CENTRALIA
Public Works

August 27, 2012

Steve Garrett, R.S.
Lewis County Public Services
2025 N.E. Kresky Avenue
Chehalis, WA 98532

Dear Steve;

Subject: COMPLIANCE MONITORING REPORT FOR THE CENTRALIA LANDFILL

Please find enclosed one copy of the Compliance Monitoring Report from the Centralia Landfill. Sampling for this event occurred in March, 2012. Sampling is done biannually, first in March during the wet season and then again in September during the dry season. Amtest Labs in Redmond, Washington performed laboratory analysis. Andy Oien and I completed the sampling.

Please call me if you have questions or concerns.

Sincerely,

Randy Prevost

Randy Prevost
City of Centralia

cc: Mohsen Kourehdar, WA. State Dept. of Ecology

1100 N. Tower Ave.
Centralia, Washington 98531-5044
Phone (360) 330-7512 • Fax (360) 330-7516

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REPORT NARRATIVE

This biannual Compliance Monitoring Report summarizes the results from the wet season sampling done at the Centralia Landfill in March, 2012. This report was prepared in accordance with the Cleanup Action Plan Consent Decree (signed May, 2001) and the latest Periodic Review from the Department of Ecology Toxics Cleanup Program (September, 2010). This report presents data and graphical analysis of selected parameters in groundwater, surface water and landfill gas. Collection and reporting of groundwater and surface water data occur biannually. Gas sampling occurs quarterly and results are included in this report. 17 groundwater monitoring wells were sampled March 27 and 28, 2012. Data from this sampling event and from quarterly gas probe sampling events are presented in Appendix B and C. Locations of groundwater monitoring wells, surface water stations, and gas probes are shown on the site maps provided. On March 27, 2012 depth to groundwater was measured in all wells.

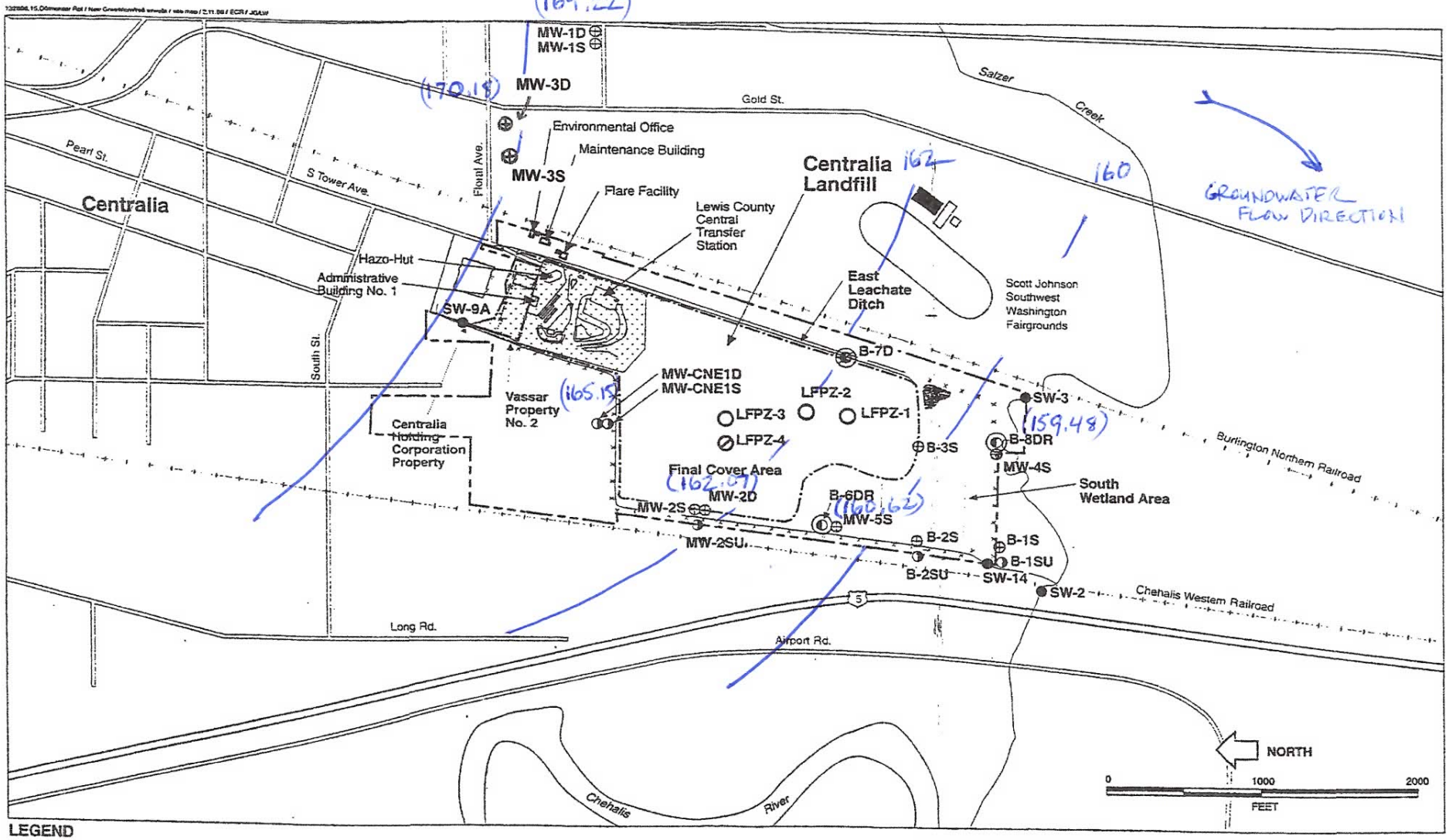
Weather during the sampling period was raining or overcast. Water was present at SW 14, in the Weyerhaeuser Ditch (the point of compliance for surface water) and samples were collected.

Depth to water levels were recorded for all wells on the day sampling commenced. Depth to water was also measured on the day of sampling before the pumps were turned on at each well. The submersible pump was adjusted to the lowest possible purge rate (usually about 2 L/minute). Parameters were taken in a stainless steel pitcher in which purge water passed through. pH, temperature, and conductivity were measured. This was repeated every 3 to 5 minutes. Water level was repeatedly checked to insure minimal drawdown. If drawdown was observed, the flow rate was adjusted if possible. When 3 successive readings were achieved within plus or minus 0.1 for pH and plus or minus 3% for conductivity, sample bottle filling began. Generally, sampling occurred in a progression from upgradient to down gradient wells. Field filtered samples (dissolved metals) were collected last at each well, and disposable inline filters were used.

CENTRALIA LANDFILL SURFACE WATER DATA

Wet Season, 2012 March 28, 2012

Parameters	Units	SW-14
Dissolved Alkalinity (as CaCO3)	mg/l	64
Total Organic Carbon	mg/l	8.6
Chemical Oxygen Demand	mg/l	22
Chloride	mg/l	10.00
Hardness (CaCO3)	mg/l	73
Ammonia Nitrogen	mg/l	0.014
Nitrate + Nitrite Nitrogen	mg/l	< 0.01
Total Dissolved Solids	mg/l	110
Sulfate	mg/l	4.6
pH		7.35
Temperature	degrees C	9.2
Conductivity	umhos/cm	191
Dissolved Oxygen	mg/l	10.36
Dissolved Metals		
Arsenic	mg/l	0.00065
Calcium	mg/l	15.9
Iron	mg/l	1.11
Mercury	mg/l	< 0.0001
Potassium	mg/l	1.32
Magnesium	mg/l	8
Manganese	mg/l	0.3952
Sodium	mg/l	8.9
Zinc	mg/l	0.02
Total Metals		
Arsenic	mg/l	0.0016
Calcium	mg/l	15
Iron	mg/l	2.7
Mercury	mg/l	< 0.0001
Potassium	mg/l	2.1
Magnesium	mg/l	9.5
Manganese	mg/l	0.1
Sodium	mg/l	6.3
Zinc	mg/l	0.048

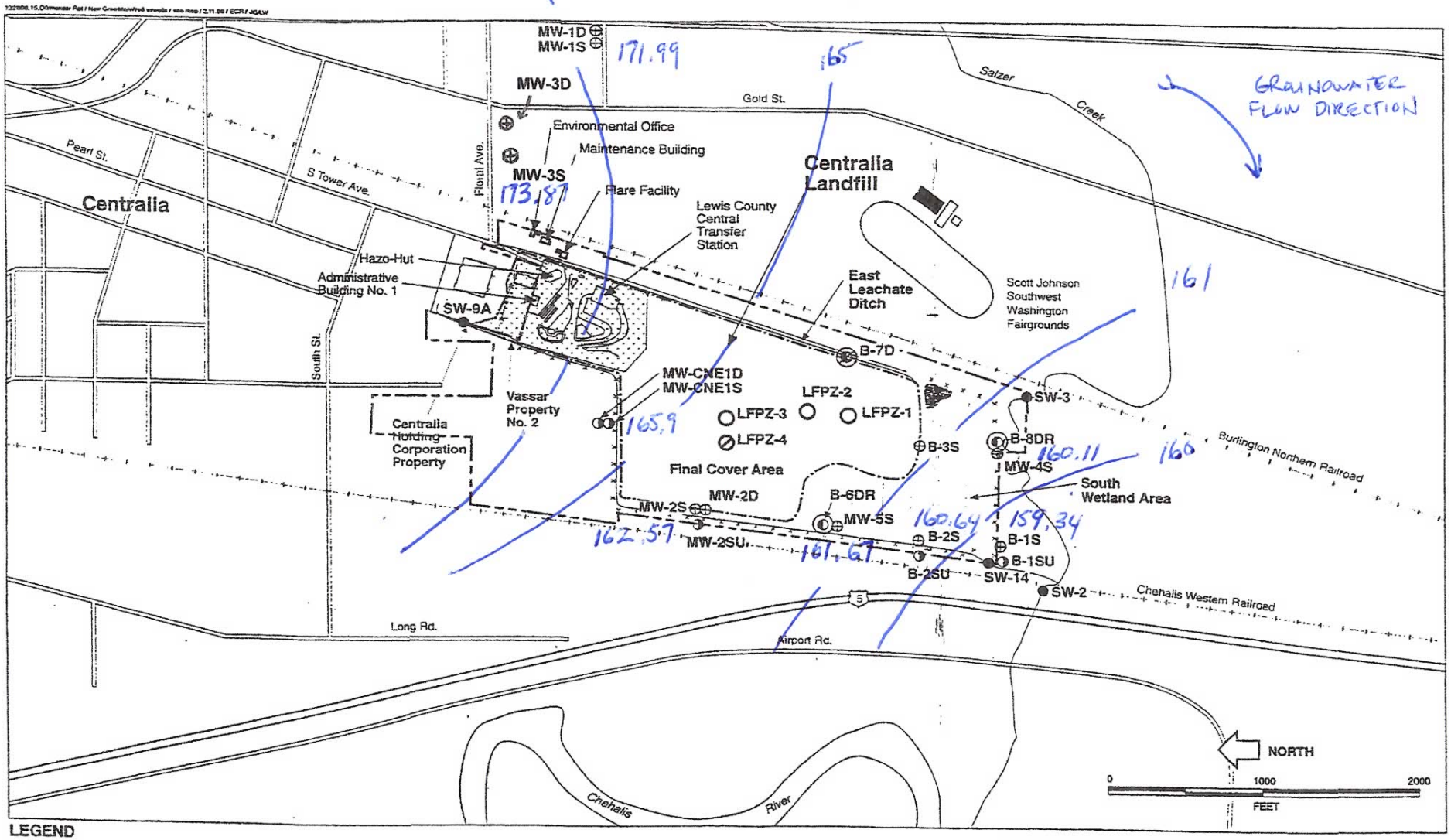


LEGEND

- Approximate Edge of Refuse and Limits of Source Area
- Fence
- Abandoned and New Replacement Monitoring Wells
- Abandoned Monitoring Wells
- Property Line
- Surface Water Monitoring Stations
- Groundwater Flow Direction
- New Monitoring Wells
- Pre-RI Monitoring Wells
- Closed Northend Landfill
- Piezometers
- Abandoned Piezometers

Site Map

LOWER AQUIFER
3/27/2012
WET SEASON, 2012



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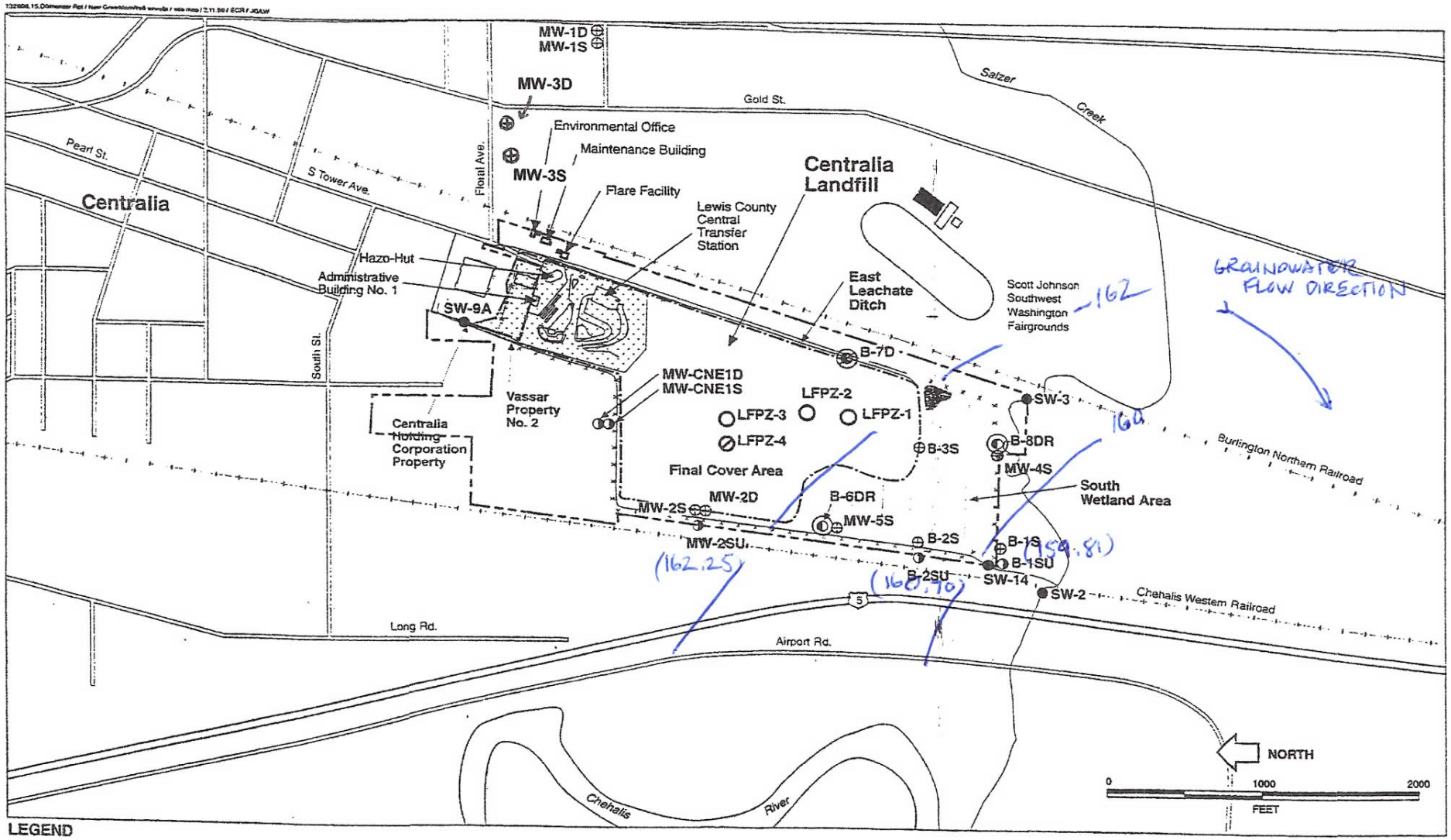
Site Map

UPPER AQUIFER
3/27/2012
WET SEASON, 2012



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Site Map

SHALLOW UPPER AQUIFER
3/27/2012
WET SEASON, 2012

Exceedences of Primary and Secondary Standards in Groundwater Wells

	pH	Conductiviy	TDS	Chloride	Sulfate	Nitrate + Nitrite	Arsenic	Iron	Mercury	Manganese	Zinc
Primary Drinking Water Standard						10 mg/l	0.01 mg/l		.002 mg/l		
Secondary Standard	6.5 - 8.5	**CAP** cleanup levels	500 mg/l	250 mg/l	250 mg/l			0.3 mg/l		0.05 mg/l	5 mg/l
Groundwater Standard	6.5 - 8.5	700 umhos/cm	500 mg/l	250 mg/l	250 mg/l		0.0005 mg/l	0.3 mg/l	.002 mg/l	0.05 mg/l	5 mg/l
MW1D	7.21	253	160	4.6	0.48	< 0.01	0.0064	0.064	< 0.0001	0.4578	0.008
MW1S	6.27	151	120	1.1	9.6	1.2	0.0001	< 0.005	< 0.0001	0.0018	0.005
MW3S	5.7	167	130	5.5	14	0.097	0.0001	< 0.005	< 0.0001	0.005	0.004
MW3D	6.99	238	170	6.4	1.2	0.053	0.0012	0.046	< 0.0001	1.082	0.008
CNE1S	6.34	1120	640	49	0.5	0.013	0.0026	11.9	< 0.0001	2.898	0.006
CNE1D	7.37	285	200	5.5	1.6	< 0.01	0.0006	0.044	< 0.0001	0.2308	0.004
MW2D	7.3	323	230	8.4	4.3	< 0.01	0.0052	0.007	< 0.0001	0.7903	0.004
MW2S	6.51	1570	1300	240	3.8	0.026	0.01	1.62	< 0.0001	9.225	0.008
MW2SU	6.61	1700	1400	210	2.3	< 0.01	0.0015	3.71	< 0.0001	8.84	0.005
MW5S	6.81	277	220	7.8	1.6	0.063	0.0015	0.334	< 0.0001	0.6694	0.002
B6DR	7.36	283	130	5.5	< 0.1	< 0.01	0.0036	0.009	< 0.0001	0.6002	0.002
B2SU	6.87	347	230	2	4.6	0.032	0.0008	< 0.005	< 0.0001	0.0043	0.004
B2S	6.97	144	250	9.7	0.72	0.021	0.019	< 0.005	< 0.0001	1.405	0.003
B1SU	6.71	929	610	41	2	< 0.01	0.0018	1.3	< 0.0001	5.892	0.006
B1S	7.07	240	250	3.5	1.3	0.015	0.014	0.062	< 0.0001	0.8439	0.005
MW4S	7.01	407	150	0.96	23	0.022	0.0005	0.011	< 0.0001	0.017	0.009
B8DR	7.55	440	290	5.3	12	< 0.01	0.0003	0.049	< 0.0001	0.263	0.007

Cleanup Levels Established in the Cleanup Action Plan

	Conductiviy	Chloride	Iron	Manganese	Arsenic
Groundwater Cleanup Levels for Shallow Upper/Upper Unit	**700 umhos/cm**	**250 mg/l**	**0.3 mg/l**	**0.05 mg/l**	**0.00027 mg/l cleanup level, 0.0005 mg/l compliance**
MW1S	151	1.1	< 0.005	0.0018	0.0001
MW3S	167	5.5	< 0.005	0.0024	0.0001
CNE1S	1120	49	11.9	2.898	0.0026
MW2S	1570	240	1.62	9.225	0.01
MW2SU	1700	210	3.71	8.84	0.0015
MW5S	277	7.8	0.334	0.6694	0.0015
B2SU	347	2	< 0.005	0.0043	0.0008
B2S	144	9.7	< 0.005	1.405	0.019
B1SU	929	41	1.3	5.892	0.0018
B1S	240	3.5	0.062	0.8439	0.014
MW4S	407	< 10	0.011	0.017	0.0005
Groundwater Cleanup Level for Lower Unit			**0.3 mg/l**	**0.05 mg/l**	**0.0005 mg/l cleanup level**
MW1D			0.064	0.4578	0.0064
MW3D			0.046	1.082	0.0012
CNE1D			0.044	0.2308	0.0006
MW2D			0.007	0.7903	0.0052
B6DR			0.009	0.6002	0.0036
B8DR			0.049	0.263	0.0003
Surface Water Standards					**0.00027 mg/l cleanup level, 0.0005 mg/l compliance**
SW14					0.00065

ANALYTICAL METHODS AND DETECTION LIMITS				
ANALYTE	**UNITS**	**METHOD NUMBER**	**REFERENCE**	**DETECTION LIMIT**
Alkalinity (as $CaC0_3$)	mg/l	2320B	EPA	1.0
Chemical Oxygen Demand	mg/l	410.4	EPA	10.
Total Organic Carbon	mg/l	415.1	EPA	1.0
Chloride	mg/l	325.2	EPA	1.0
Hardness (as $CaC0_3$)	mg/l	130.2	EPA	1.0
Ammonia Nitrogen	mg/l	350.1	EPA	0.005
Nitrate+Nitrite	mg/l	353.2	EPA	0.010
Total Dissolved Solids	mg/l	2540C	EPA	1.0
Sulfate	mg/l	375.4	EPA	1.0
Arsenic	mg/l	200.8	EPA	0.0005
Calcium	mg/l	200.7	EPA	0.10
Iron	mg/l	200.7	EPA	0.01
Mercury	mg/l	245.1	EPA	0.0001
Potassium	mg/l	200.7	EPA	1.0
Magnesium	mg/l	200.7	EPA	0.10
Manganese	mg/l	200.7	EPA	0.002
Sodium	mg/l	200.7	EPA	0.1
Zinc	mg/l	200.7	EPA	0.002

APPENDIX A
DISCUSSION OF GROUNDWATER MONITORING DATA
CENTRALIA LANDFILL

The following discussion summarizes results of the wet season groundwater monitoring for 2012. The analysis consists of a comparison of groundwater monitoring data to Washington State groundwater and drinking water standards, and an evaluation of trends in monitoring parameter values over time (time series plots).

Time series plots were generated for the current monitoring parameters and for each sampling event since June, 1996. These are included in Attachment B of this appendix.

Analysis for each monitoring parameter is discussed below, organized by regulatory criteria. Results for parameters with primary drinking water standards and/or state groundwater standards are presented first (arsenic, mercury, and nitrate), followed by results for parameters with secondary drinking water standards (chloride, iron, manganese, pH, sulfate, TDS and zinc).

Additionally, a discussion of sampling results compared to Cleanup Levels established at the point of compliance for groundwater and surface waters is included.

Parameters with Primary Standards:

Arsenic has two standards: a primary drinking water standard of 0.01 mg/l and a state groundwater quality standard of 0.0005 mg/l. Three wells exceeded the drinking water standard and fourteen exceeded the groundwater standard. Arsenic was detected in all wells.

Mercury has a primary standard of 0.002 mg/l. Mercury was not detected in any wells this quarter.

Nitrate has a primary standard of 10 mg/l. Nitrate was detected in ten wells this round. All wells were below the standard. MW1S had the highest value with 1.2 mg/l.

Parameters with Secondary Standards:

Chloride has a secondary standard of 250 mg/l. No wells exceeded the standard.

Iron has a secondary standard of 0.3 mg/l. Iron was detected in all but four wells this season, and CNE1S had the highest value with 11.9 mg/l.

Manganese has a secondary standard of 0.05 mg/l. Manganese was detected in all wells. All but four of the wells exceeded the standard.

pH has a regulatory range of 6.5 to 8.5. Three of the 17 wells exceeded the standard. All exceedences were values below 6.5.

Sulfate has a secondary standard of 250 mg/l. All wells were far below the standard.

TDS has a secondary standard of 500 mg/l. This value was exceeded in four wells. The highest value was 1700 mg/l in MW2SU.

Zinc has a secondary standard of 5 mg/l. Zinc was detected in all seventeen wells. All wells were well below the standard.

Surface Water Standards:

Soluble Arsenic has a cleanup level of 0.27 µg/L with a compliance level of 0.50 µg/L. SW14, the point of compliance, exceeded both levels with a value of 0.65µg/L.

Comparisons of monitoring results to Cleanup Levels established in the Cleanup Action Plan

Ground Water cleanup levels for the shallow upper/upper unit:

Soluble Arsenic has a cleanup level of 0.27 µg/L with a compliance level of 0.50 µg/L. Two wells were below the cleanup and compliance levels: MW1S and MW3S. All other wells in the unit exceeded both levels.

Conductivity has a cleanup level of 700 umhos/cm. Four of the wells exceeded this value; two of the wells in the shallow upper aquifer (B1SU and MW2SU), the cross gradient well CNE1S, and MW2S.

Chloride has a cleanup level of 250 mg/l. No wells exceeded this level.

Soluble Iron has a cleanup level of 300 µg/L. Five wells exceeded the cleanup level this dry season. CNE1S had the highest value with 11.9 mg/l.

Soluble Manganese has a cleanup level of 50 µg/L. MW1S, MW3S, B2SU and MW4S were under this value. All other wells exceeded the cleanup level.

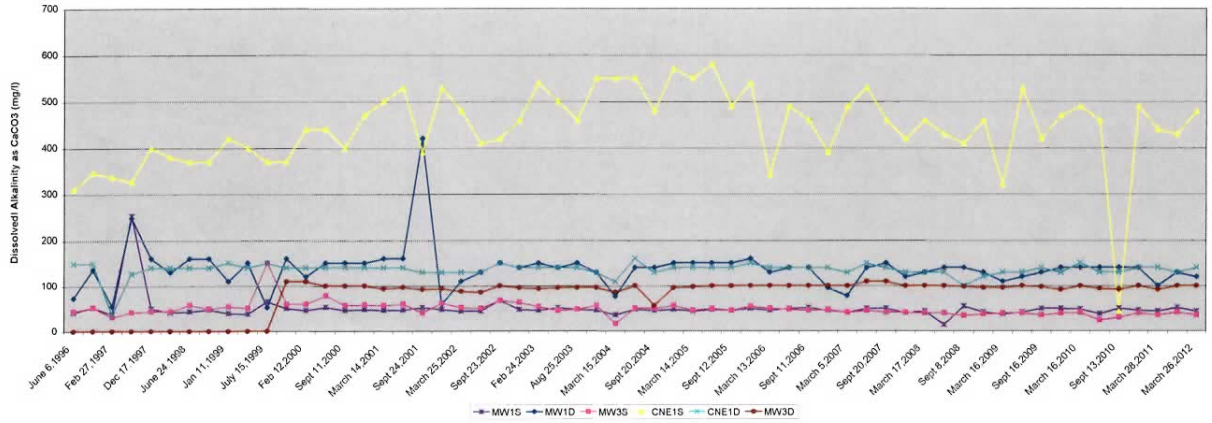
Ground Water Cleanup Levels for the Lower Unit:

The Soluble Arsenic cleanup level is 5 µg/L. B8DR was below the cleanup level. The five other wells in the lower unit exceeded the level.

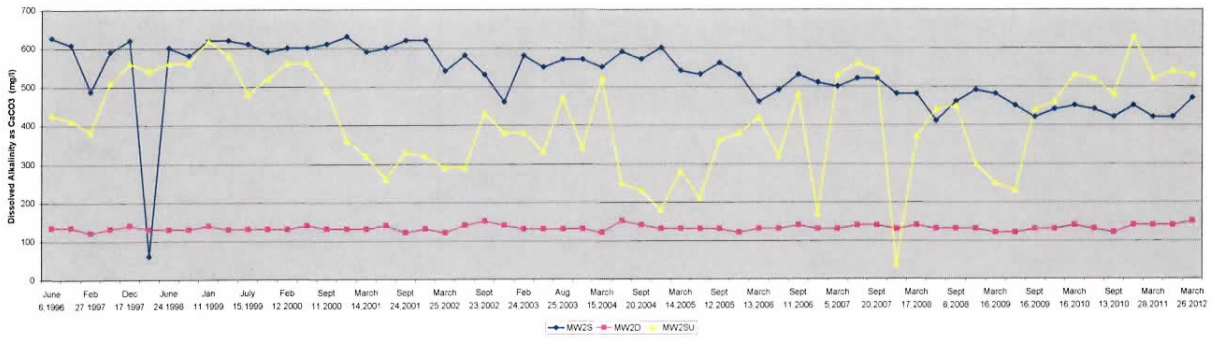
Soluble Iron has a cleanup level of 300 µg/L. All wells in the lower unit had values below the cleanup level this season.

Appendix B - Groundwater Time Series Graphs

GROUP 1 WELLS DISSOLVED ALKALINITY



GROUP 2 WELLS DISSOLVED ALKALINITY



GROUP 3 WELLS DISSOLVED ALKALINITY

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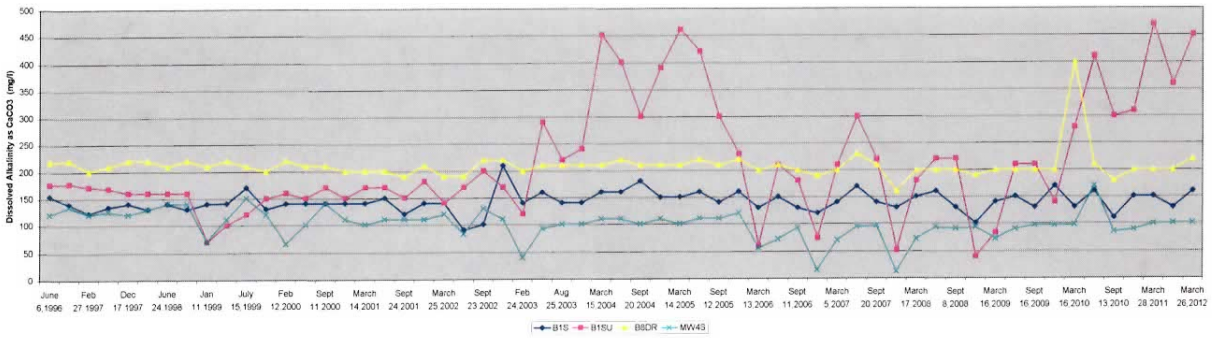

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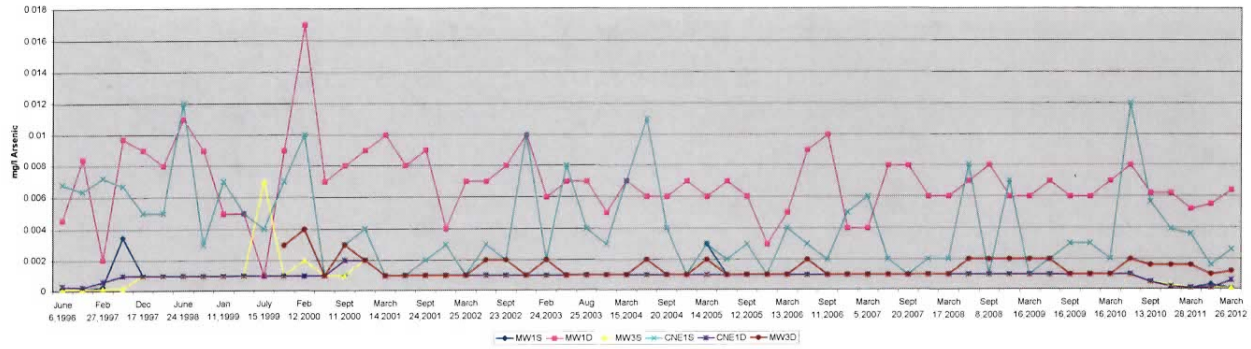

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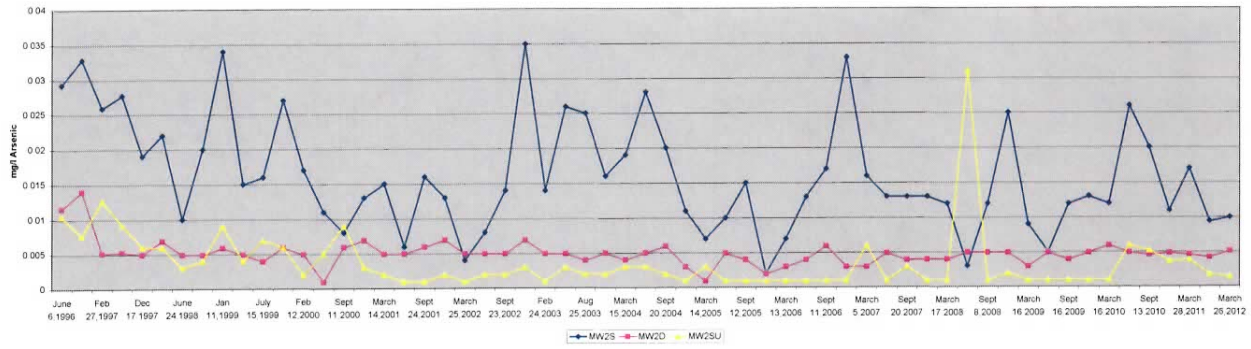

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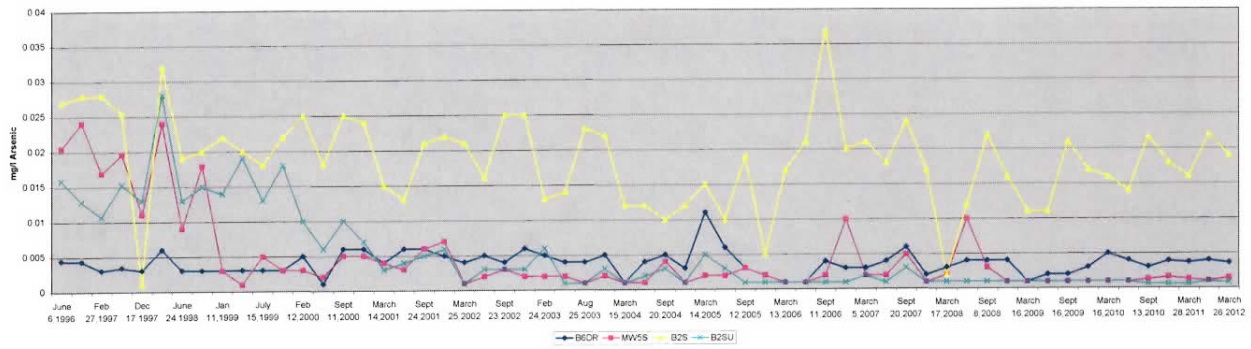

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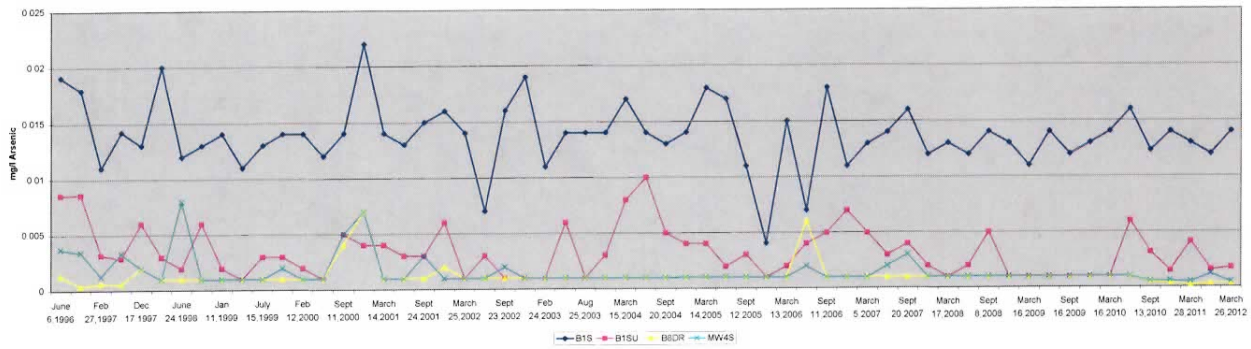

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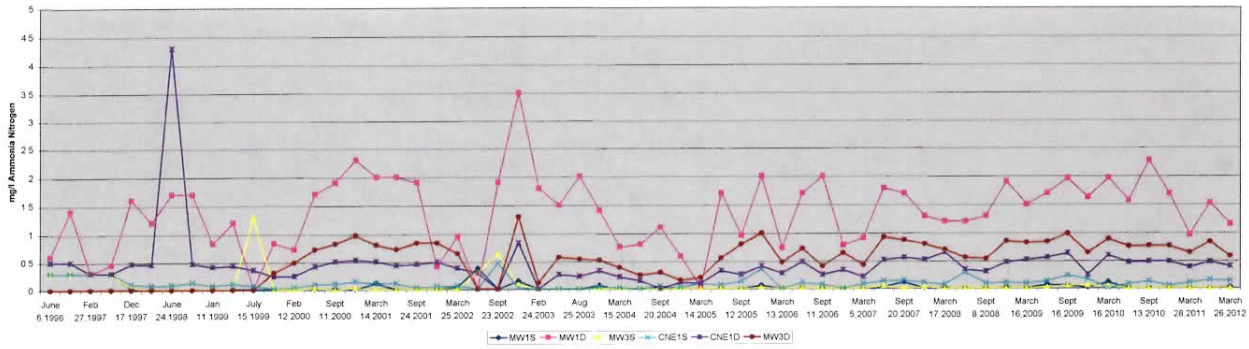

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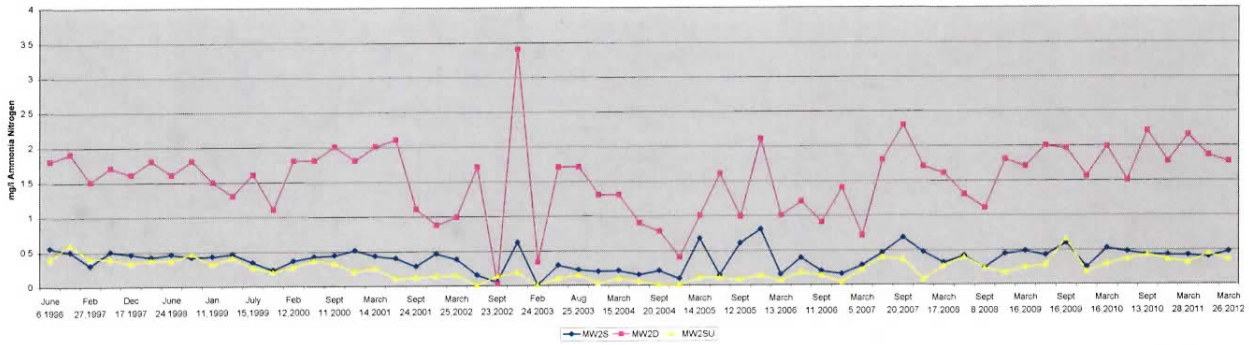

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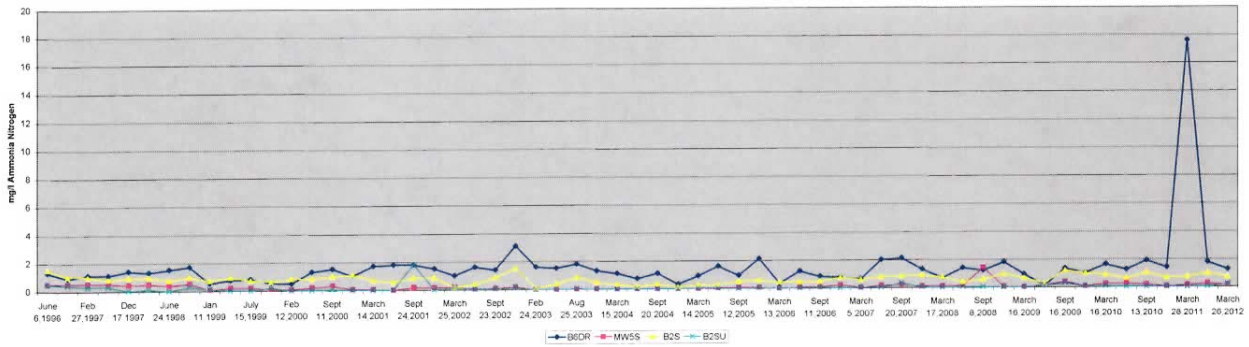

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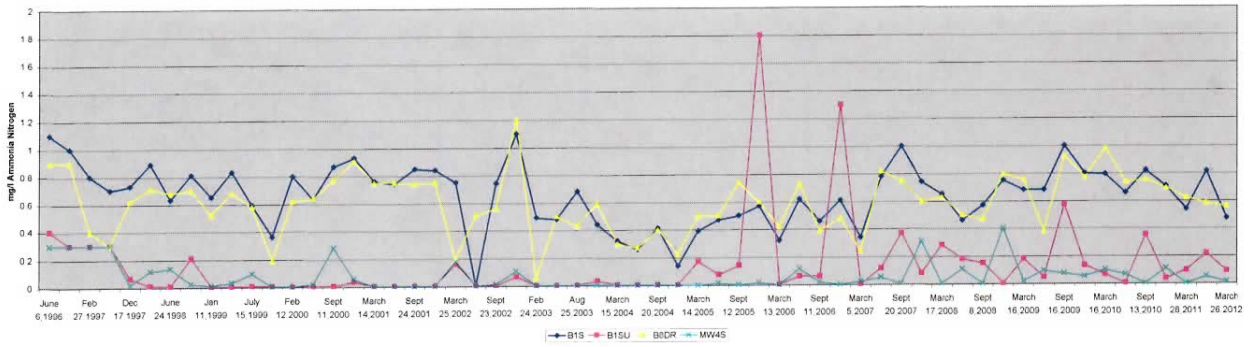

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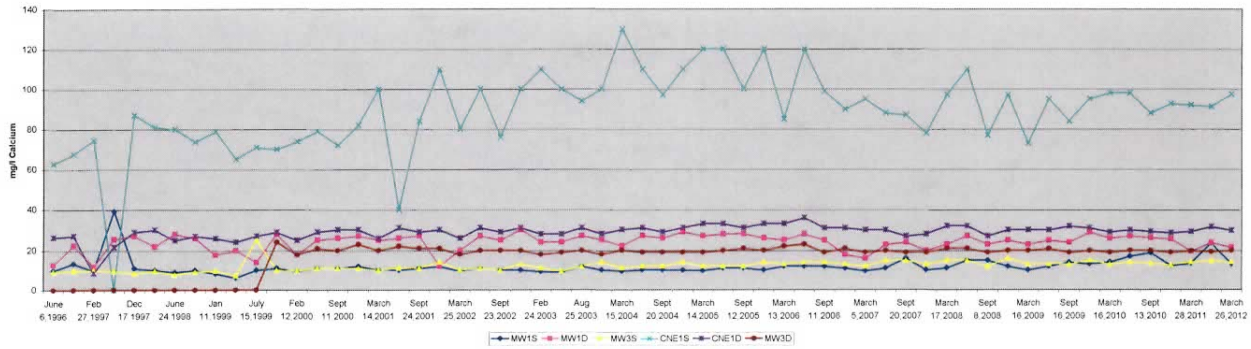

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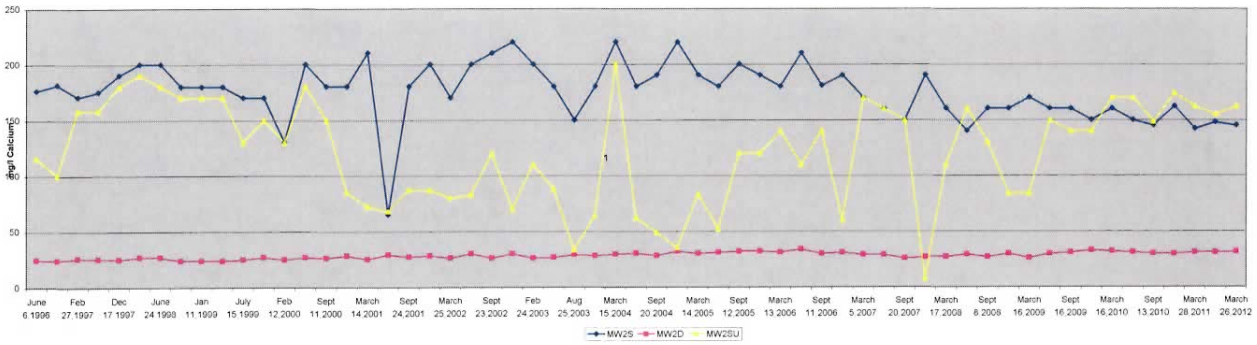

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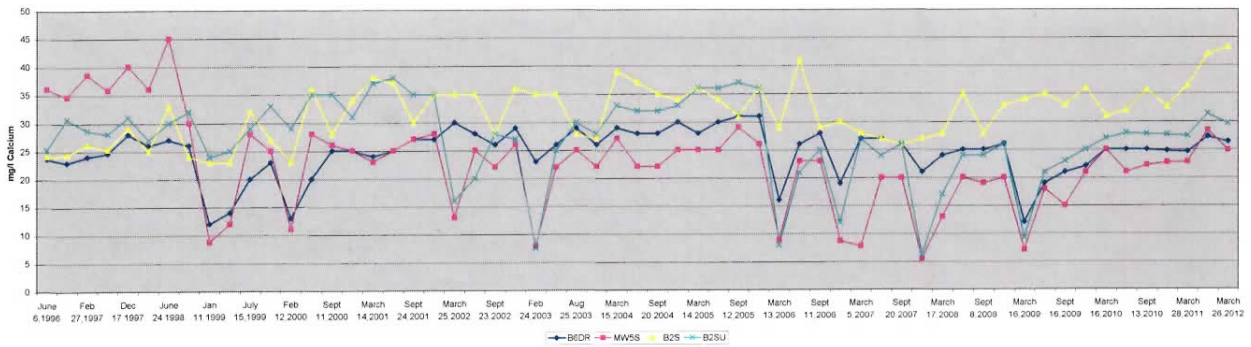

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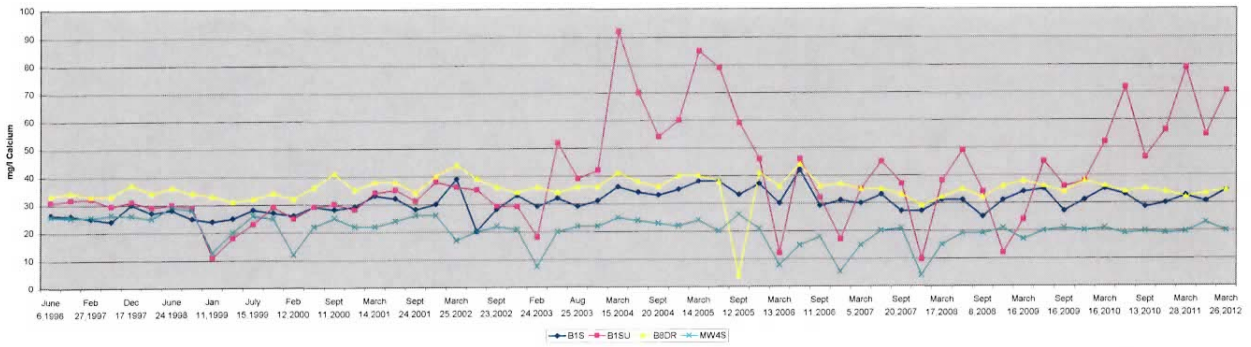
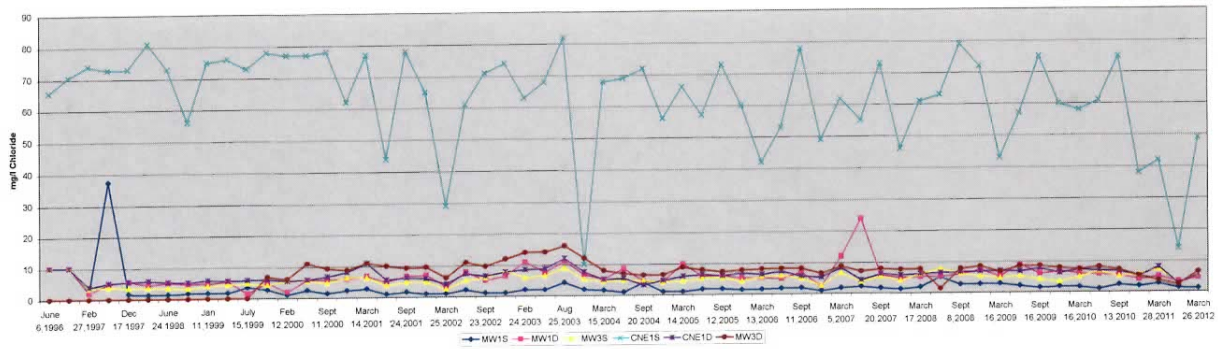


GROUP 1 WELLS DISSOLVED CHLORIDE



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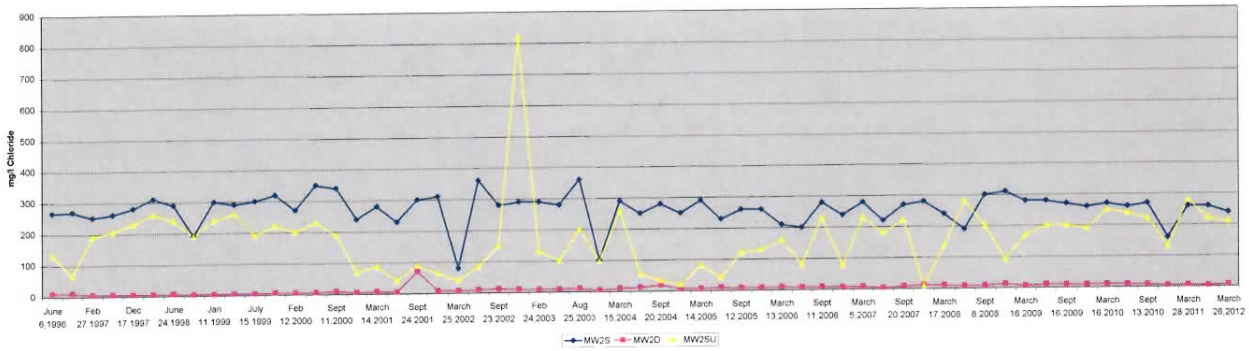

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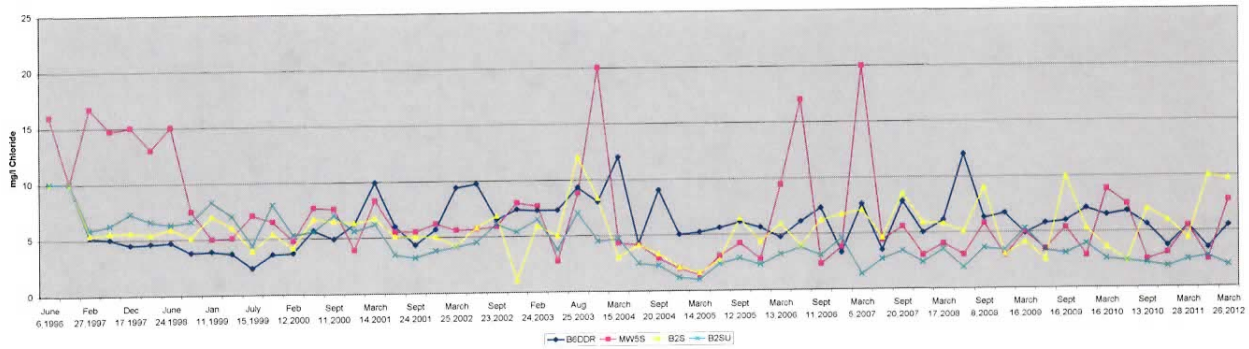

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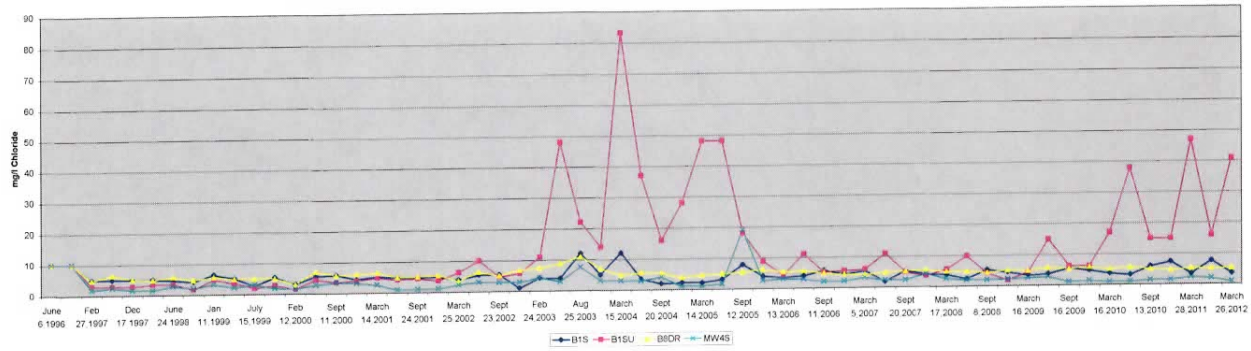

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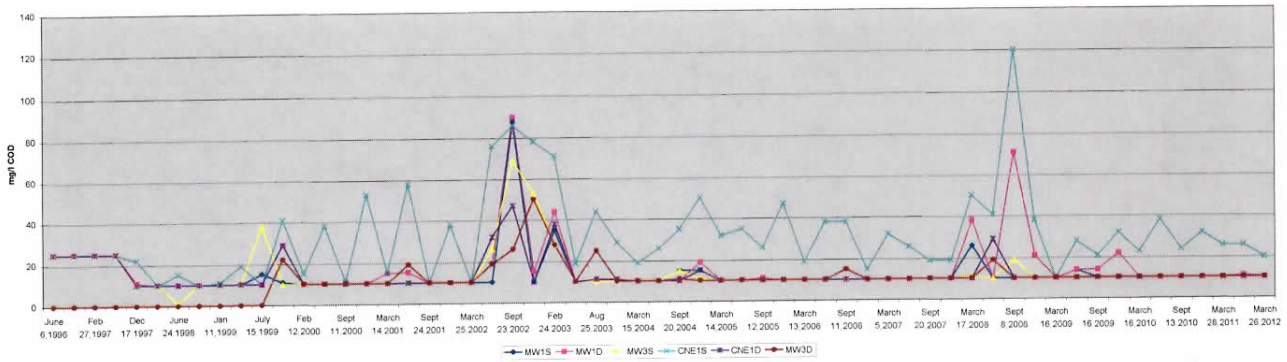

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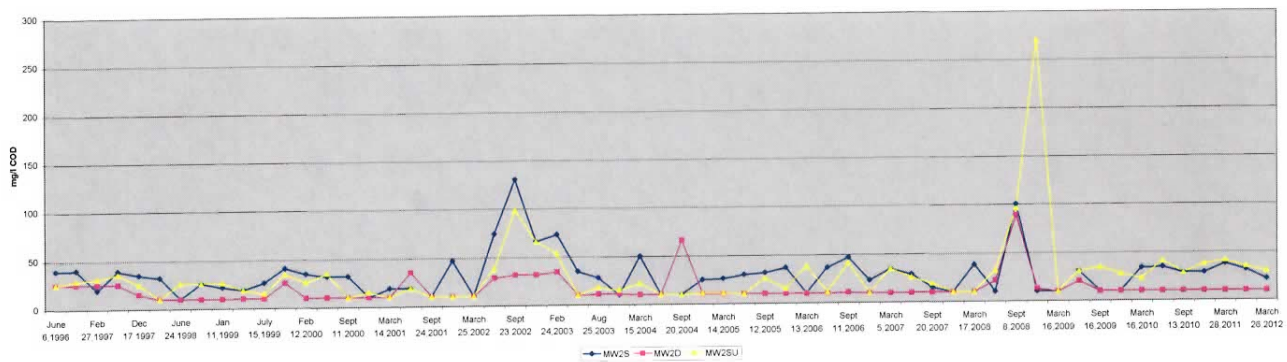

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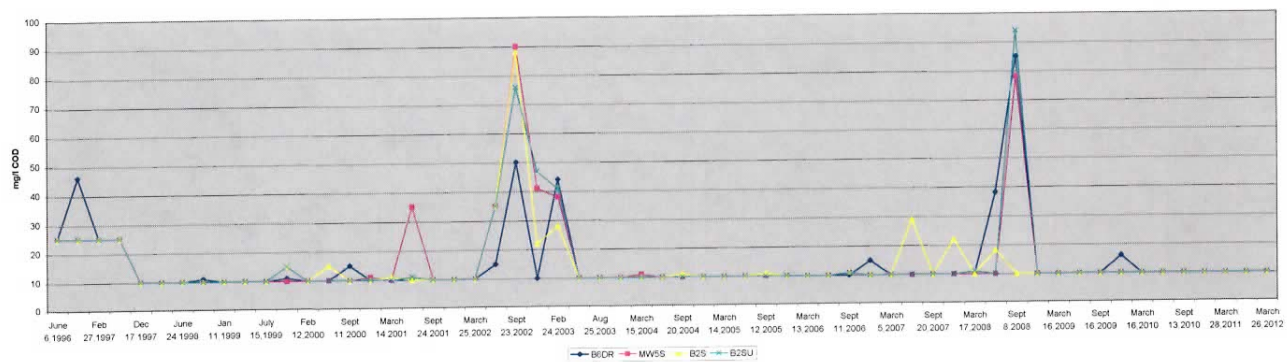
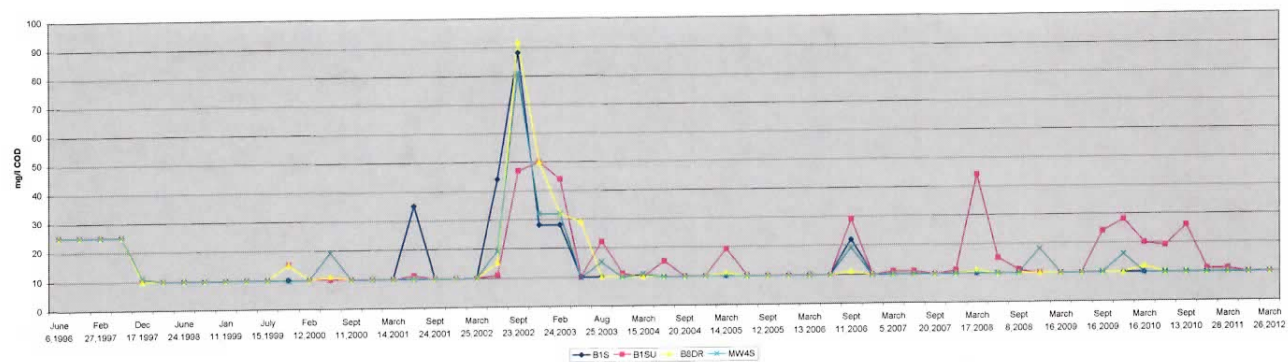
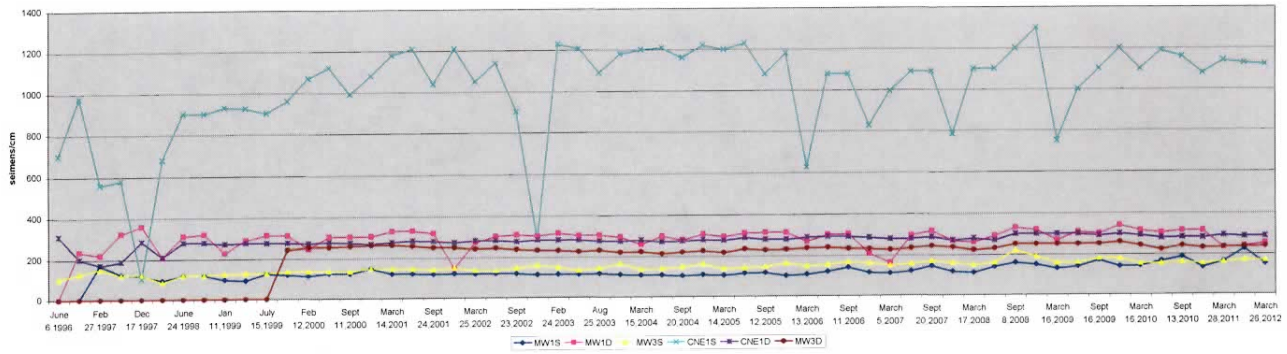


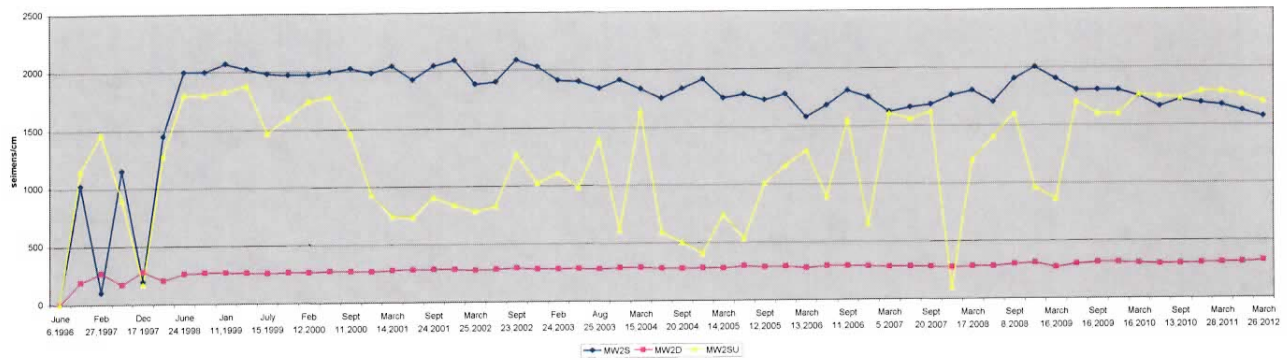
GROUP 4 WELLS CHEMICAL OXYGEN DEMAND



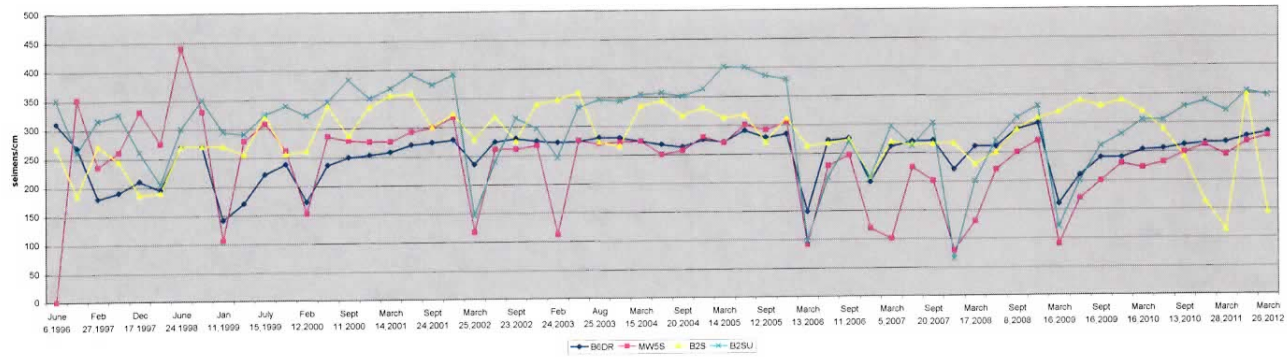
GROUP 1 WELLS CONDUCTIVITY



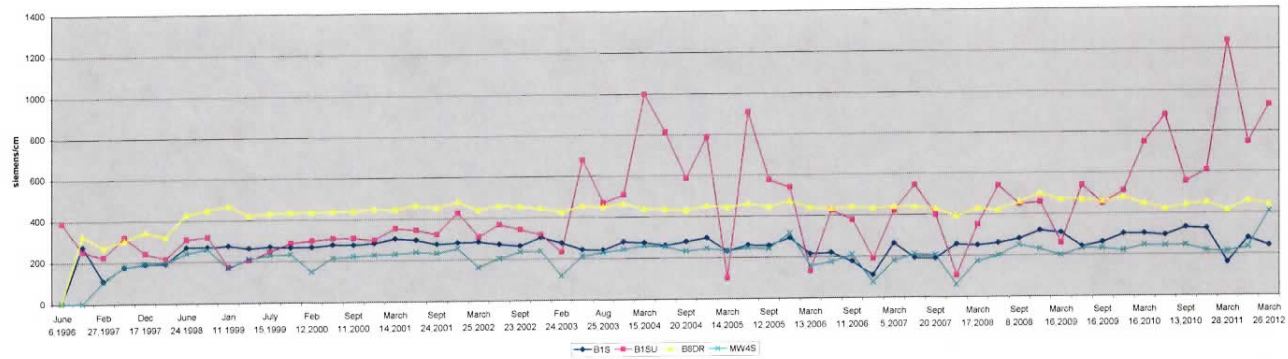
GROUP 2 WELLS CONDUCTIVITY



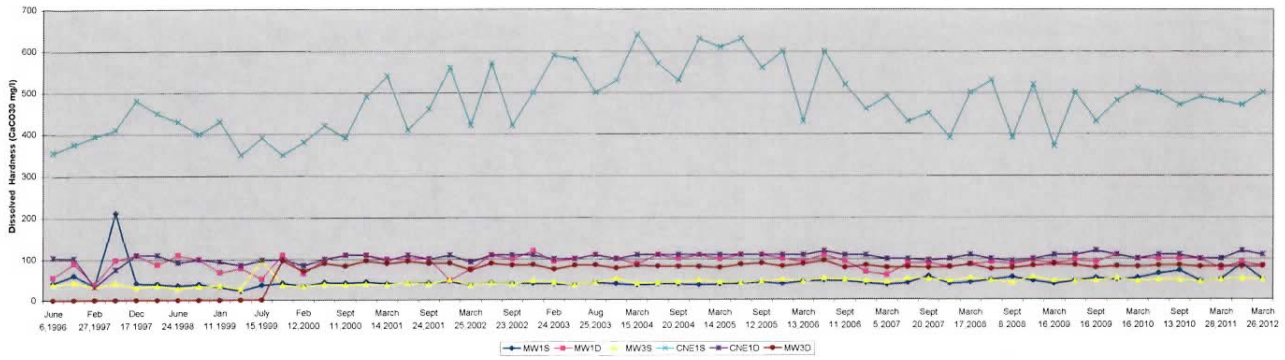
GROUP 3 WELLS CONDUCTIVITY



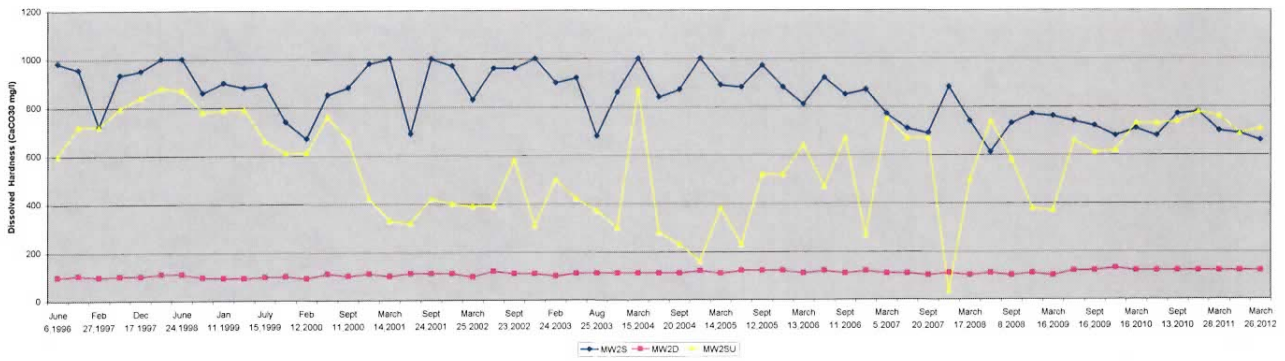
GROUP 4 WELLS CONDUCTIVITY



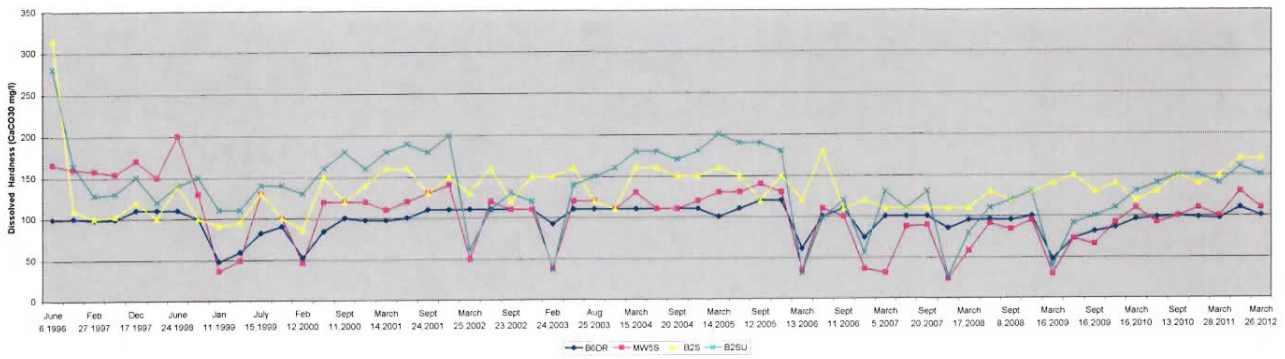
GROUP 1 WELLS DISSOLVED HARDNESS



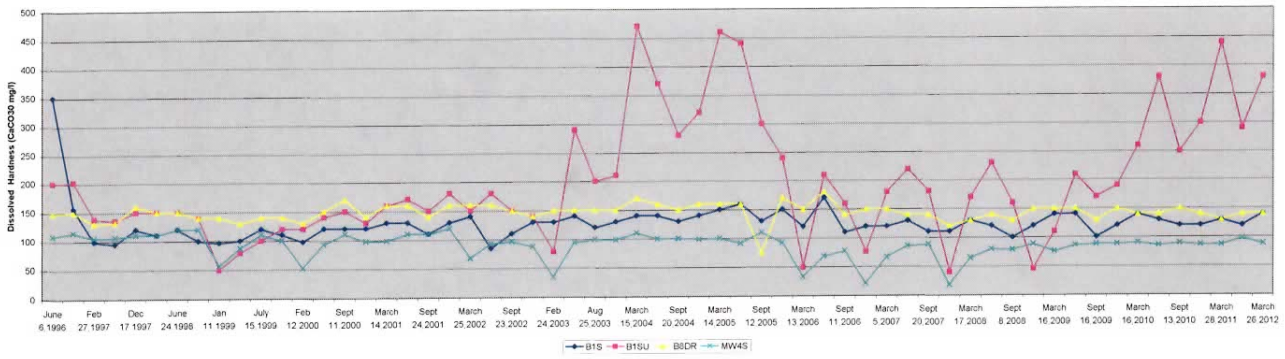
GROUP 2 WELLS HARDNESS



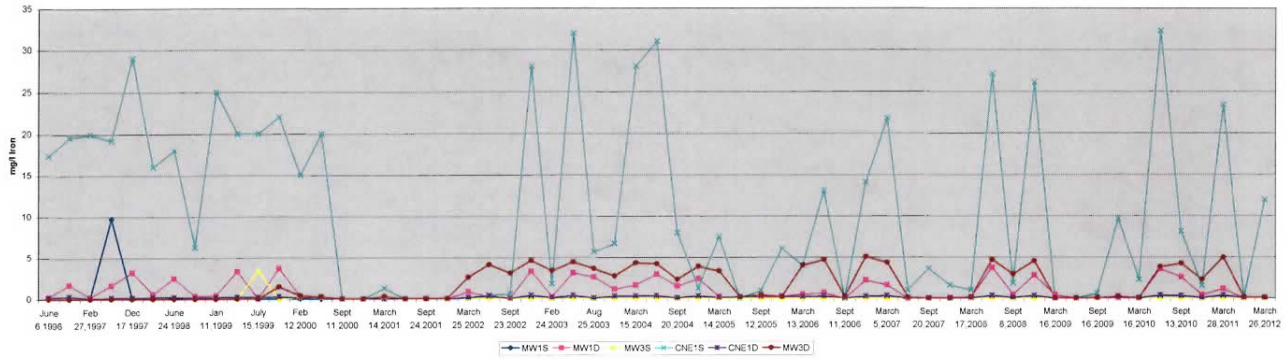
GROUP 3 WELLS HARDNESS



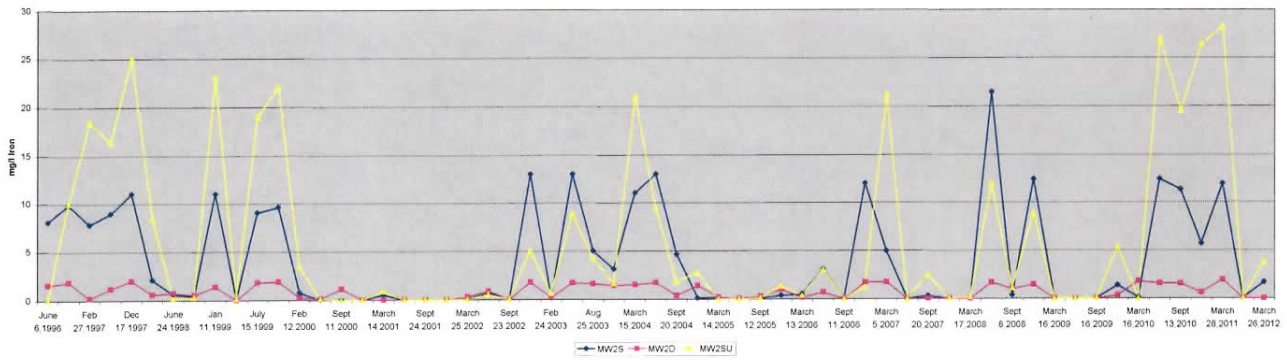
GROUP 4 WELLS HARDNESS



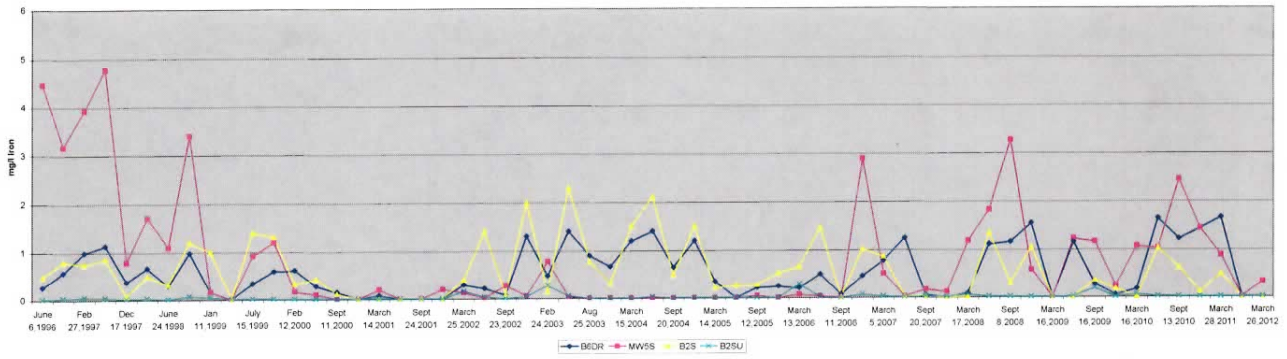
GROUP 1 WELLS DISSOLVED IRON



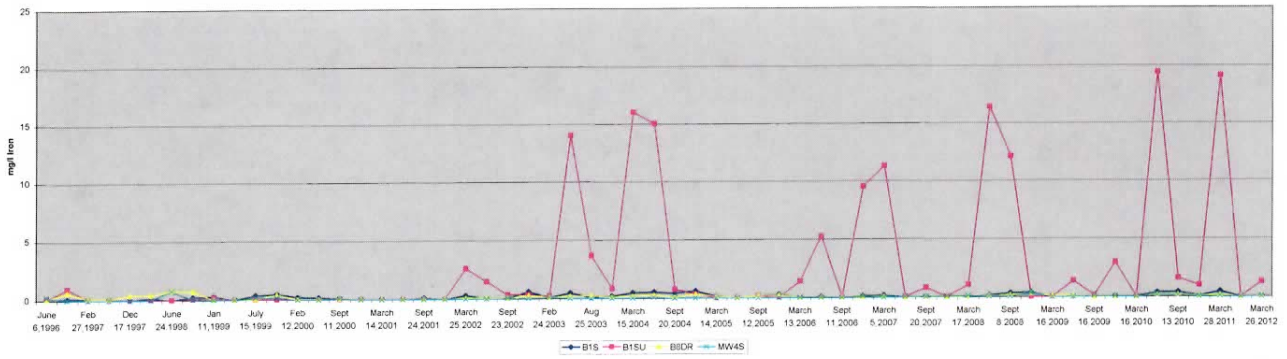
GROUP 2 WELLS DISSOLVED IRON



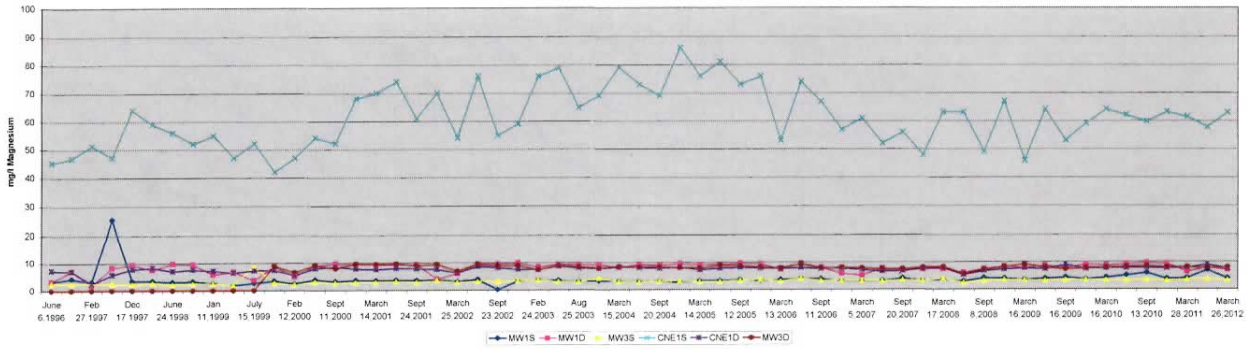
GROUP 3 WELLS DISSOLVED IRON



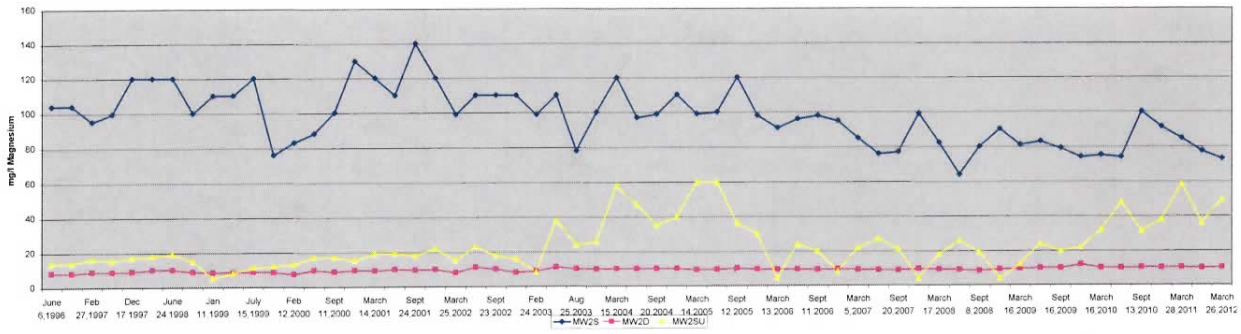
GROUP 4 WELLS DISSOLVED IRON



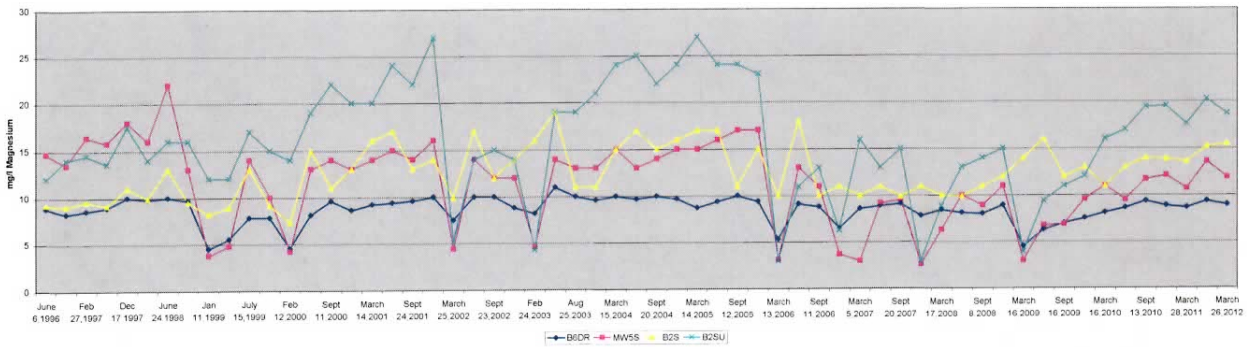
GROUP 1 WELLS DISSOLVED MAGNESIUM



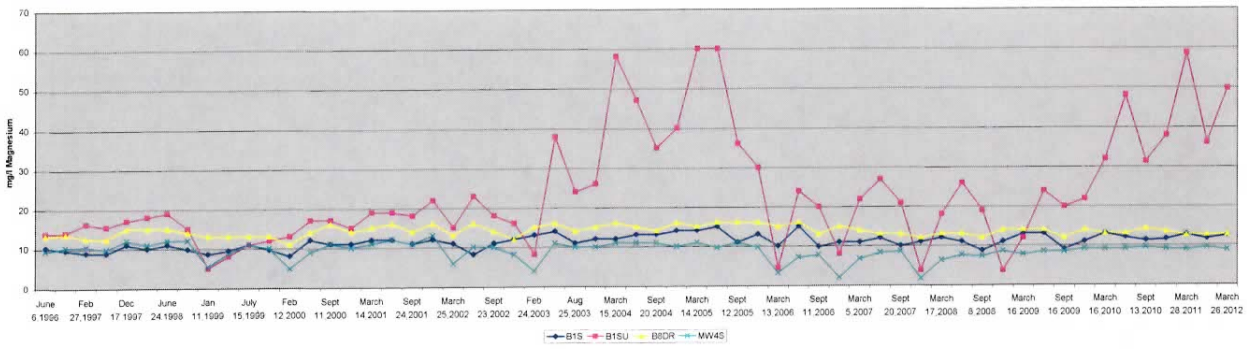
GROUP 2 WELLS DISSOLVED MAGNESIUM



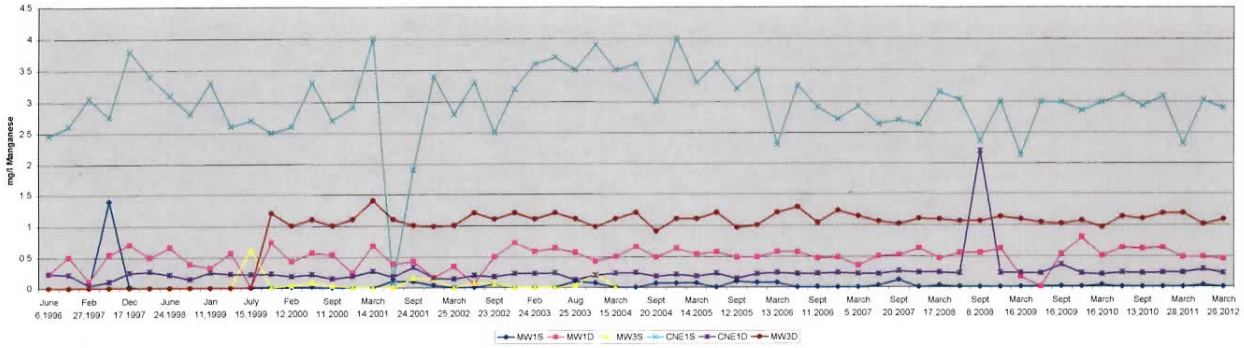
GROUP 3 WELLS DISSOLVED MAGNESIUM



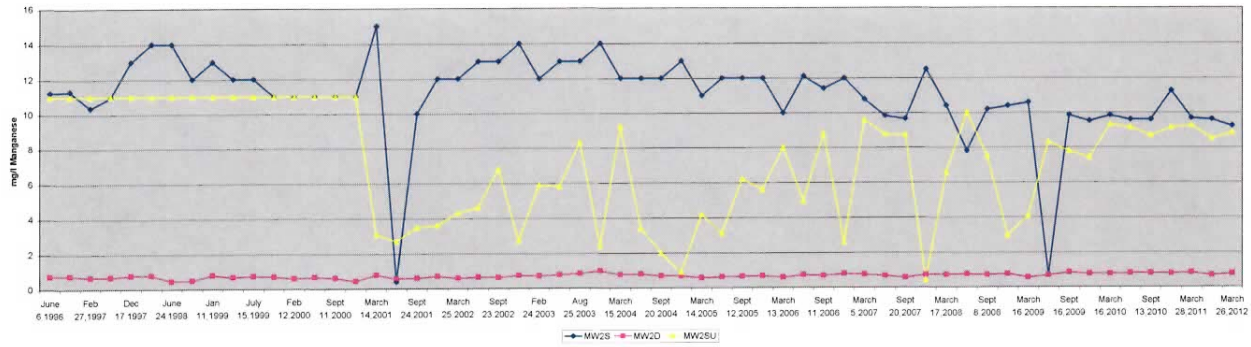
GROUP 4 WELLS DISSOLVED MAGNESIUM



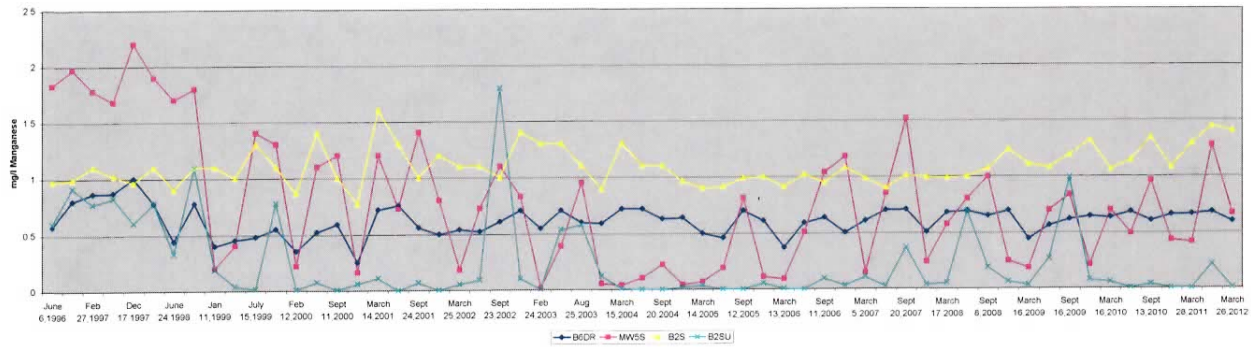
GROUP 1 WELLS DISSOLVED MANGANESE



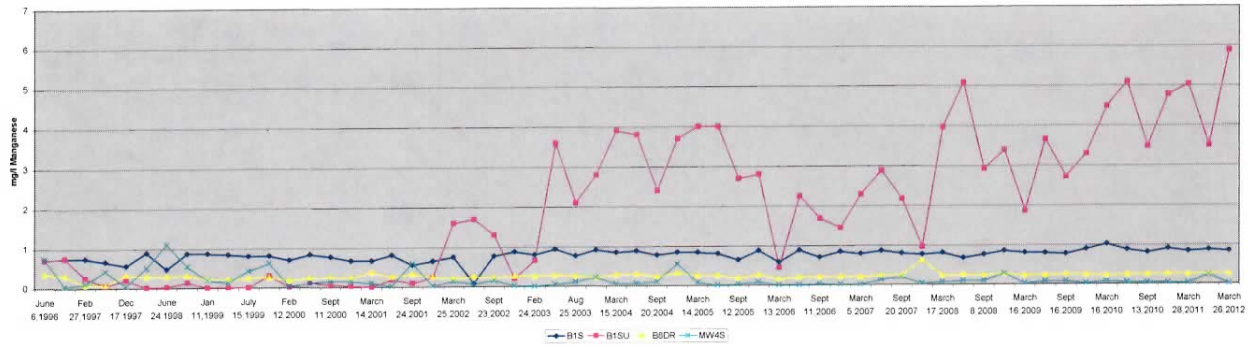
GROUP 2 WELLS DISSOLVED MANGANESE



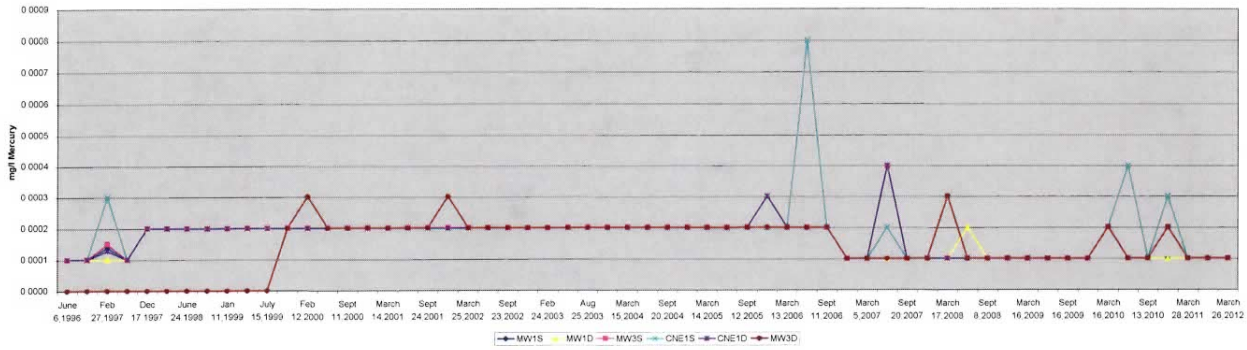
GROUP 3 WELLS DISSOLVED MANGANESE



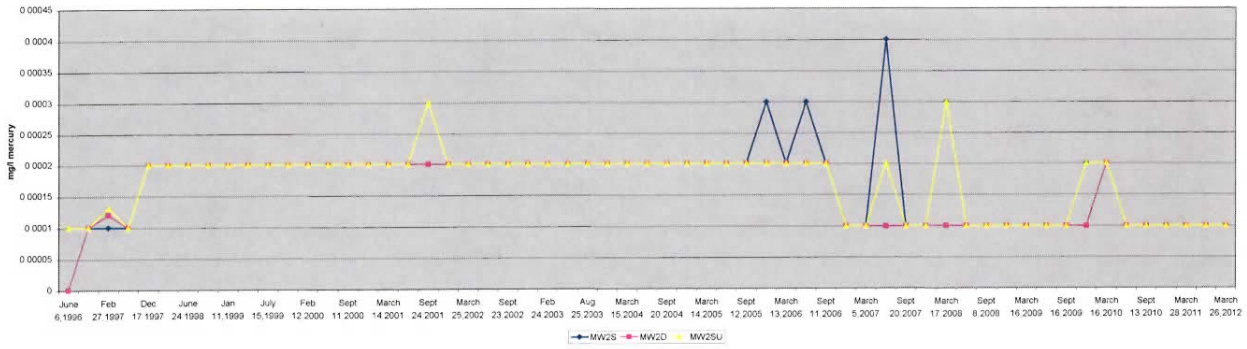
GROUP 4 WELLS DISSOLVED MANGANESE



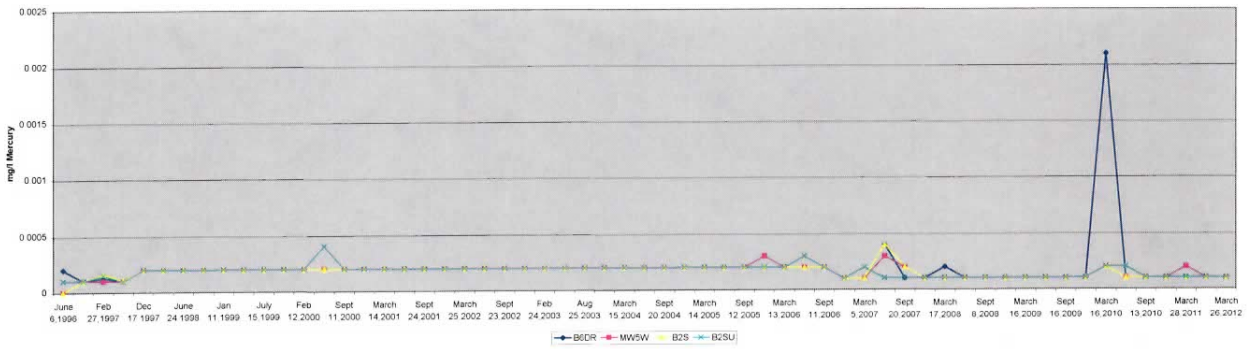
GROUP 1 WELLS DISSOLVED MERCURY



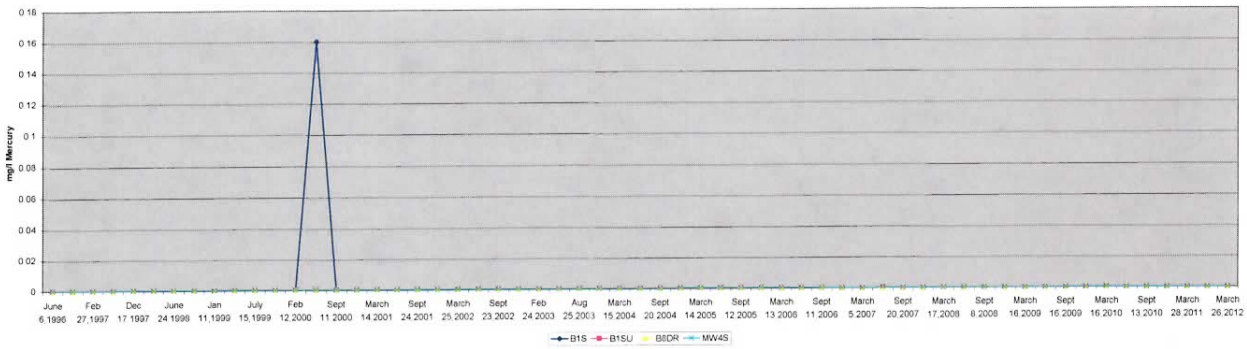
GROUP 2 WELLS DISSOLVED MERCURY



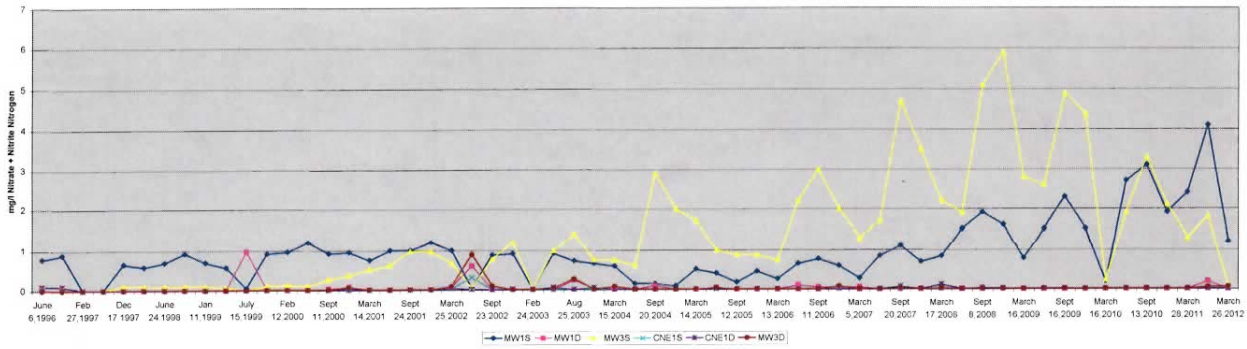
GROUP 3 WELLS DISSOLVED MERCURY



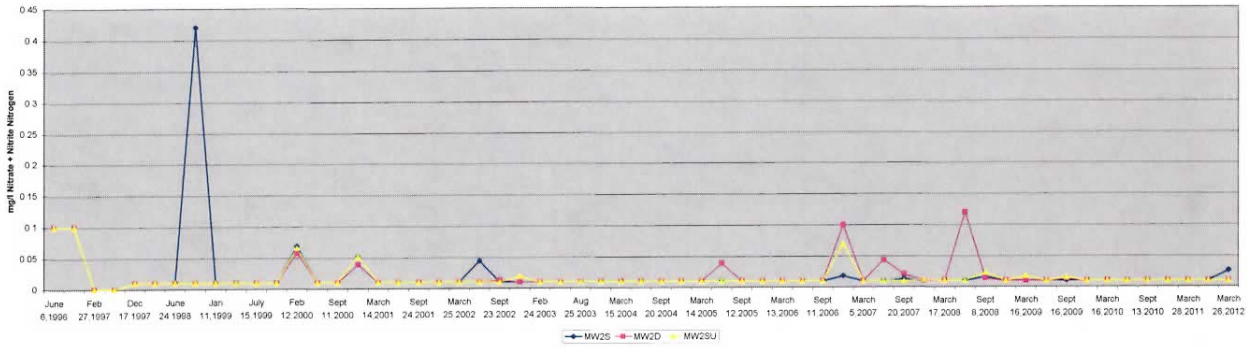
GROUP 4 WELLS DISSOLVED MERCURY



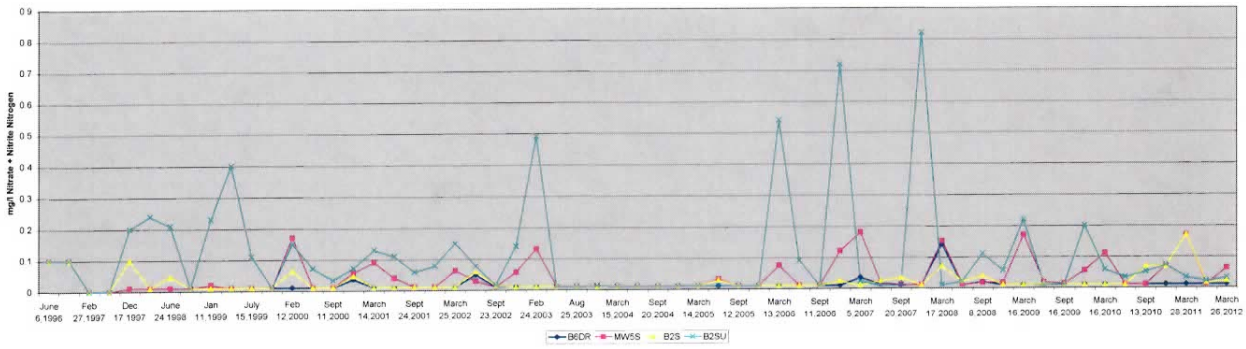
GROUP 1 WELLS NITRATE + NITRITE NITROGEN



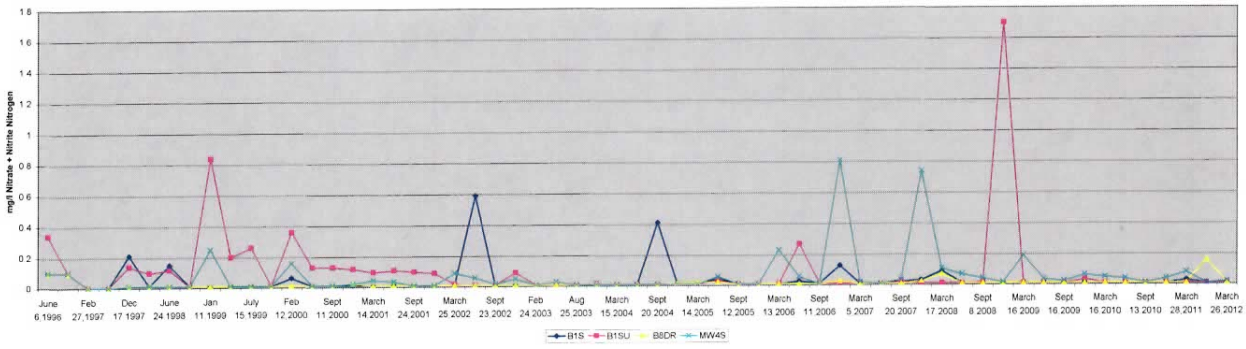
GROUP 2 WELLS NITRATE + NITRITE NITROGEN



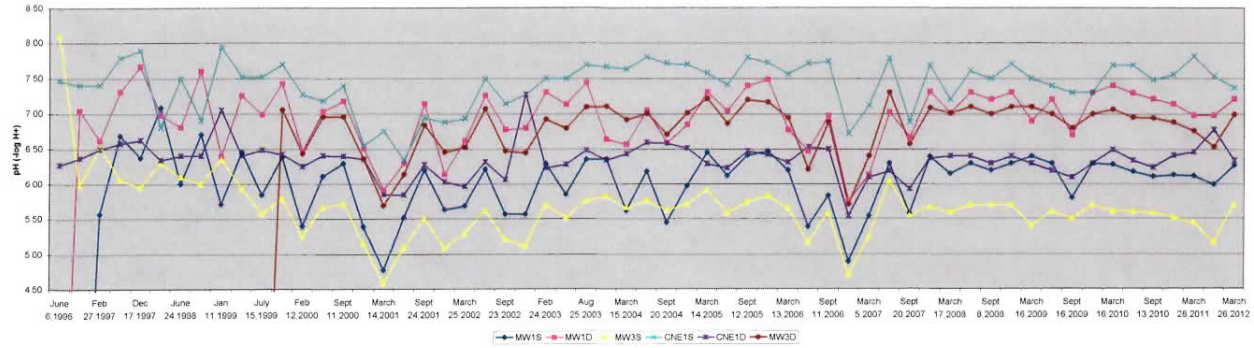
GROUP 3 WELLS NITRATE + NITRITE NITROGEN



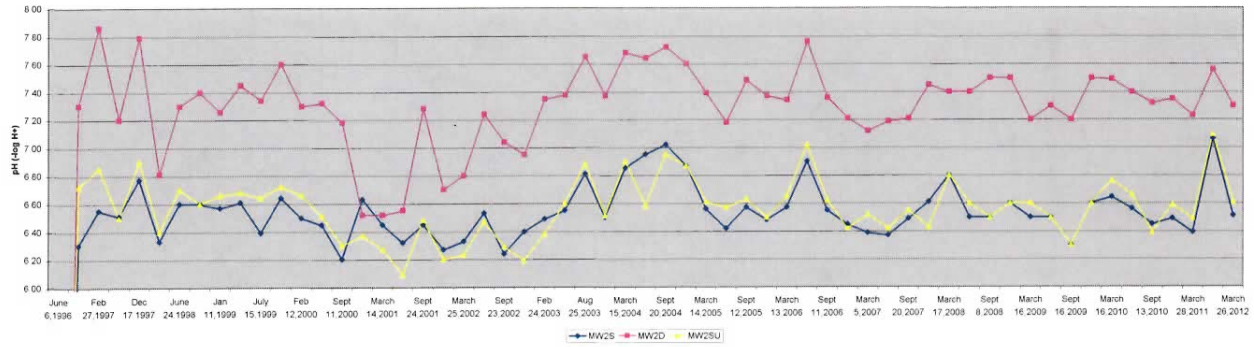
GROUP 4 WELLS NITRATE + NITRITE NITROGEN



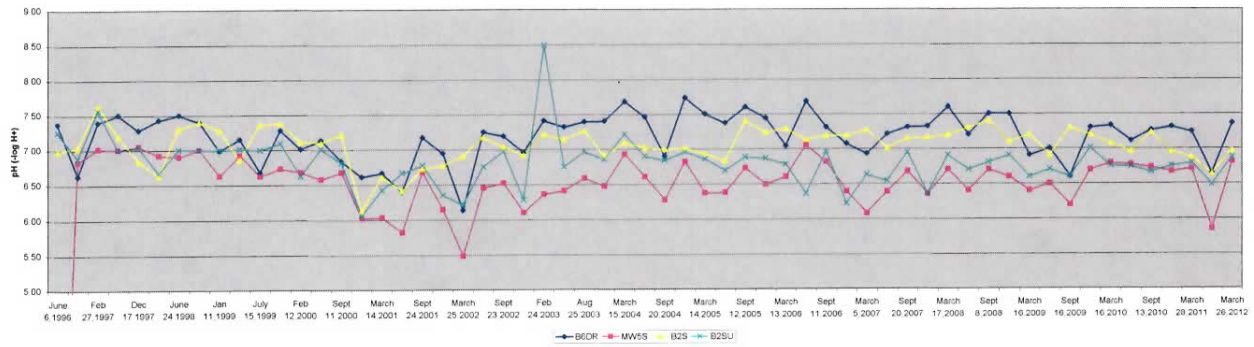
GROUP 1 WELLS pH



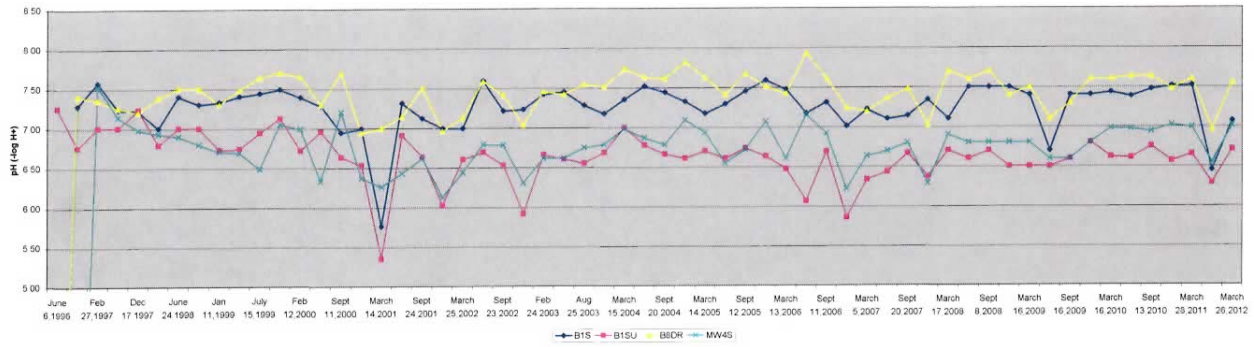
GROUP 2 WELLS pH



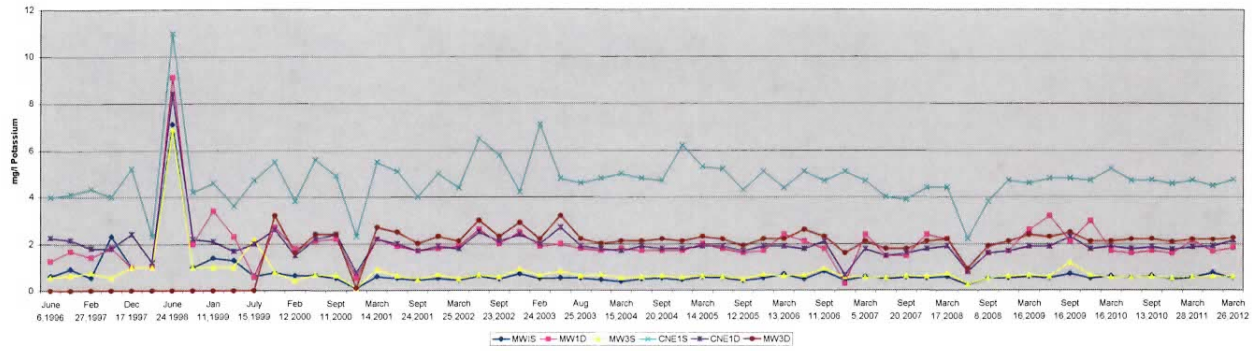
GROUP 3 WELLS pH



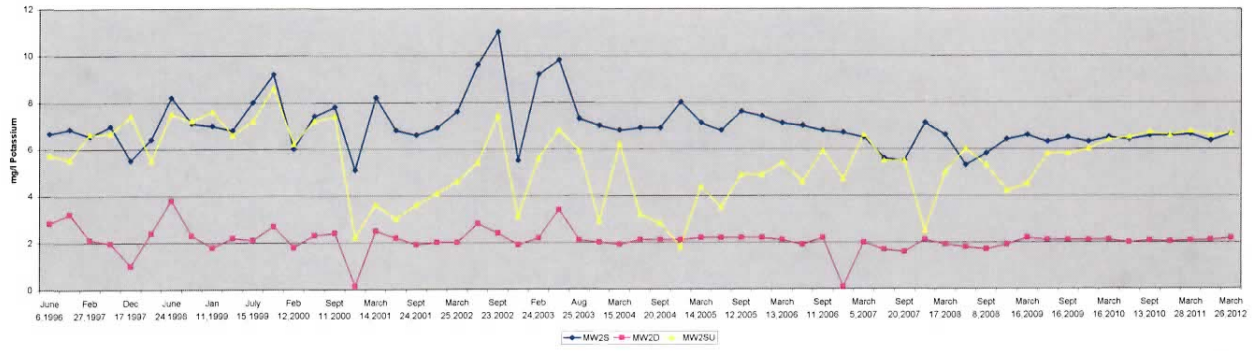
GROUP 4 WELLS pH



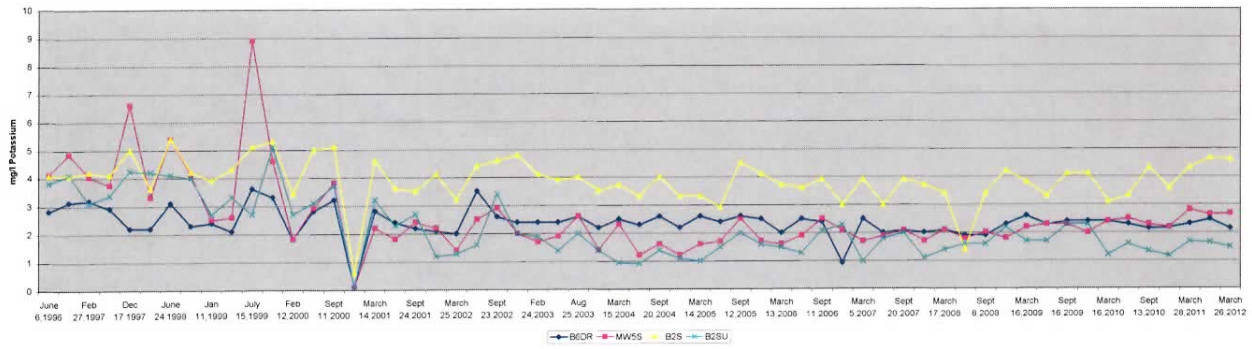
GROUP 1 WELLS DISSOLVED POTASSIUM



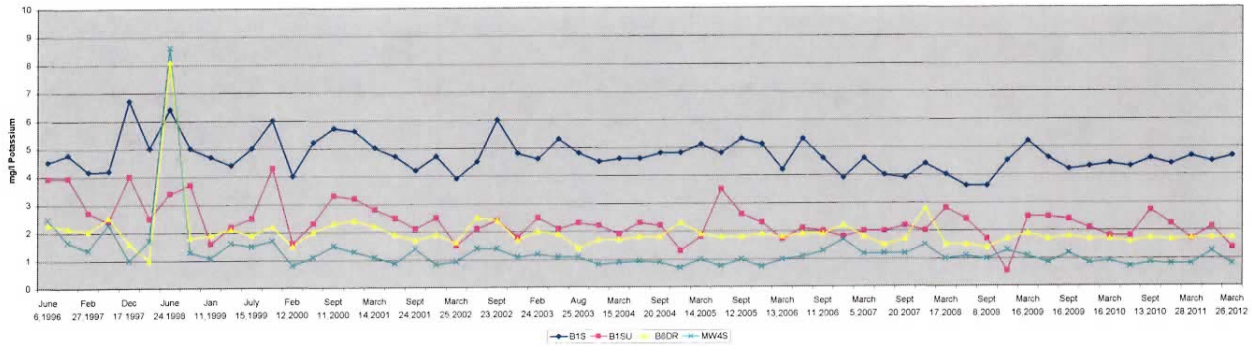
GROUP 2 WELLS DISSOLVED POTASSIUM



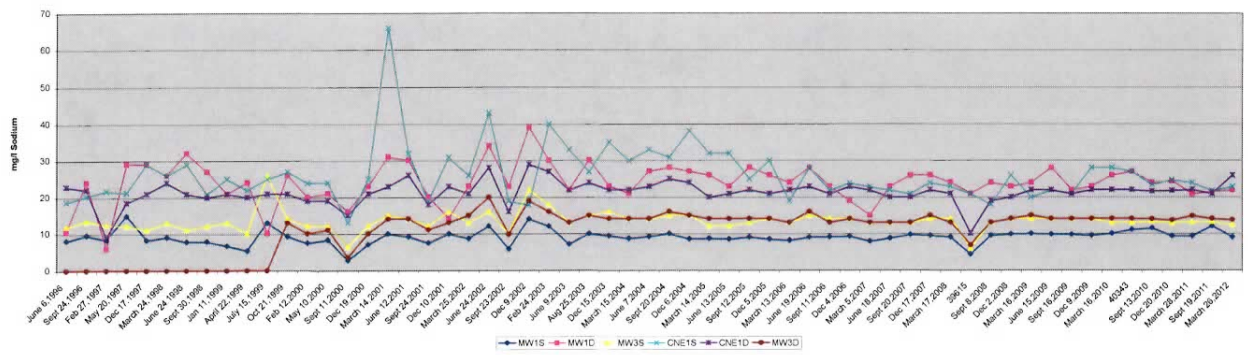
GROUP 3 WELLS DISSOLVED POTASSIUM



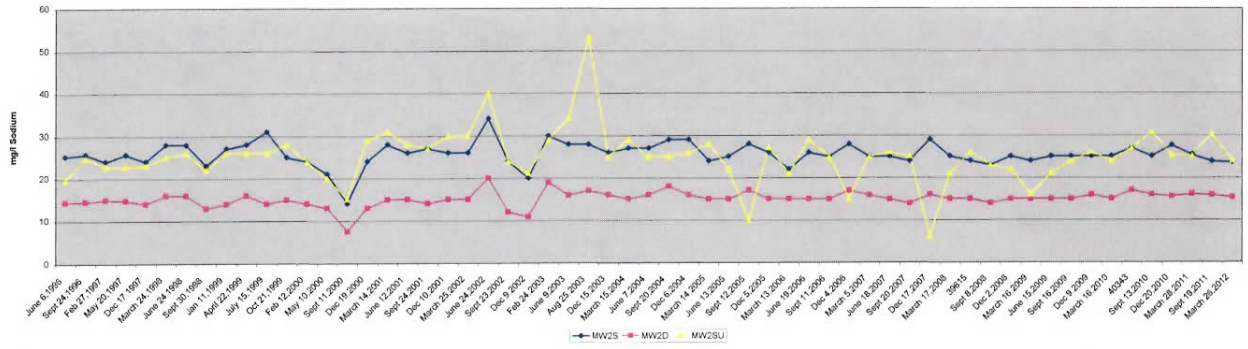
GROUP 4 WELLS DISSOLVED POTASSIUM



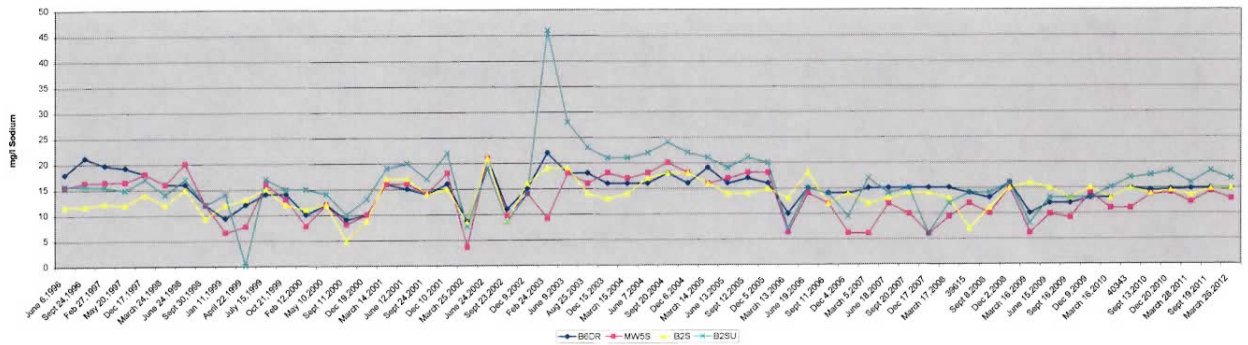
GROUP 1 WELLS SODIUM



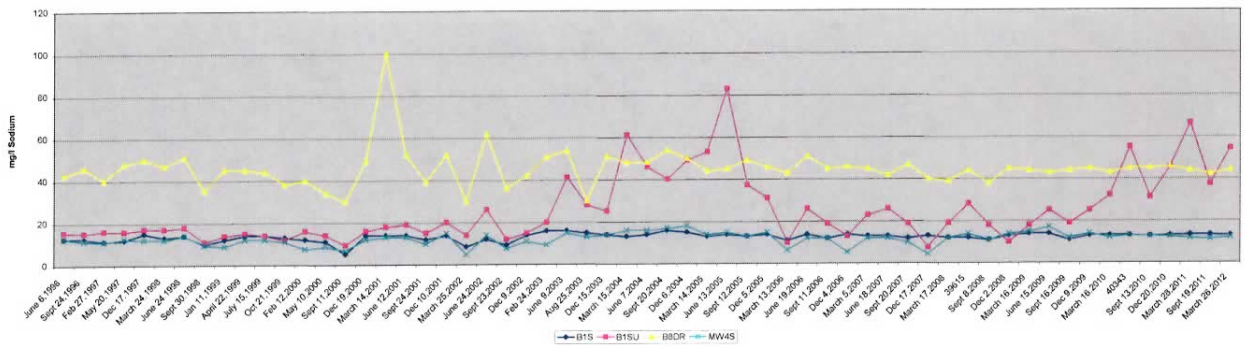
GROUP 2 WELLS SODIUM



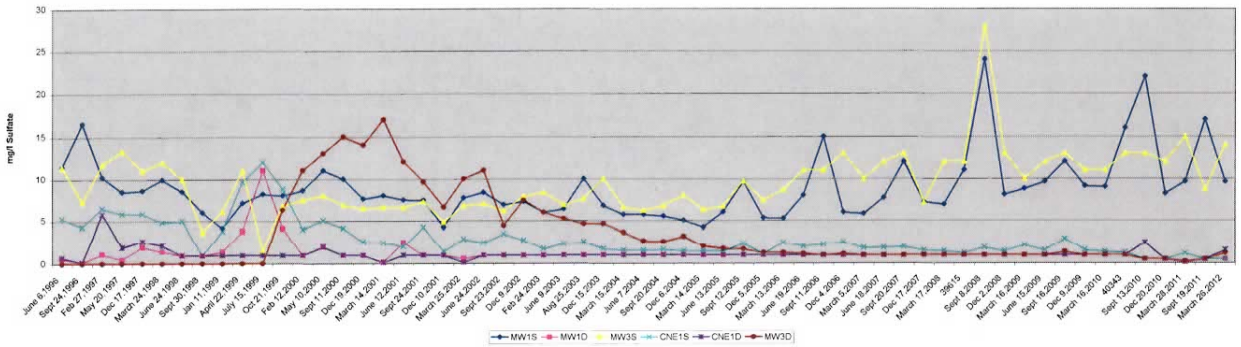
GROUP 3 WELLS SODIUM



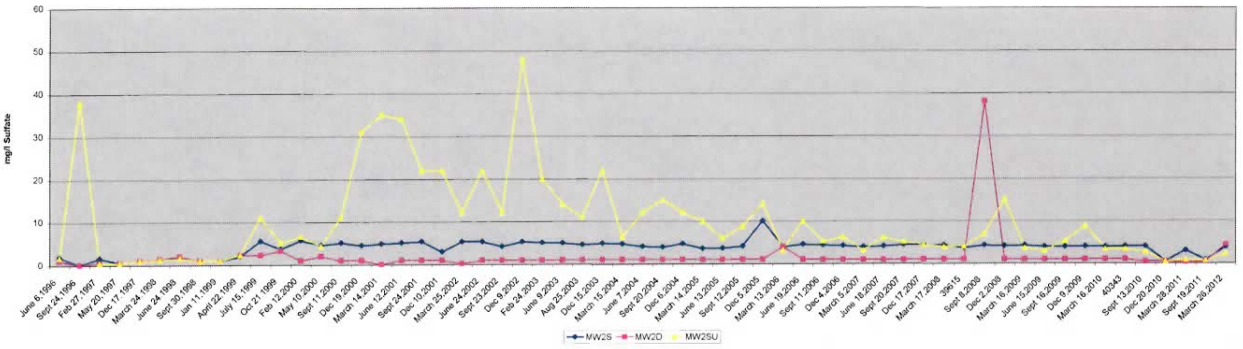
GROUP 4 WELLS SODIUM



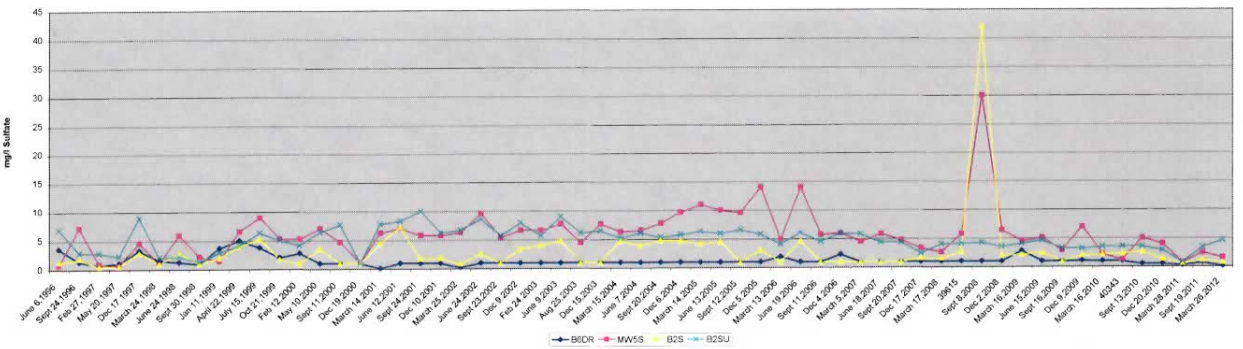
GROUP 1 WELLS SULFATE



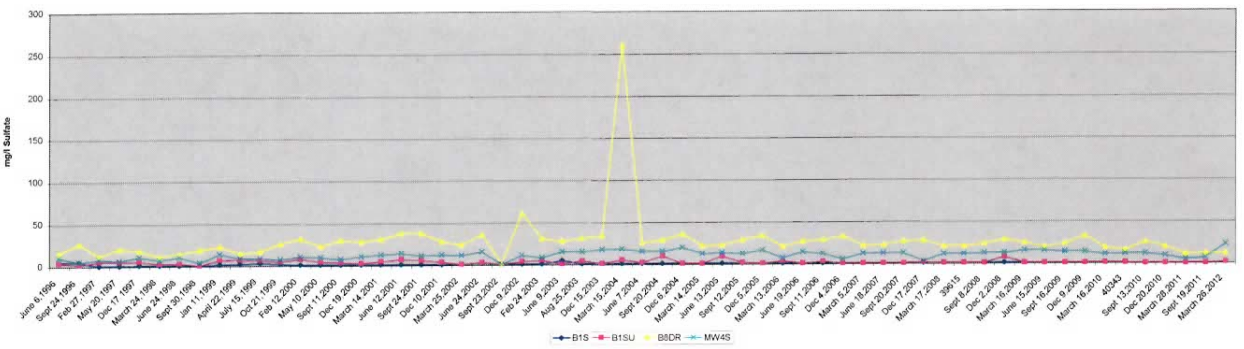
GROUP 2 WELLS SULFATE



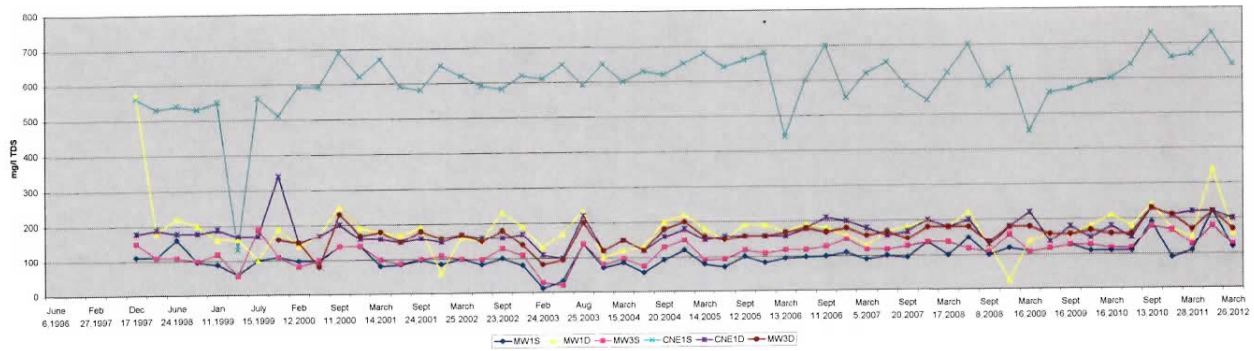
GROUP 3 WELLS SULFATE



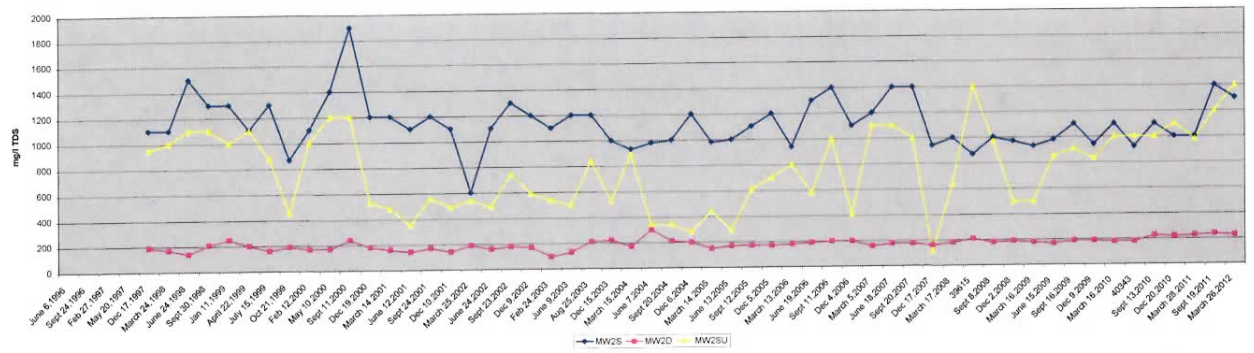
GROUP 4 WELLS SULFATE



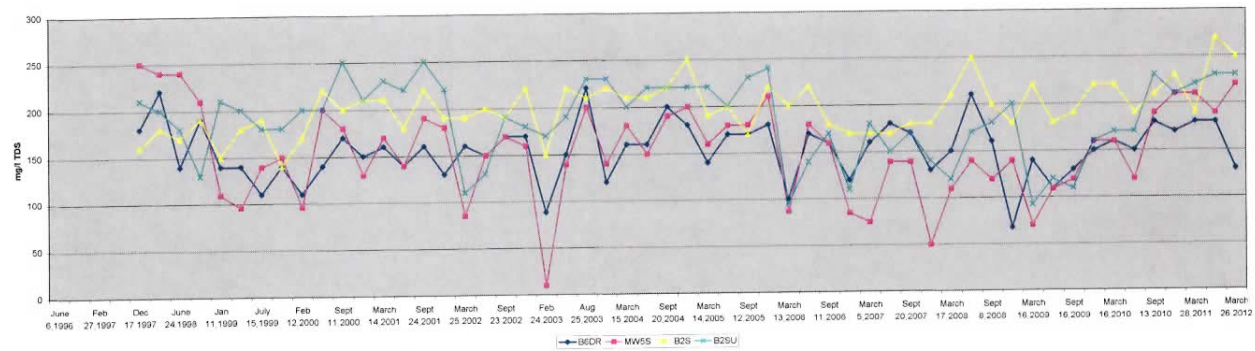
GROUP 1 WELLS TOTAL DISSOLVED SOLIDS



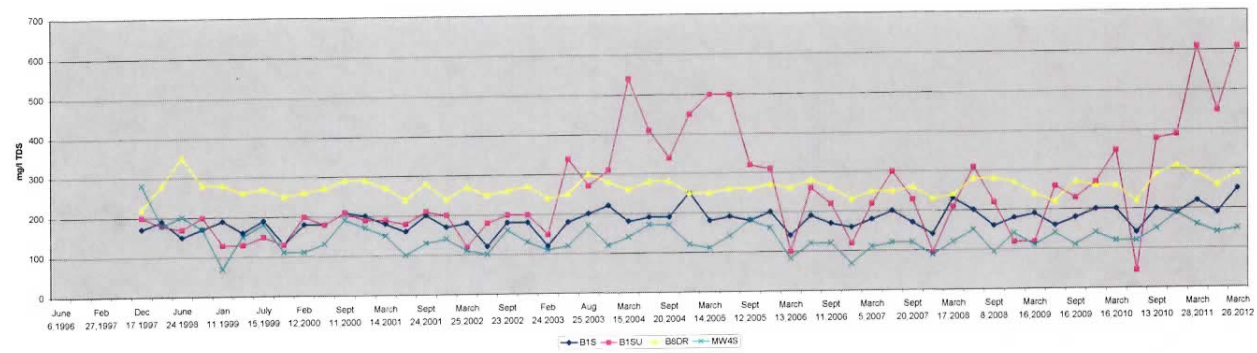
GROUP 2 WELLS TOTAL DISSOLVED SOLIDS



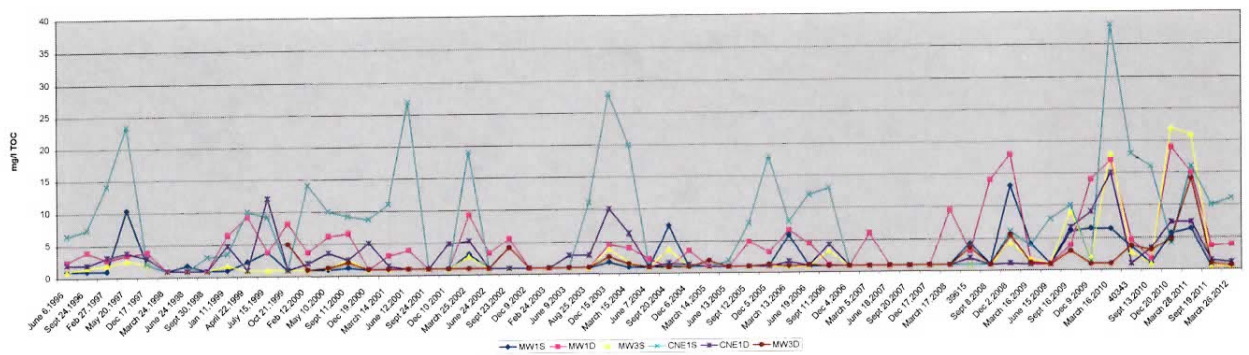
GROUP 3 WELLS TOTAL DISSOLVED SOLIDS



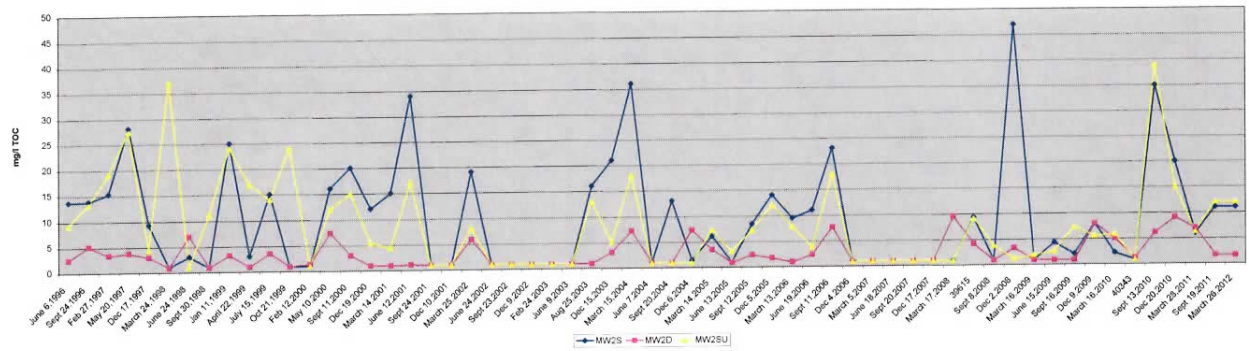
GROUP 4 WELLS TOTAL DISSOLVED SOLIDS



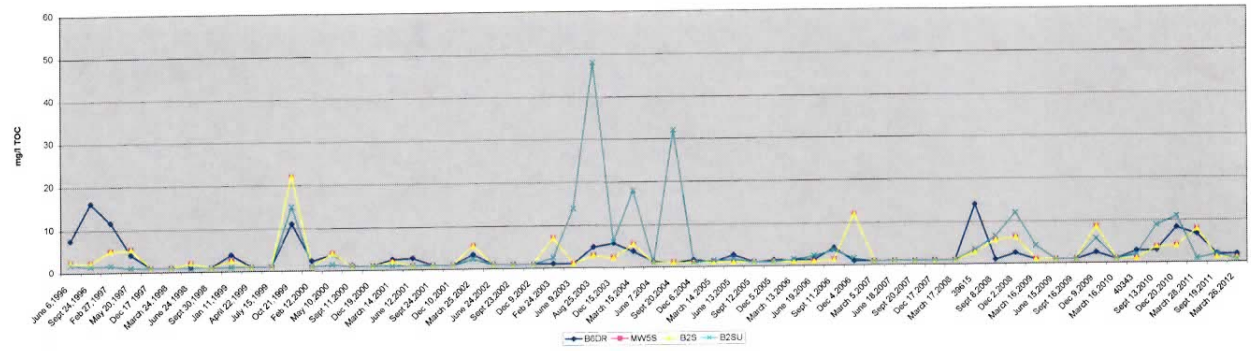
GROUP 1 WELLS TOTAL ORGANIC CARBON



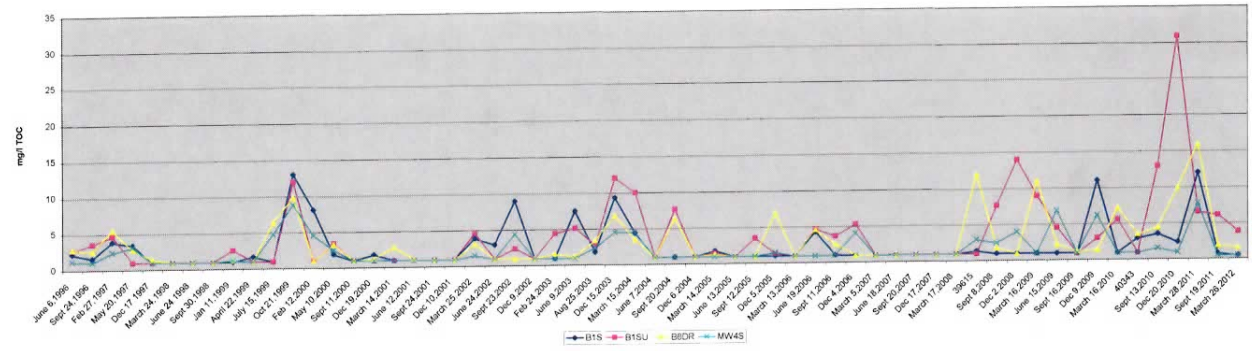
GROUP 2 WELLS TOTAL ORGANIC CARBON



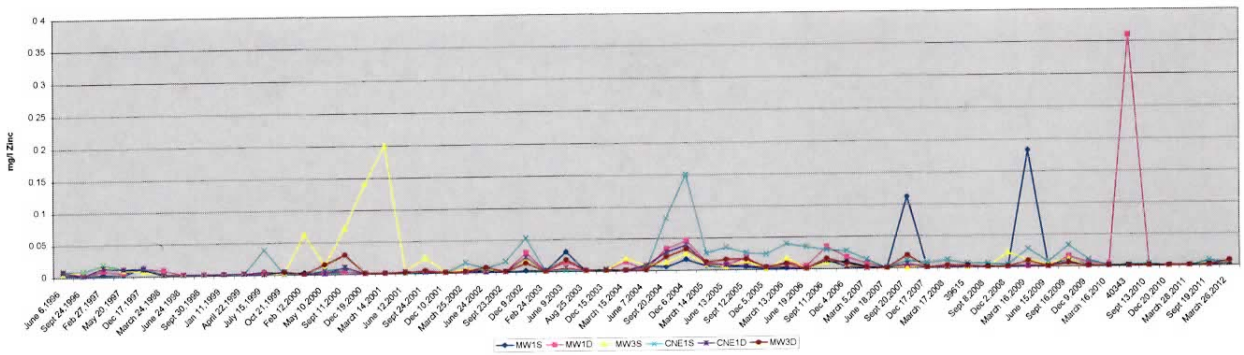
GROUP 3 WELLS TOTAL ORGANIC CARBON



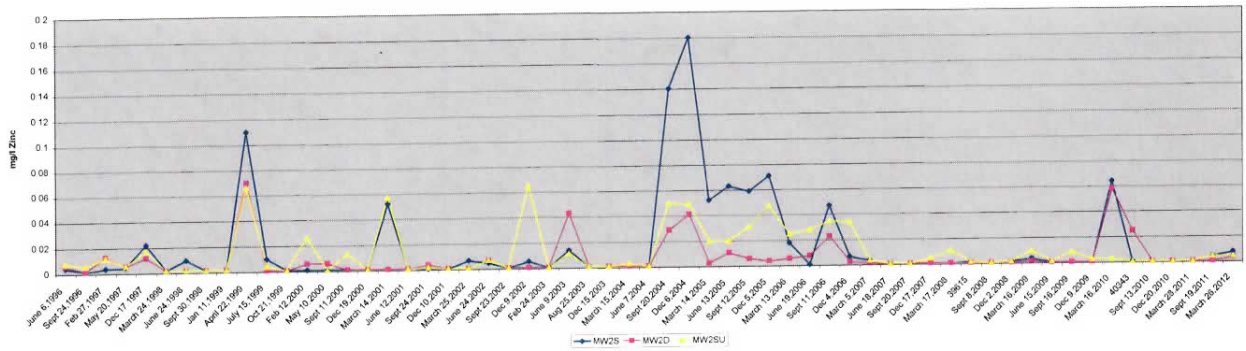
GROUP 4 WELLS TOTAL ORGANIC CARBON



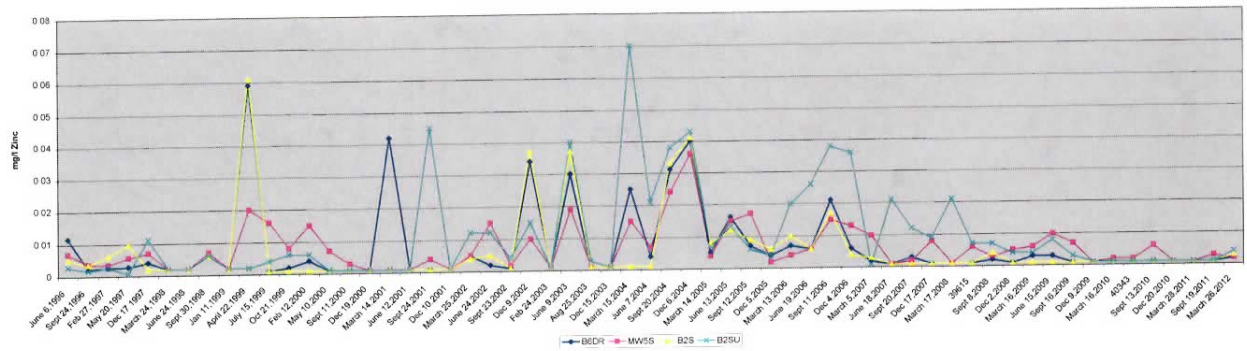
GROUP 1 WELLS DISSOLVED ZINC



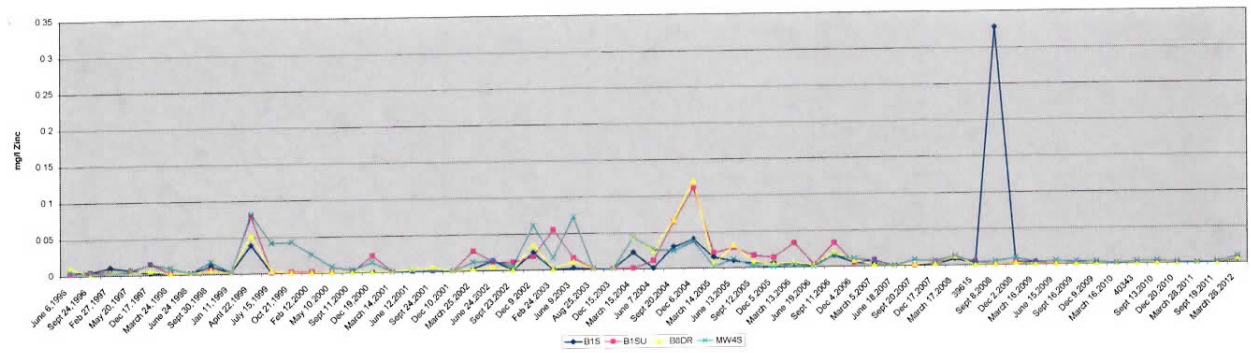
GROUP 2 WELLS DISSOLVED ZINC



GROUP 3 WELLS DISSOLVED ZINC



GROUP 4 WELLS DISSOLVED ZINC



APPENDIX C
LANDFILL GAS MONITORING

The landfill gas collection system is composed of gas trenches, extraction wells, and a collection manifold that carries the gas to a flare facility for destruction. Data is collected at regular intervals from the monitoring ports at the risers and wellheads, but is not included as part of this report. Gas monitoring probes located around the perimeter of the site provide feedback on the effectiveness of the gas collection system.

The Centralia Landfill Gas Probe Monitoring Program includes measurement of landfill gas volumes below the surface of the landfill and at four probes located off the site. Landfill gas probes are tested quarterly unless flooding prohibits this. Most of the probes are underwater during flood events.

Fourteen perimeter probes were sampled. Magnehelic gauges and a GasTech GT201 combustible gas detector were used to test pressure and combustible gas by volume. Magnehelics were zeroed prior to use. The GasTech was calibrated prior to each use. All calibration data were recorded and archived.

Measurements were collected by attaching a flexible hose to the hosebarb on the top of each probe. Percent LEL measurements were recorded after waiting at least one minute to allow for gas equilibration.

Perimeter gas data for this report were collected in March and June, 2012.

Centralia Landfill Perimeter Probe Data

Date	Probe Number	Time	Barometric Pressure	Probe Pressure inches W. C.	% LEL	% Oxygen
3/2/2012	GP2	1135	30.06	0	0	20.9
3/2/2012	GP1	1142	30.06	-0.1	0	20.9
3/2/2012	GP4A		30.06	flooded		
3/2/2012	GP4B		30.06	flooded		
3/2/2012	GP15	1028	30.06	0	0	20.9
3/2/2012	GP11	1035	30.06	0	0	20.9
3/2/2012	GP10	1042	30.06	0	0	20.9
3/2/2012	GP12	1048	30.06	0	0	20.9
3/2/2012	GP9	1058	30.06	-0.1	0	20.9
3/2/2012	GP13	1107	30.06	0	0	20.9
3/2/2012	GP8	1110	30.06	-0.2	0	20.9
3/2/2012	GP7	1114	30.06	0	0	20.9
3/2/2012	GP14	1118	30.06	0	0	20.9
3/2/2012	GP5R	1124	30.06	0	0	20.9
6/25/2012	GP2	1140	30	0	0	13.4
6/25/2012	GP1	1145	30	0	0	20.7
6/25/2012	GP4A	1150	30	0	0	18
6/25/2012	GP4B	1152	30	flooded		
6/25/2012	GP15	1048	30	0	0	14.7
6/25/2012	GP11	1055	30	0	0	20.9
6/25/2012	GP10	1100	30	0	0	18.5
6/25/2012	GP12	1105	30	0	0	20.8
6/25/2012	GP9	1110	30	0	0	20.9
6/25/2012	GP13	1113	30	0	0	9.6
6/25/2012	GP8	1120	30	0	0	17.4
6/25/2012	GP7	1125	30	0	0	20.9
6/25/2012	GP14	1130	30	0	0	20.9
6/25/2012	GP5R	1135	30	0	0	20.9