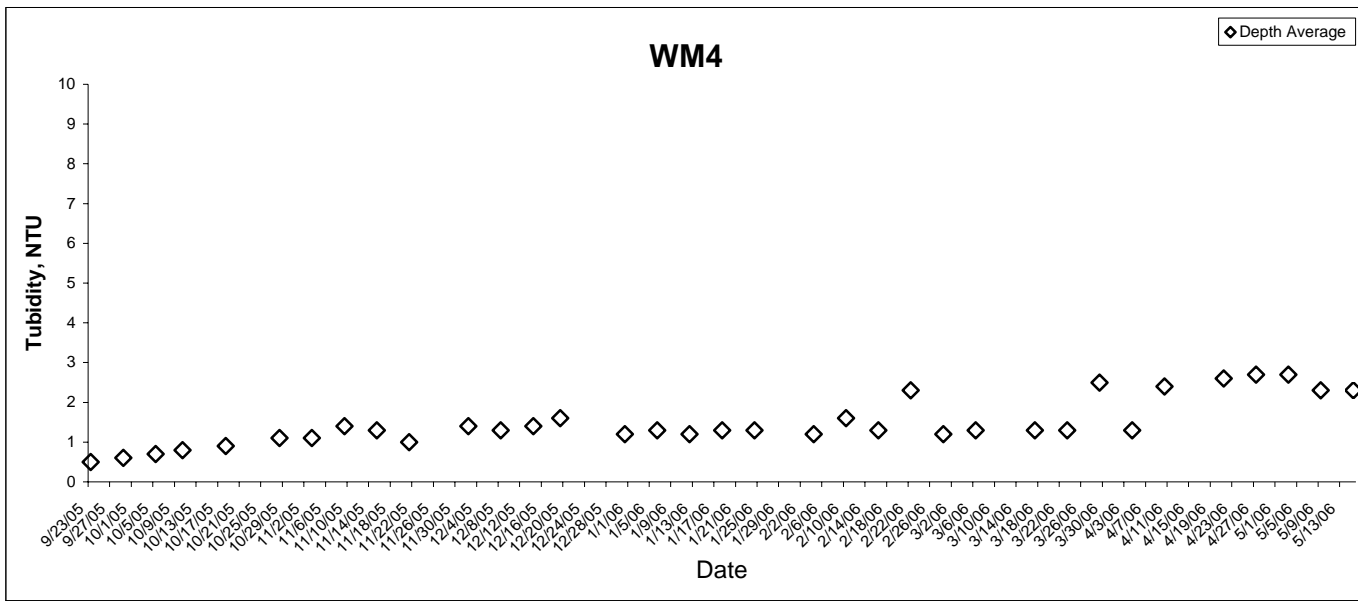
pH



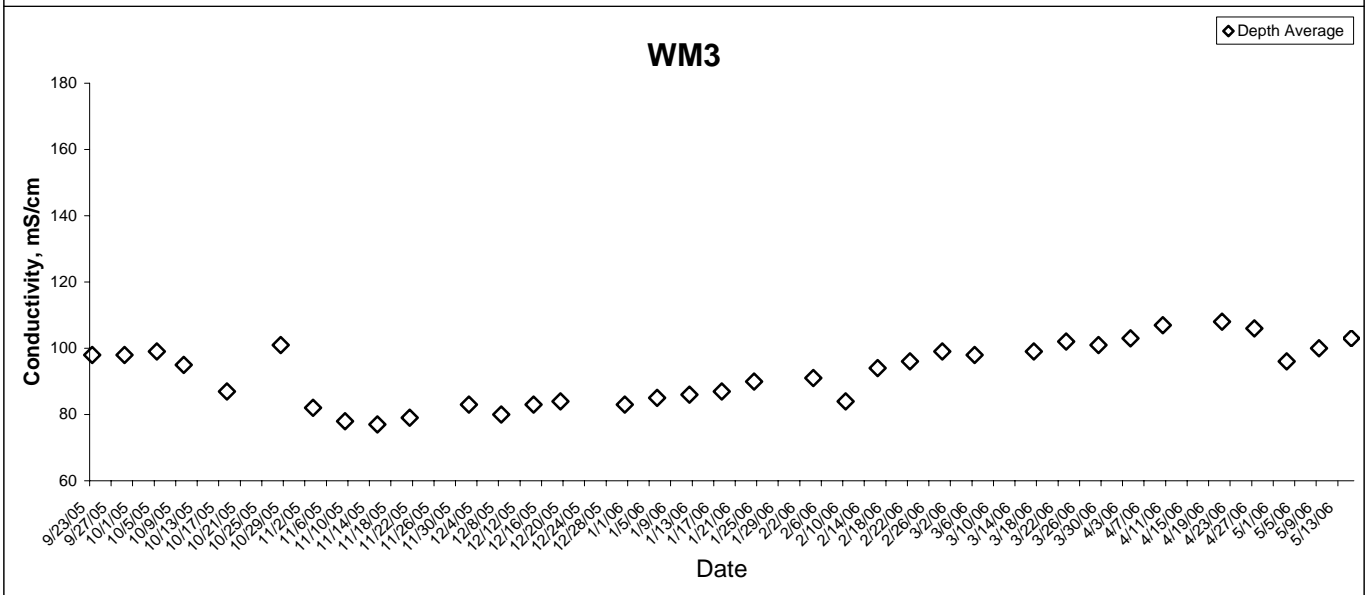
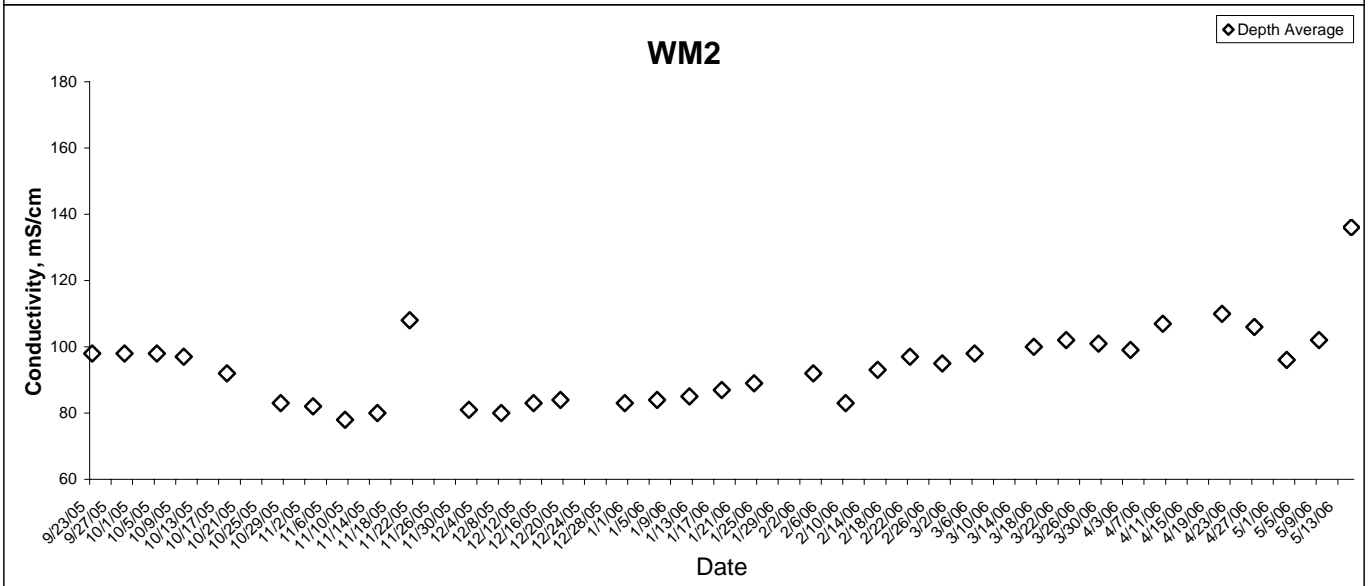
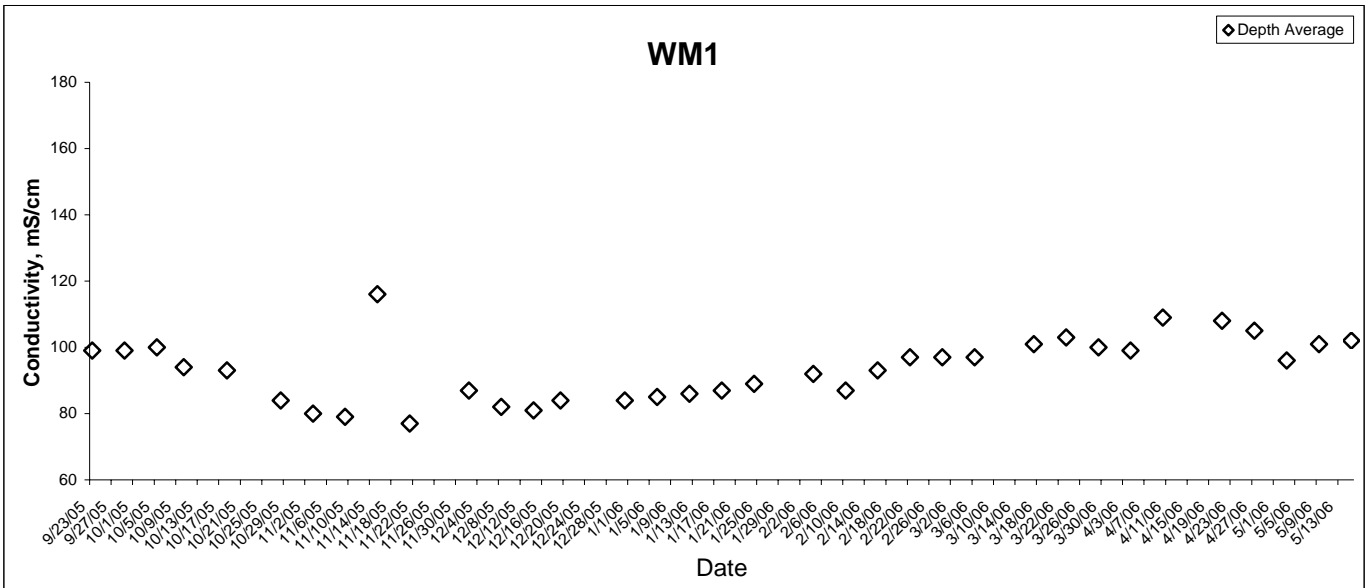
Turbidity



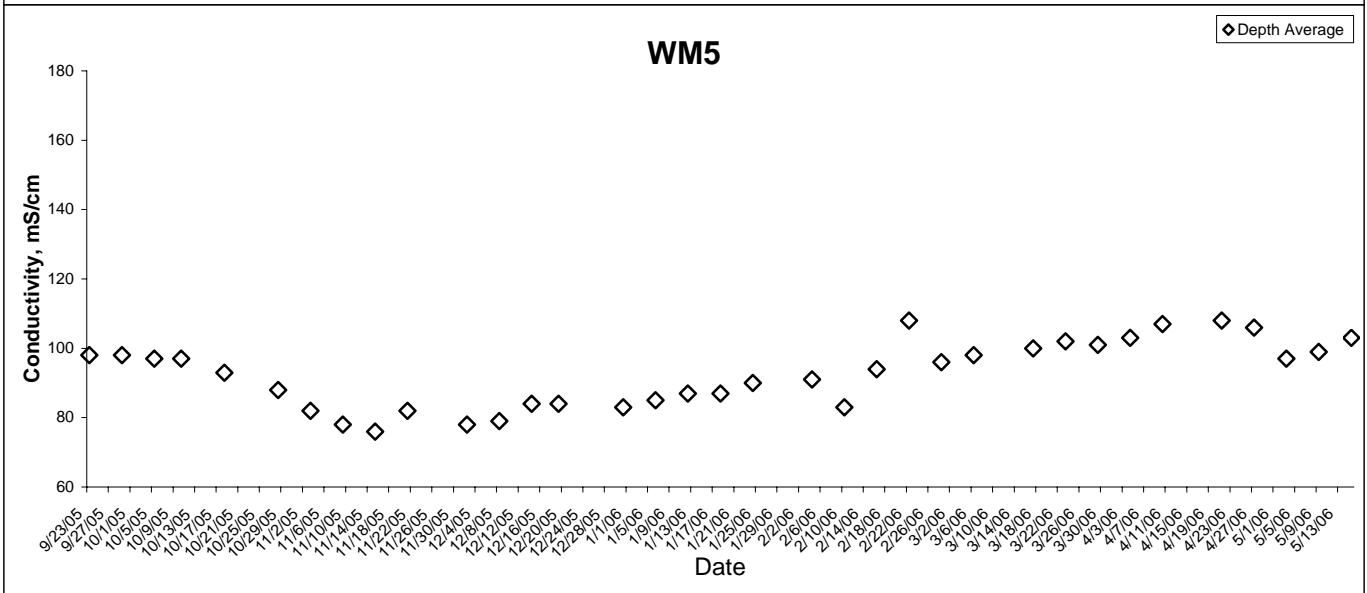
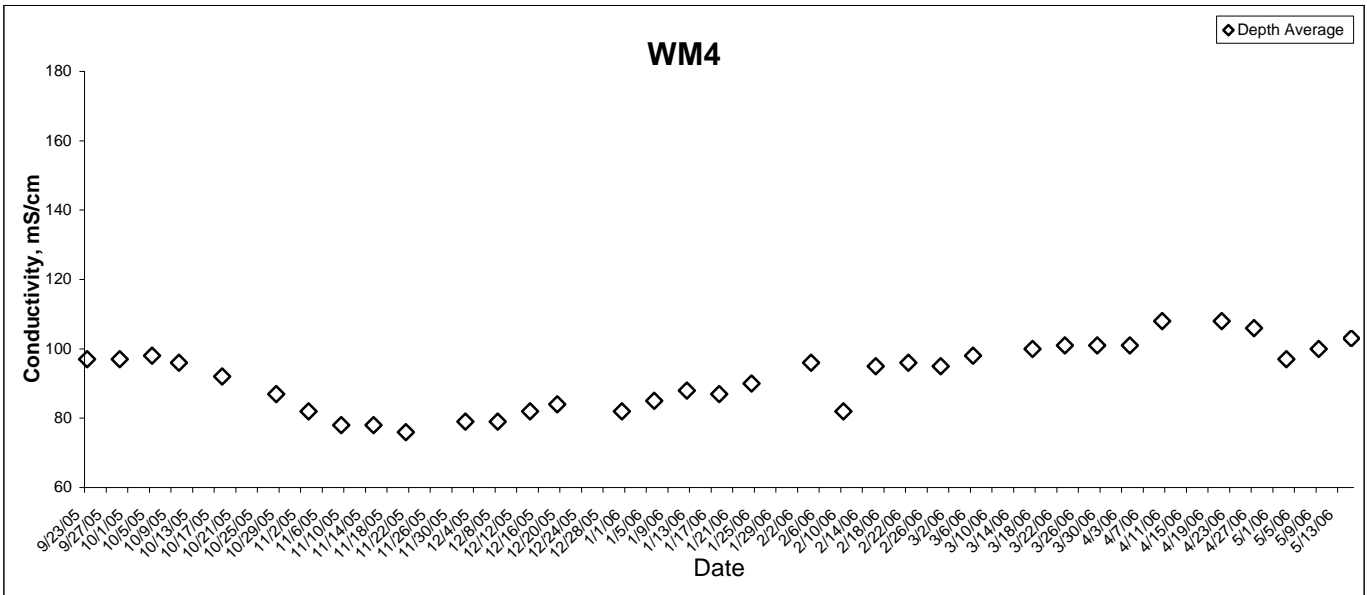
Turbidity



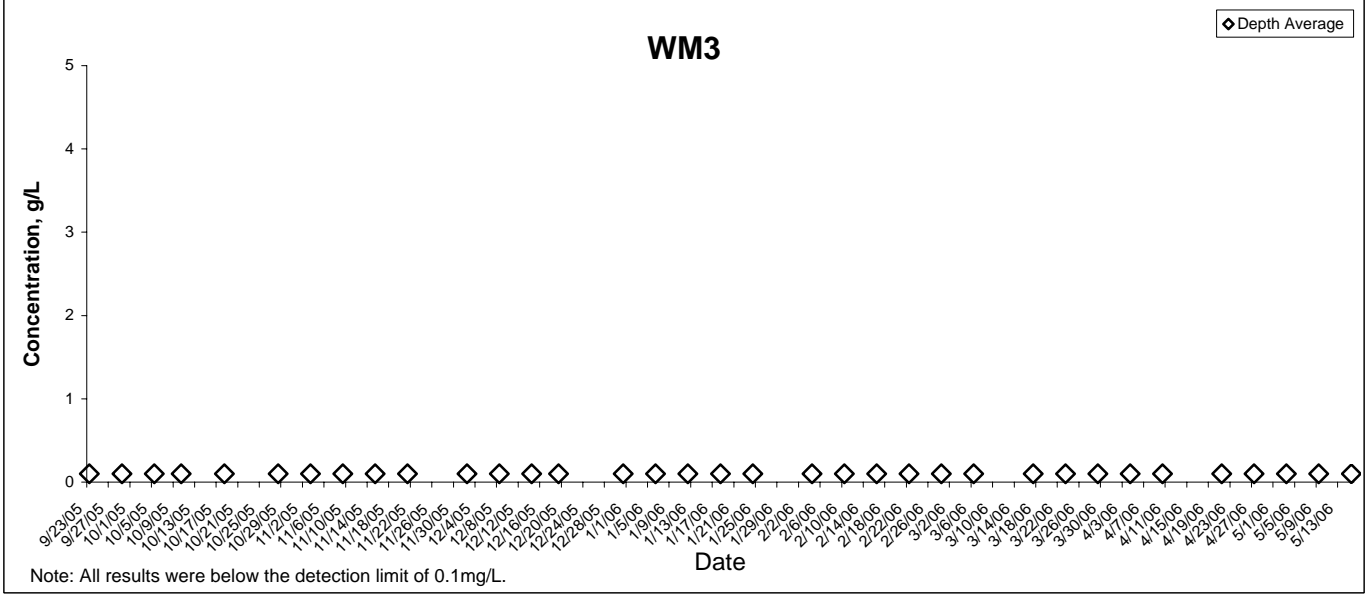
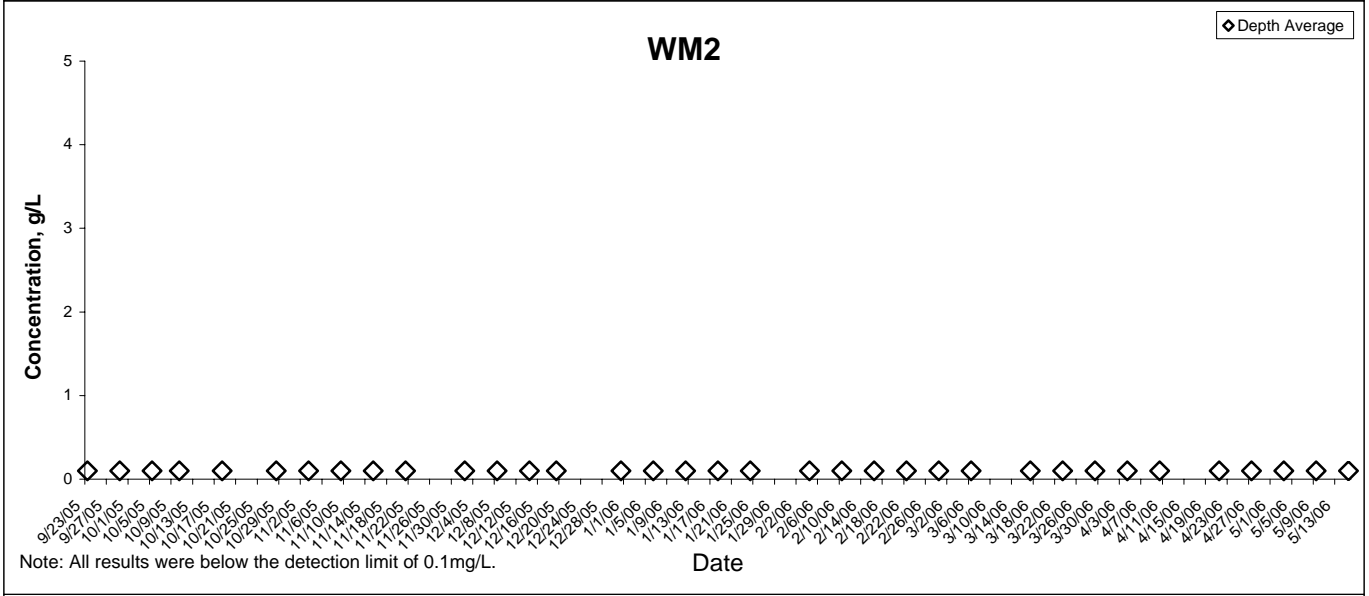
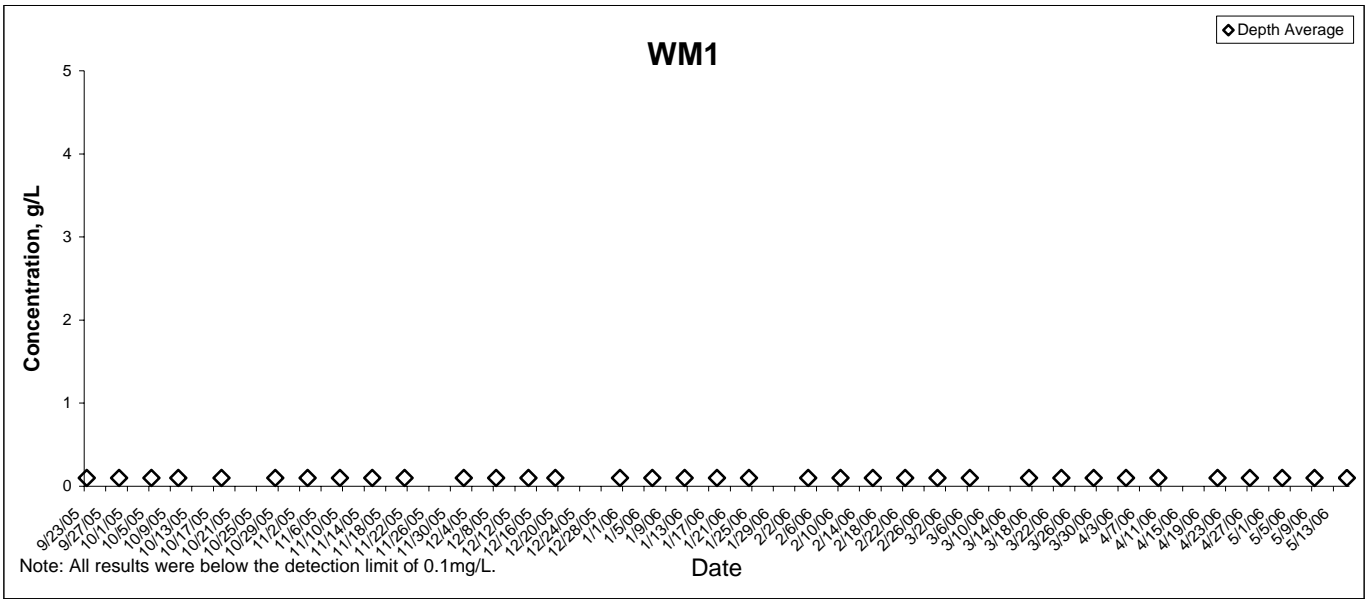
Conductivity



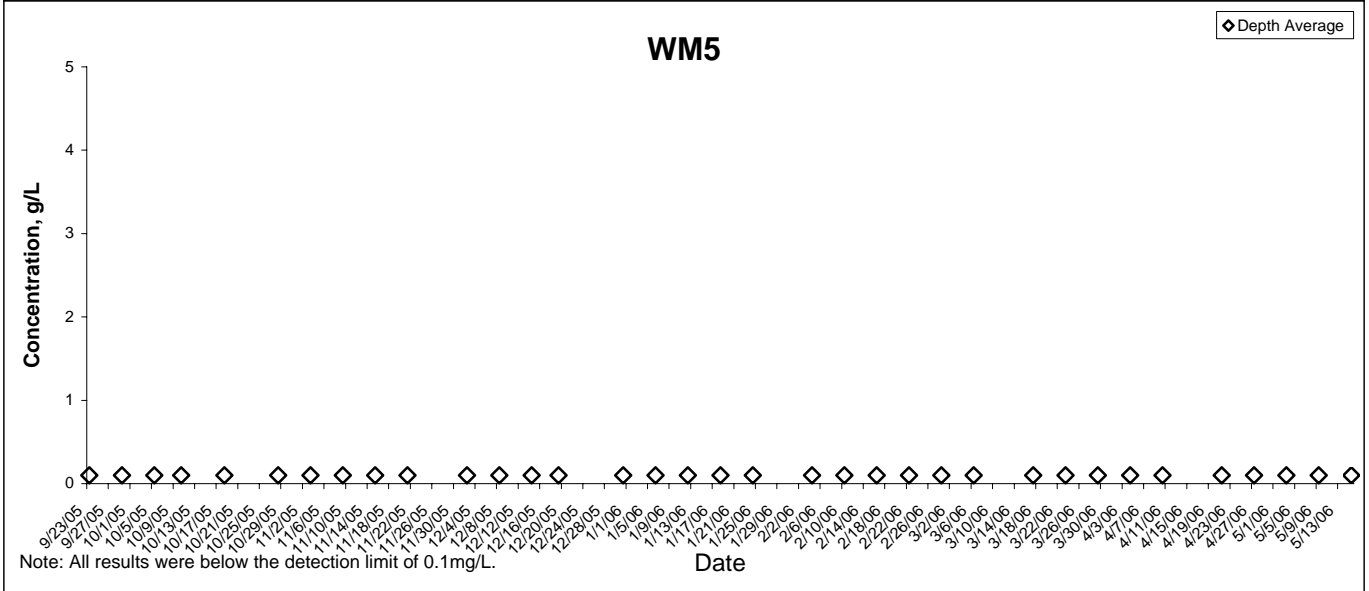
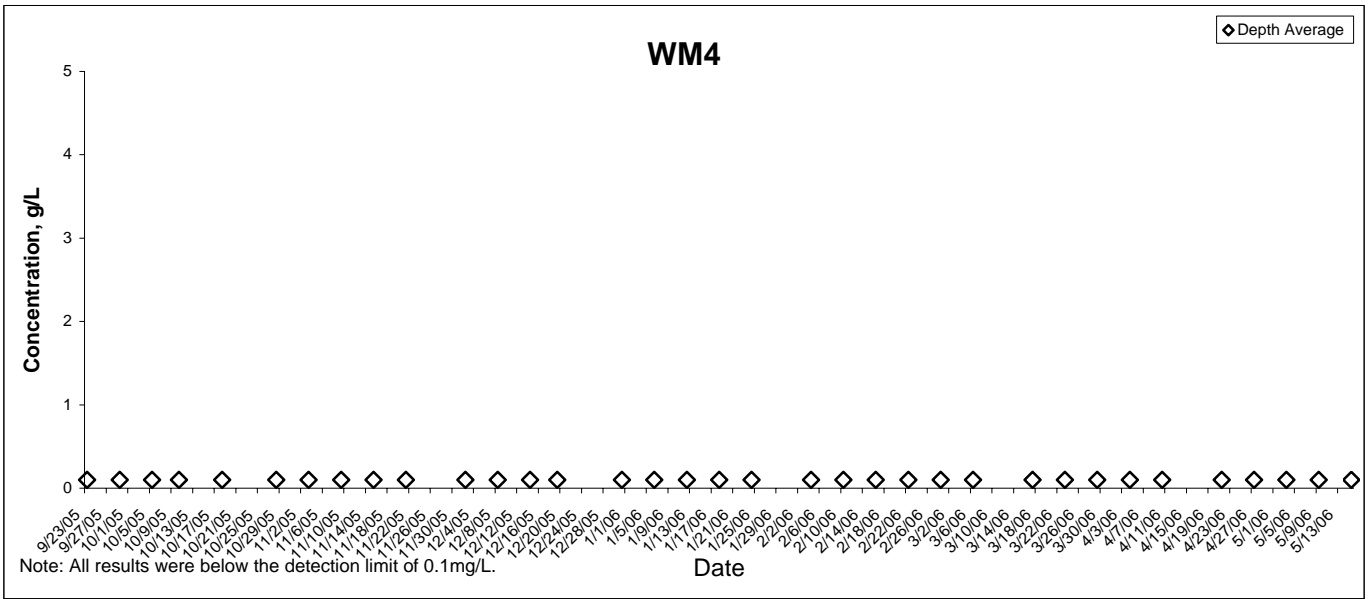
Conductivity



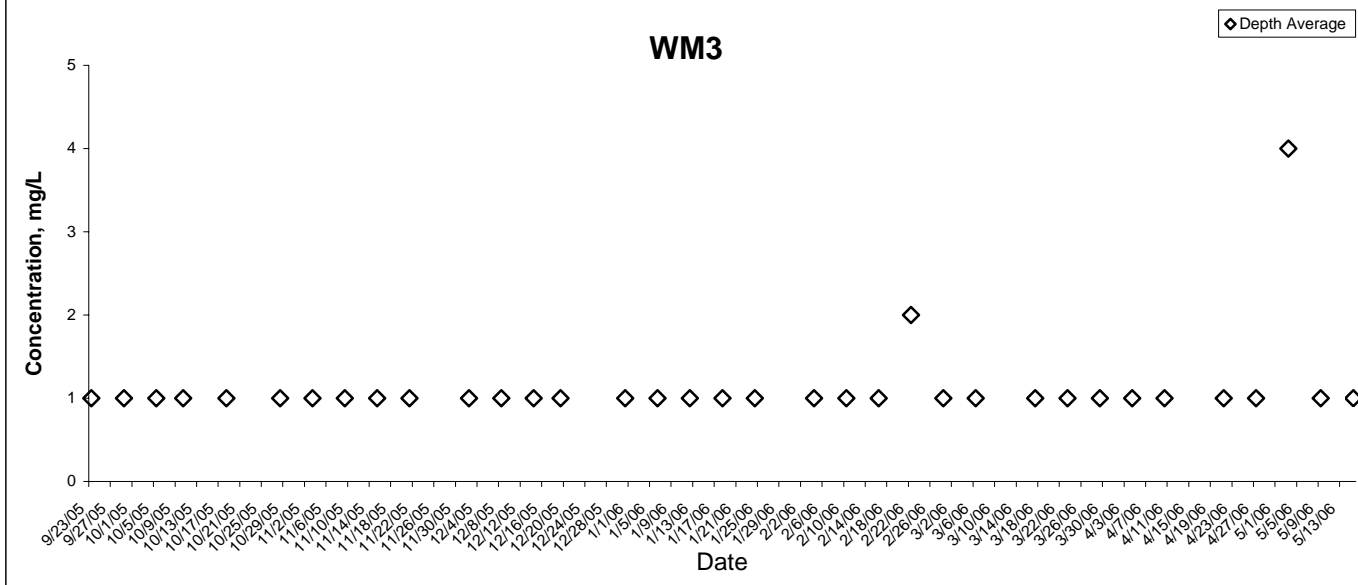
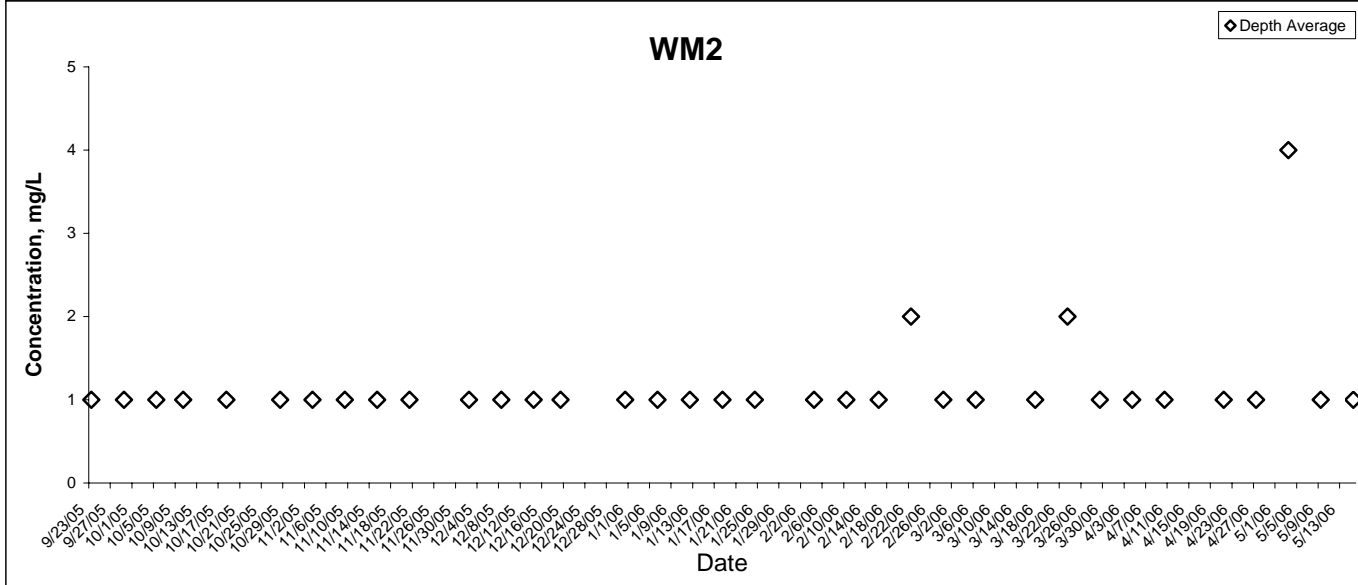
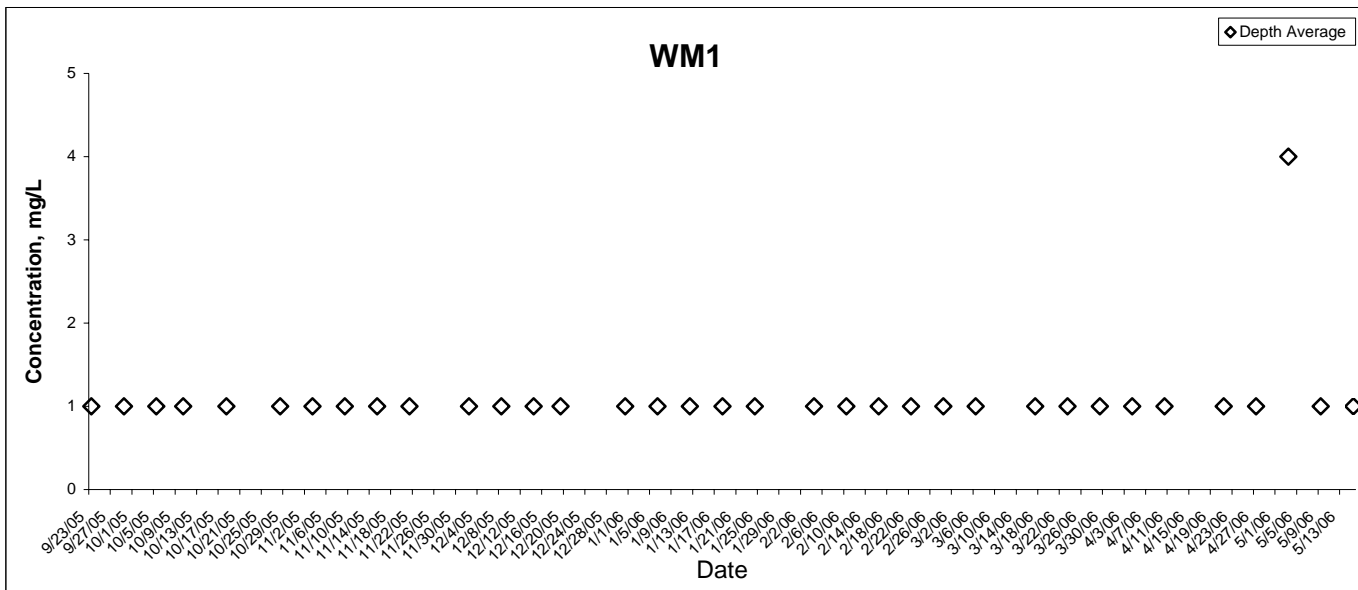
Salinity



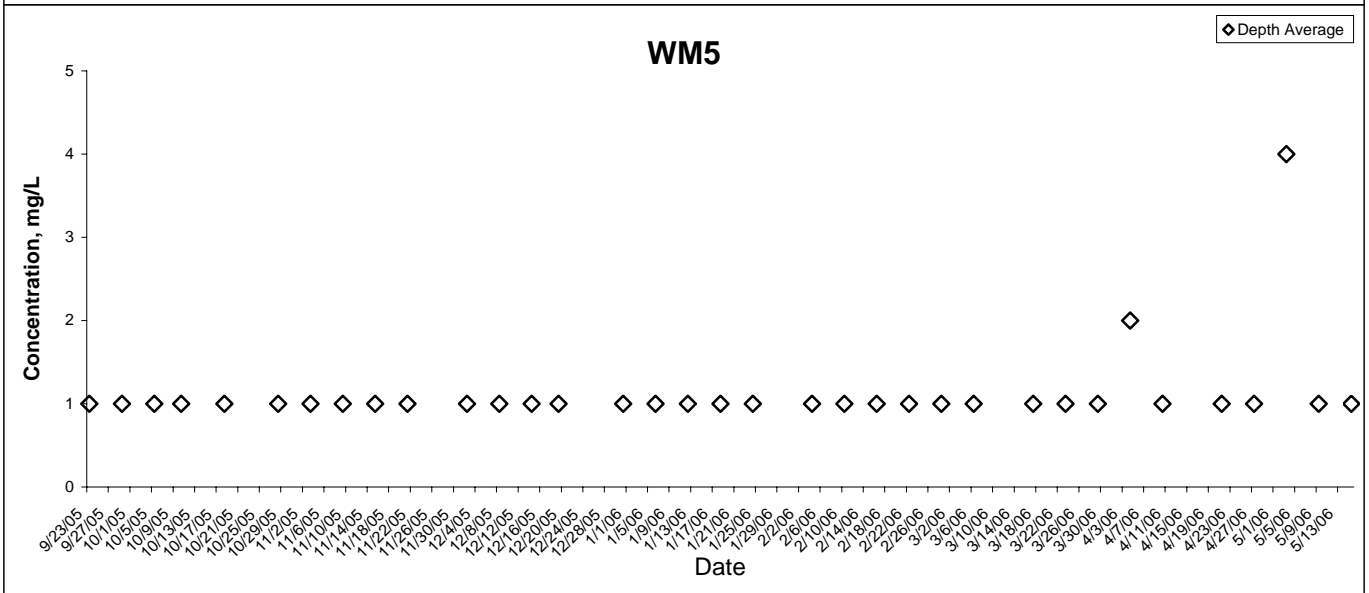
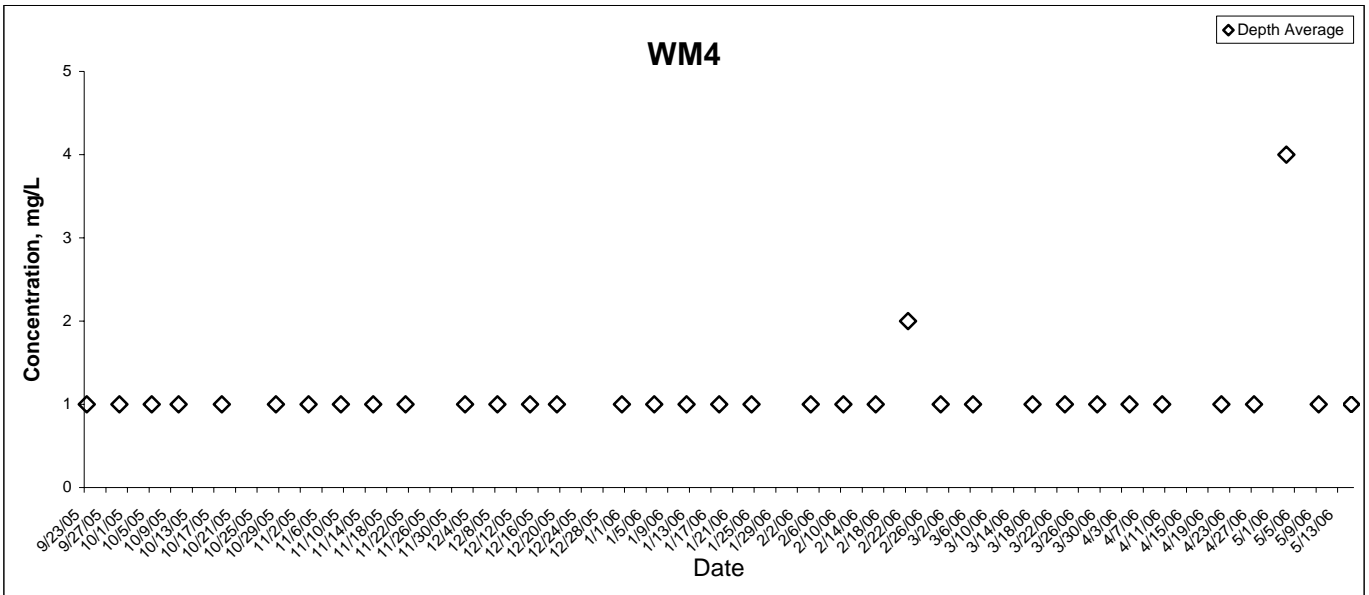
Salinity



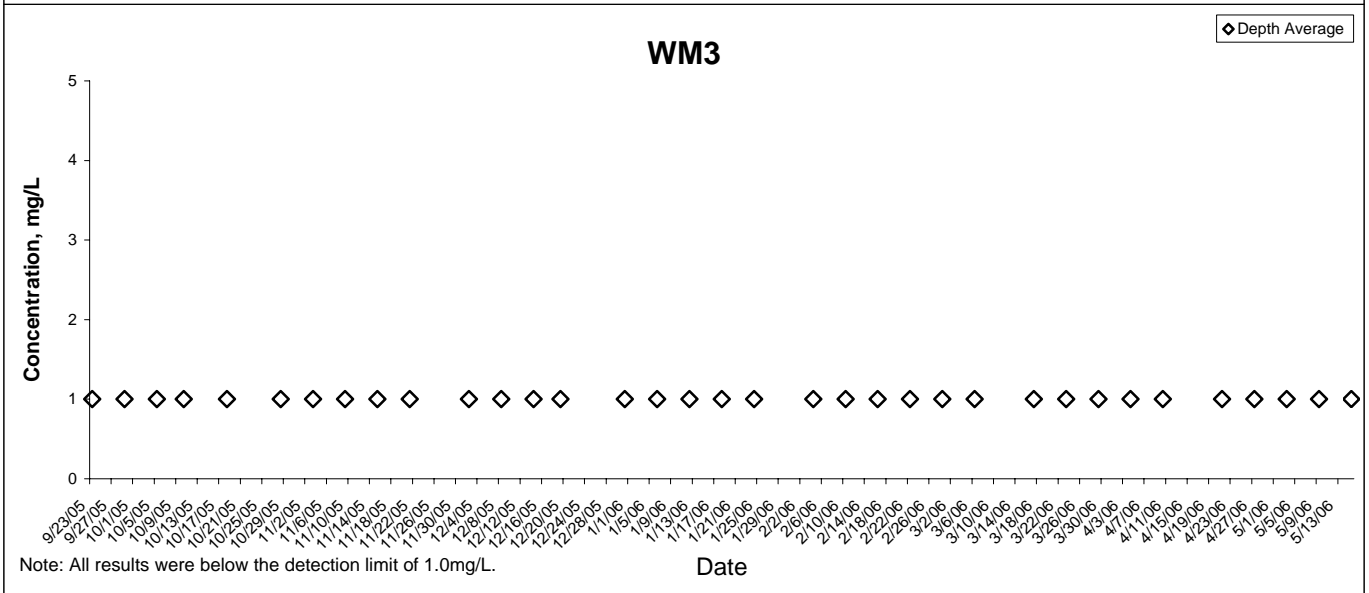
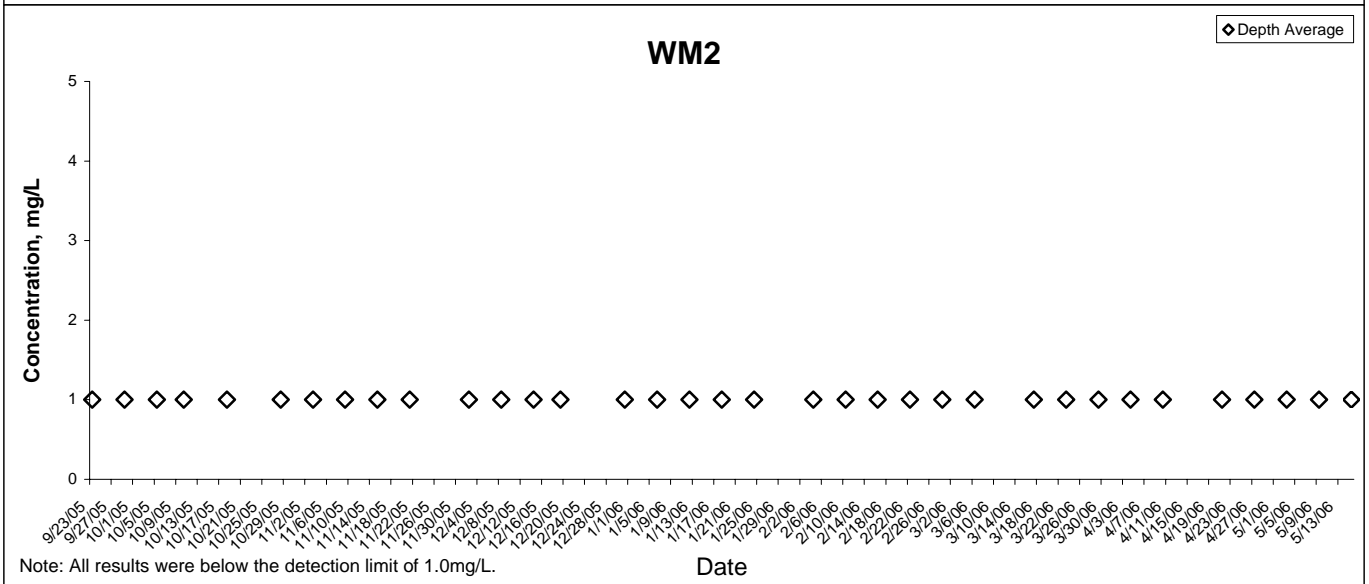
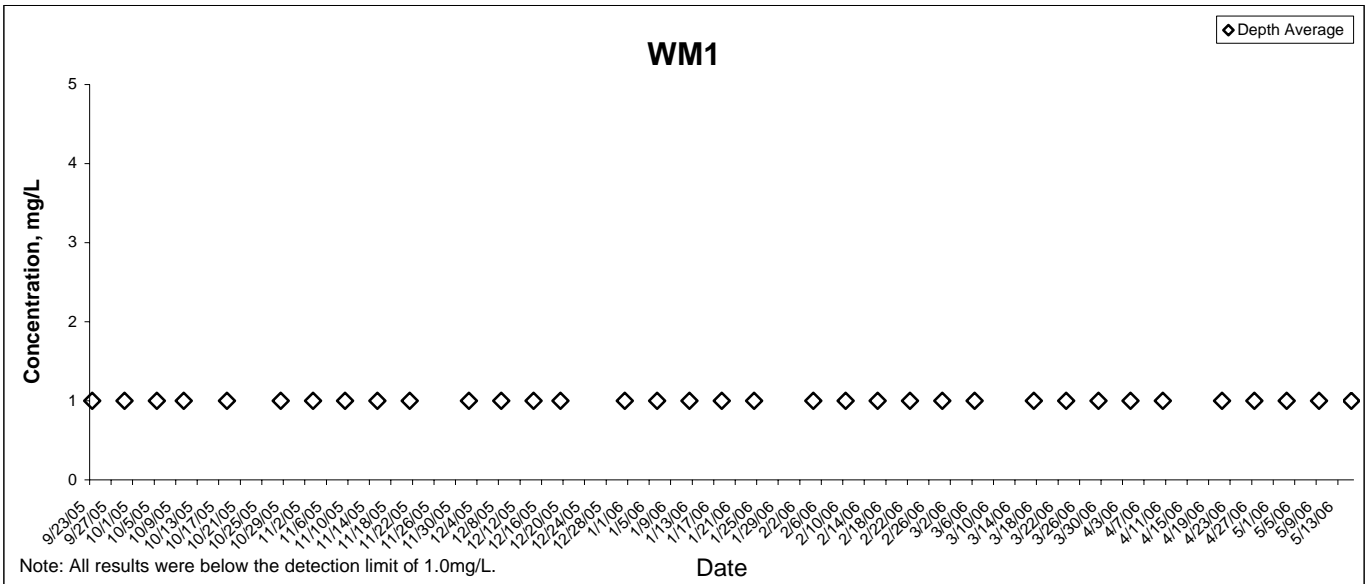
Copper



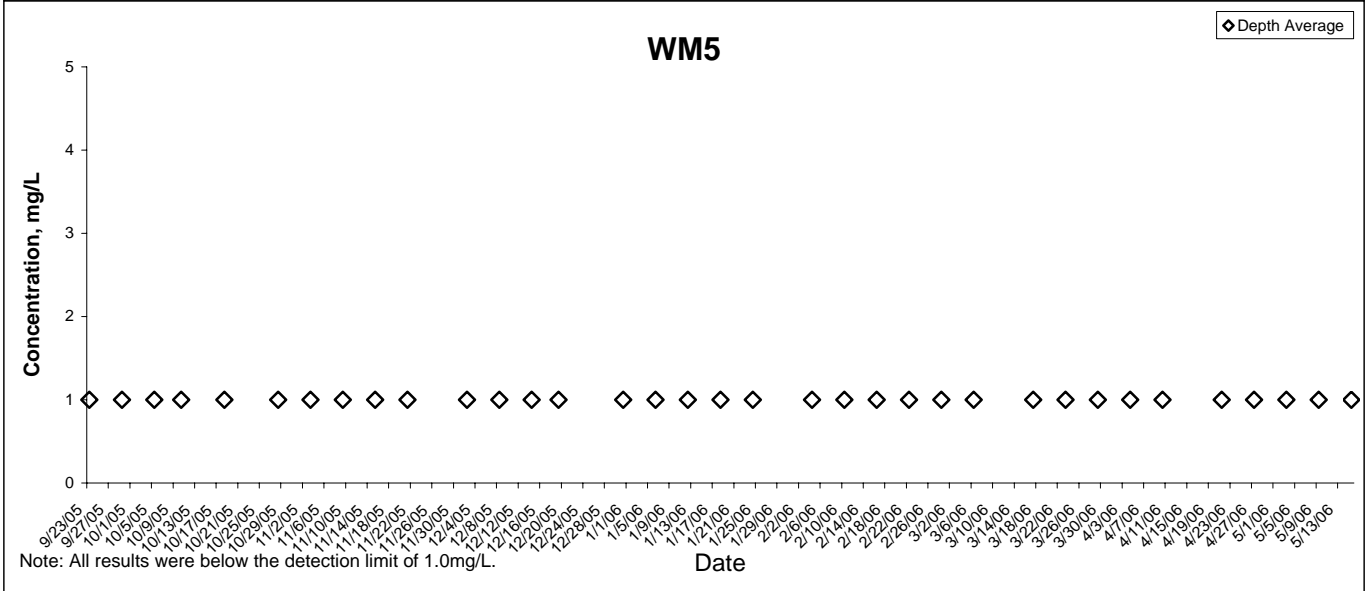
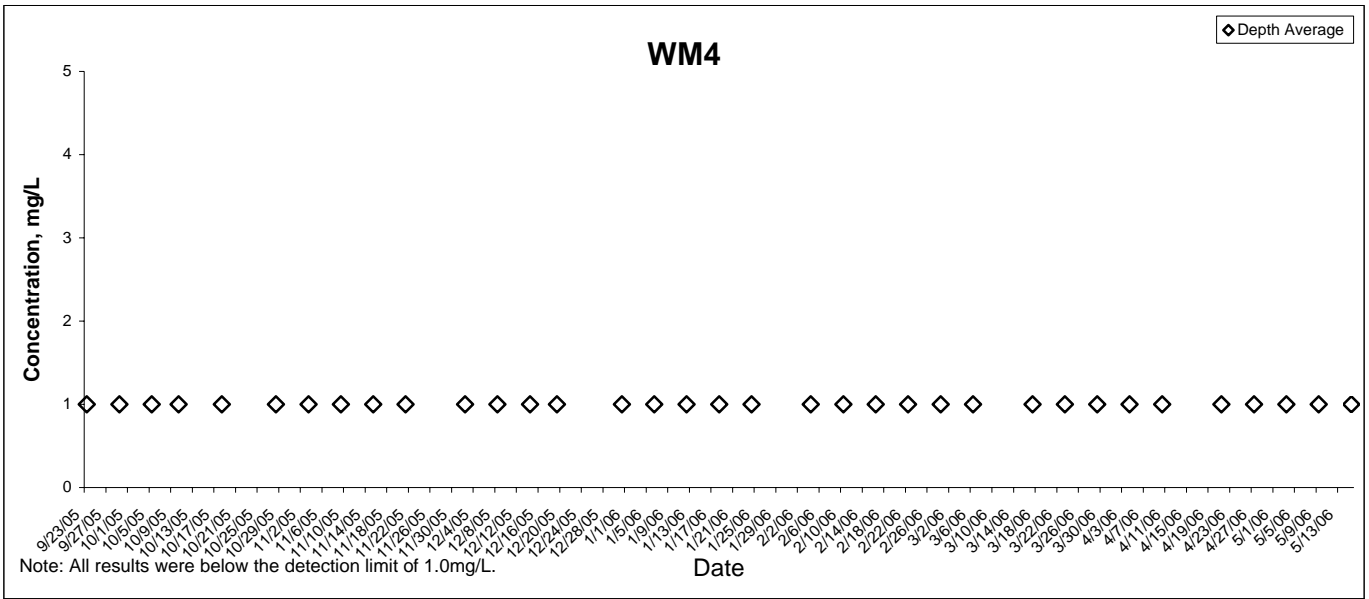
Copper



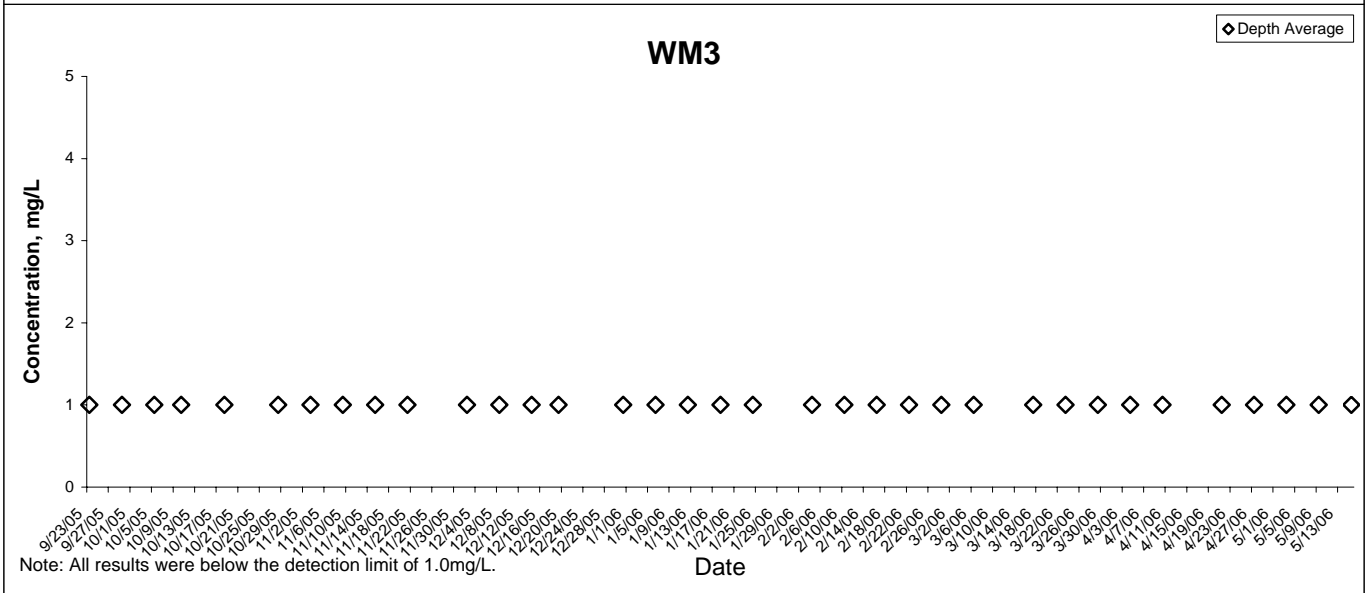
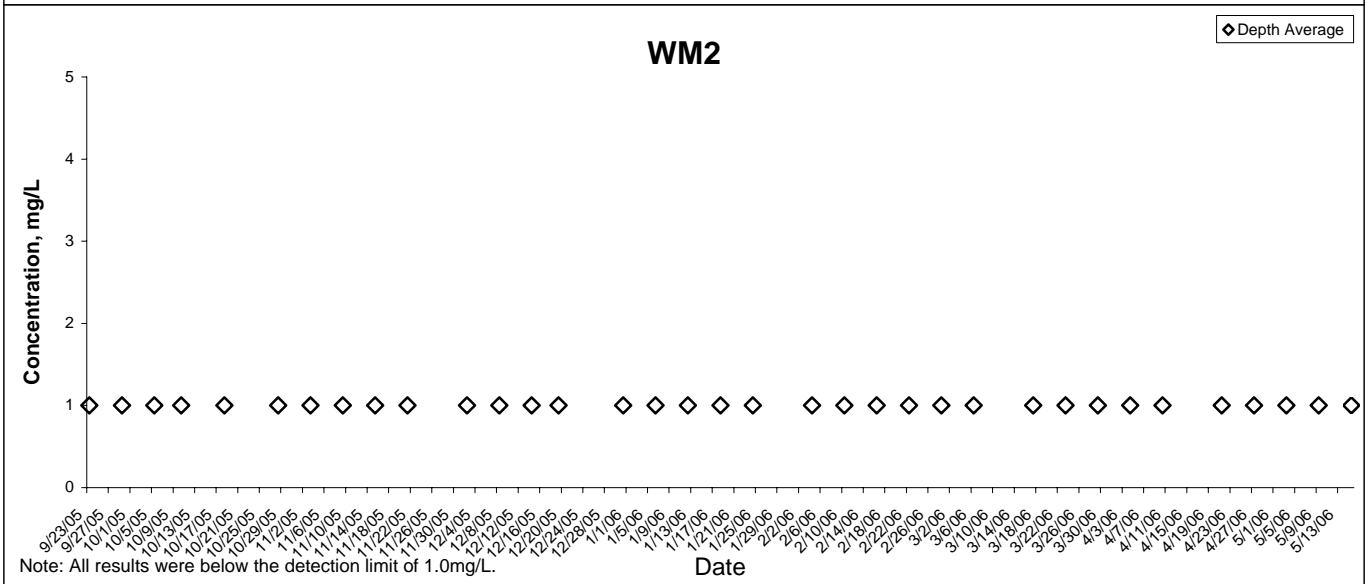
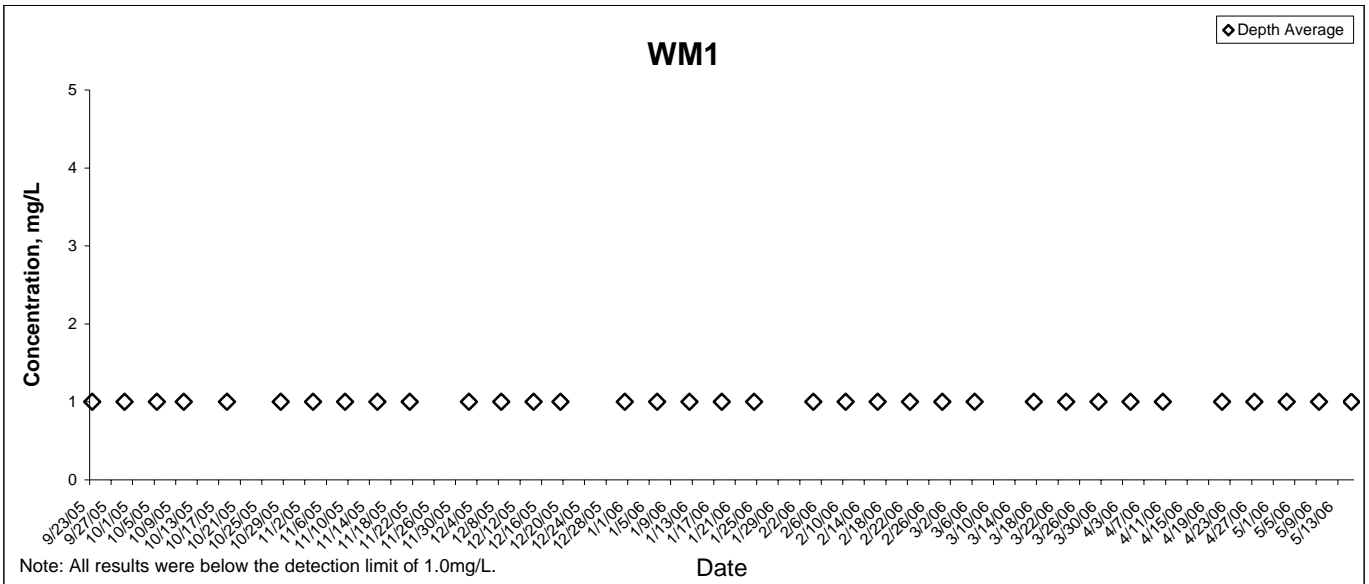
Chromium



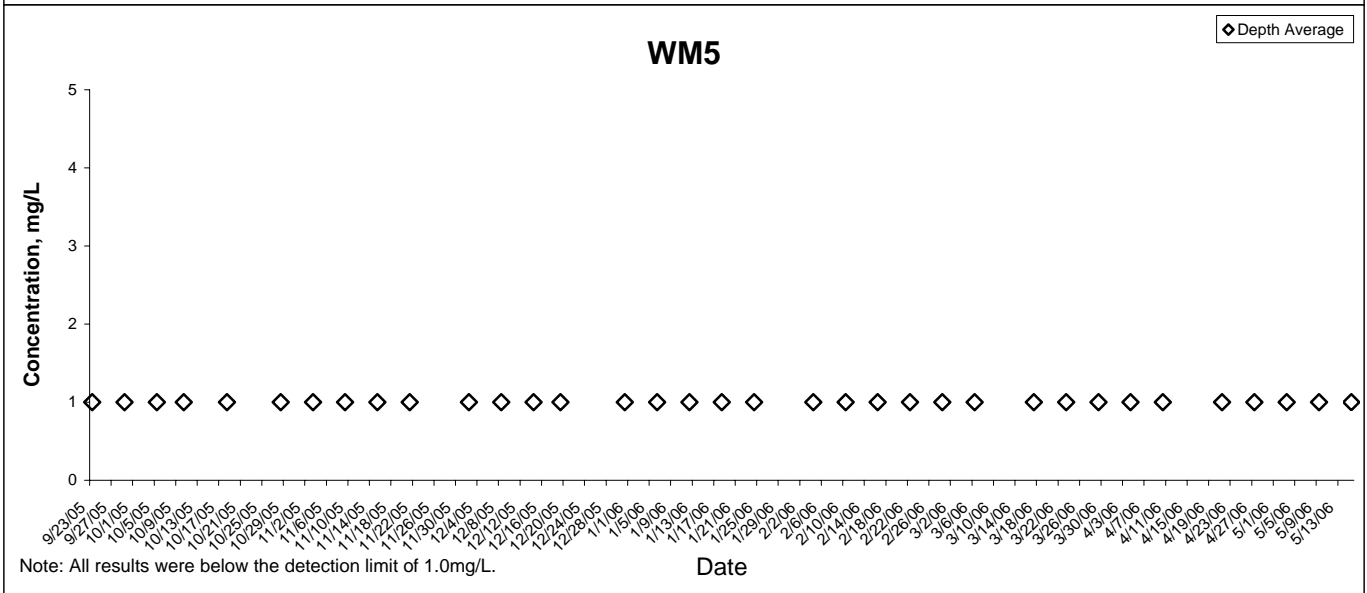
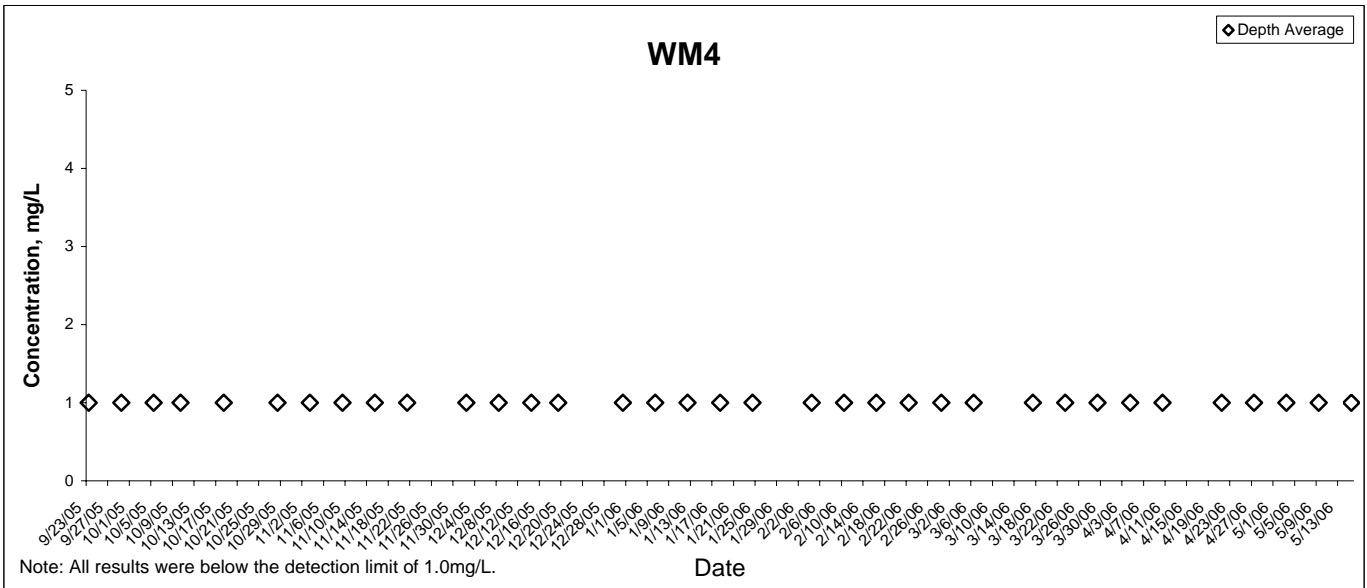
Chromium



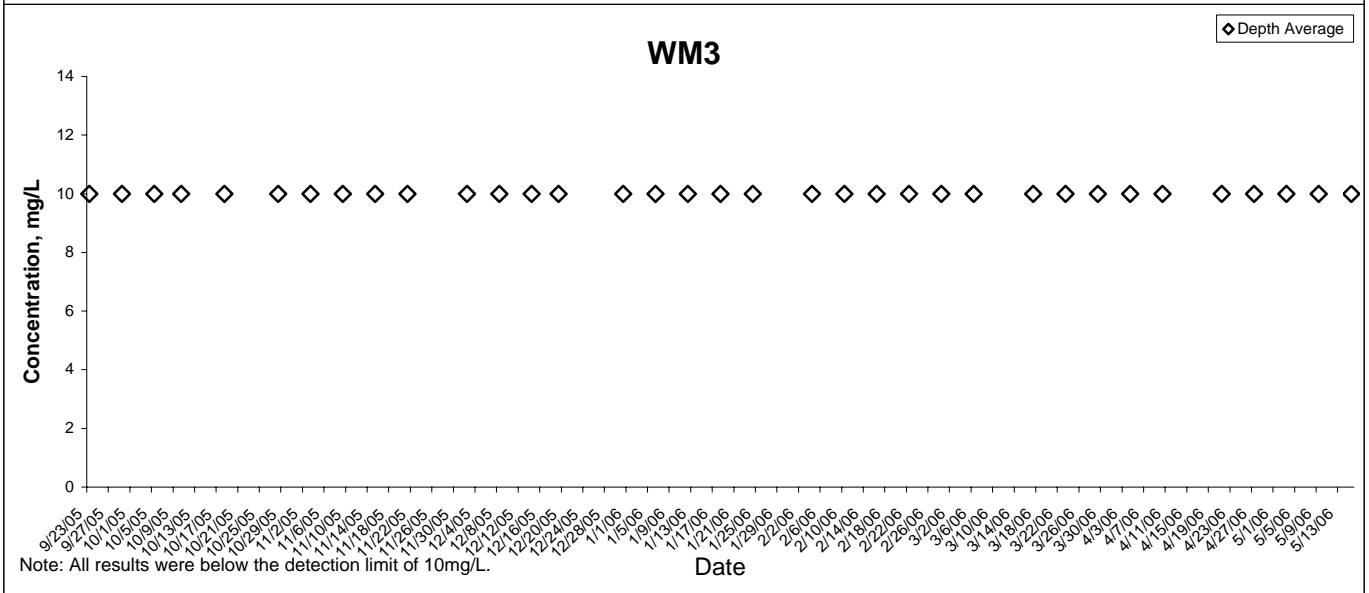
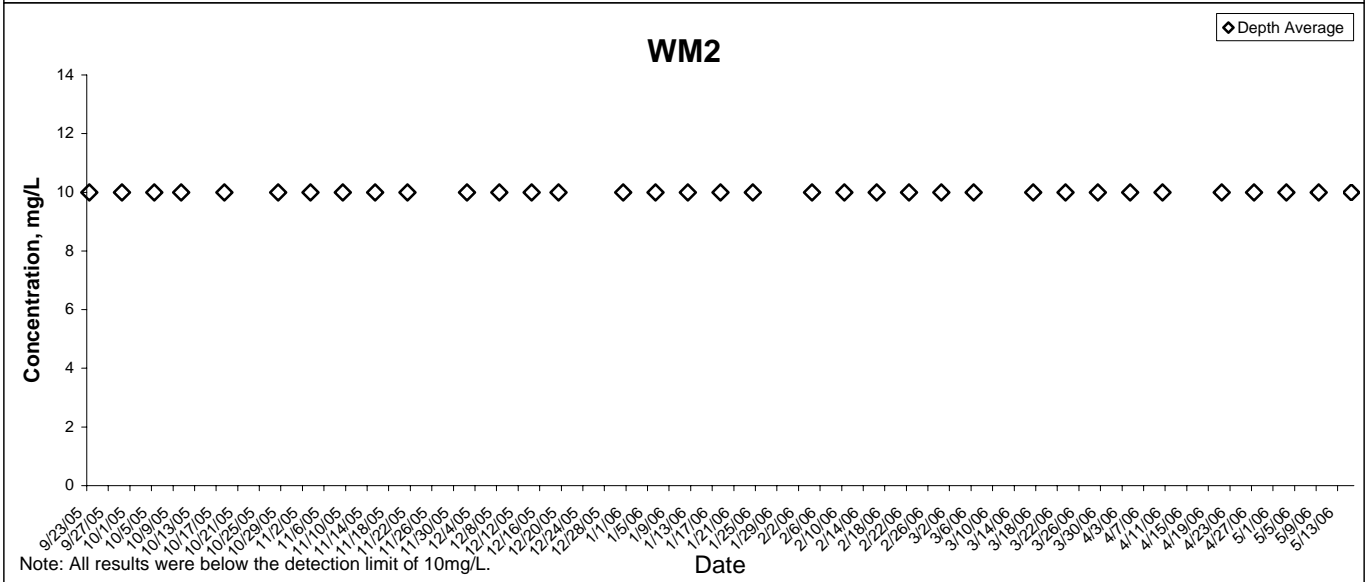
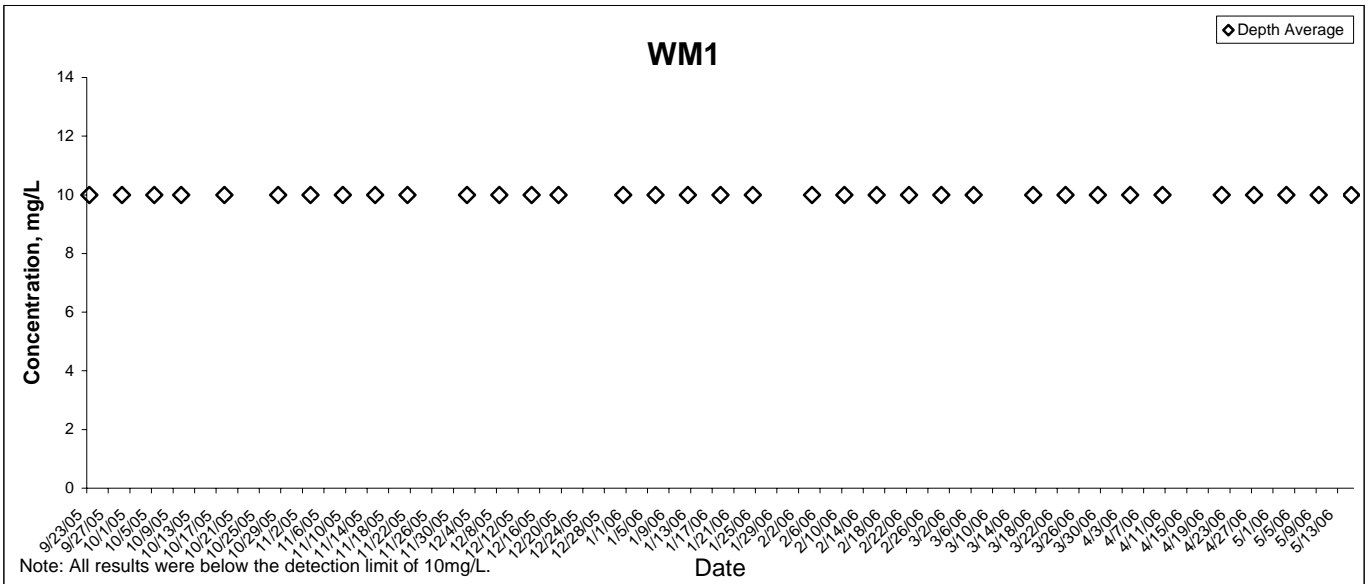
Lead



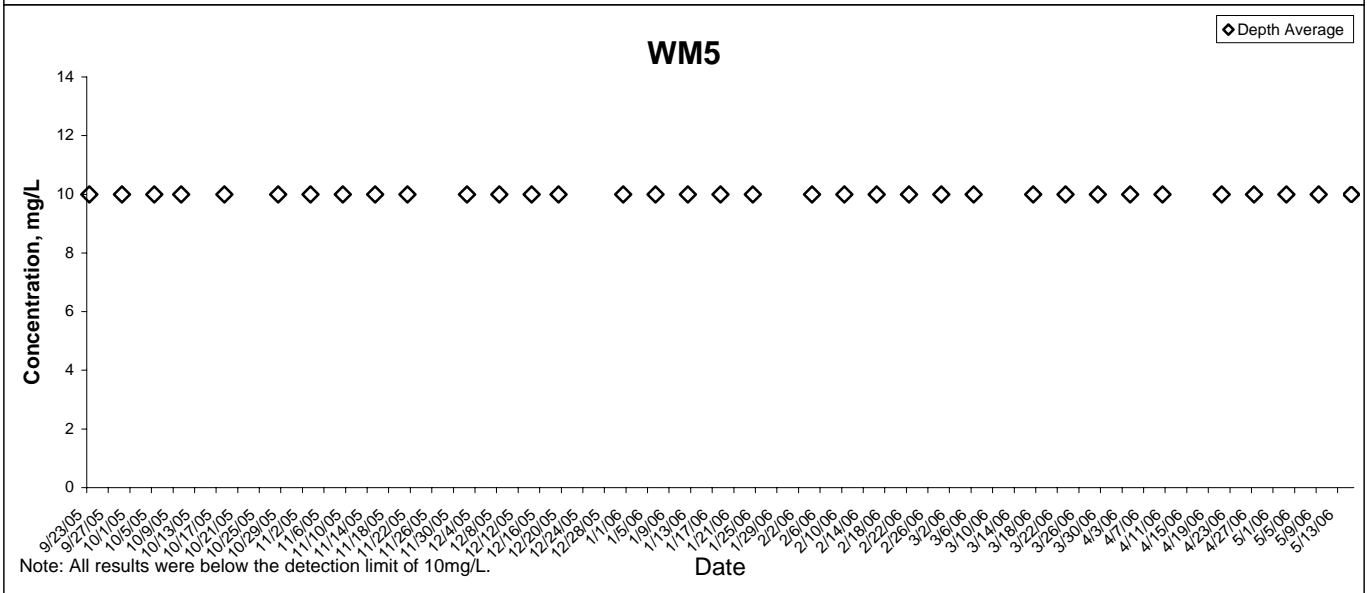
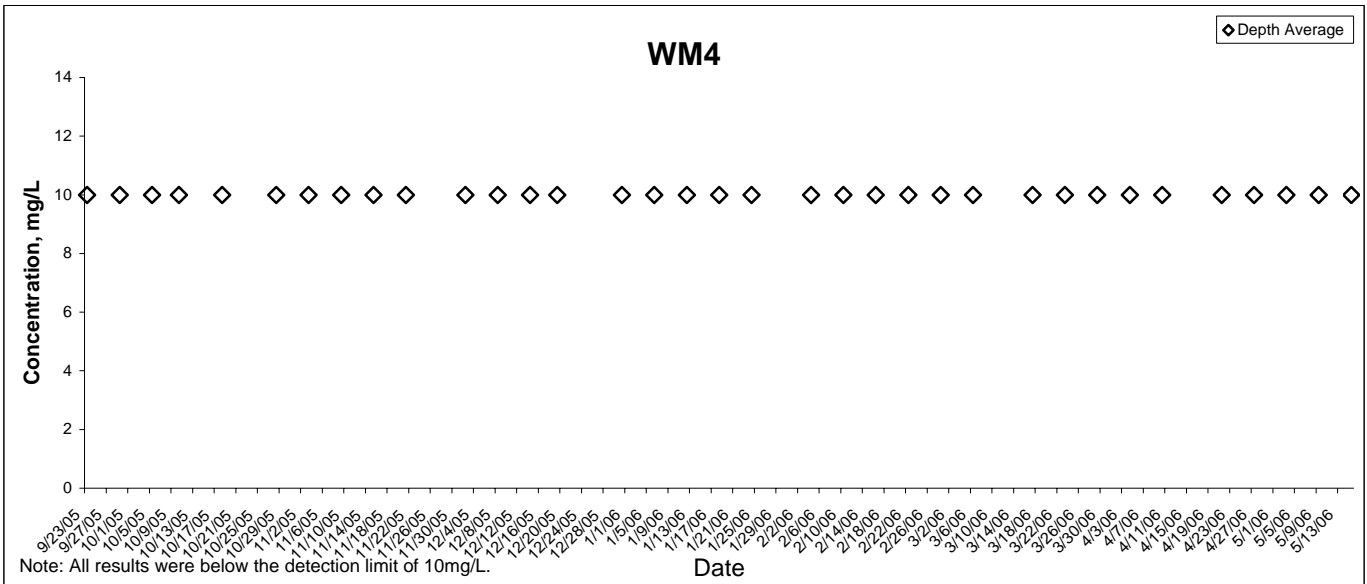
Lead



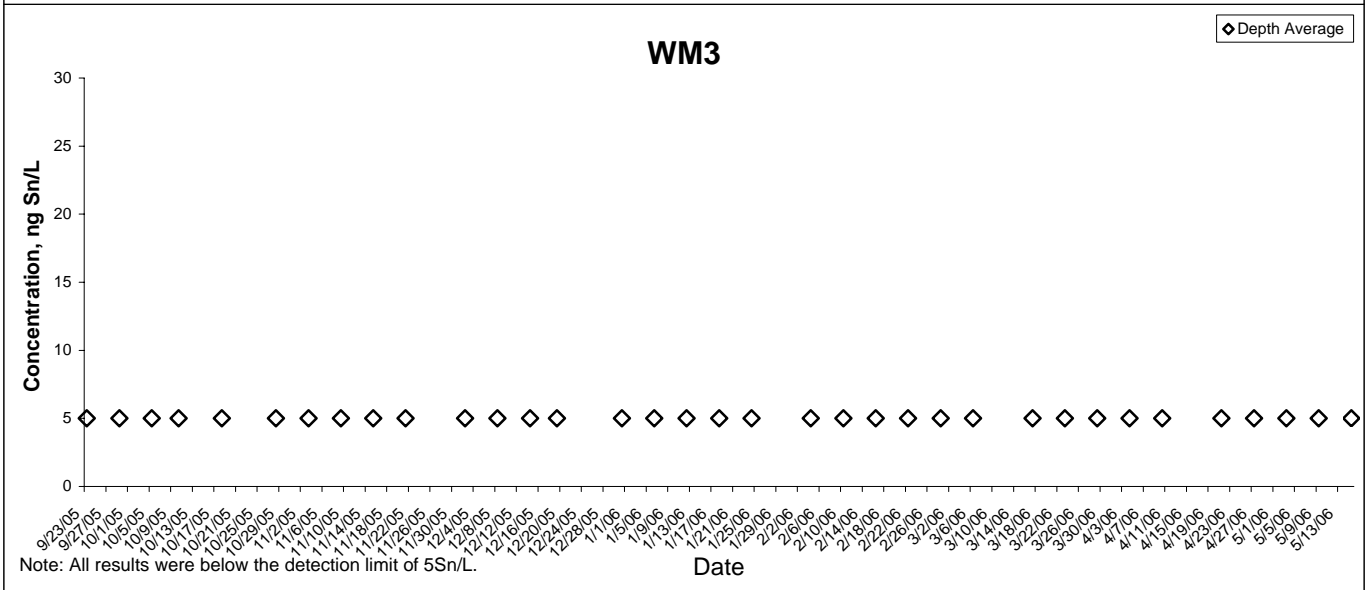
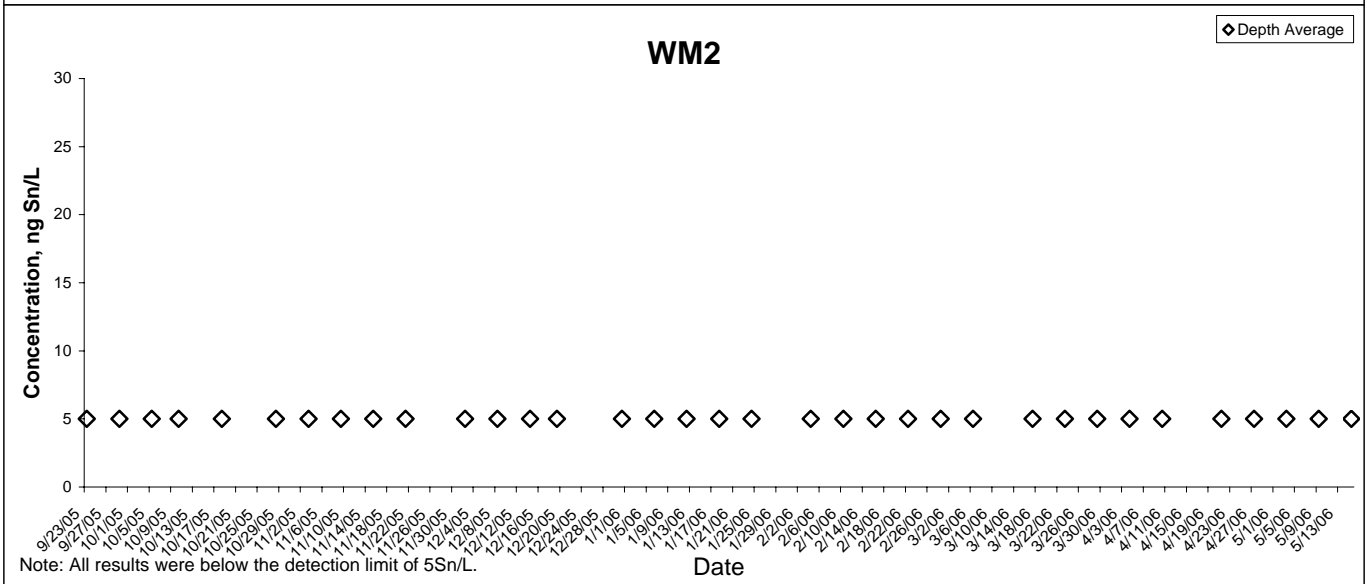
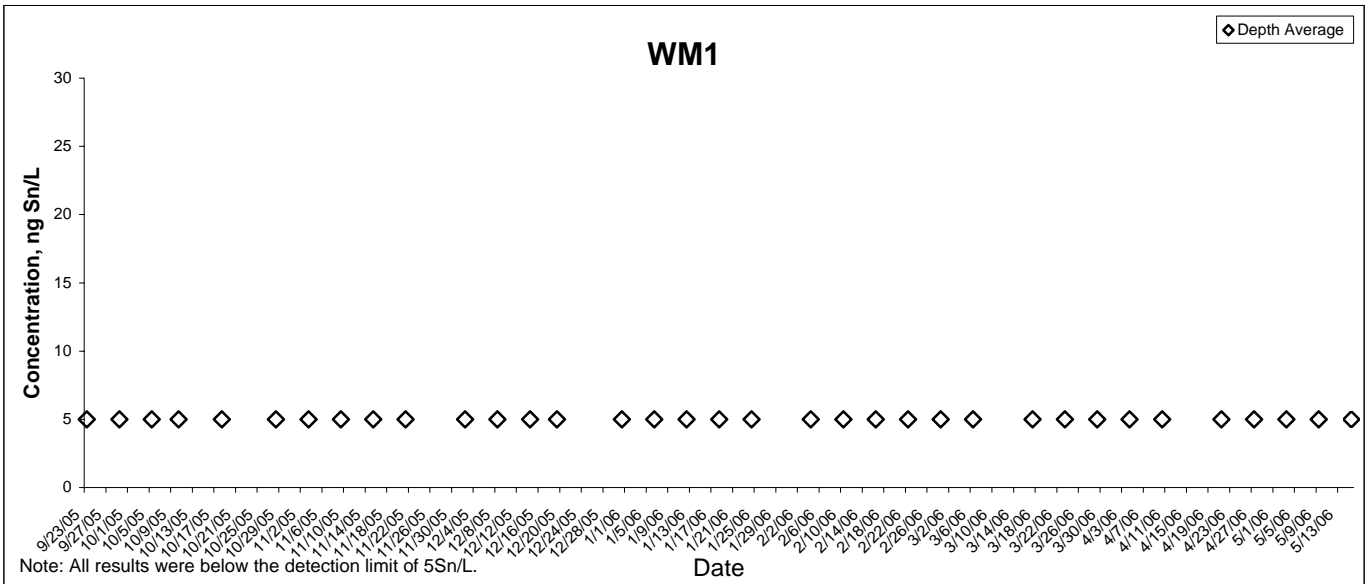
Zinc



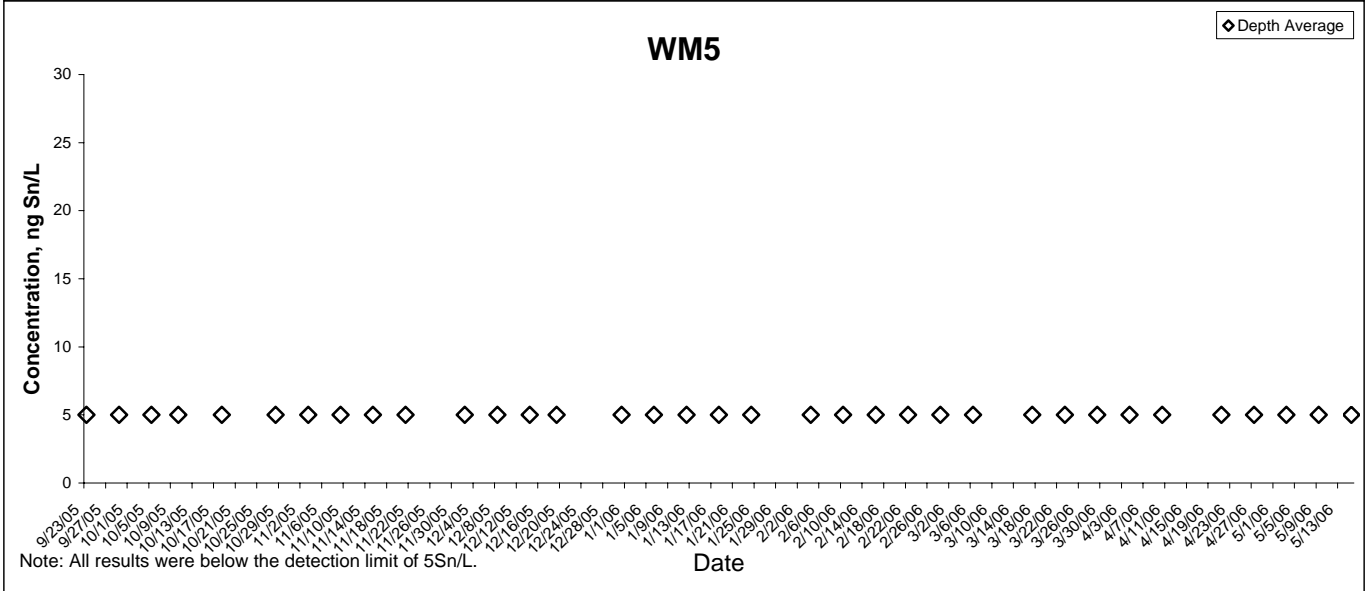
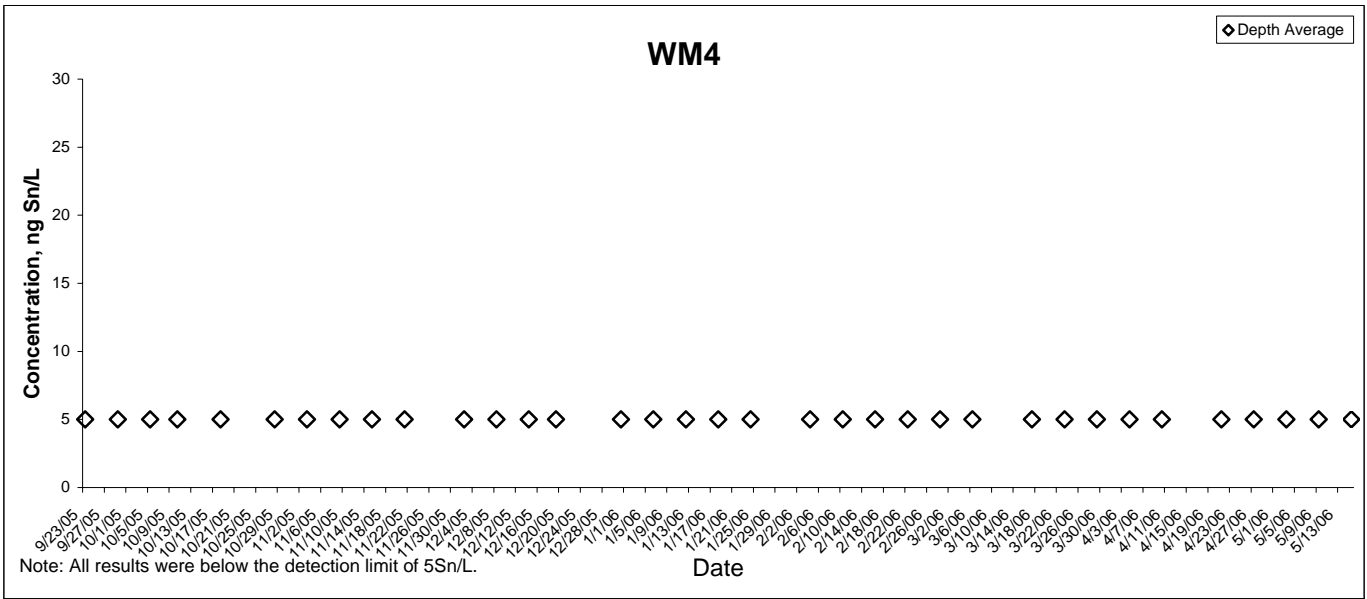
Zinc



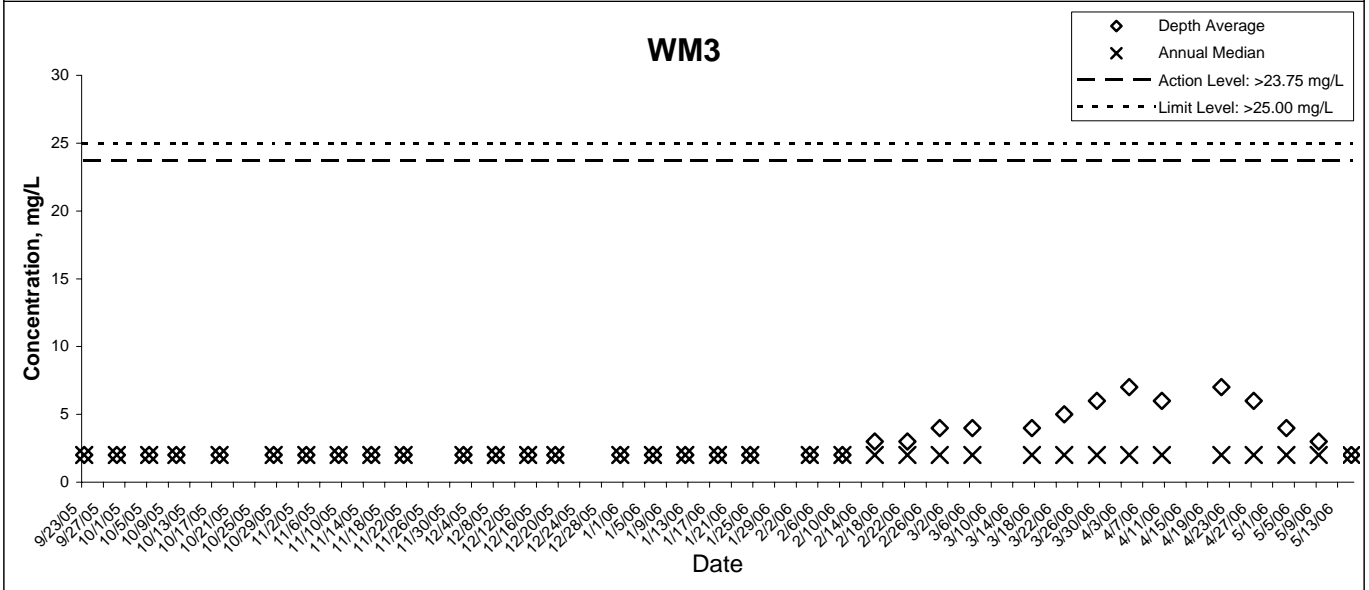
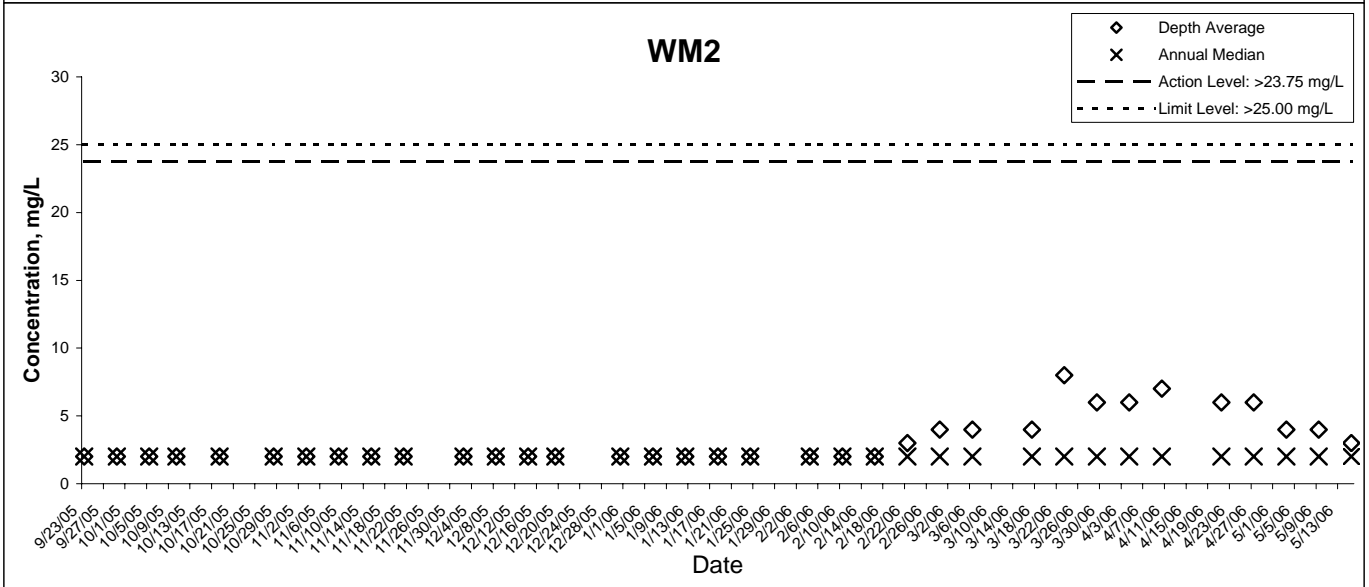
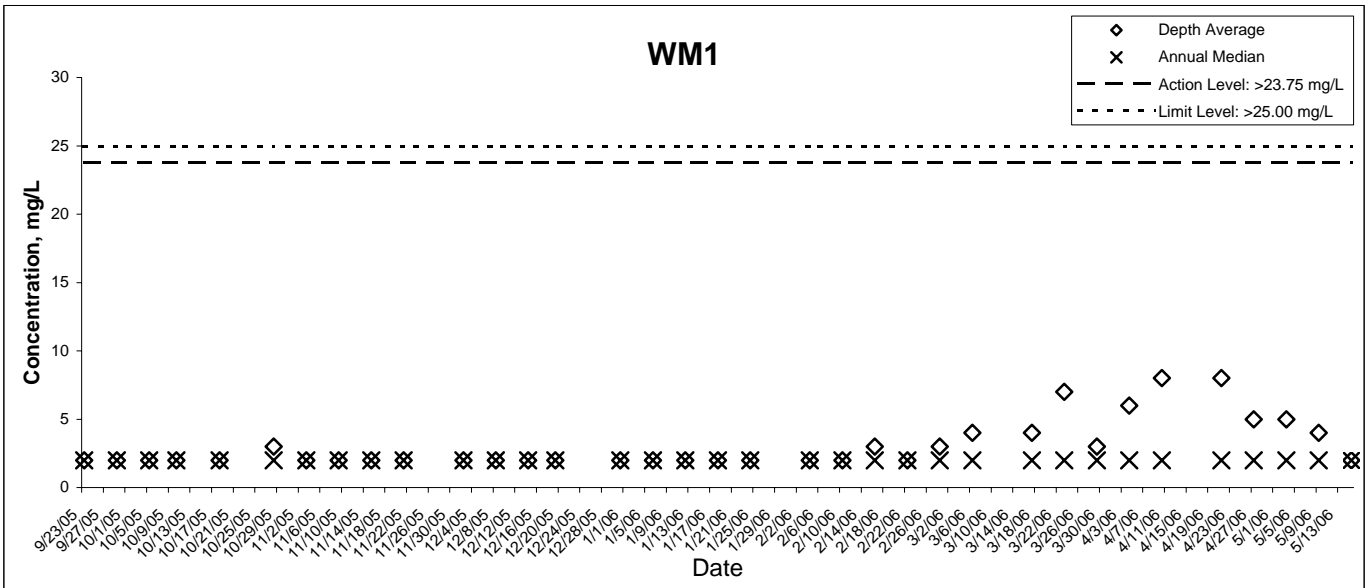
TBT



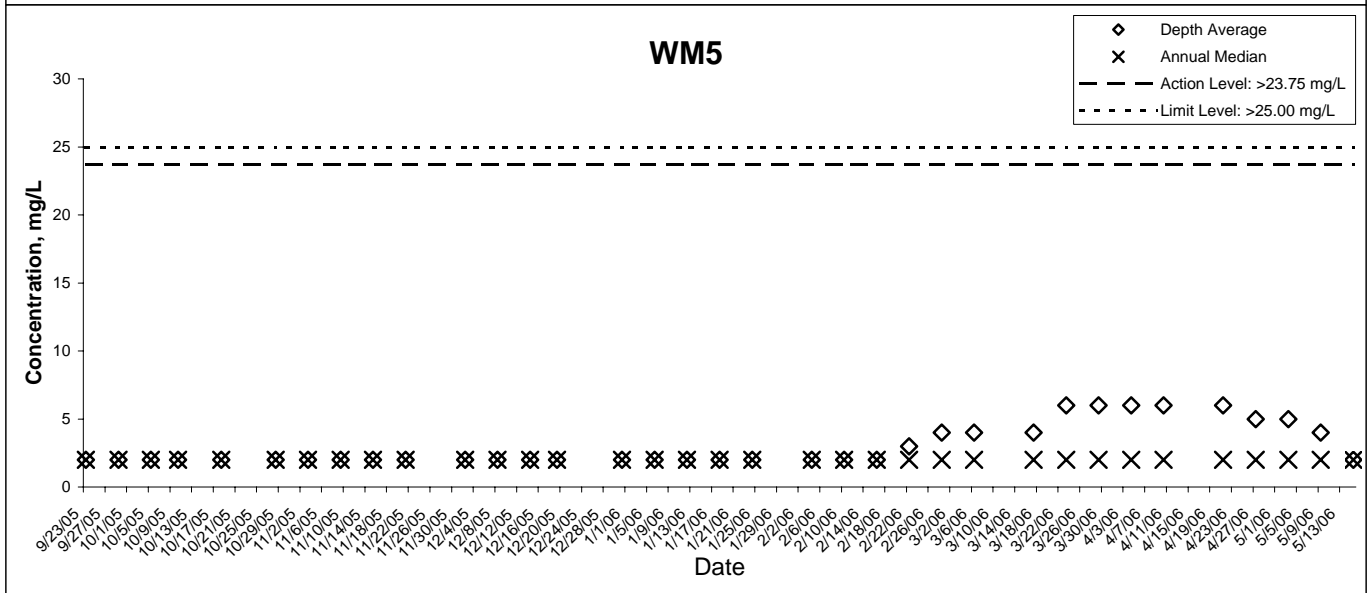
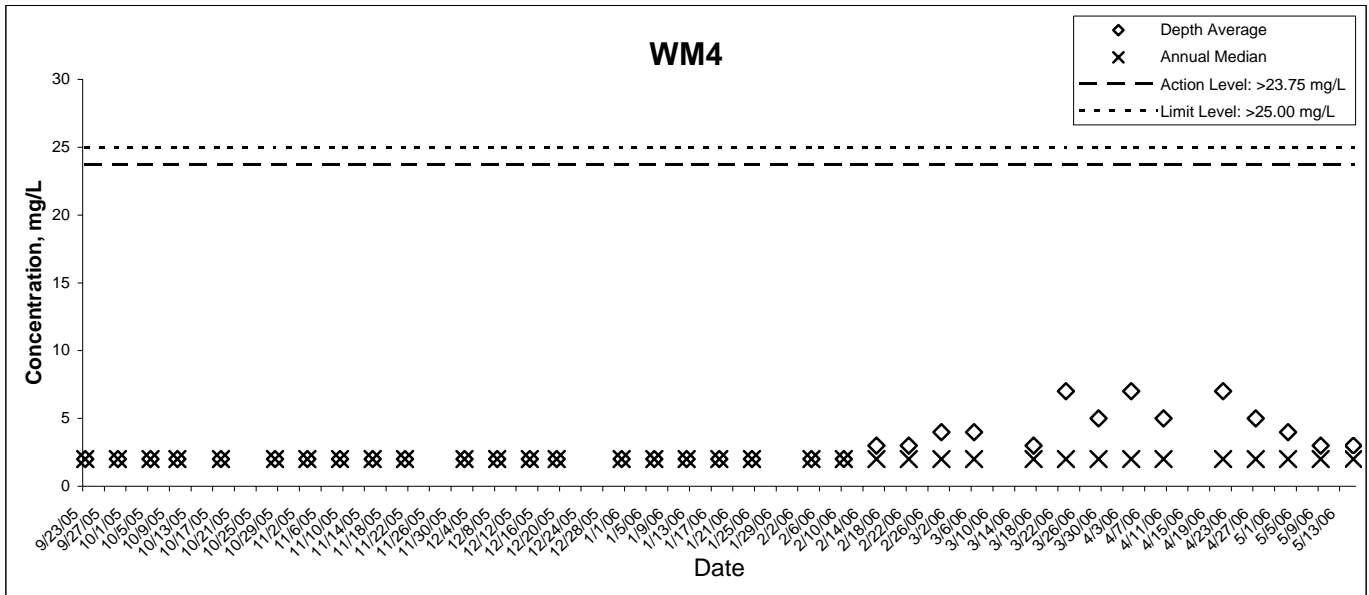
TBT



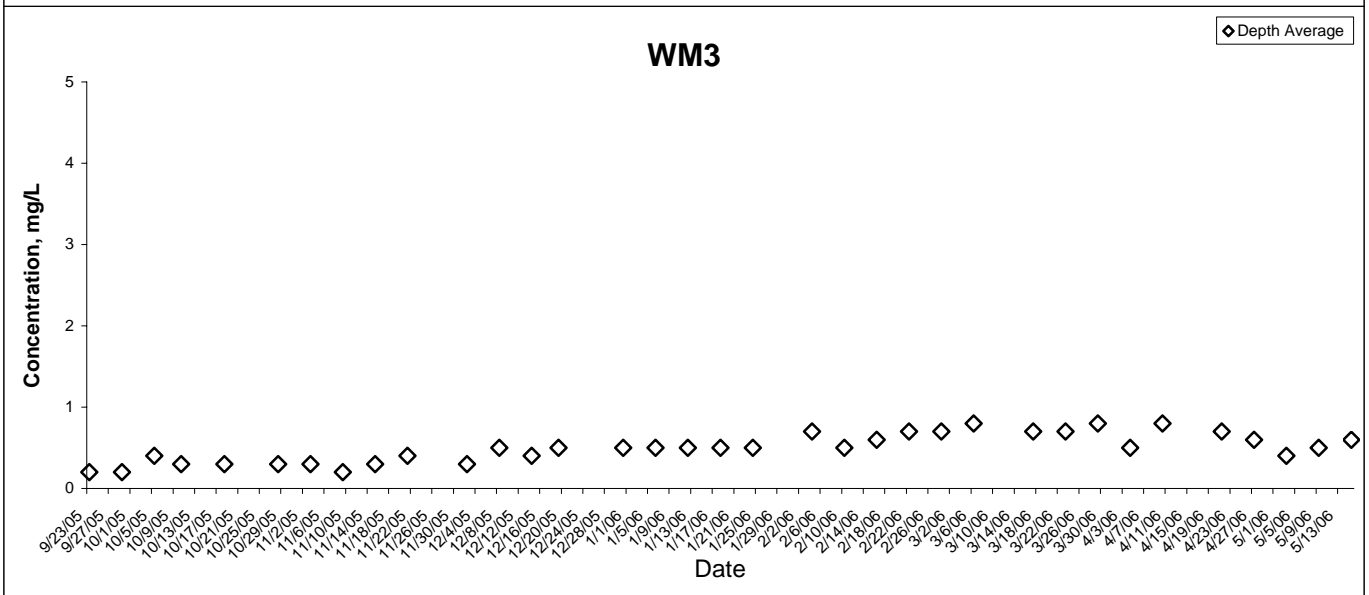
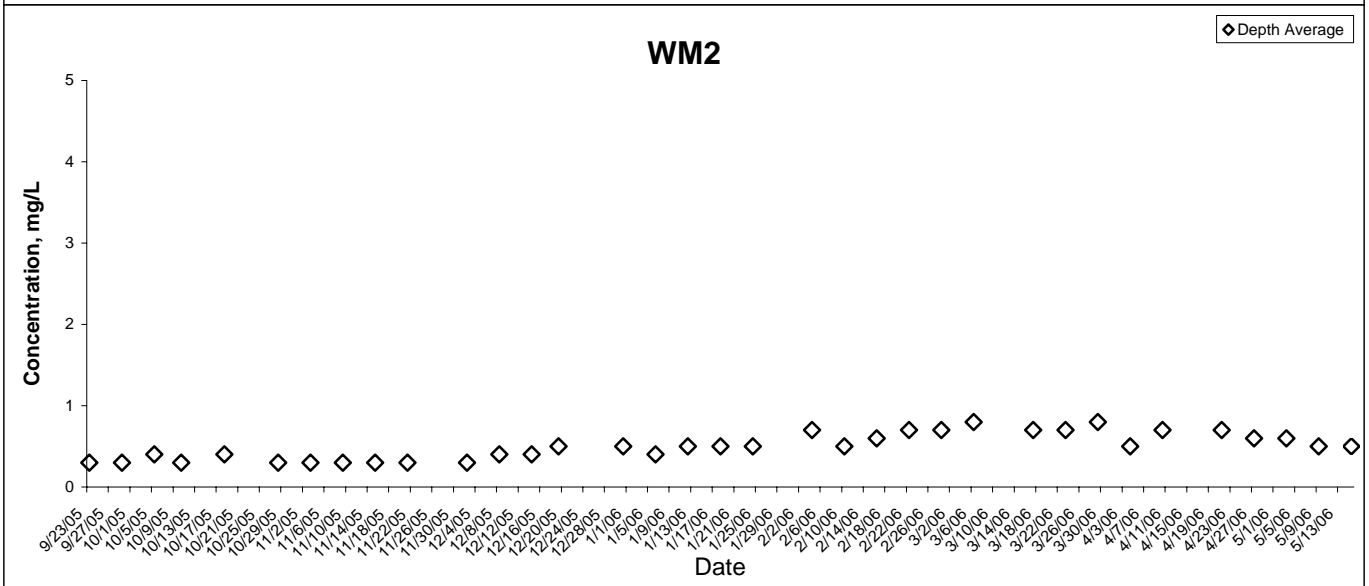
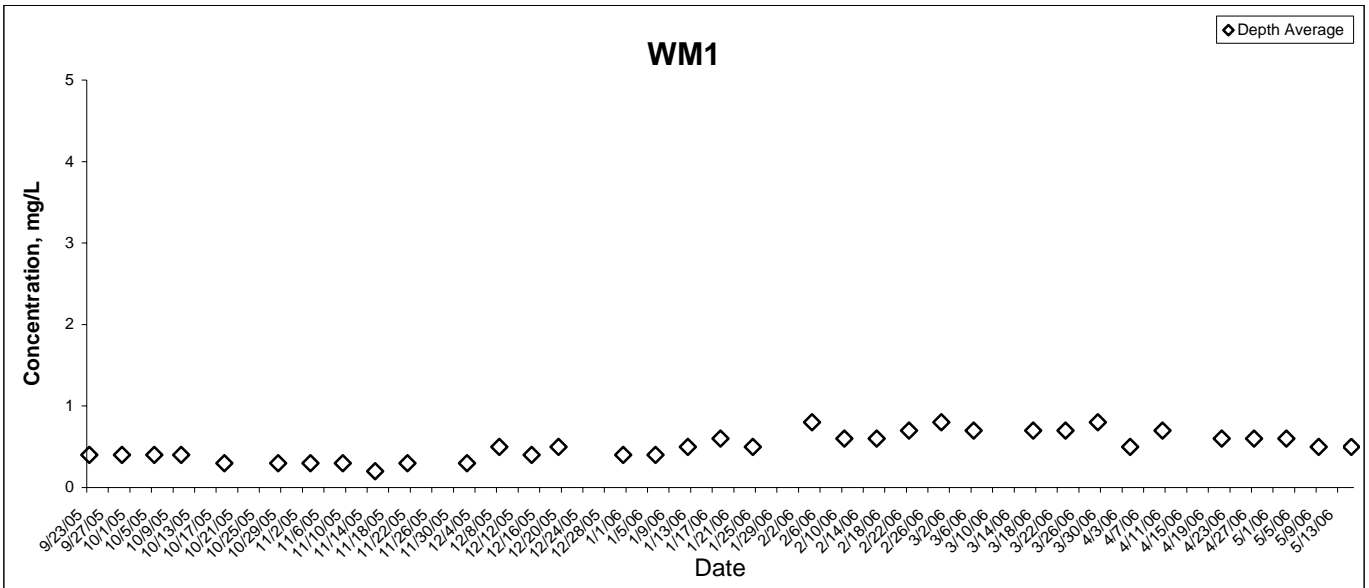
Suspended Solids



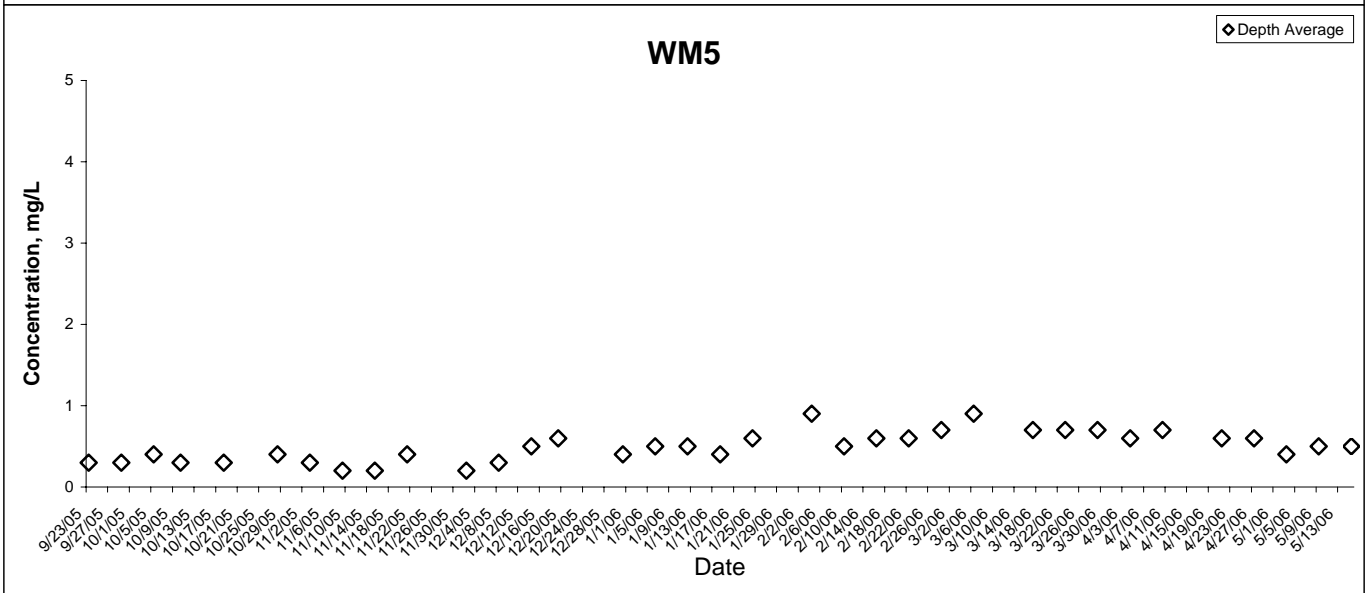
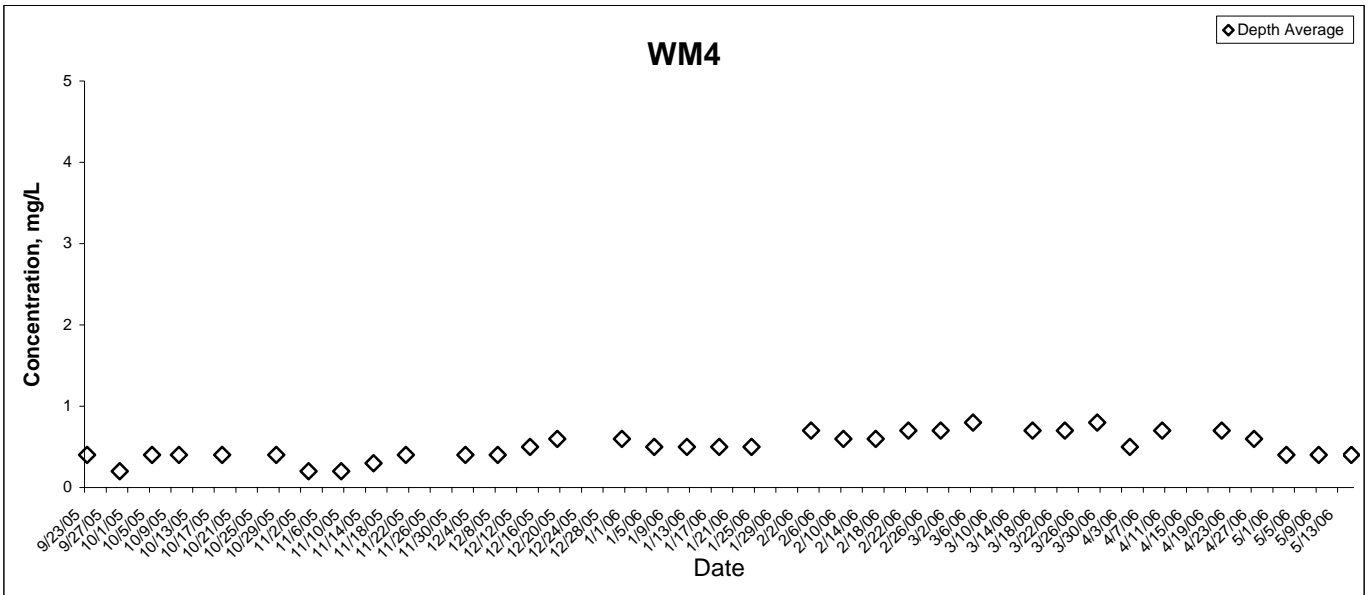
Suspended Solids



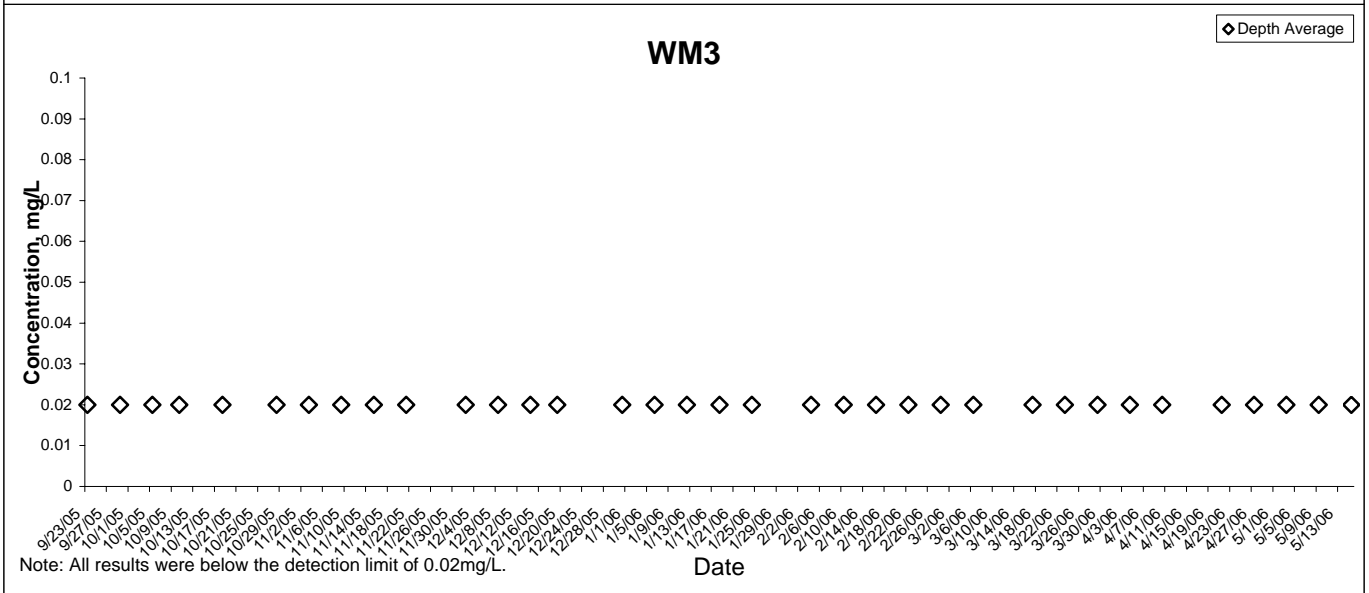
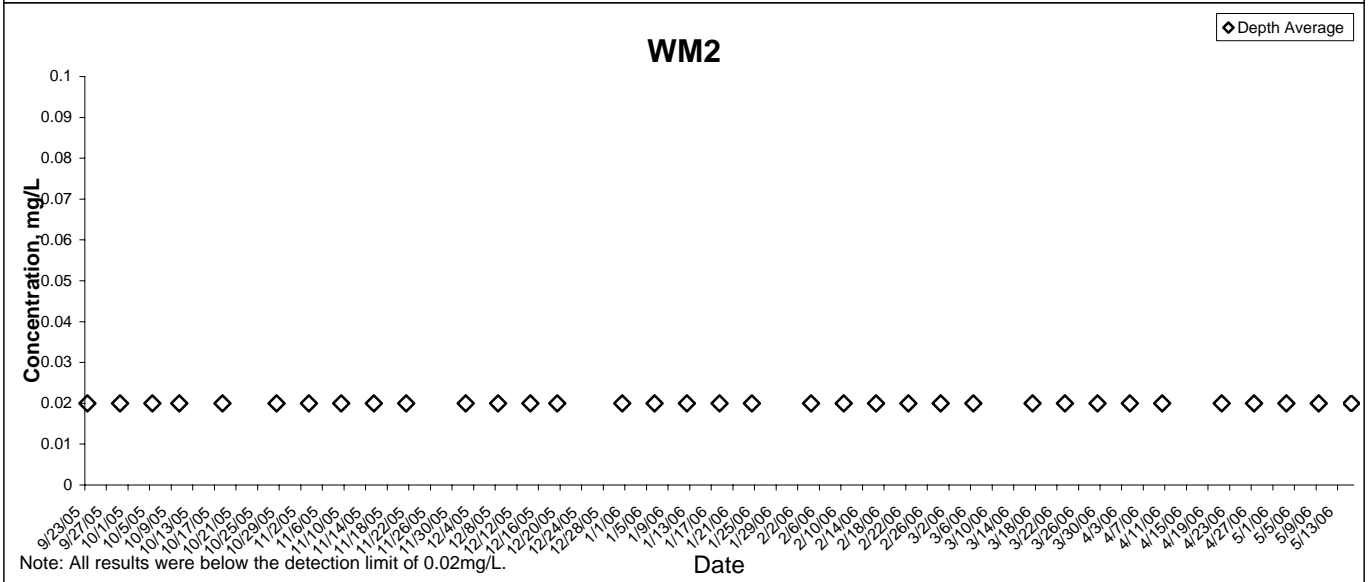
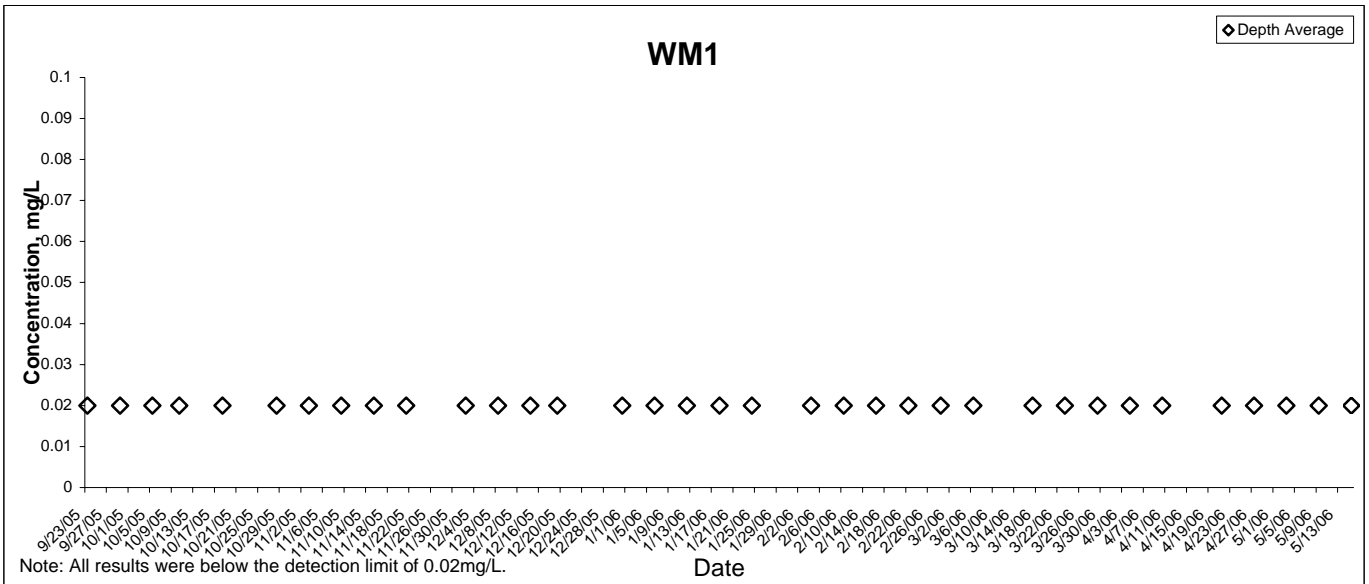
Total Nitrogen



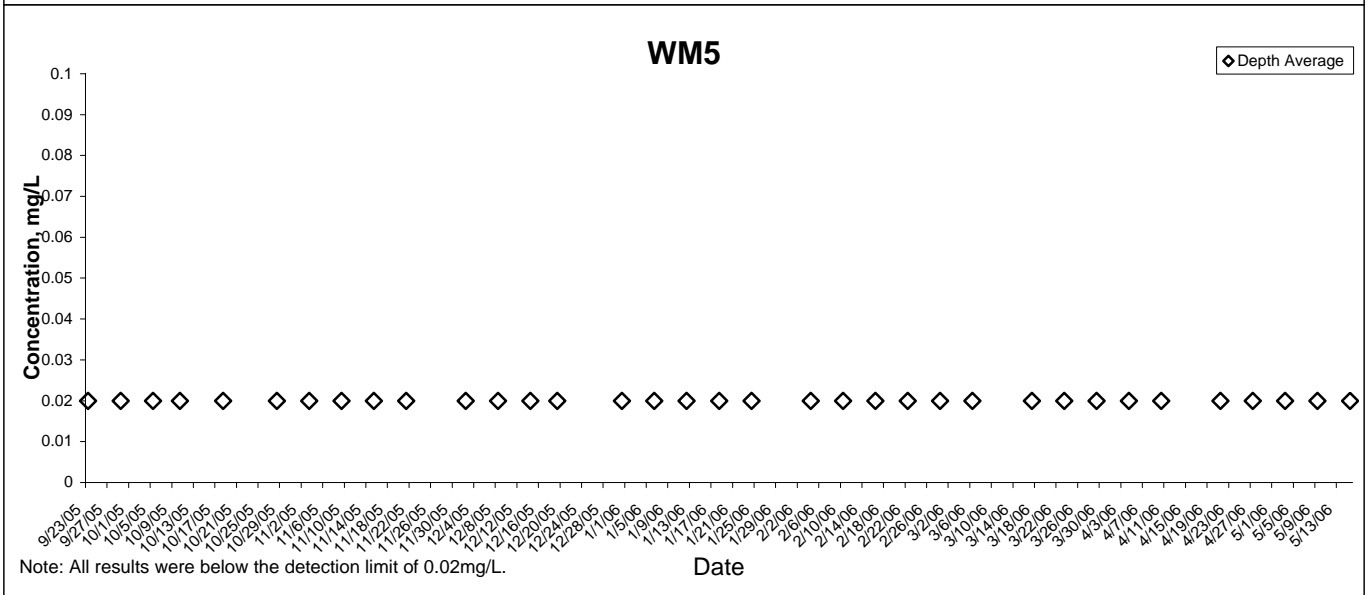
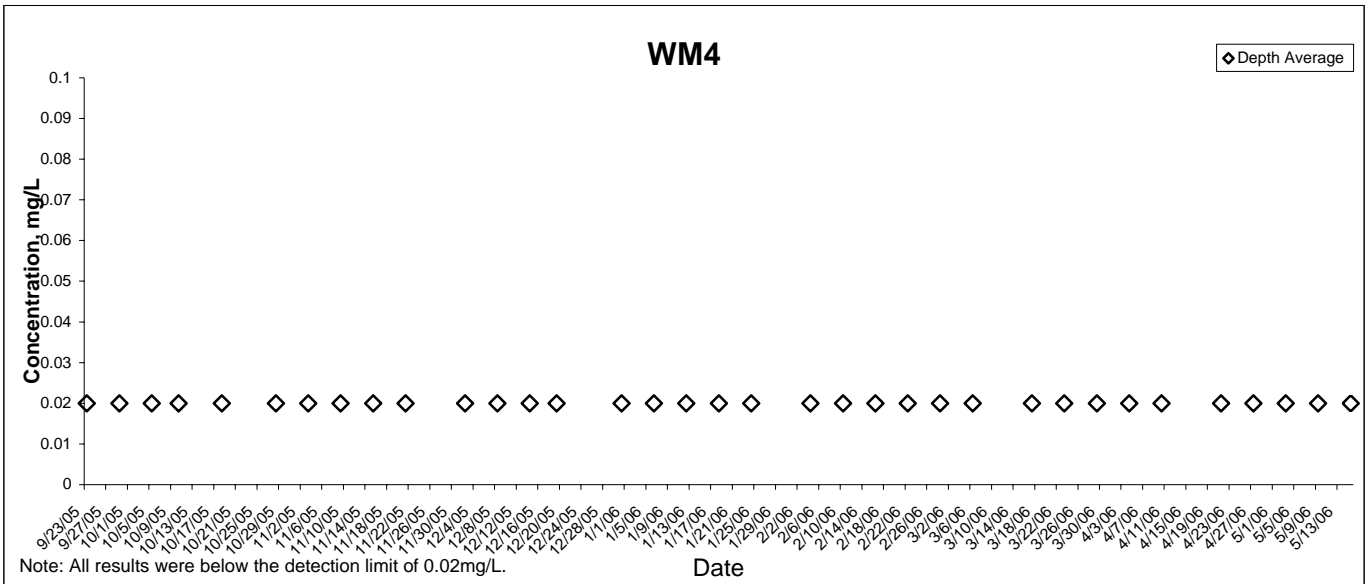
Total Nitrogen



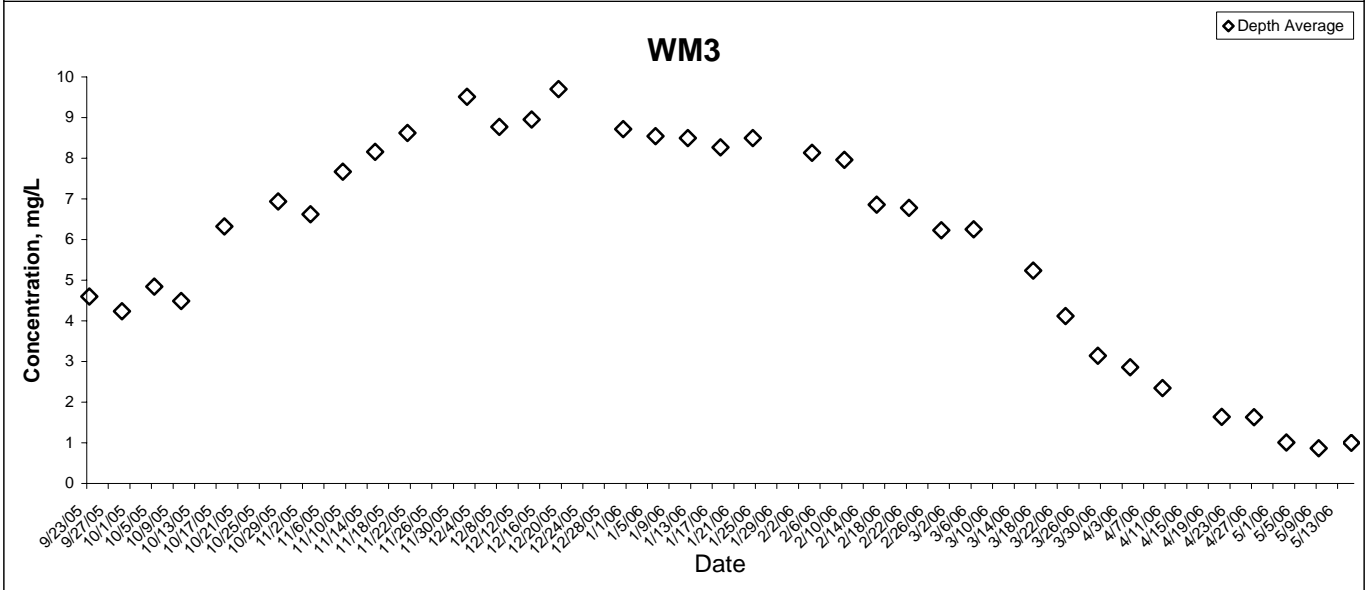
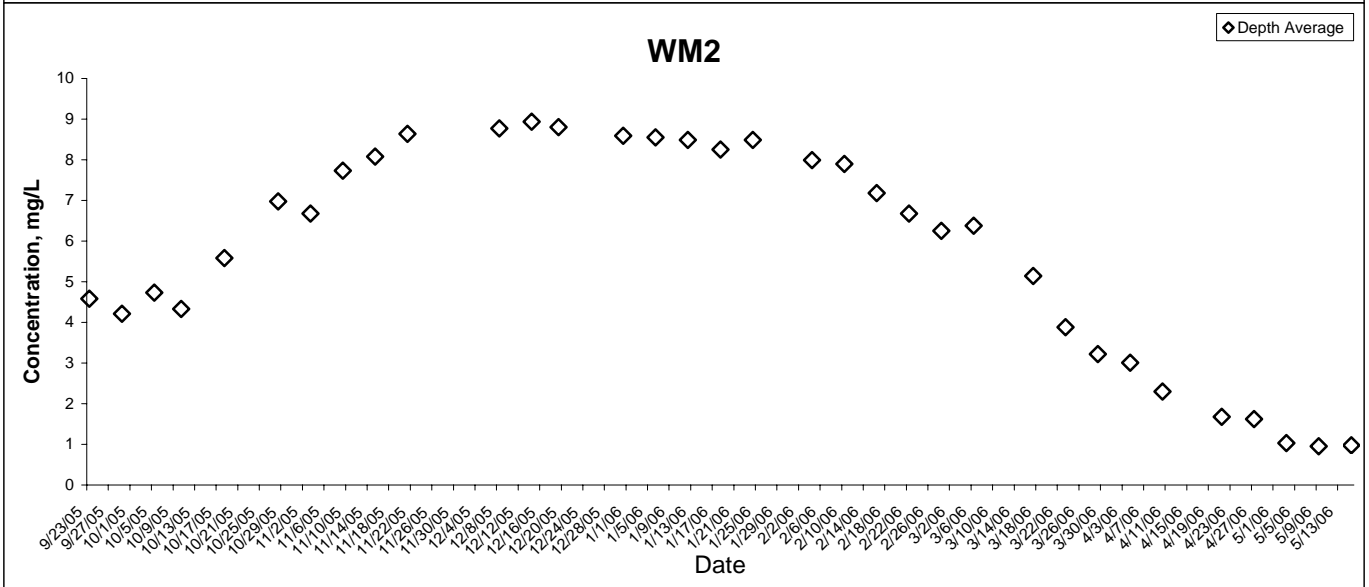
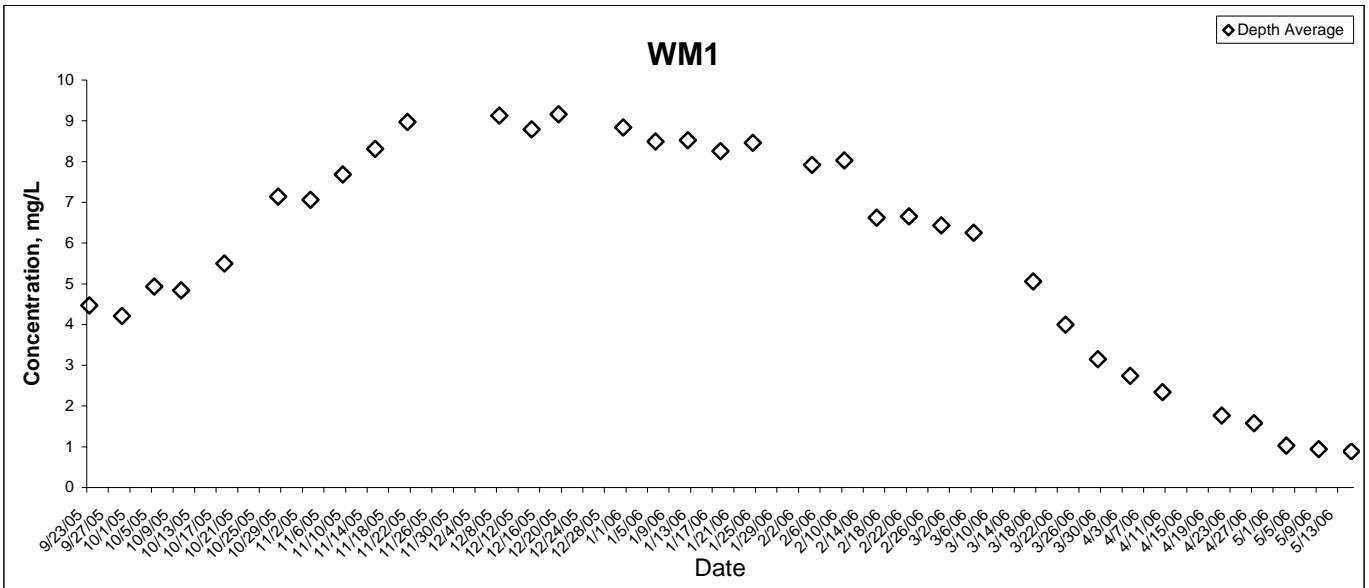
Total Phosphorous



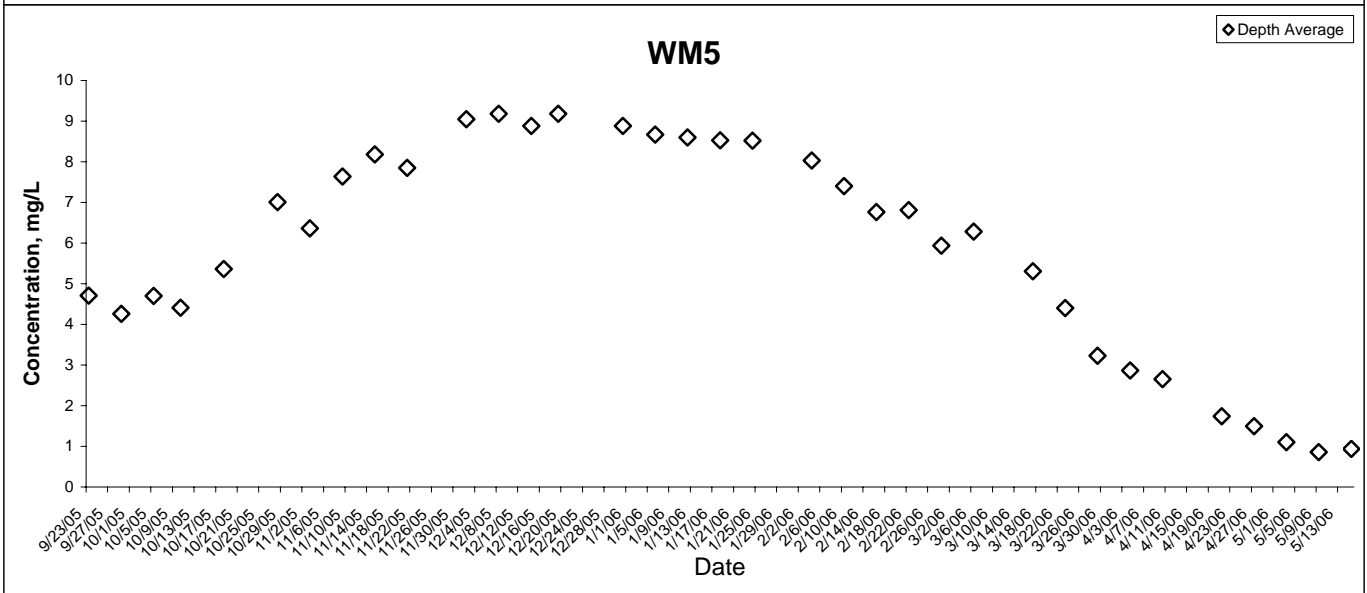
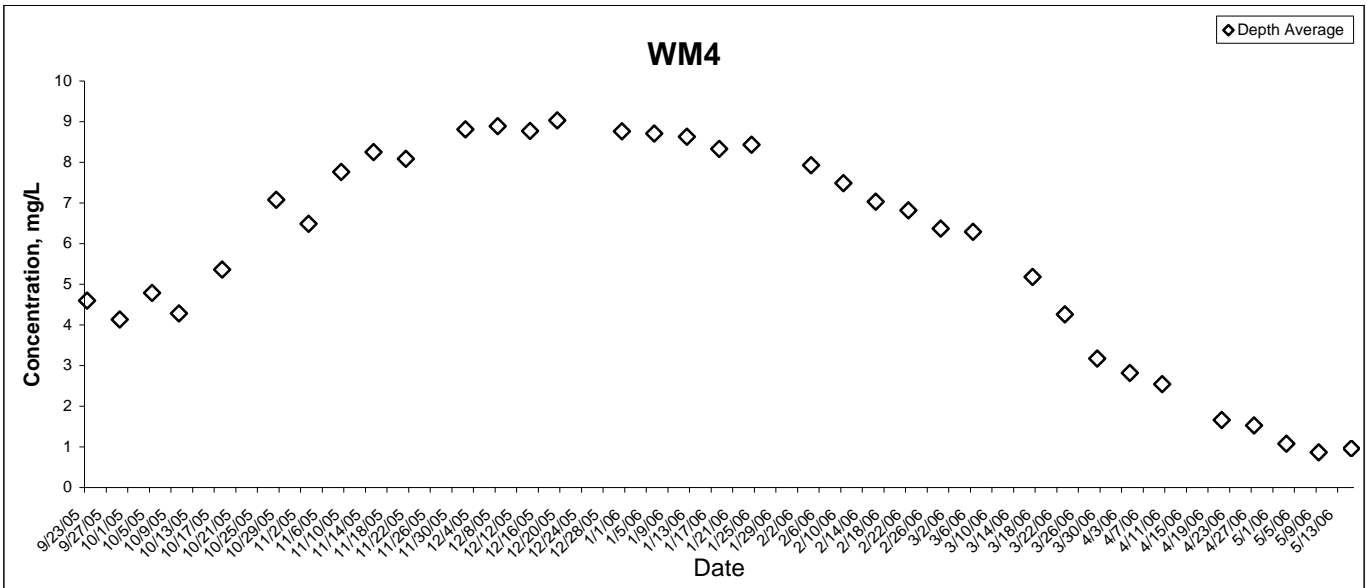
Total Phosphorous



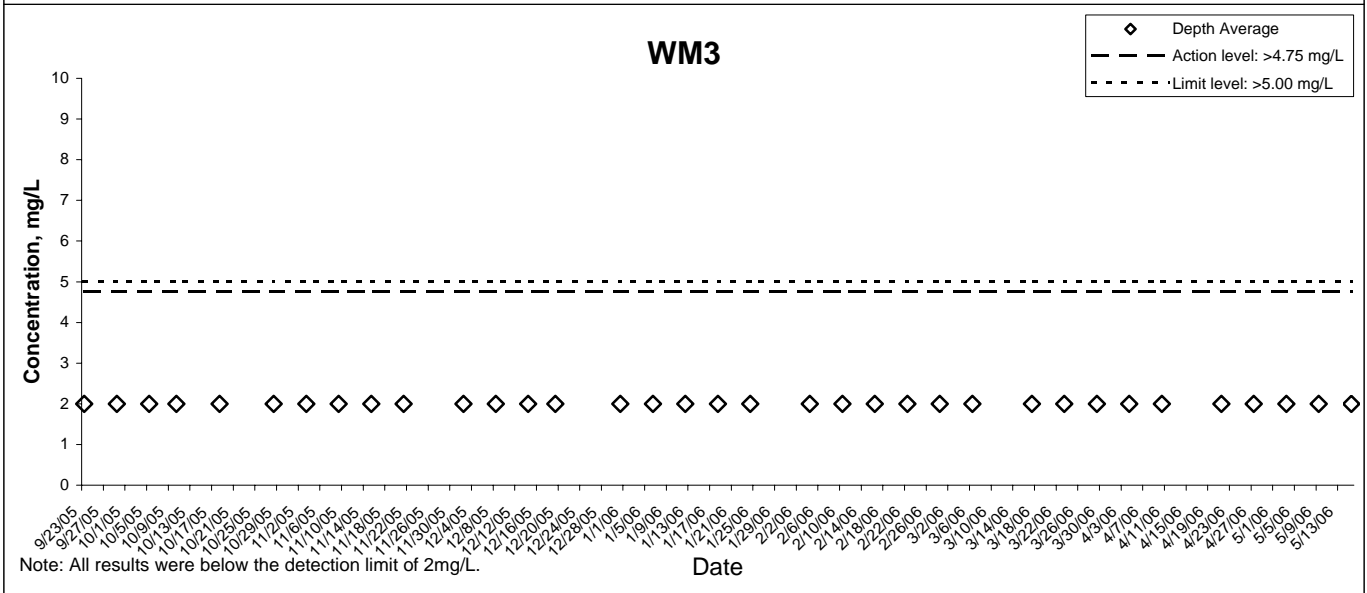
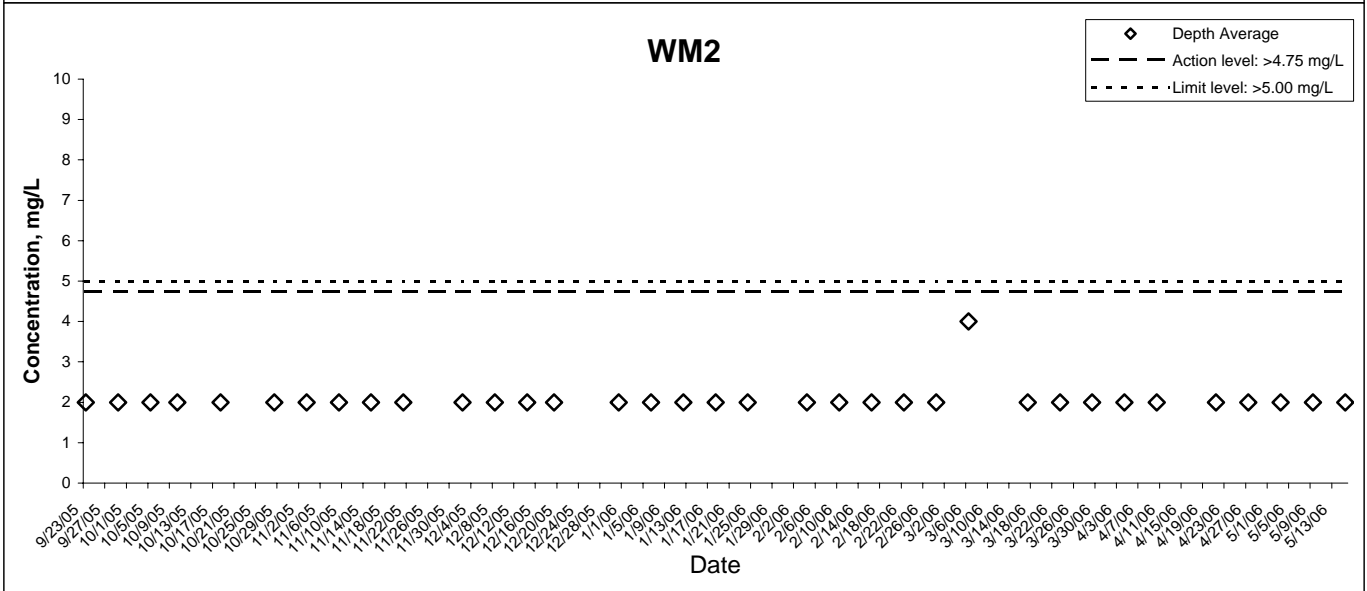
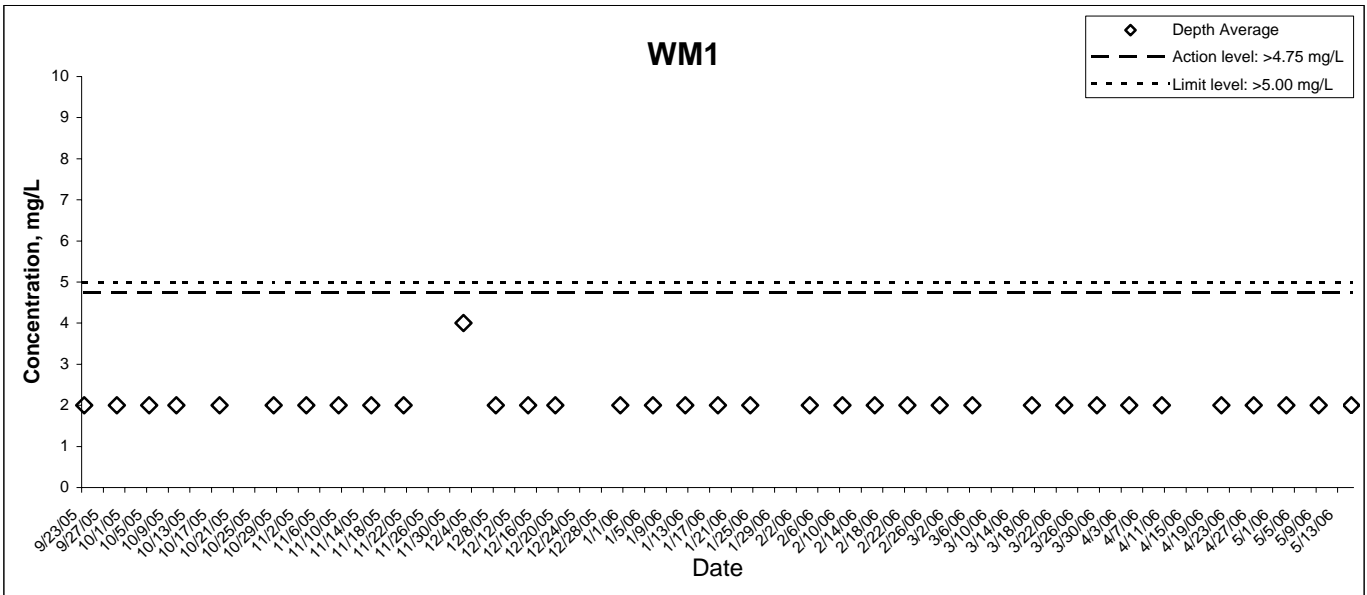
Silica



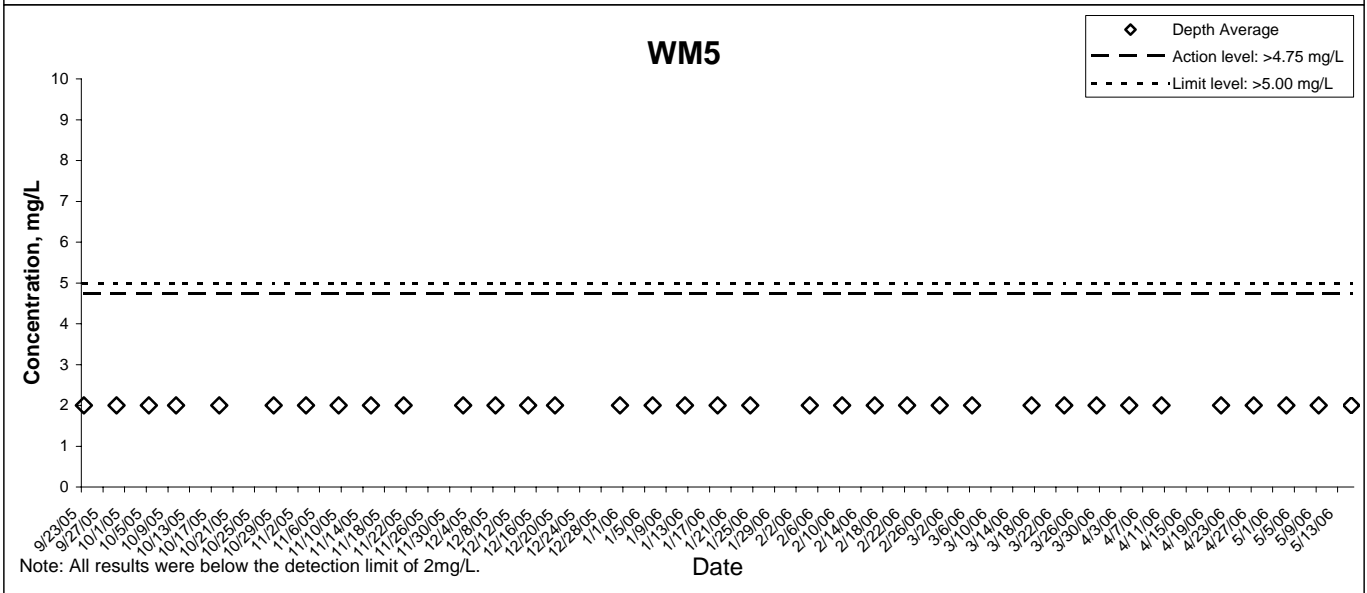
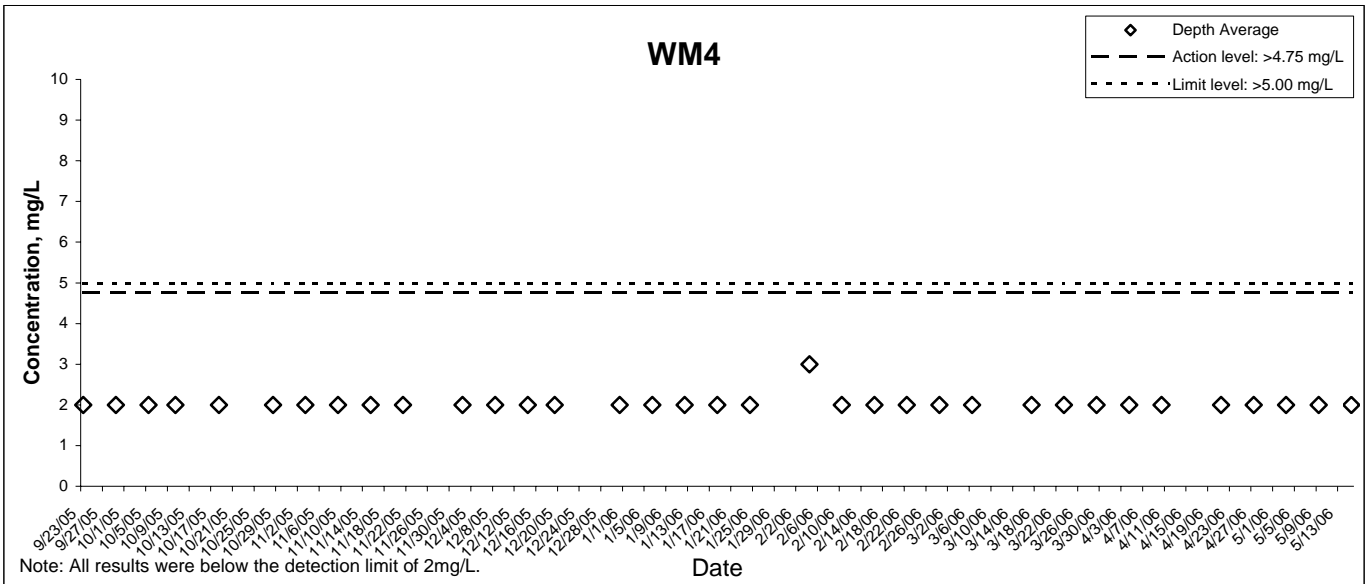
Silica



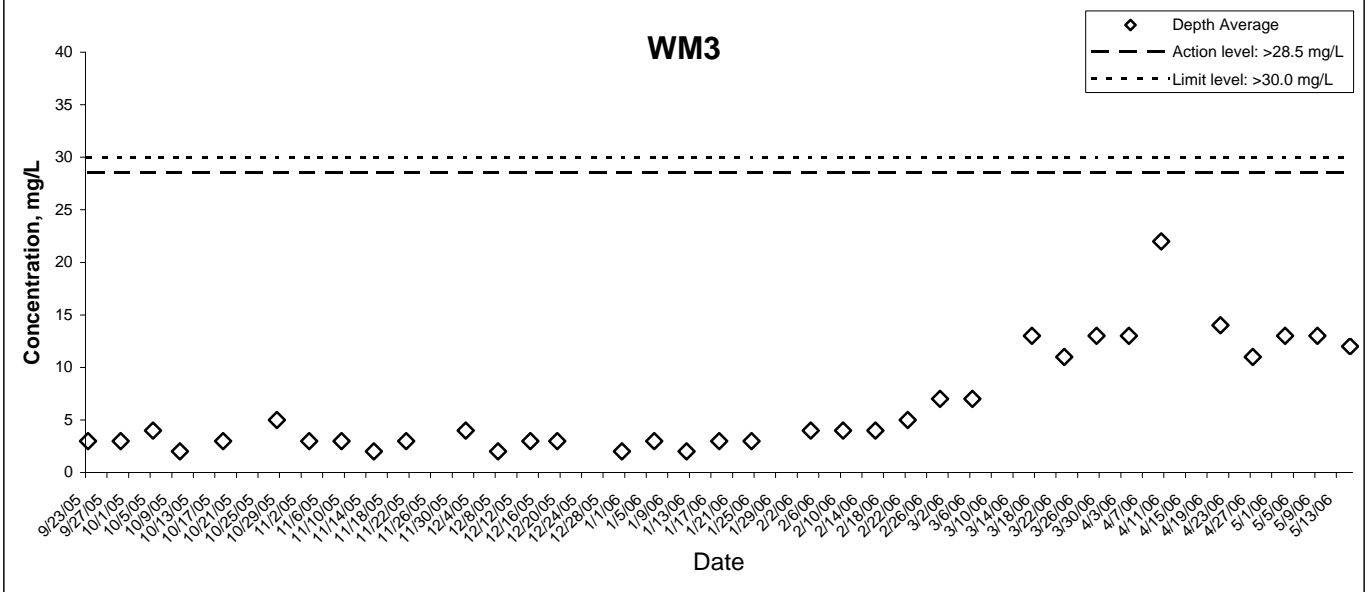
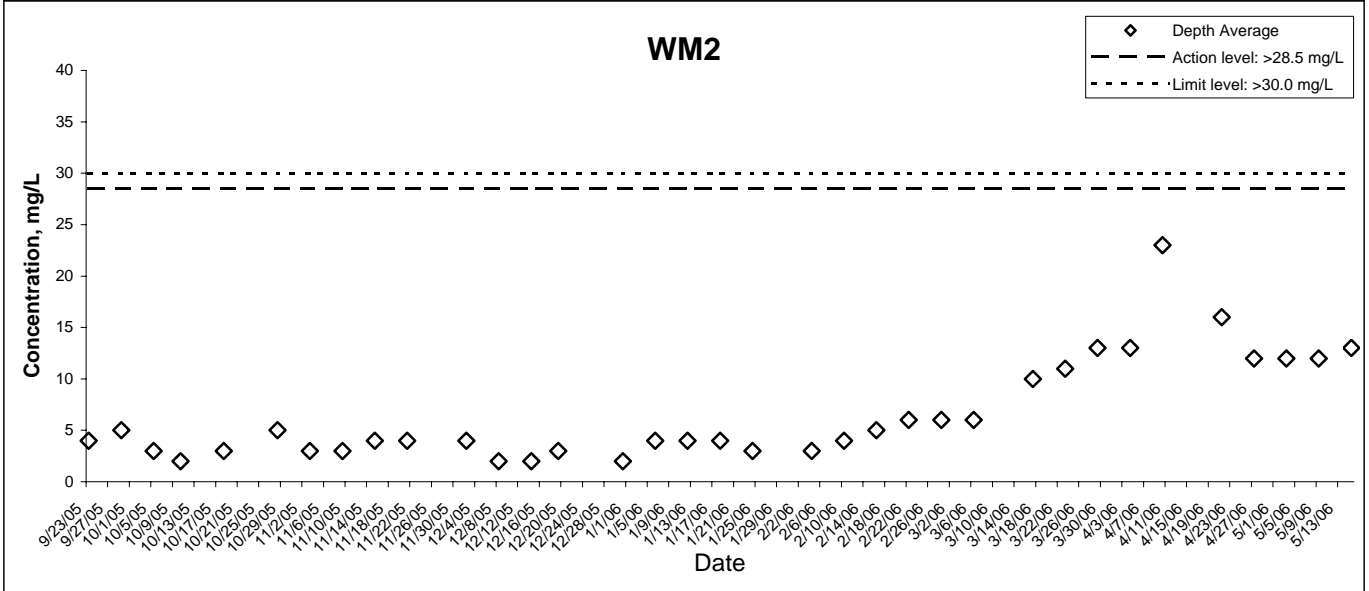
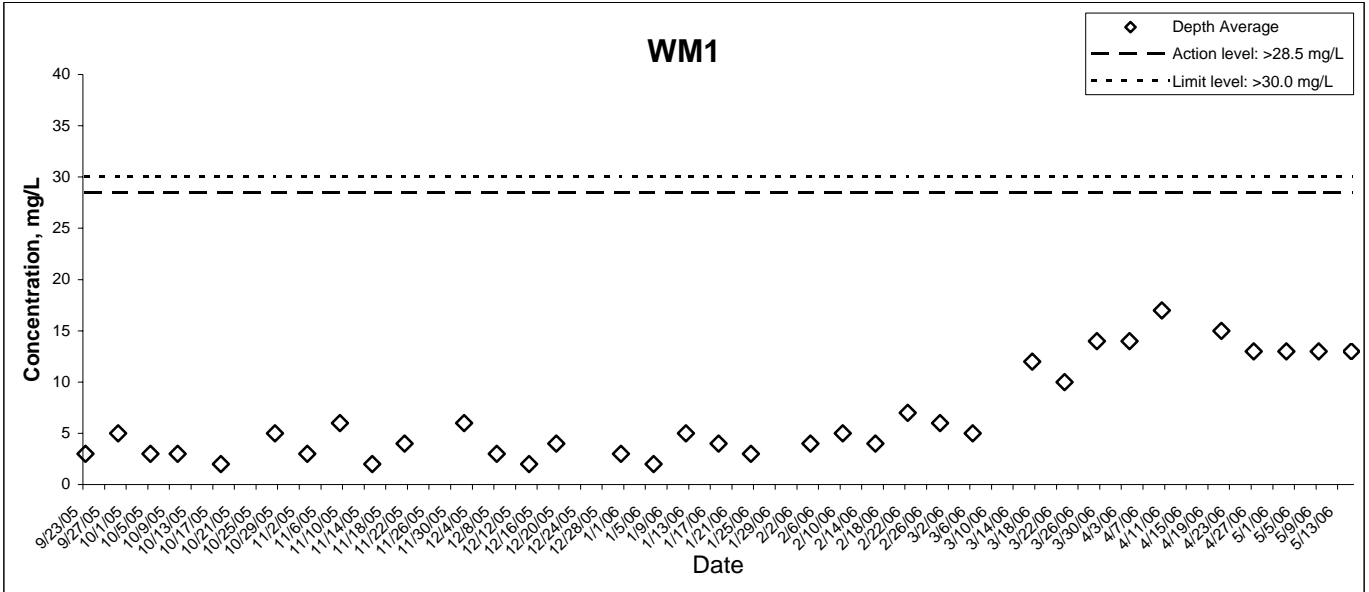
5-day BOD



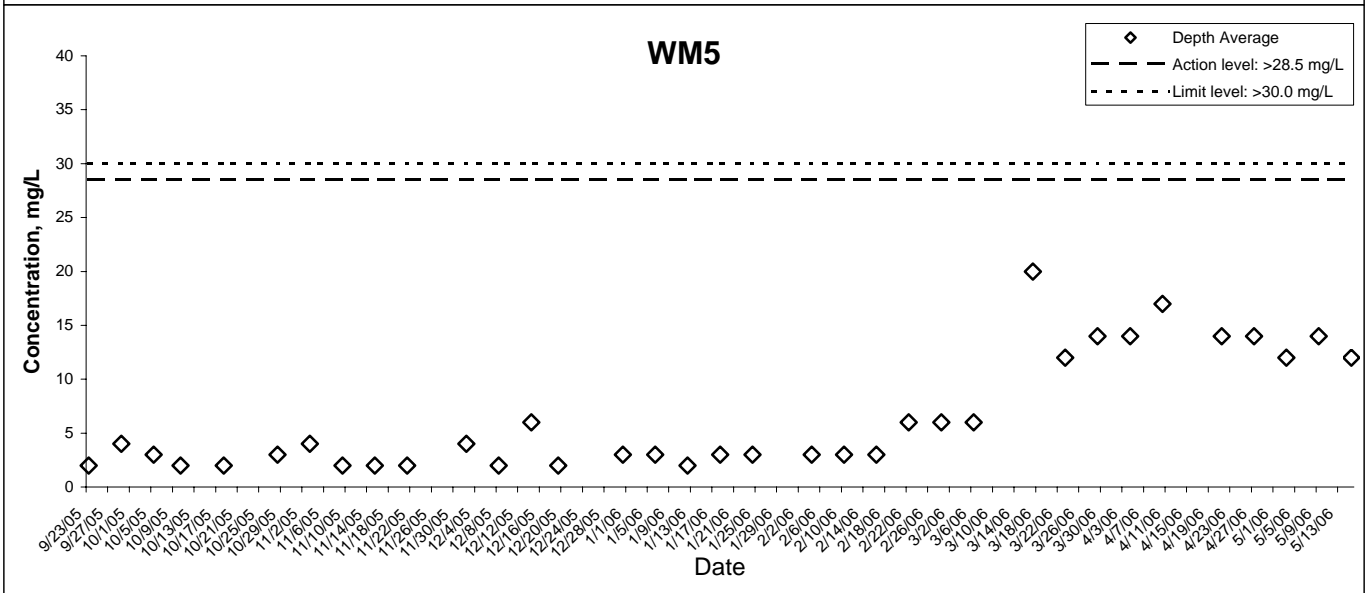
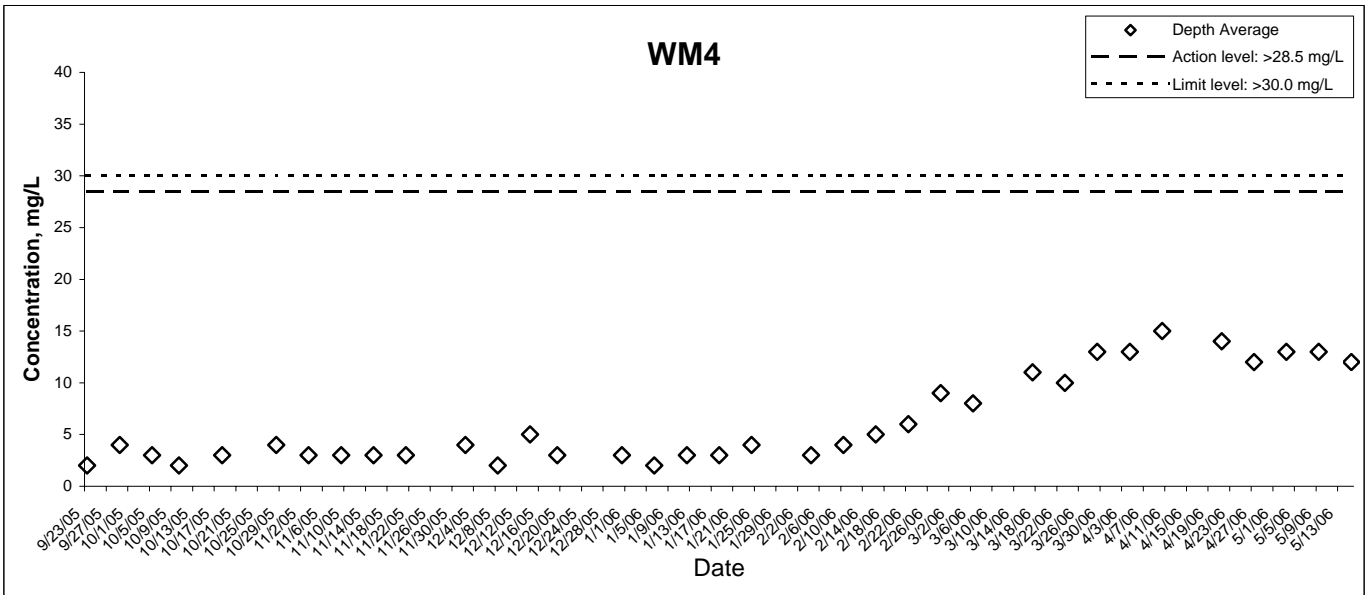
5-day BOD



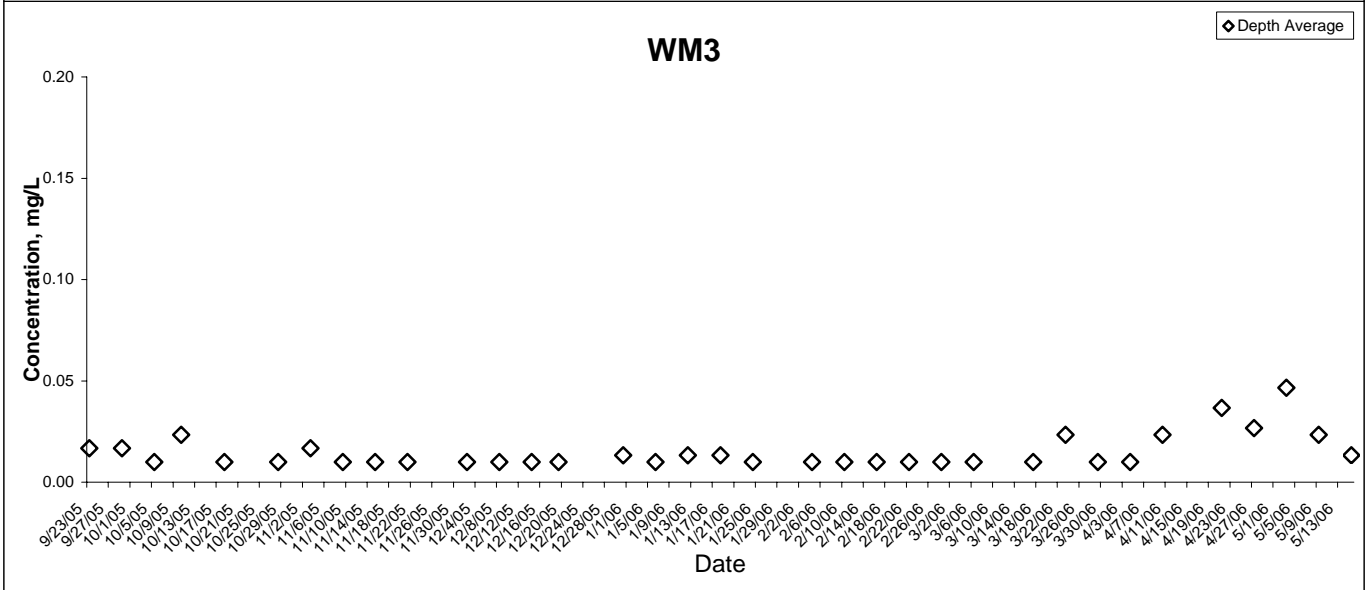
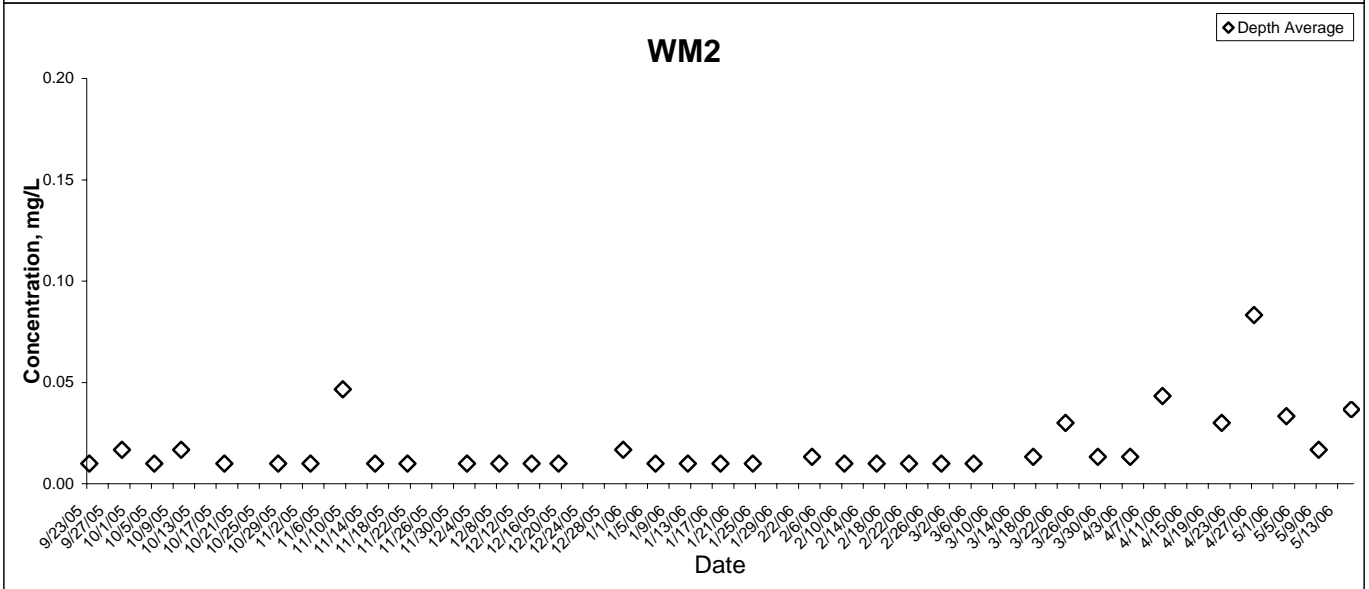
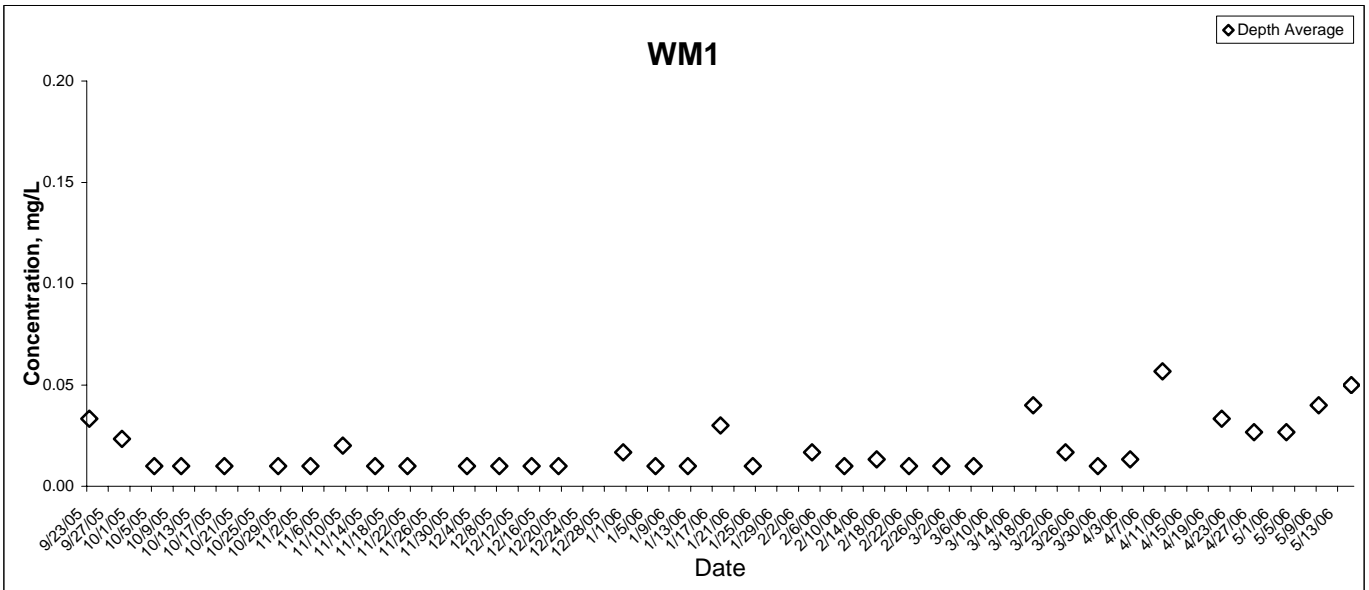
Chemical Oxygen Demand



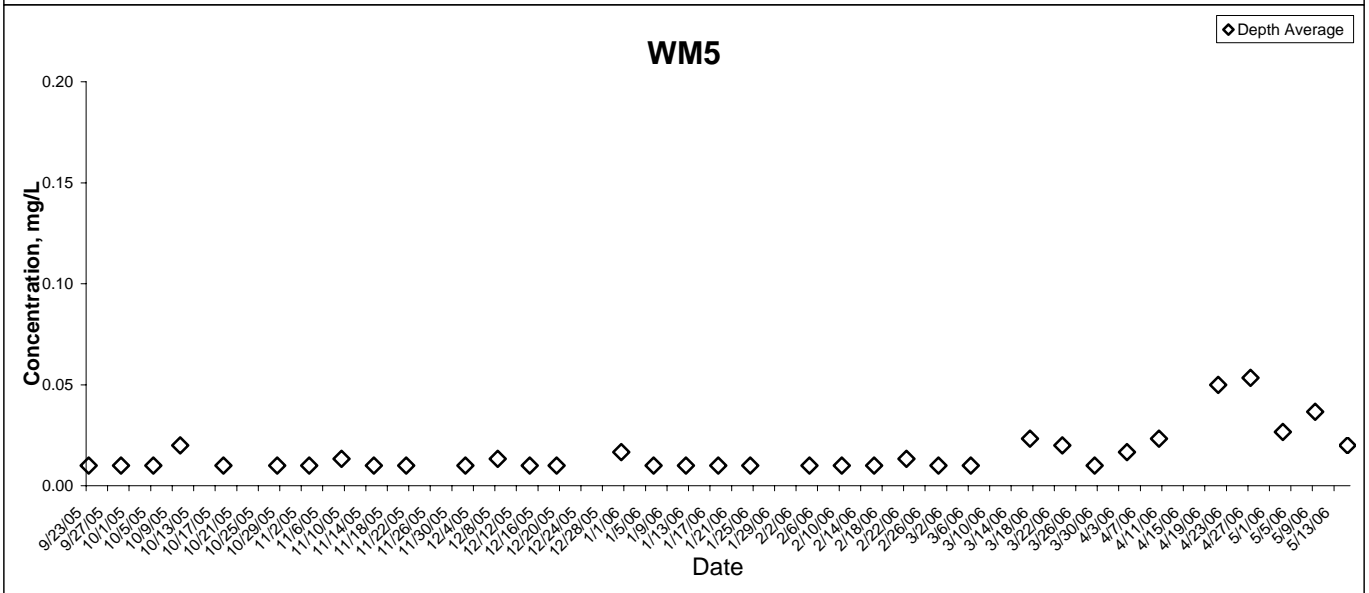
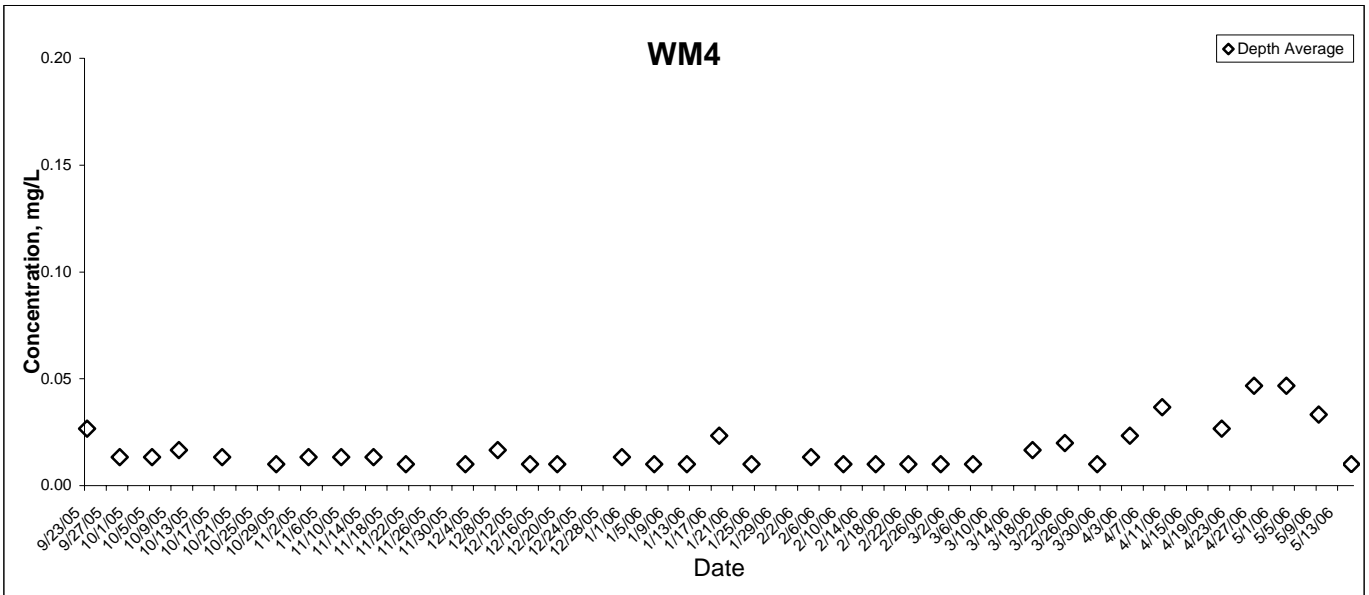
Chemical Oxygen Demand



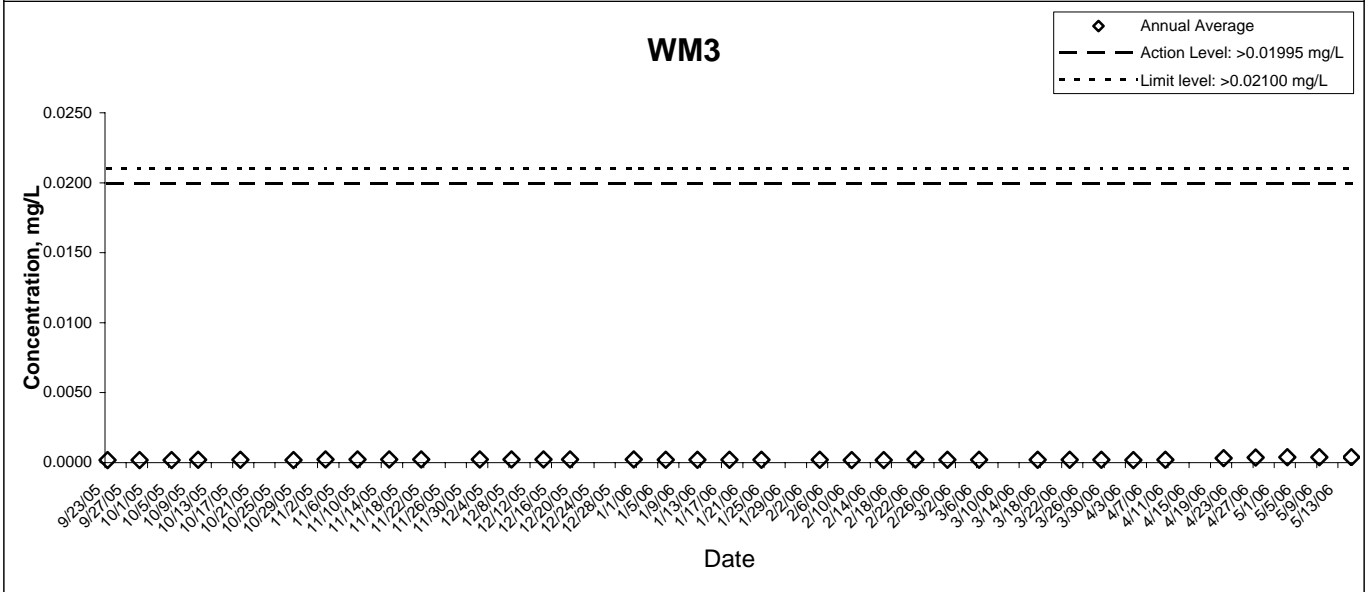
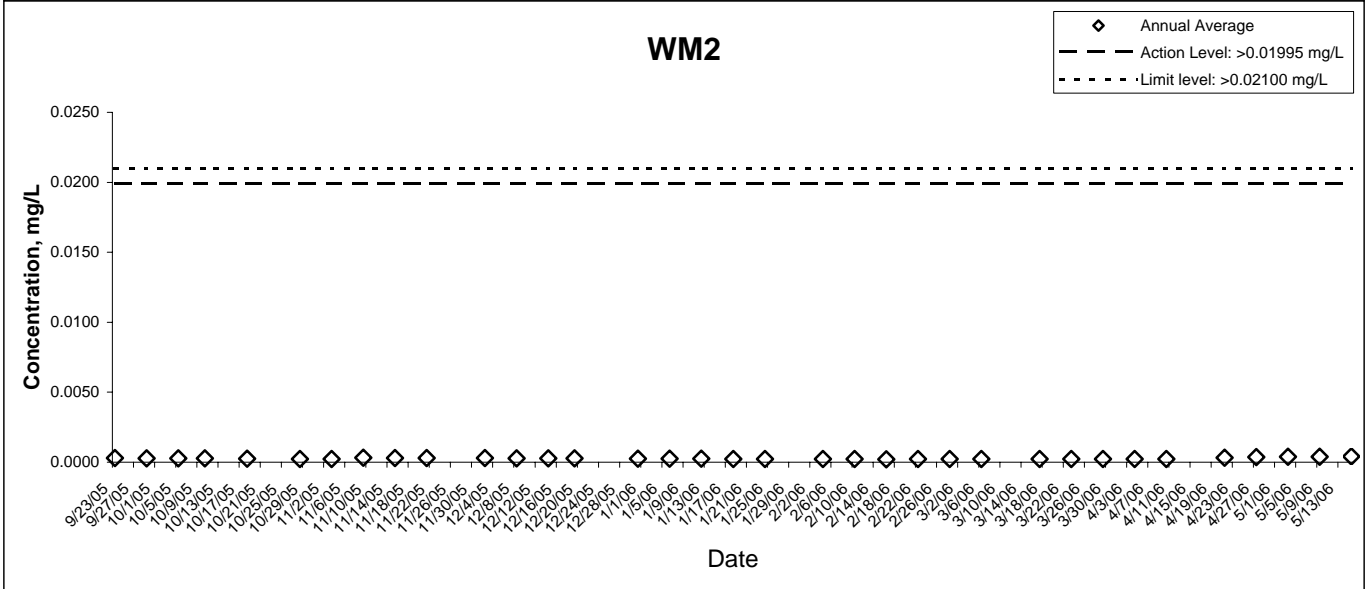
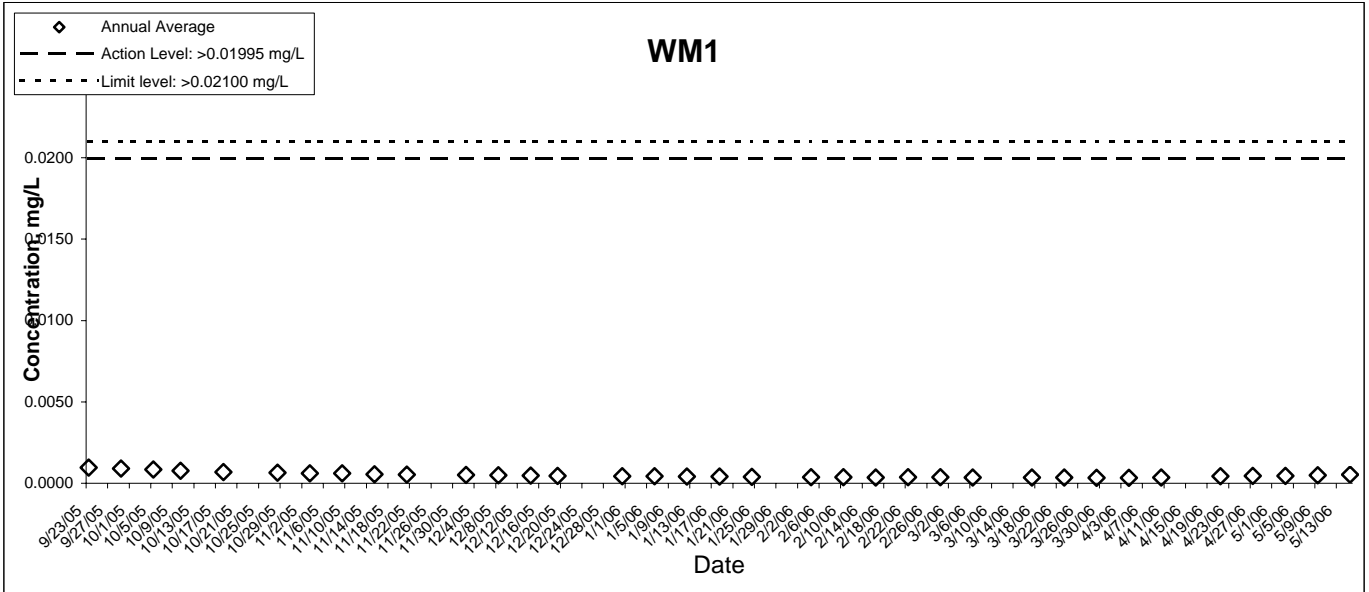
Ammonia Nitrogen



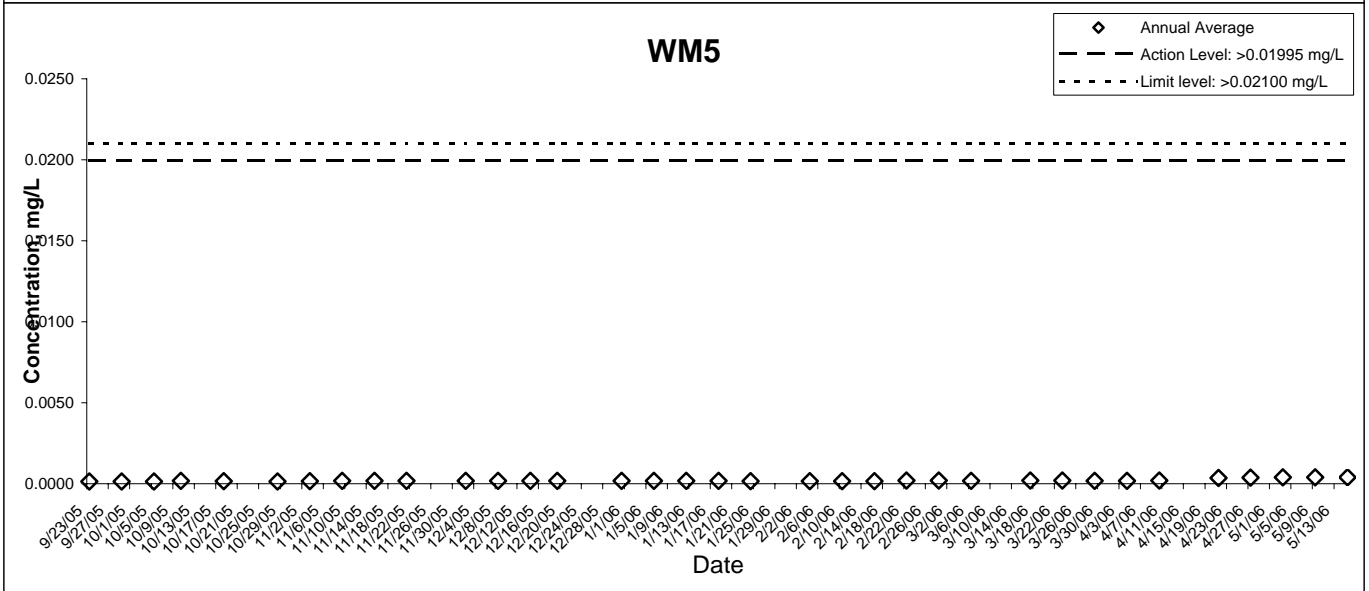
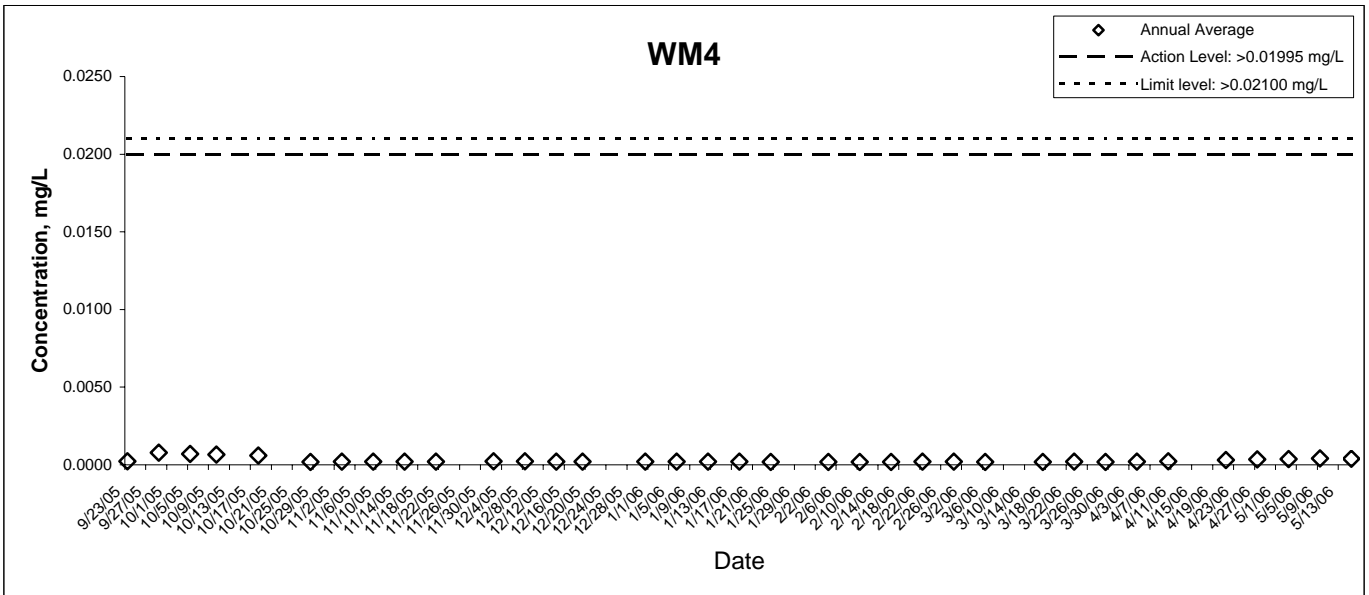
Ammonia Nitrogen



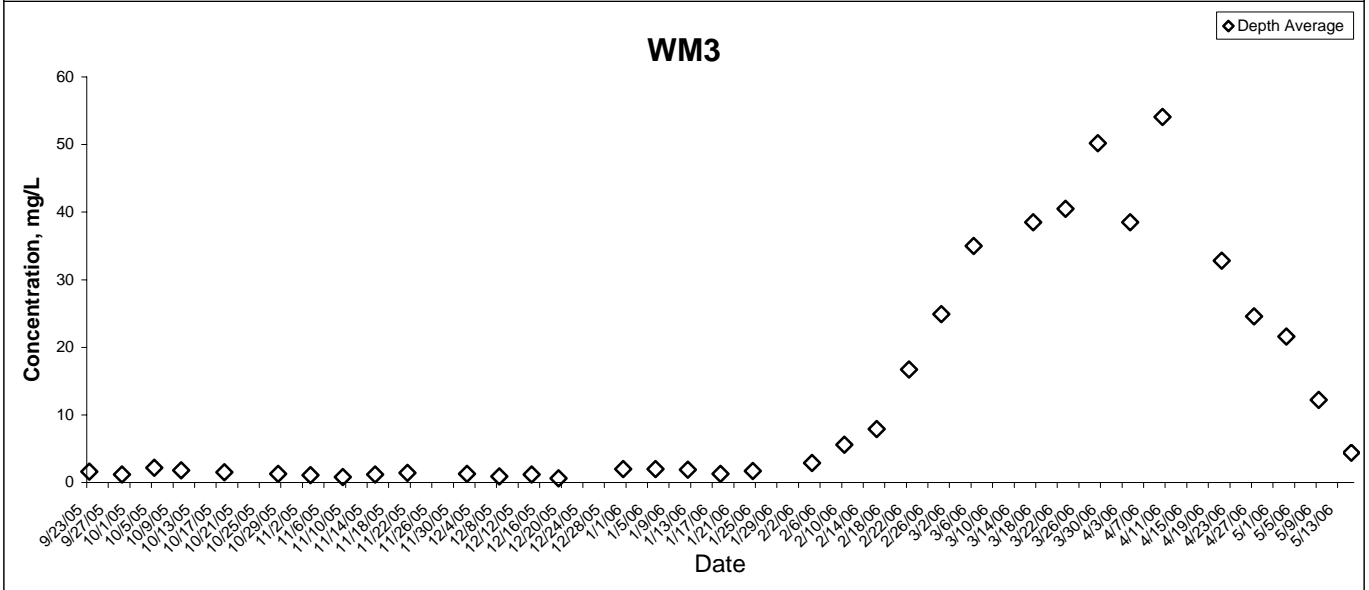
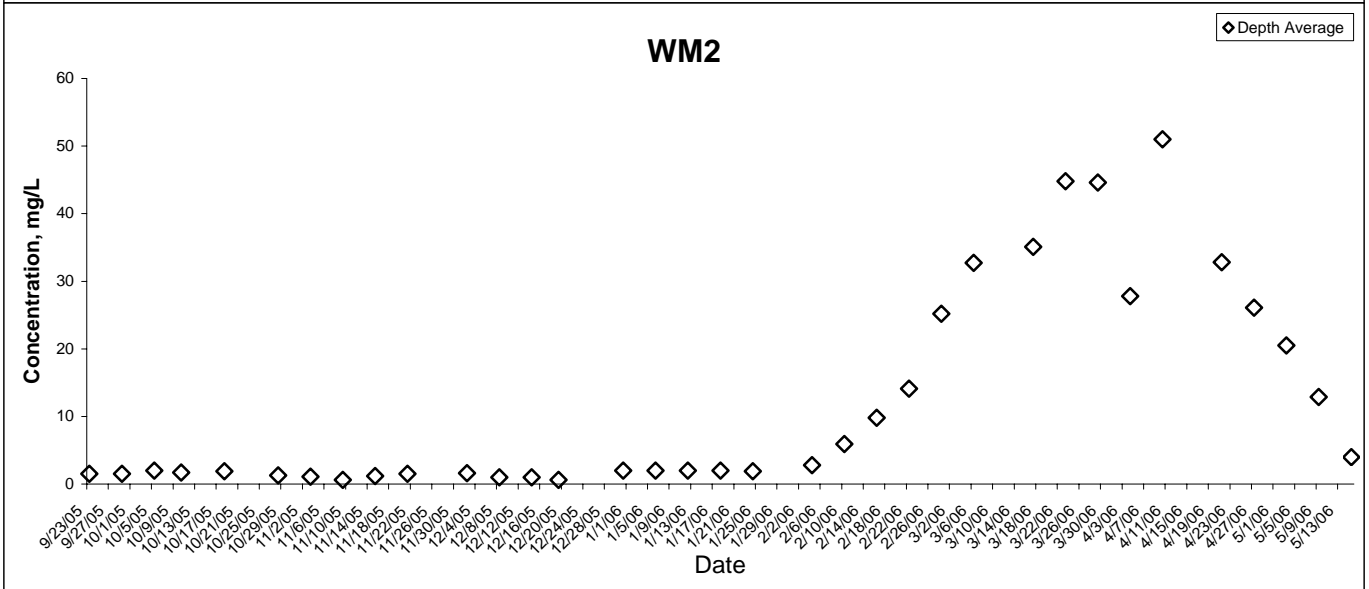
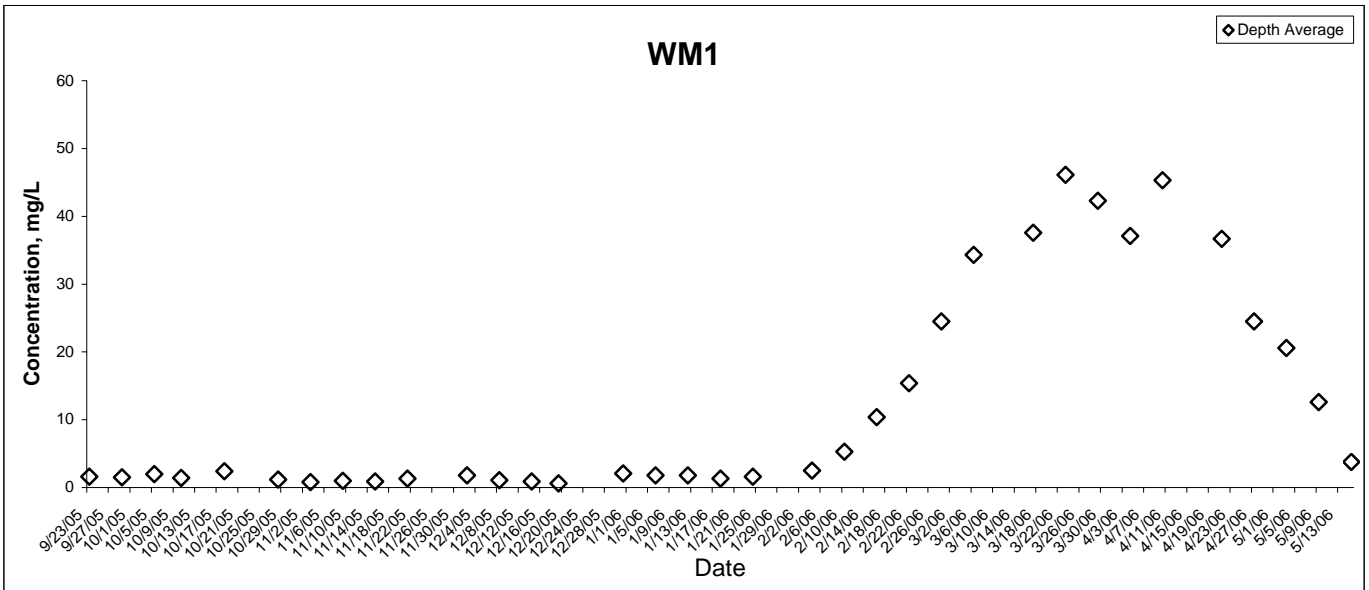
Unionised Nitrogen (Annual Average)



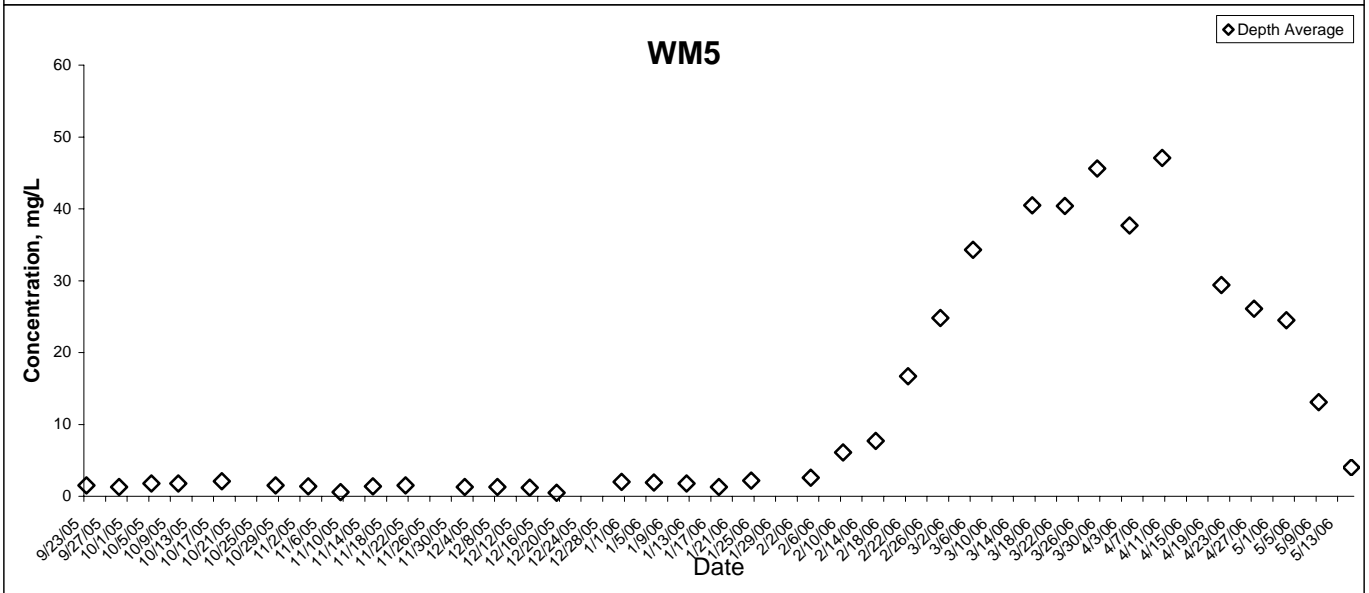
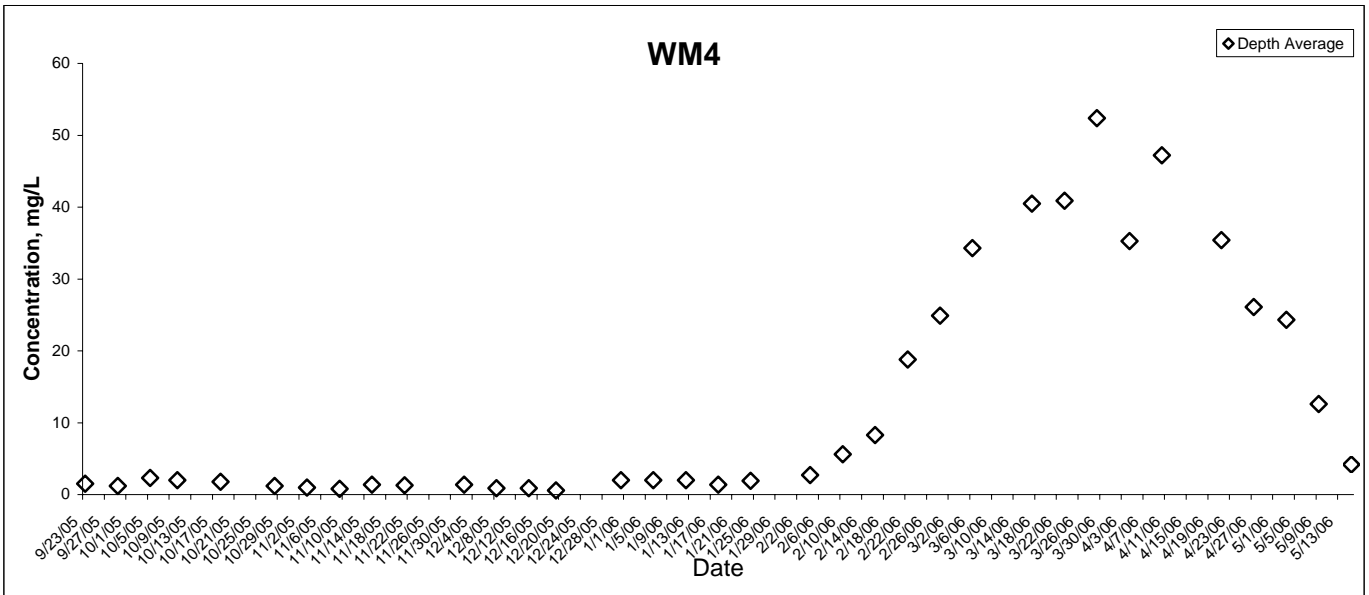
Unionised Nitrogen (Annual Average)



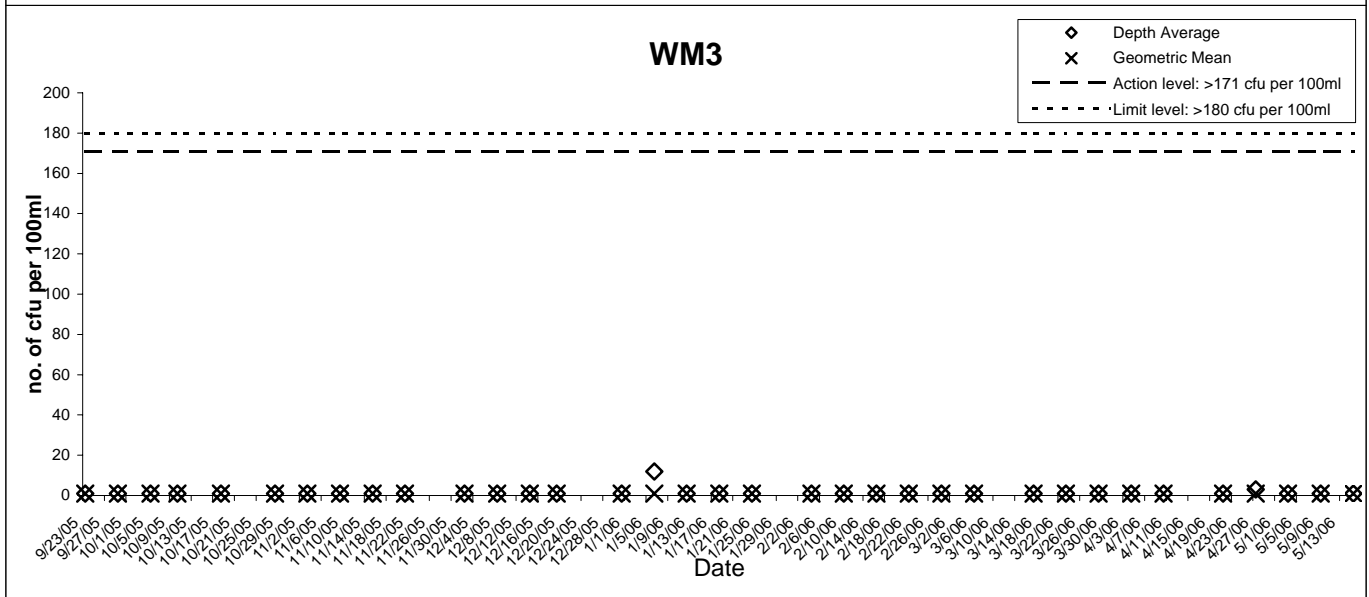
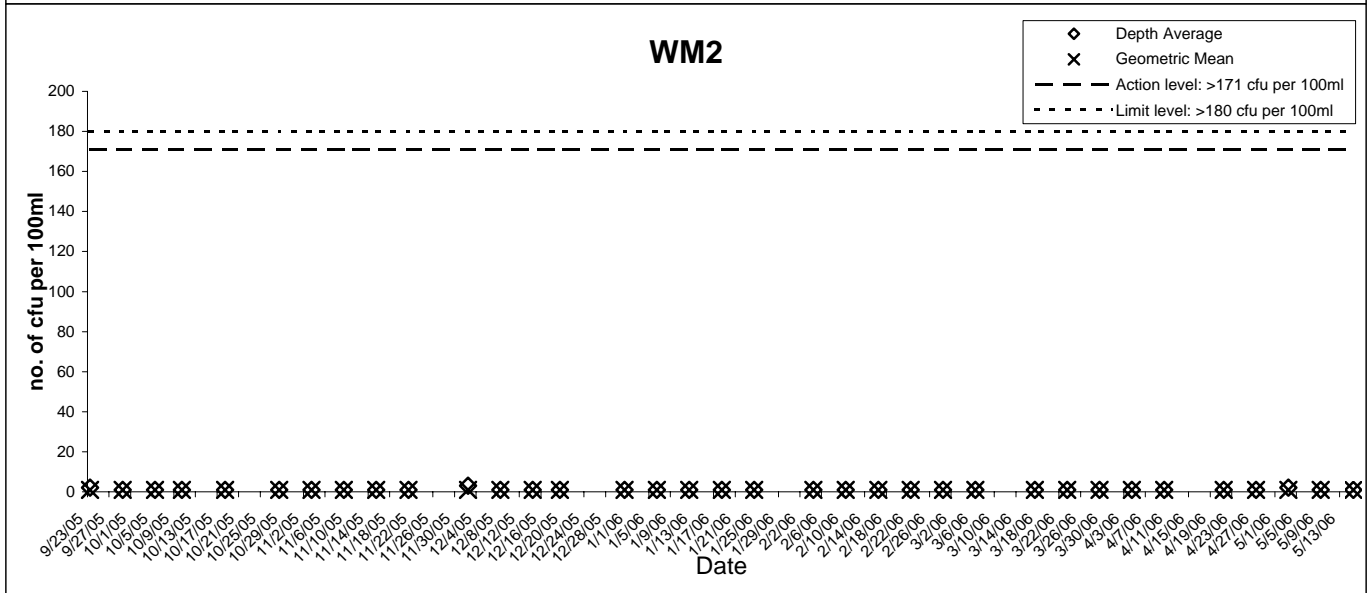
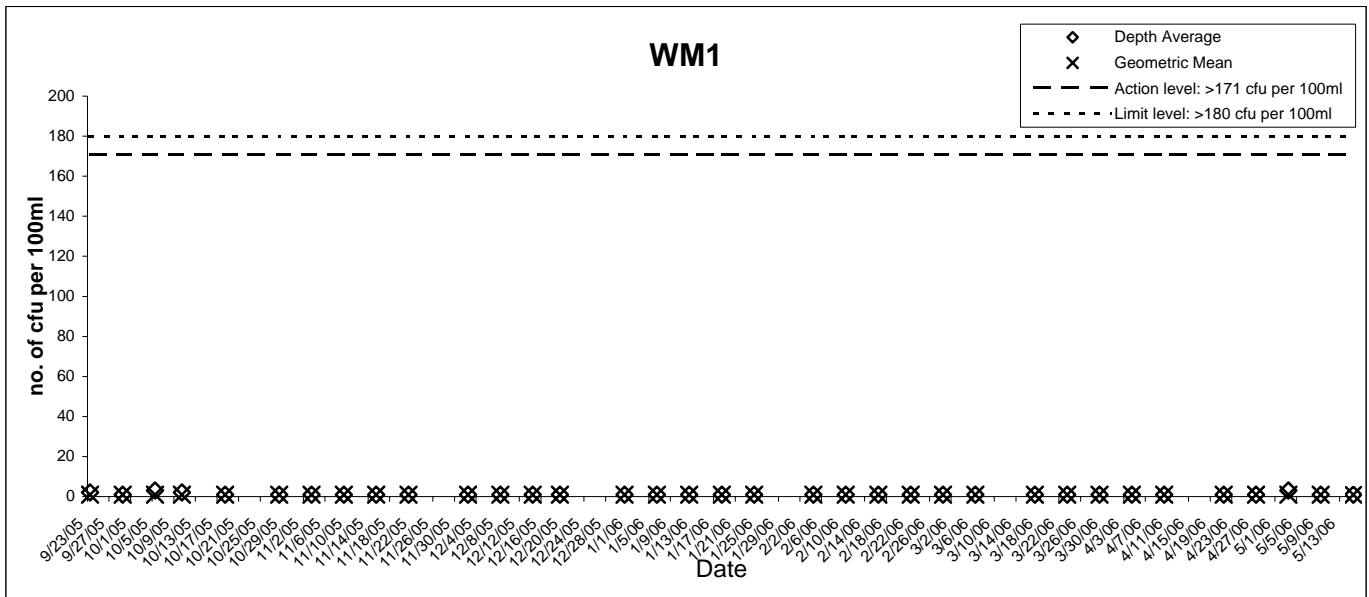
Chlorophyll-a



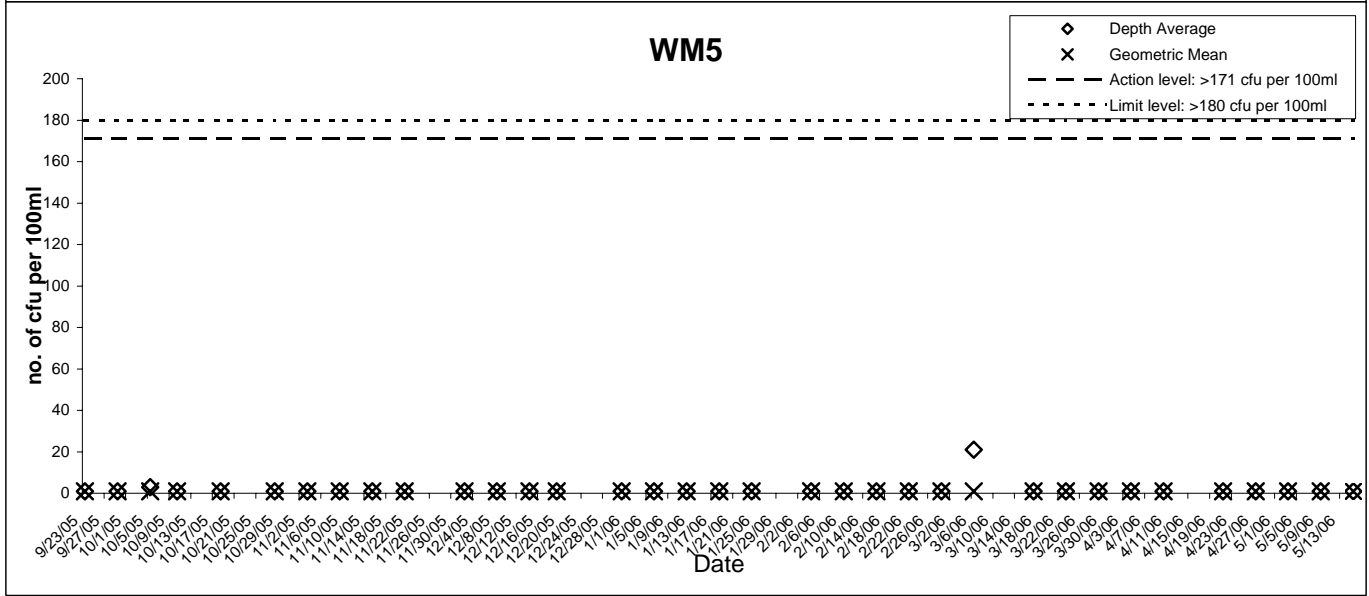
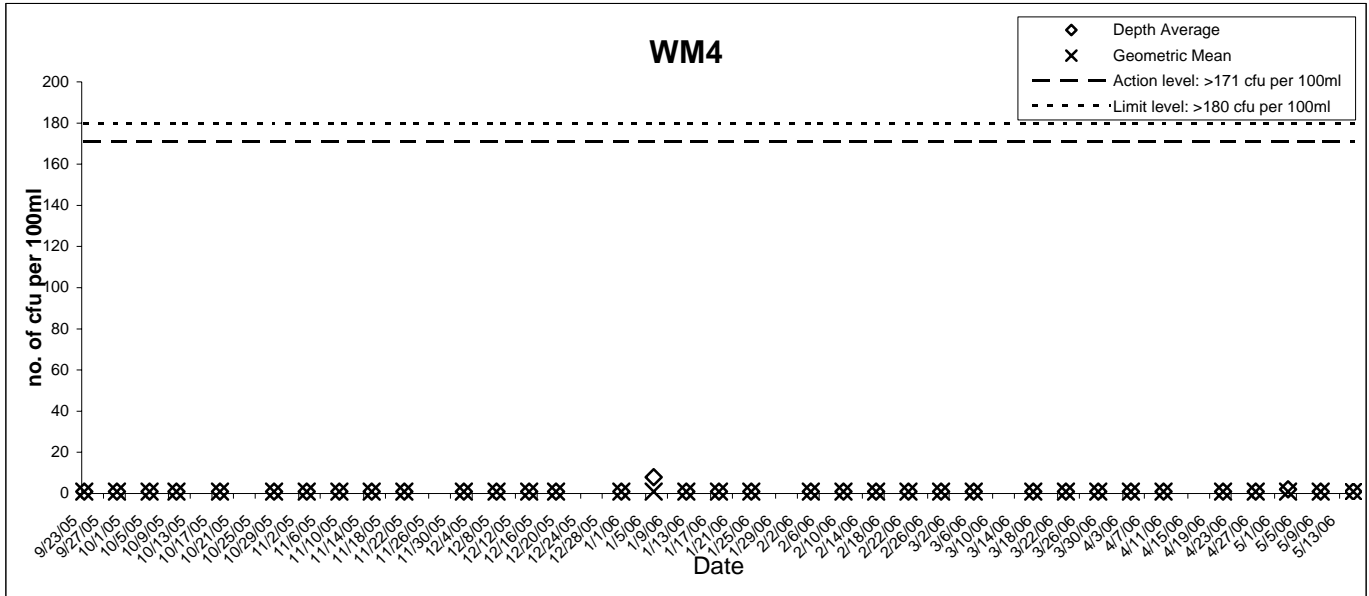
Chlorophyll-a



E.coli



E.coli



**Appendix F:
Quality Control Reports**

Date		21-Apr	21-Apr	21-Apr	21-Apr	21-Apr	21-Apr	27-Apr	27-Apr	27-Apr	27-Apr	27-Apr	27-Apr	3-May	3-May	3-May
Id		200	201	1	11	10	15	200	201	1	11	10	15	200	201	1
Monitoring Location				WM 1S	WM 4M	WM 4S	WM 5B			WM 1S	WM 4M	WM 4S	WM 5B			WM 1S
		BLANK	LCS % REC	% SPK REC	% SPK REC	CHK	CHK	BLANK	LCS % REC	% SPK REC	% SPK REC	CHK	CHK	BLANK	LCS % REC	% SPK REC
Conductivity @ 25°C	uS/cm	<1	98%	----	----	105	110	<1	99%	----	----	107	105	<1	101%	----
Salinity	g/L	<0.1	100%	----	----	<0.1	<0.1	----	----	----	----	<0.1	<0.1	----	----	----
Suspended Solids (SS)	mg/L	<2	95%	----	----	7	7	<2	95%	----	----	5	5	<2	100%	----
Chromium	ug/L	<1	95%	92%	91%	<1	<1	<1	95%	99%	96%	<1	<1	<1	89%	94%
Copper	ug/L	<1	97%	94%	93%	1	<1	<1	100%	103%	100%	<1	<1	<1	93%	97%
Lead	ug/L	<1	90%	89%	88%	<1	<1	<1	103%	100%	98%	<1	<1	<1	93%	91%
Zinc	ug/L	<10	93%	93%	87%	<10	<10	<10	94%	100%	97%	<10	<10	<10	90%	94%
Silica	mg/L	<0.01	100%	91%	125%	1.8	1.82	<0.01	93%	95%	102%	1.42	1.46	<0.01	98%	108%
Ammonia as N	mg/L	<0.01	99%	99%	102%	0.02	0.05	<0.01	98%	90%	104%	0.04	0.04	<0.01	97%	103%
Nitrite + Nitrate as N	mg/L	<0.1	102%	113%	113%	0.3	0.3	<0.1	102%	90%	90%	0.2	0.2	<0.1	101%	107%
Total Kjeldahl Nitrogen as N	mg/L	<0.1	101%	117%	120%	0.4	0.3	<0.1	102%	101%	121%	0.4	0.3	<0.1	88%	79%
Total Nitrogen	mg/L	----	----	----	----	0.7	0.6	----	----	----	----	0.6	0.5	----	----	----
Total Phosphorus	mg/L	<0.02	97%	102%	103%	<0.02	<0.02	<0.02	86%	75%	75%	<0.02	<0.02	<0.02	97%	80%
E. coli	cfu/100ml	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chlorophyll a	ug/L	<0.5	88%	----	----	36.2	34.3	<0.5	88%	----	----	24.4	29.4	<0.5	105%	----
Dissolved Oxygen	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chemical Oxygen Demand	mg/L	----	94%	105%	----	12	----	----	107%	112%	92%	12	13	----	97%	104%
Biochemical Oxygen Demand	mg/L	----	----	----	----	----	----	----	95%	----	----	----	----	----	101%	----
ORGANOTIN COMPOUNDS -																
Tributyltin - Soluble	ng Sn/L	<5	*****	*****	*****	*****	*****	<5	*****	*****	*****	*****	*****	<5	*****	*****
ORGANOTIN COMPOUND SURROGATE -																
Tripropyltin- Soluble	%	102	*****	*****	*****	*****	*****	102	*****	*****	*****	*****	*****	96	*****	*****

**Appendix F:
Quality Control Reports**

Date		3-May	3-May	3-May	9-May	9-May	9-May	9-May	9-May	9-May	15-May	15-May	15-May	15-May	15-May	15-May
Id		11	10	15	200	201	1	11	10	15	200	201	1	11	10	15
Monitoring Location		WM 4M	WM 4S	WM 5B			WM 1S	WM 4M	WM 4S	WM 5B			WM 1S	WM 4M	WM 4S	WM 5B
		% SPK REC	CHK	CHK	BLANK	LCS % REC	% SPK REC	% SPK REC	CHK	CHK	BLANK	LCS % REC	% SPK REC	% SPK REC	CHK	CHK
Conductivity @ 25°C	uS/cm	----	97	94	<1	101%	----	----	100	100	<1	100%	----	----	104	103
Salinity	g/L	----	<0.1	<0.1	----	----	----	----	<0.1	<0.1	----	----	----	----	<0.1	<0.1
Suspended Solids (SS)	mg/L	----	5	4	<2	95%	----	----	4	3	<2	110%	----	----	2	2
Chromium	ug/L	94%	<1	<1	<1	88%	89%	90%	<1	<1	<1	105%	104%	103%	<1	<1
Copper	ug/L	92%	4	4	<1	94%	93%	95%	<1	<1	<1	104%	103%	103%	<1	<1
Lead	ug/L	92%	<1	<1	<1	93%	92%	92%	<1	<1	<1	97%	100%	98%	<1	<1
Zinc	ug/L	93%	<10	<10	<10	87%	90%	91%	<10	<10	<10	103%	102%	101%	<10	<10
Silica	mg/L	96%	1.12	1	<0.01	111%	100%	101%	1	0.97	<0.01	100%	114%	105%	0.91	0.85
Ammonia as N	mg/L	106%	0.06	0.05	<0.01	113%	86%	89%	<0.01	0.01	<0.01	99%	96%	98%	<0.01	<0.01
Nitrite + Nitrate as N	mg/L	106%	0.2	0.2	<0.1	99%	93%	94%	0.2	0.2	<0.1	95%	107%	108%	0.2	0.2
Total Kjeldahl Nitrogen as N	mg/L	102%	0.2	0.2	<0.1	107%	----	112%	0.2	0.3	<0.1	113%	80%	96%	0.2	0.3
Total Nitrogen	mg/L	----	0.4	0.4	----	----	----	----	0.4	0.5	----	----	----	----	0.4	0.5
Total Phosphorus	mg/L	87%	<0.02	<0.02	<0.02	96%	75%	94%	<0.02	<0.02	<0.02	86%	75%	90%	<0.02	<0.02
E. coli	cfu/100ml	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chlorophyll a	ug/L	----	25.1	22.6	<0.5	108%	----	----	13	13.2	<0.5	97%	----	----	5	----
Dissolved Oxygen	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chemical Oxygen Demand	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Biochemical Oxygen Demand	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
ORGANOTIN COMPOUNDS -																
Tributyltin - Soluble	ng Sn/L	*****	*****	*****	<5	*****	*****	*****	*****	*****	*****	<5	*****	*****	*****	*****
ORGANOTIN COMPOUND SURROGATE -																
Tripropyltin- Soluble	%	*****	*****	*****	105	*****	*****	*****	*****	*****	*****	106	*****	*****	*****	*****

Appendix G ^{3/4} Summary of Environmental Mitigation Implementation Schedule

Reference	Mitigation Measures	Status
	<i>Water Quality</i>	
EIA Report 5.11.2	<ul style="list-style-type: none"> The lake shall be lined with an impermeable liner. However, as such liners may have a limited life span, beyond which the performance may deteriorates, the liner shall be replaced once the manufacturer's specified lifespan is reached. 	√
EIA Report 5.11.2	<ul style="list-style-type: none"> Stormwater run-off from surrounding hillsides shall pass through silt traps prior to entering the artificial lake to prevent siltation. The silt traps shall be designed to have adequate capacity to retain any silt/sediment contained within the stormwater. The silt traps shall be frequently maintained/cleaned to prevent a deterioration in performance. 	√
EIA Report 5.11.2, EP 3.7	<ul style="list-style-type: none"> Should the quality of the water in the Tai Lam Chung Reservoir deteriorate below the present levels an alternate supply of water, of a quality at least as good as that within the Tai Lam Chung Reservoir, shall be used to 'top up' the water within the lake. 	N/A
EIA Report 5.11.2, EP 3.8, 3.9	<ul style="list-style-type: none"> If it becomes necessary to add an algicide to the lake to control algal growth, the algicide shall be biodegradable with a short half life of three days or less. During use of the algicide discharge of the lake water to the marine waters shall be prohibited, until the algicide has decayed. The algicide shall not be used during periods of heavy rainfall when overflow of the lake is possible. 	N/A
EIA Report 5.11.2, EP 3.6	<ul style="list-style-type: none"> Stormwater from any urban/developed areas shall not be allowed to enter the lake as they may contain pollutants. Sewage effluent from the water recreation centre shall be transported to the sewerage mains for conveyance to the Siu Ho Wan STW. 	√
EIA Report 5.11.2, EP 3.10	<ul style="list-style-type: none"> Any fuel for motorised water sports vessels shall be stored in bunded areas, of at least 110% capacity of the largest fuel storage container to prevent any accidental spills entering the lake. 	N/A
EIA Report 5.11.2	<ul style="list-style-type: none"> Servicing of any water sports vessels shall be undertaken at suitable facilities away from the artificial lake. In the event that fuel or other petroleum products enter the lake, a suitable clean-up plan shall be implemented. The clean-up plan being devised by the operators of the water recreation centre and approved by EPD prior to the commencement of operations at the water sports centre. 	√
	<i>Waste</i>	
EIA Report 5.11.2	<ul style="list-style-type: none"> To minimise the potential adverse impacts to aesthetics and odour impacts, the HKITP should maintain floating refuse collection initiatives at both the coast of the Theme Park and within the artificial lake of the Water Recreation Centre. 	√

Note:

- √ Compliance of mitigation measure
- × Non-compliance of mitigation measures
- Non-compliance but rectified
- N/A Not applicable

Appendix H ³/₄ Event and Action Plans

Event and Action Plan for Water Quality

Exceedance	ETL	HKITP	IEC
Action Level			
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Repeat in-situ measurement to confirm findings. 2. Identify the source(s) of impact (e.g. intake water). 3. Inform HKITP and IEC. 4. Check monitoring data, all monitoring equipment and monitoring methods; consider changes of monitoring methods. 5. Discuss mitigation measures with HKITP and IEC. 6. Repeat measurement on next day of exceedance. 	<ol style="list-style-type: none"> 1. Discuss with IEC and ETL on WRC operations or any changes to the operations that may have an impact on the water quality. 2. Rectify unacceptable practice and propose mitigation measures. 3. Make agreement on the mitigation measures to be implemented. 4. Implement the agreed mitigation measures. 	<ol style="list-style-type: none"> 1. Discuss with ETL and HKITP on WRC operations or any changes to the operations that may have an impact on the water quality, and discuss possible mitigation measures. 2. Review proposals on mitigation measures by HKITP. 3. Assess the effectiveness of the implemented mitigation measures.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Repeat in-situ measurement to confirm findings. 2. Identify the source(s) of impact (eg intake water). 3. Inform HKITP and IEC. 4. Check monitoring data, all monitoring equipment and monitoring methods; consider changes of monitoring methods 5. Discuss mitigation measures with HKITP and IEC. 6. Ensure mitigation measures are implemented. 7. Prepare to increase monitoring frequency to assess efficacy of remedial measures. 8. Repeat measurement on next day of exceedance. 	<ol style="list-style-type: none"> 1. Discuss with IEC and ETL on WRC operations or any changes to the operations that may have an impact on the water quality. 2. Rectify unacceptable practice and propose mitigation measures. 3. Make agreement on the mitigation measures to be implemented. 4. Implement the agreed mitigation measures 5. Assess the effectiveness of the implemented mitigation measures 	<ol style="list-style-type: none"> 1. Discuss with HKITP and ETL on WRC operations or any changes to the operations that may have an impact on the water quality, and discuss possible mitigation measures. 2. Review proposals on mitigation measures by HKITP. 3 .Assess the effectiveness of the implemented mitigation measures

Exceedance	ETL	HKITP	IEC
Limit Level			
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Repeat measurement to confirm findings. 2. Identify the source(s) of impact (eg intake water). 3. Inform HKITP and IEC. 4. Check monitoring data, all monitoring equipment and monitoring methods; consider changes of monitoring methods 5. Discuss mitigation measures with HKITP and IEC. 6. Ensure mitigation measures are implemented. 7. Increase monitoring frequency to daily until no exceedance of Limit Level. 	<ol style="list-style-type: none"> 1. Inform EPD of exceedance. 2. Discuss with IEC and ETL on WRC operations or any changes to the operations that may have an impact on the water quality. 3. Rectify unacceptable practice and propose mitigation measures. 4. Make agreement on the mitigation measures to be implemented. 5. Implement the agreed mitigation measures 6. Assess the effectiveness of the implemented mitigation measures 	<ol style="list-style-type: none"> 1. Discuss with HKITP and ETL on WRC operations or any changes to the operations that may have an impact on the water quality, and discuss possible mitigation measures. 2. Review proposals on mitigation measures by HKITP. 3. Assess the effectiveness of the implemented mitigation measures
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Repeat measurement to confirm findings. 2. Identify the source(s) of impact (eg intake water). 3. Inform HKITP and IEC. 4. Check monitoring data, all monitoring equipment and monitoring methods; consider changes of monitoring methods 5. Discuss mitigation measures with HKITP and IEC. 6. Ensure mitigation measures are implemented. 7. Increase monitoring frequency to daily until no exceedance of Limit Level for two consecutive days. 	<ol style="list-style-type: none"> 1. Inform EPD of exceedance. 2. Discuss with IEC and ETL on WRC operations or any changes to the operations that may have an impact on the water quality. 3. Rectify unacceptable practice and propose mitigation measures. 4. Make agreement on the mitigation measures to be implemented. 5. Implement the agreed mitigation measures 6. Assess the effectiveness of the implemented mitigation measures 7. Consider to slow down or to stop all or part of the water-based activities until no exceedance of Limit level. 	<ol style="list-style-type: none"> 1. Discuss with HKITP and ETL on WRC operations or any changes to the operations that may have an impact on the water quality, and discuss possible mitigation measures. 2. Review proposals on mitigation measures by HKITP. 3. Assess the effectiveness of the implemented mitigation measures

