



January 31, 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 September, 2011. 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,

A handwritten signature in blue ink, reading 'Randy Prevost', is positioned below the word 'Sincerely,'.

Randy Prevost
City of Centralia

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

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REPORT NARRATIVE

This biannual Compliance Monitoring Report summarizes the results from the dry season sampling done at the Centralia Landfill in September, 2011. 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 September 19, 20, and 21, 2011. 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 September 19, 2011 depth to groundwater was measured in all wells.

Weather during the sampling period was sunny or overcast. Water was not present at SW 14, in the Weyerhaeuser Ditch (the point of compliance for surface water) and samples were not 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.

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	6.98	240	340	3.4	0.5	0.2	0.0055	< 0.005	< 0.0001	0.4931	0.003
MW1S	5.99	225	220	1.3	17	4.1	0.0003	< 0.005	< 0.0001	0.0302	0.002
MW3S	5.16	172	180	2.8	8.7	1.8	0.0001	0.011	< 0.0001	0.0091	0.004
MW3D	6.53	235	220	2.3	< 0.5	0.044	0.00099	0.073	< 0.0001	1.008	0.002
CNE1S	6.78	1130	730	14	< 0.5	0.01	0.0016	0.031	< 0.0001	3.017	0.009
CNE1D	7.53	286	220	2.6	< 0.5	0.01	0.0001	0.022	< 0.0001	0.292	< 0.001
MW2D	7.56	310	240	3.8	< 0.5	0.01	0.0043	0.019	< 0.0001	0.7097	< 0.001
MW2S	7.06	1620	1400	260	0.8	0.01	0.0094	0.031	< 0.0001	9.598	< 0.005
MW2SU	7.09	1760	1200	220	0.7	0.01	0.0018	< 0.025	< 0.0001	8.501	< 0.005
MW5S	5.85	267	190	2.5	2.5	0.01	0.0011	0.011	< 0.0001	1.279	0.003
B6DR	6.64	276	180	3.5	0.7	0.01	0.004	0.02	< 0.0001	0.6845	< 0.001
B2SU	6.48	354	230	2.8	3.4	0.021	0.001	0.014	< 0.0001	0.2135	0.001
B2S	6.64	349	270	10	1.1	0.016	0.022	0.008	< 0.0001	1.444	< 0.001
B1SU	6.29	748	450	16	< 0.5	0.01	0.0016	< 0.005	< 0.0001	3.498	0.001
B1S	6.45	277	190	7.7	< 0.5	0.01	0.012	< 0.005	< 0.0001	0.8756	< 0.001
MW4S	6.55	235	140	2	7.2	0.01	0.0012	< 0.005	< 0.0001	0.244	0.002
B8DR	6.96	461	260	5.2	12	0.16	0.0003	0.007	< 0.0001	0.2632	< 0.001

Cleanup Levels Established in the Cleanup Action Plan

			Conductivity	Chloride	Iron	Manganese	Arsenic		
Groundwater Cleanup Levels for Shallow Upper/Upper Unit									
MW1S			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		
MW3S			225	1.3	< 0.005	0.0302	0.0003		
CNE1S			172	2.8	0.011	0.0091	0.0001		
MW2S			1130	14	0.031	3.017	0.0016		
MW2SU			1620	260	0.031	9.598	0.0094		
MW5S			1760	220	<0.025	8.501	0.0018		
B2SU			267	2.5	0.011	1.279	0.0011		
B2S			354	2.8	0.014	0.2135	0.001		
B1SU			349	10	0.008	1.444	0.022		
B1S			748	16	<0.005	3.498	0.0016		
MW4S			277	7.7	<0.005	0.8756	0.012		
			235	2	<0.005	0.244	0.0012		
Groundwater Cleanup Level for Lower Unit									
MW1D					0.3 mg/l	0.05 mg/l	0.0005 mg/l cleanup level		
MW3D					<0.005	0.4931	0.0055		
CNE1D					0.073	1.008	0.00099		
MW2D					0.022	0.292	0.0001		
B6DR					0.019	0.7097	0.0043		
B8DR					0.02	0.6845	0.004		
					0.007	0.2632	0.0003		
Surface Water Standards									
SW14							0.00027 mg/l cleanup level, 0.0005 mg/l compliance		
							no samples taken		

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 dry season groundwater monitoring for 2011. 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 thirteen 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 all wells this round. All wells were below the standard.

Parameters with Secondary Standards:

Chloride has a secondary standard of 250 mg/l. Only MW2S exceeded the standard this round with a value of 260 mg/l.

Iron has a secondary standard of 0.3 mg/l. Iron was detected in all but four wells this season, though none exceeded the standard.

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

pH has a regulatory range of 6.5 to 8.5. Six 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 three wells. The highest value was 1400 mg/l in MW2S.

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

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. Only one well, MW3S, was below the cleanup level. Two wells were below the compliance level: MW3S and MW1S.

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. Only MW2S exceeded the level with a reading of 260 mg/l. MW2S and MW2SU have often exceeded the cleanup level, though the values do not seem to be increasing since the Remedial Investigation.

Soluble Iron has a cleanup level of 300 µg/L. All wells were under the cleanup level this dry season.

Soluble Manganese has a cleanup level of 50 µg/L. MW1S and MW3S 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. The cross gradient well CNE1D was below the cleanup level as was the down gradient well B8DR. The four other wells in the lower unit exceeded the level.

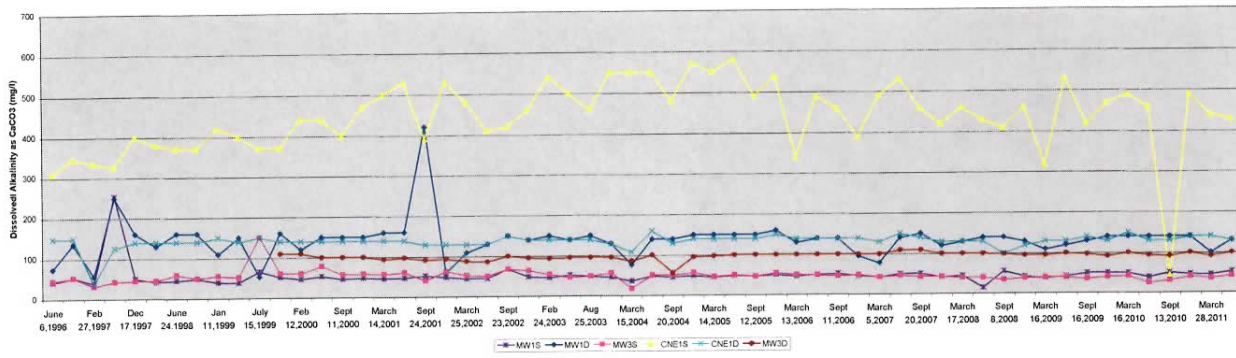
Soluble Iron has a cleanup level of 300 µg/L. All wells had values below the cleanup level this season.

Surface Water Standards:

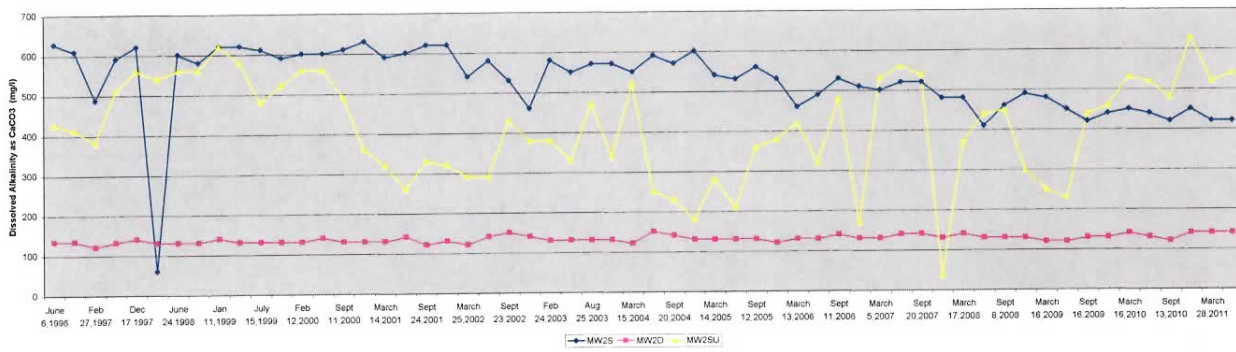
Soluble Arsenic has a cleanup level of 0.27 µg/L with a compliance level of 0.50 µg/L. Water was not flowing at the point of compliance, SW14, and no samples were taken.

Appendix B - Groundwater Time Series Graphs

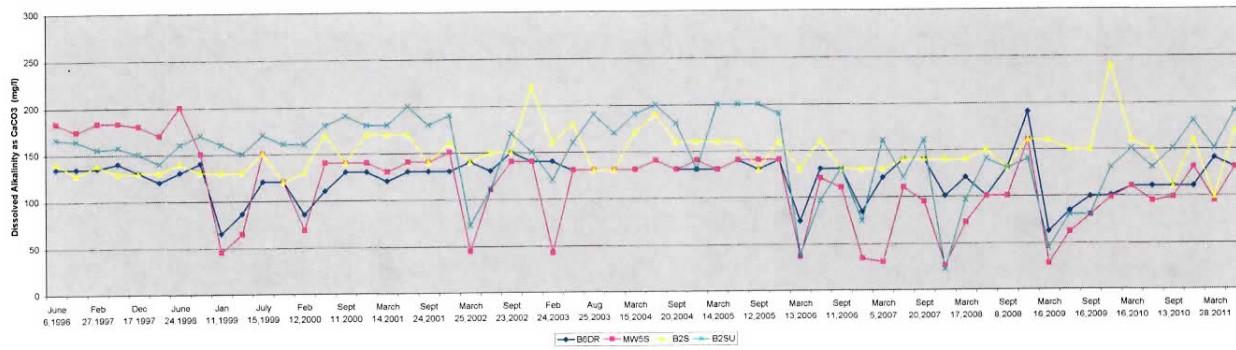
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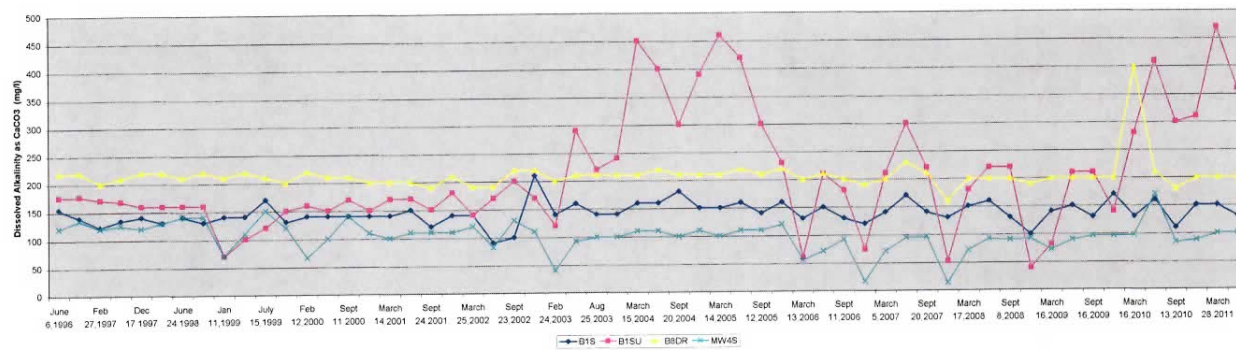
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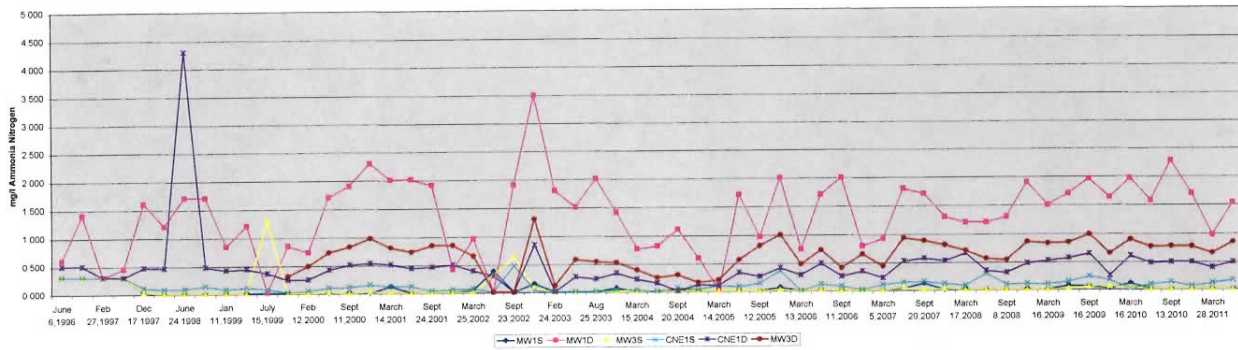
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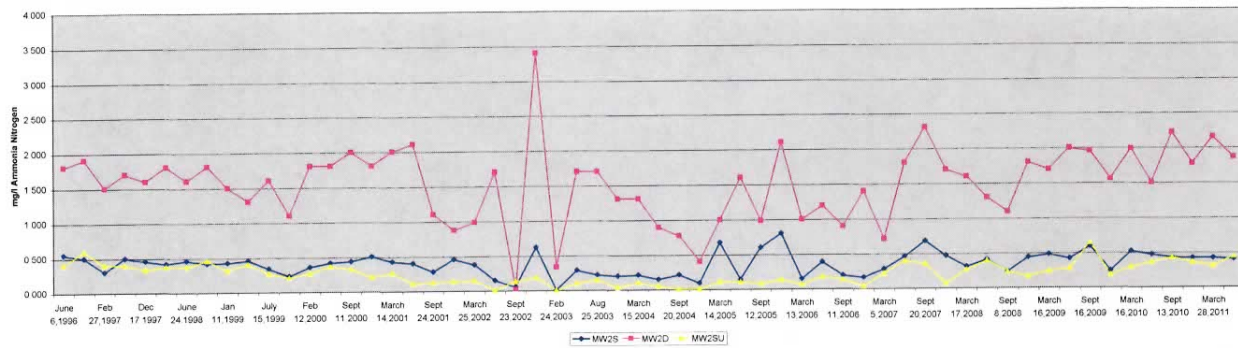
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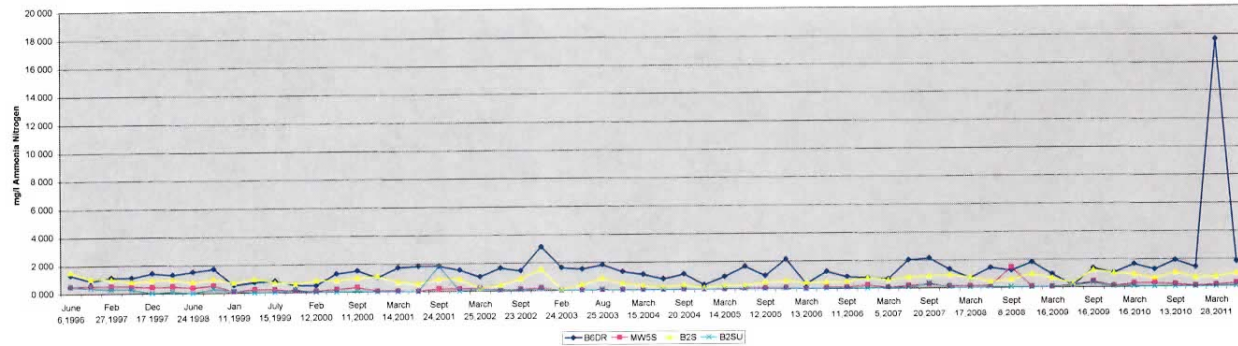
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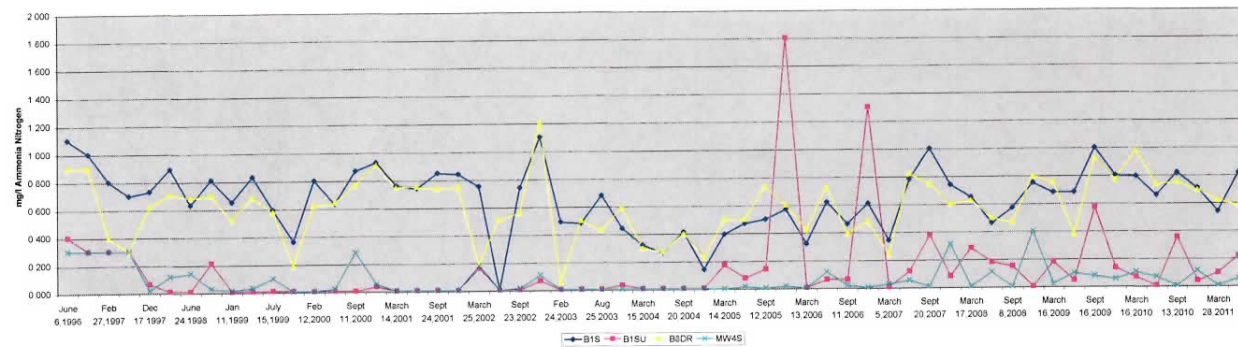
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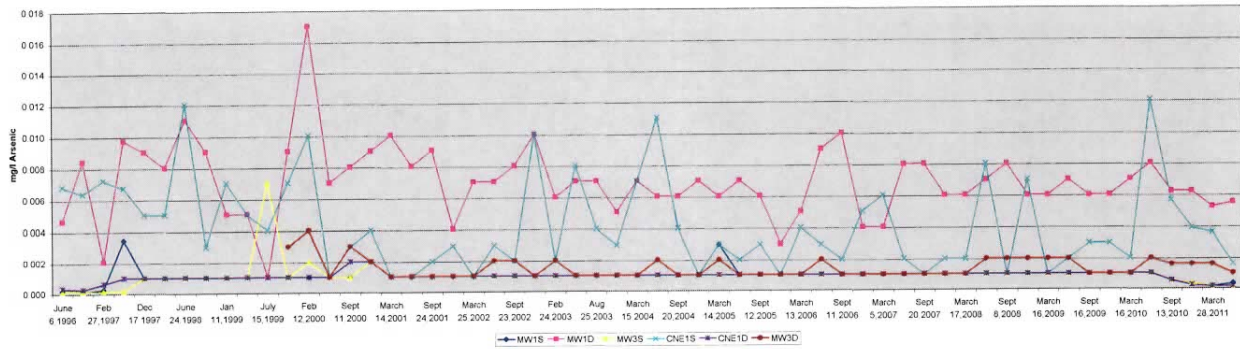
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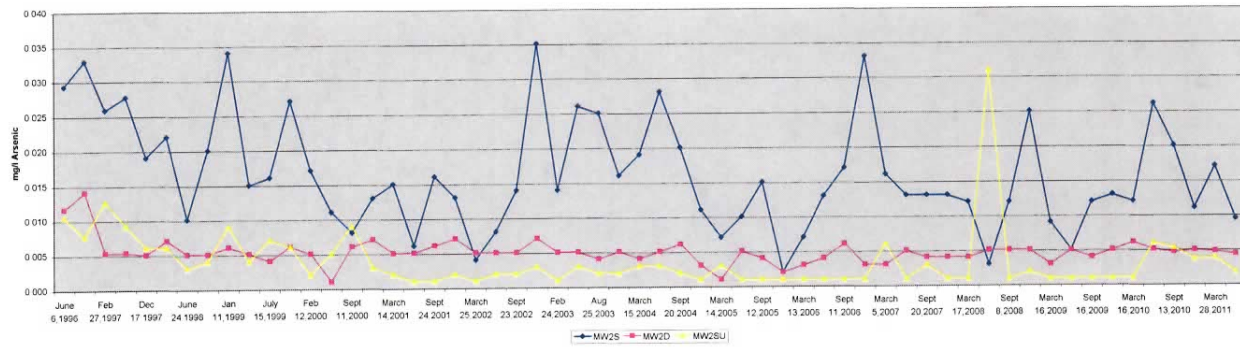
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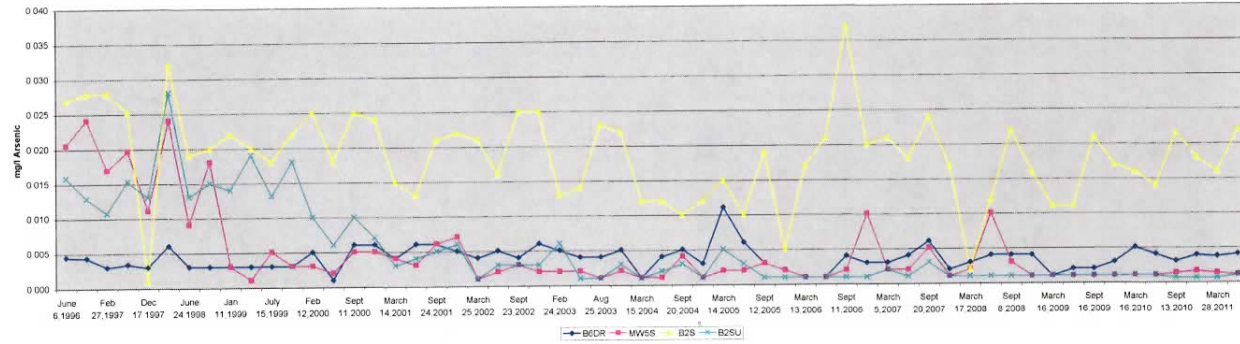
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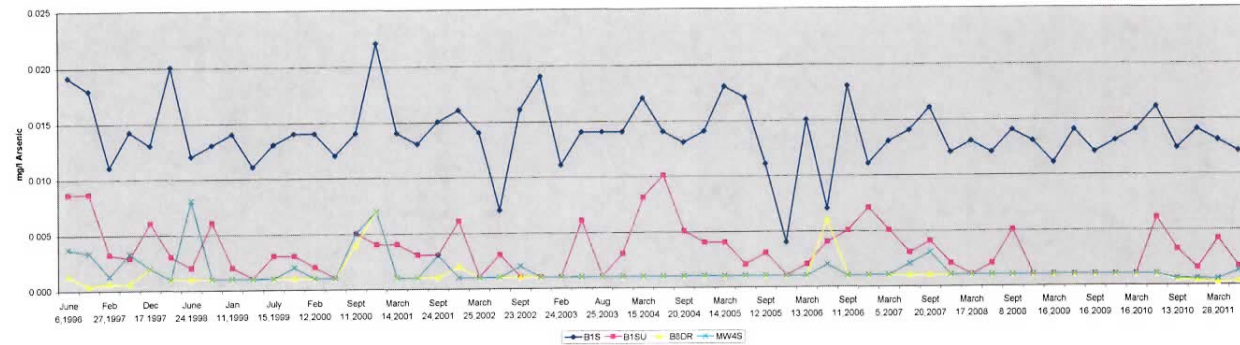
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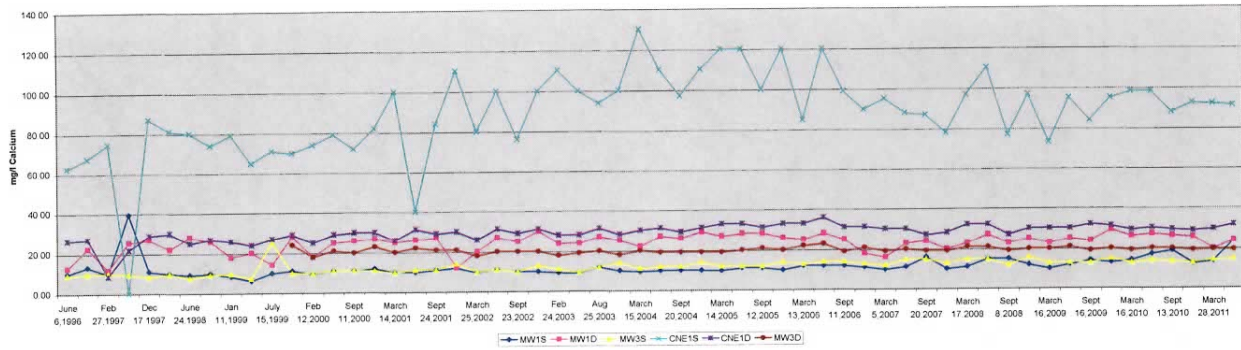
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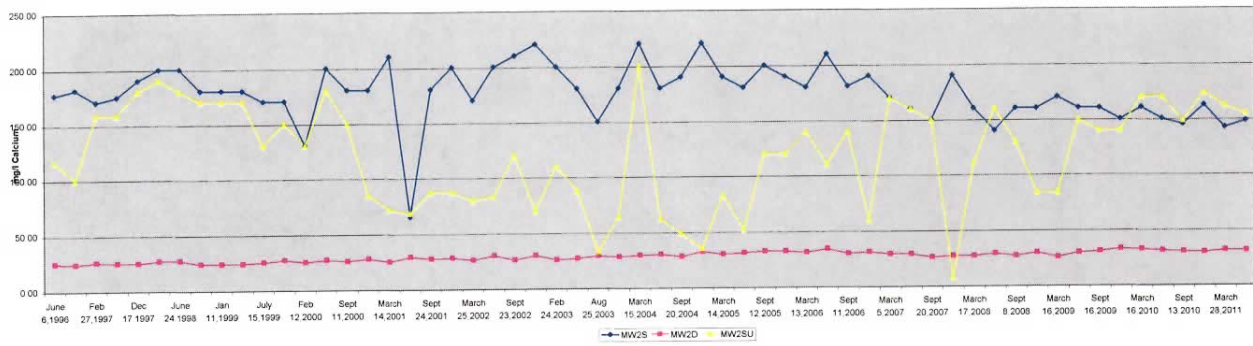
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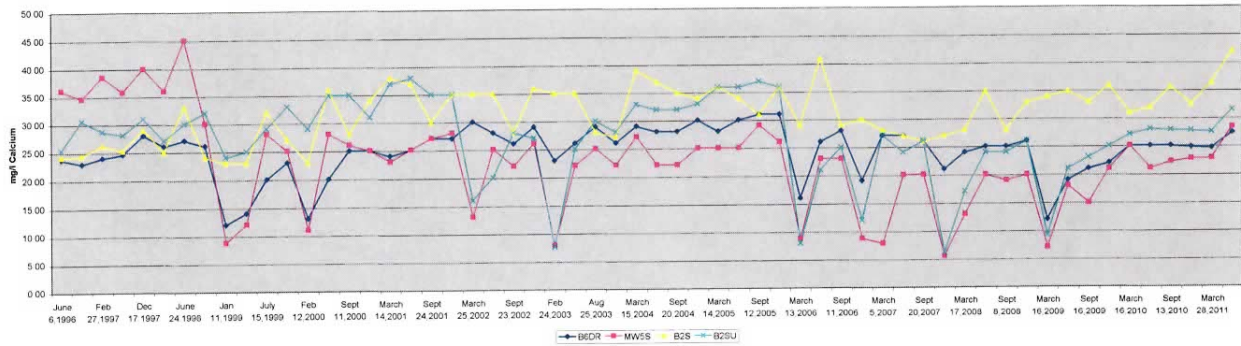
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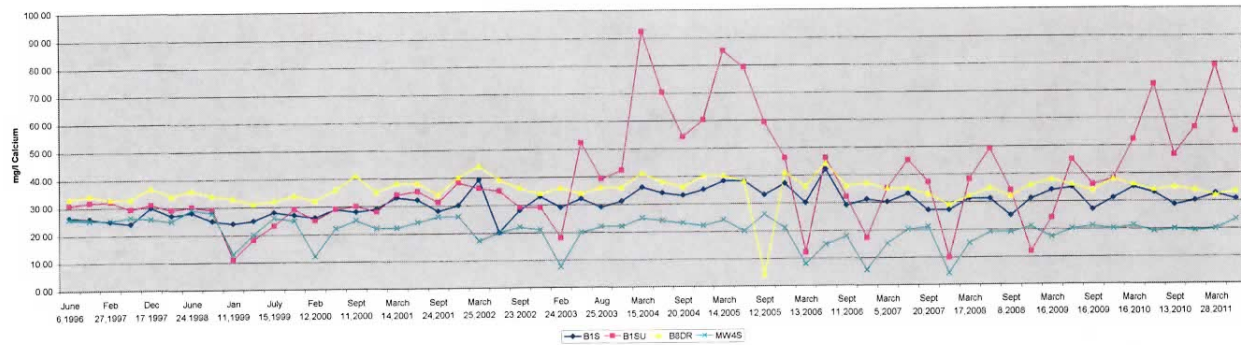
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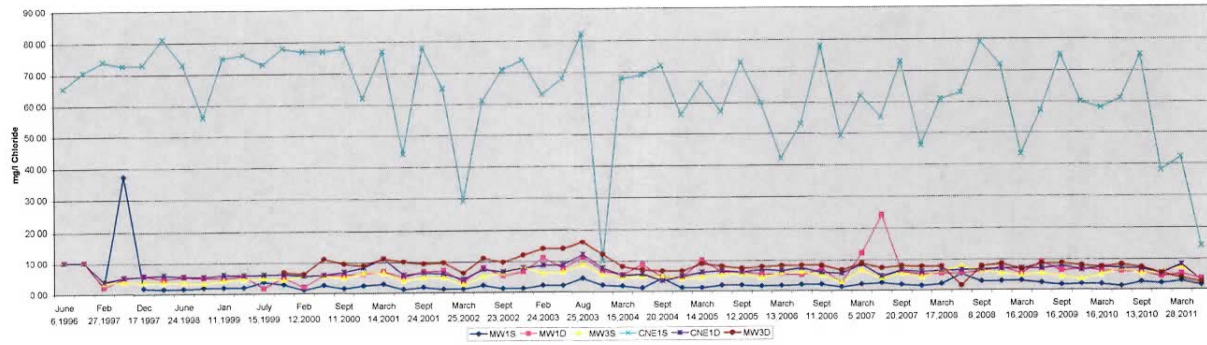
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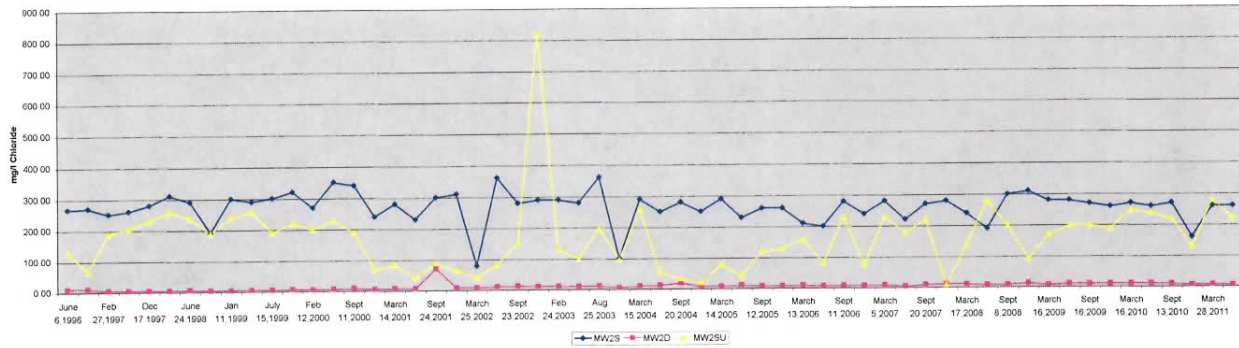
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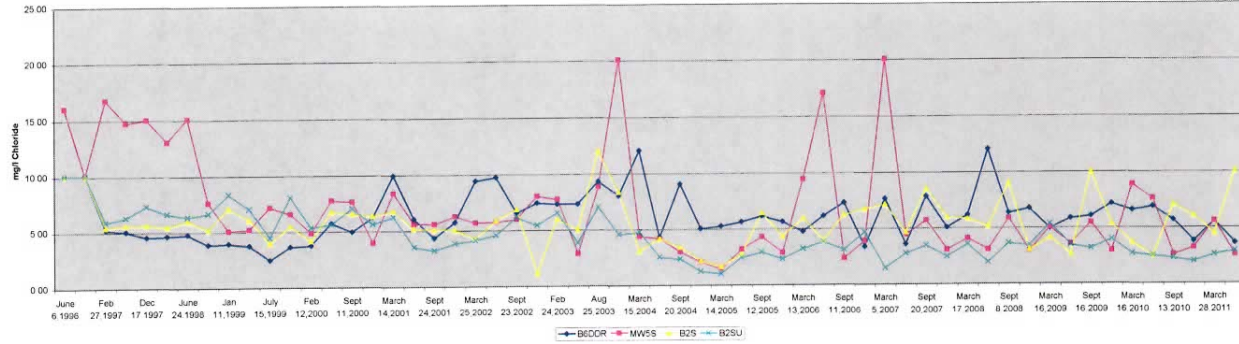
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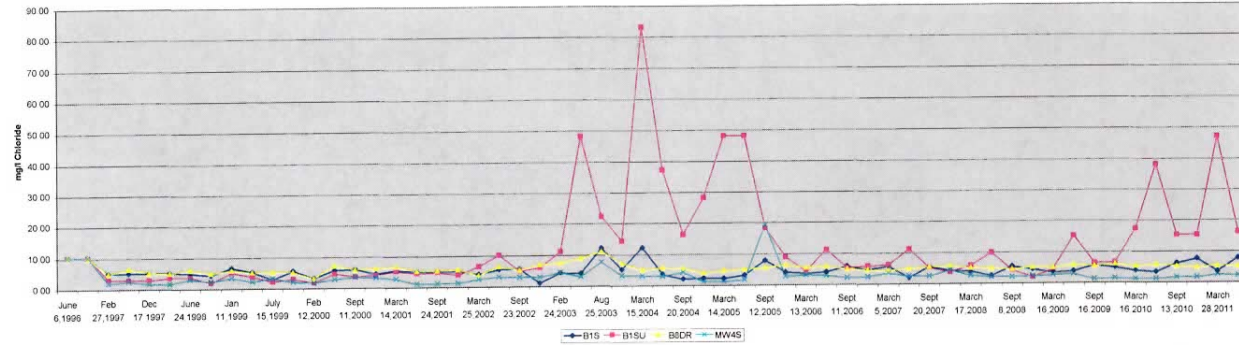
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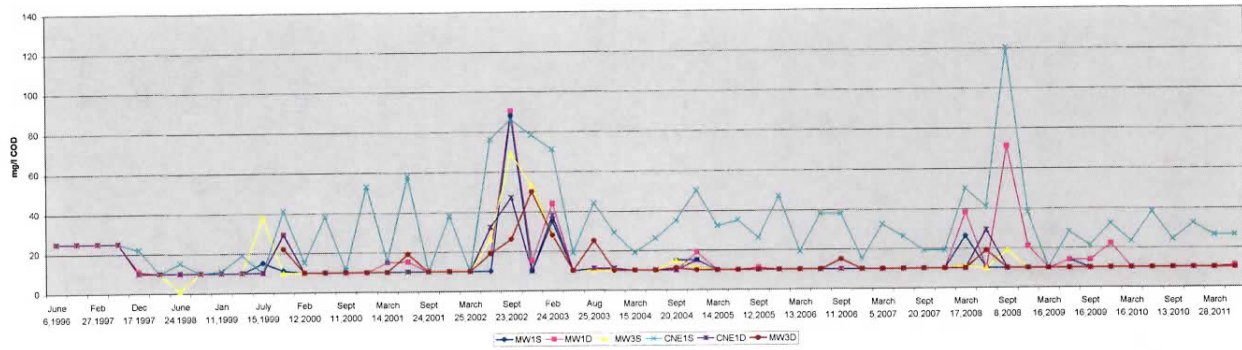
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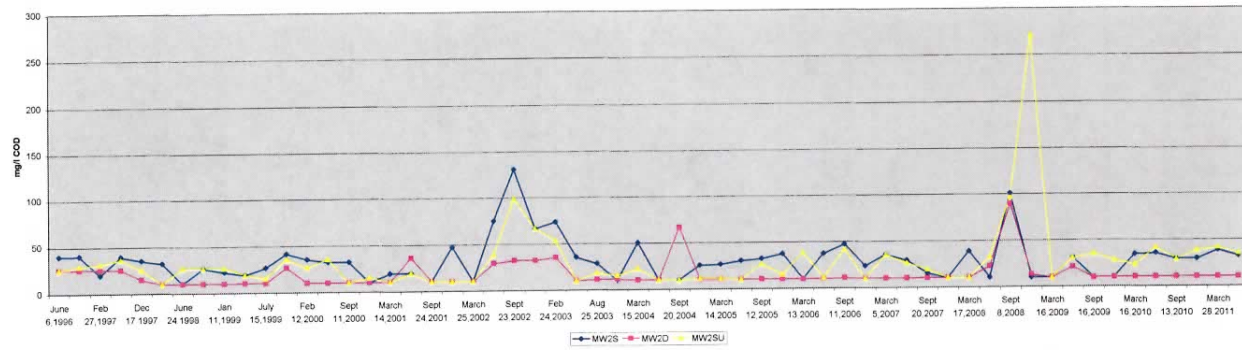
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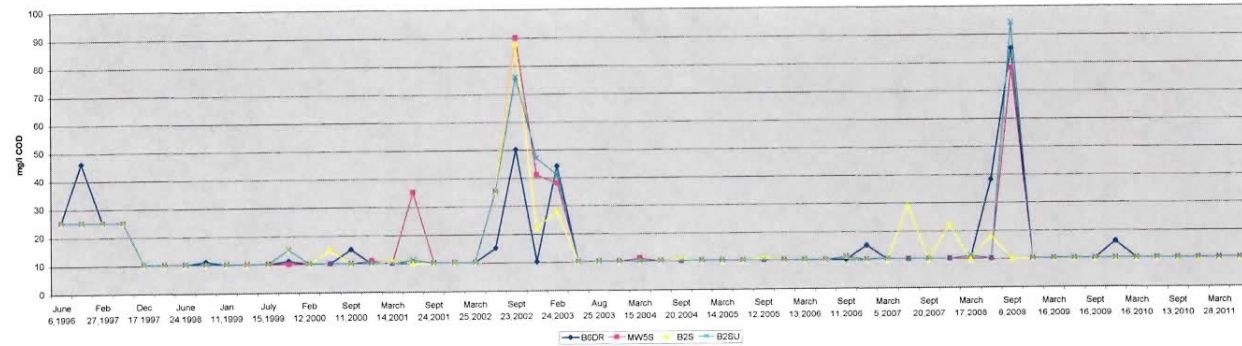
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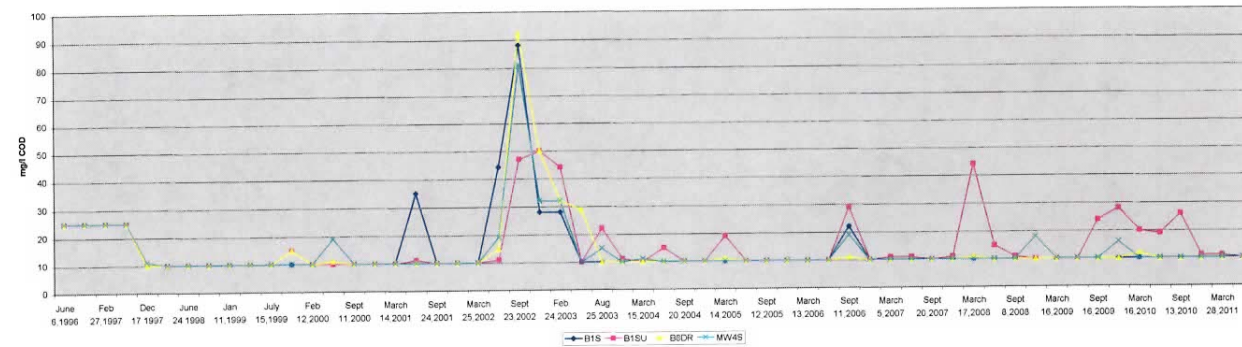
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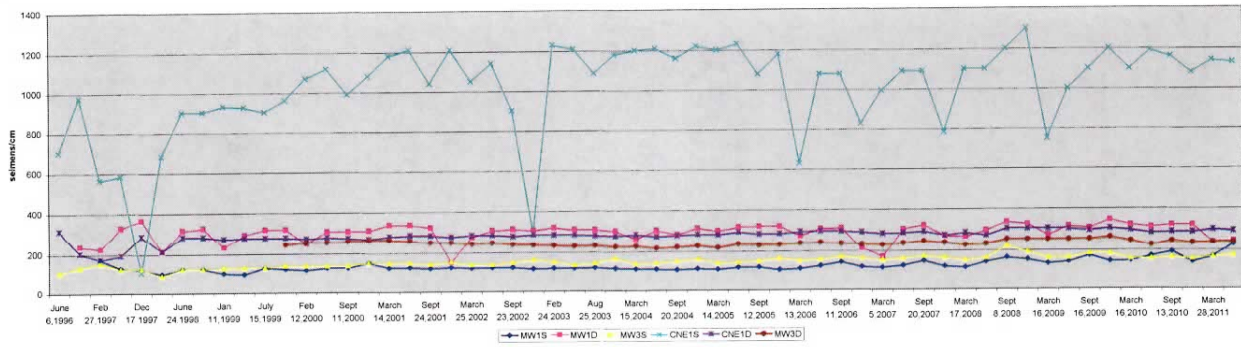
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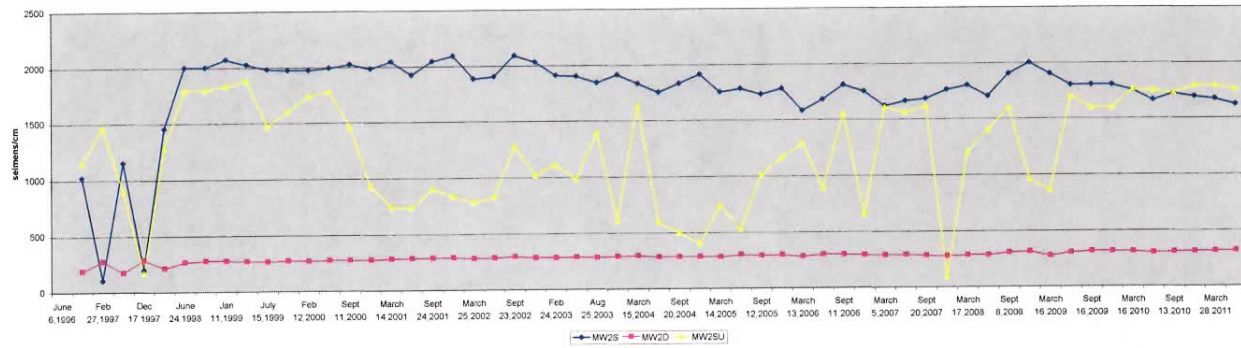
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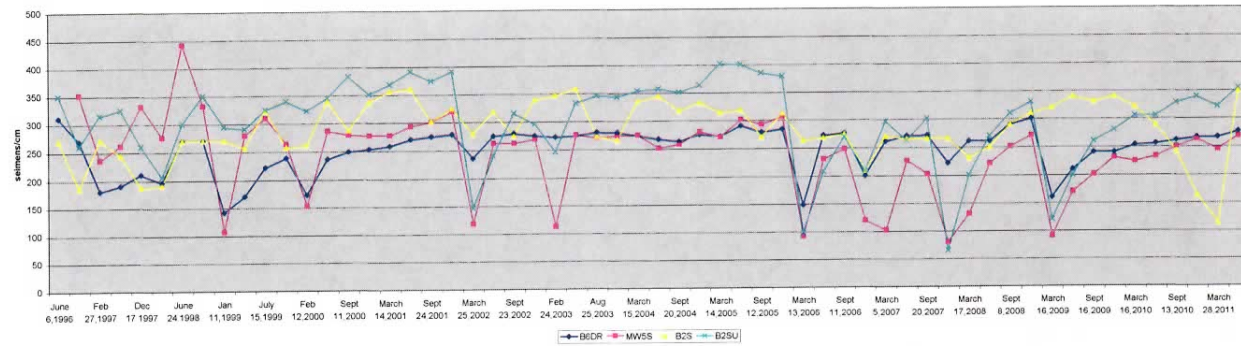
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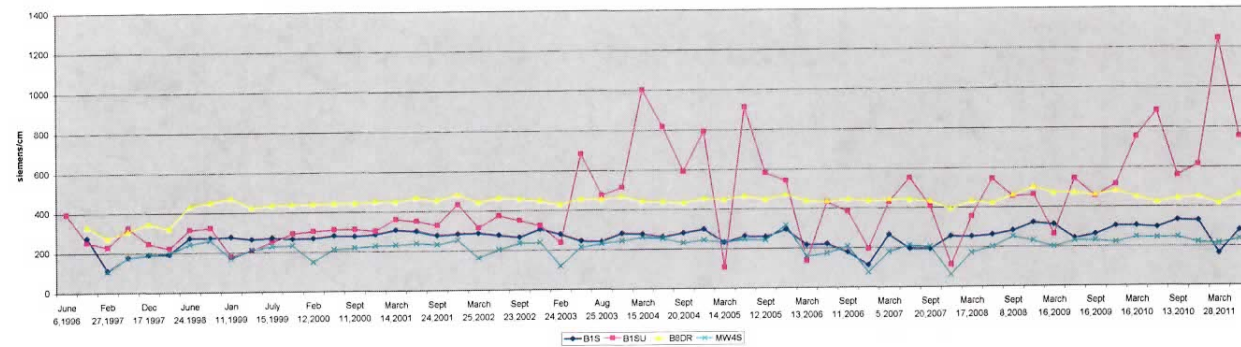
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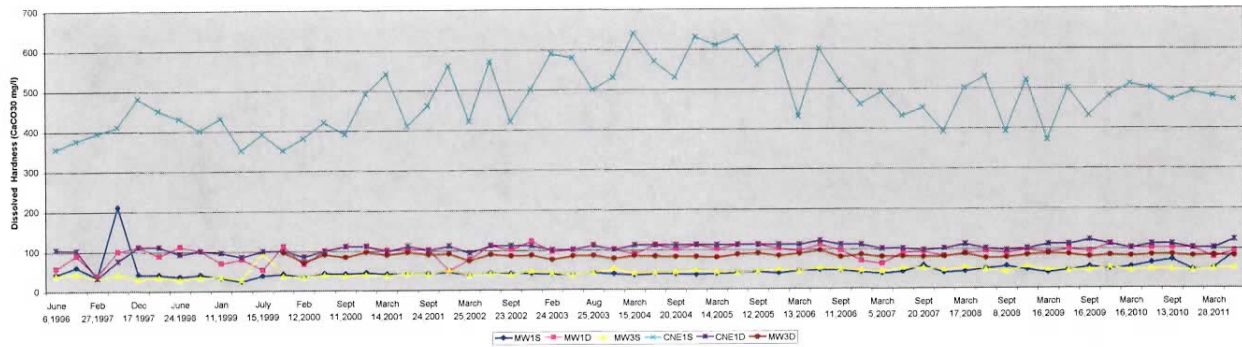
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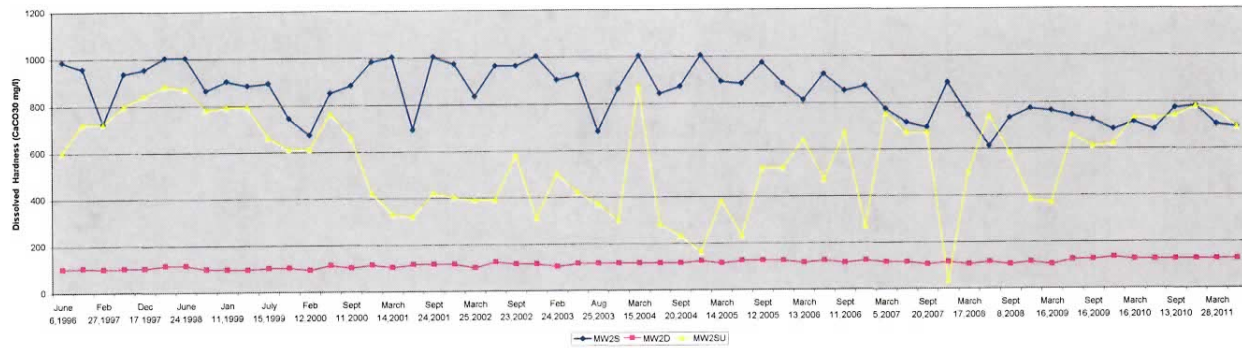
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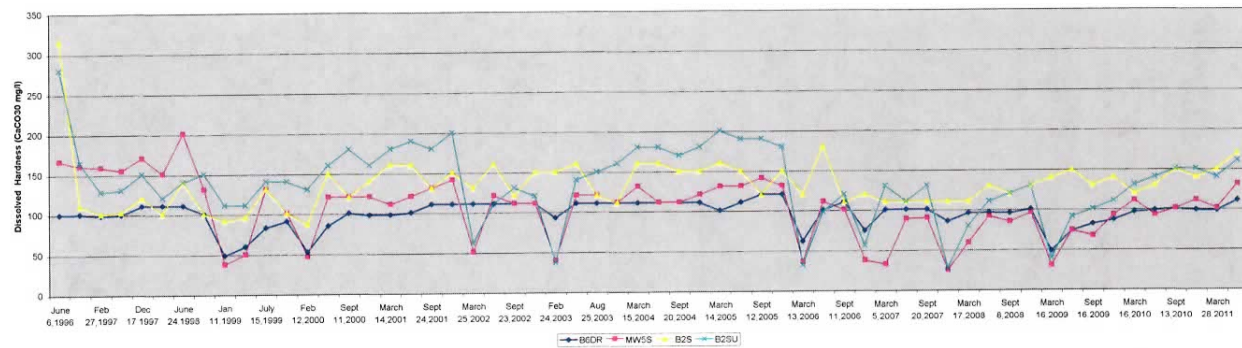
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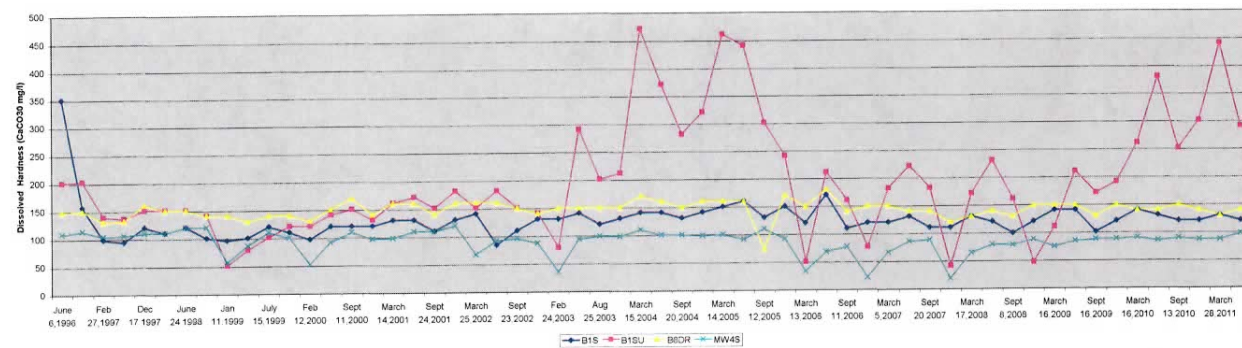
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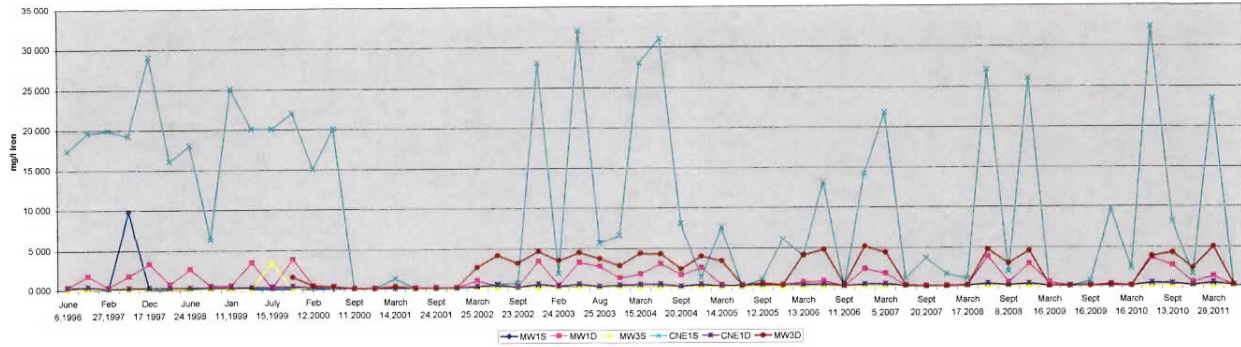
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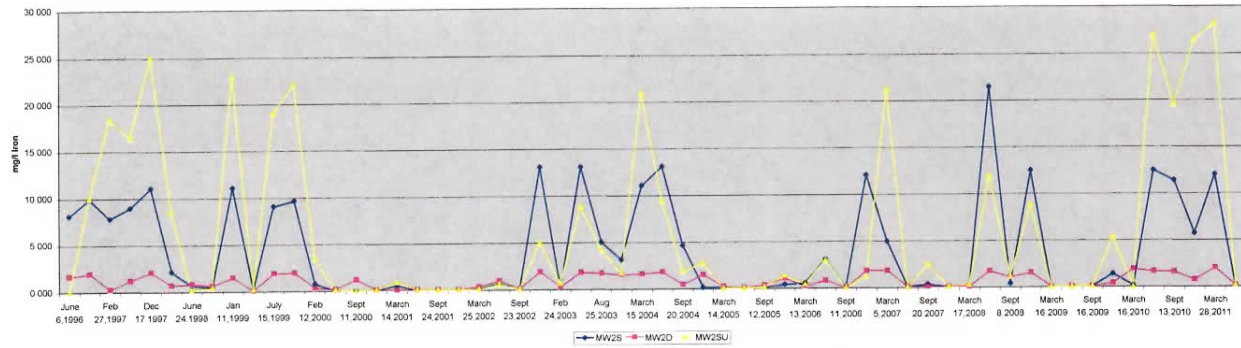
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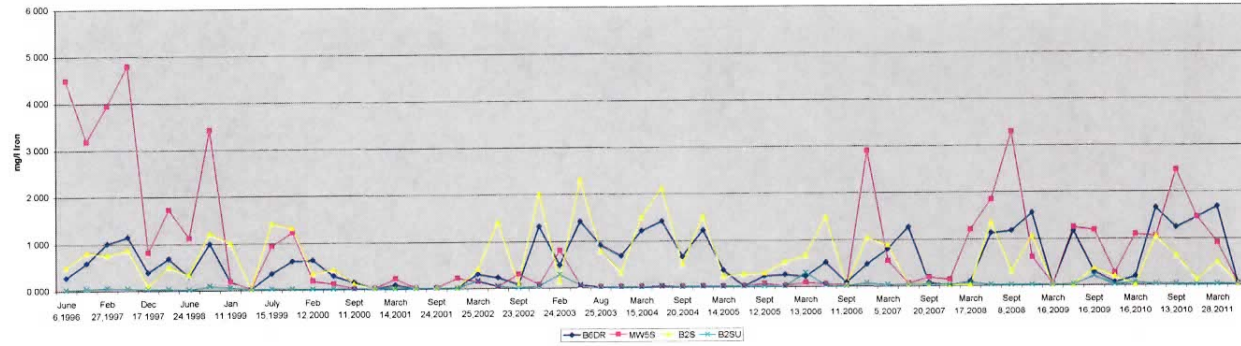
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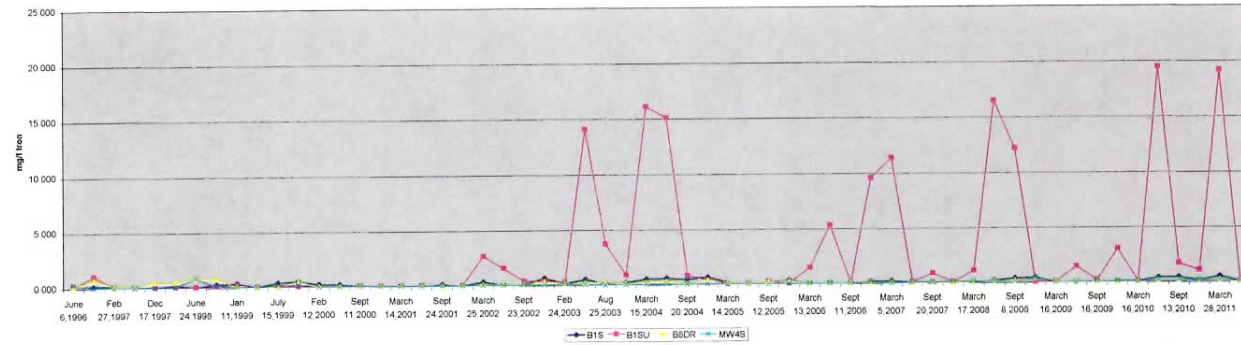
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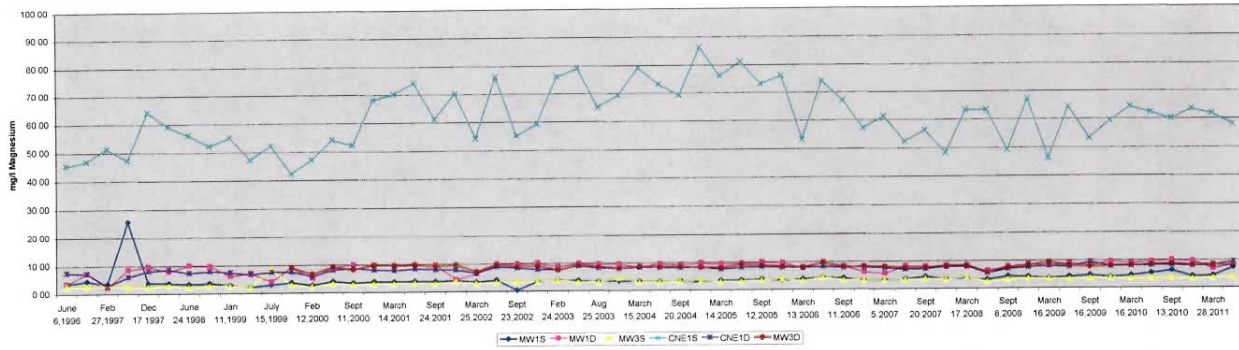
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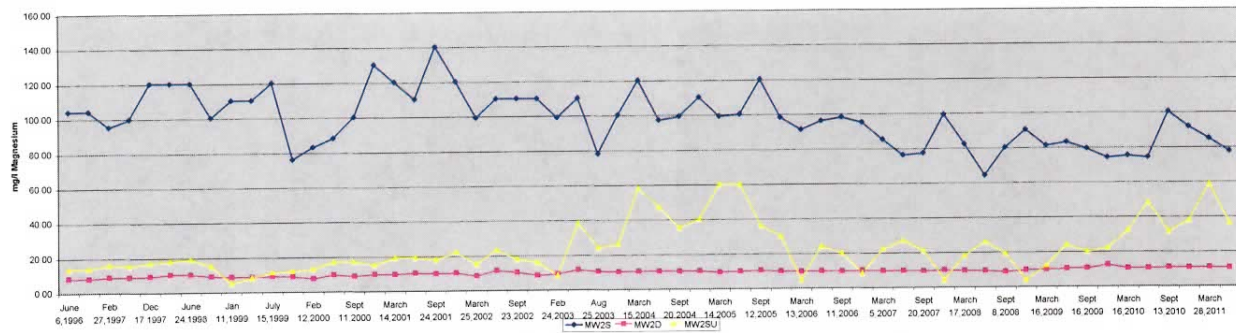
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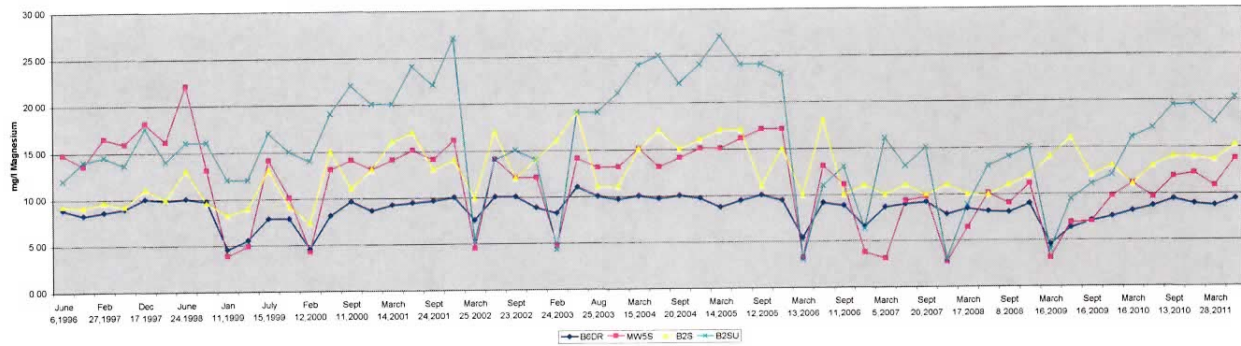
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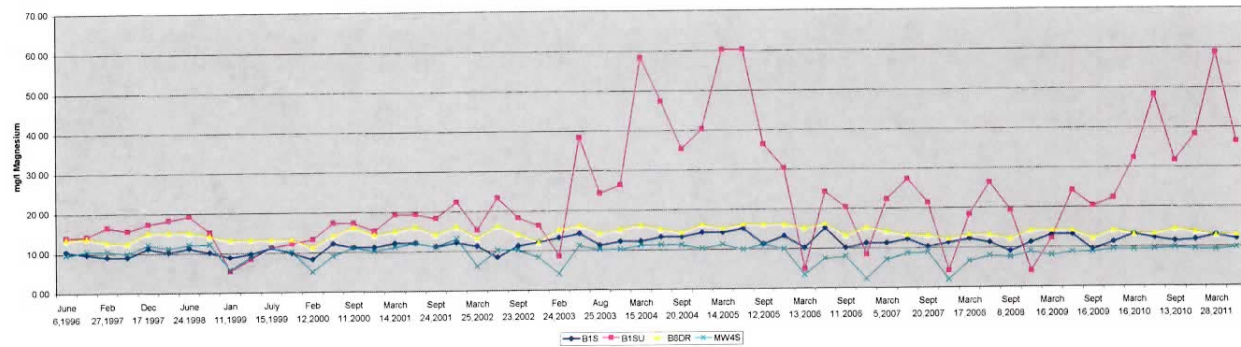
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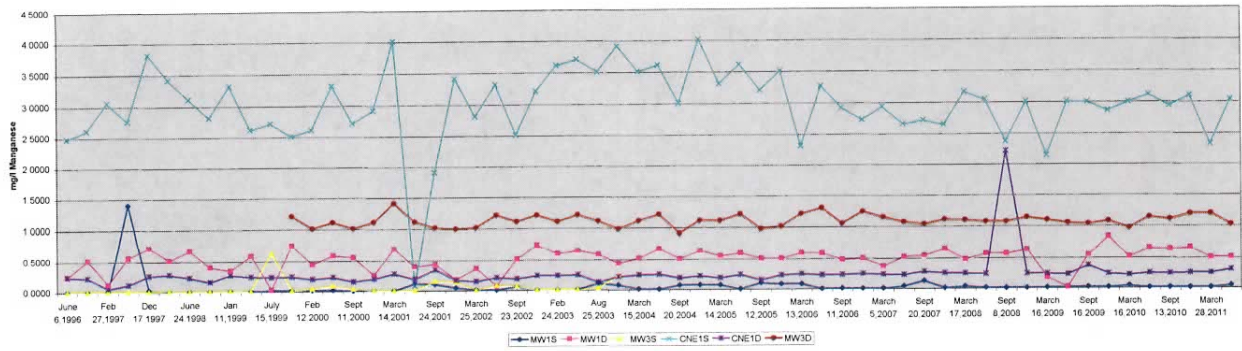
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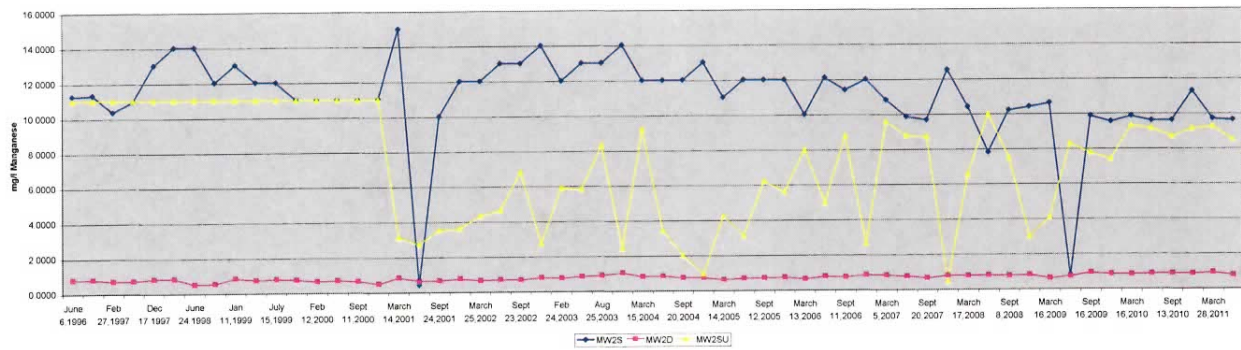
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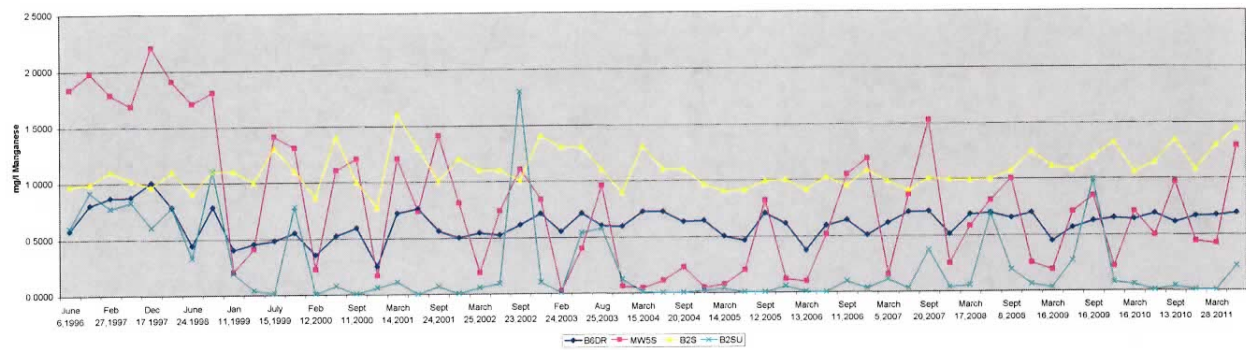
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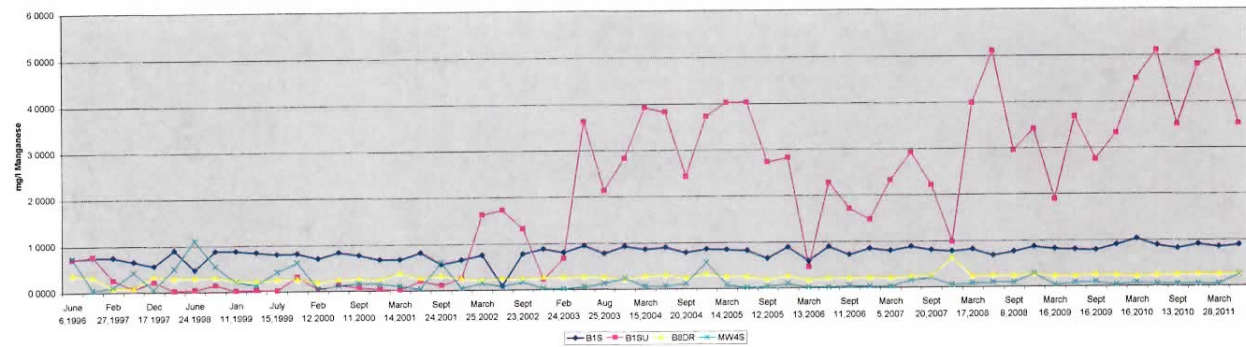
GROUP 2 WELLS DISSOLVED MANGANESE



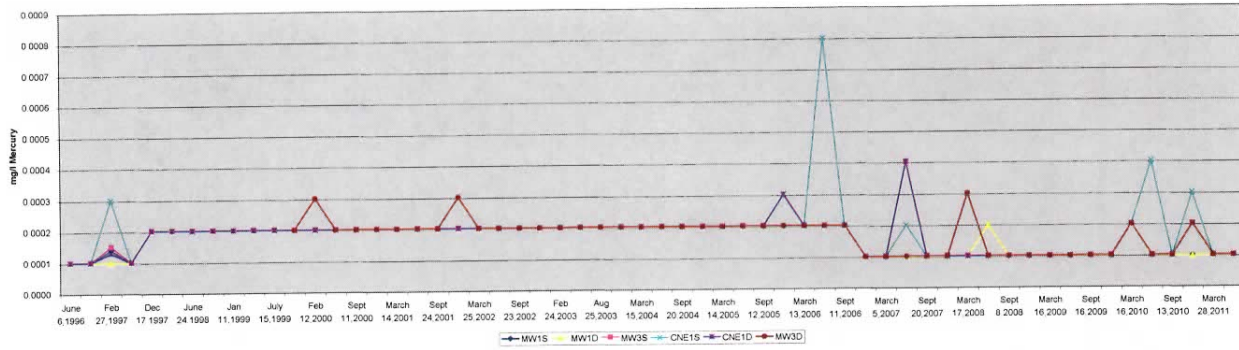
GROUP 3 WELLS DISSOLVED MANGANESE



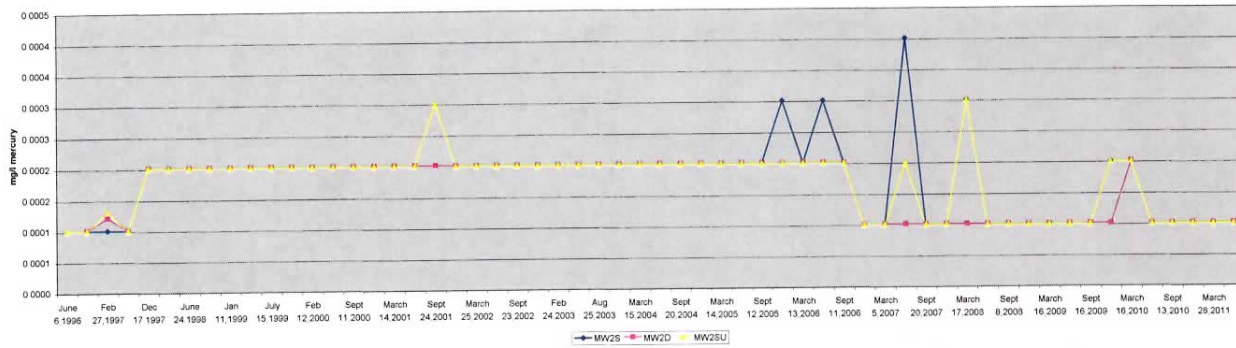
GROUP 4 WELLS DISSOLVED MANGANESE



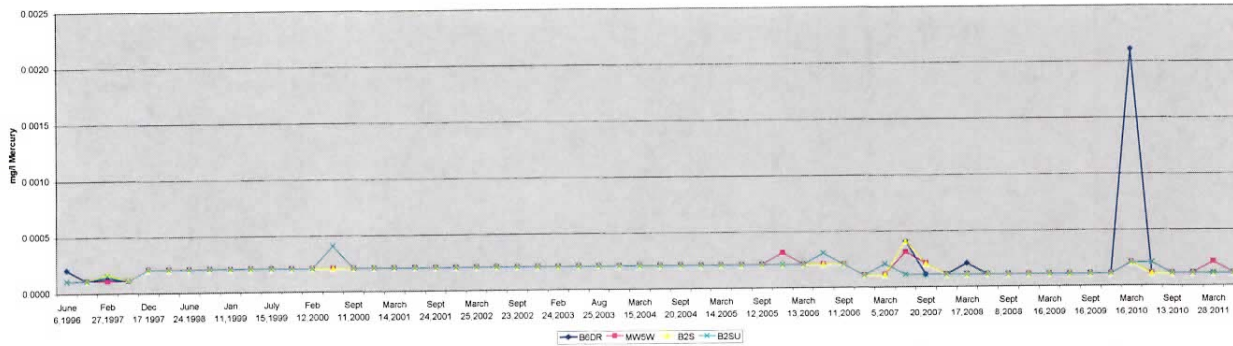
GROUP 1 WELLS DISSOLVED MERCURY



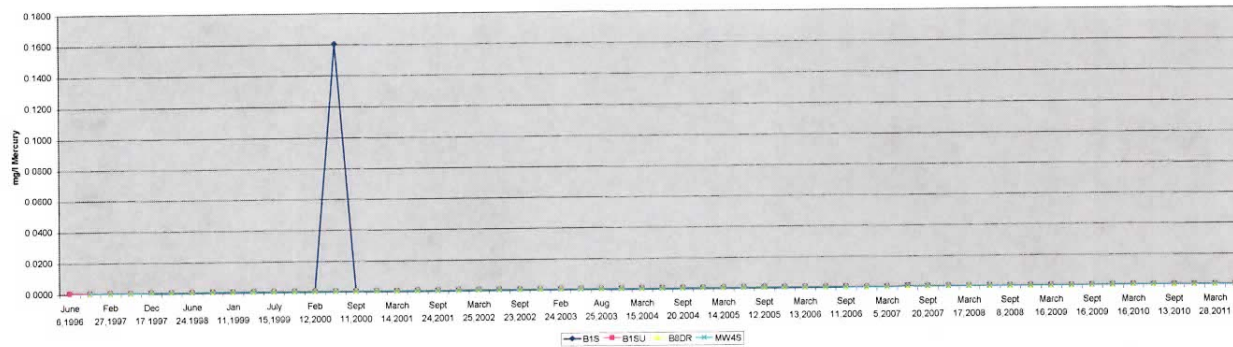
GROUP 2 WELLS DISSOLVED MERCURY



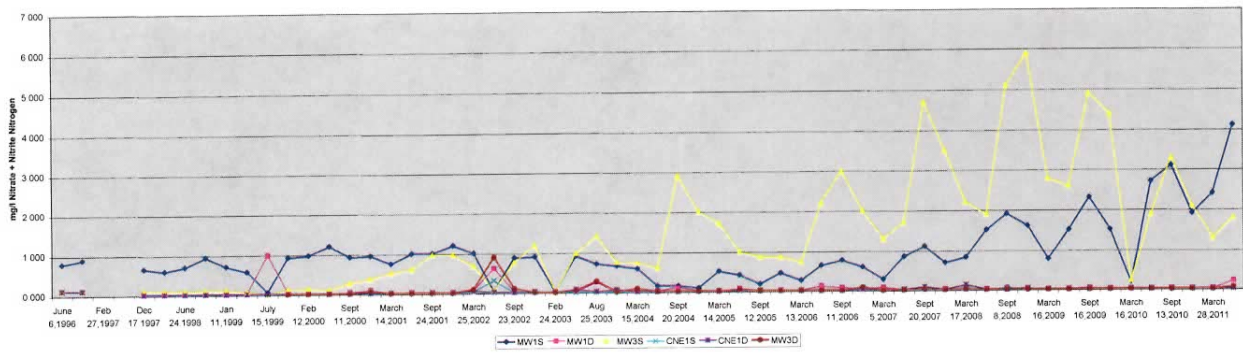
GROUP 3 WELLS DISSOLVED MERCURY



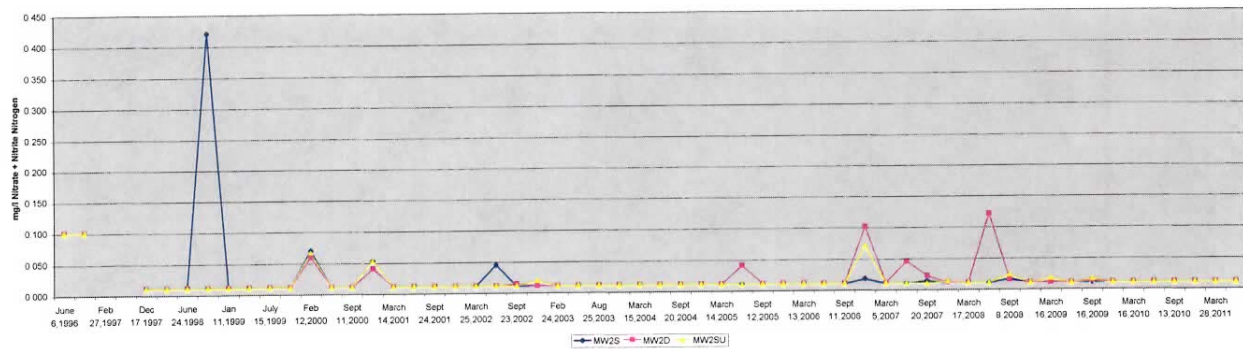
GROUP 4 WELLS DISSOLVED MERCURY



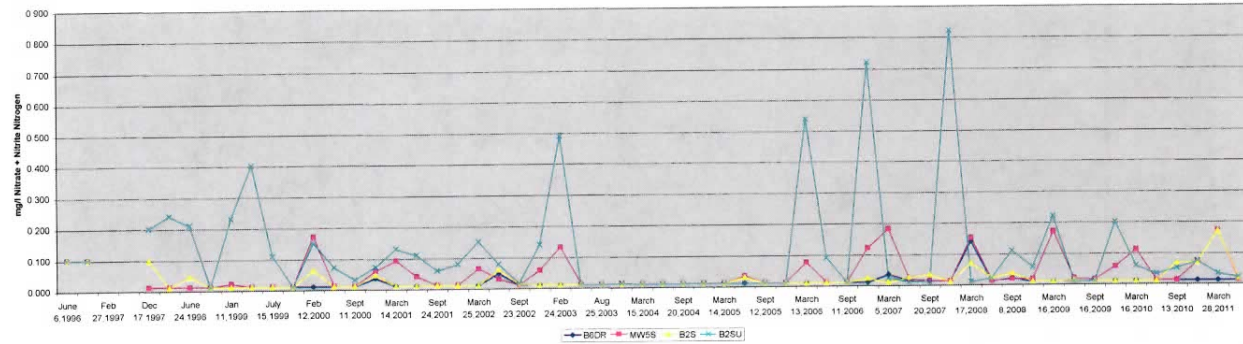
GROUP 1 WELLS NITRATE + NITRITE NITROGEN



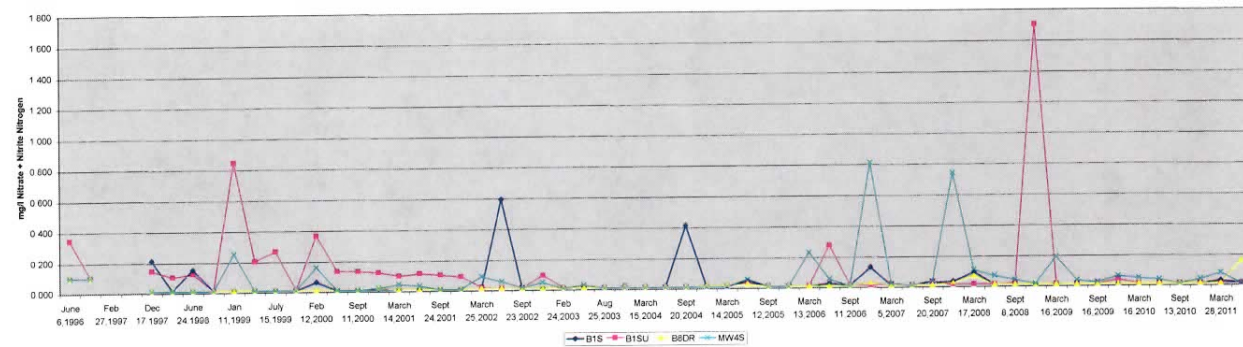
GROUP 2 WELLS NITRATE + NITRITE NITROGEN



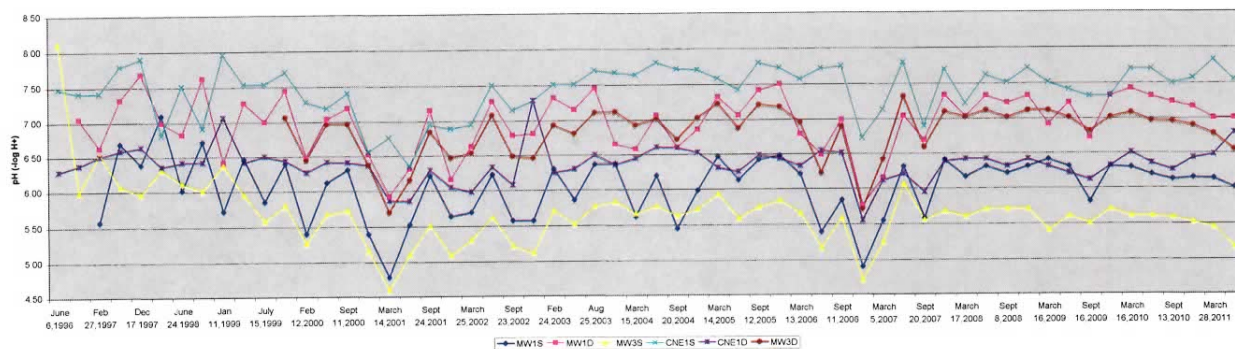
GROUP 3 WELLS NITRATE + NITRITE NITROGEN



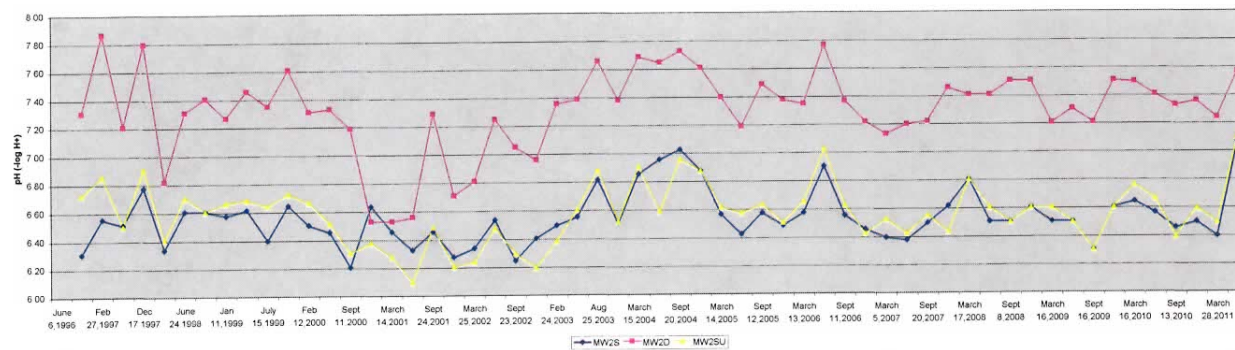
GROUP 4 WELLS NITRATE + NITRITE NITROGEN



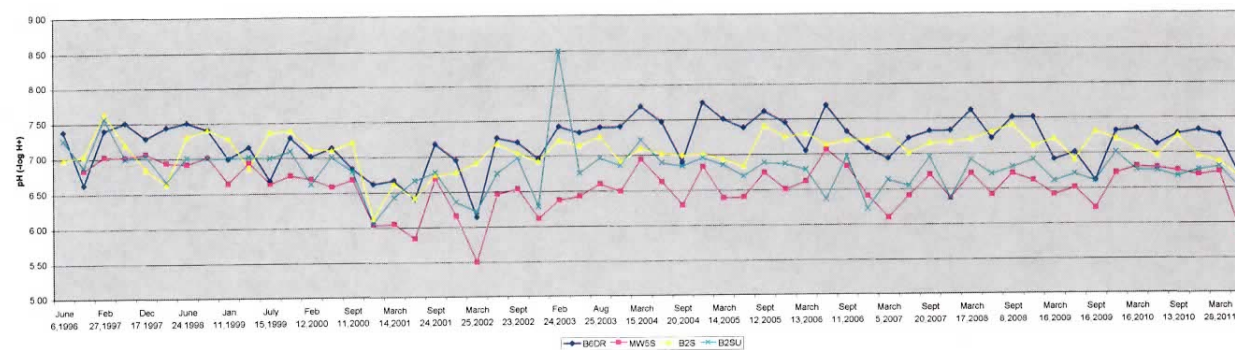
GROUP 1 WELLS pH



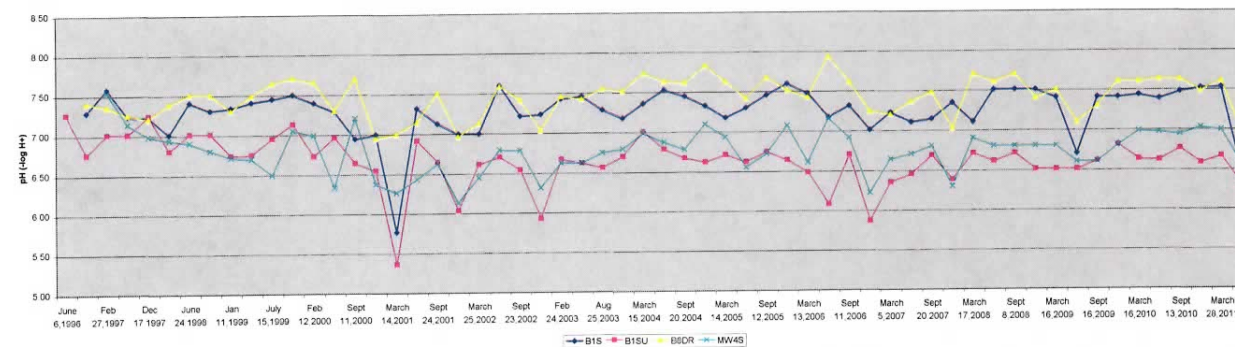
GROUP 2 WELLS pH



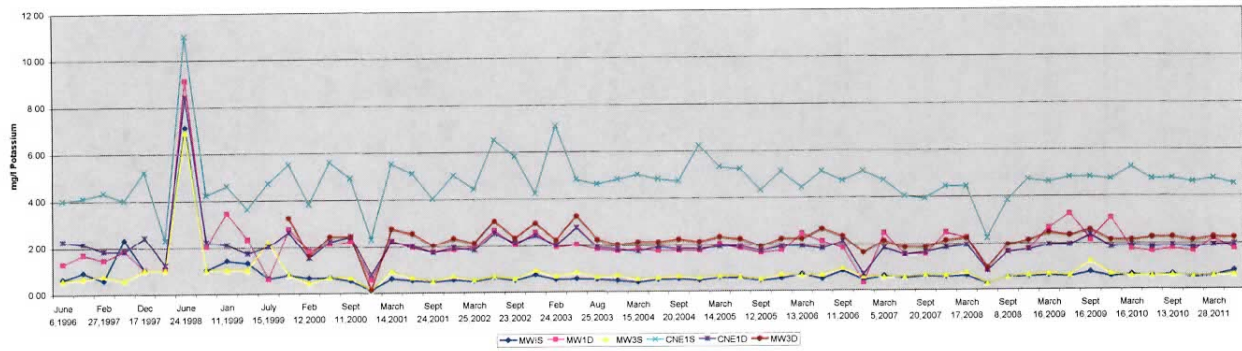
GROUP 3 WELLS pH



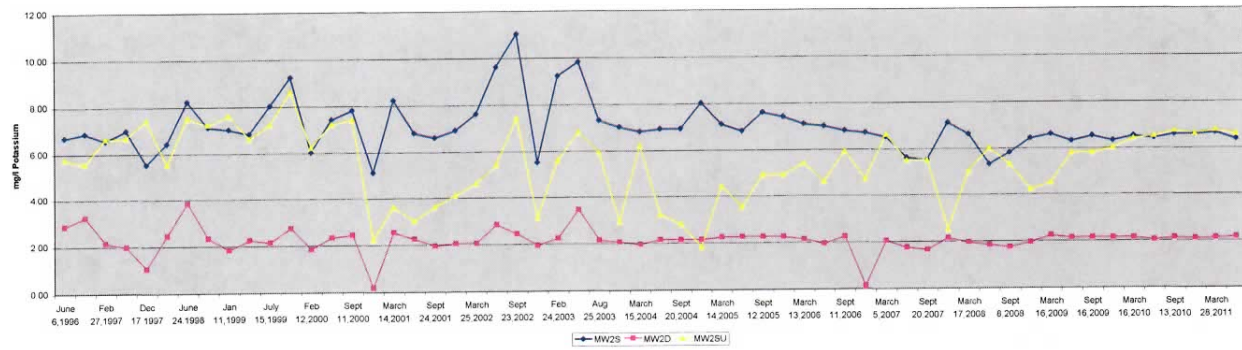
GROUP 4 WELLS pH



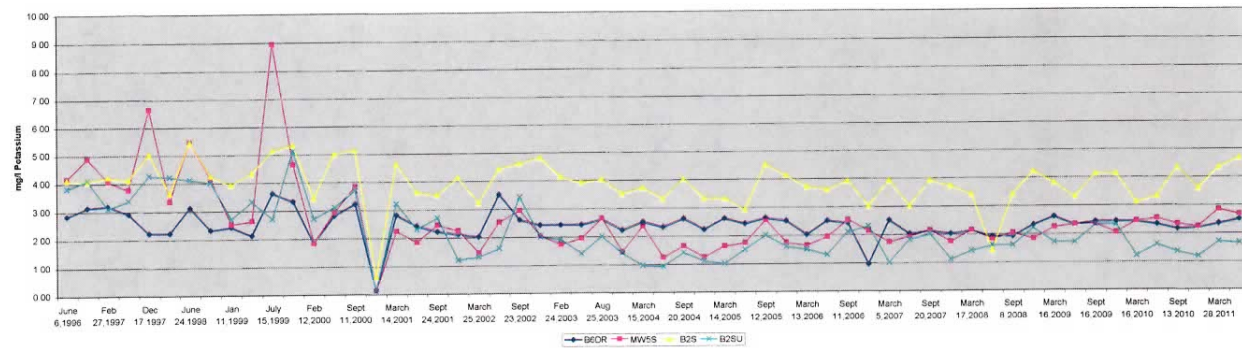
GROUP 1 WELLS DISSOLVED POTASSIUM



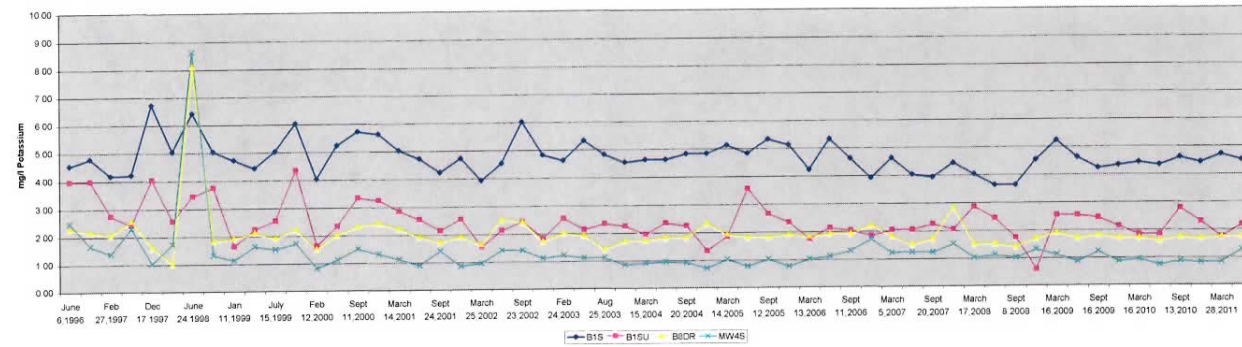
GROUP 2 WELLS DISSOLVED POTASSIUM



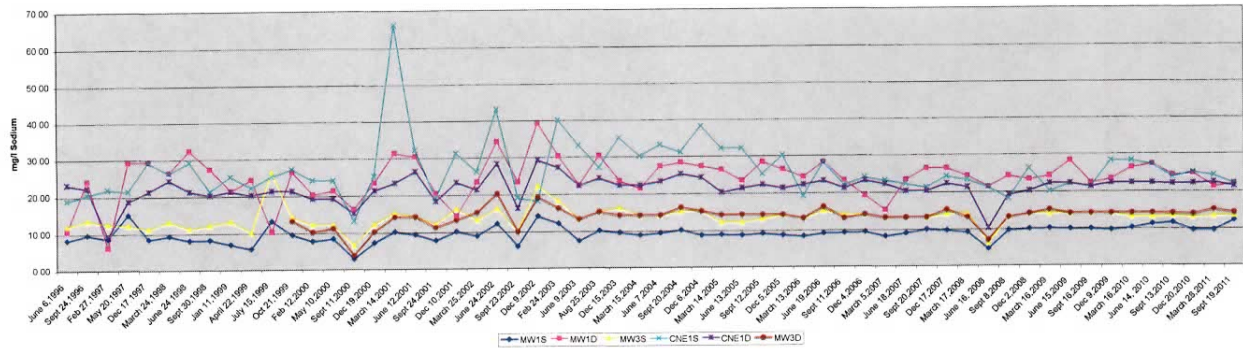
GROUP 3 WELLS DISSOLVED POTASSIUM



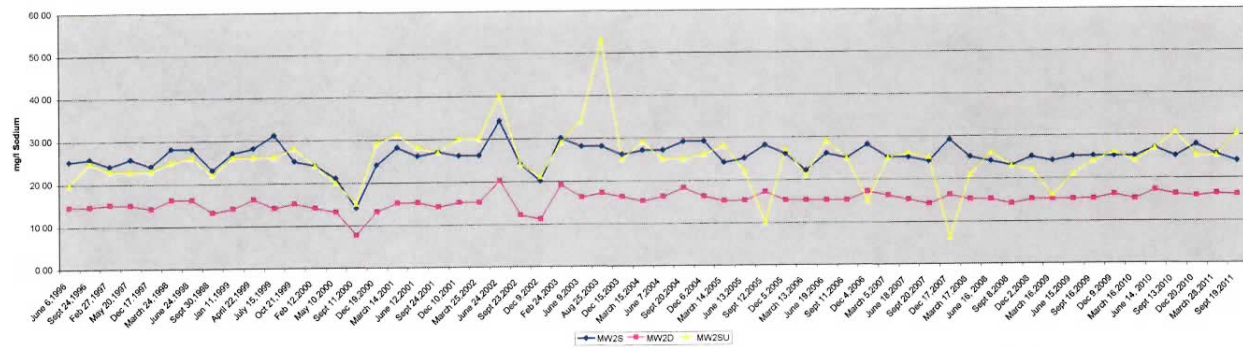
GROUP 4 WELLS DISSOLVED POTASSIUM



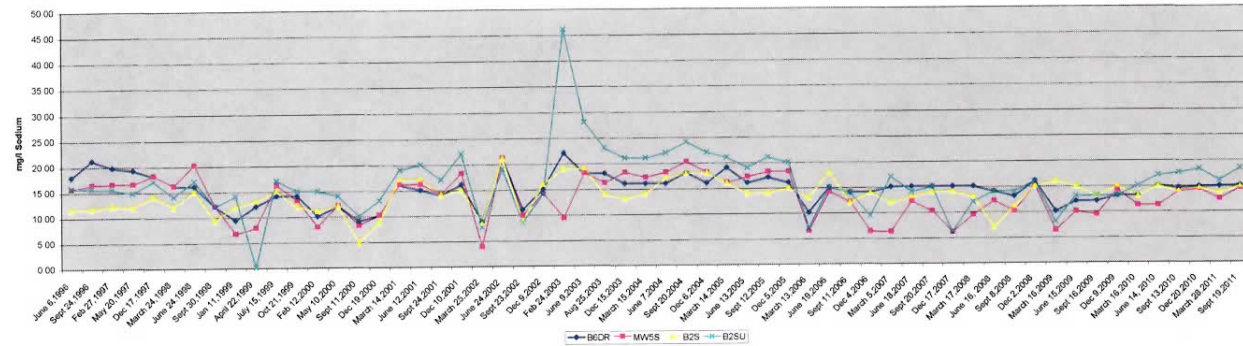
GROUP 1 WELLS SODIUM



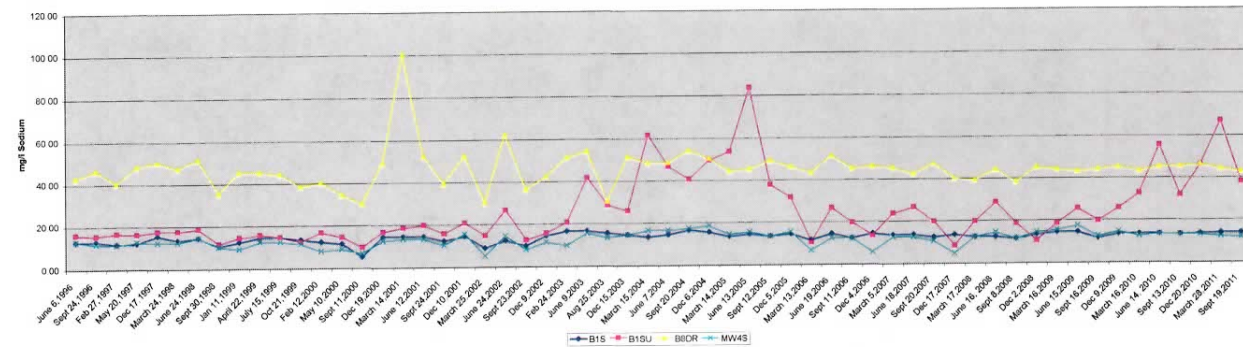
GROUP 2 WELLS SODIUM



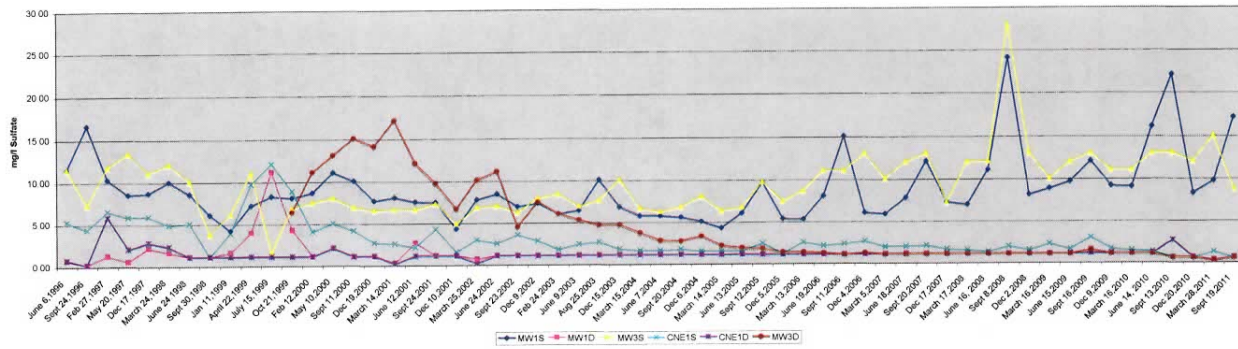
GROUP 3 WELLS SODIUM



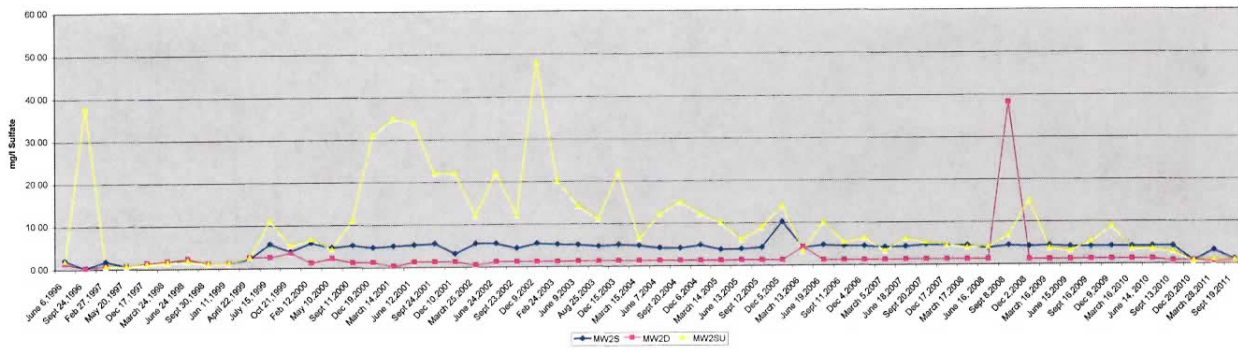
GROUP 4 WELLS SODIUM



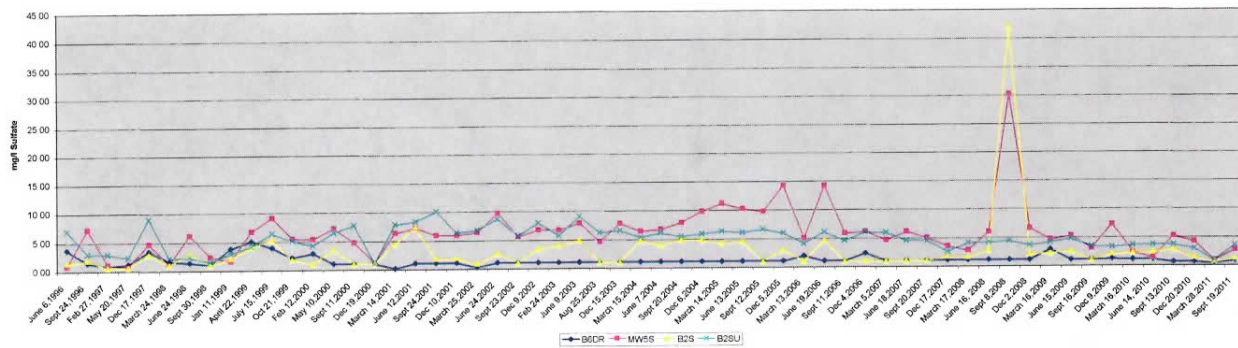
GROUP 1 WELLS SULFATE



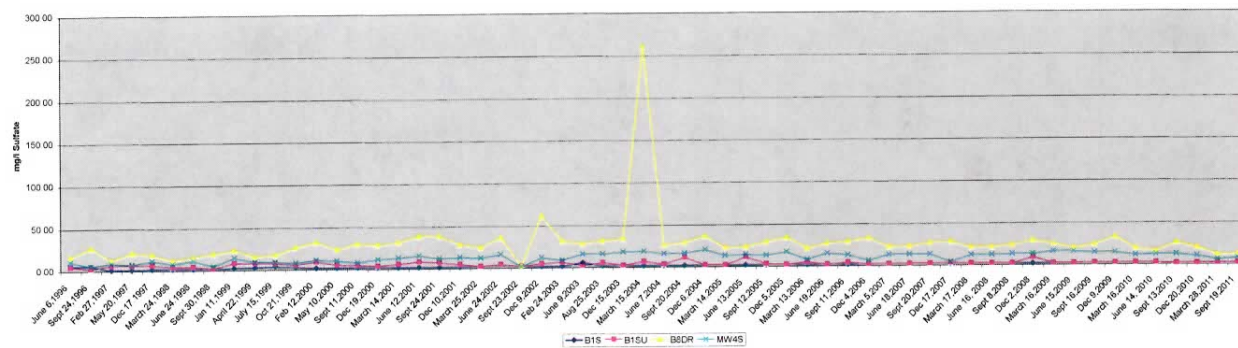
GROUP 2 WELLS SULFATE



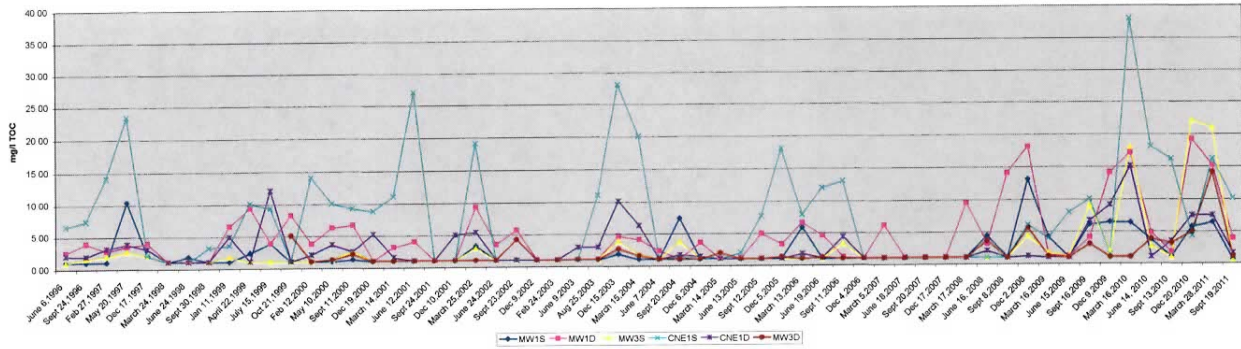
GROUP 3 WELLS SULFATE



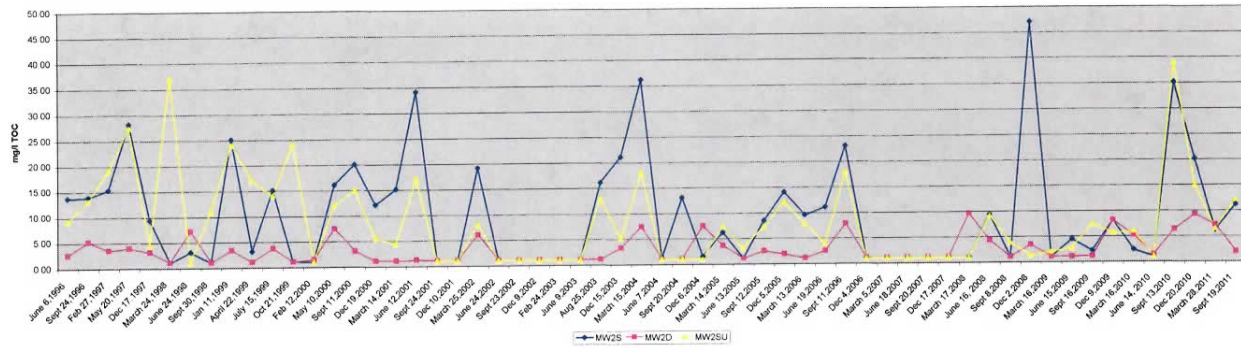
GROUP 4 WELLS SULFATE



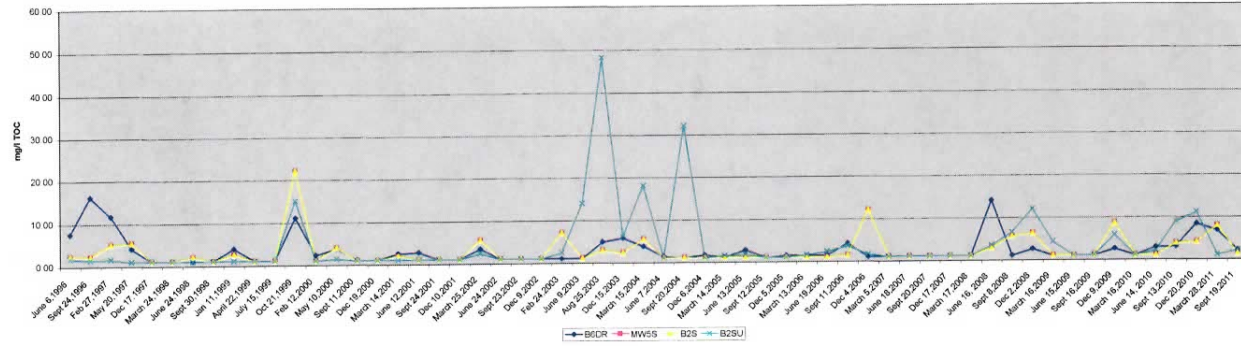
GROUP 1 WELLS TOTAL ORGANIC CARBON



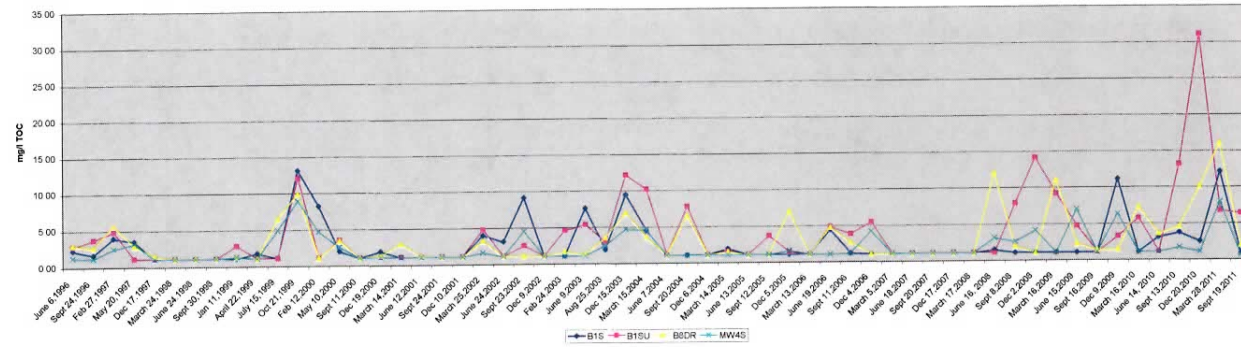
GROUP 2 WELLS TOTAL ORGANIC CARBON



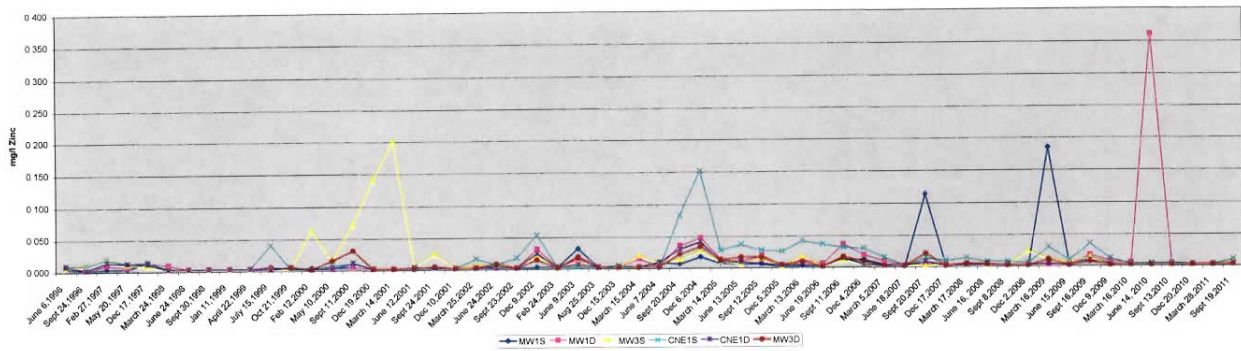
GROUP 3 WELLS TOTAL ORGANIC CARBON



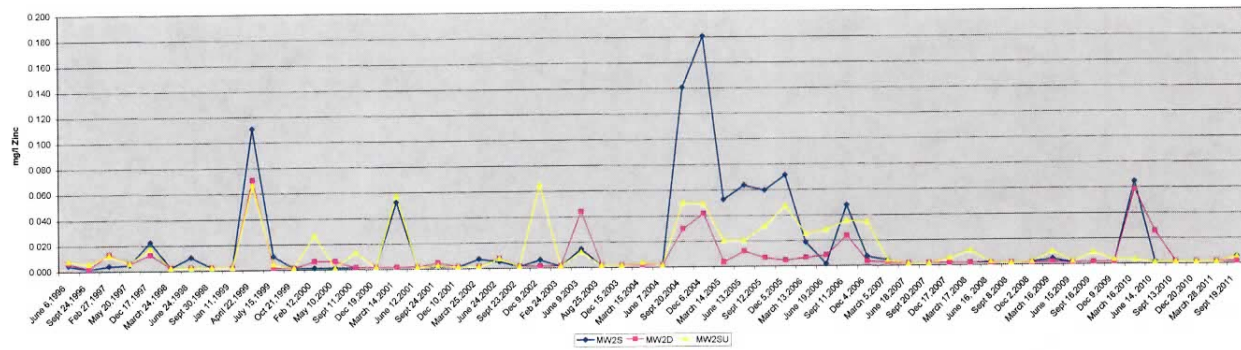
GROUP 4 WELLS TOTAL ORGANIC CARBON



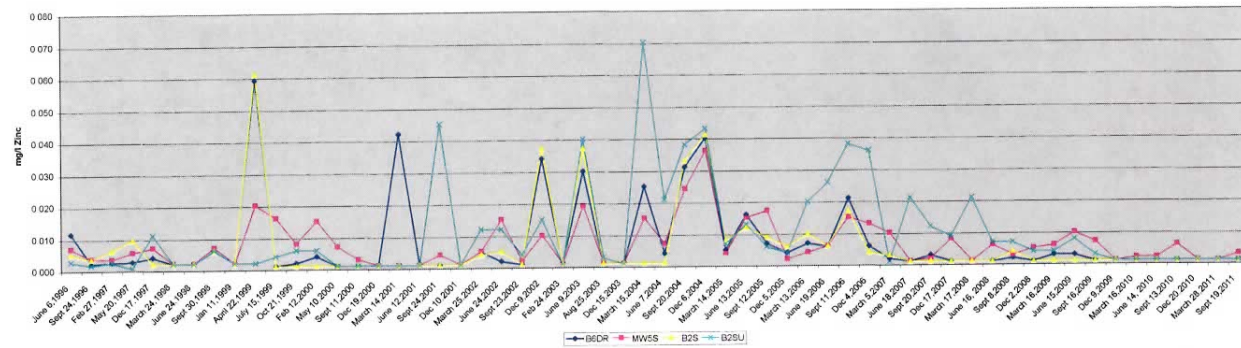
GROUP 1 WELLS DISSOLVED ZINC



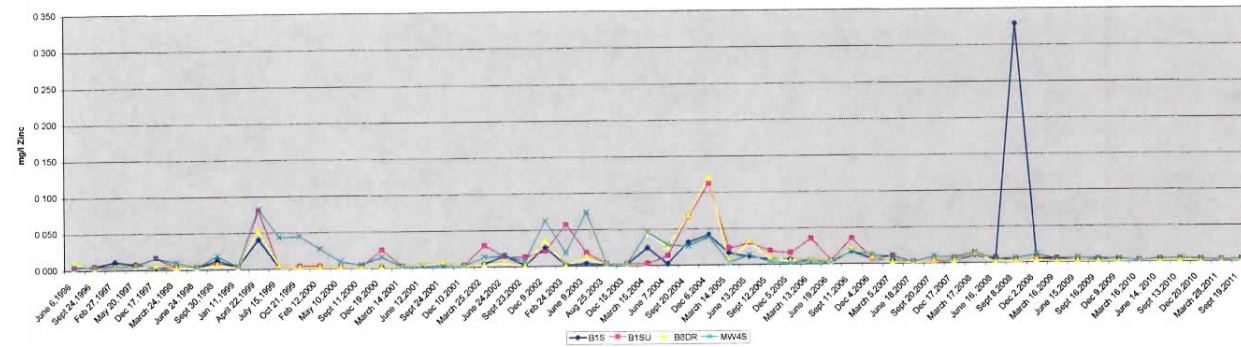
GROUP 2 WELLS DISSOLVED ZINC



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 September of 2011 and early January of 2012 (there was some flooding in December and all probes were not accessible).

Centralia Landfill Perimeter Probe Data

Date	Probe Number	Time	Barometric Pressure	Probe Pressure inches W. C.	% LEL	% Oxygen
9/27/2011	GP2	1035	30.07	0	0	20.5
9/27/2011	GP1	1040	30.07	0	0	20.5
9/27/2011	GP4A	1045	30.07	0	5	19.5
9/27/2011	GP4B	1050	30.07	0	0	20.9
9/27/2011	GP15	921	30.07	0	1	4.2
9/27/2011	GP11	930	30.07	0	0	17.2
9/27/2011	GP10	940	30.07	0	0	19.1
9/27/2011	GP12	943	30.07	0	0	13.5
9/27/2011	GP9	950	30.07	0	0	17.8
9/27/2011	GP13	953	30.07	0	0	19.6
9/27/2011	GP8	1000	30.07	0	0	18.4
9/27/2011	GP7	1010	30.07	0	0	20
9/27/2011	GP14	1012	30.07	0	0	18
9/27/2011	GP5R	1020	30.07	0	0	20.1
1/6/2012	GP2	1000	30.33	0	0	20.9
1/6/2012	GP1	1131	30.33	0	0	20.9
1/6/2012	GP4A	1130	30.33	0	0	20.8
1/6/2012	GP4B	1010	30.33	0	0	20.9
1/6/2012	GP15	910	30.33	0	0	17
1/6/2012	GP11	913	30.33	0	0	20.9
1/6/2012	GP10	920	30.33	0	0	20.9
1/6/2012	GP12	922	30.33	0	0	20.9
1/6/2012	GP9	928	30.33	0	0	20.9
1/6/2012	GP13	932	30.33	0	0	20.9
1/6/2012	GP8	935	30.33	0	0	20.9
1/6/2012	GP7	940	30.33	0	0	20.9
1/6/2012	GP14	945	30.33	0	0	20.9
1/6/2012	GP5R	955	30.33	0	0	20.9