



June 14, 2013

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, 2013. 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
City of Centralia

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

TABLE OF CONTENTS

Report Narrative, Groundwater Elevation Contour Maps, Table of Primary and Secondary Exceedances, Table of Results Compared to Cleanup Levels for Groundwater and Surface Waters, Analytical Methods and Detection Limits, and Surface Water Data.

Appendix A - Analysis of Groundwater Data

Appendix B - Groundwater Time Series Graphs

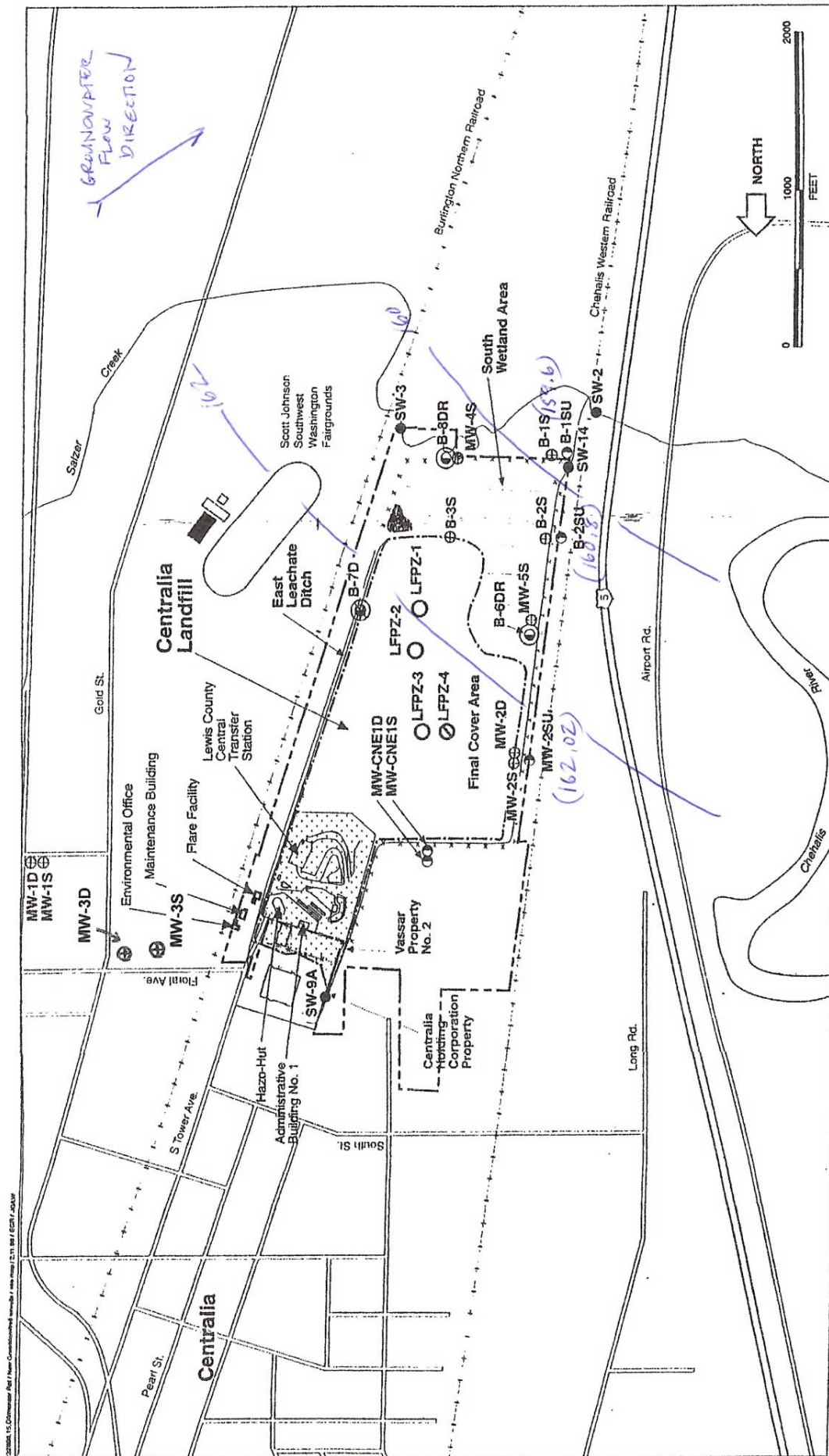
Appendix C - Landfill Gas Monitoring Narrative and Data Presentation

REPORT NARRATIVE

This biannual Compliance Monitoring Report summarizes the results from the wet season sampling done at the Centralia Landfill in March, 2013. 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 25, 26 and 27, 2013. 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 25, 2013 depth to groundwater was measured in all wells.

Weather during the sampling period was 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.



Site Map

SHALLOW UPPER AQUIFER
3/25/2013
WET SEASON, 2013

LEGEND

-
- The map displays the study area with various monitoring wells and property boundaries. A dashed line represents the 'Approximate Edge of Refuse and Limits of Source Area'. A solid line represents the 'Fence'. A thick black arrow indicates the 'Groundwater Flow Direction' from the source area towards the 'New Monitoring Wells'. The 'Property Line' is shown as a dashed line. The 'Surface Water Monitoring Stations' are marked with a circle containing a dot. The 'Closed Northend Landfill' is a shaded rectangular area. The 'Pre-RI Monitoring Wells' are marked with a circle containing a cross. The 'Piezometers' are marked with a circle containing a dot. The 'Abandoned Piezometers' are marked with a circle containing a cross. The 'Abandoned and New Replacement Monitoring Wells' are marked with a circle containing a dot. The 'Abandoned Monitoring Wells' are marked with a circle containing a cross.

Exceedences of Primary and Secondary Standards in Groundwater Wells

	pH	Conductivity	TDS	Chloride	Sulfate	Nitrate + Nitrite	Arsenic	Iron	Mercury	Manganese	Zinc
Primary Drinking Water Standard	6.5 - 8.5	CAP cleanup levels	500 mg/l	250 mg/l	250 mg/l	10 mg/l	0.01 mg/l	0.3 mg/l	.002 mg/l	0.05 mg/l	5 mg/l
Secondary 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
Groundwater Standard											
MW1D	6.96	262	210	5.26	< 0.1	< 0.02	0.0068	0.008	< 0.00002	0.4936	0.002
MW1S	6.14	204	170	1.95	28.8	3.7	0.0001	< 0.005	< 0.00002	0.0057	< 0.001
MW3S	5.49	169	140	6.5	22	0.82	0.0002	< 0.005	< 0.00002	0.0051	< 0.001
MW3D	6.79	219	190	6.58	< 0.1	< 0.02	0.0011	0.079	< 0.00002	0.9804	< 0.001
CNE1S	6.27	1030	680	64.6	0.46	< 0.02	0.0022	7.69	< 0.00002	2.376	0.002
CNE1D	7.42	276	190	6.27	< 0.1	< 0.02	0.0001	0.099	< 0.00002	0.2041	0.001
MW2D	7.2	304	230	8.9	< 0.1	< 0.02	0.0046	< 0.005	< 0.00002	0.7297	< 0.001
MW2S	6.42	1390	950	224	0.95	< 0.02	0.012	1.14	< 0.00002	8.134	< 0.001
MW2SU	6.5	1290	1000	227	0.51	< 0.02	0.0011	0.352	< 0.00002	7.217	< 0.001
MW5S	6.59	172	130	5.41	3.57	0.13	0.0014	0.715	< 0.00002	0.3638	0.001
B6DR	7.05	211	160	6.24	0.71	< 0.02	0.0028	0.051	< 0.00002	0.4551	< 0.001
B2SU	6.74	328	220	3.1	3.33	0.061	0.0009	0.008	< 0.00002	0.0153	0.001
B2S	6.45	171	180	4.71	2.25	< 0.02	0.0014	0.028	< 0.00002	0.766	0.013
B1SU	6.51	579	370	29.2	0.44	< 0.02	0.0018	0.011	< 0.00002	4.036	< 0.001
B1S	6.45	171	210	3.31	< 0.1	< 0.02	0.013	< 0.005	< 0.00002	0.8174	< 0.001
MW4S	6.65	229	130	1.76	11.5	0.086	0.0004	< 0.005	< 0.00002	0.0204	< 0.001
B8DR	7.28	320	260	4.93	10.6	< 0.02	0.0002	0.068	< 0.00002	0.2194	< 0.001

ANALYTICAL METHODS AND DETECTION LIMITS				
ANALYTE	UNITS	METHOD NUMBER	REFERENCE	DETECTION LIMIT
Alkalinity (as CaCO 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 CaCO 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 2013. 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. Two wells exceeded the drinking water standard and twelve 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 five wells this round. All wells were below the standard. MW1S had the highest value with 3.7 mg/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. MW1S and MW3S were below both cleanup and compliance levels. All other wells in the unit exceeded both standards.

Conductivity has a cleanup level of 700 umhos/cm. Three of the wells exceeded this value; one of the wells in the shallow upper aquifer (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 0.3 mg/L. Four wells exceeded the cleanup level this wet season. CNE1S had the highest value with 7.69 mg/l.

Soluble Manganese has a cleanup level of 50 µg/L. MW1S, MW3S, MW4S and B2SU 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. Only MW1D exceeded the cleanup level with a value of 6.8 µg/L.

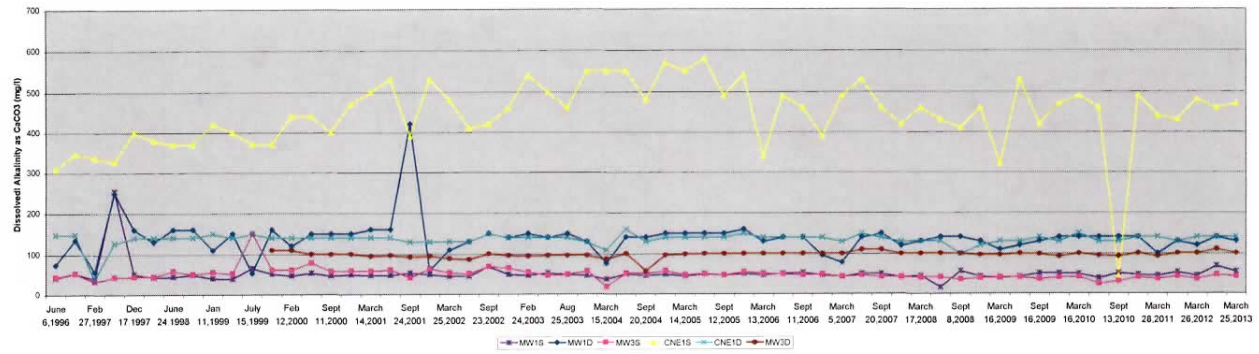
Soluble Iron has a cleanup level of 300 µg/L. All wells in the lower unit had values below the cleanup level this season.

Soluble Manganese has a cleanup level of 50 µg/L. All wells in the lower unit exceeded this value.

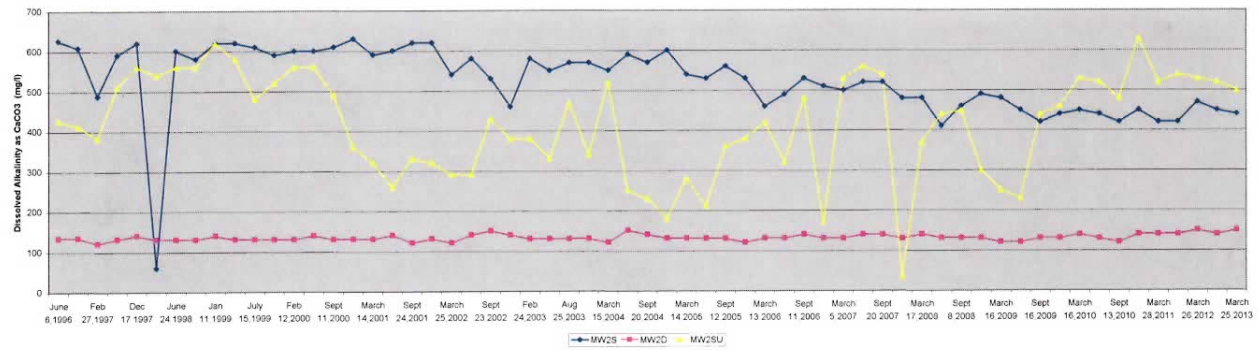
Surface Water Standards:

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 for surface water, had a value of 0.67 µg/L, exceeding the cleanup level. Dissolved arsenic was also sampled, and had a value of 0.55 µg/L.

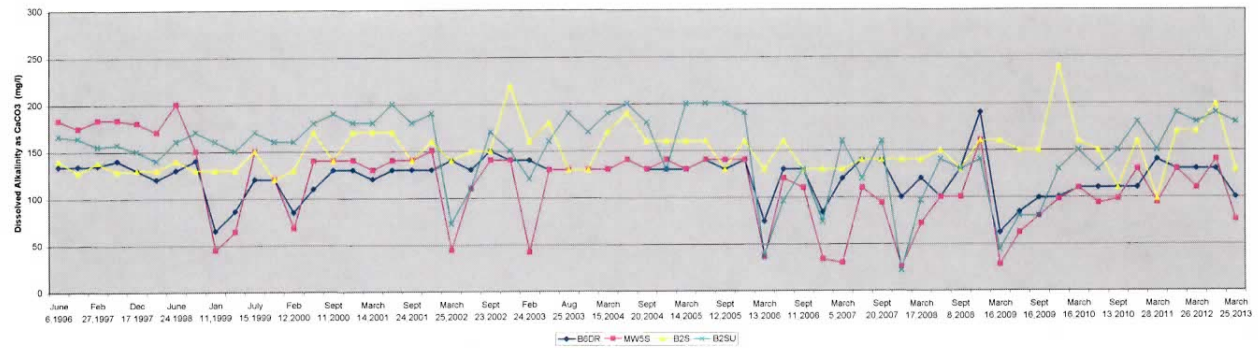
GROUP 1 WELLS DISSOLVED ALKALINITY



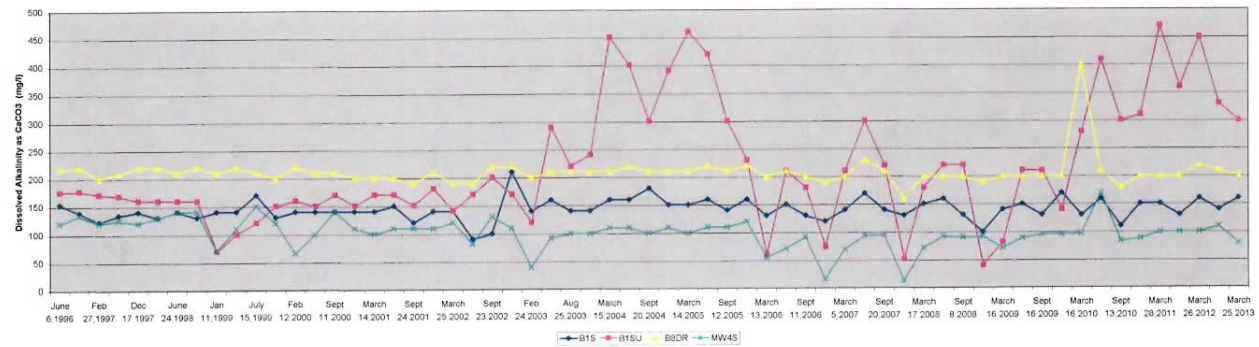
GROUP 2 WELLS DISSOLVED ALKALINITY



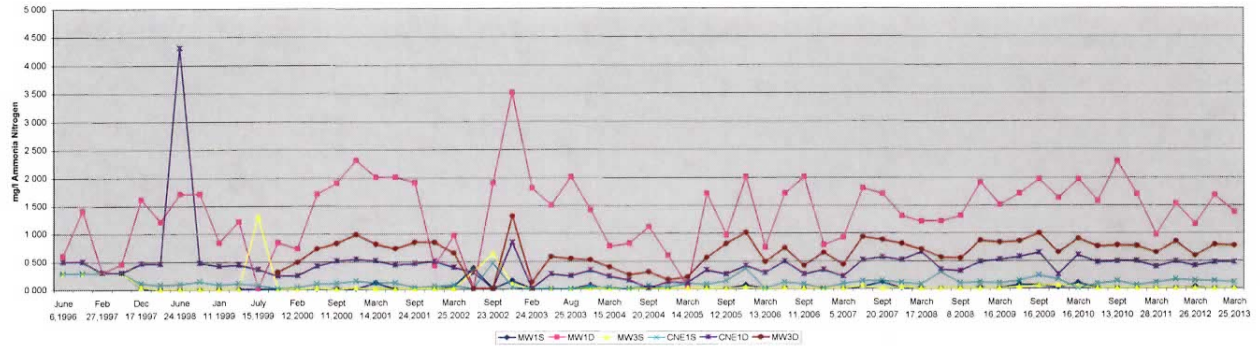
GROUP 3 WELLS DISSOLVED ALKALINITY



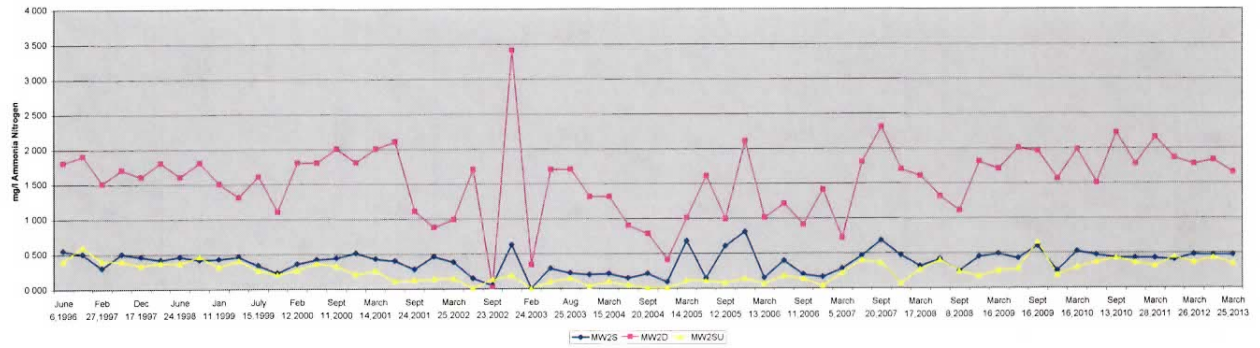
GROUP 4 WELLS DISSOLVED ALKALINITY



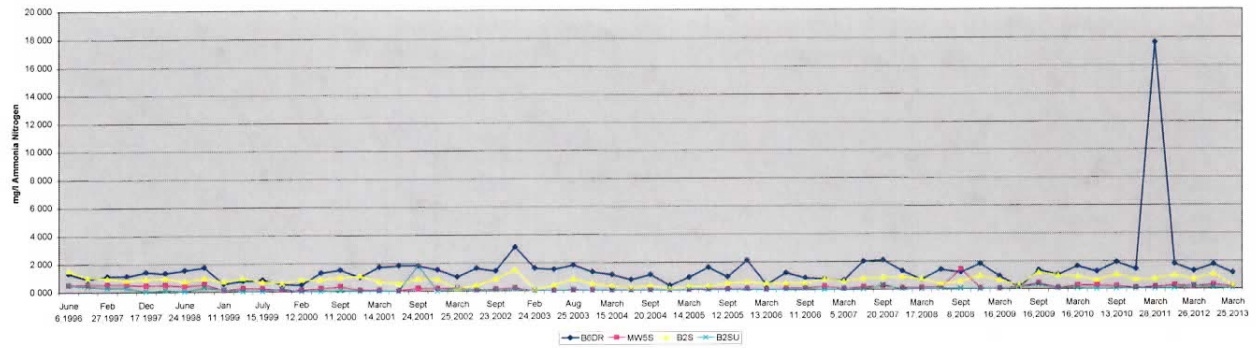
GROUP 1 WELLS AMMONIA



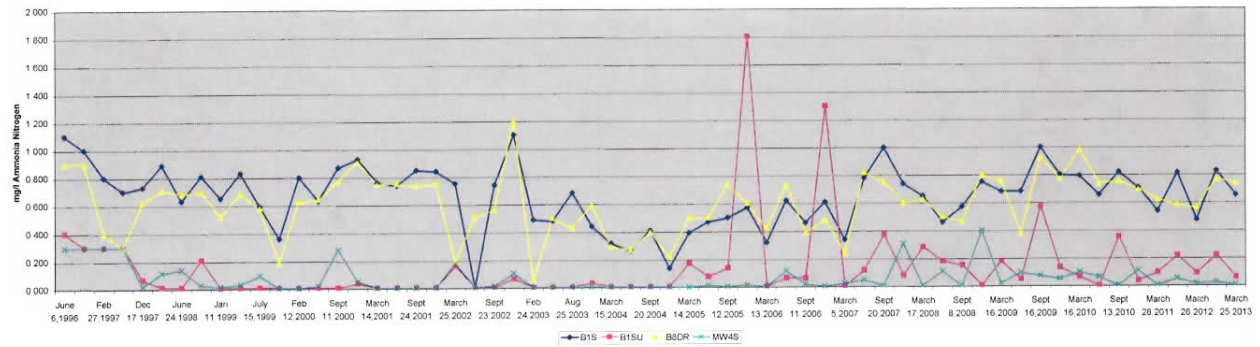
GROUP 2 WELLS AMMONIA



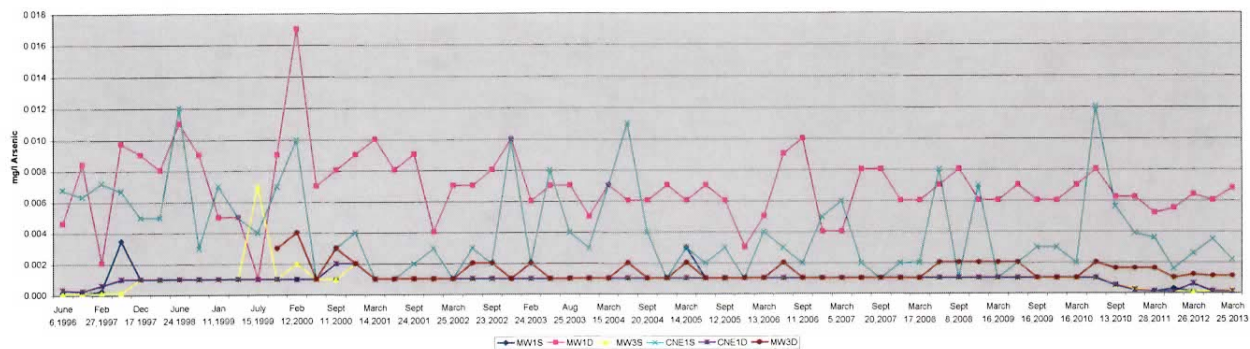
GROUP 3 WELLS AMMONIA



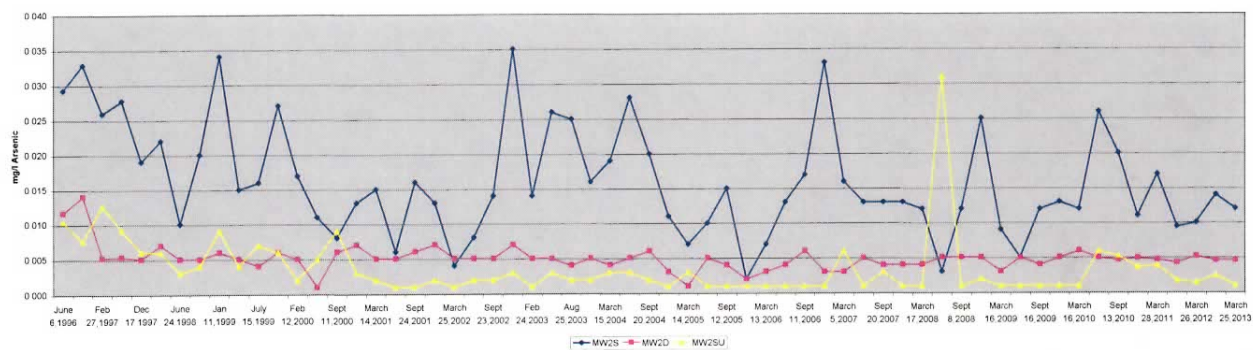
GROUP 4 WELLS AMMONIA



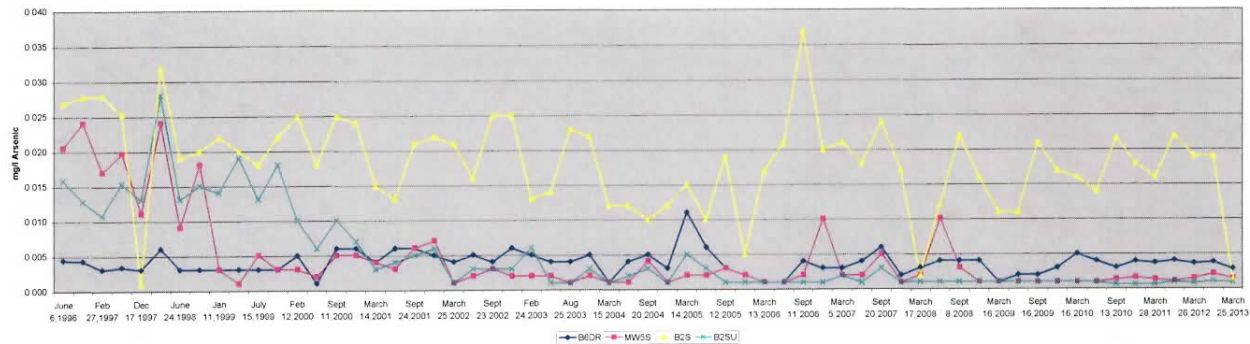
GROUP 1 WELLS DISSOLVED ARSENIC



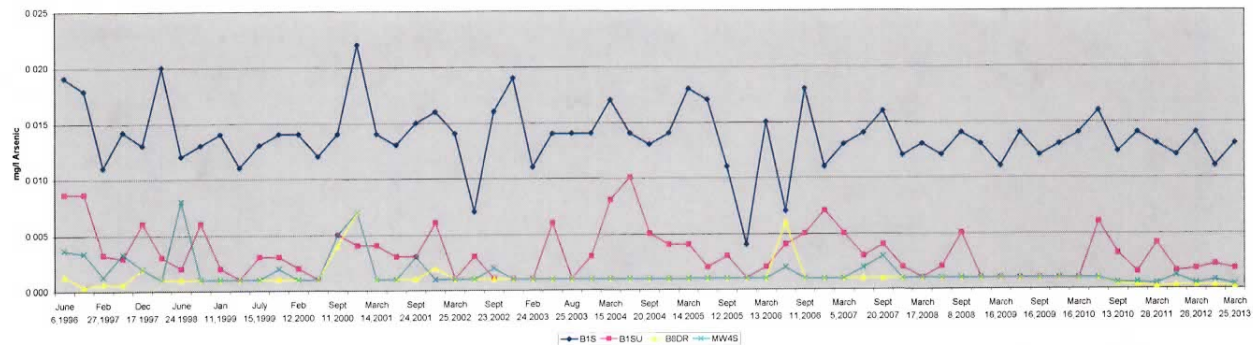
GROUP 2 WELLS DISSOLVED ARSENIC



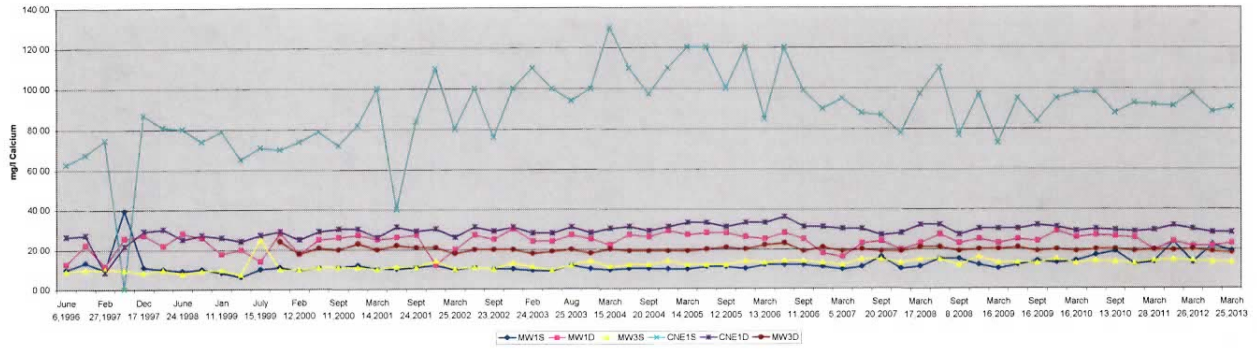
GROUP 3 WELLS DISSOLVED ARSENIC



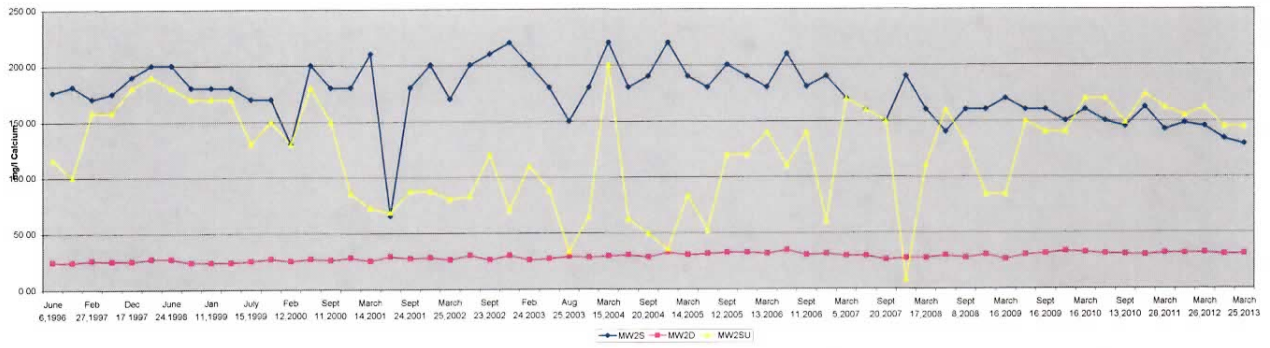
GROUP 4 WELLS DISSOLVED ARSENIC



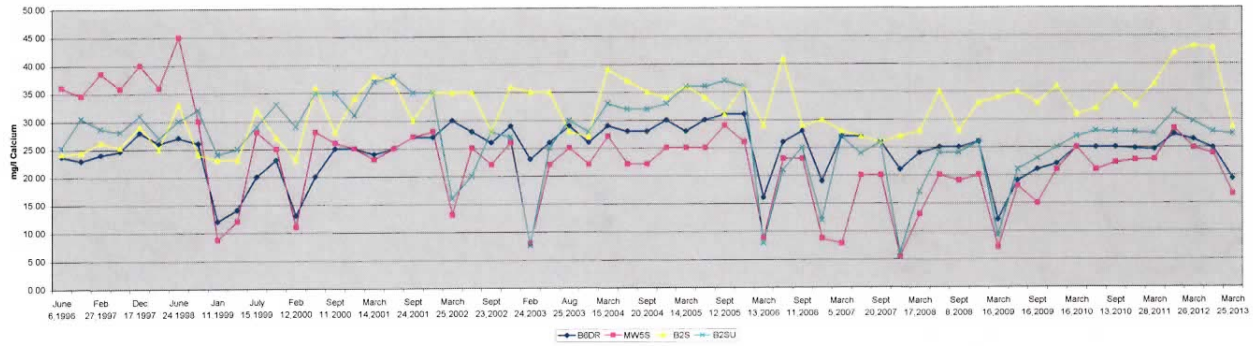
GROUP 1 WELLS DISSOLVED CALCIUM



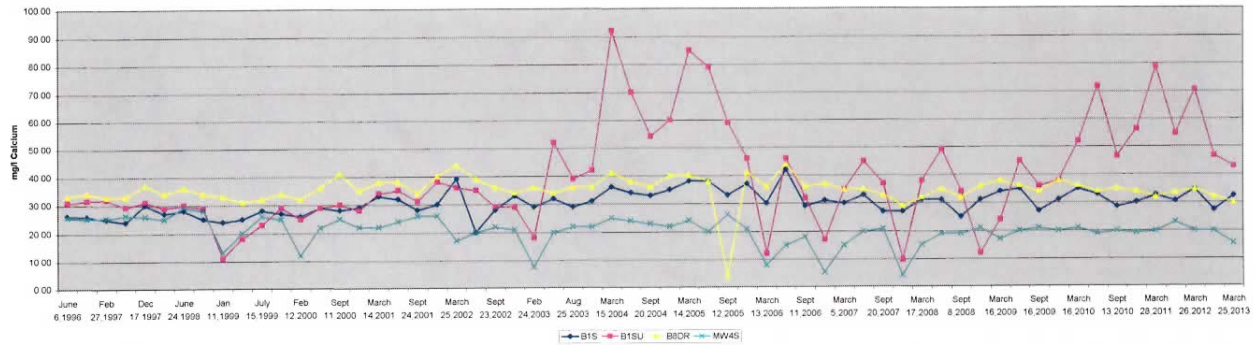
GROUP 2 WELLS DISSOLVED CALCIUM



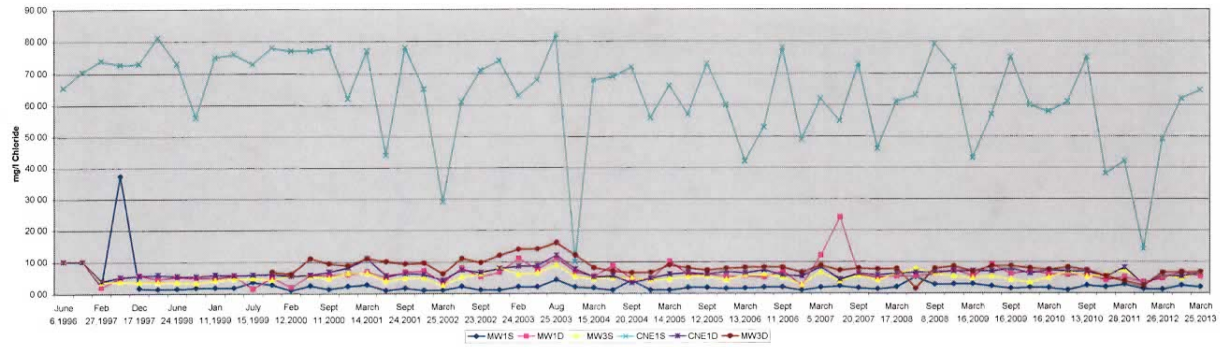
GROUP 3 WELLS DISSOLVED CALCIUM



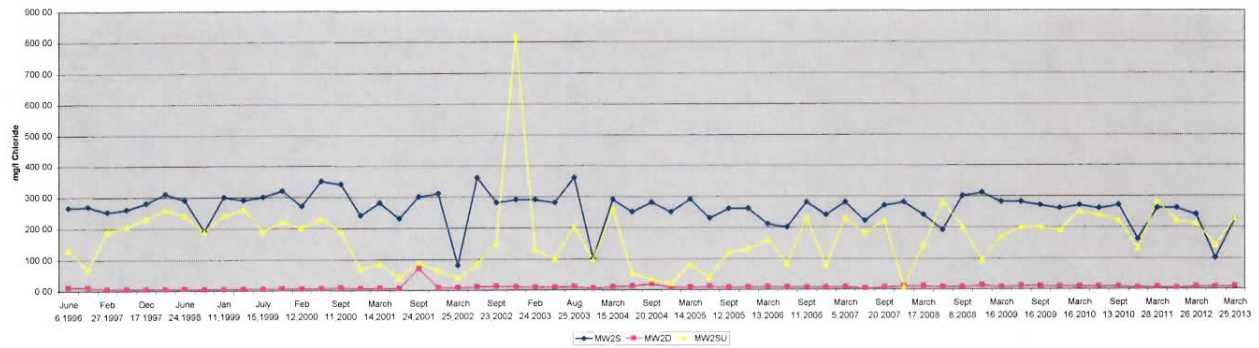
GROUP 4 WELLS DISSOLVED CALCIUM



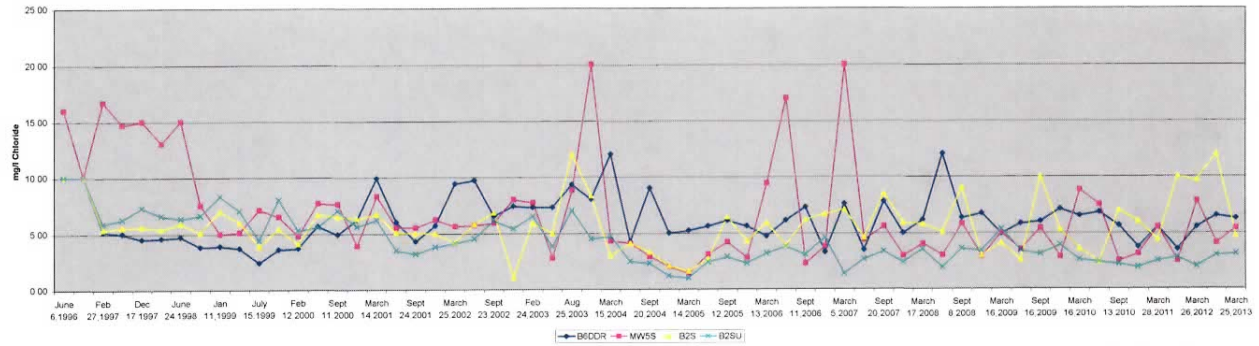
GROUP 1 WELLS DISSOLVED CHLORIDE



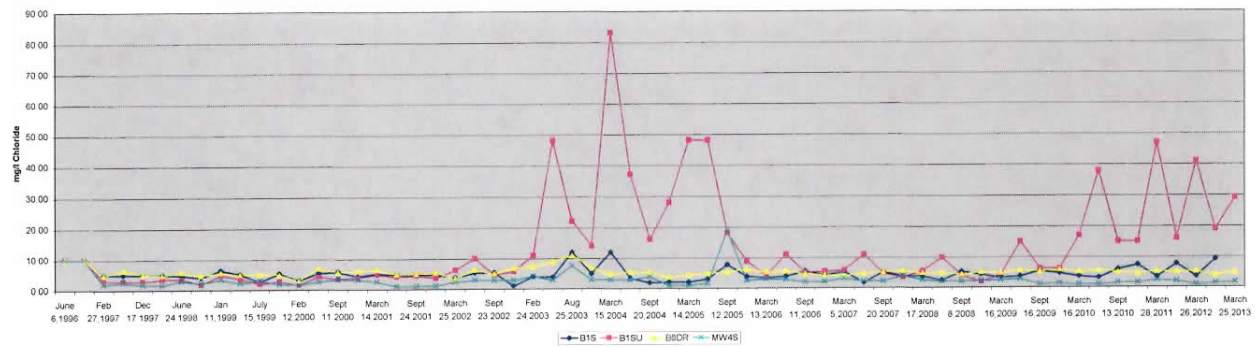
GROUP 2 WELLS DISSOLVED CHLORIDE



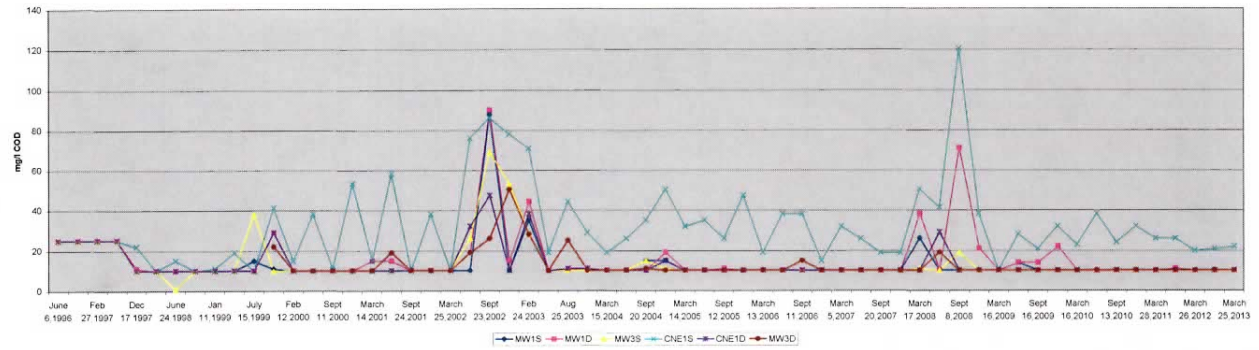
GROUP 3 WELLS DISSOLVED CHLORIDE



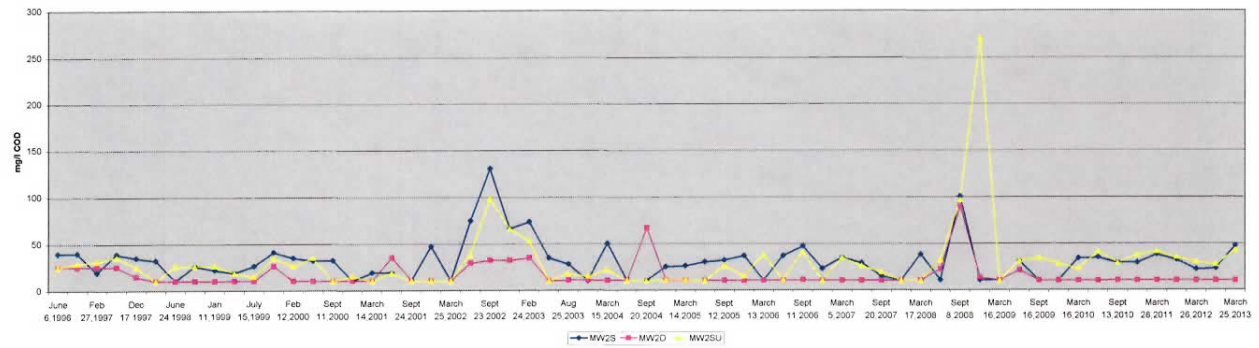
GROUP 4 WELLS DISSOLVED CHLORIDE



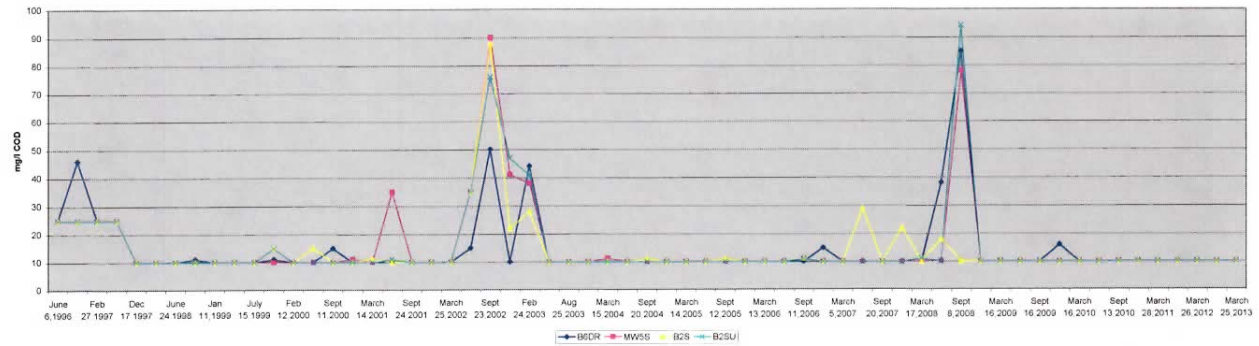
GROUP 1 WELLS CHEMICAL OXYGEN DEMAND



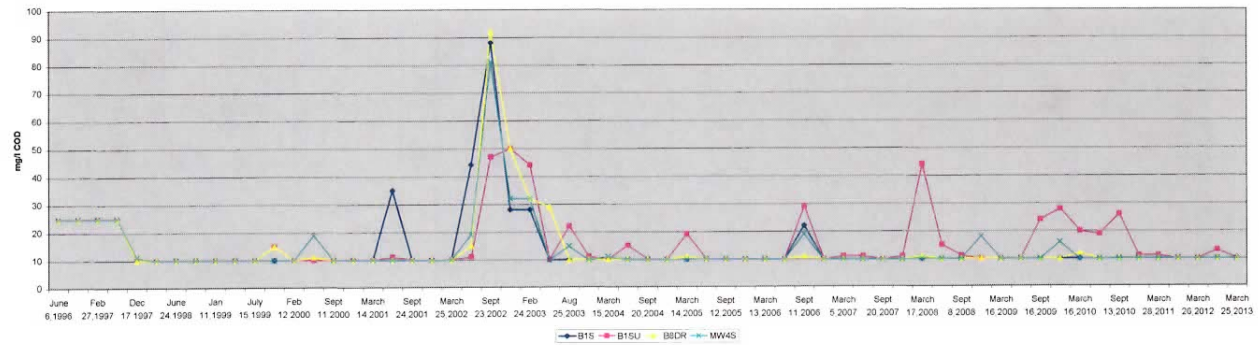
GROUP 2 WELLS CHEMICAL OXYGEN DEMAND



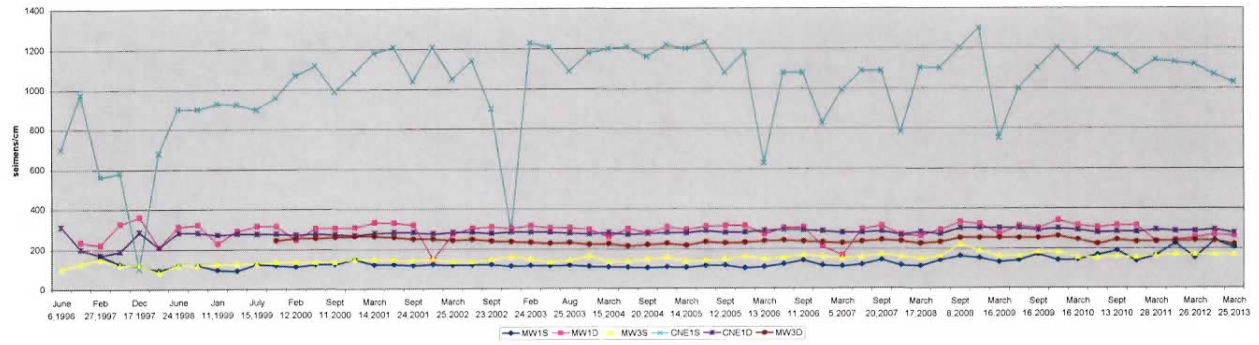
GROUP 3 WELLS CHEMICAL OXYGEN DEMAND



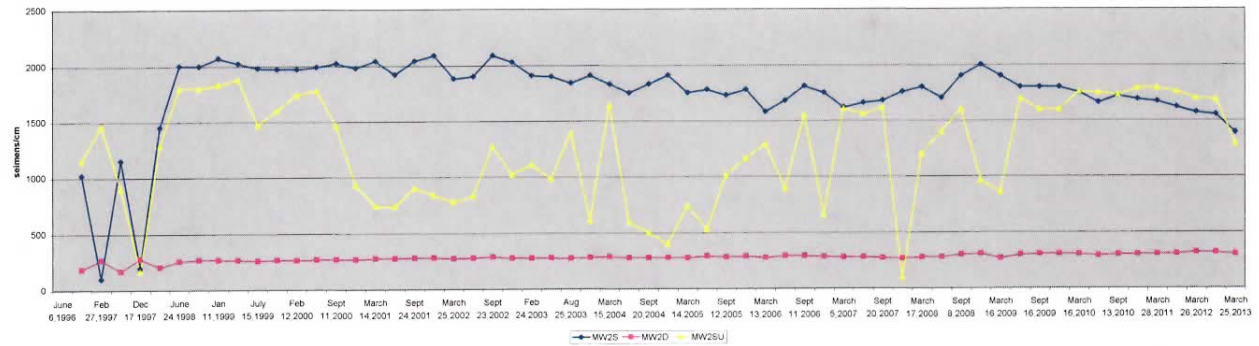
GROUP 4 WELLS CHEMICAL OXYGEN DEMAND



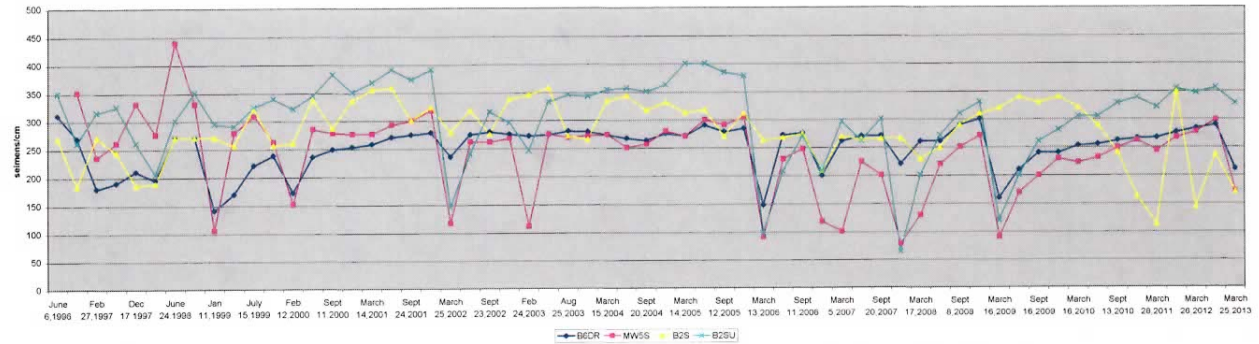
GROUP 1 WELLS CONDUCTIVITY



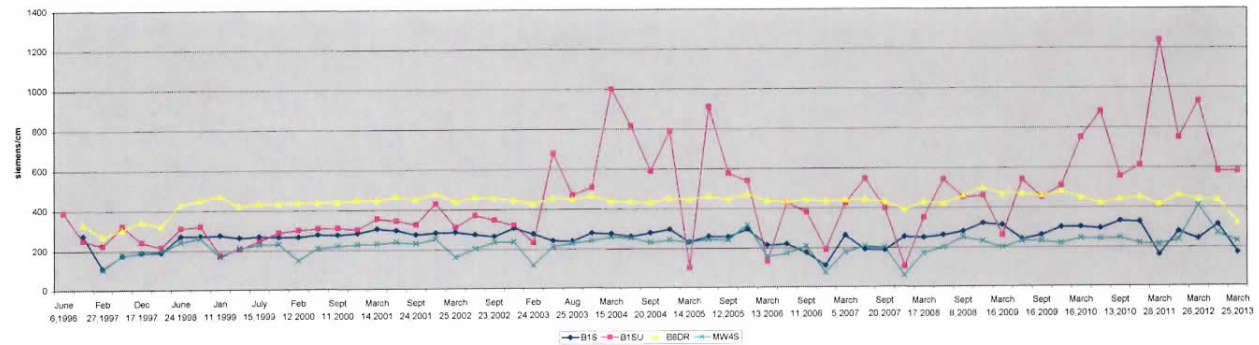
GROUP 2 WELLS CONDUCTIVITY



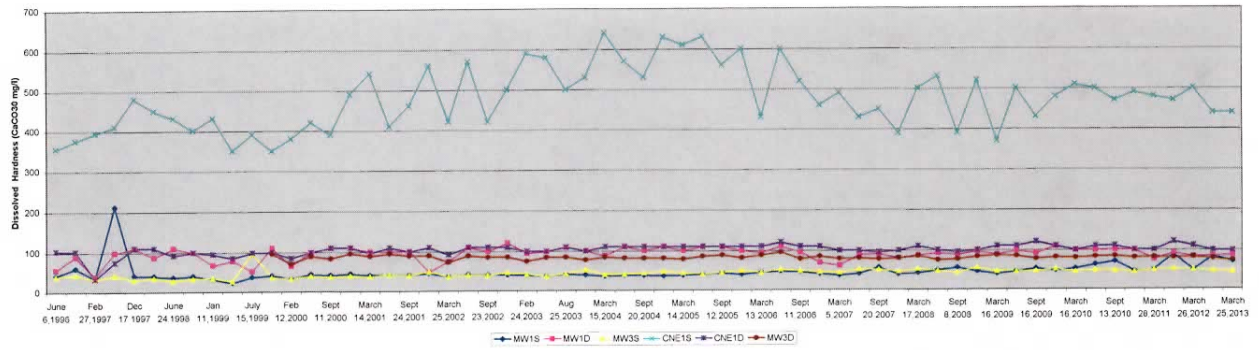
GROUP 3 WELLS CONDUCTIVITY



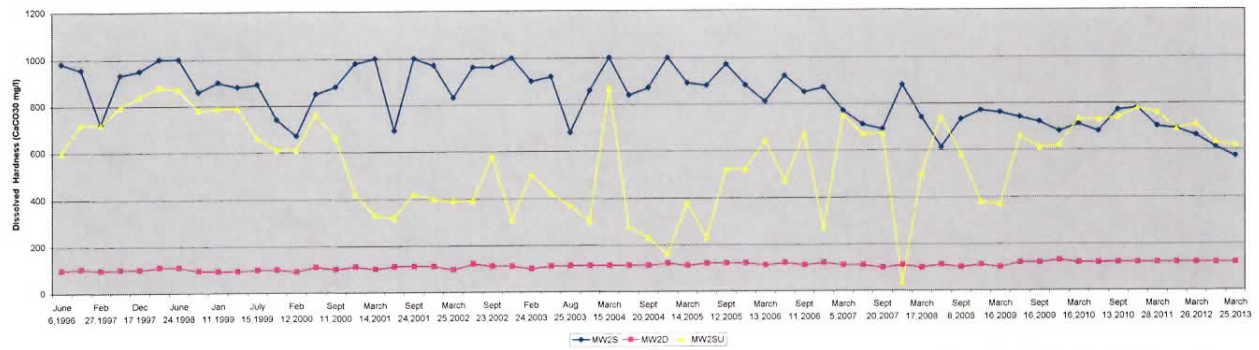
GROUP 4 WELLS CONDUCTIVITY



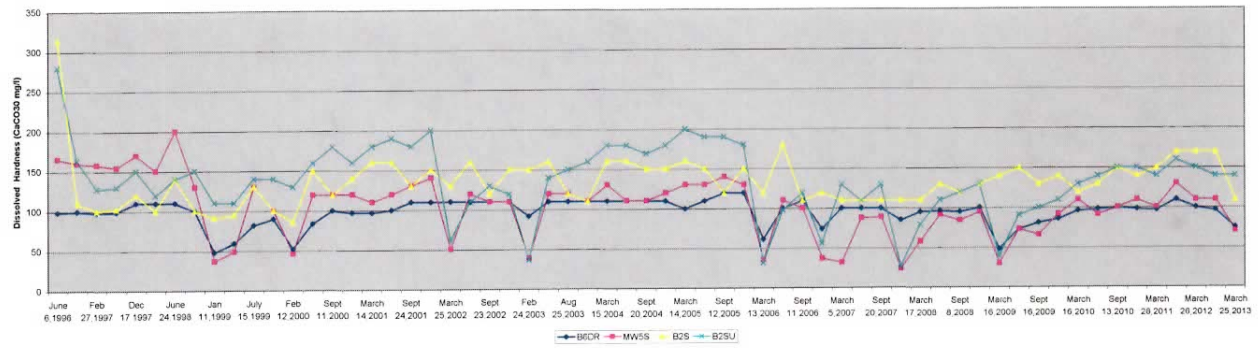
GROUP 1 WELLS DISSOLVED HARDNESS



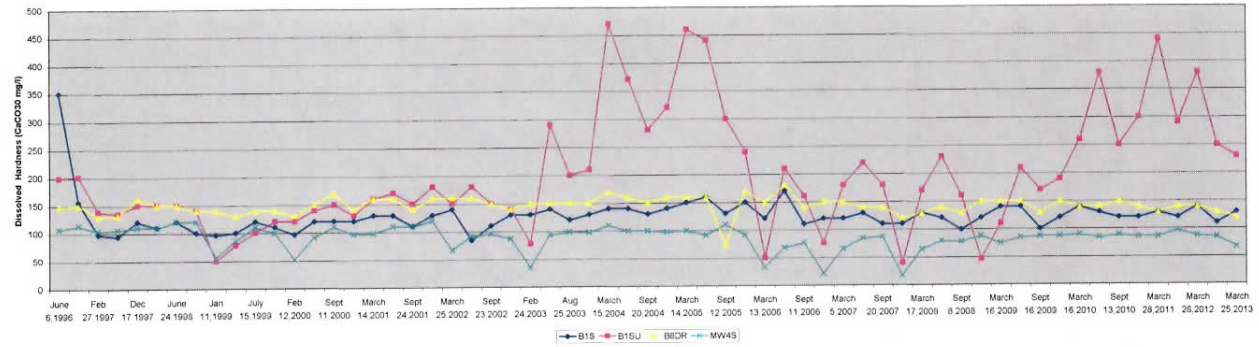
GROUP 2 WELLS HARDNESS



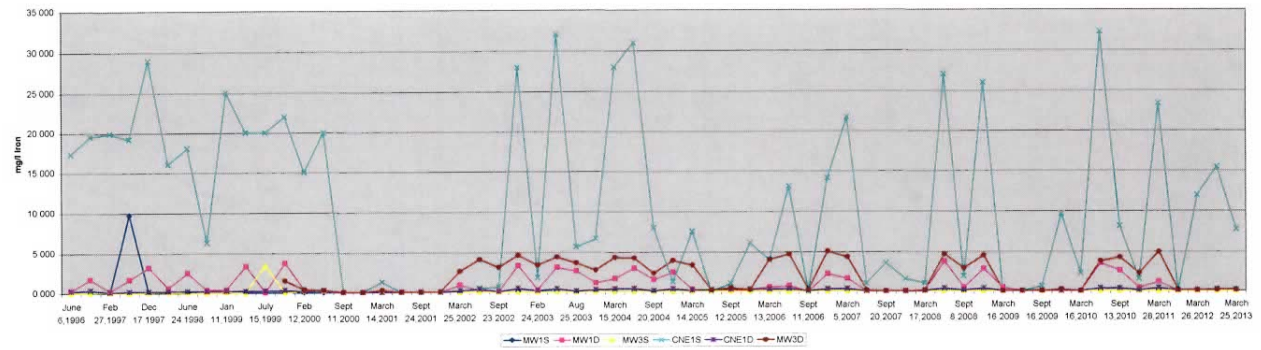
GROUP 3 WELLS HARDNESS



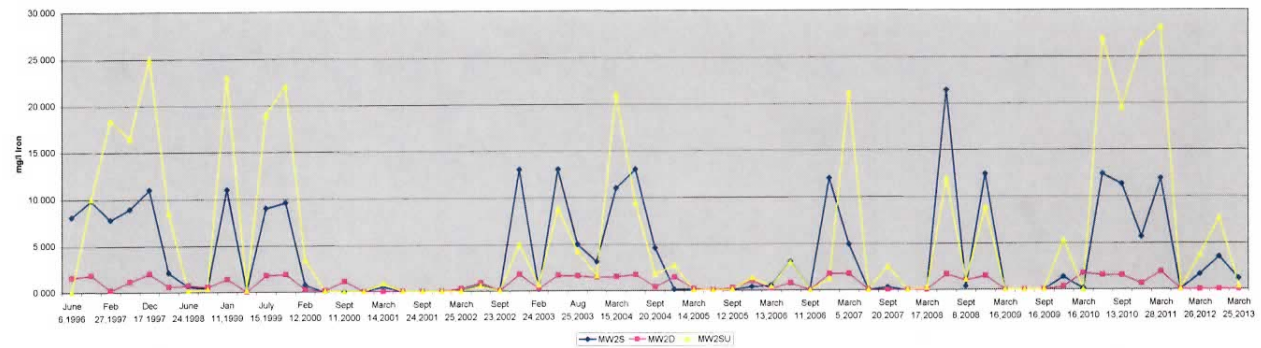
GROUP 4 WELLS HARDNESS



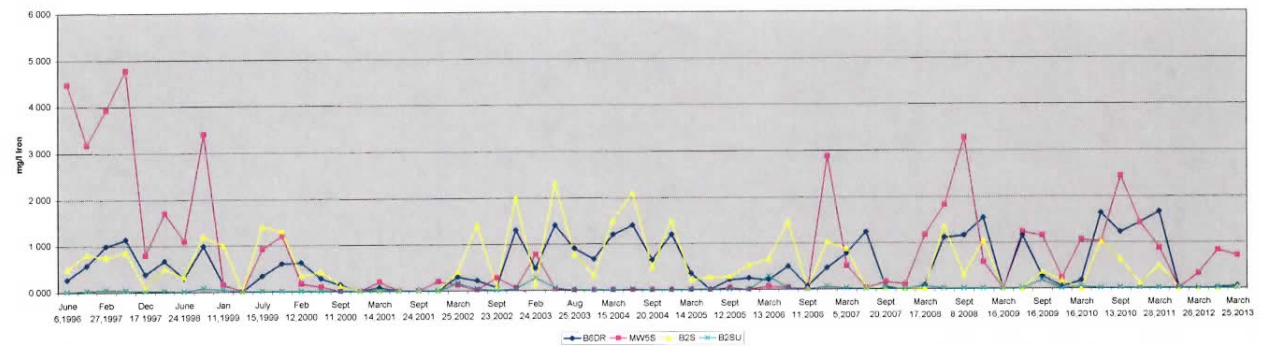
GROUP 1 WELLS DISSOLVED IRON



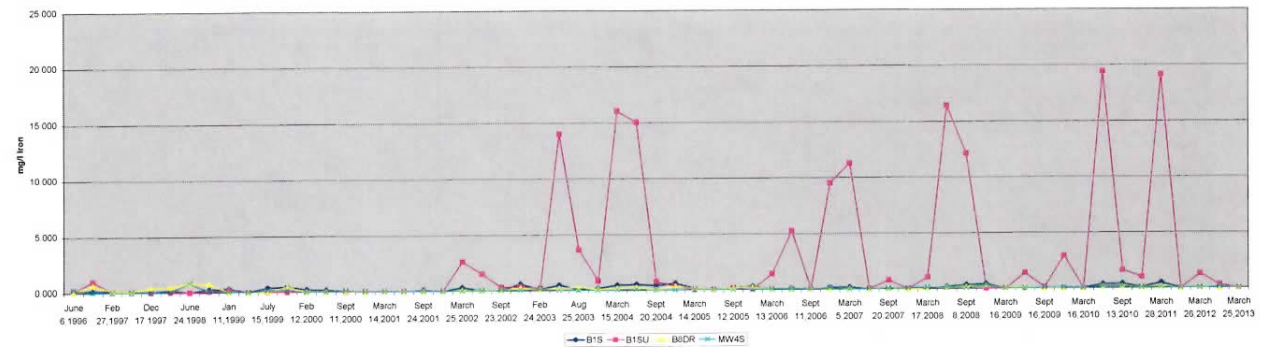
GROUP 2 WELLS DISSOLVED IRON



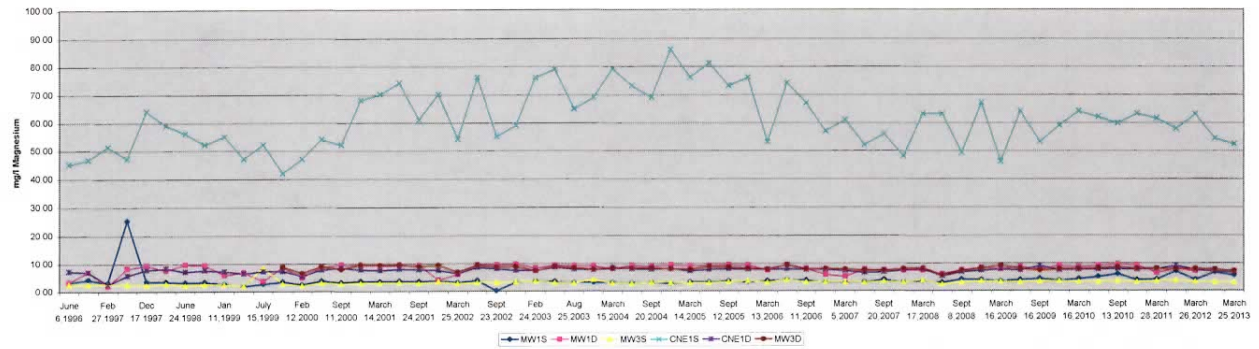
GROUP 3 WELLS DISSOLVED IRON



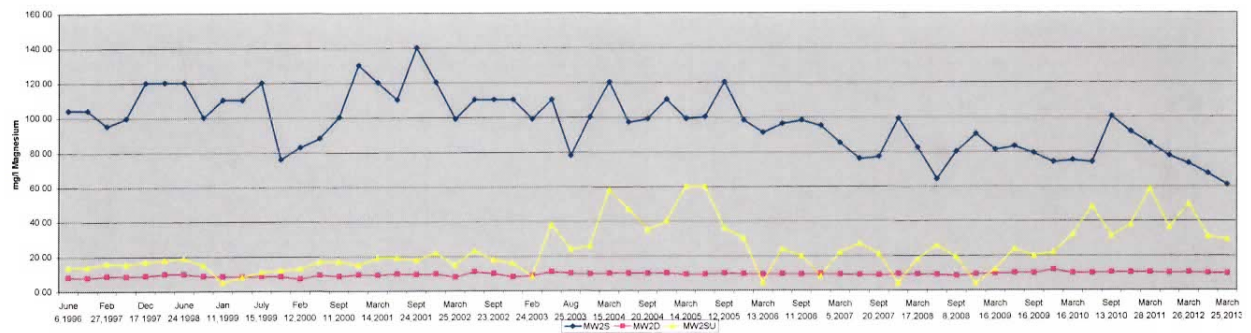
GROUP 4 WELLS DISSOLVED IRON



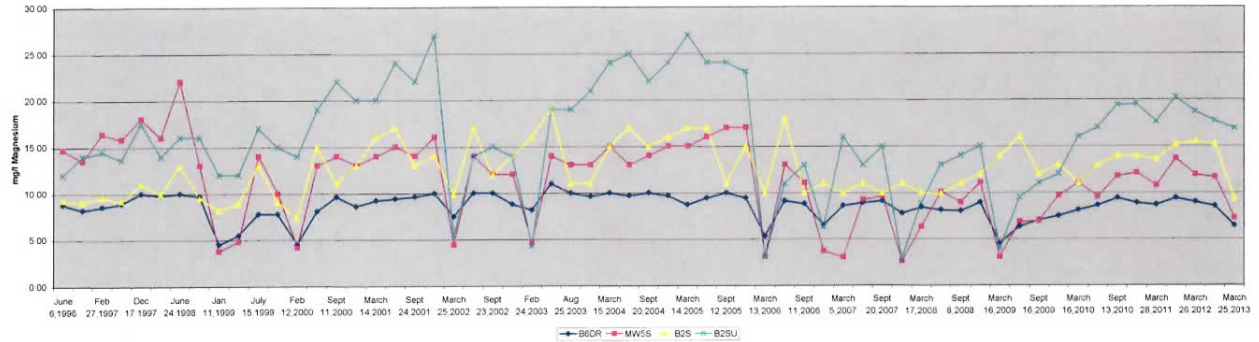
GROUP 1 WELLS DISSOLVED MAGNESIUM



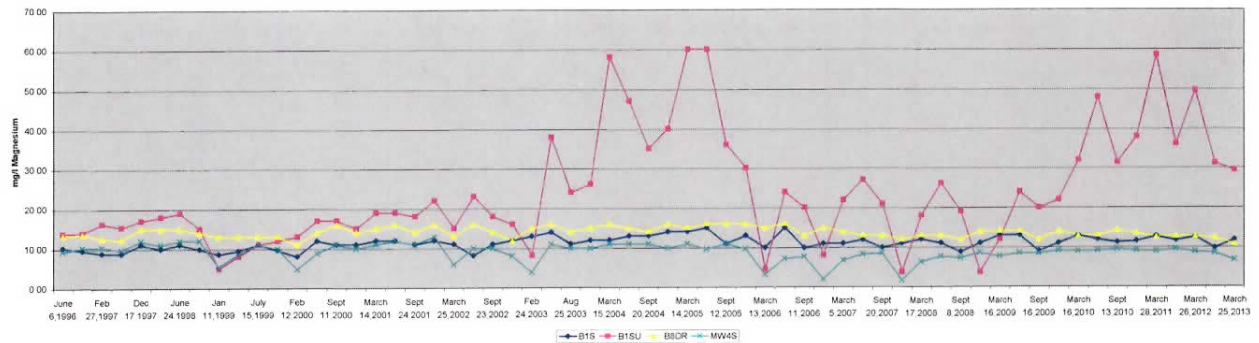
GROUP 2 WELLS DISSOLVED MAGNESIUM



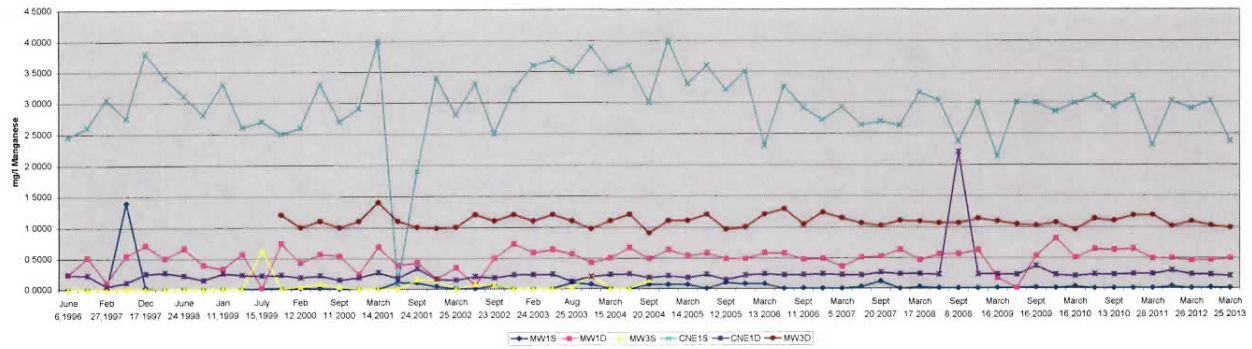
GROUP 3 WELLS DISSOLVED MAGNESIUM



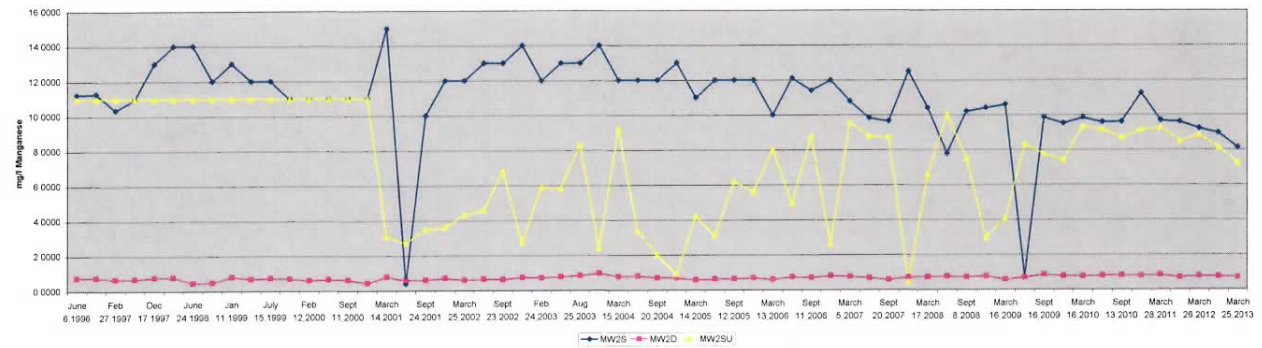
GROUP 4 WELLS DISSOLVED MAGNESIUM



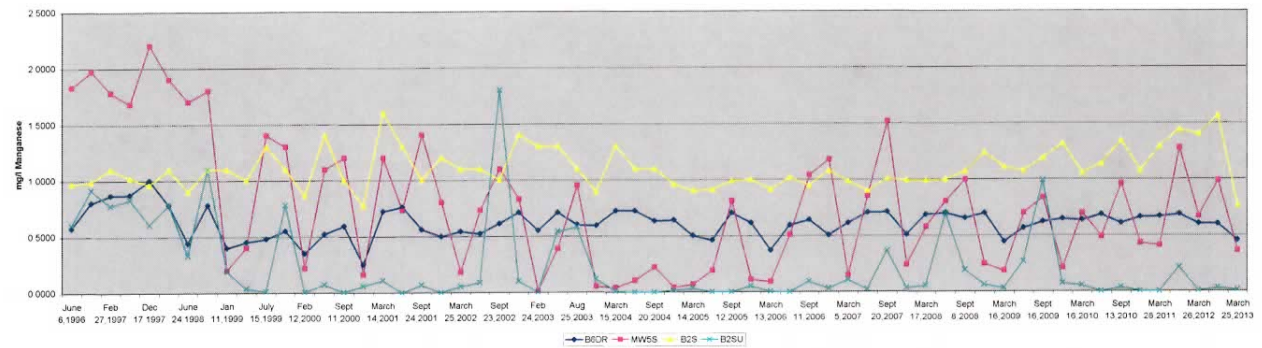
GROUP 1 WELLS DISSOLVED MANGANESE



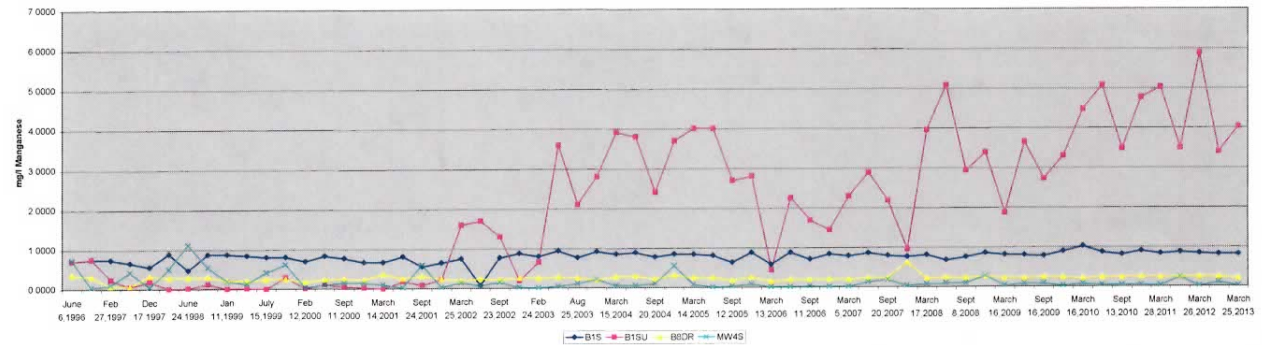
GROUP 2 WELLS DISSOLVED MANGANESE



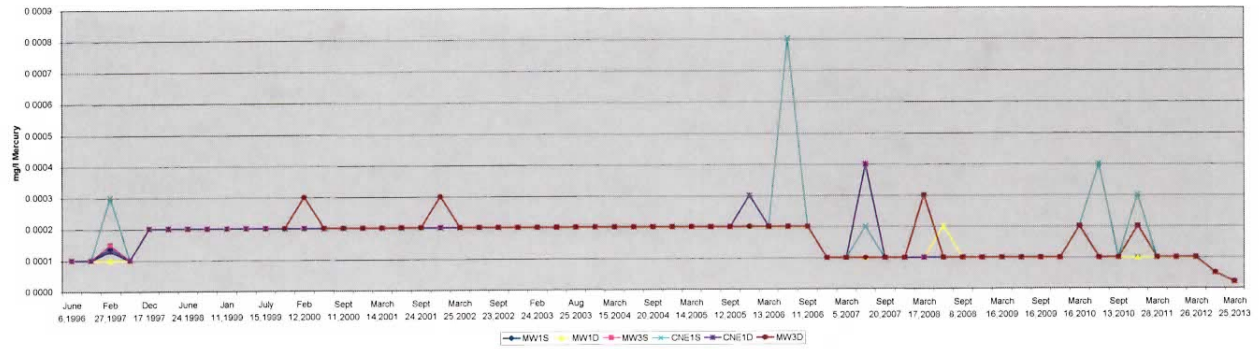
GROUP 3 WELLS DISSOLVED MANGANESE



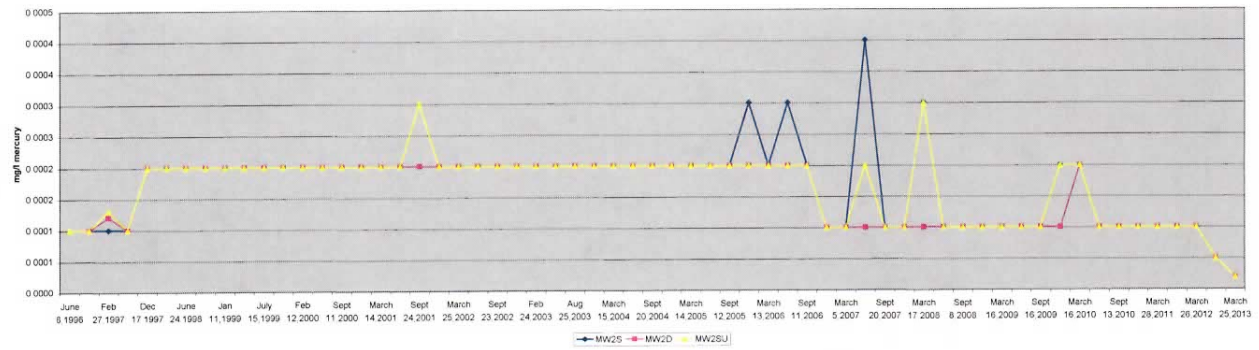
GROUP 4 WELLS DISSOLVED MANGANESE



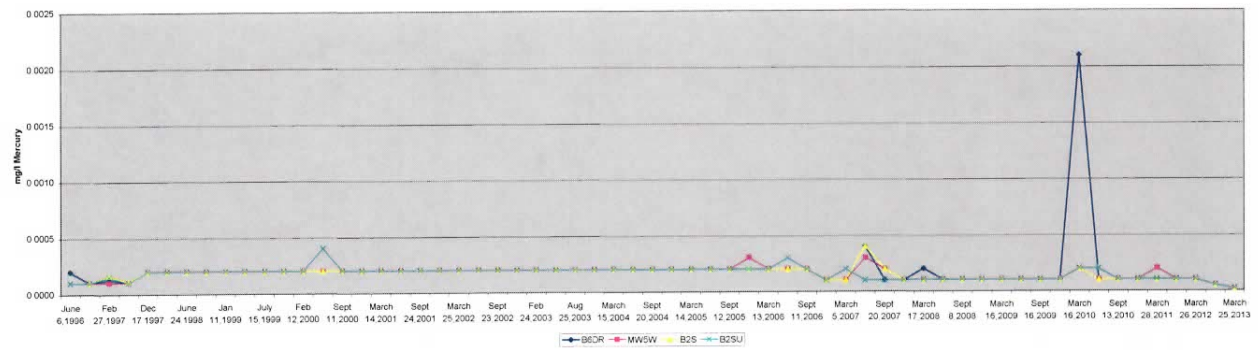
GROUP 1 WELLS DISSOLVED MERCURY



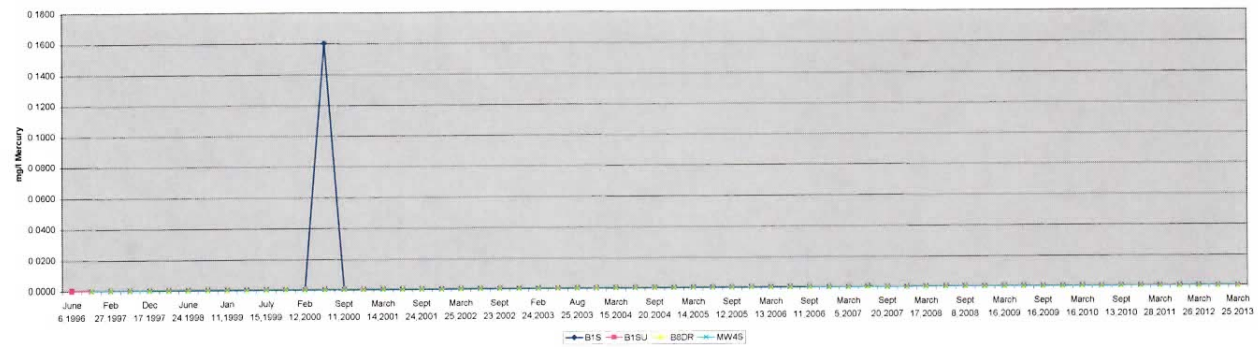
GROUP 2 WELLS DISSOLVED MERCURY



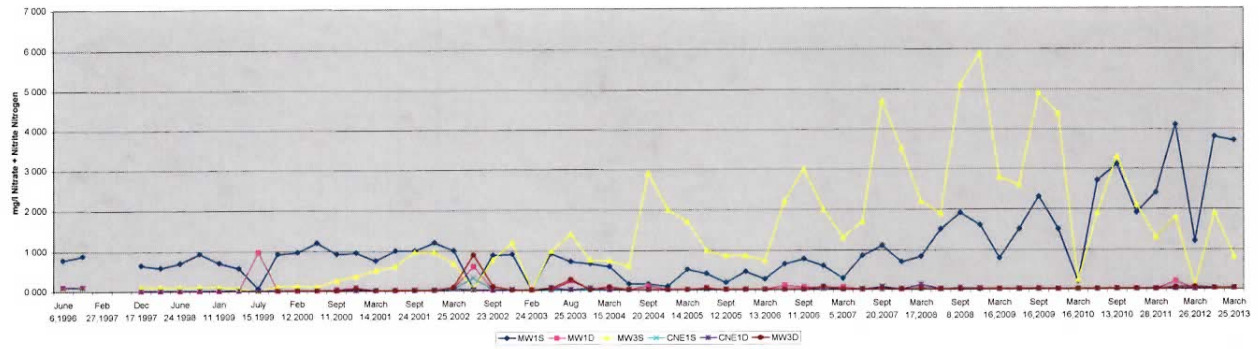
GROUP 3 WELLS DISSOLVED MERCURY



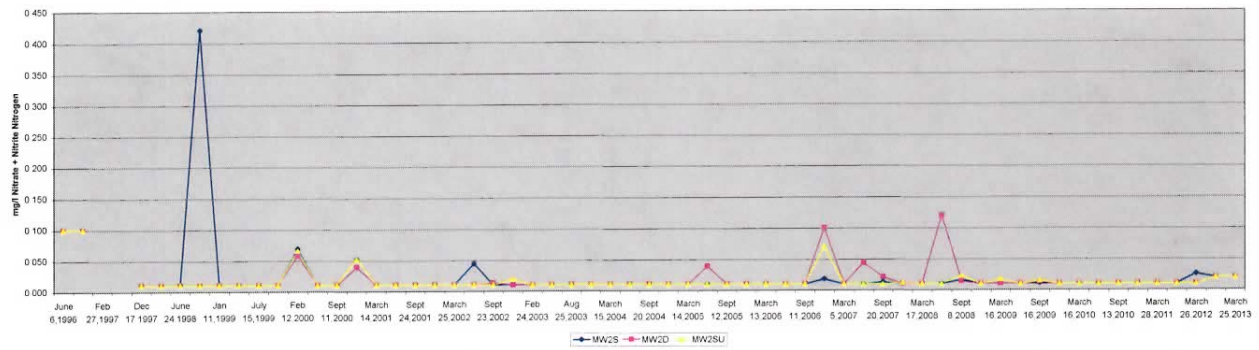
GROUP 4 WELLS DISSOLVED MERCURY



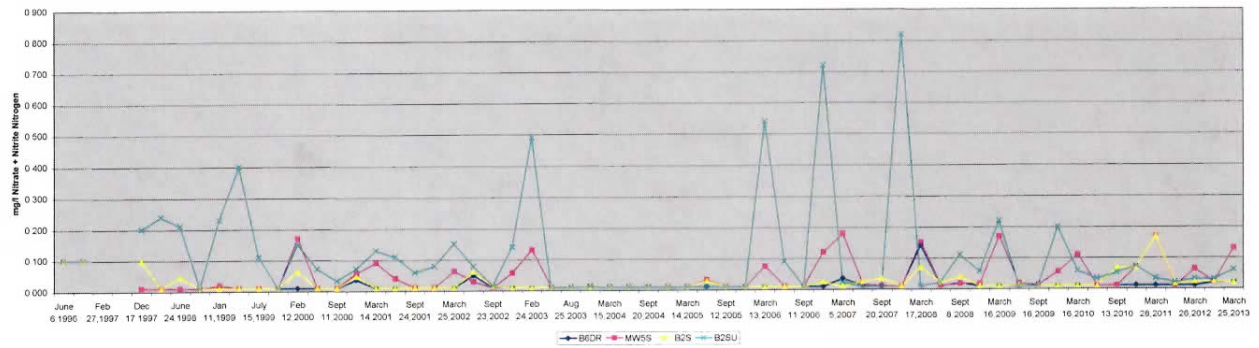
GROUP 1 WELLS NITRATE + NITRITE NITROGEN



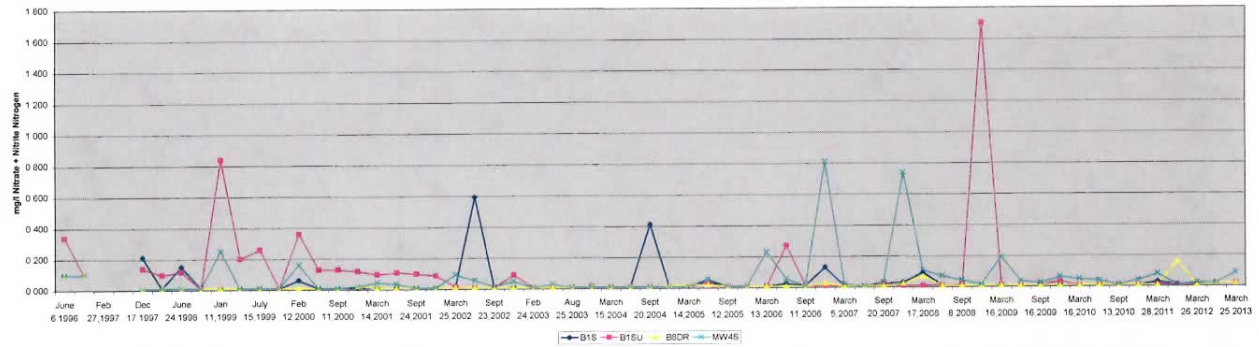
GROUP 2 WELLS NITRATE + NITRITE NITROGEN



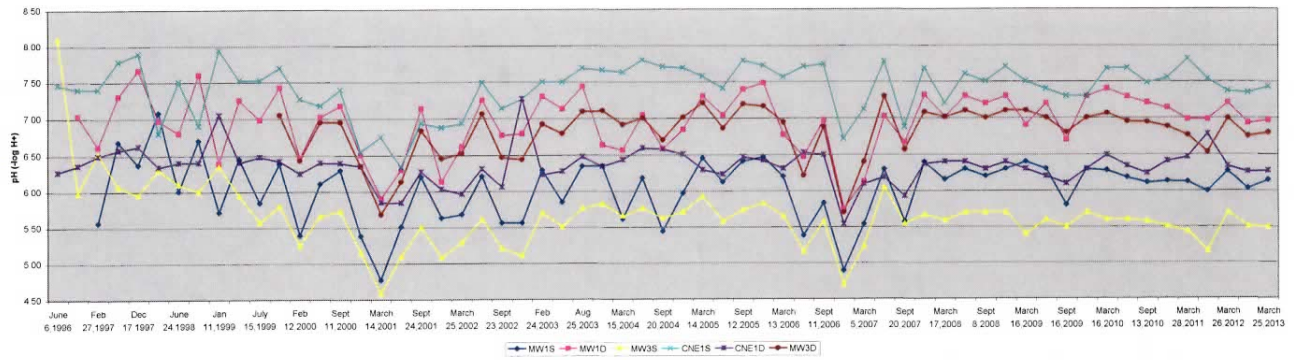
GROUP 3 WELLS NITRATE + NITRITE NITROGEN



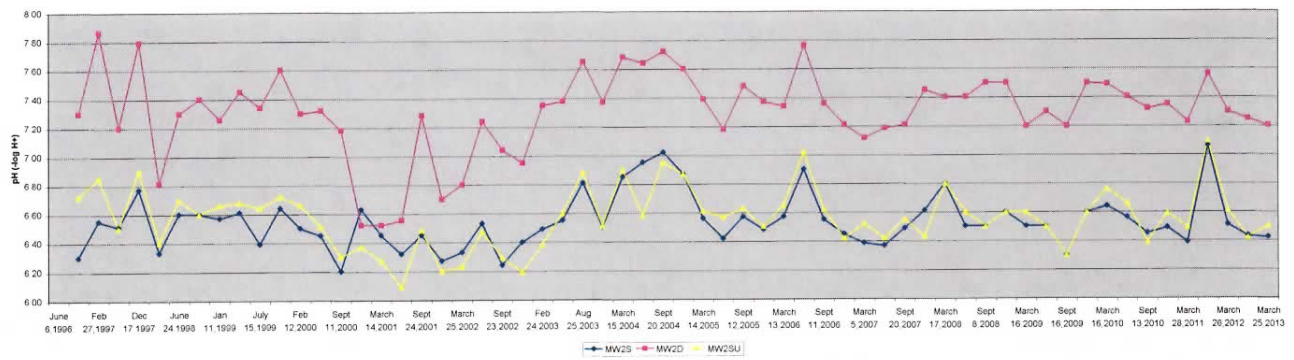
GROUP 4 WELLS NITRATE + NITRITE NITROGEN



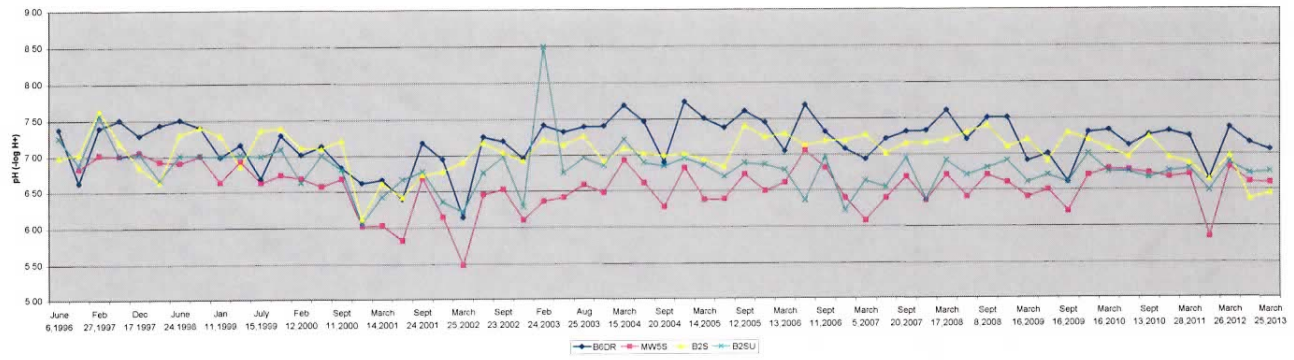
GROUP 1 WELLS pH



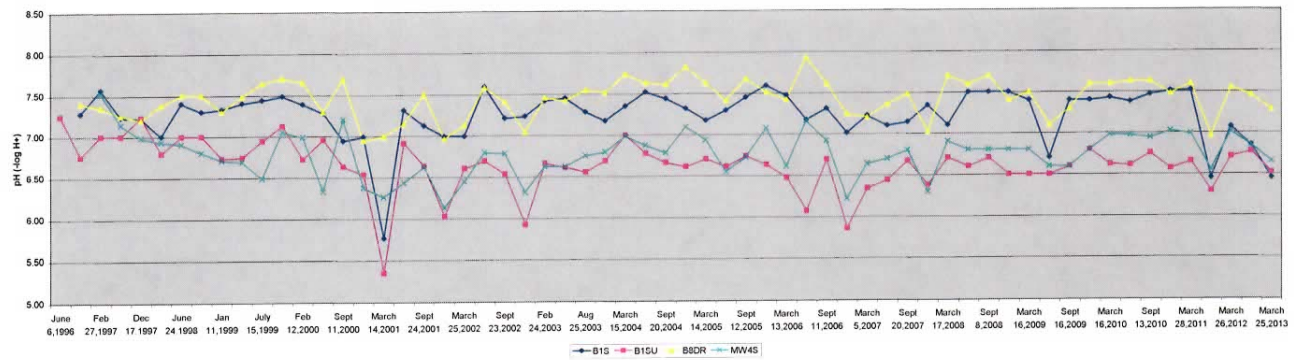
GROUP 2 WELLS pH



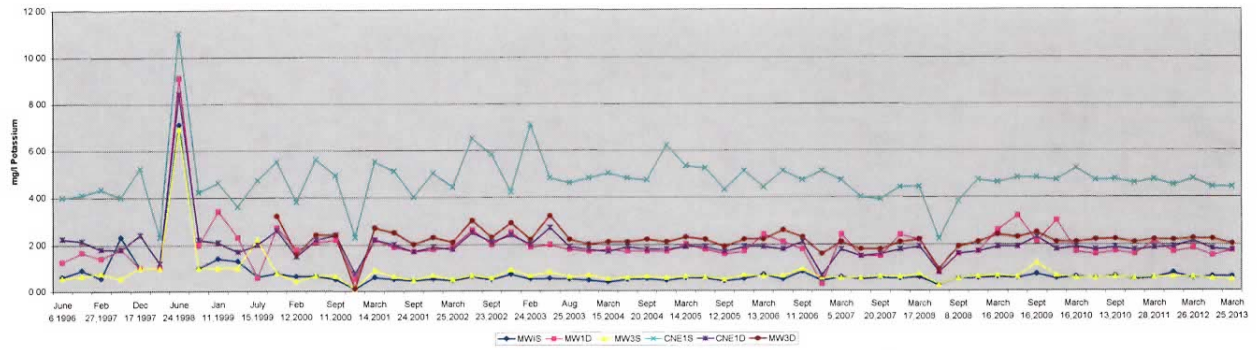
GROUP 3 WELLS pH



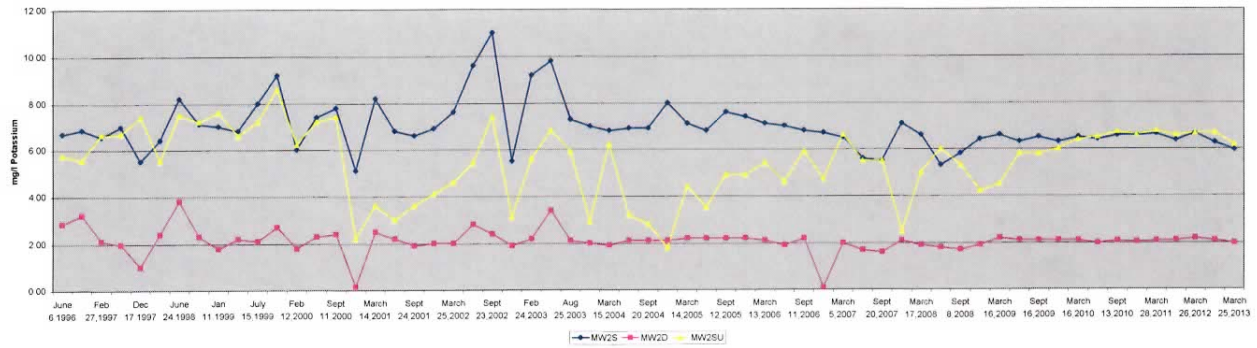
GROUP 4 WELLS pH



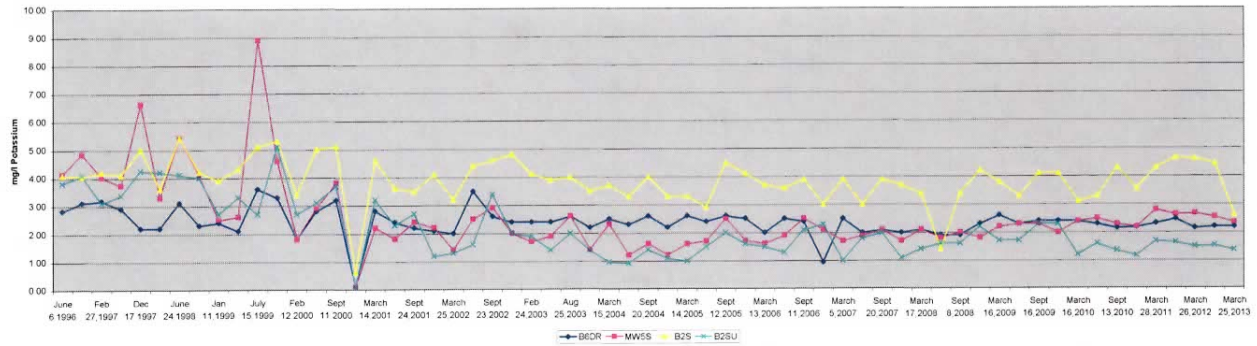
GROUP 1 WELLS DISSOLVED POTASSIUM



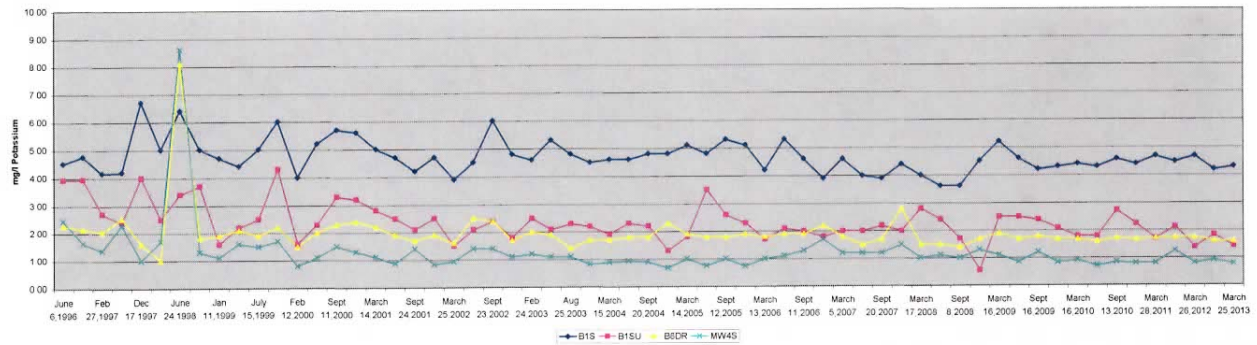
GROUP 2 WELLS DISSOLVED POTASSIUM



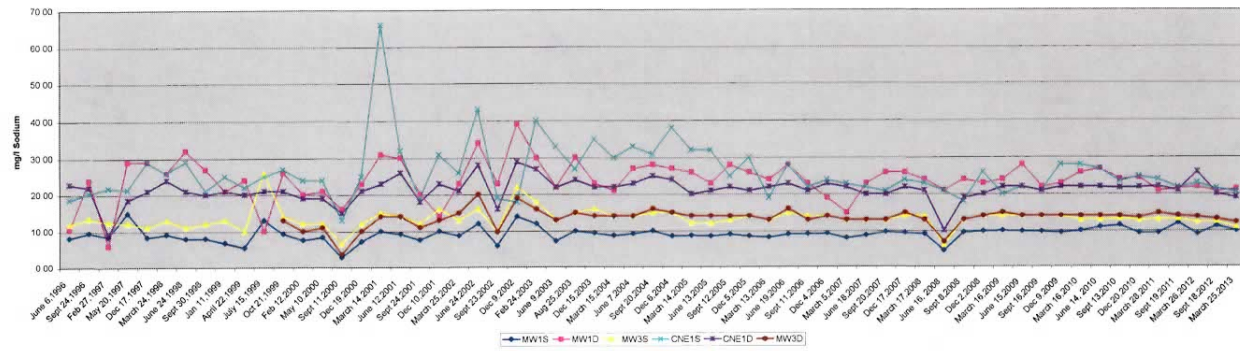
GROUP 3 WELLS DISSOLVED POTASSIUM



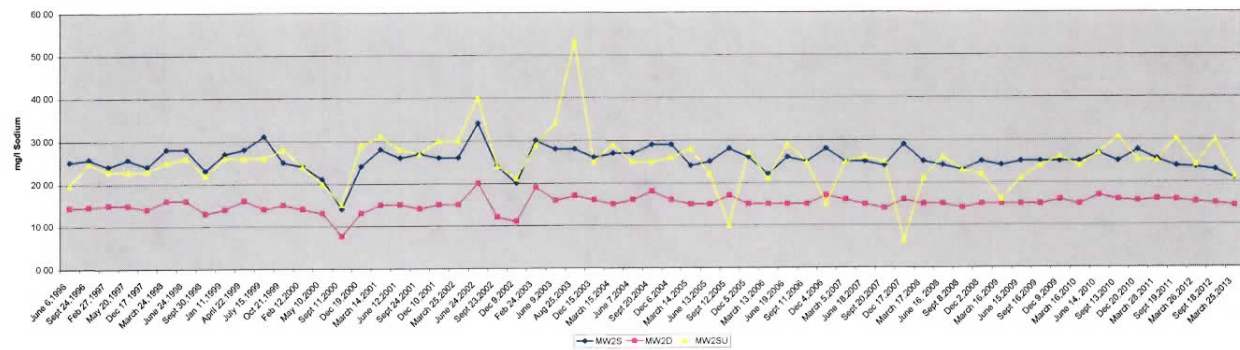
GROUP 4 WELLS DISSOLVED POTASSIUM



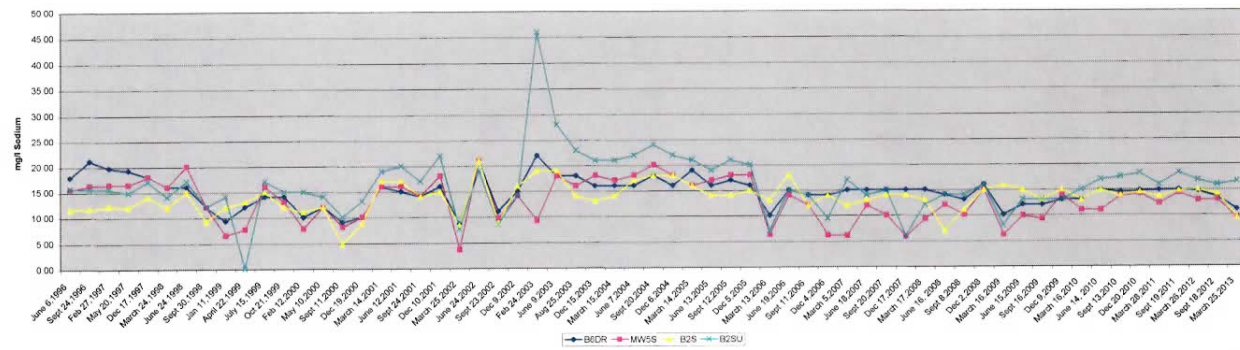
GROUP 1 WELLS SODIUM



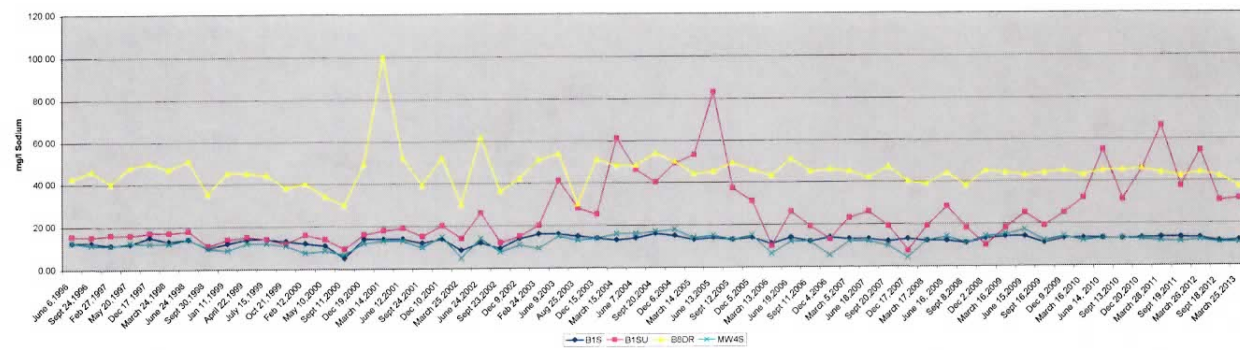
GROUP 2 WELLS SODIUM



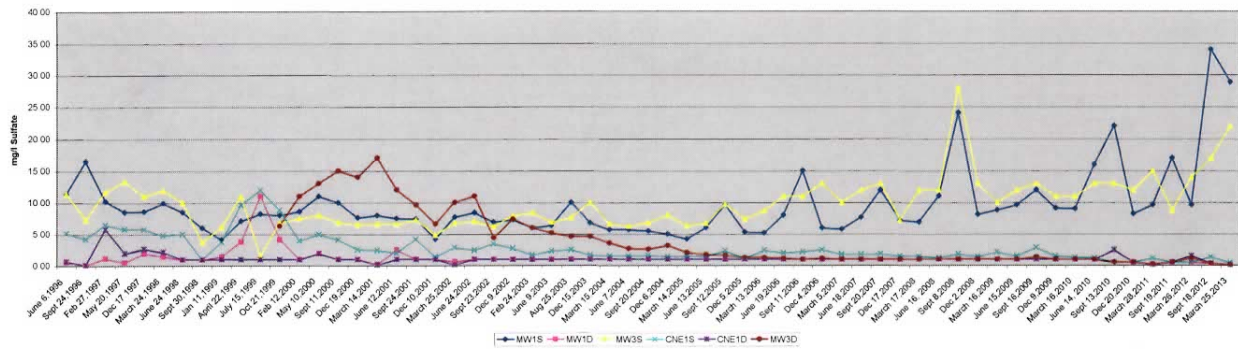
GROUP 3 WELLS SODIUM



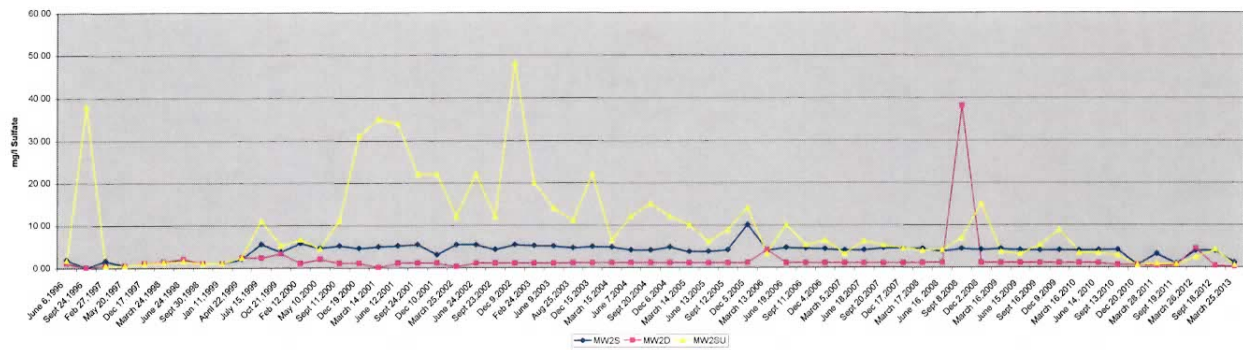
GROUP 4 WELLS SODIUM



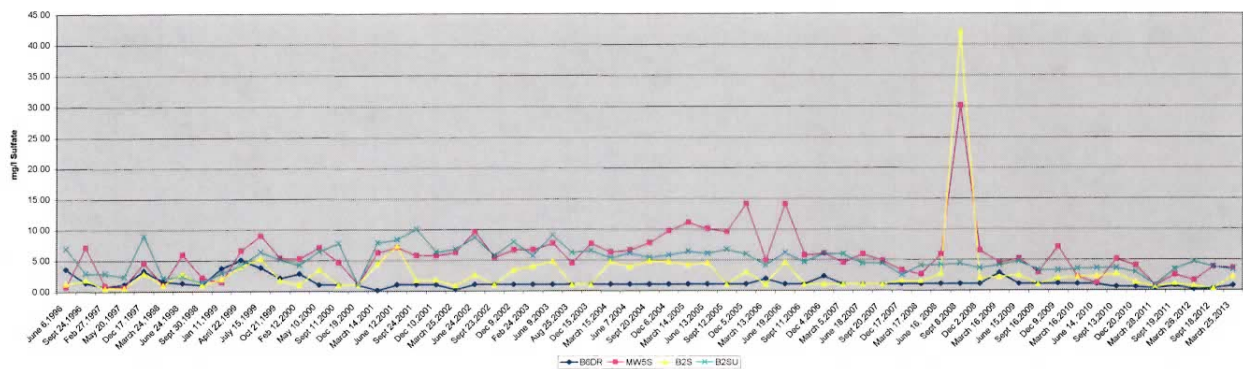
GROUP 1 WELLS SULFATE



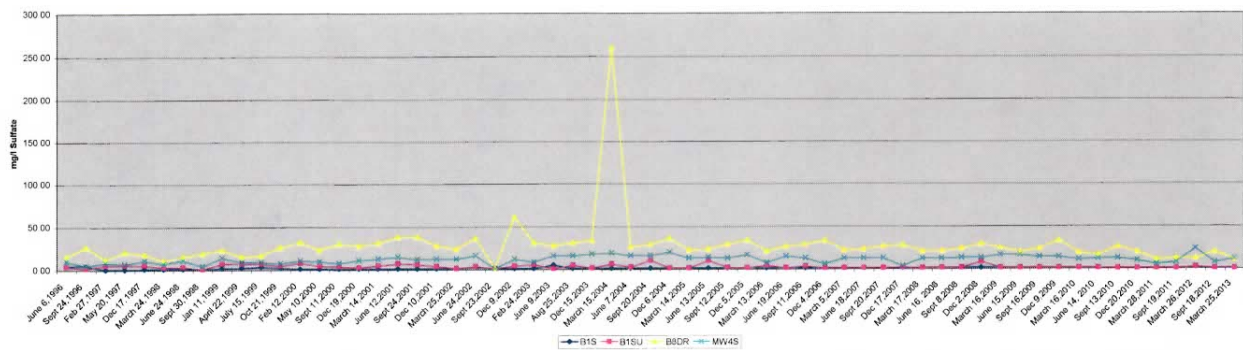
GROUP 2 WELLS SULFATE



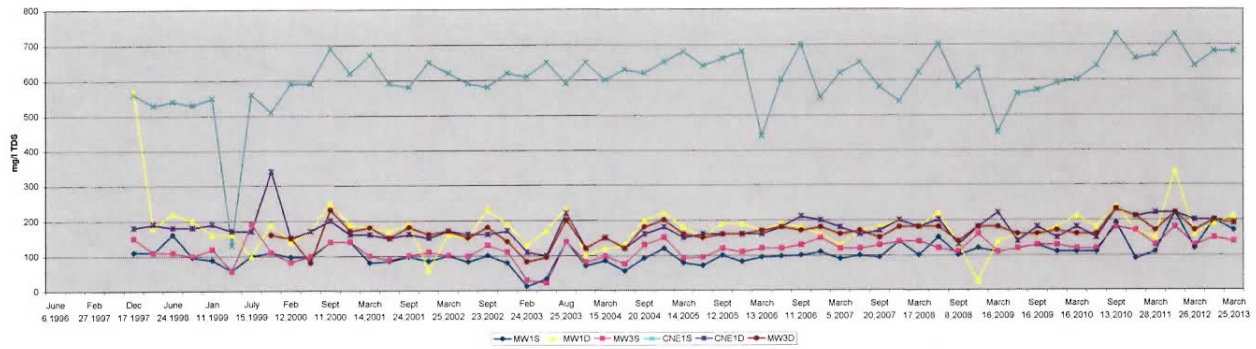
GROUP 3 WELLS SULFATE



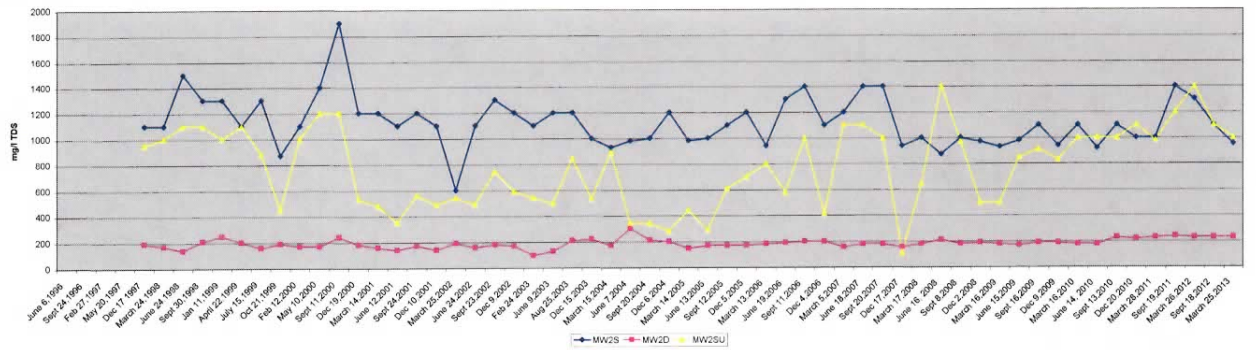
GROUP 4 WELLS SULFATE



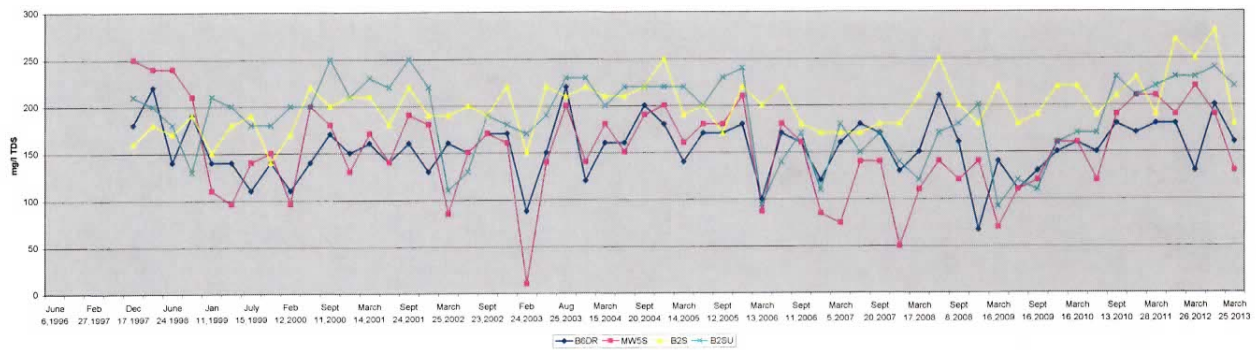
GROUP 1 WELLS TOTAL DISSOLVED SOLIDS



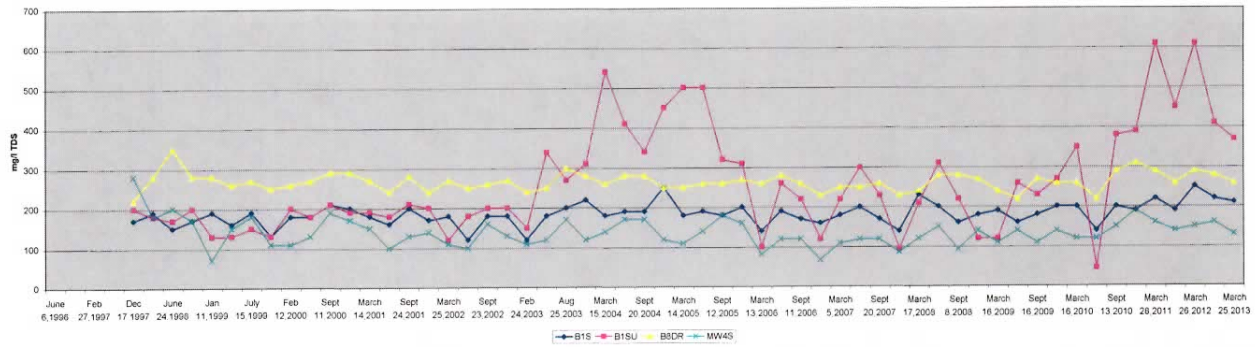
GROUP 2 WELLS TOTAL DISSOLVED SOLIDS



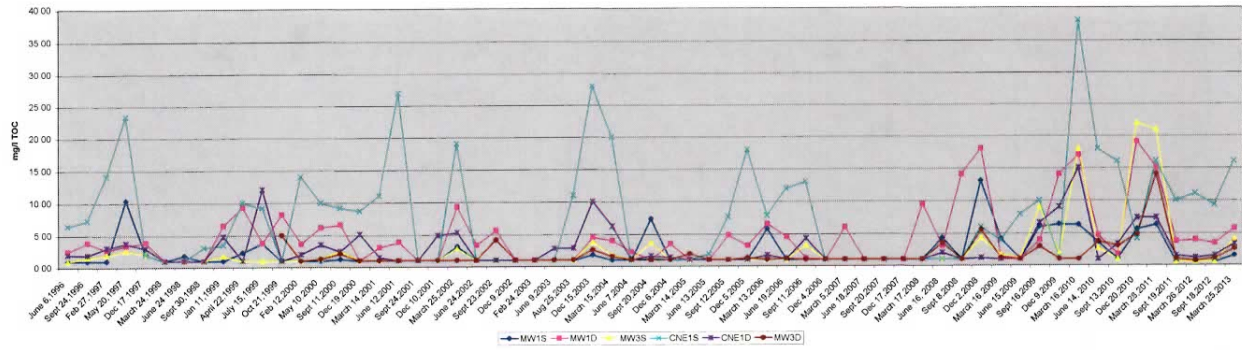
GROUP 3 WELLS TOTAL DISSOLVED SOLIDS



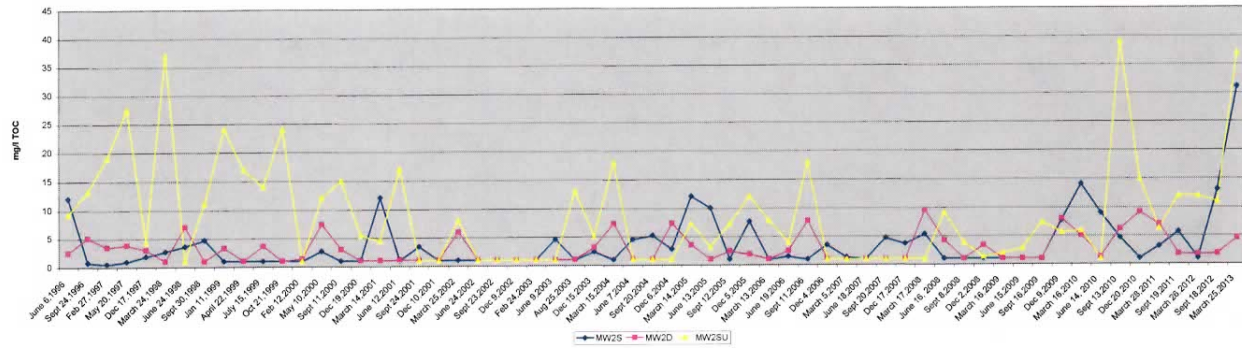
GROUP 4 WELLS TOTAL DISSOLVED SOLIDS



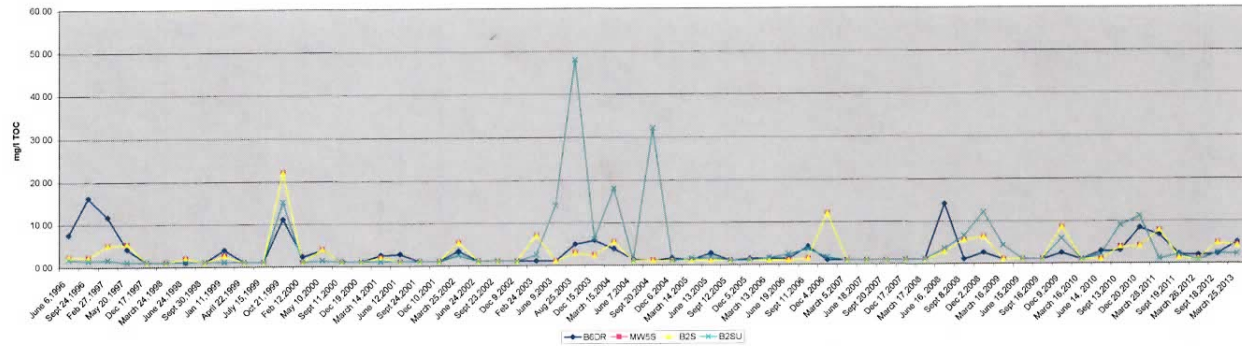
GROUP 1 WELLS TOTAL ORGANIC CARBON



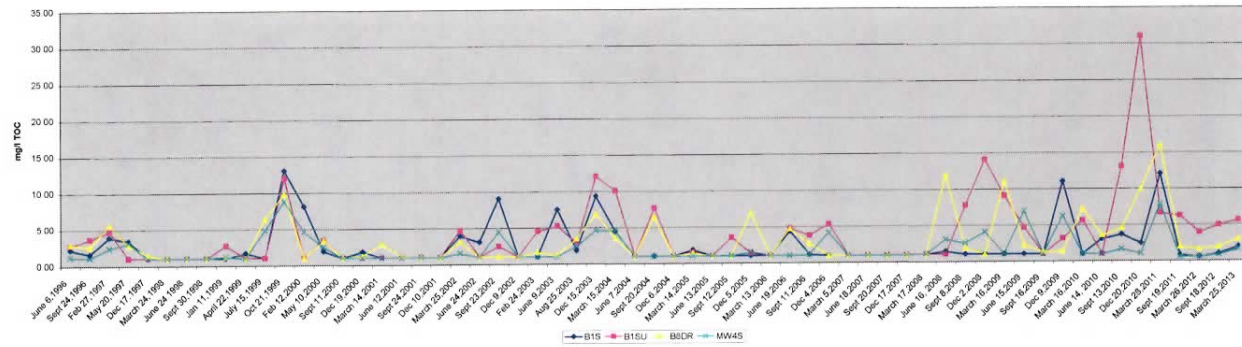
GROUP 2 WELLS TOTAL ORGANIC CARBON



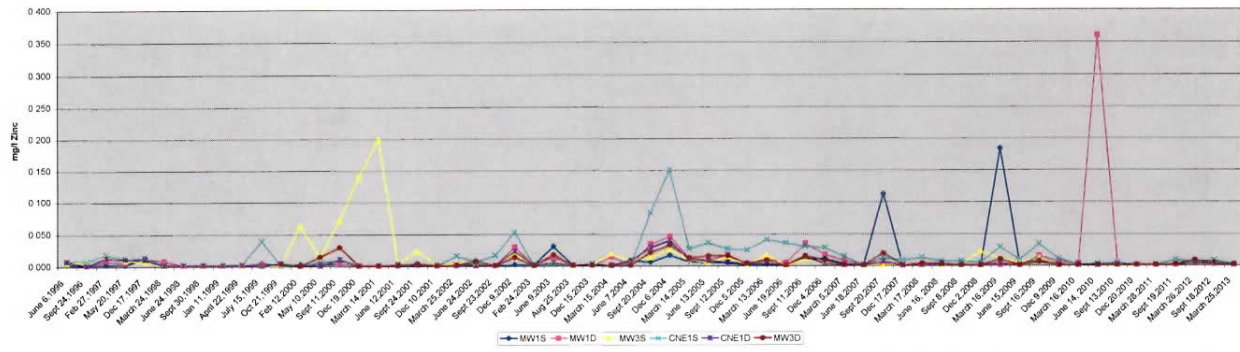
GROUP 3 WELLS TOTAL ORGANIC CARBON



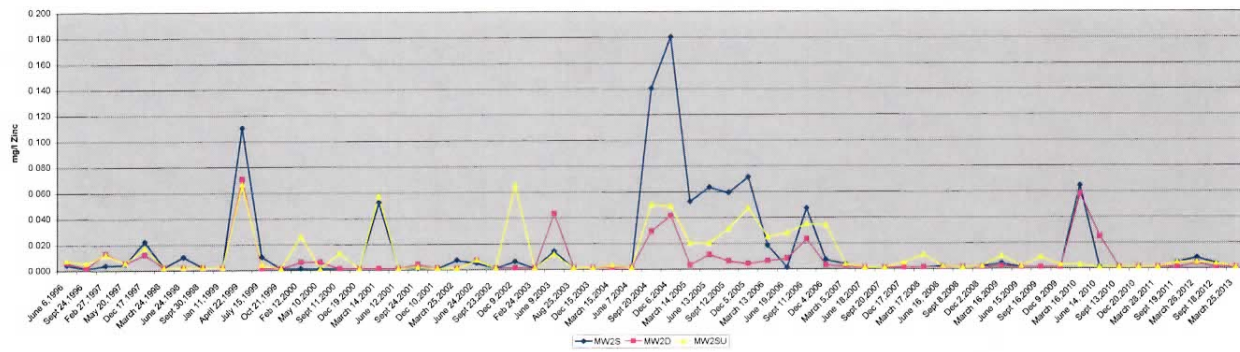
GROUP 4 WELLS TOTAL ORGANIC CARBON



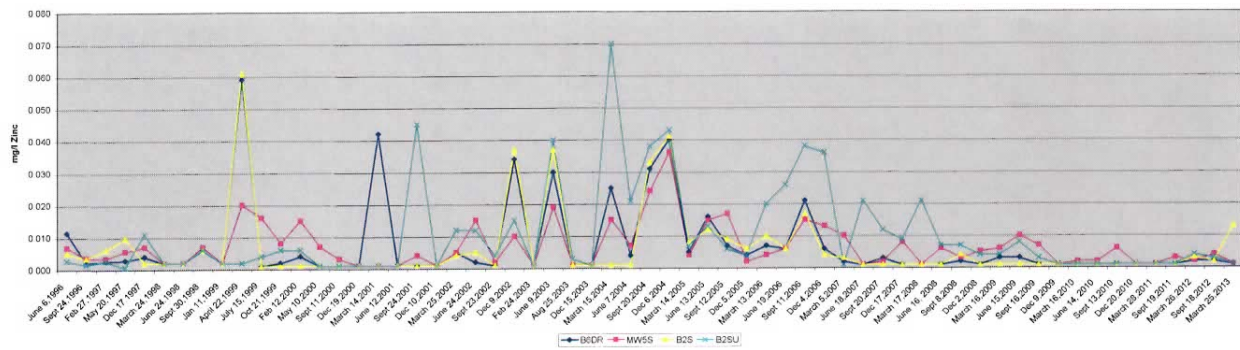
GROUP 1 WELLS DISSOLVED ZINC



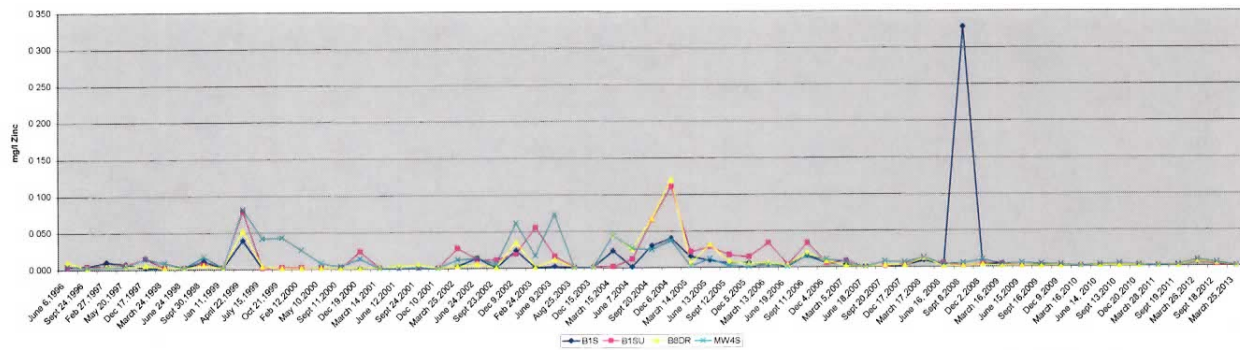
GROUP 2 WELLS DISSOLVED ZINC



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 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, 2013.

Centralia Landfill Perimeter Probe Data

Date	Probe Number	Time	Barometric Pressure	Probe Pressure inches W. C.	% LEL	% Oxygen	
3/8/2013	GP2	940	30.59	0	0	20.9	
3/8/2013	GP1		30.59				flooded
3/8/2013	GP4A		30.59				flooded
3/8/2013	GP4B	945	30.59	0	0	20.9	
3/8/2013	GP15	900	30.59	0	0	20.9	
3/8/2013	GP11	907	30.59	0	0	20.9	
3/8/2013	GP10	910	30.59	0	0	20.9	
3/8/2013	GP12	914	30.59	0	0	20.9	
3/8/2013	GP9	917	30.59	0	0	20.9	
3/8/2013	GP13	920	30.59	0	0	20.9	
3/8/2013	GP8	924	30.59	0	0	20.9	
3/8/2013	GP7	930	30.59	0	0	20.9	
3/8/2013	GP14	935	30.59	0	0	20.9	
3/8/2013	GP5R	939	30.59	0	0	20.9	