



April 21, 2015

Bill Teitzel
Lewis County Environmental Services
2025 N.E. Kresky Avenue
Chehalis, WA 98532

Dear Bill;

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, 2015. 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. Mike Gray 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

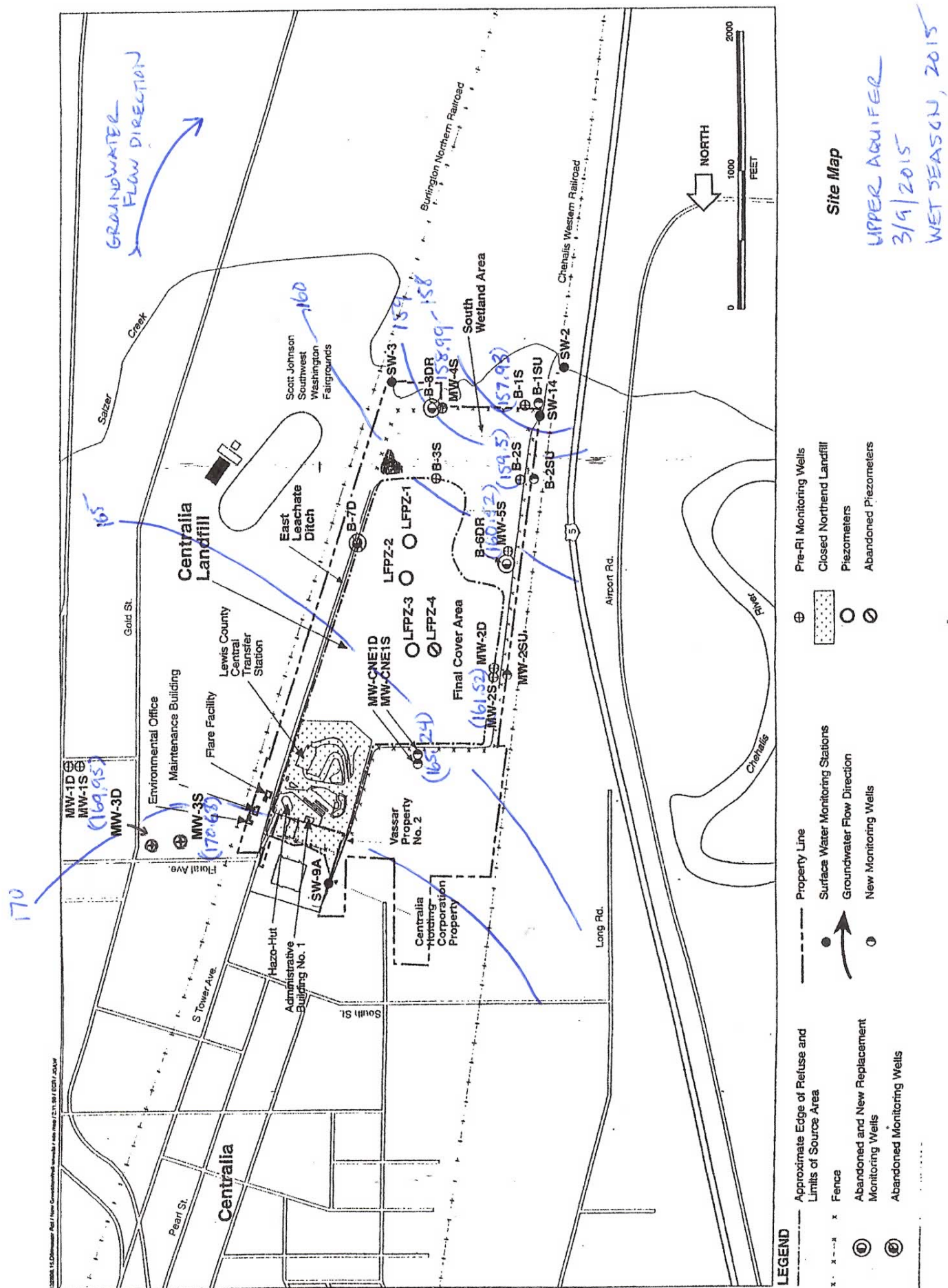
REPORT NARRATIVE

This biannual Compliance Monitoring Report summarizes the results from the wet season sampling done at the Centralia Landfill in March, 2015. 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 9, 10 and 11, 2015. 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 9, 2015 depth to groundwater was measured in all wells.

Weather during the sampling period varied from showers to 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, 2015 March 11, 2015			
Parameters		Units	SW-14
Dissolved Alkalinity (as CaCO ₃)		mg/l	120
Total Organic Carbon		mg/l	7.3
Chemical Oxygen Demand		mg/l	19
Chloride		mg/l	25.10
Hardness (CaCO ₃)		mg/l	130
Ammonia Nitrogen		mg/l	0.046
Nitrate + Nitrite Nitrogen		mg/l	0.034
Total Dissolved Solids		mg/l	140
Sulfate		mg/l	2.07
pH			6.72
Temperature		degrees C	11
Conductivity		umhos/cm	288
Dissolved Oxygen		mg/l	11.1
Dissolved Metals			
Arsenic		mg/l	0.00072
Calcium		mg/l	25.6
Iron		mg/l	0.602
Mercury		mg/l	< 0.00002
Potassium		mg/l	1.07
Magnesium		mg/l	15.9
Manganese		mg/l	0.6996
Sodium		mg/l	15.9
Zinc		mg/l	0.0054
Total Metals			
Arsenic		mg/l	0.000811
Calcium		mg/l	25
Iron		mg/l	2.21
Mercury		mg/l	< 0.00005
Potassium		mg/l	1.2
Magnesium		mg/l	16
Manganese		mg/l	0.741
Sodium		mg/l	12
Zinc		mg/l	0.0054



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	6.46	288	200	6.67	< 0.1	< 0.02	0.008	3.16	< 0.00002	0.7374	0.003
MW1S	5.67	185	140	1.88	26.8	2.8	0.0001	0.076	< 0.00002	< 0.0005	0.003
MW3S	5.1	175	120	5.85	26.2	0.87	0.0001	0.009	< 0.00002	< 0.0005	0.006
MW3D	6.42	240	170	7.19	< 0.1	< 0.02	0.0021	3.76	< 0.00002	1.161	< 0.001
CNE1S	6.13	1040	570	77.2	< 0.1	< 0.02	0.0044	21.1	< 0.00002	2.826	< 0.001
CNE1D	7.11	292	180	8.05	< 0.1	< 0.02	0.0001	0.602	< 0.00002	0.253	0.005
MW2D	7.12	334	170	11.5	< 0.1	< 0.02	0.0065	1.79	< 0.00002	0.8552	0.003
MW2S	6.37	1270	730	234	2.27	< 0.02	0.0058	1.42	< 0.00002	8.406	0.008
MW2SU	6.52	1510	850	254	1.5	0.055	0.0013	2.36	< 0.00002	7.558	0.005
MW5S	6.28	87	62	4.7	3.48	0.58	0.0007	0.149	< 0.00002	0.0437	0.006
B6DR	6.77	165	100	6.04	2.27	< 0.02	0.0025	0.715	< 0.00002	0.3963	0.005
B2SU	6.66	320	180	3.23	3.75	0.043	0.0018	0.028	< 0.00002	< .0005	0.005
B2S	5.8	109	73	2.05	6.15	< 0.02	0.0008	0.016	< 0.00002	0.3684	0.007
B1SU	6.57	526	260	48.3	1.41	< 0.02	0.0054	5.08	< 0.00002	3.68	0.005
B1S	6.63	153	170	6.74	< 0.1	0.04	0.017	0.69	< 0.00002	0.9802	0.006
MW4S	6.74	157	110	2.79	8.68	0.65	0.0004	0.129	< 0.00002	0.0044	0.023
B6DR	7.4	425	260	6.26	16.1	< 0.02	0.0003	0.19	< 0.00002	0.2664	< 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		185	1.88	0.076	< 0.0005	0.0001	
MW3S		175	5.85	0.009	< 0.0005	0.0001	
CNE1S		1040	77.2	21.1	2.86	0.0044	
MW2S		1270	234	1.42	8.406	0.0058	
MW2SU		1510	254	2.36	7.558	0.0013	
MW5S		87	4.7	0.149	0.0437	0.0007	
B2SU		320	3.23	0.028	< 0.0005	0.0018	
B2S		109	2.05	0.016	0.3684	0.0008	
B1SU		526	48.3	5.08	3.68	0.0054	
B1S		153	6.74	0.69	0.9802	0.017	
MW4S		157	2.79	0.129	0.0044	0.0004	
Groundwater Cleanup Level for Lower Unit							
MW1D				0.3 mg/l	0.05 mg/l	0.005 mg/l cleanup level	
MW3D				3.16	0.7374	0.008	
CNE1D				3.76	1.161	0.021	
MW2D				0.602	0.253	0.0001	
B6DR				1.79	0.8552	0.0065	
B8DR				0.715	0.3963	0.0025	
B8DR				0.19	0.2664	0.0003	
Surface Water Standards							
SW14						0.00027 mg/l cleanup level, 0.0005 mg/l compliance	
						0.0007	

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 2015. 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. Only B1S exceeded the drinking water standard. Twelve wells 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 seven wells this round. All wells were below the standard. MW1S had the highest value with 2.8 mg/l.

Parameters with Secondary Standards:

Chloride has a secondary standard of 250 mg/l. Only MW2SU exceeded the standard with a measurement of 254 mg/l.

Iron has a secondary standard of 0.3 mg/l. Iron was detected in all seventeen wells this season. Ten wells exceeded the standard. CNE1S had the highest value with 21.1 mg/l.

Manganese has a secondary standard of 0.05 mg/l. Manganese was detected in fourteen wells. Twelve wells exceeded the standard.

pH has a regulatory range of 6.5 to 8.5. Eight 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 850 mg/l in MW2SU.

Zinc has a secondary standard of 5 mg/l. Zinc was detected in fourteen wells this quarter, all 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. MW1S and MW3S were below both cleanup and compliance levels. MW4S was under the compliance level. 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 the down gradient shallow well MW2S.

Chloride has a cleanup level of 250 mg/l. MW2SU exceeded this level with a value of 254 mg/l.

Soluble Iron has a cleanup level of 0.3 mg/L. Five wells exceeded the cleanup level this season. CNE1S had the highest value with 21.1 mg/l.

Soluble Manganese has a cleanup level of 50 µg/L. MW1S, MW3S, MW4S, MW5S 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. Three of the six wells exceeded the cleanup level; MW3D, MW1D, and MW2D.

Soluble Iron has a cleanup level of 300 µg/L. Only B8DR in the lower unit did not exceed the cleanup level this season.

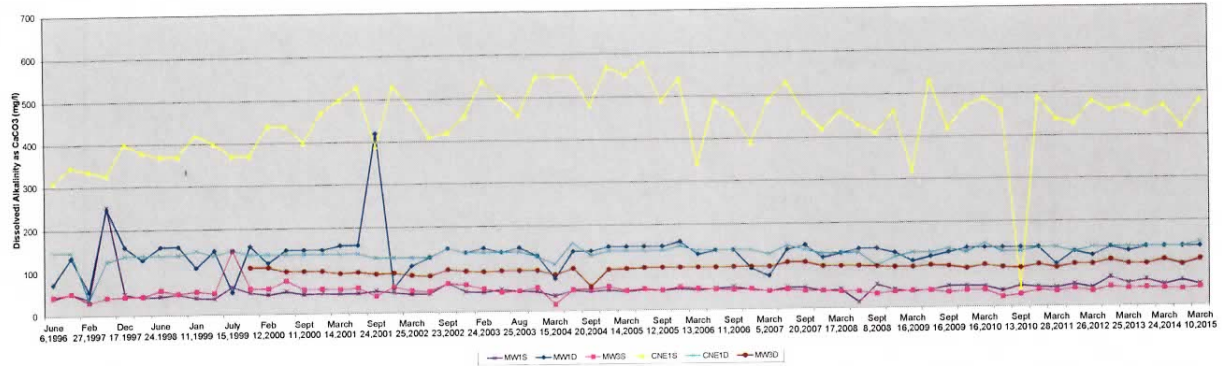
Soluble Manganese has a cleanup level of 50 µg/L. All wells in the lower unit exceeded this value.

Surface Water Standards:

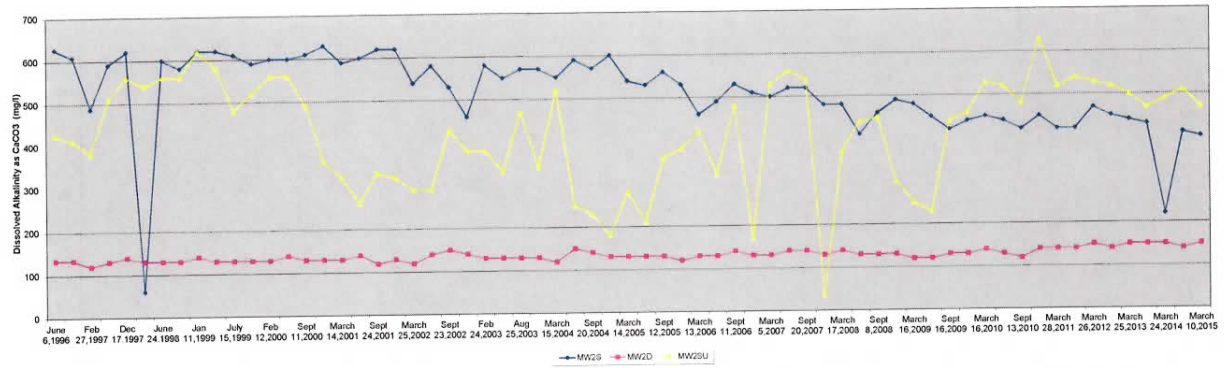
Surface water was sampled at SW14, the point of compliance. Soluble Arsenic has a cleanup level of 0.27 µg/L with a compliance level of 0.50 µg/L. The sample exceeded both standards with a value of 0.7 µg/L.

Appendix B - Groundwater Time Series Graphs

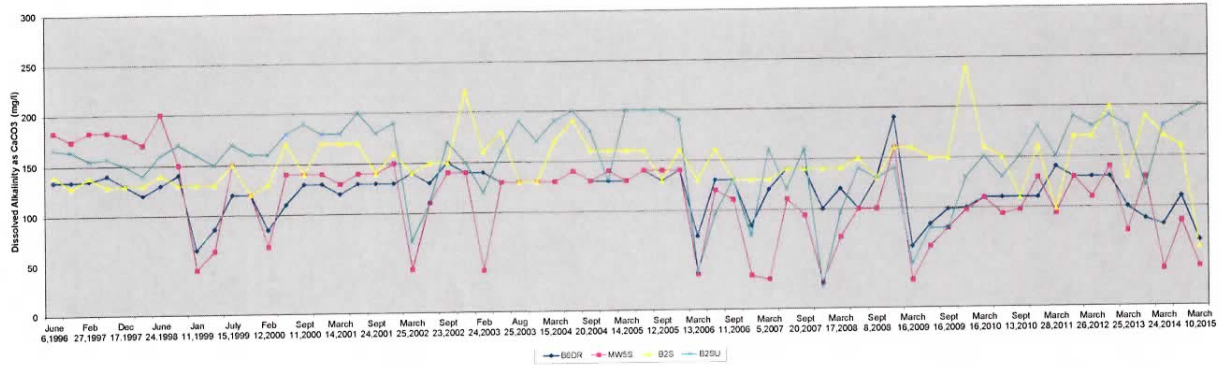
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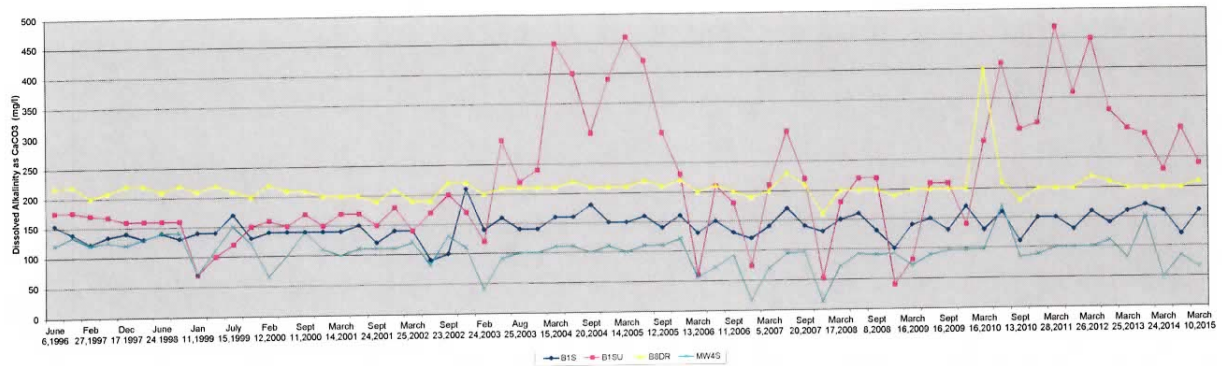
GROUP 2 WELLS DISSOLVED ALKALINITY



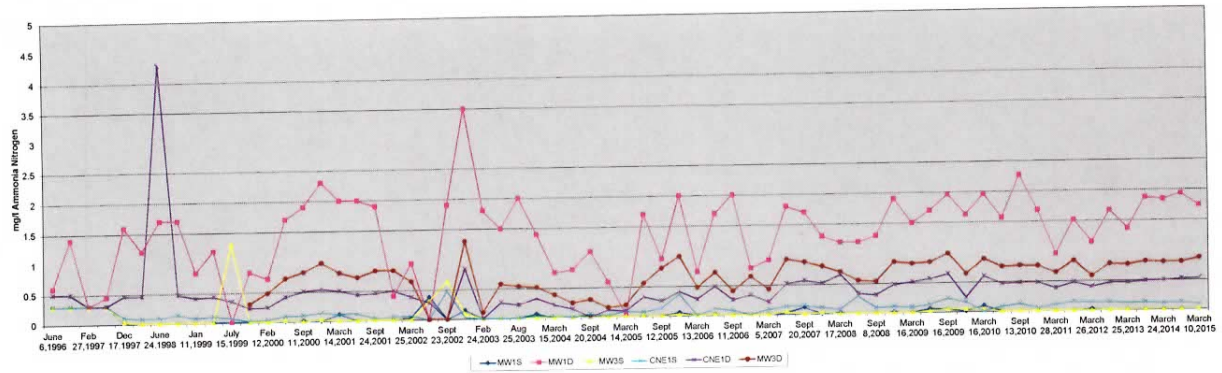
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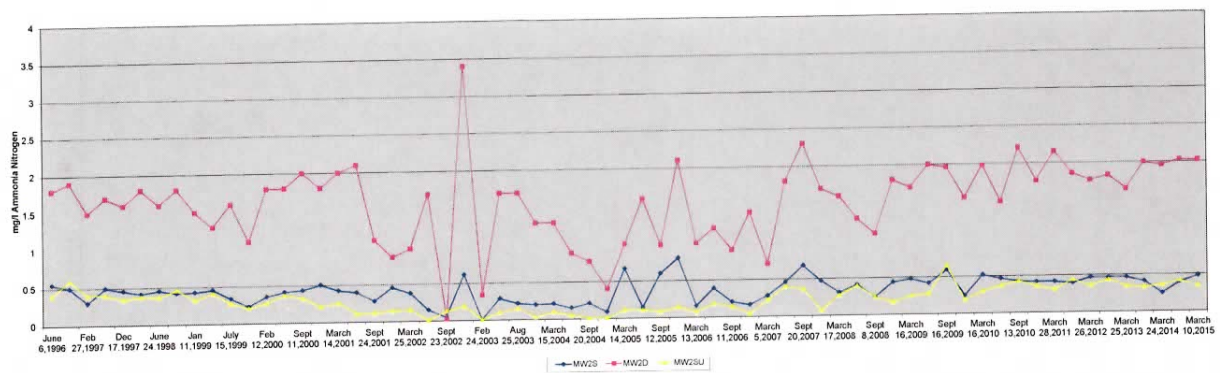
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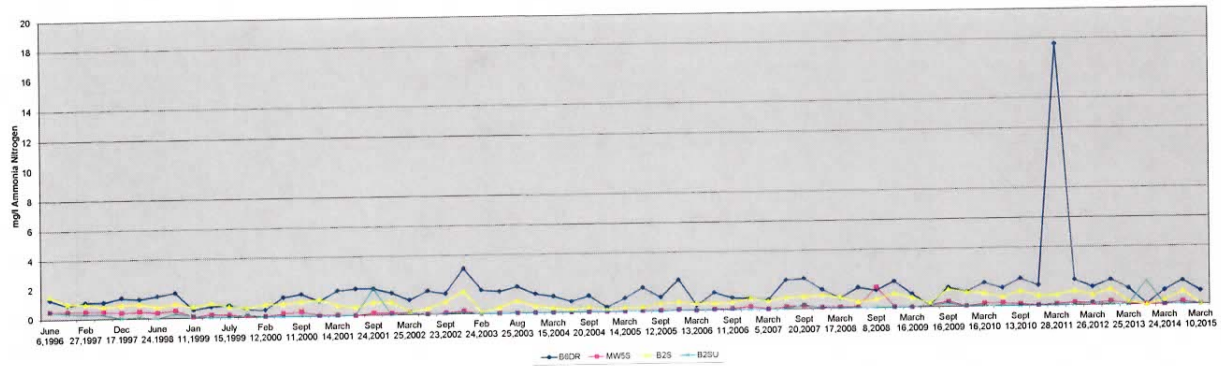
GROUP 1 WELLS AMMONIA



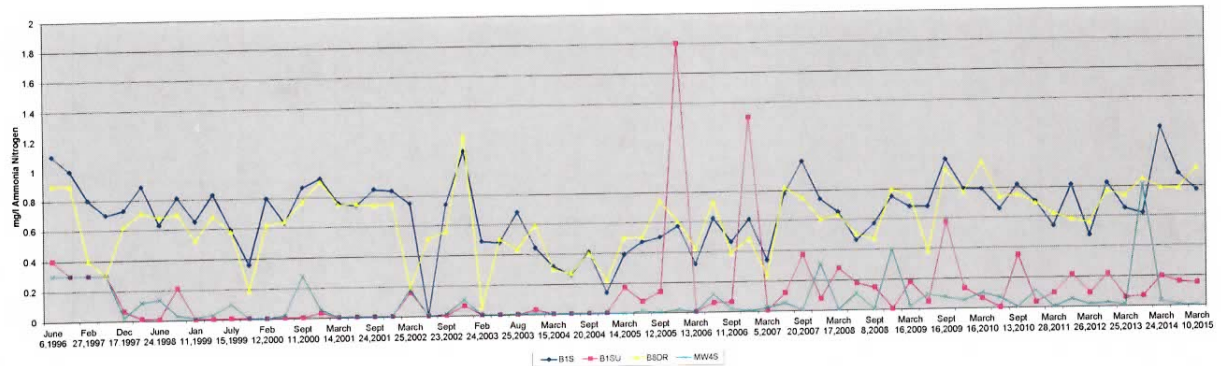
GROUP 2 WELLS AMMONIA



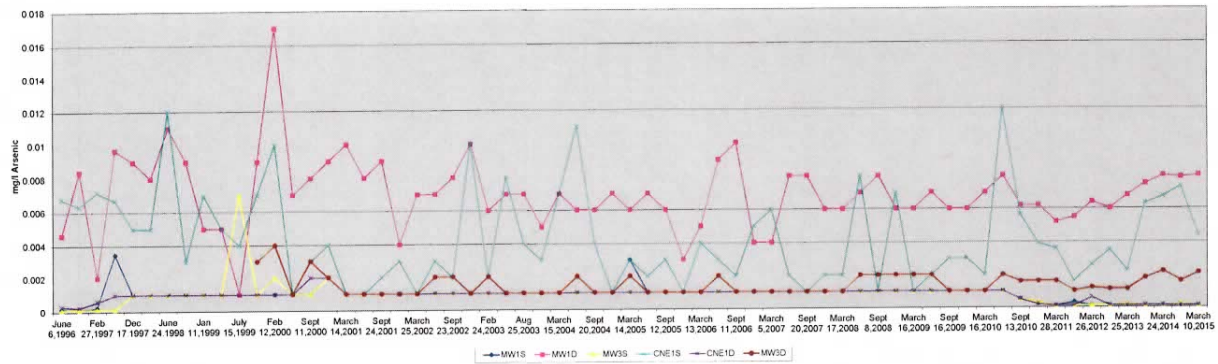
GROUP 3 WELLS AMMONIA



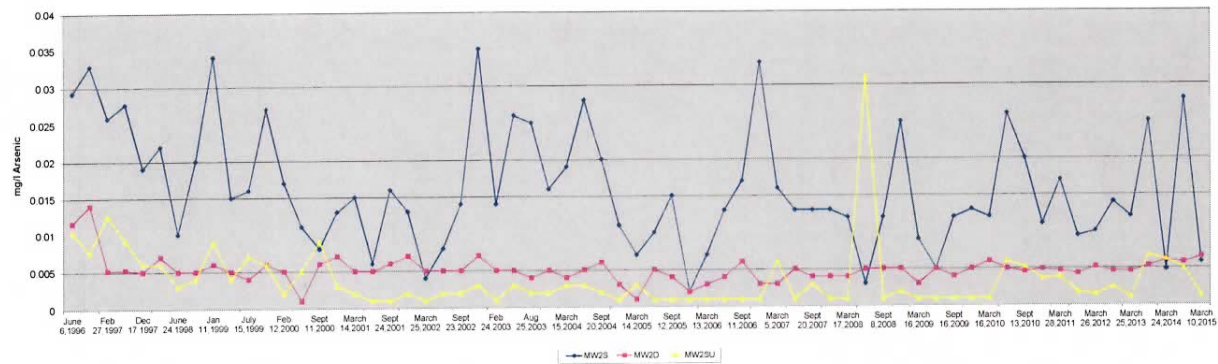
GROUP 4 WELLS AMMONIA



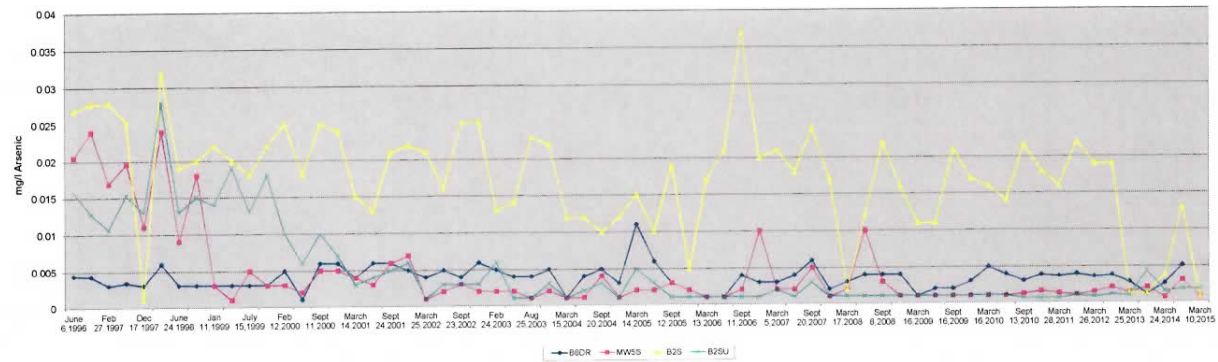
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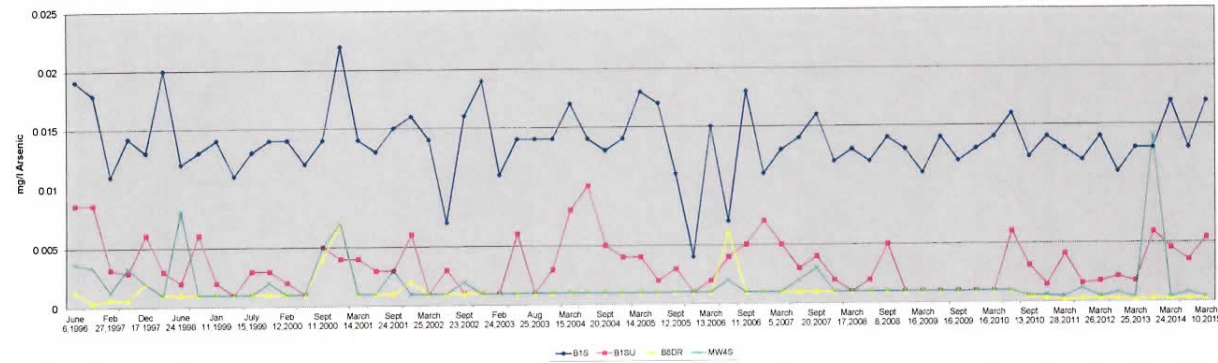
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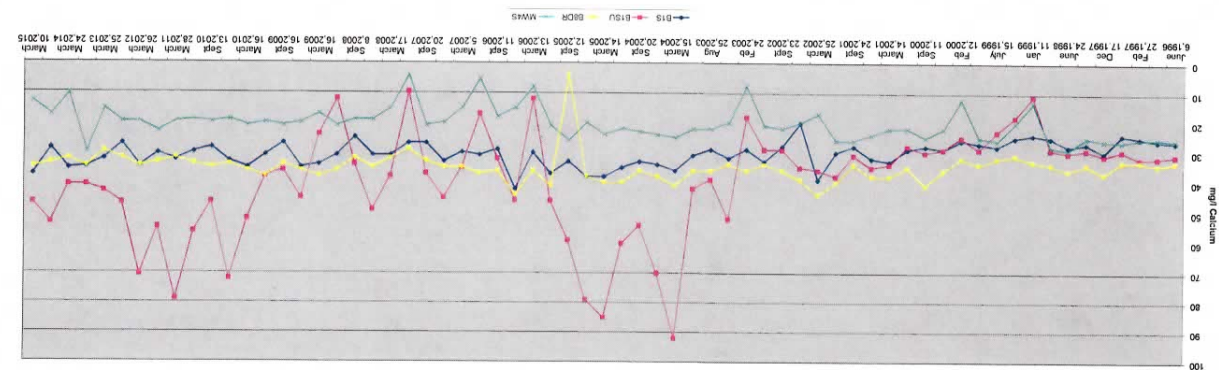


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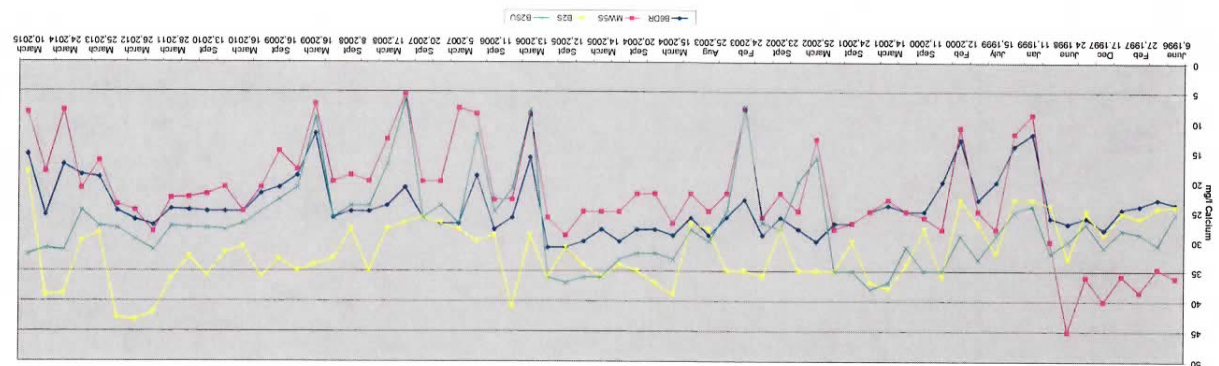


GROUP 4 WELLS DISSOLVED ARSENIC





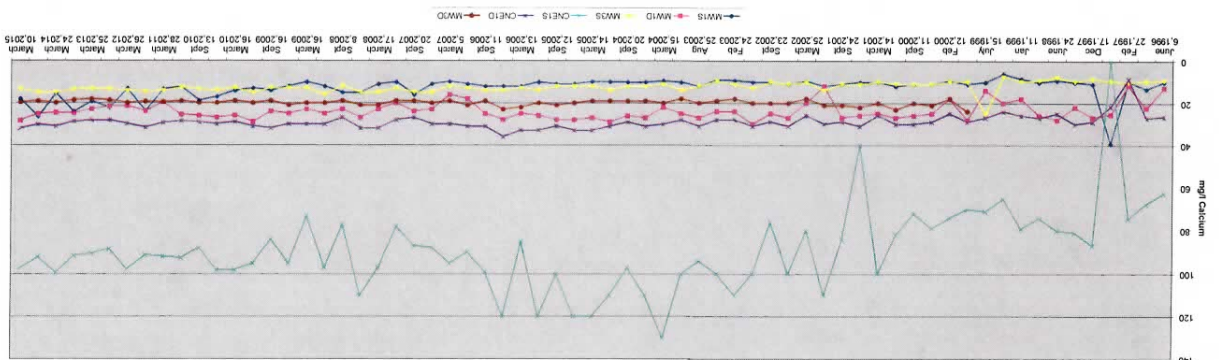
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GROUP 2 WELLS DISSOLVED CALCIUM

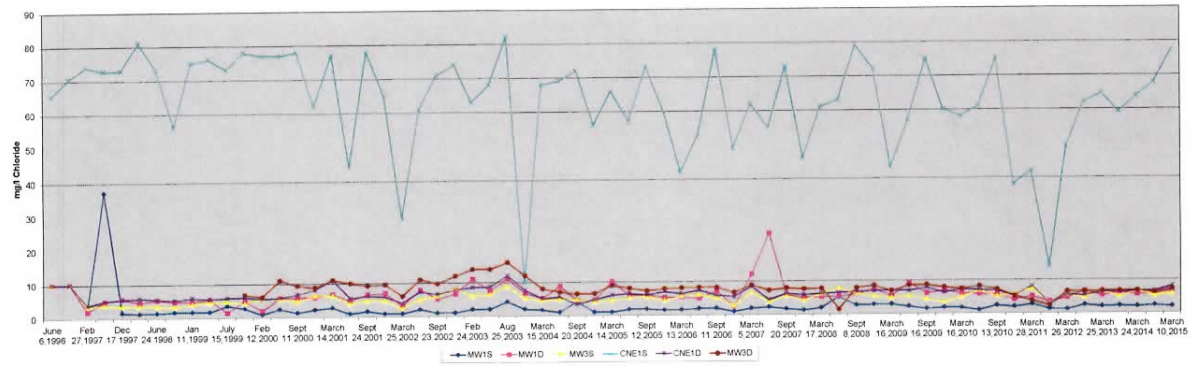


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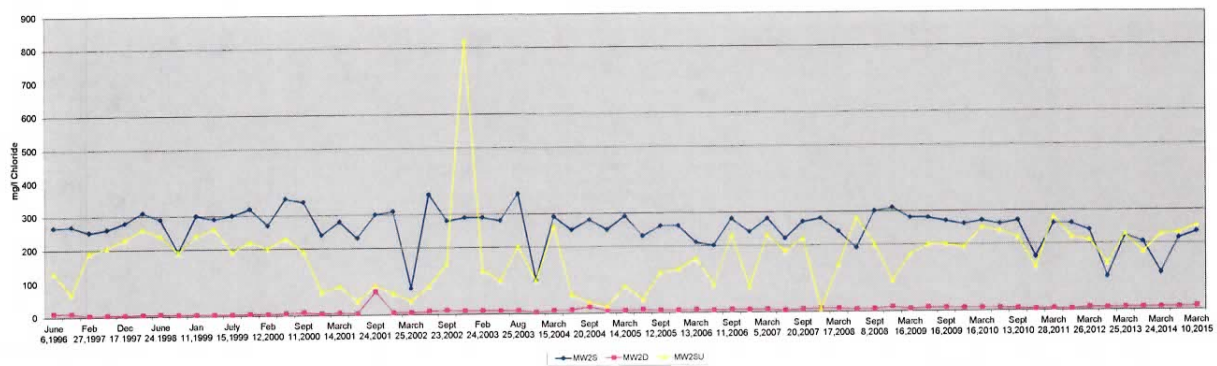


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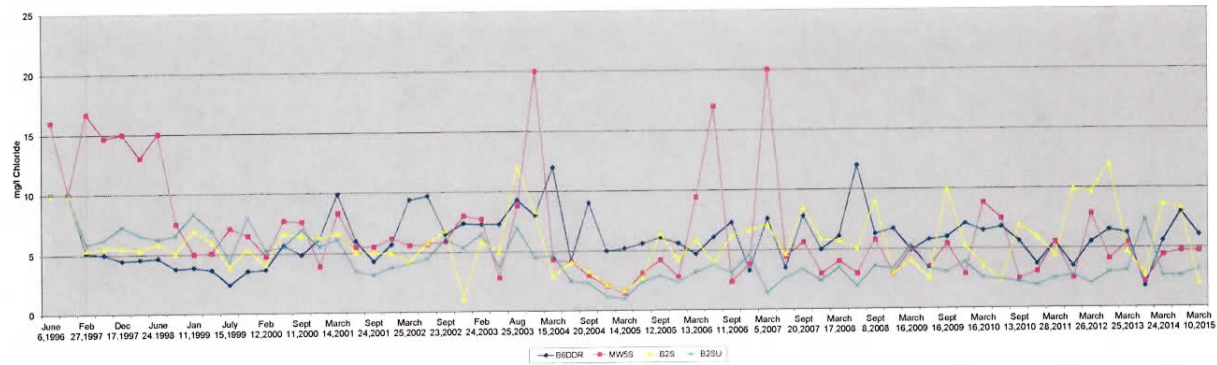
GROUP 1 WELLS DISSOLVED CHLORIDE



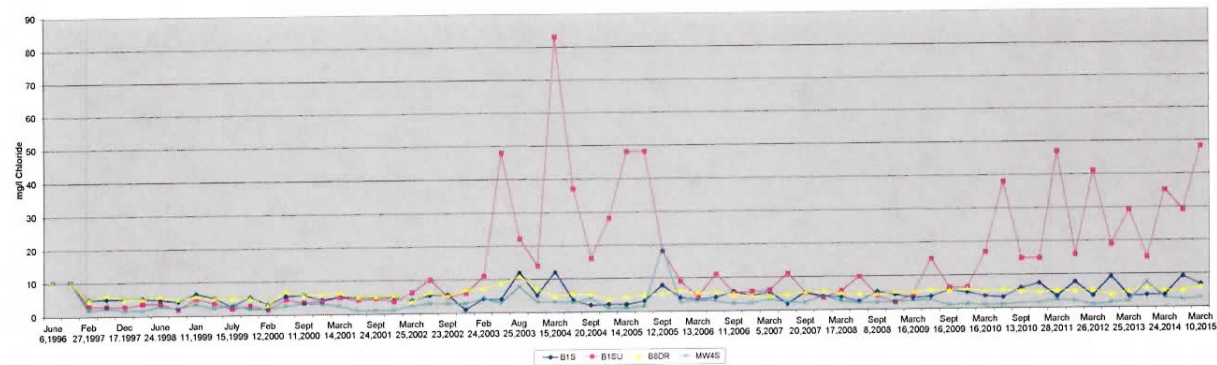
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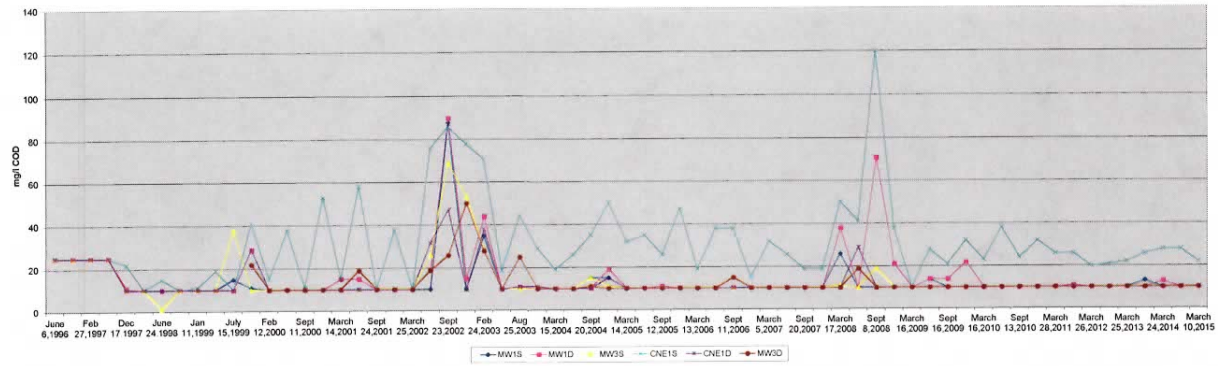
GROUP 3 WELLS DISSOLVED CHLORIDE



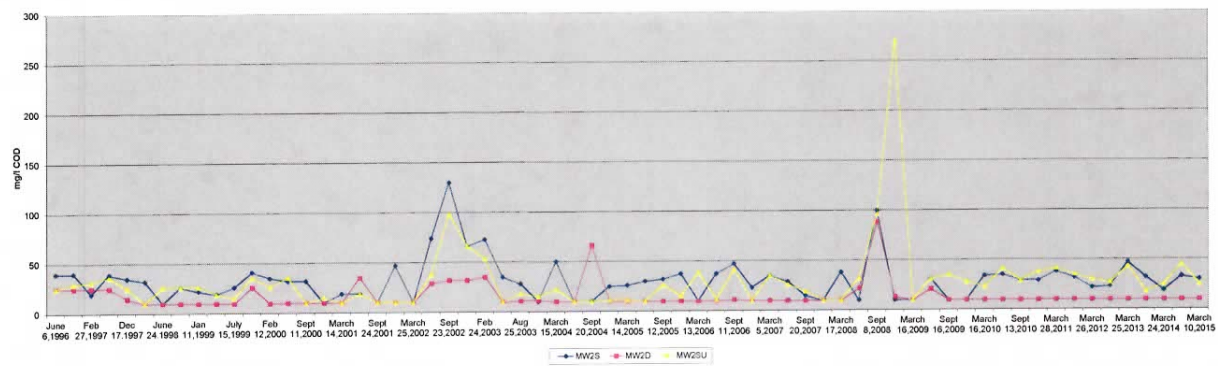
GROUP 4 WELLS DISSOLVED CHLORIDE



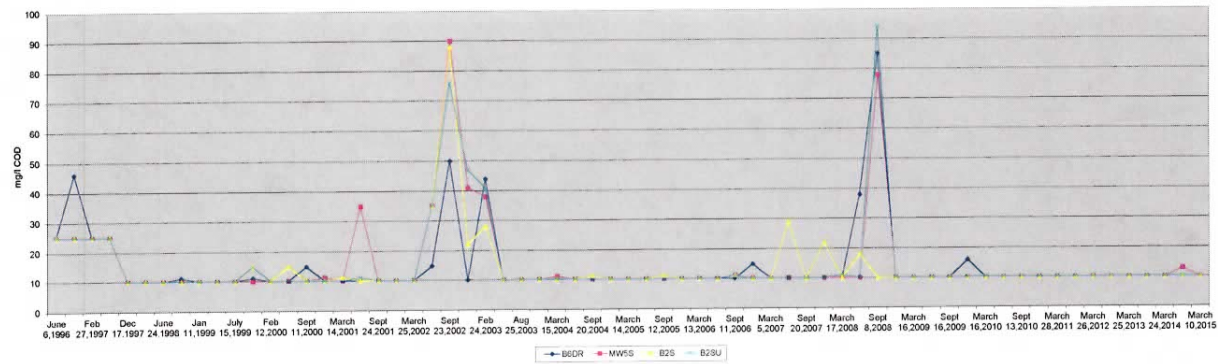
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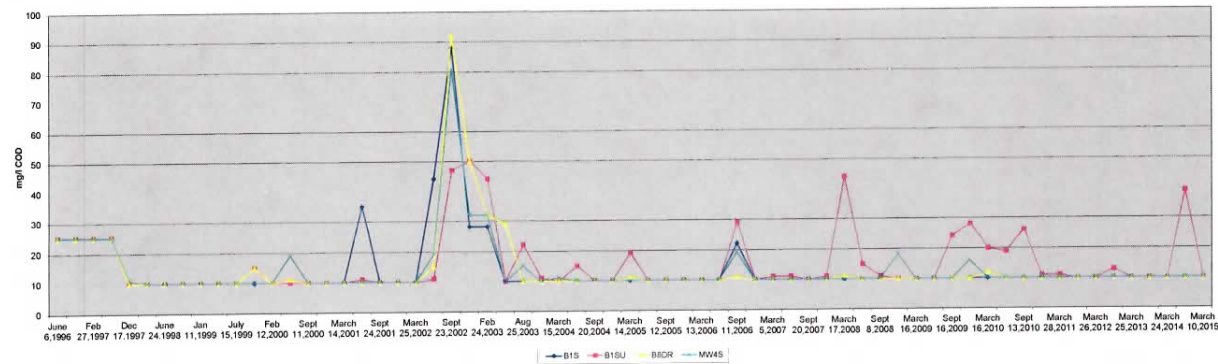
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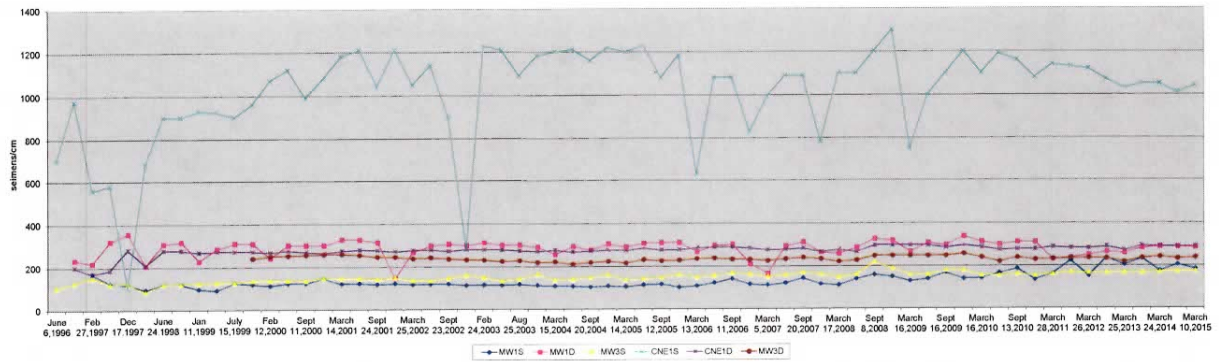
GROUP 3 WELLS CHEMICAL OXYGEN DEMAND



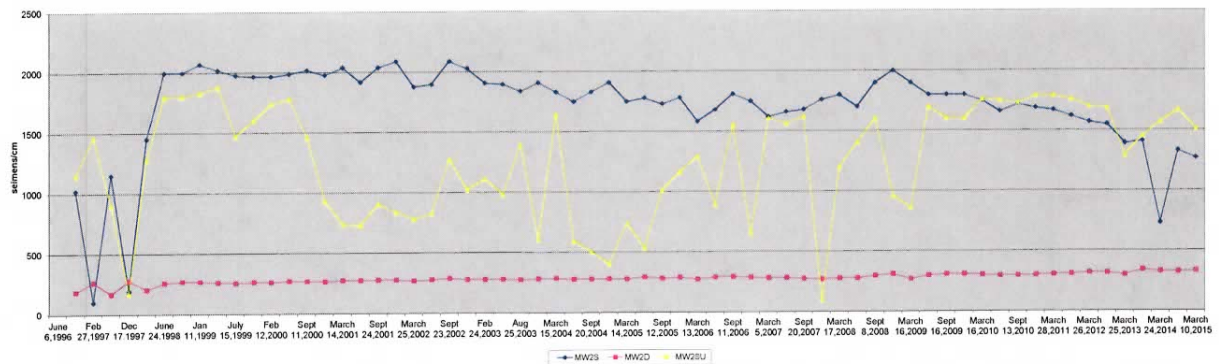
GROUP 4 WELLS CHEMICAL OXYGEN DEMAND



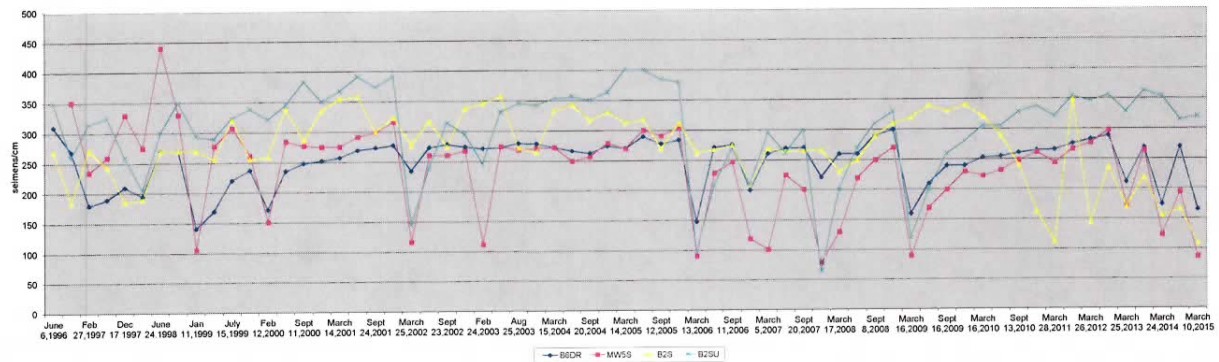
GROUP 1 WELLS CONDUCTIVITY



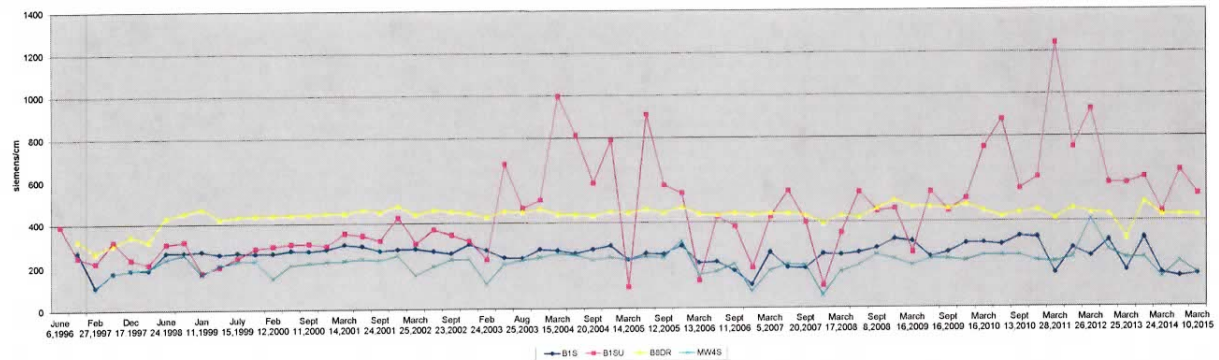
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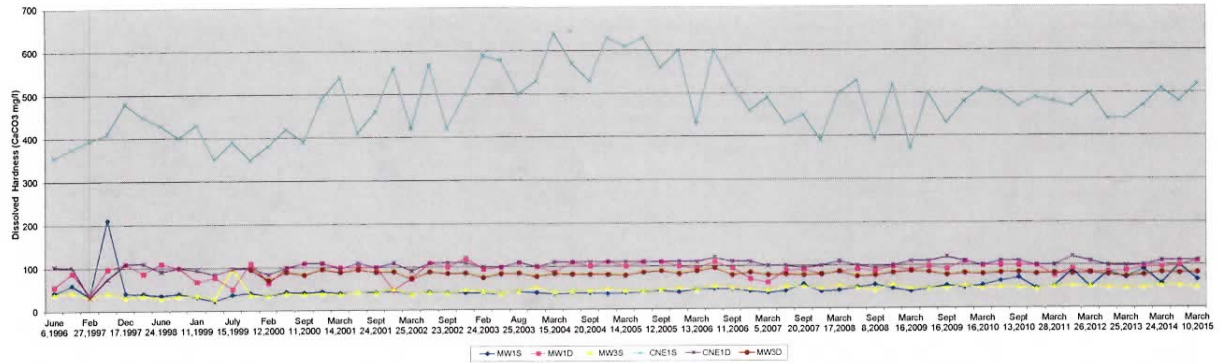
GROUP 3 WELLS CONDUCTIVITY



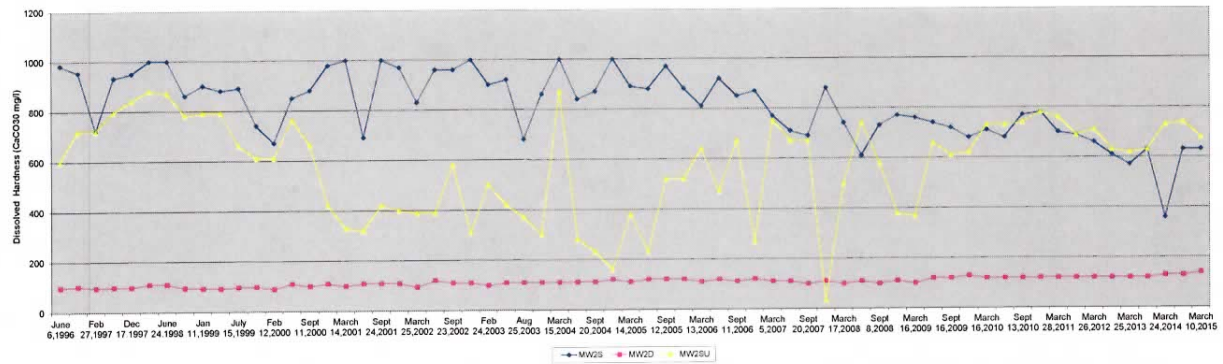
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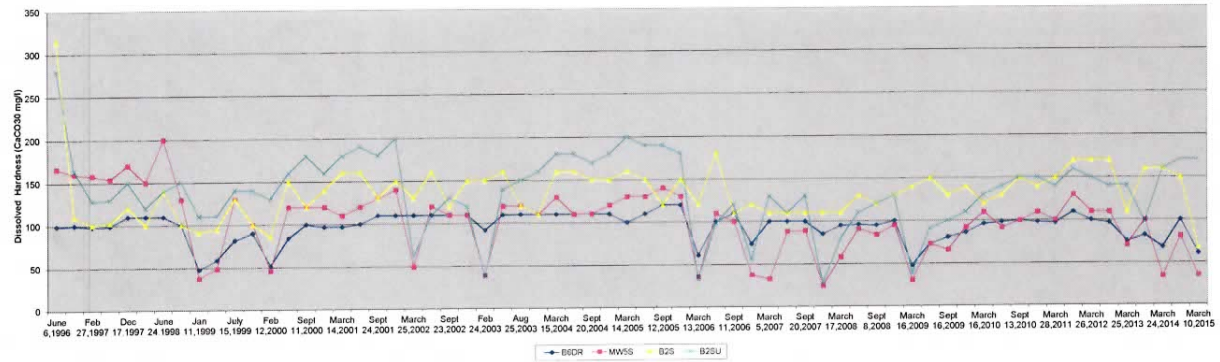
GROUP 1 WELLS DISSOLVED HARDNESS



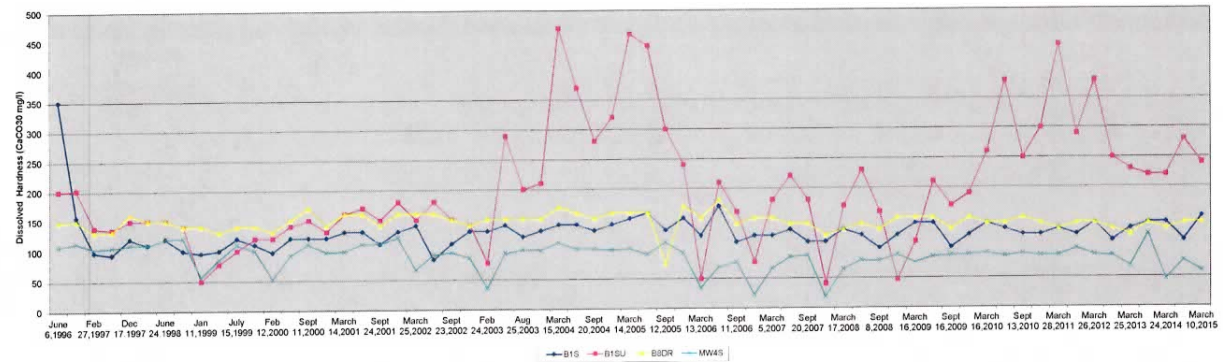
GROUP 2 WELLS HARDNESS



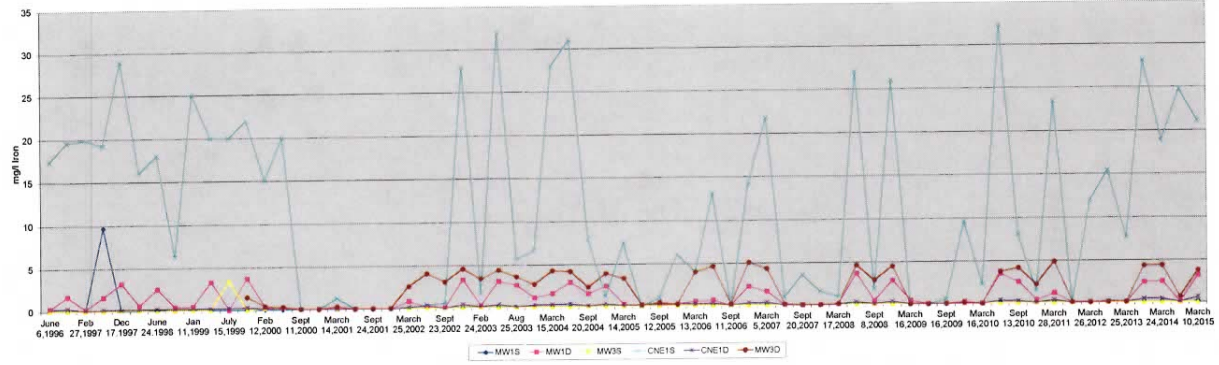
GROUP 3 WELLS HARDNESS



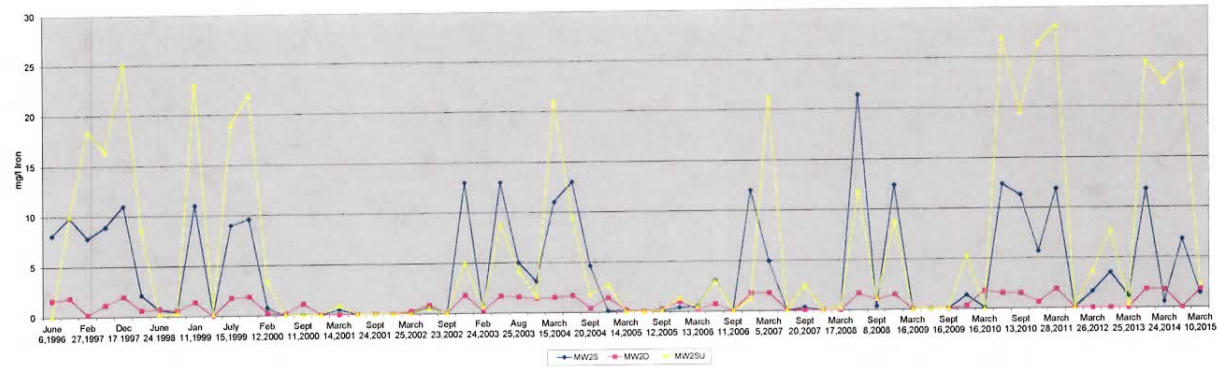
GROUP 4 WELLS HARDNESS



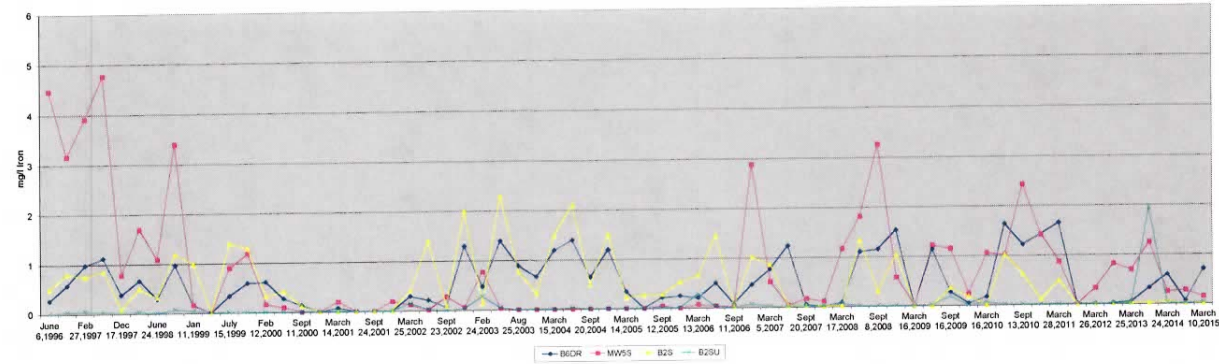
GROUP 1 WELLS DISSOLVED IRON



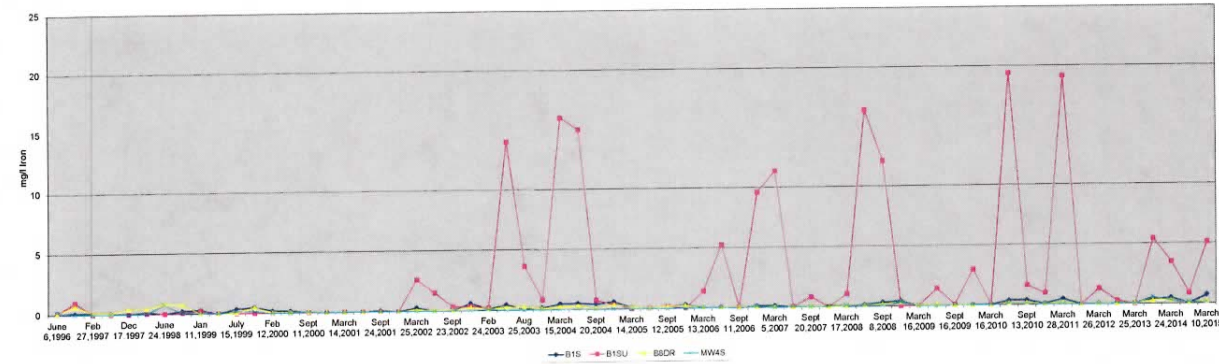
GROUP 2 WELLS DISSOLVED IRON



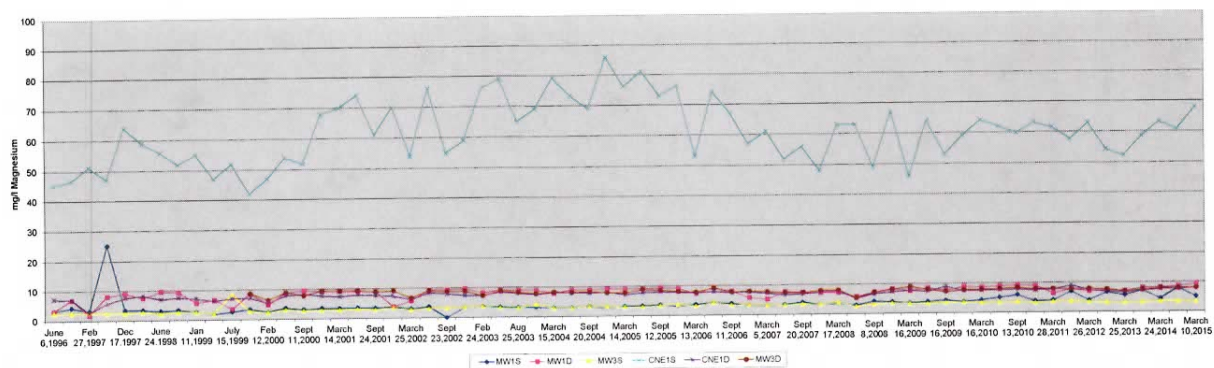
GROUP 3 WELLS DISSOLVED IRON



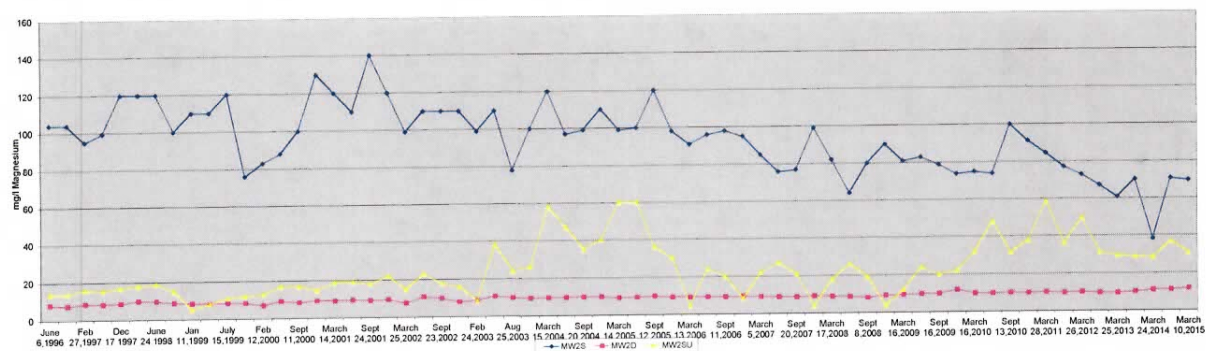
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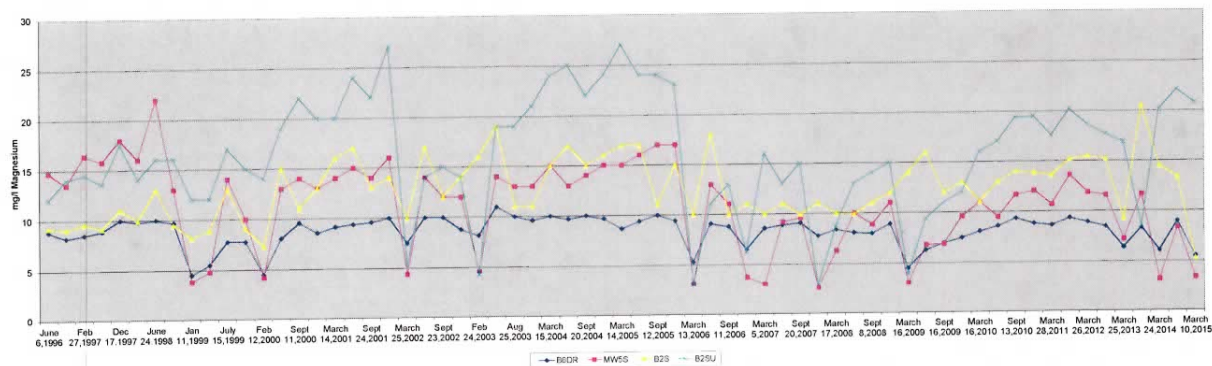
GROUP 1 WELLS DISSOLVED MAGNESIUM



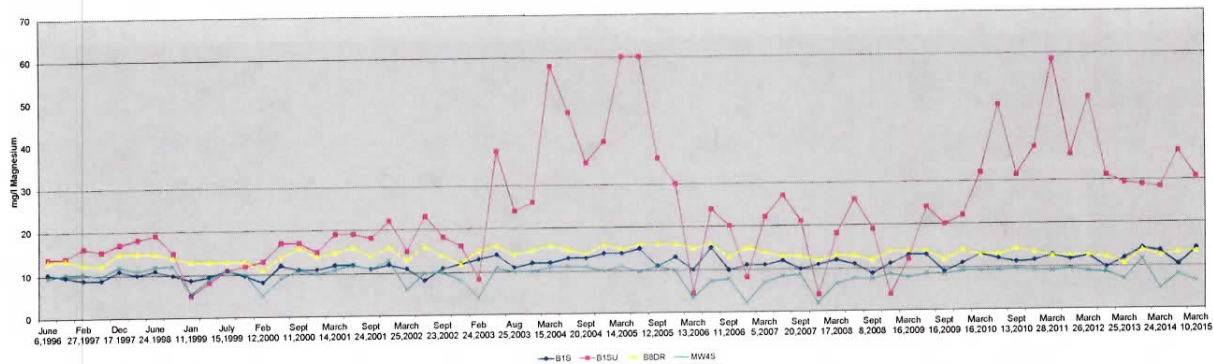
GROUP 2 WELLS DISSOLVED MAGNESIUM



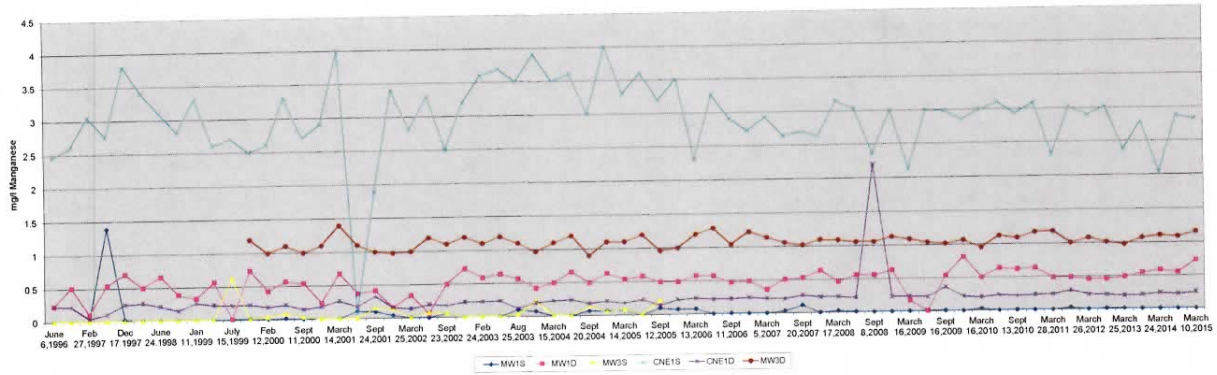
GROUP 3 WELLS DISSOLVED MAGNESIUM



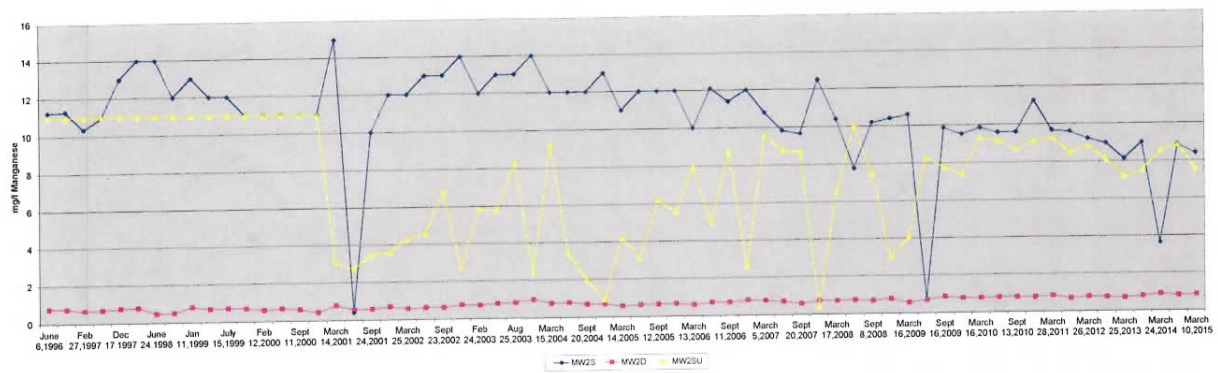
GROUP 4 WELLS DISSOLVED MAGNESIUM



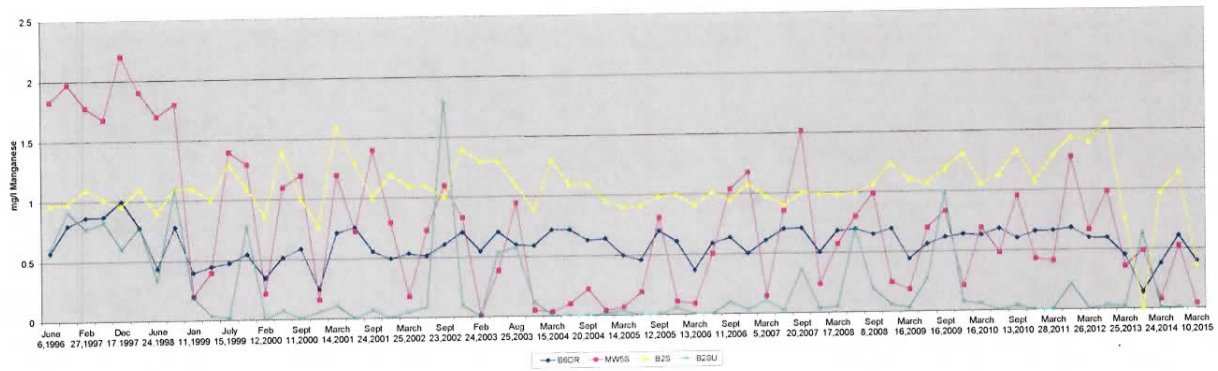
GROUP 1 WELLS DISSOLVED MANGANESE



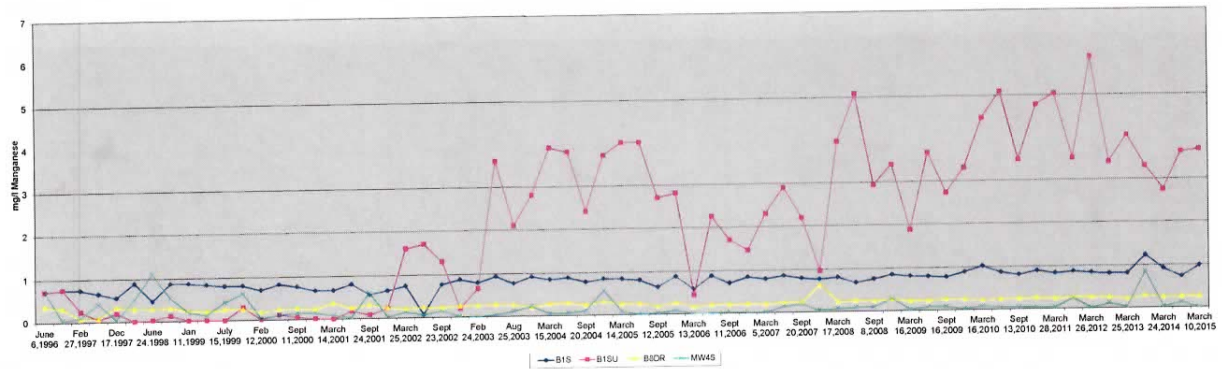
GROUP 2 WELLS DISSOLVED MANGANESE



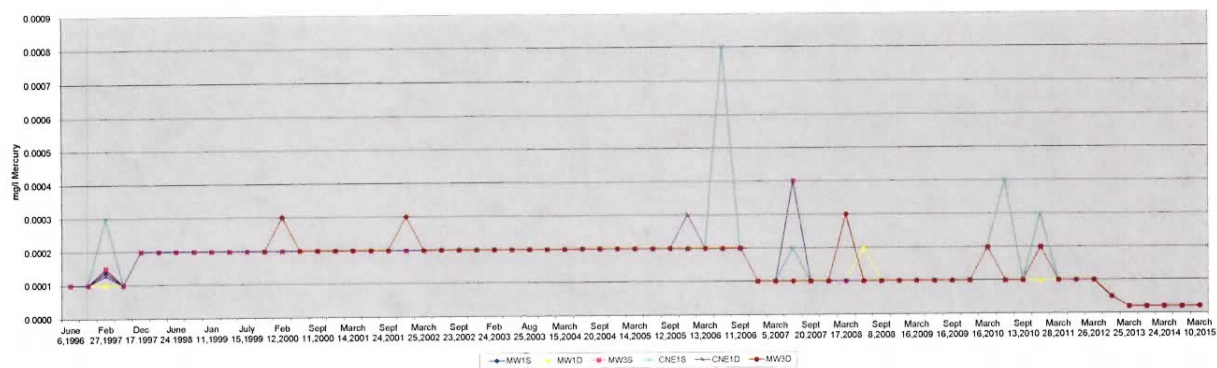
GROUP 3 WELLS DISSOLVED MANGANESE



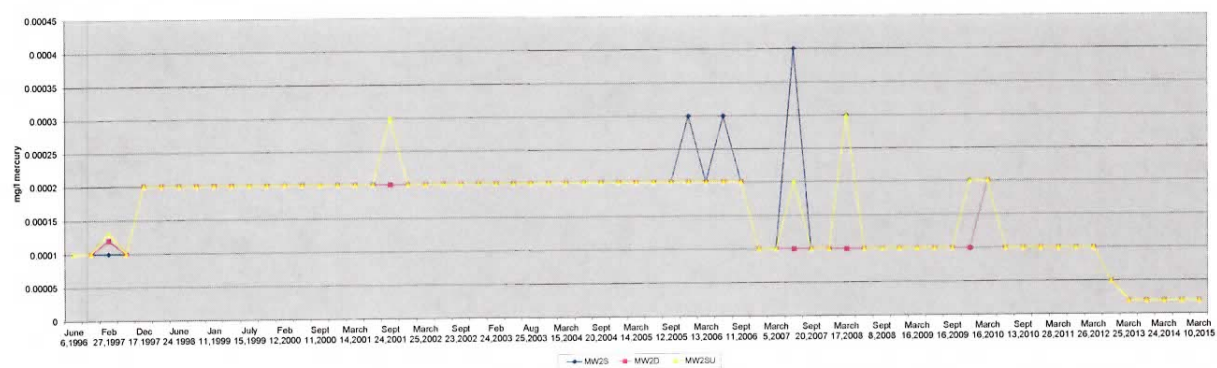
GROUP 4 WELLS DISSOLVED MANGANESE



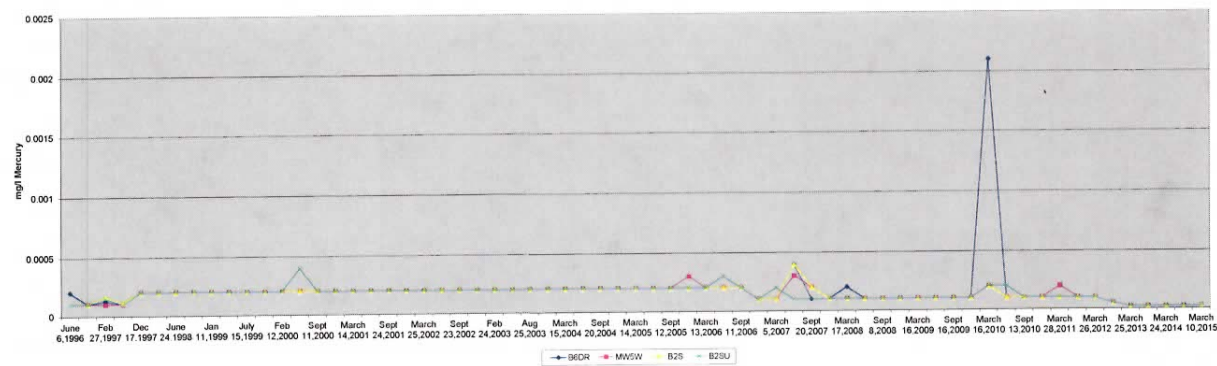
GROUP 1 WELLS DISSOLVED MERCURY



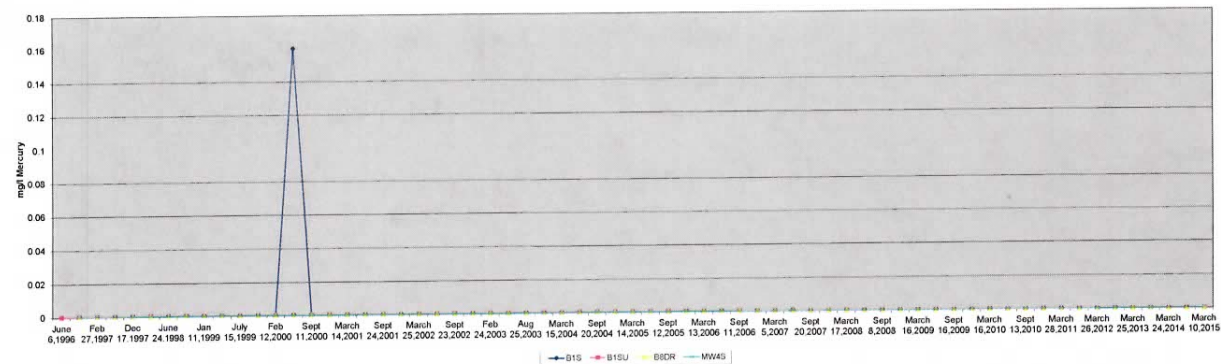
GROUP 2 WELLS DISSOLVED MERCURY



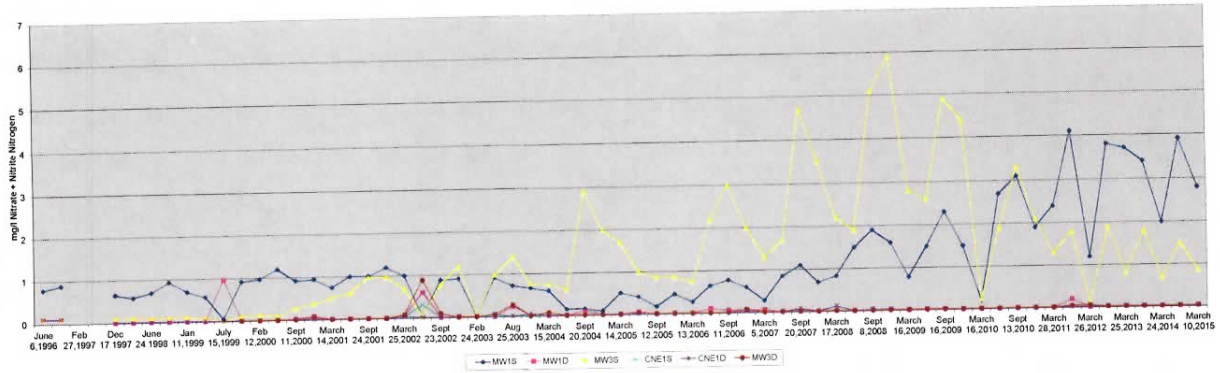
GROUP 3 WELLS DISSOLVED MERCURY



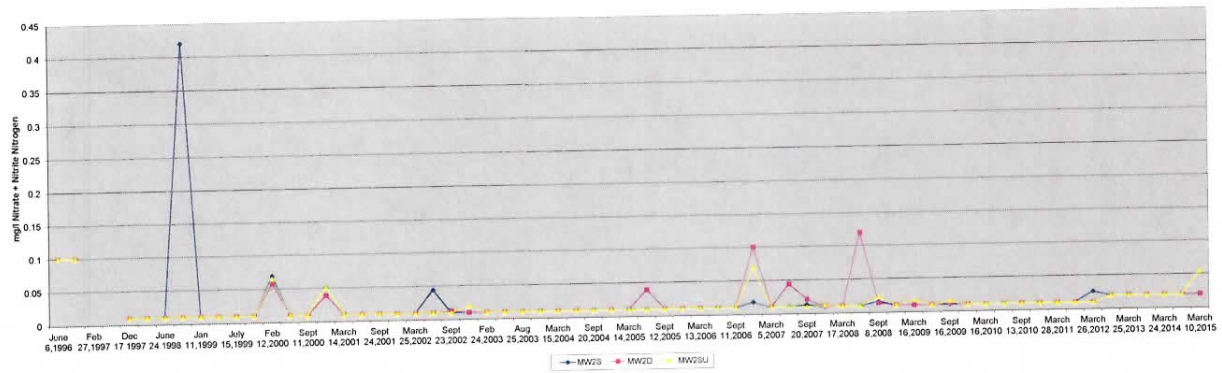
GROUP 4 WELLS DISSOLVED MERCURY



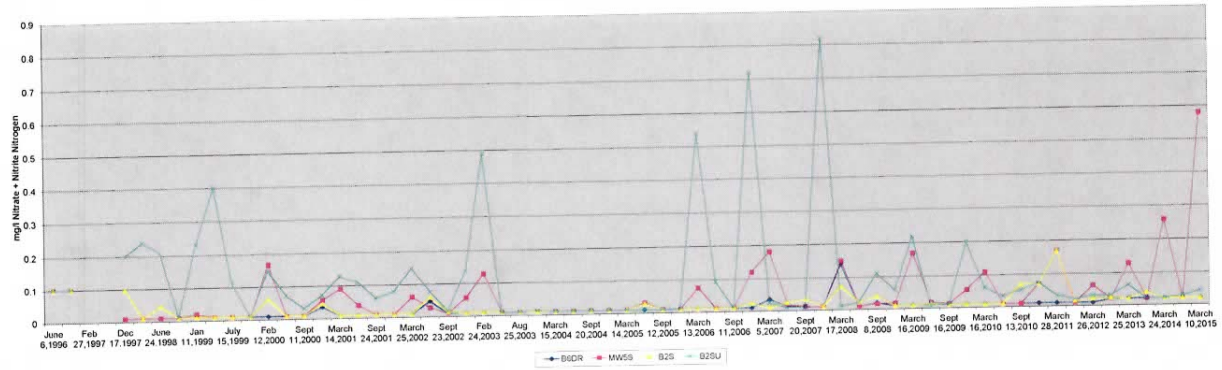
GROUP 1 WELLS NITRATE + NITRITE NITROGEN



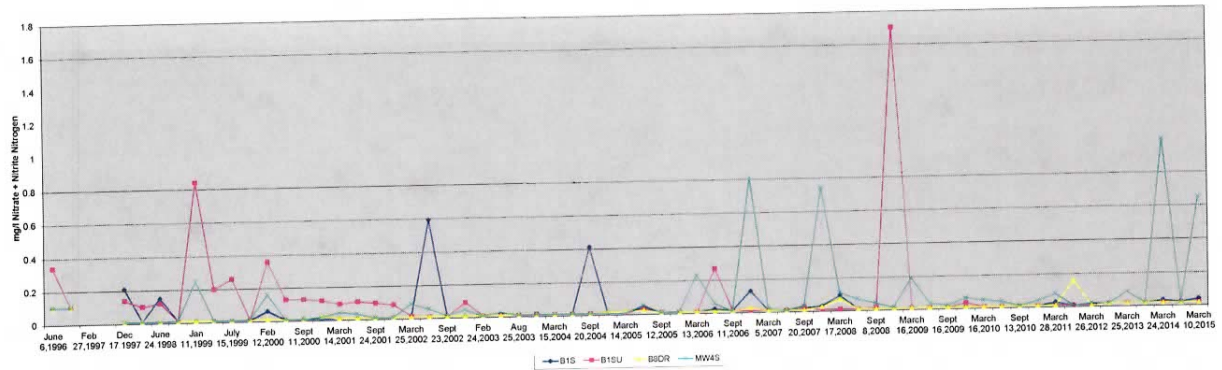
GROUP 2 WELLS NITRATE + NITRITE NITROGEN



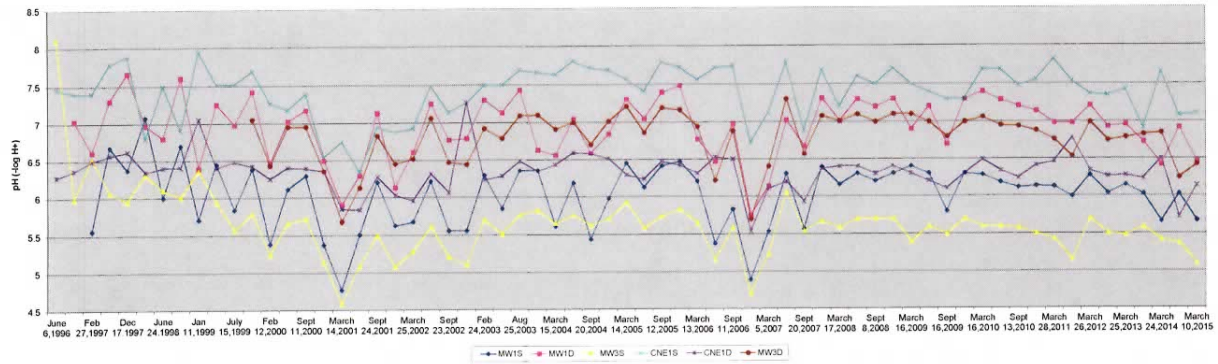
GROUP 3 WELLS NITRATE + NITRITE NITROGEN



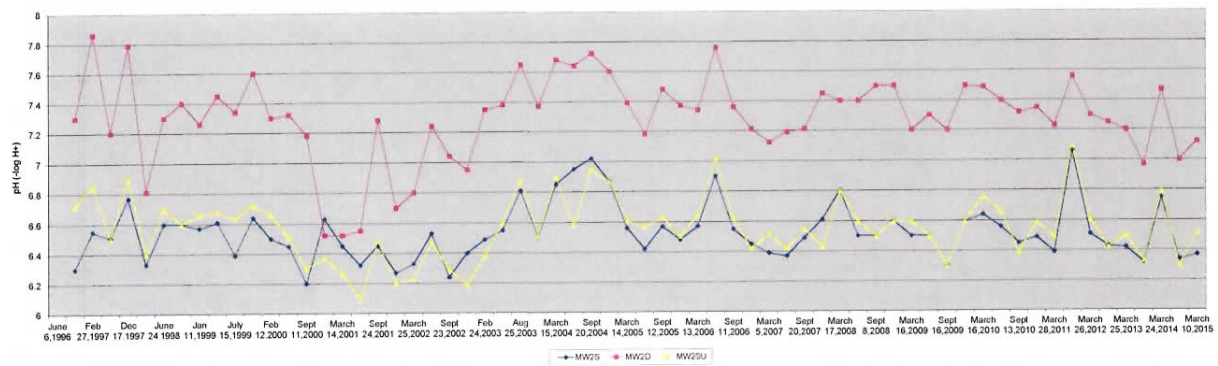
GROUP 4 WELLS NITRATE + NITRITE NITROGEN



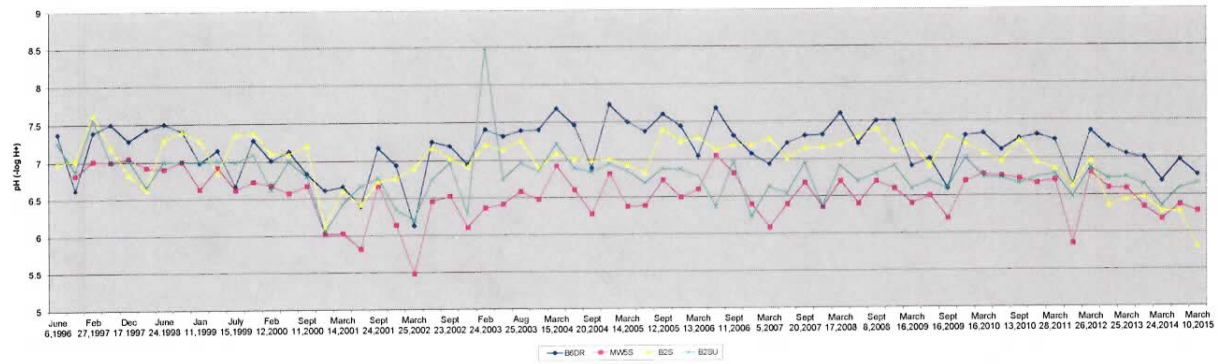
GROUP 1 WELLS pH



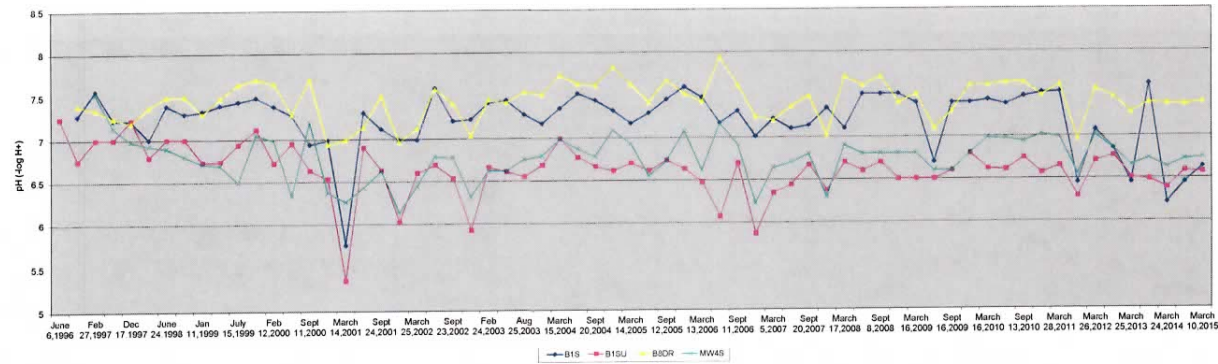
GROUP 2 WELLS pH



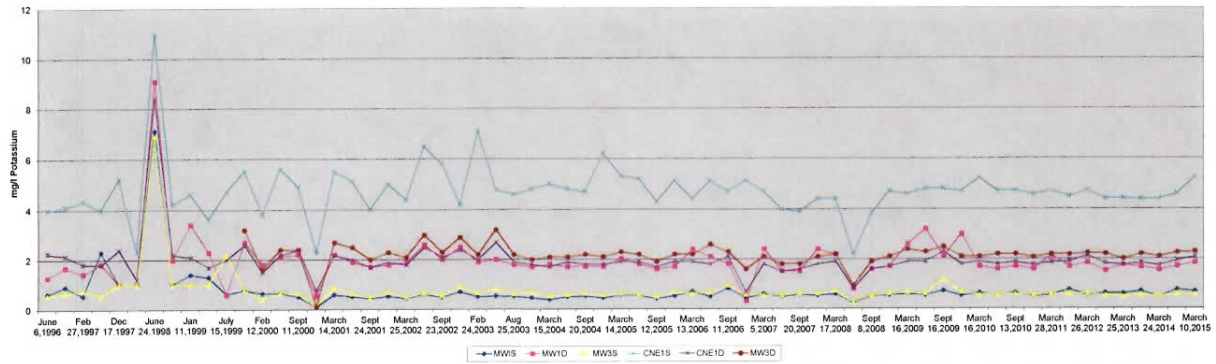
GROUP 3 WELLS pH



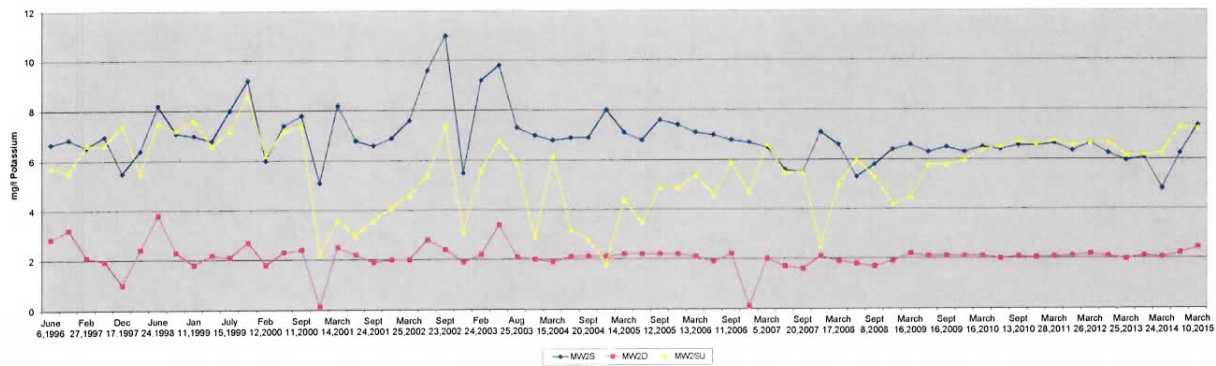
GROUP 4 WELLS pH



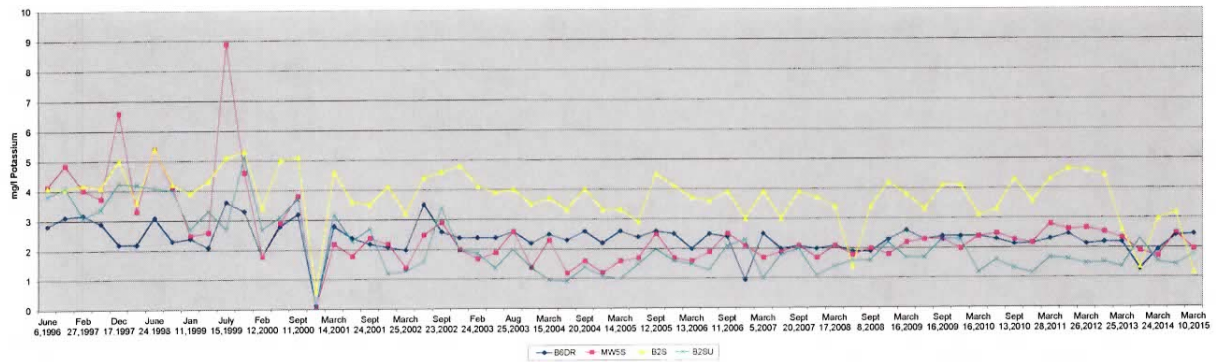
GROUP 1 WELLS DISSOLVED POTASSIUM



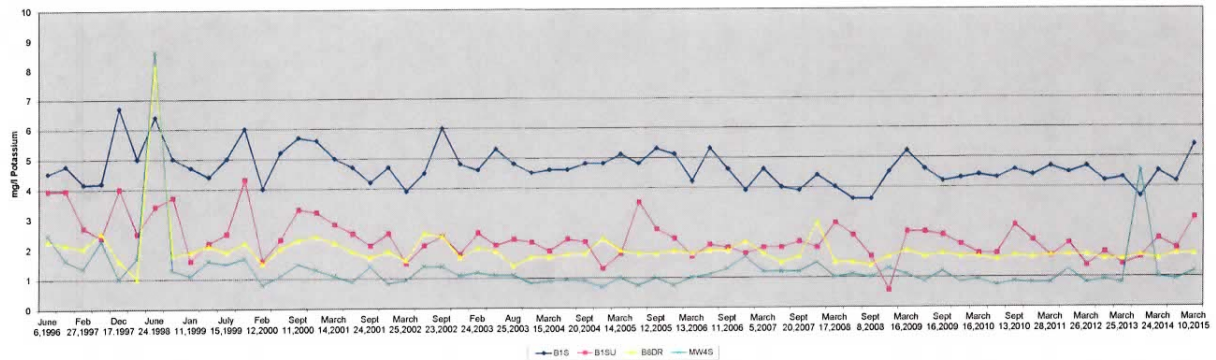
GROUP 2 WELLS DISSOLVED POTASSIUM



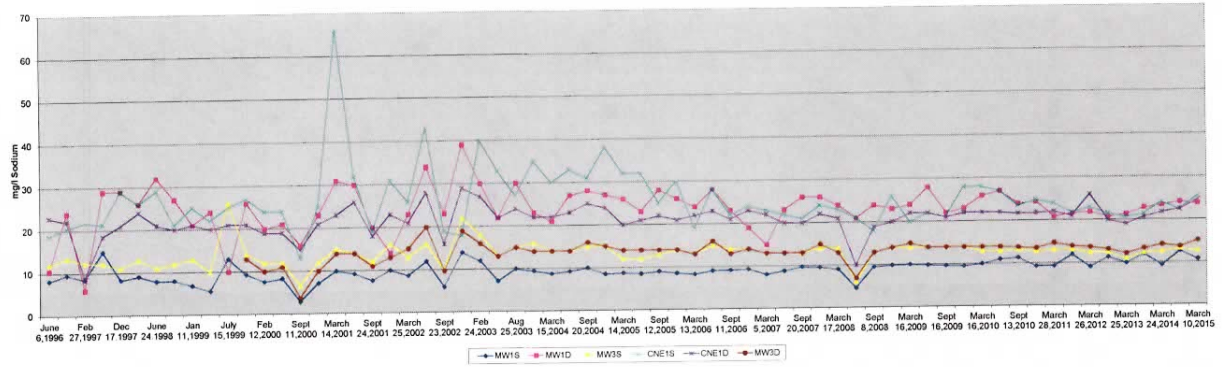
GROUP 3 WELLS DISSOLVED POTASSIUM



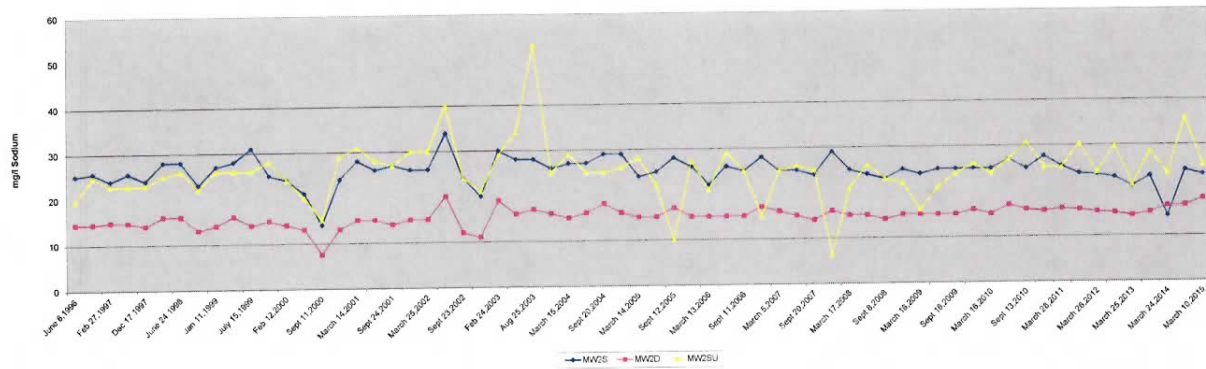
GROUP 4 WELLS DISSOLVED POTASSIUM



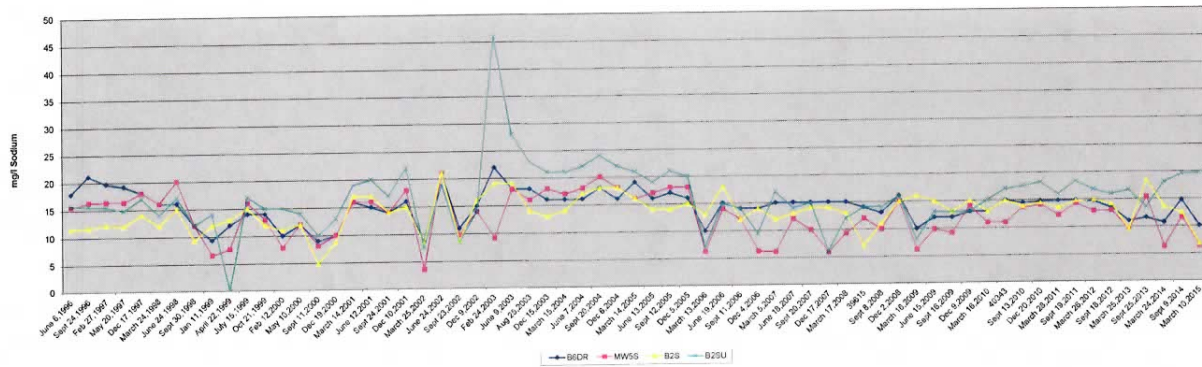
GROUP 1 WELLS SODIUM



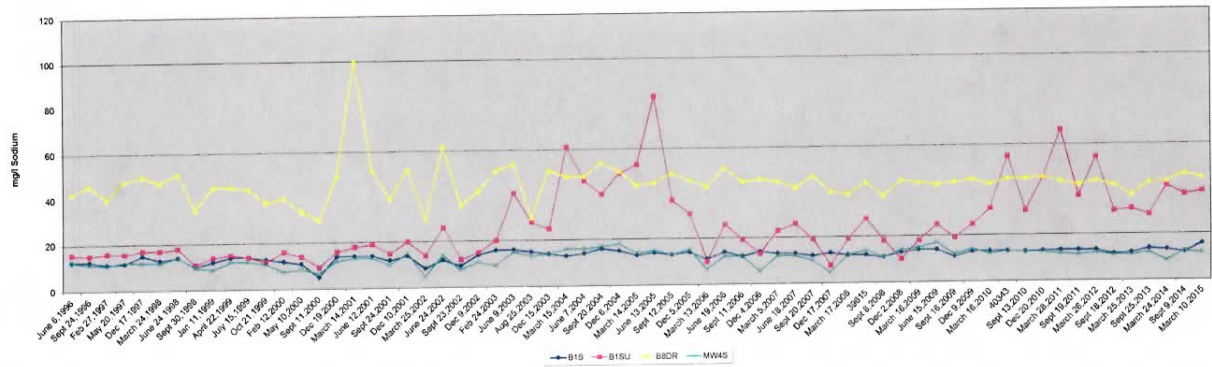
GROUP 2 WELLS SODIUM



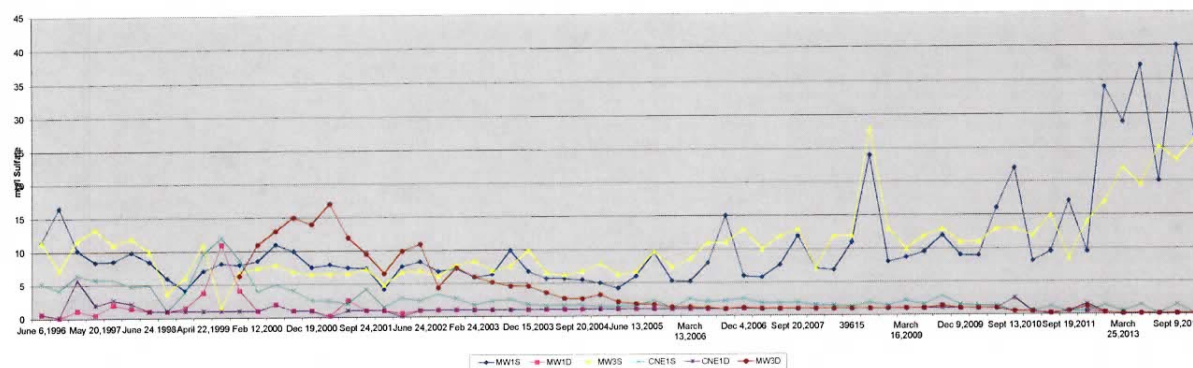
GROUP 3 WELLS SODIUM



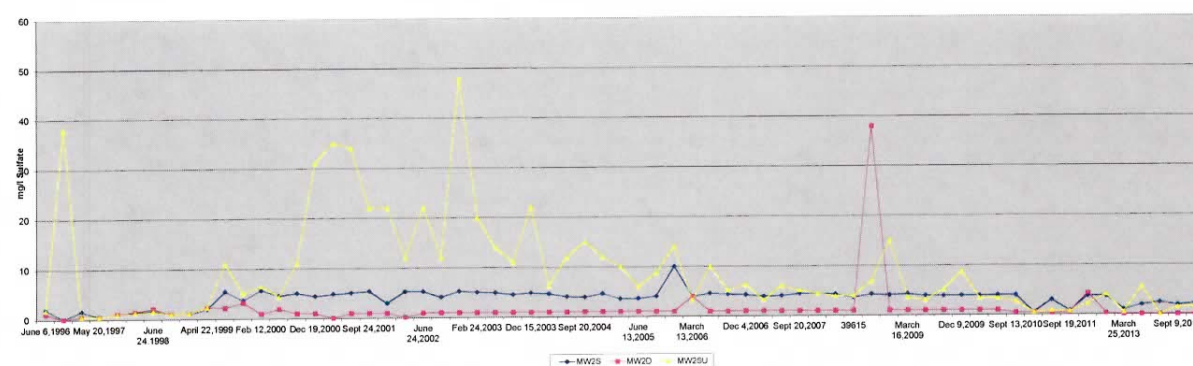
GROUP 4 WELLS SODIUM



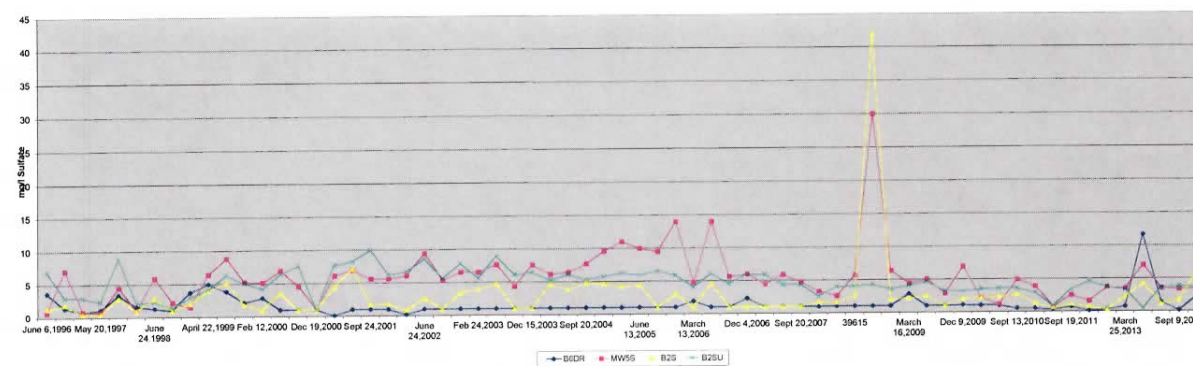
GROUP 1 WELLS SULFATE



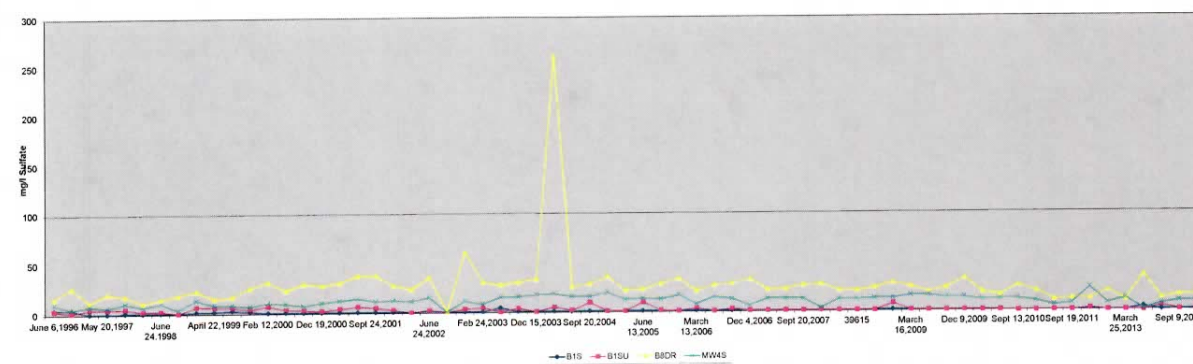
GROUP 2 WELLS SULFATE



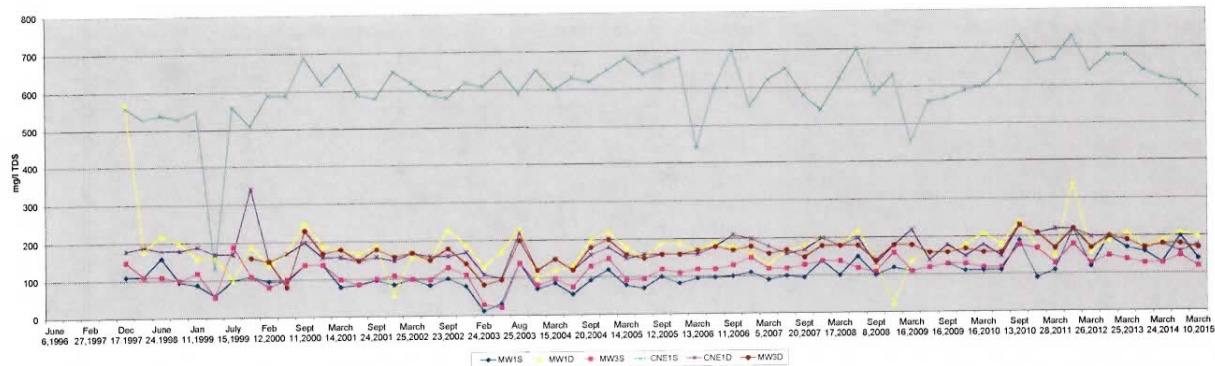
GROUP 3 WELLS SULFATE



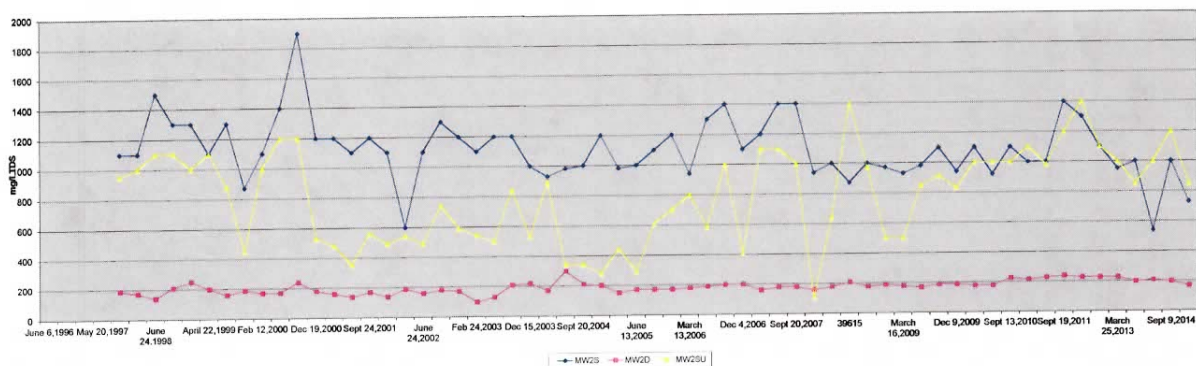
GROUP 4 WELLS SULFATE



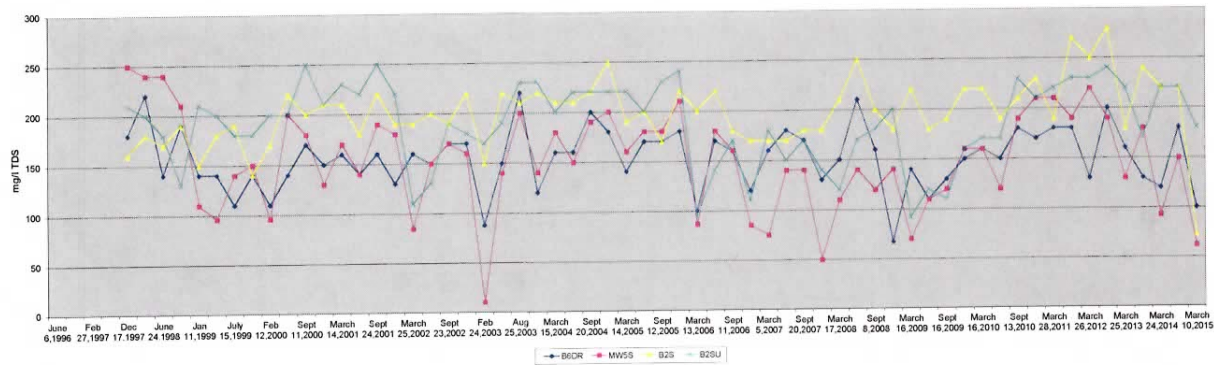
GROUP 1 WELLS TOTAL DISSOLVED SOLIDS



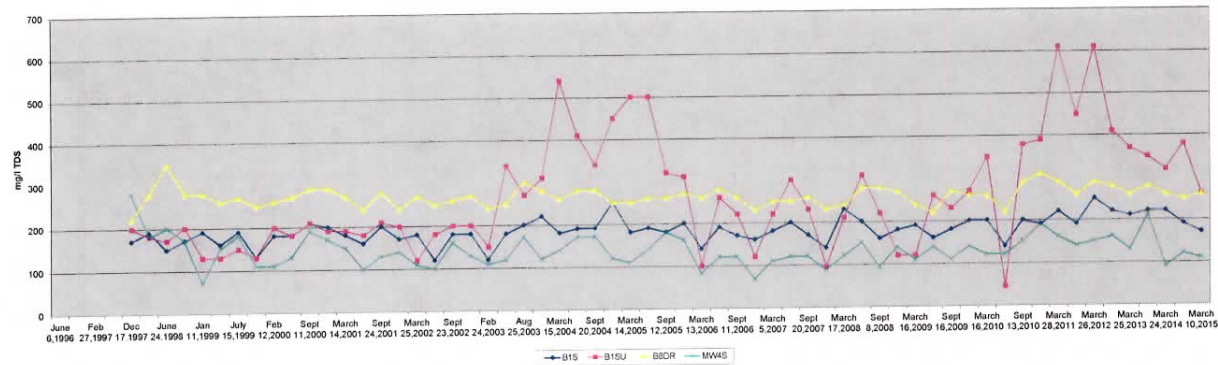
GROUP 2 WELLS TOTAL DISSOLVED SOLIDS



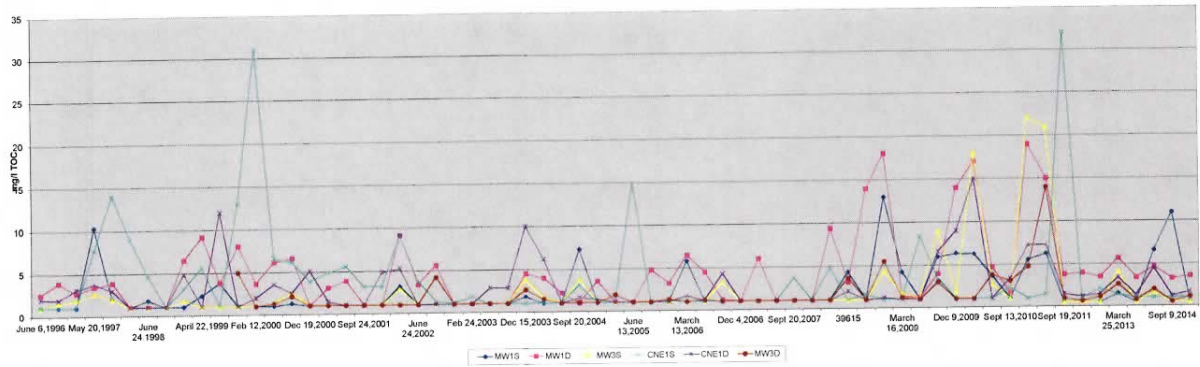
GROUP 3 WELLS TOTAL DISSOLVED SOLIDS



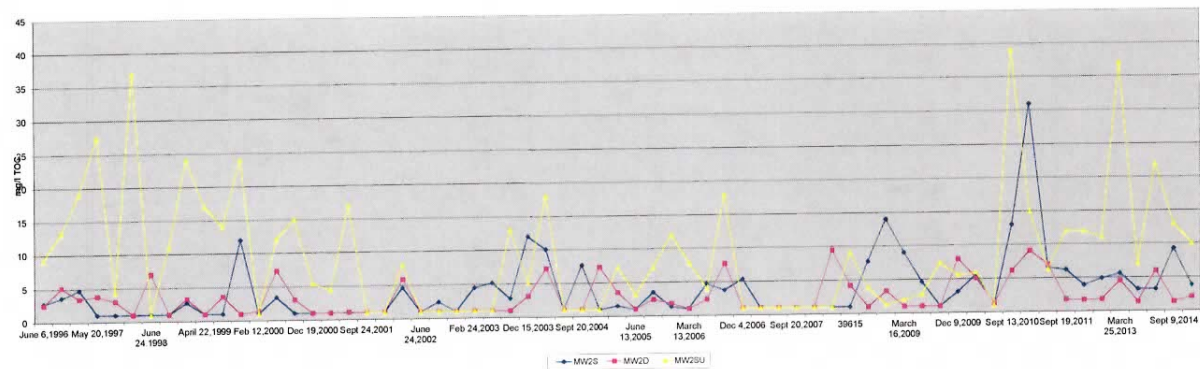
GROUP 4 WELLS TOTAL DISSOLVED SOLIDS



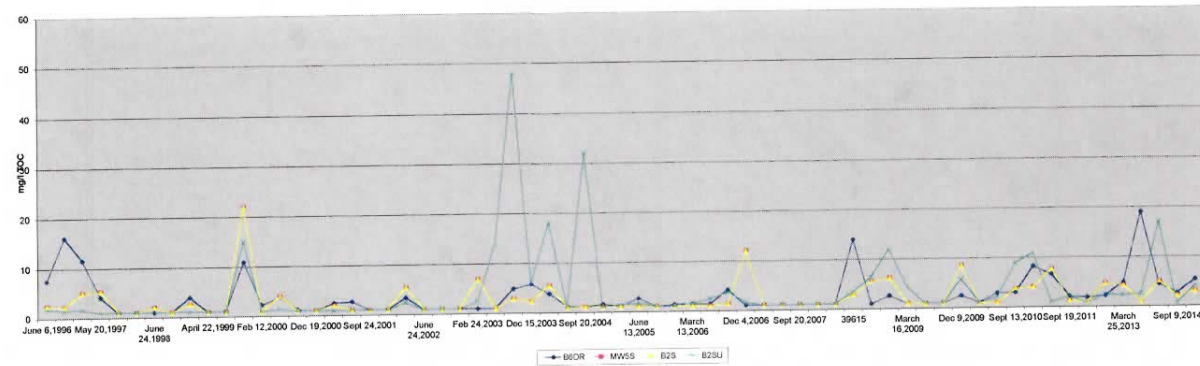
GROUP 1 WELLS TOTAL ORGANIC CARBON



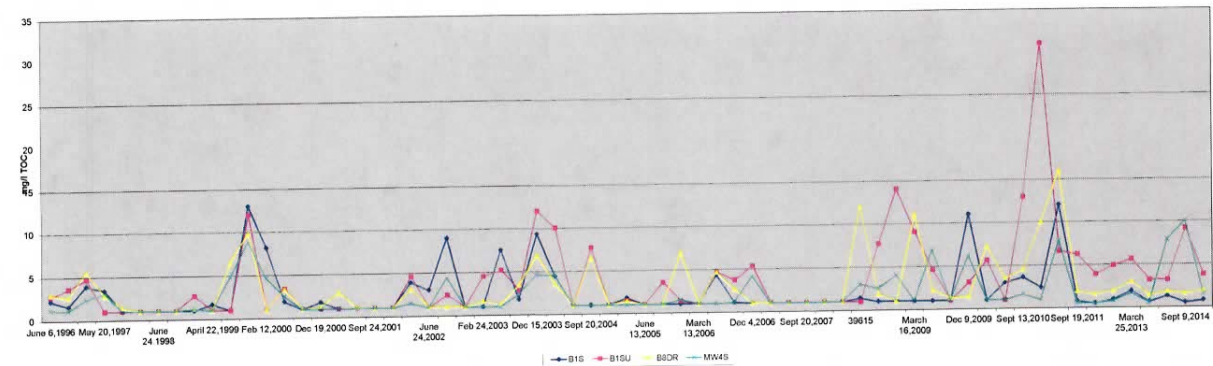
GROUP 2 WELLS TOTAL ORGANIC CARBON



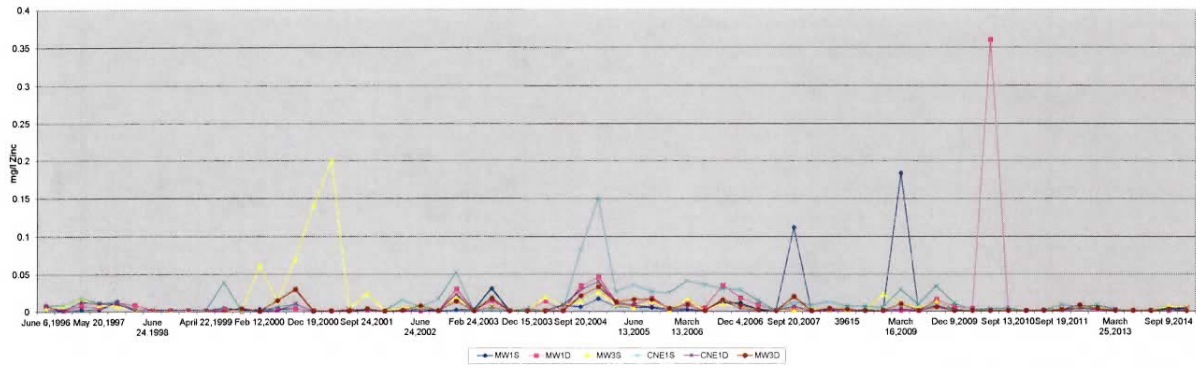
GROUP 3 WELLS TOTAL ORGANIC CARBON



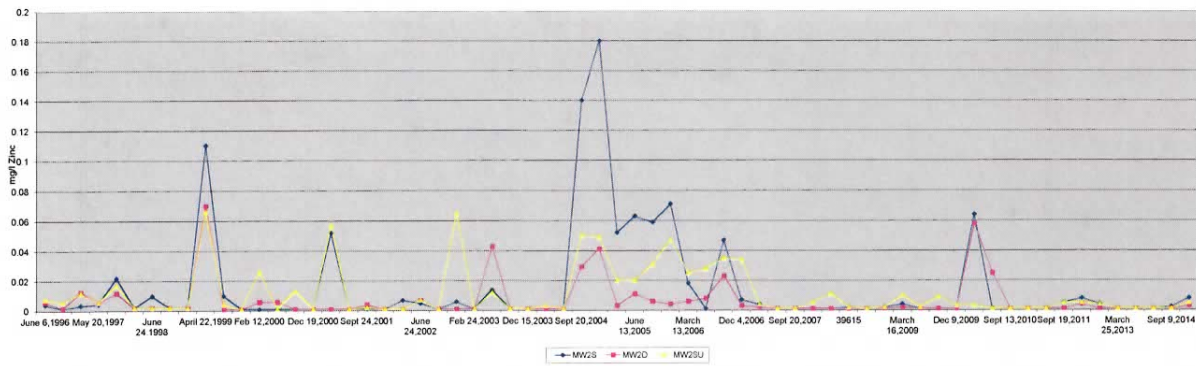
GROUP 4 WELLS TOTAL ORGANIC CARBON



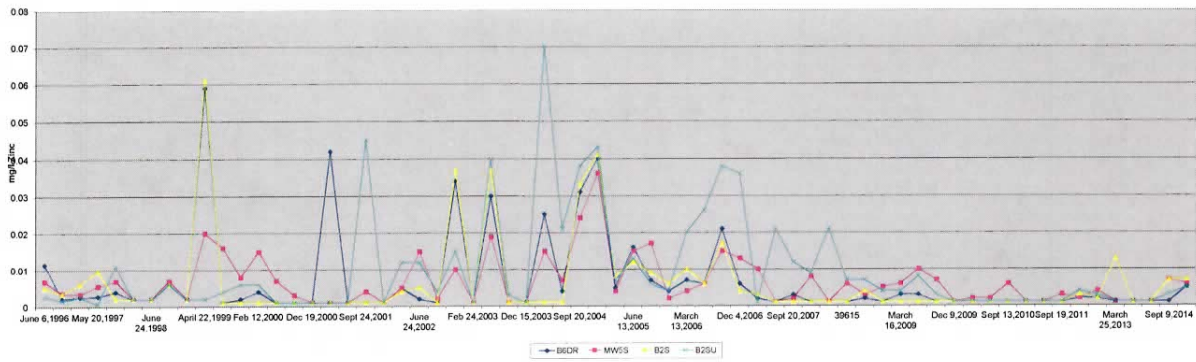
GROUP 1 WELLS DISSOLVED ZINC



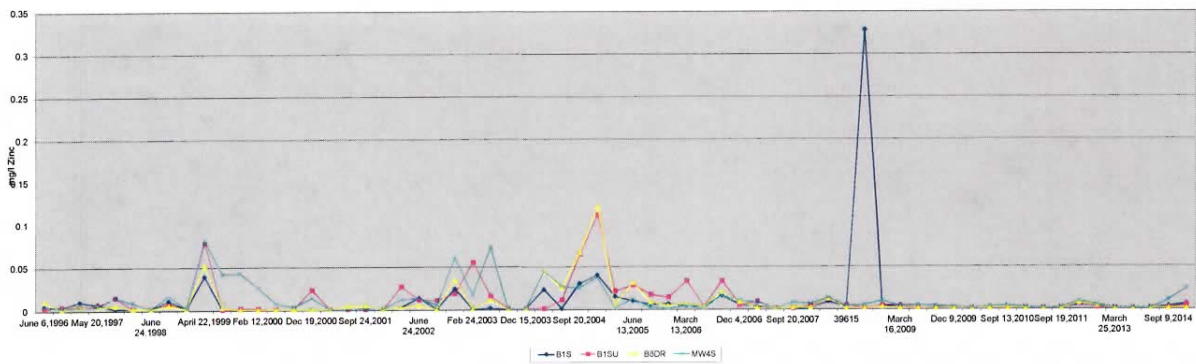
GROUP 2 WELLS DISSOLVED ZINC



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 December, 2014 and March, 2015.

Centralia Landfill Perimeter Probe Data						
Date	Probe Number	Time	Barometric Pressure	Probe Pressure inches W. C.	% LEL	% Oxygen
12/17/2014	GP2	1040	29.9	0	0	20.9
12/17/2014	GP1	1048	29.9	0	0	14.2
12/17/2014	GP4A	1055	29.9	0	2	0
12/17/2014	GP4B	1105	29.9	probe flooded		
12/17/2014	GP15	940	29.9	0	0	20.9
12/17/2014	GP11	945	29.9	0	0	20.9
12/17/2014	GP10	950	29.9	0	0	20.9
12/17/2014	GP12	955	29.9	0	0	20.9
12/17/2014	GP9	1000	29.9	0	0	20.9
12/17/2014	GP13	1010	29.9	0	0	20.9
12/17/2014	GP8	1015	29.9	0	0	20.9
12/17/2014	GP7	1020	29.9	0	0	20.9
12/17/2014	GP14	1025	29.9	0	0	20.9
12/17/2014	GP5R	1030	29.9	0	0	20.9
3/2/2015	GP2	1056	29.83	0	0	20.9
3/2/2015	GP1		29.83	probe flooded		
3/2/2015	GP4A	1101	29.83	probe flooded		
3/2/2015	GP4B		29.83	probe flooded		
3/2/2015	GP15	938	29.83	0	0	20.9
3/2/2015	GP11	944	29.83	0	0	20.9
3/2/2015	GP10	952	29.83	0	0	20.9
3/2/2015	GP12	958	29.83	0	0	20.9
3/2/2015	GP9	1023	29.83	0	0	20.9
3/2/2015	GP13	1020	29.83	0	0	20.9
3/2/2015	GP8	1028	29.83	0	0	20.9
3/2/2015	GP7	1032	29.83	0	0	20.9
3/2/2015	GP14	1037	29.83	0	0	20.9
3/2/2015	GP5R	1046	29.83	0	0	20.9