



December 3, 2014

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 September, 2014. 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, which appears to read 'Randy Prevost', is written over the printed name.

Randy Prevost
City of Centralia

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

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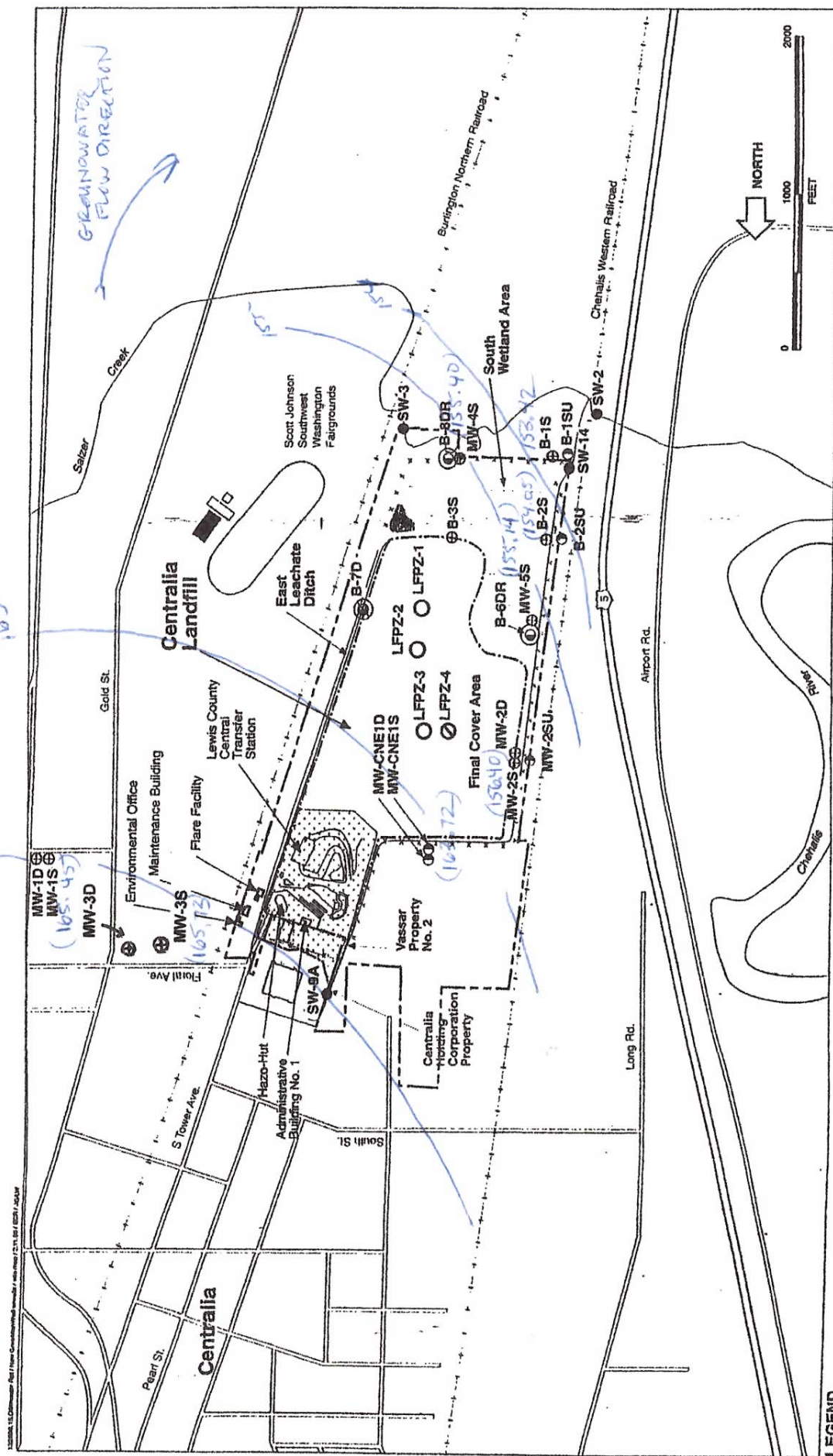
Appendix C - Landfill Gas Monitoring Narrative and Data Presentation

REPORT NARRATIVE

This biannual Compliance Monitoring Report summarizes the results from the dry season sampling done at the Centralia Landfill in September, 2014. 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 9 and 10, 2014. 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, 2014 depth to groundwater was measured in all wells.

Weather during the sampling period was varied from sunny to overcast. Water was not present at SW 14, in the Weyerhaeuser Ditch (the point of compliance for surface water), and no 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

UPPER AQUIFER
9/9/2014
DRY SEASON, 2014

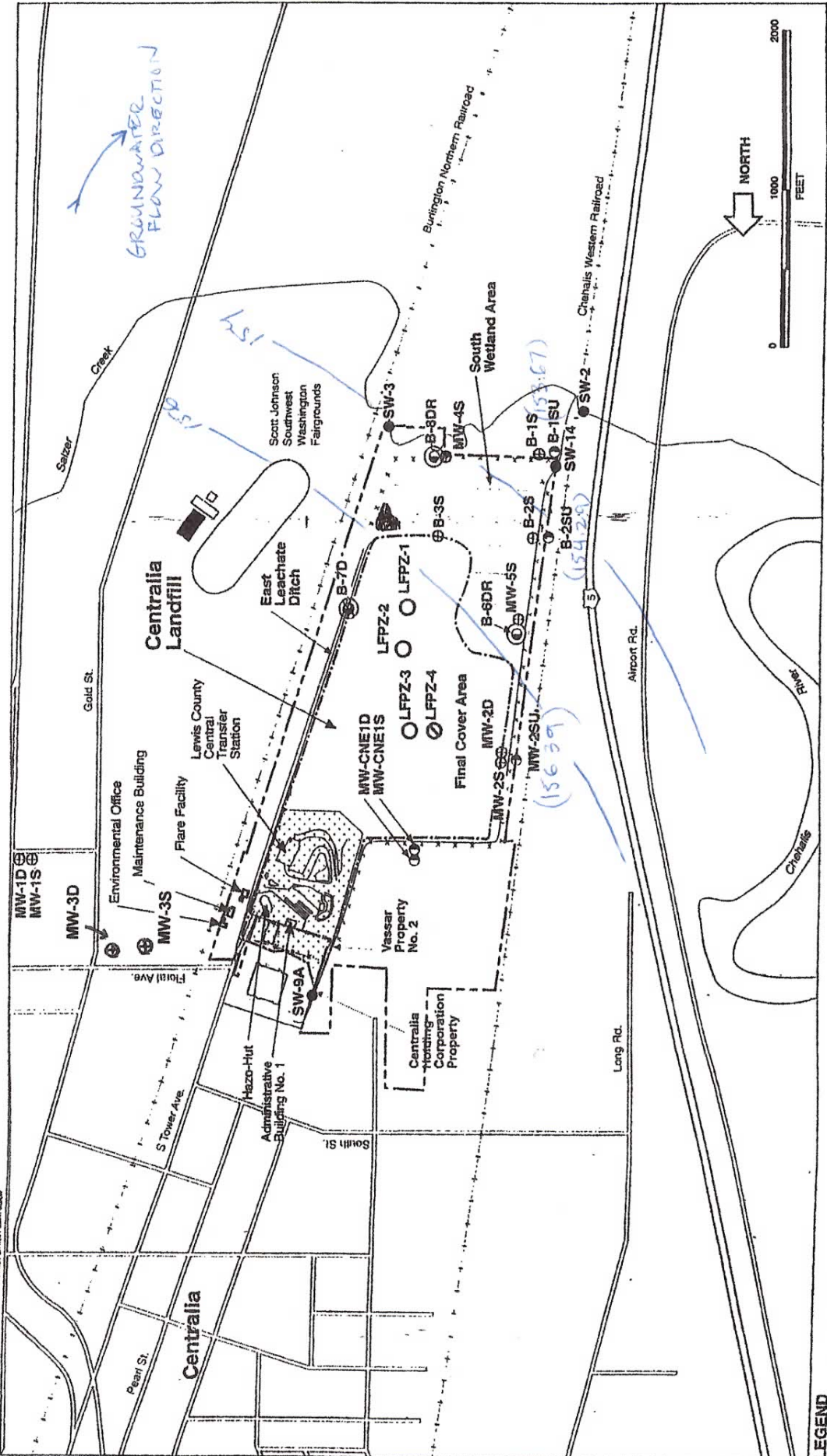
LEGEND

- Approximate Edge of Refuse and Limits of Source Area
- Fence
- Abandoned and New Replacement Monitoring Wells
- Abandoned Monitoring Wells

-

-  Pre-RI Monitoring Wells
 Closed Northend Landfill Piezometers
 Abandoned Piezometers

12/28/04, 10:00 AM: Red River Groundwater Remediation Site Map / 2.14.04 / E221 / JALW



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-RII Monitoring Wells
- Closed Northend Landfill
- Piezometers
- Abandoned Piezometers

Site Map

SHALLOW UPPER AQUIFER
9/9/2014
DRY SEASON, 2014

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	6.92	292	210	5.78	< 0.1	< 0.02	0.0079	0.019	< 0.00002	0.5554	< 0.001
MW1S	6.02	206	200	2.24	40	3.9	0.0001	< 0.009	< 0.00002	< 0.0005	0.004
MW3S	5.38	173	150	5.25	23.3	1.5	0.0002	< 0.009	< 0.00002	0.0069	0.007
MW3D	6.24	235	180	6.2	< 0.1	< 0.02	0.0016	0.638	< 0.00002	1.091	0.003
CNE1S	5.72	1010	610	67.7	1.45	< 0.02	0.0073	24.7	< 0.00002	2.873	< 0.001
CNE1D	7.08	292	160	6.5	< 0.1	< 0.02	0.0001	0.053	< 0.00002	0.2255	0.003
MW2D	7	329	200	9.37	< 0.1	< 0.02	0.0058	0.02	< 0.00002	0.8272	< 0.001
MW2S	6.34	1330	1000	215	1.92	< 0.02	0.028	6.79	< 0.00002	8.861	< 0.001
MW2SU	6.3	1670	1200	232	1.55	< 0.02	0.005	24.2	< 0.00002	8.855	< 0.001
MW5S	6.37	195	150	4.74	3.44	< 0.02	0.0031	0.286	< 0.00002	0.5272	0.007
B6DR	6.97	270	180	7.96	< 0.1	< 0.02	0.0051	0.061	< 0.00002	0.81	< 0.001
B2SU	6.59	315	220	2.64	3.83	0.028	0.0018	< 0.009	< 0.00002	0.0046	0.003
B2S	6.28	167	220	8.3	1.73	< 0.02	0.013	< 0.009	< 0.00002	1.146	0.007
B1SU	6.59	639	380	29.1	0.79	< 0.02	0.0036	0.887	< 0.00002	3.633	< 0.001
B1S	6.45	142	190	9.14	0.84	0.024	0.013	0.028	< 0.00002	0.7325	0.003
MW4S	6.72	212	120	2.23	8.94	< 0.02	0.0008	0.089	< 0.00002	0.1213	0.01
B8DR	7.37	429	250	5.08	15.6	< 0.02	0.0003	0.089	< 0.00002	0.2565	< 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 2014. 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. B1S, B2S and MW2S exceeded the drinking water standard. Thirteen 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 four wells this round. All wells were below the standard. MW1S had the highest value with 3.9 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 thirteen wells this season. Five wells exceeded the standard. CNE1S had the highest value with 24.7 mg/l.

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

pH has a regulatory range of 6.5 to 8.5. Nine 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 1200 mg/l in MW2SU.

Zinc has a secondary standard of 5 mg/l. Zinc was detected in ten 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. 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 dry season. CNE1S had the highest value with 24.7 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. Three of the six wells exceeded the cleanup level; MW3D, CNE1D, and B8DR

Soluble Iron has a cleanup level of 300 µg/L. Only MW3D in the lower unit exceeded the cleanup level this season.

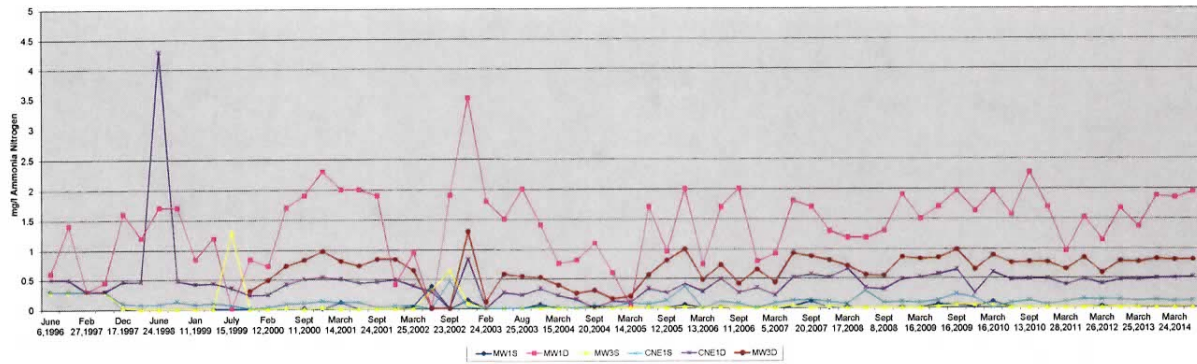
Soluble Manganese has a cleanup level of 50 µg/L. All wells in the lower unit exceeded this value.

Surface Water Standards:

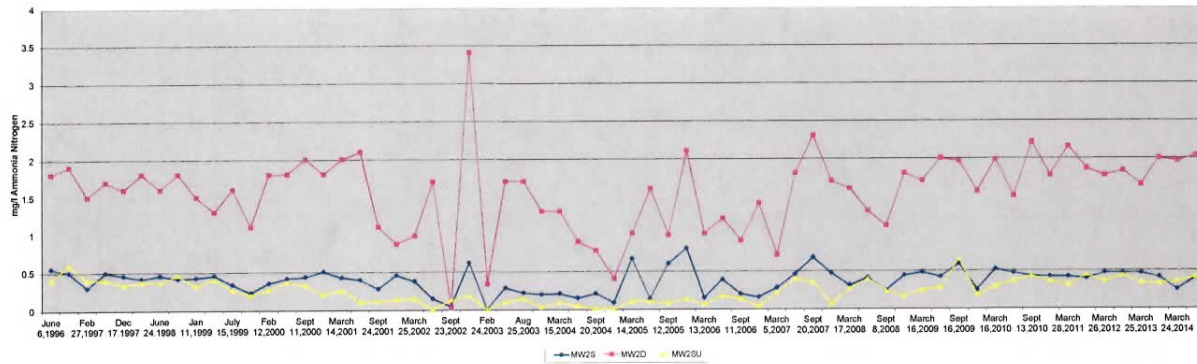
Surface water was not sampled at SW14, the point of compliance. No water was present this dry season.

Appendix B - Groundwater Time Series Graphs

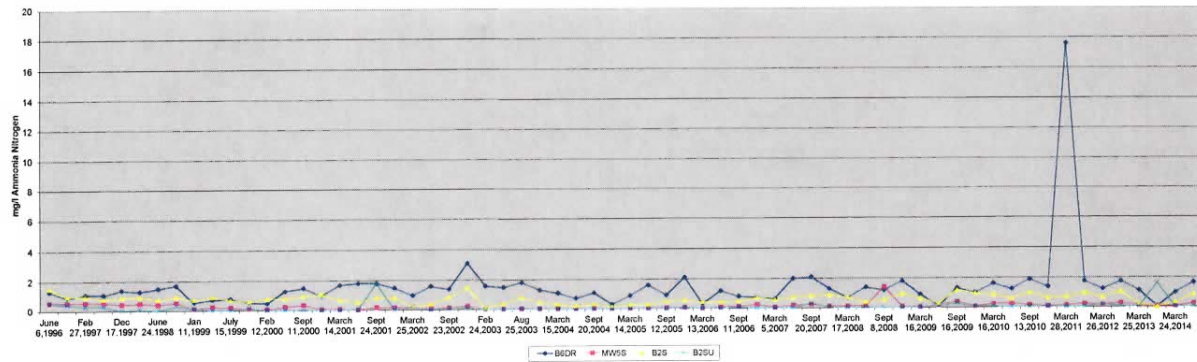
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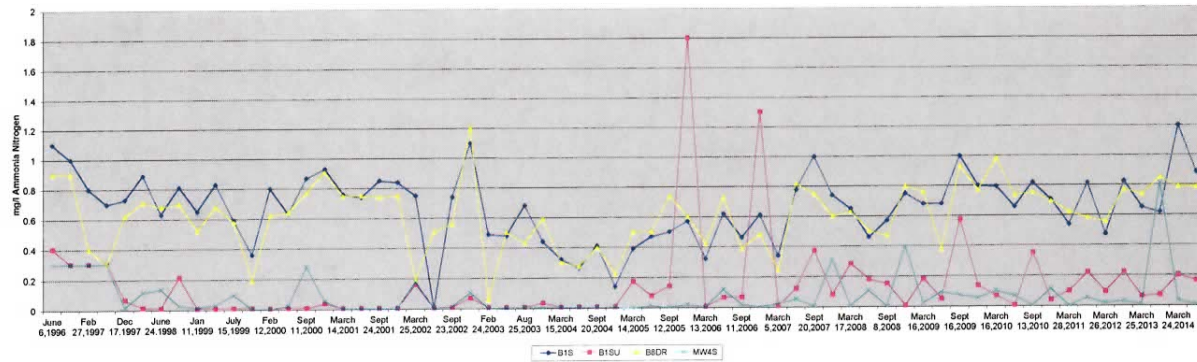
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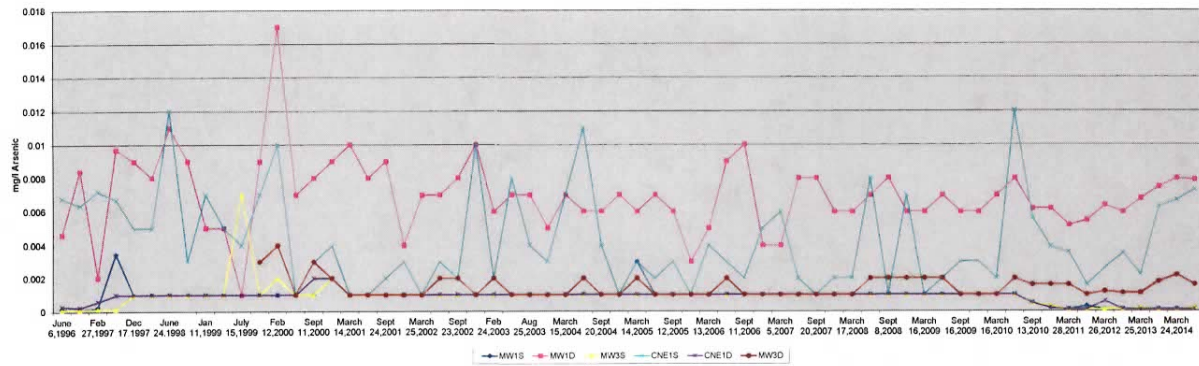
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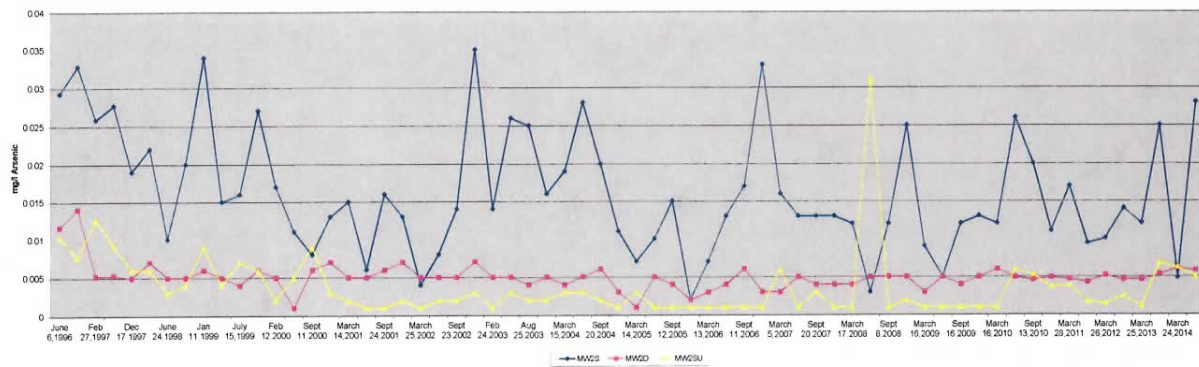
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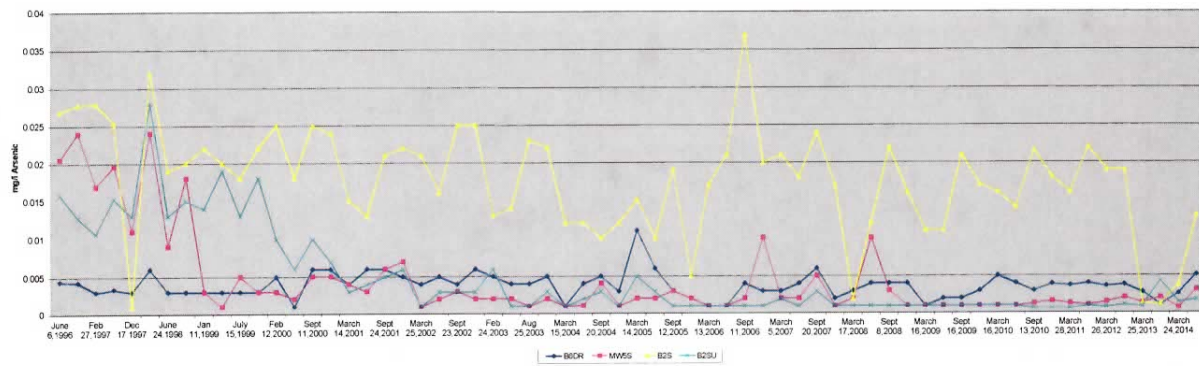
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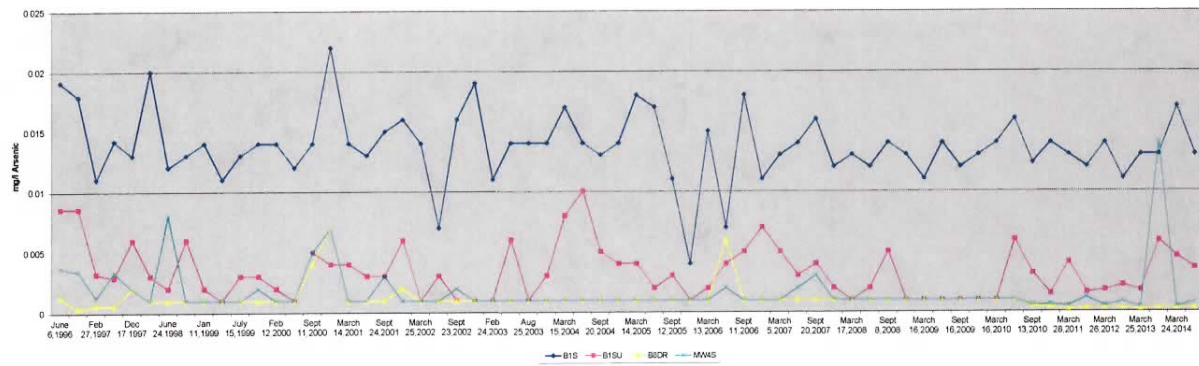
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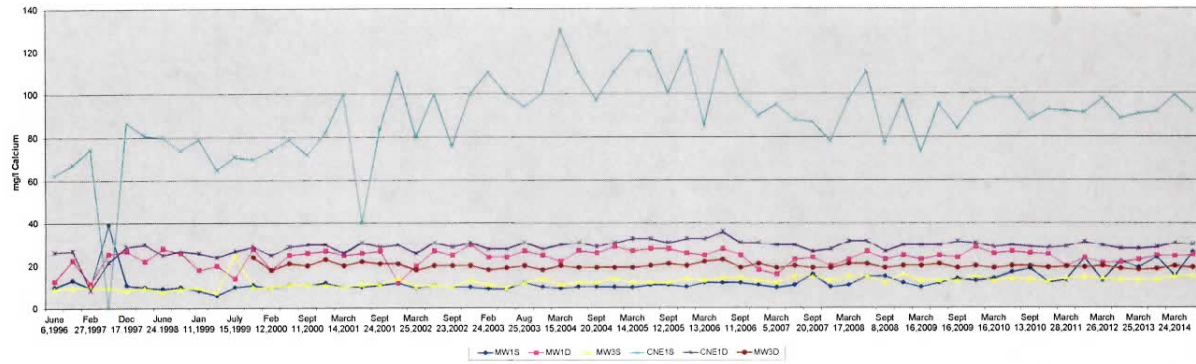
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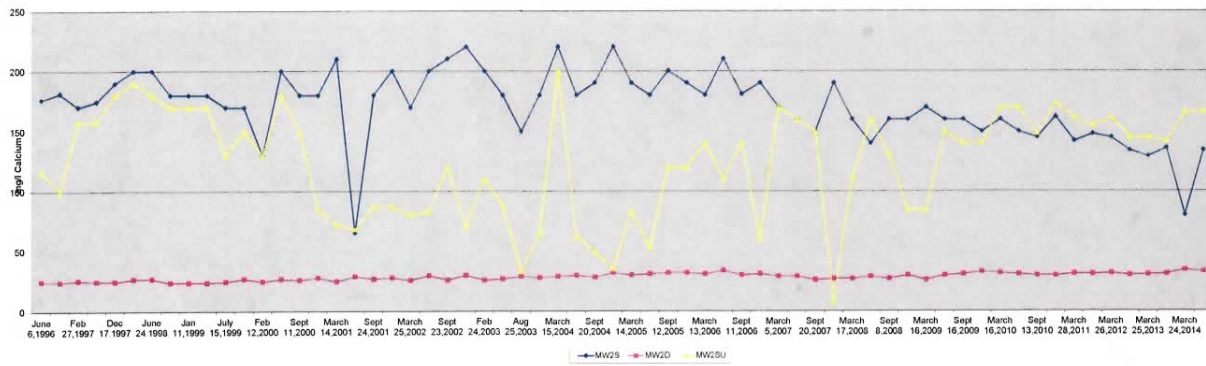
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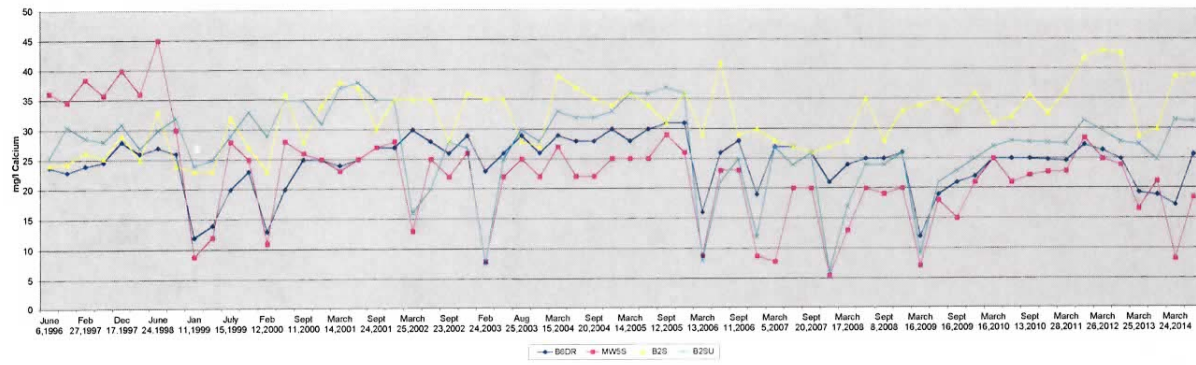
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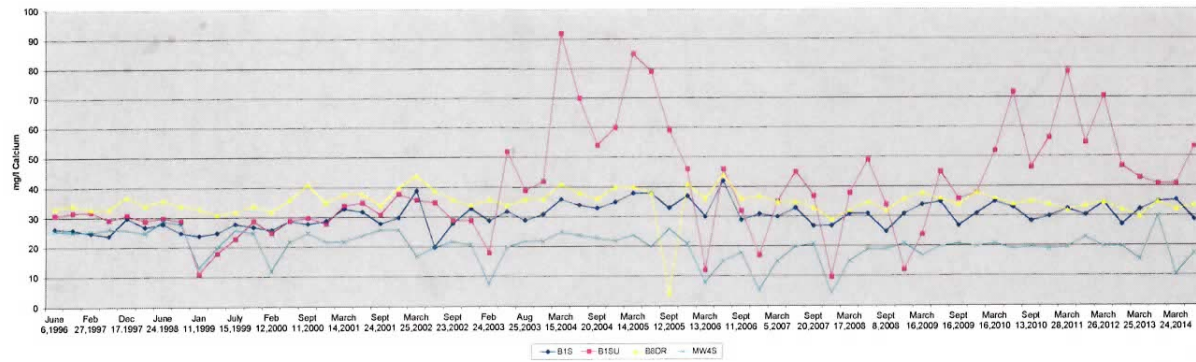
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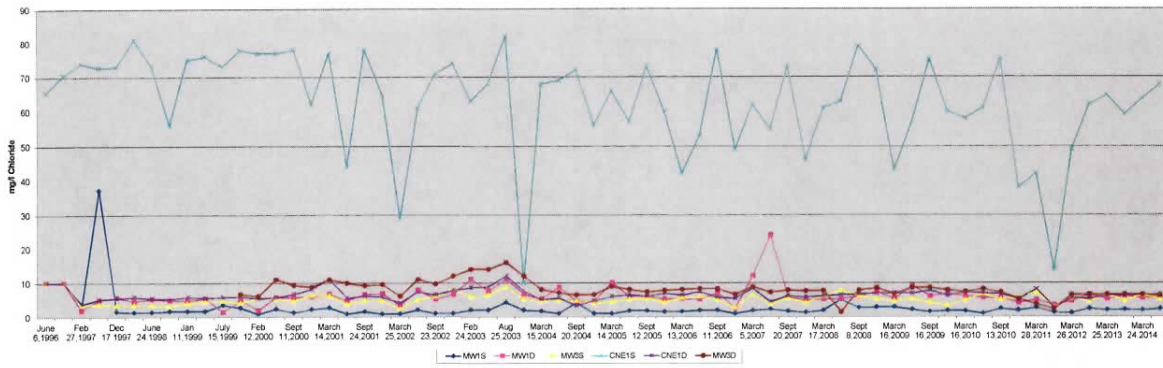
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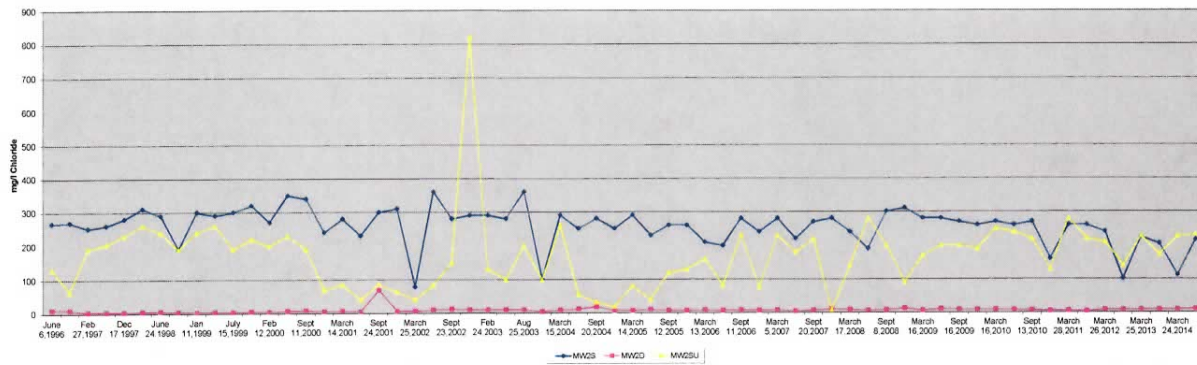
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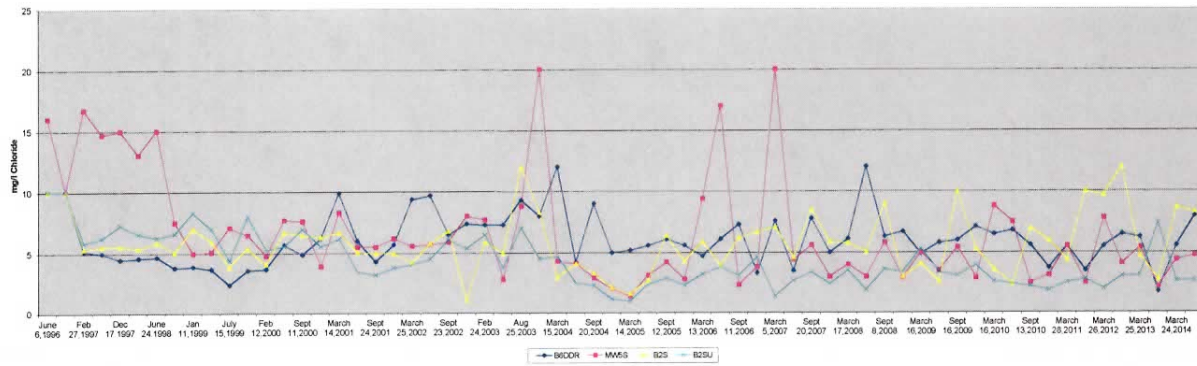
GROUP 1 WELLS DISSOLVED CHLORIDE



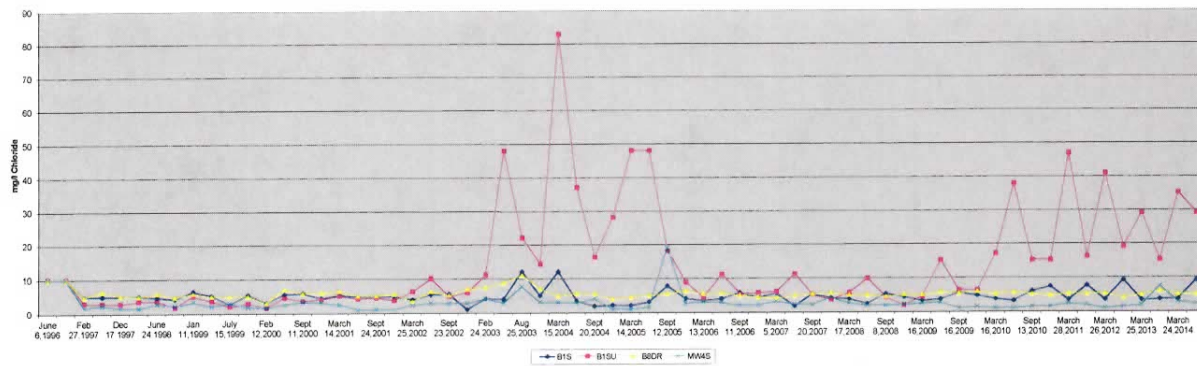
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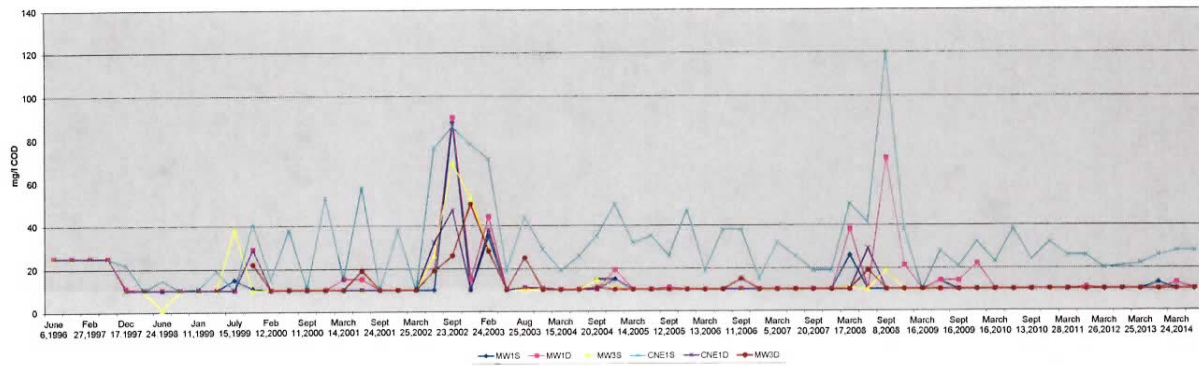
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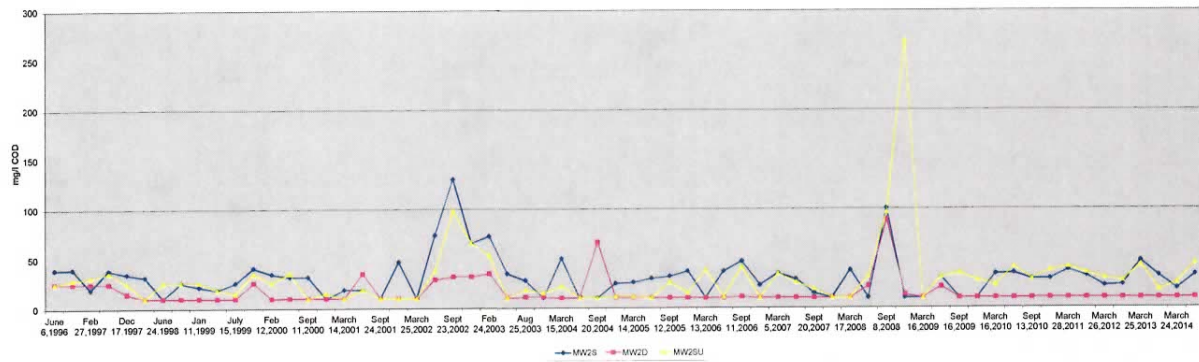
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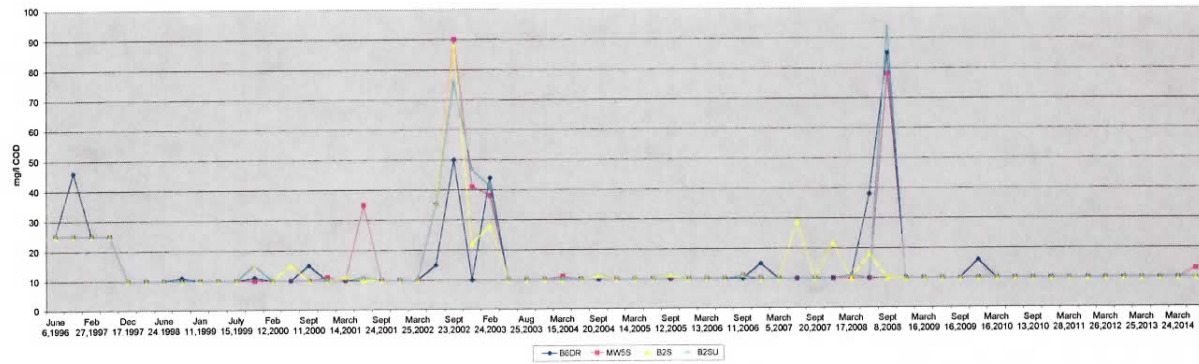
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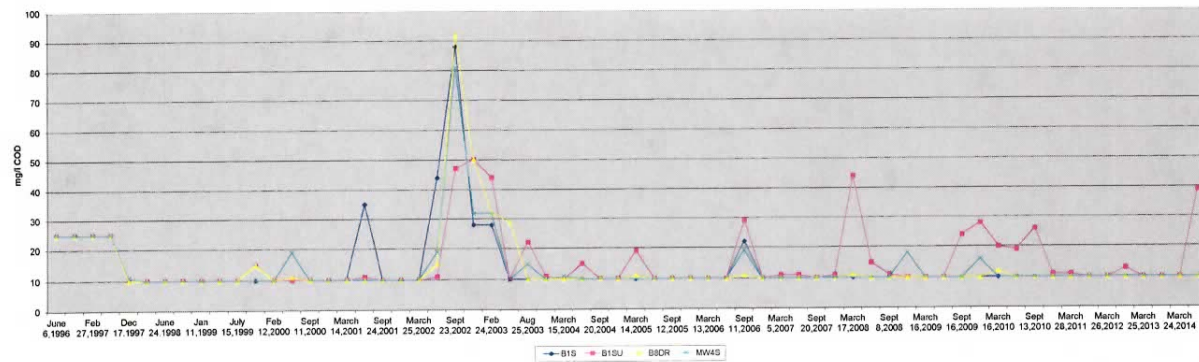
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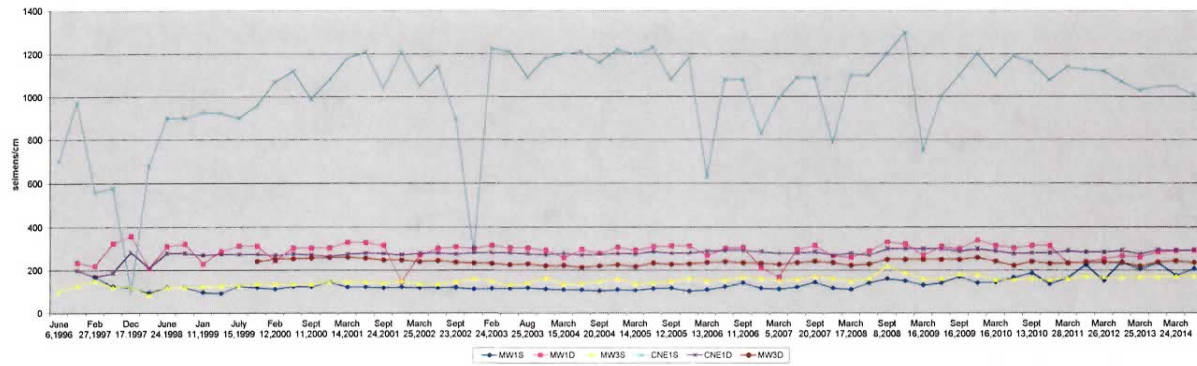
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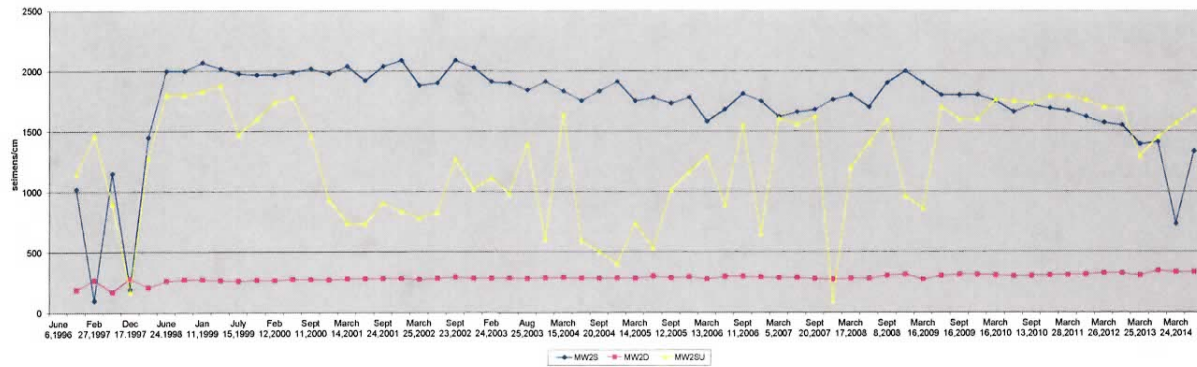
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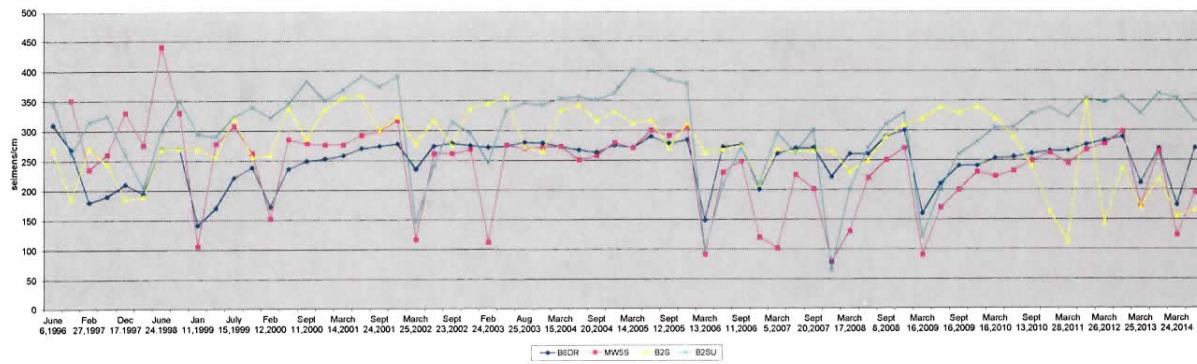
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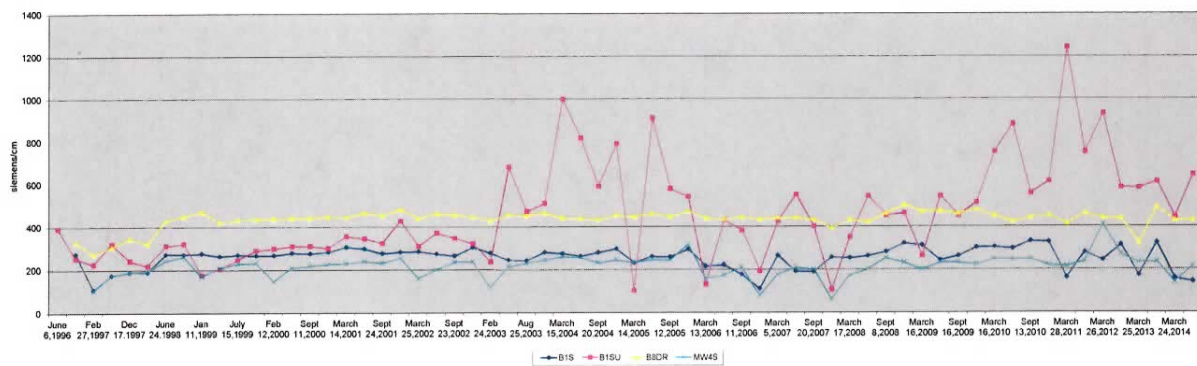
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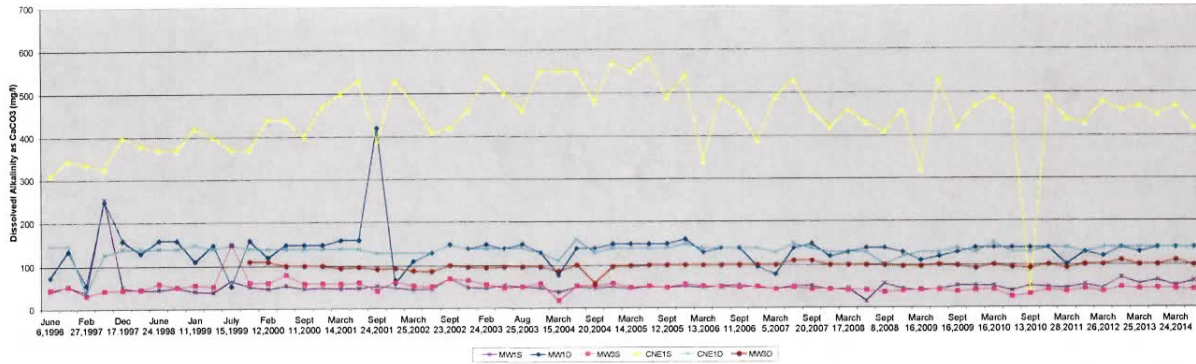
GROUP 3 WELLS CONDUCTIVITY



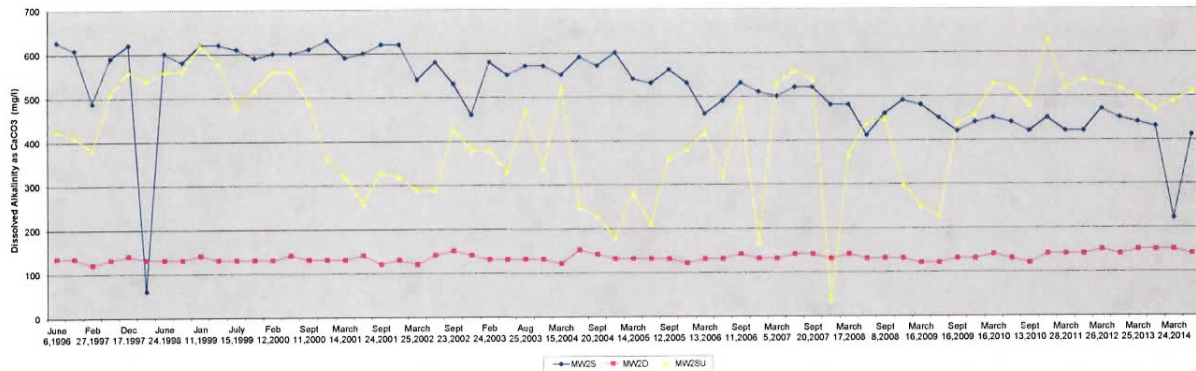
GROUP 4 WELLS CONDUCTIVITY



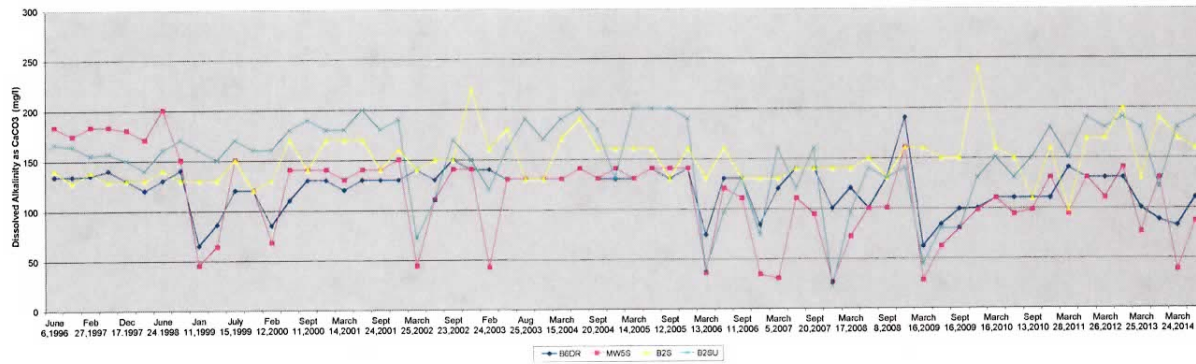
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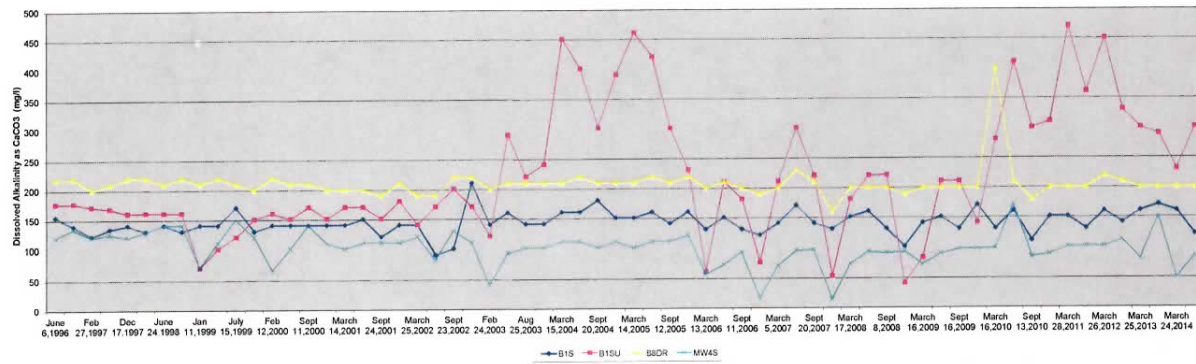
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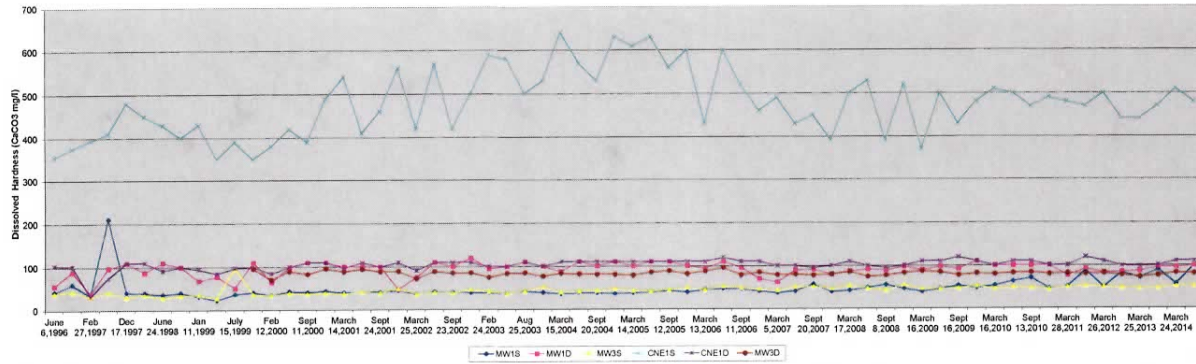
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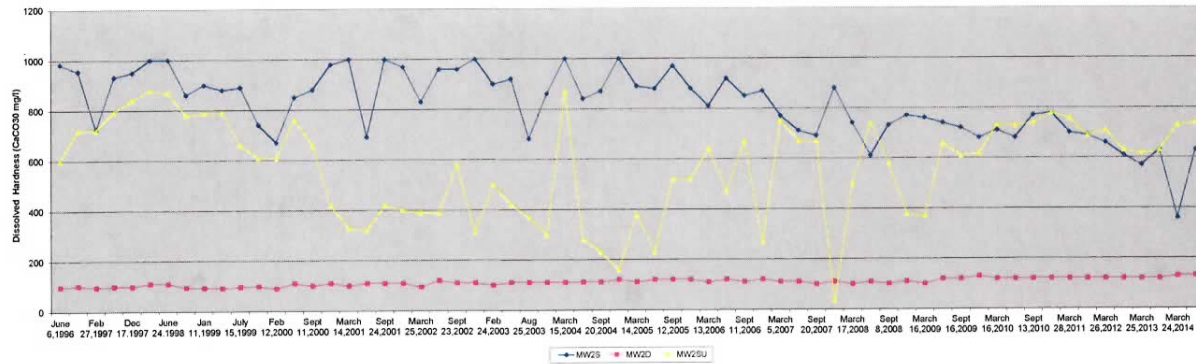
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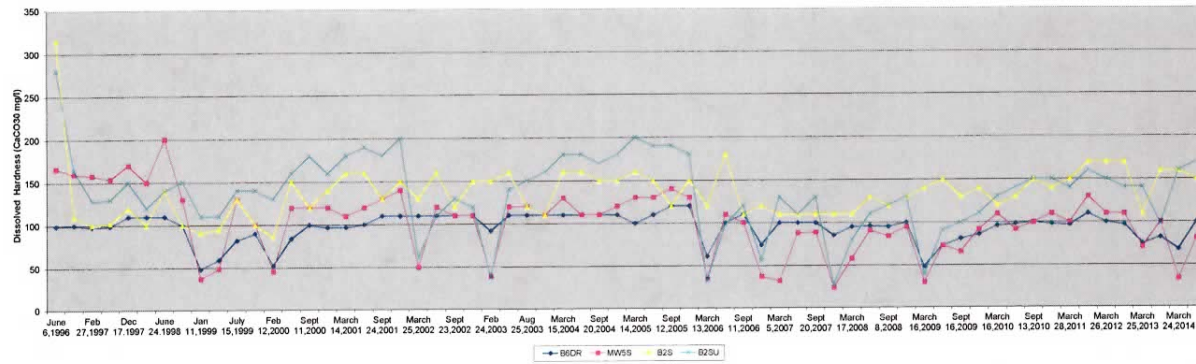
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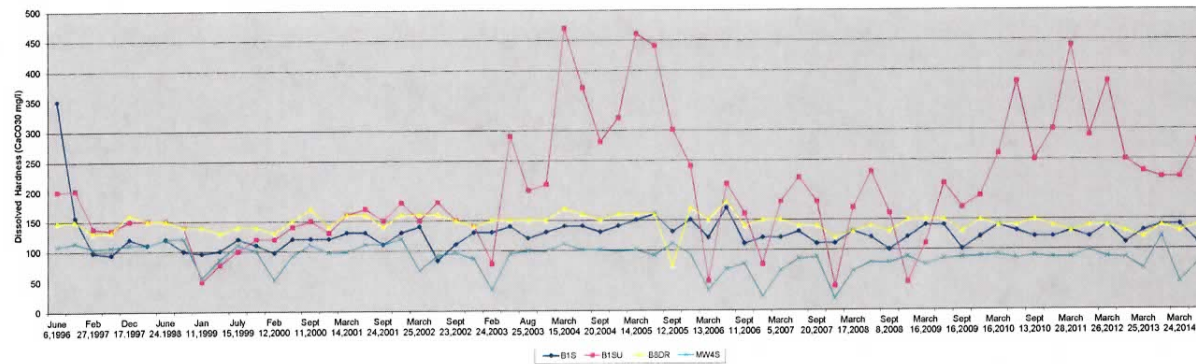
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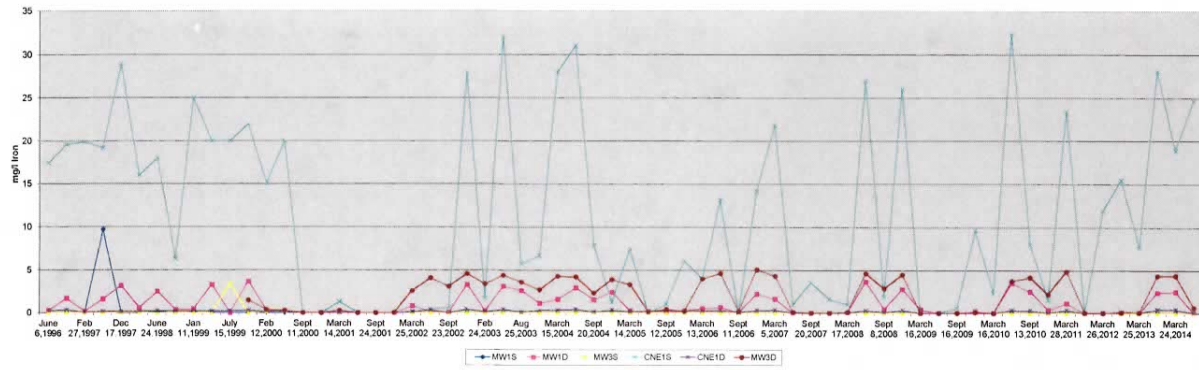
GROUP 3 WELLS HARDNESS



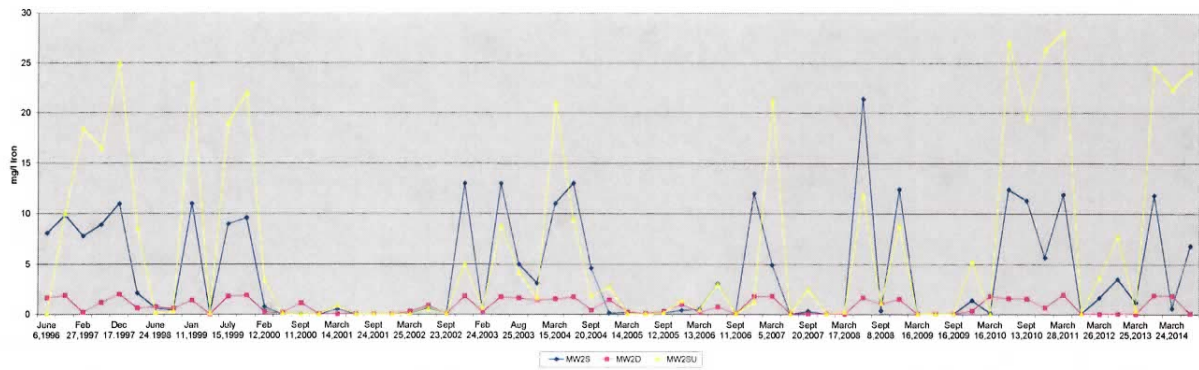
GROUP 4 WELLS HARDNESS



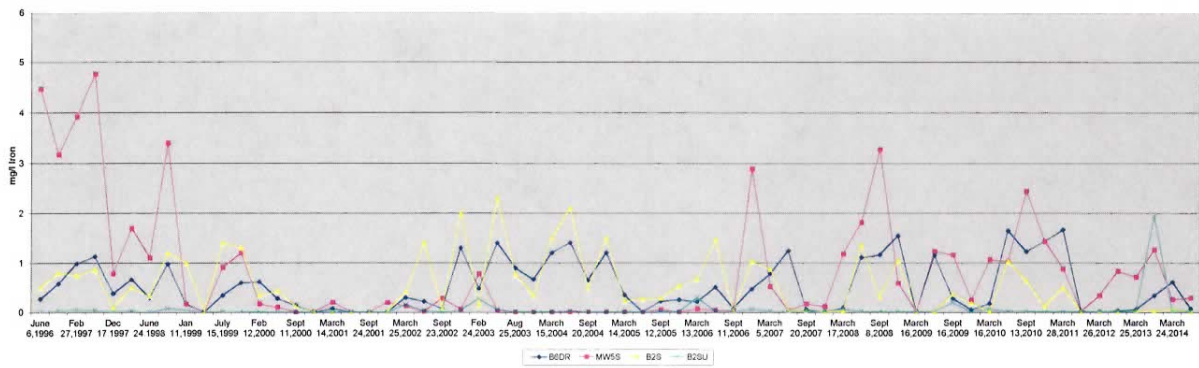
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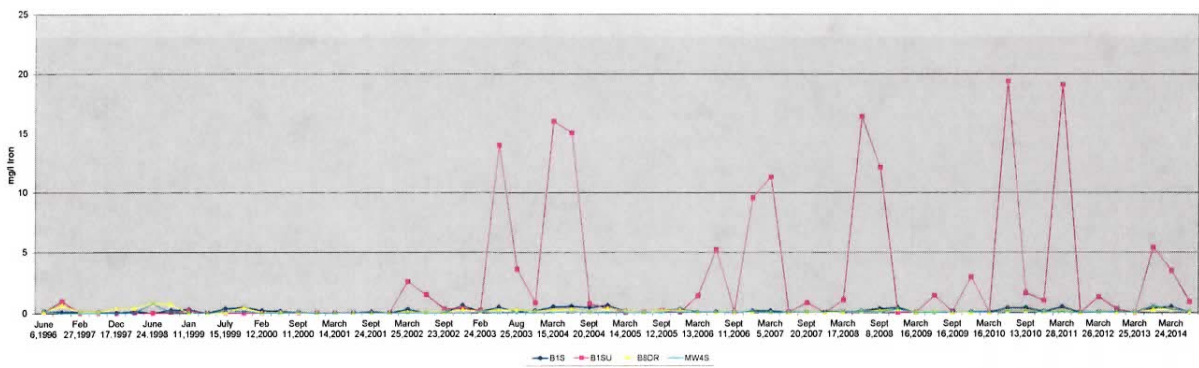
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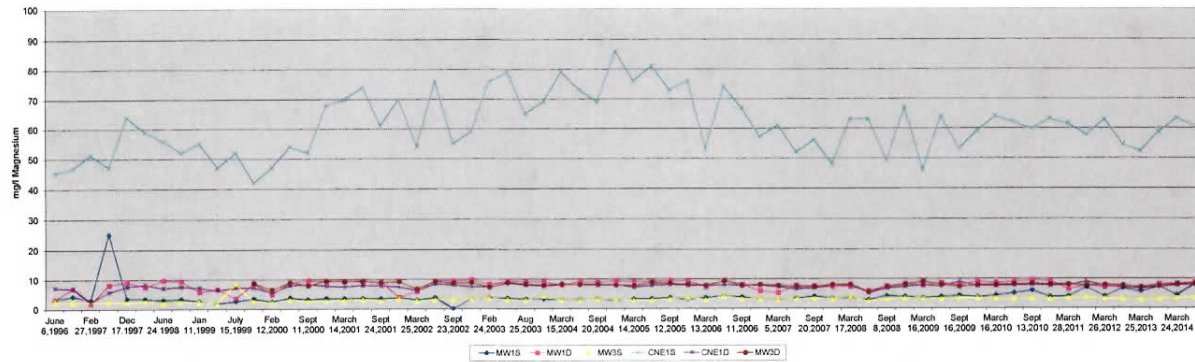
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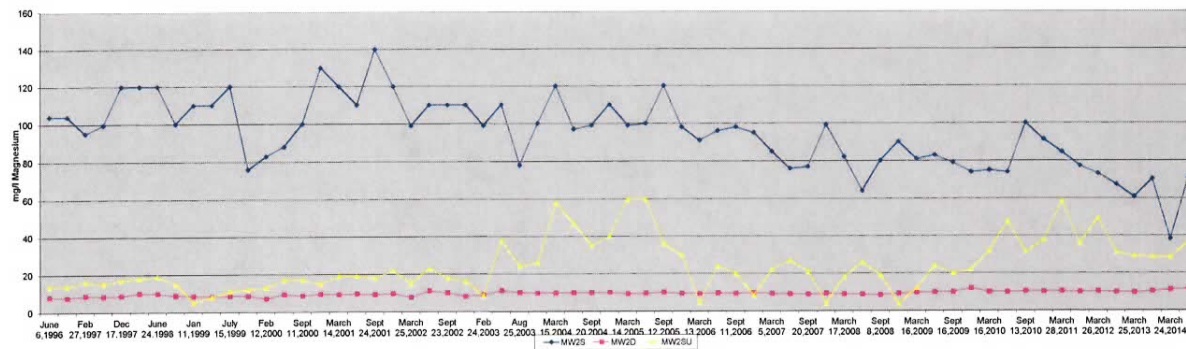
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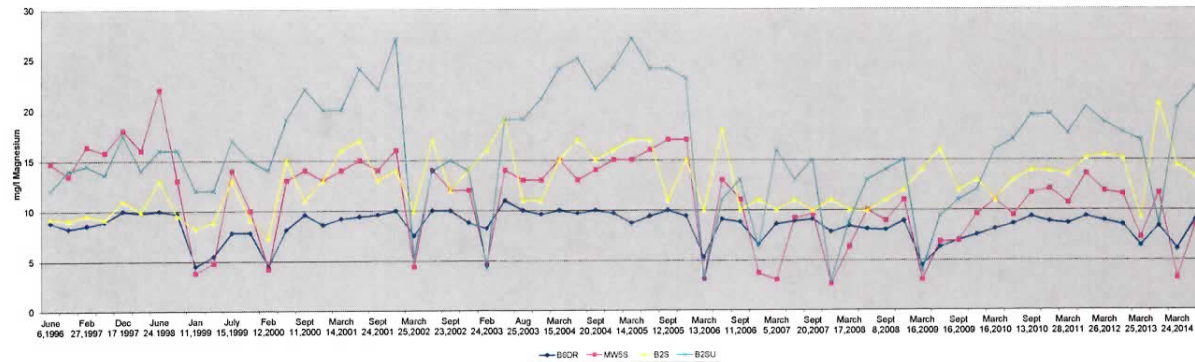
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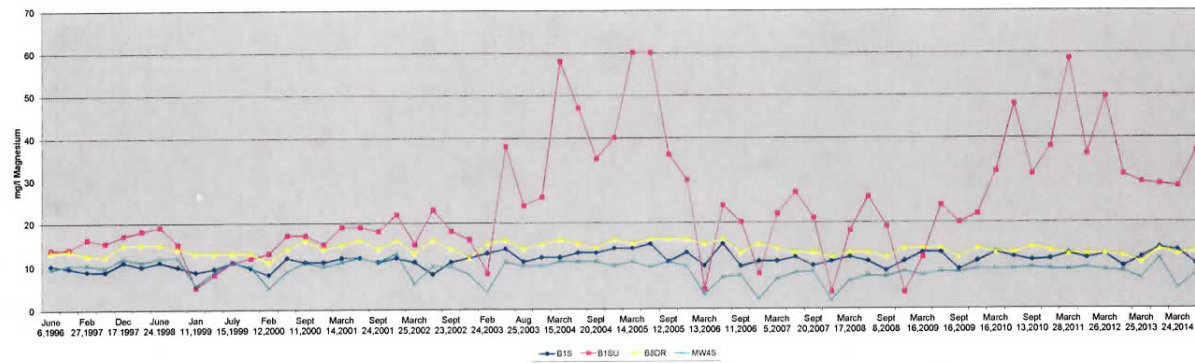
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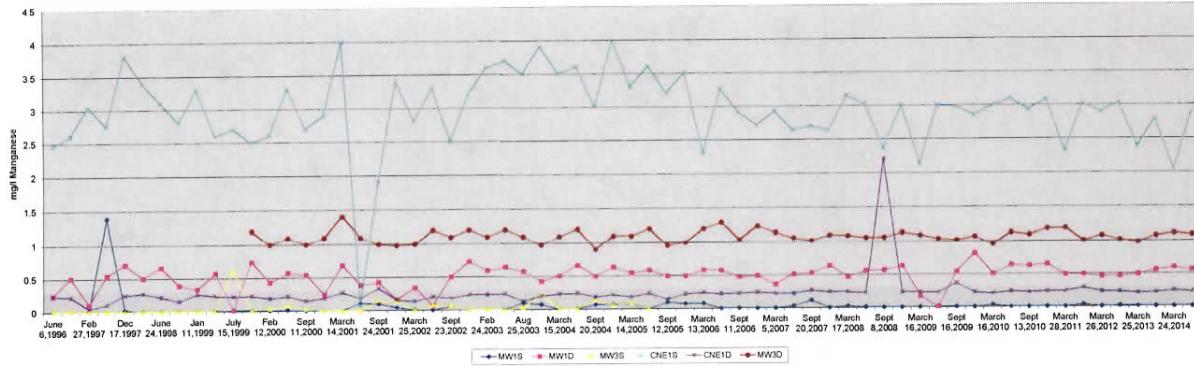
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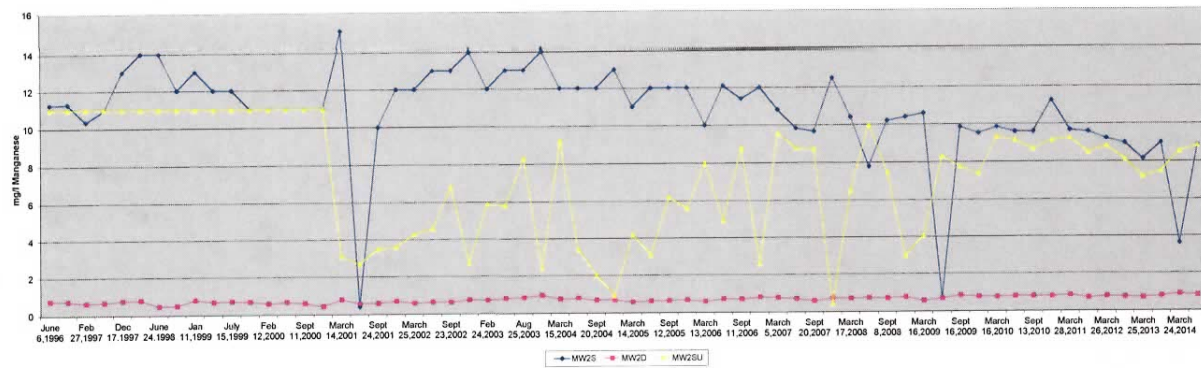
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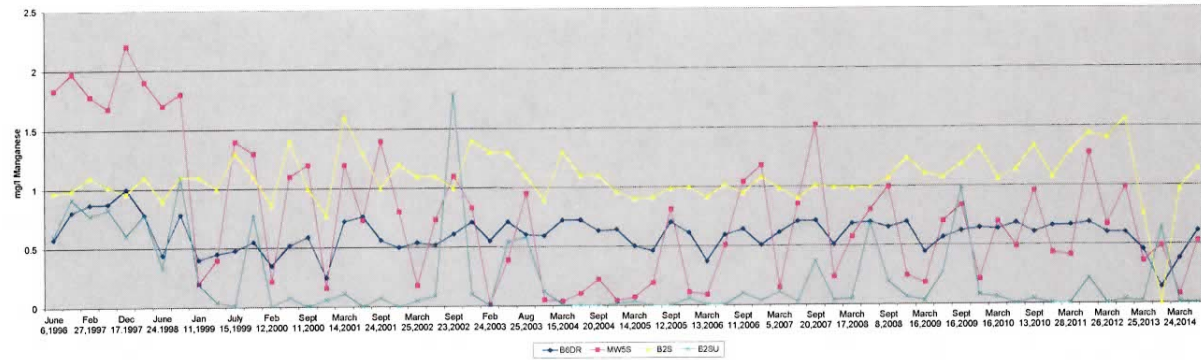
GROUP 1 WELLS DISSOLVED MANGANESE



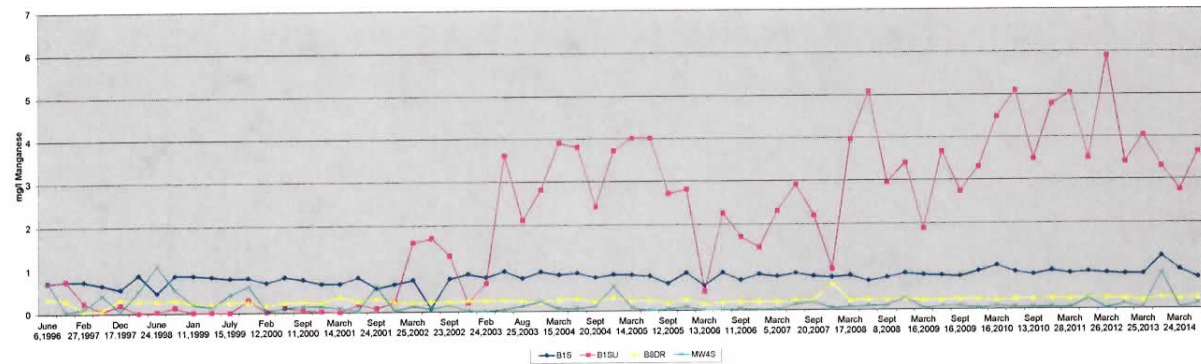
GROUP 2 WELLS DISSOLVED MANGANESE



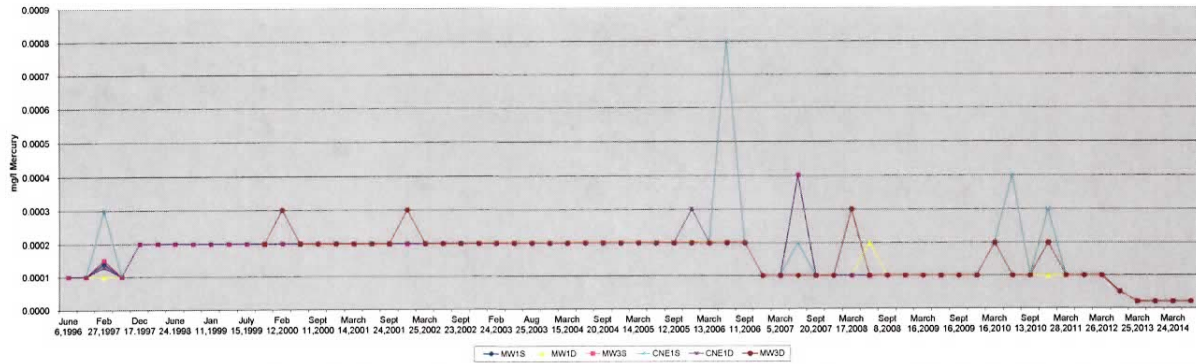
GROUP 3 WELLS DISSOLVED MANGANESE



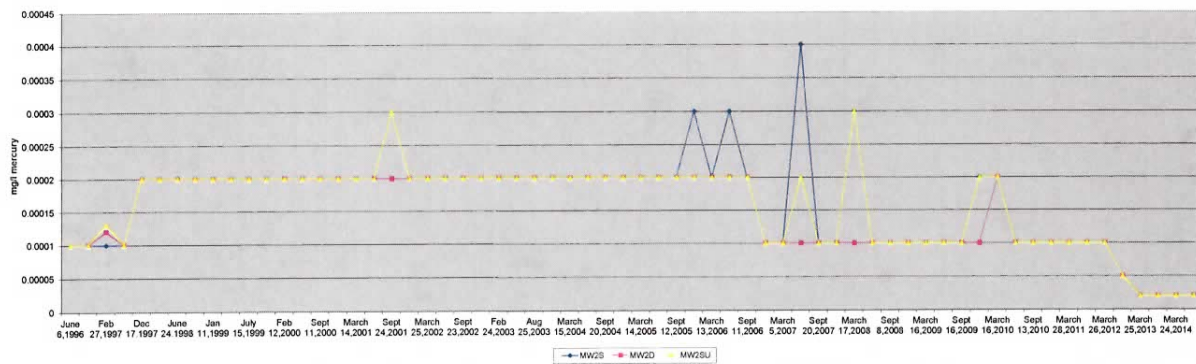
GROUP 4 WELLS DISSOLVED MANGANESE



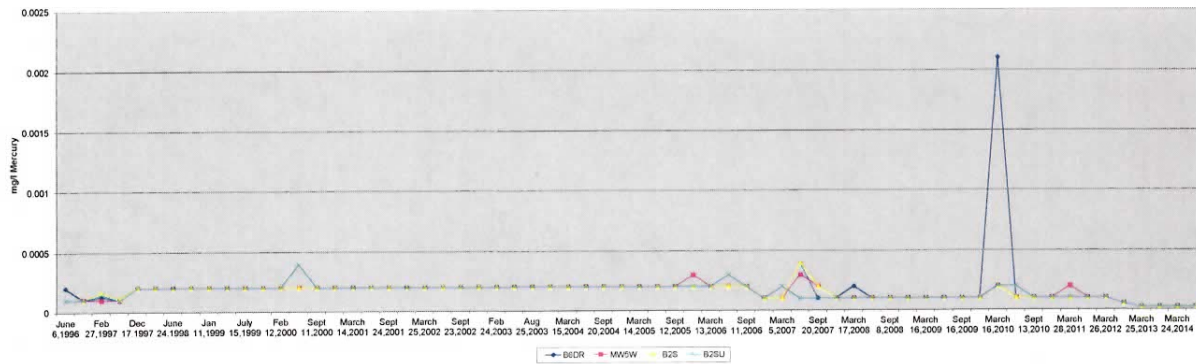
GROUP 1 WELLS DISSOLVED MERCURY



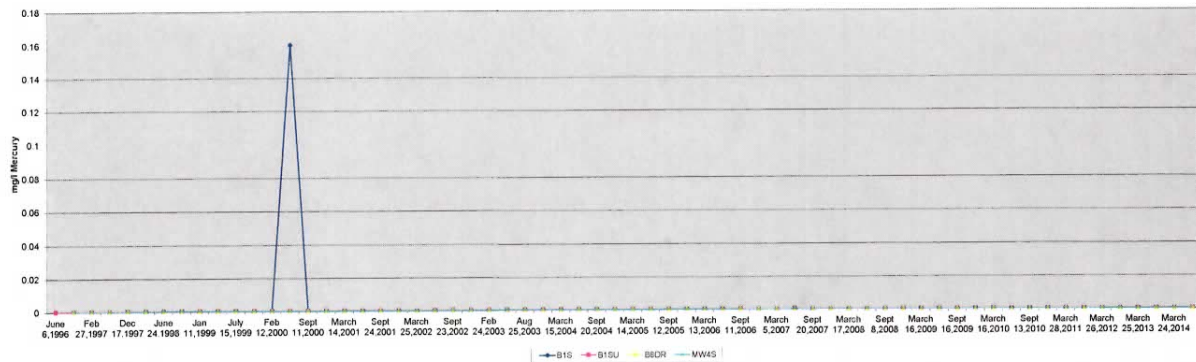
GROUP 2 WELLS DISSOLVED MERCURY



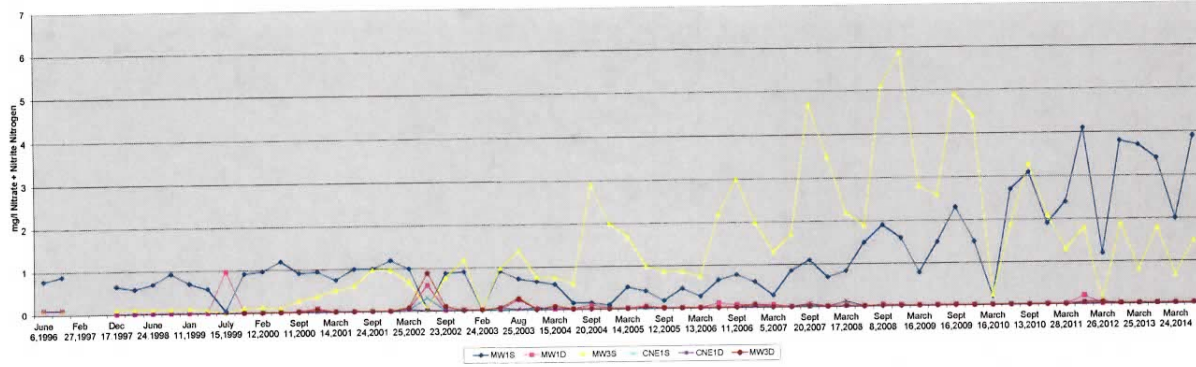
GROUP 3 WELLS DISSOLVED MERCURY



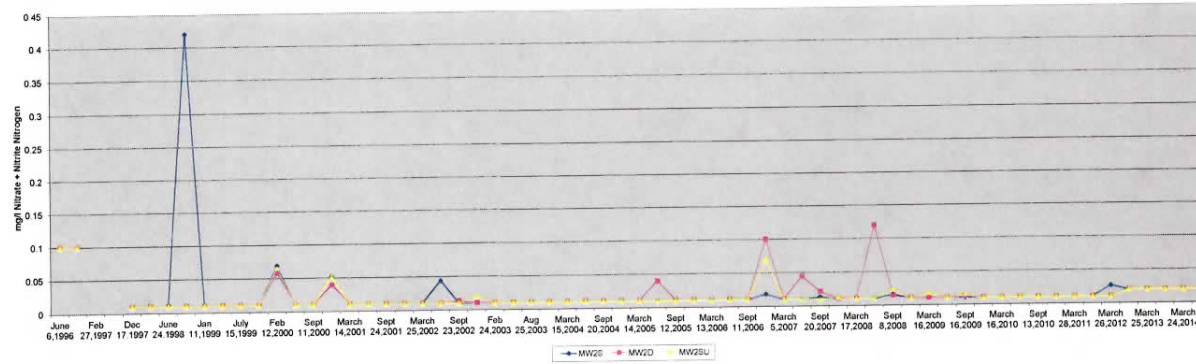
GROUP 4 WELLS DISSOLVED MERCURY



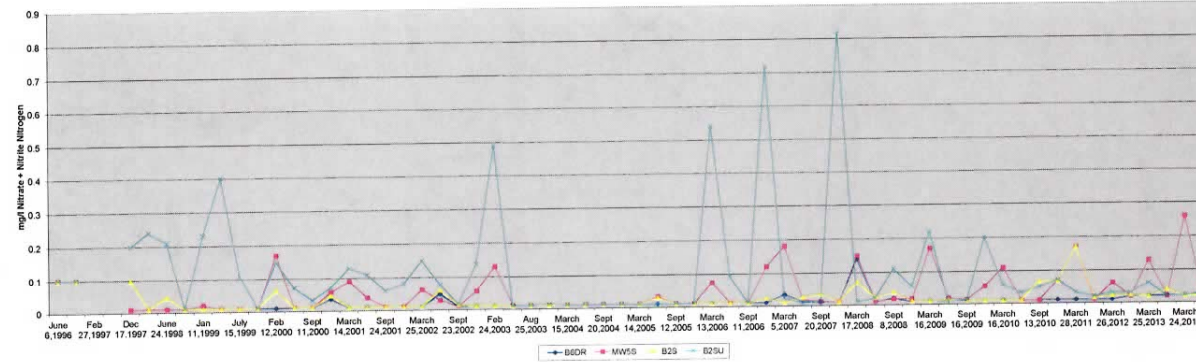
GROUP 1 WELLS NITRATE + NITRITE NITROGEN



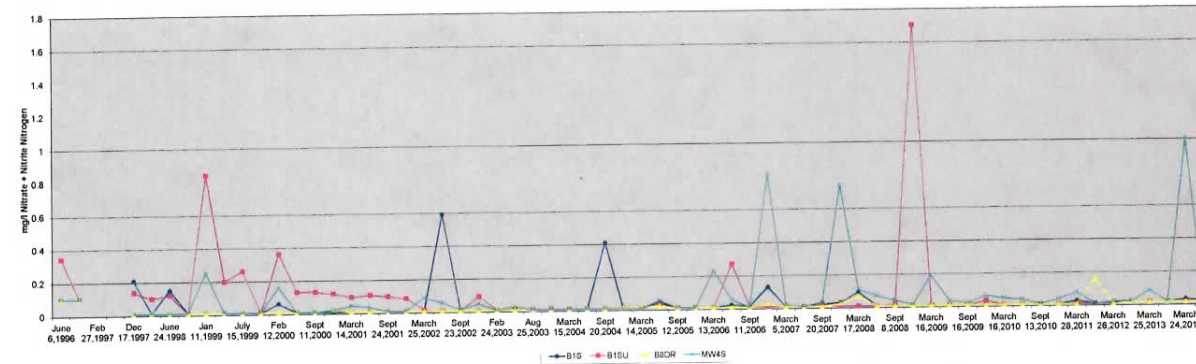
GROUP 2 WELLS NITRATE + NITRITE NITROGEN



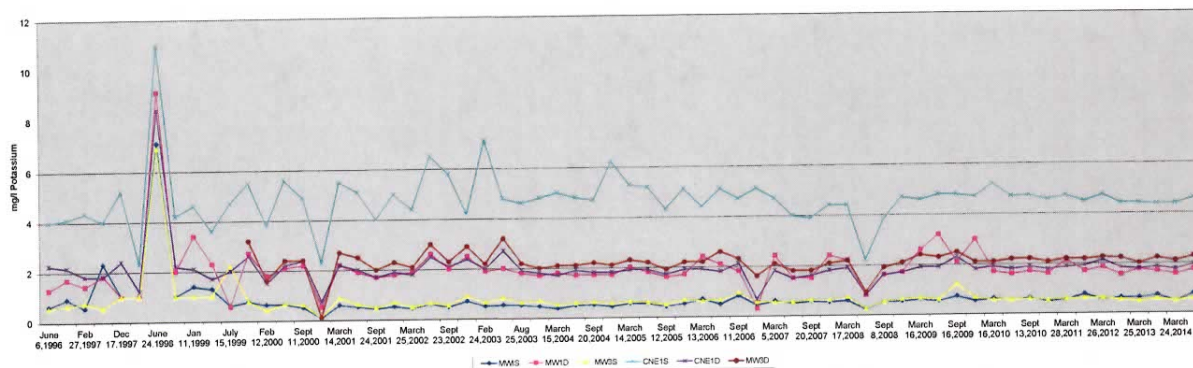
GROUP 3 WELLS NITRATE + NITRITE NITROGEN



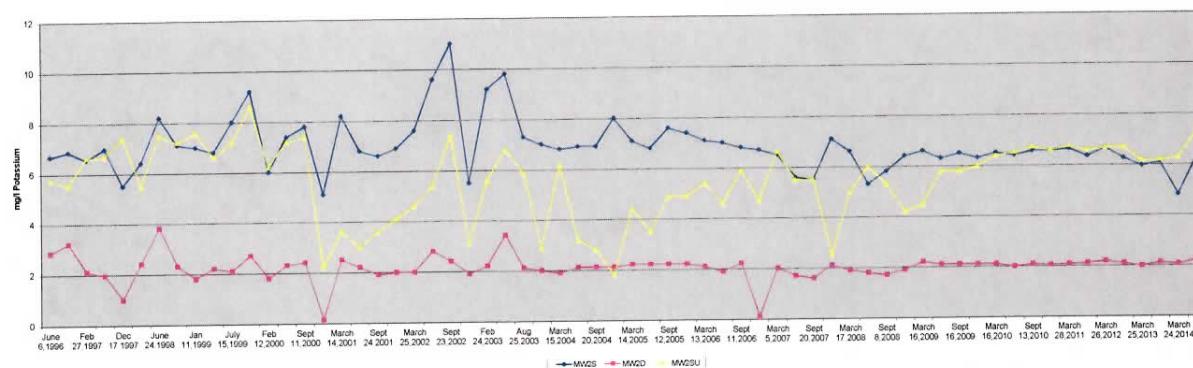
GROUP 4 WELLS NITRATE + NITRITE NITROGEN



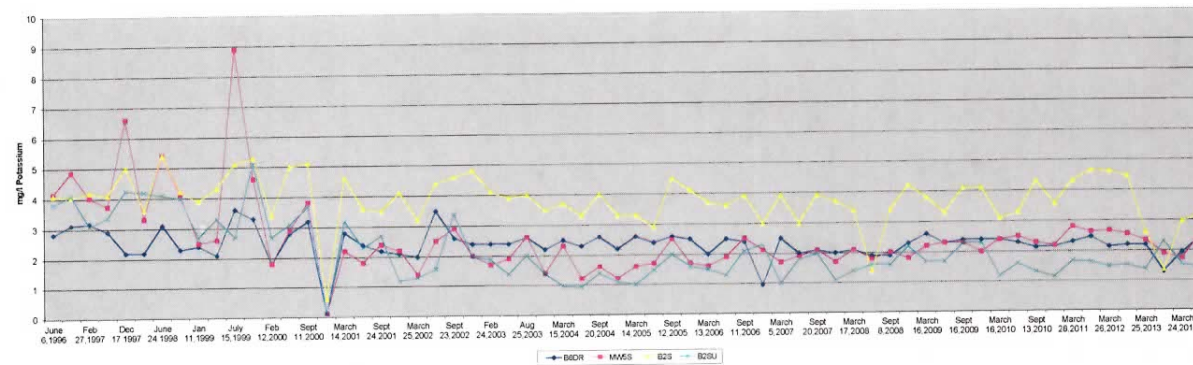
GROUP 1 WELLS DISSOLVED POTASSIUM



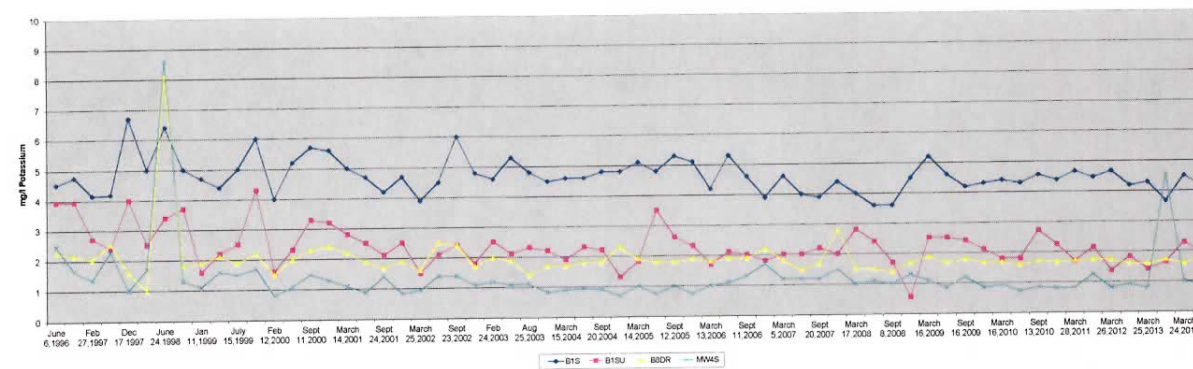
GROUP 2 WELLS DISSOLVED POTASSIUM



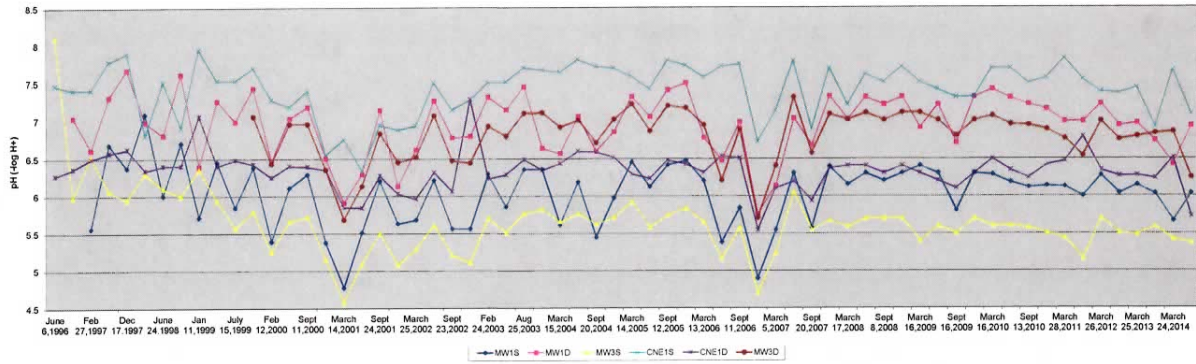
GROUP 3 WELLS DISSOLVED POTASSIUM



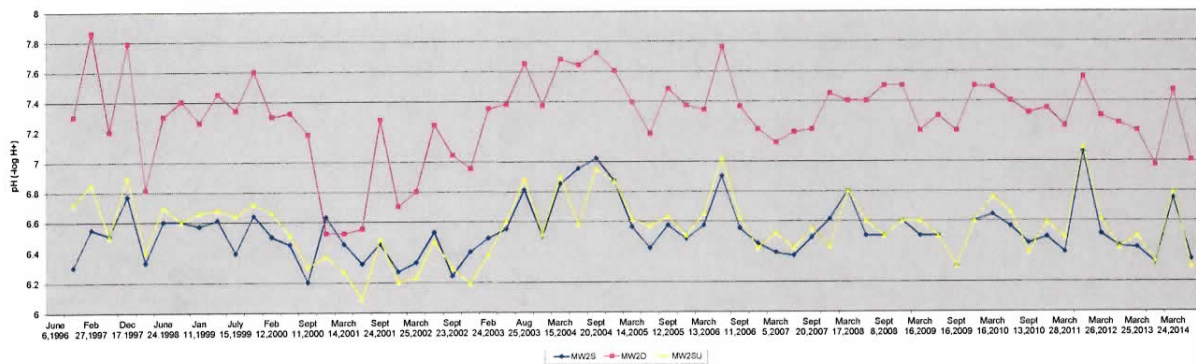
GROUP 4 WELLS DISSOLVED POTASSIUM



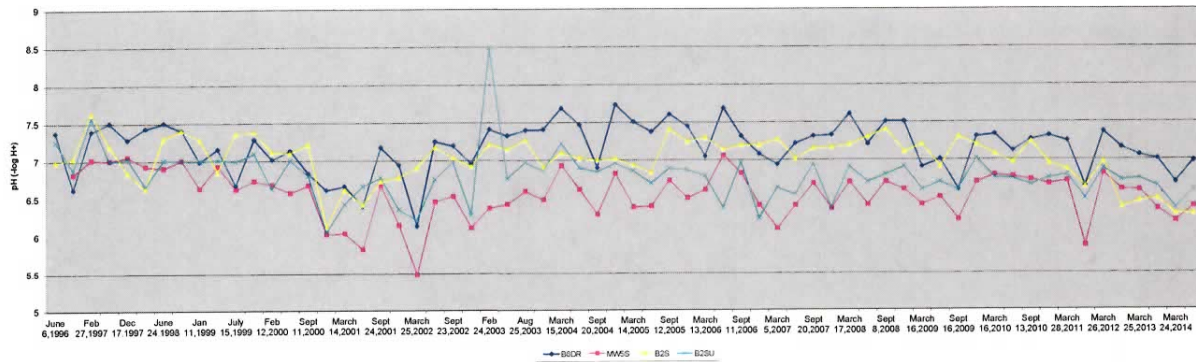
GROUP 1 WELLS pH



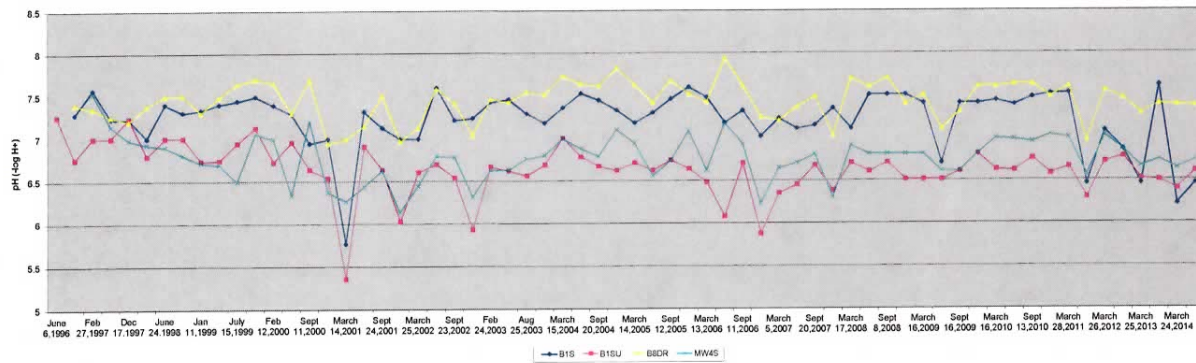
GROUP 2 WELLS pH



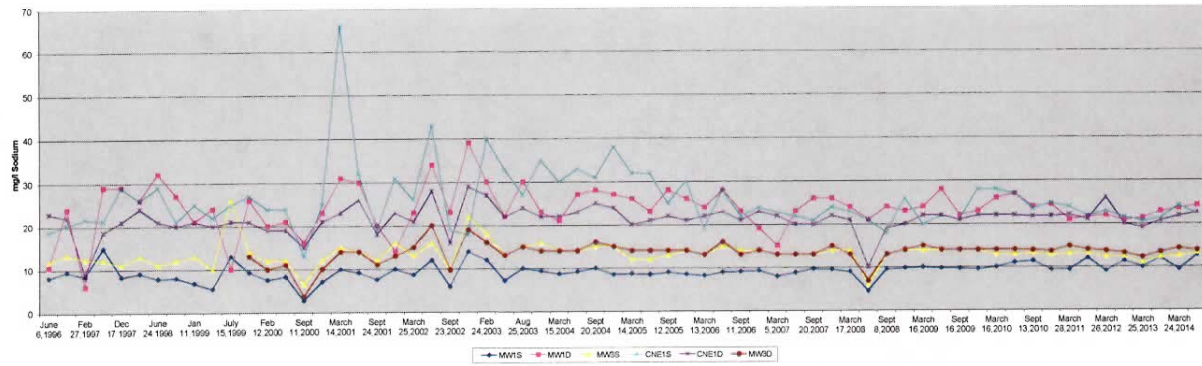
GROUP 3 WELLS pH



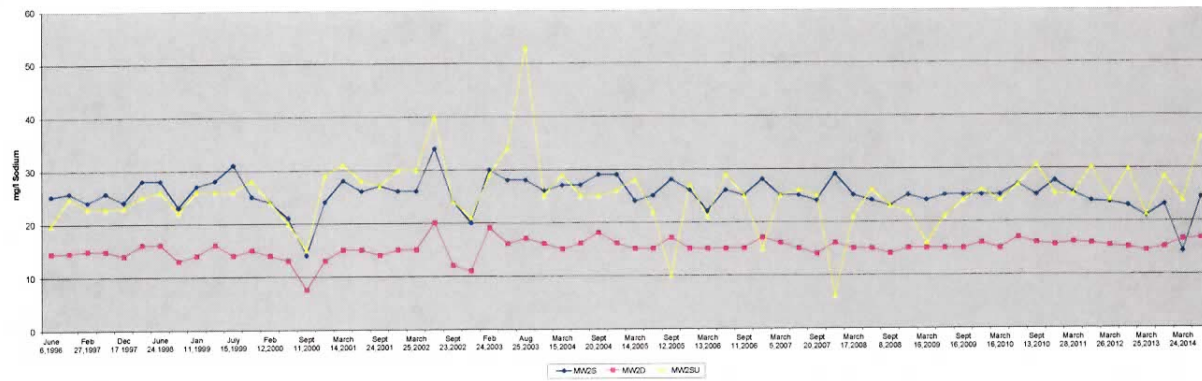
GROUP 4 WELLS pH



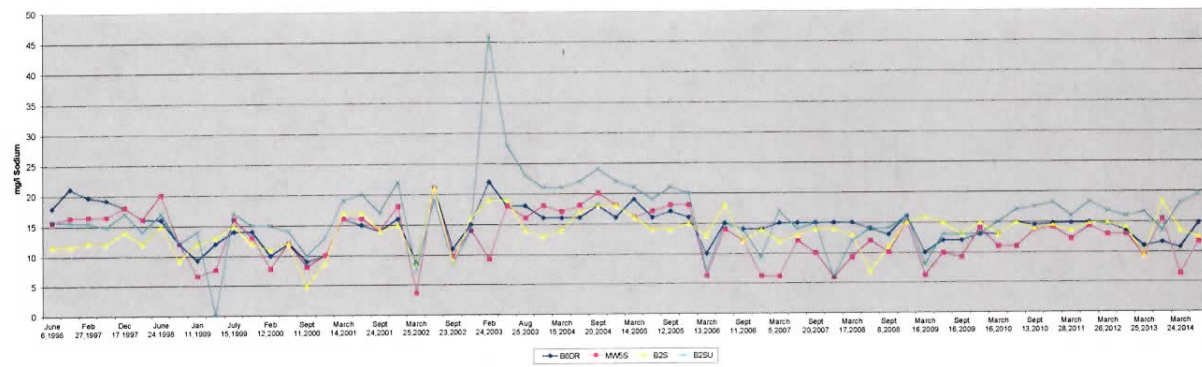
GROUP 1 WELLS SODIUM



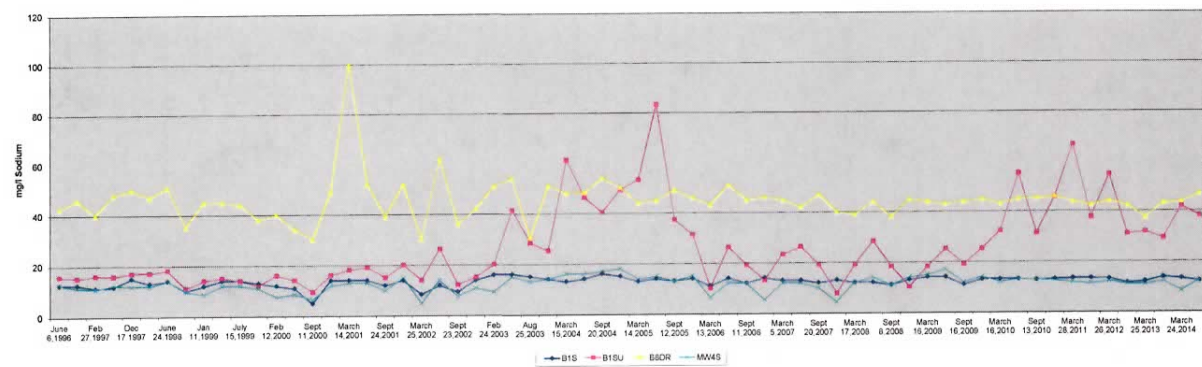
GROUP 2 WELLS SODIUM



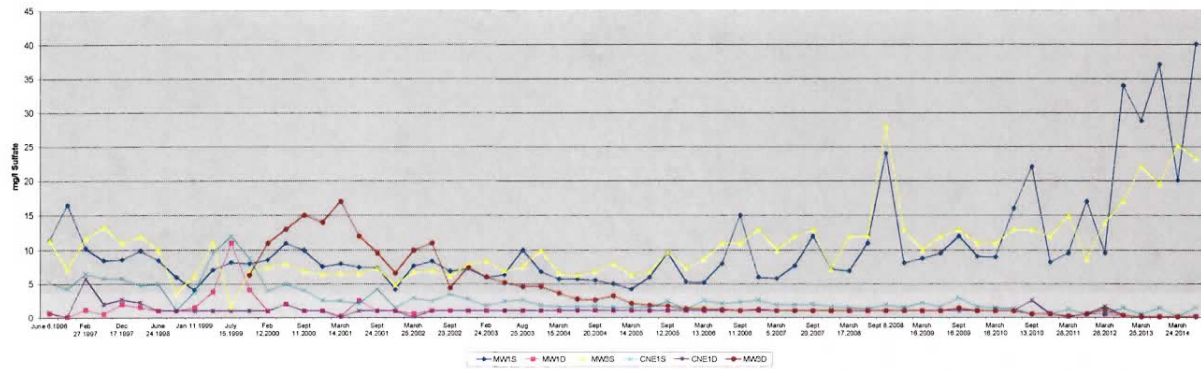
GROUP 3 WELLS SODIUM



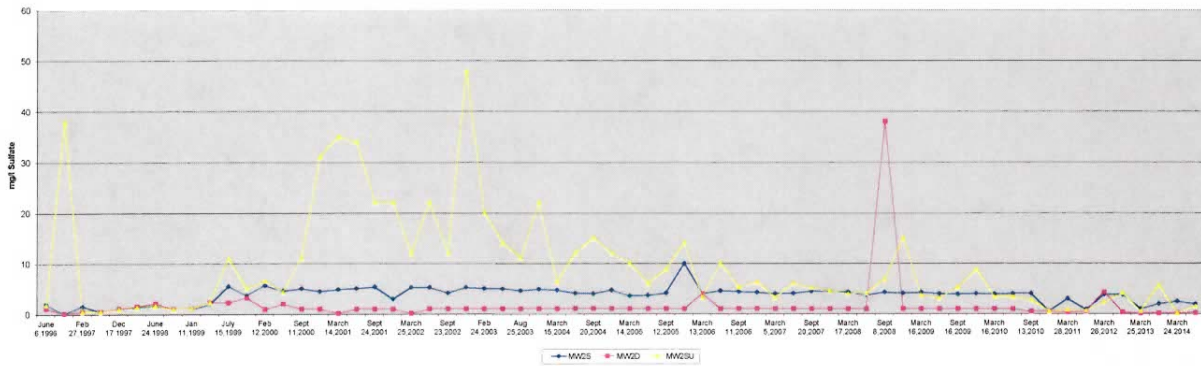
GROUP 4 WELLS SODIUM



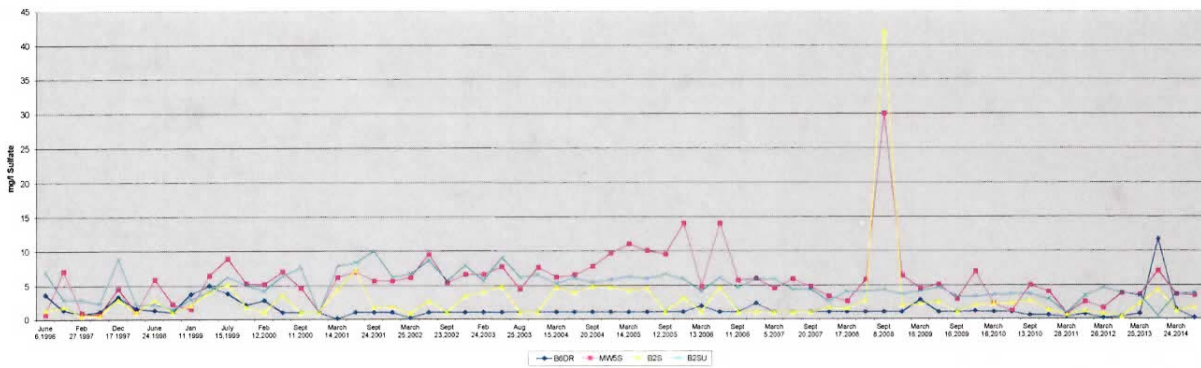
GROUP 1 WELLS SULFATE



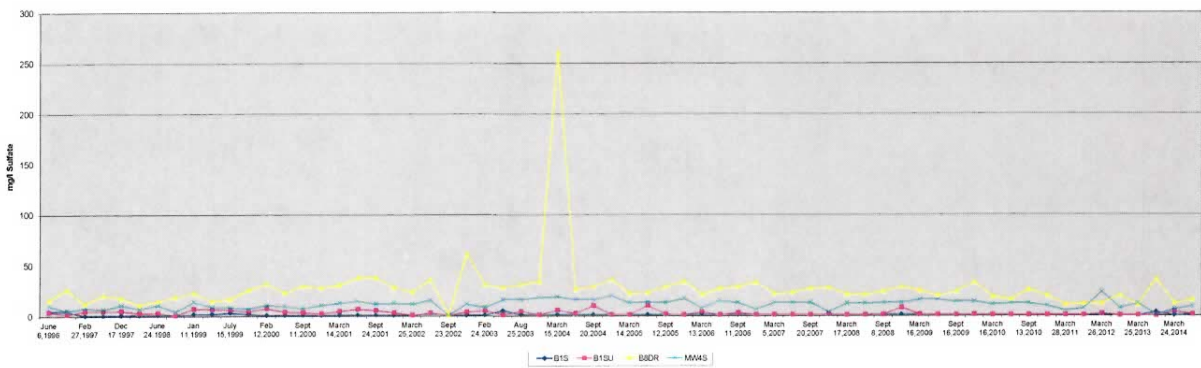
GROUP 2 WELLS SULFATE



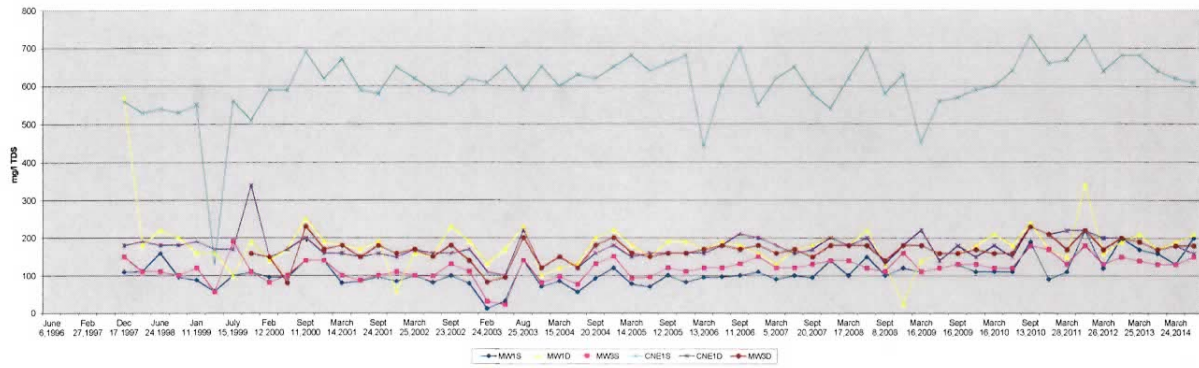
GROUP 3 WELLS SULFATE



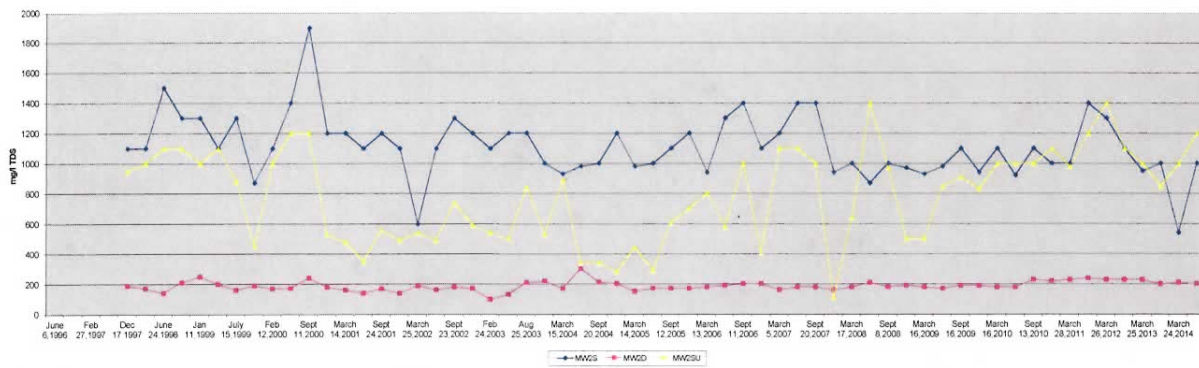
GROUP 4 WELLS SULFATE



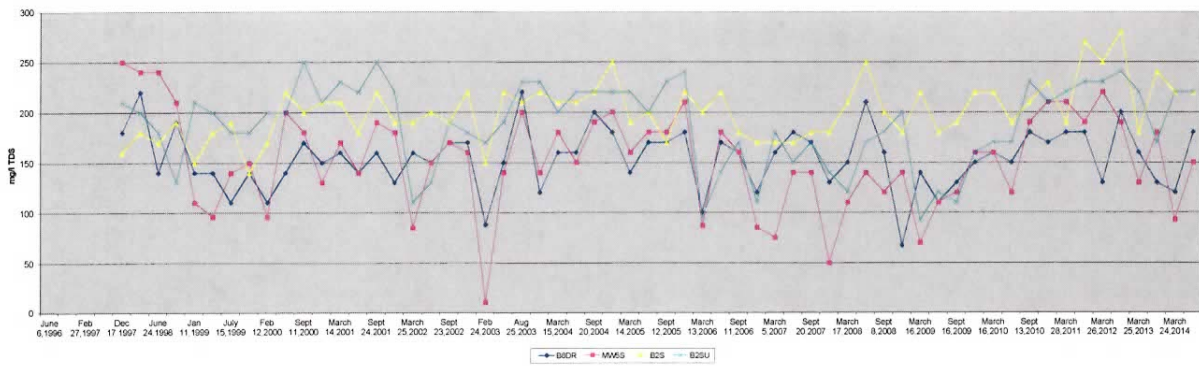
GROUP 1 WELLS TOTAL DISSOLVED SOLIDS



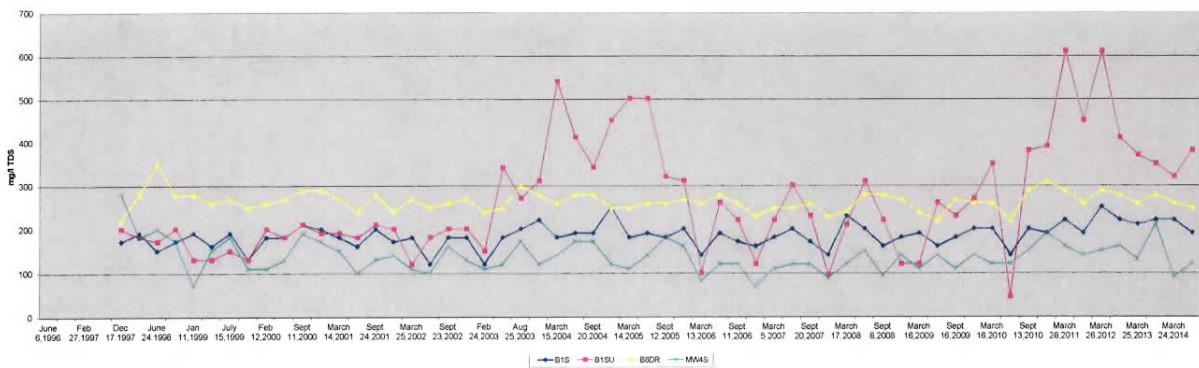
GROUP 2 WELLS TOTAL DISSOLVED SOLIDS



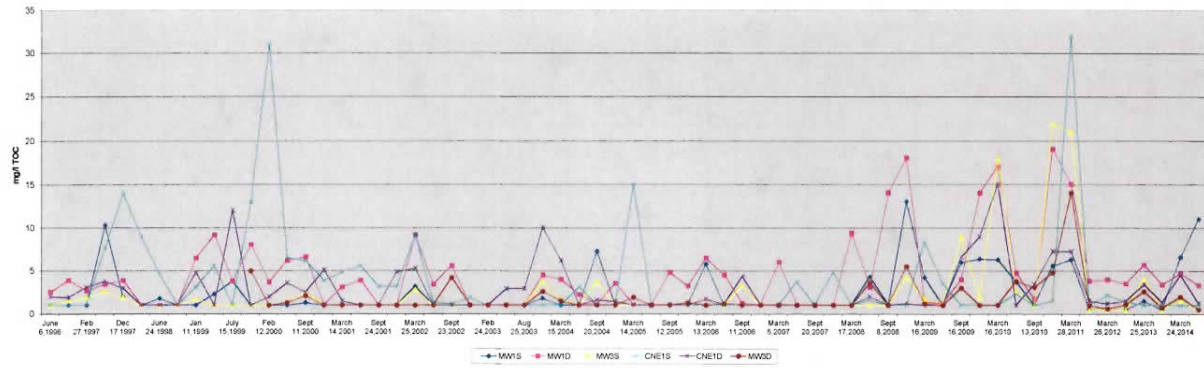
GROUP 3 WELLS TOTAL DISSOLVED SOLIDS



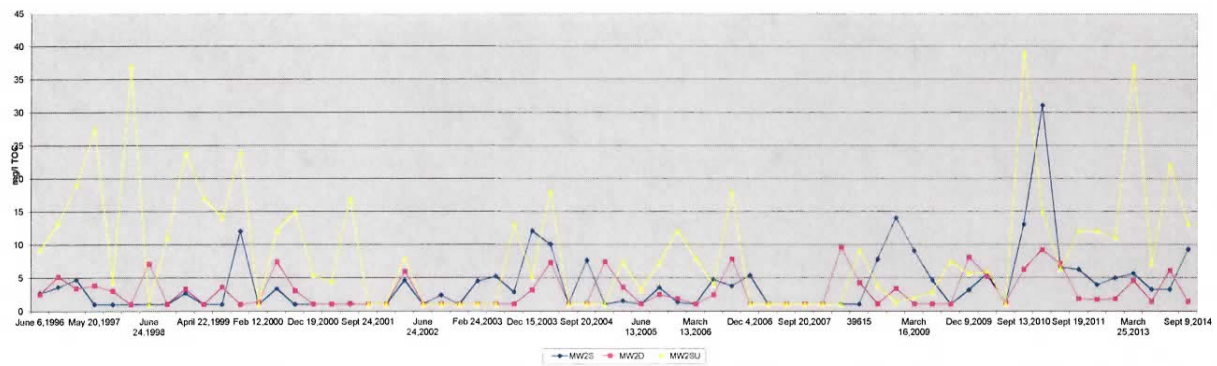
GROUP 4 WELLS TOTAL DISSOLVED SOLIDS



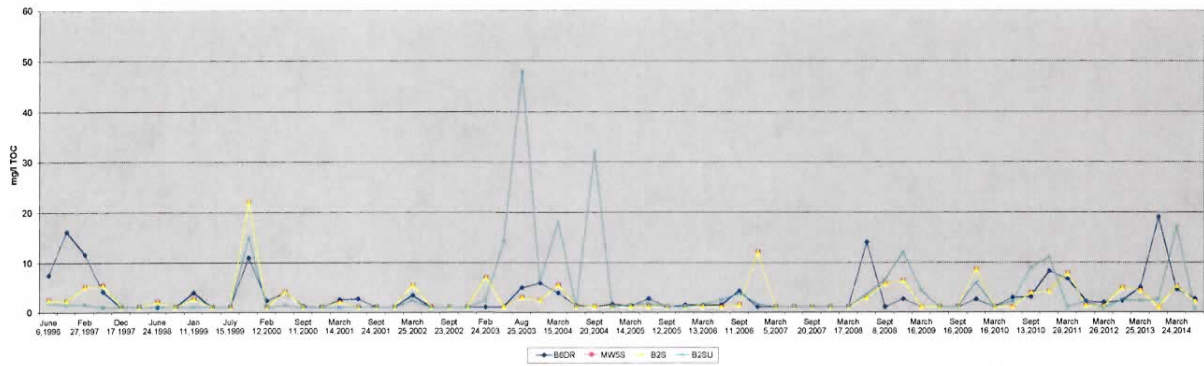
GROUP 1 WELLS TOTAL ORGANIC CARBON



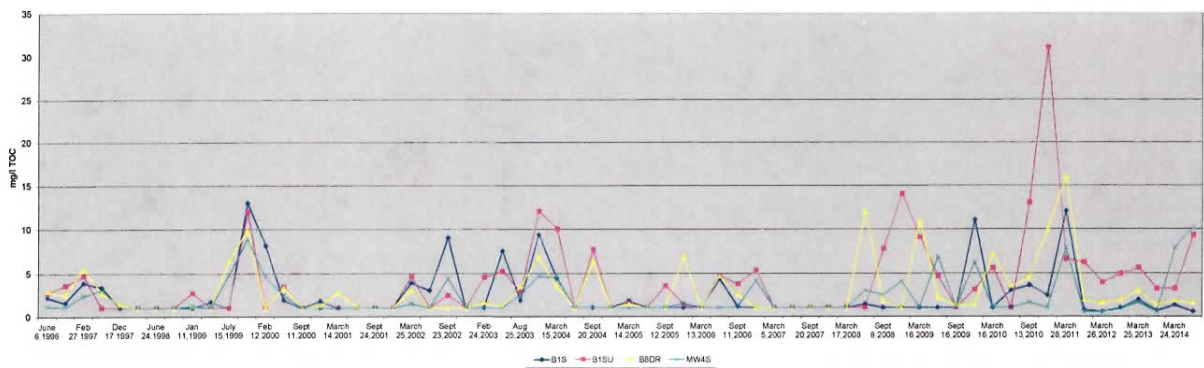
GROUP 2 WELLS TOTAL ORGANIC CARBON



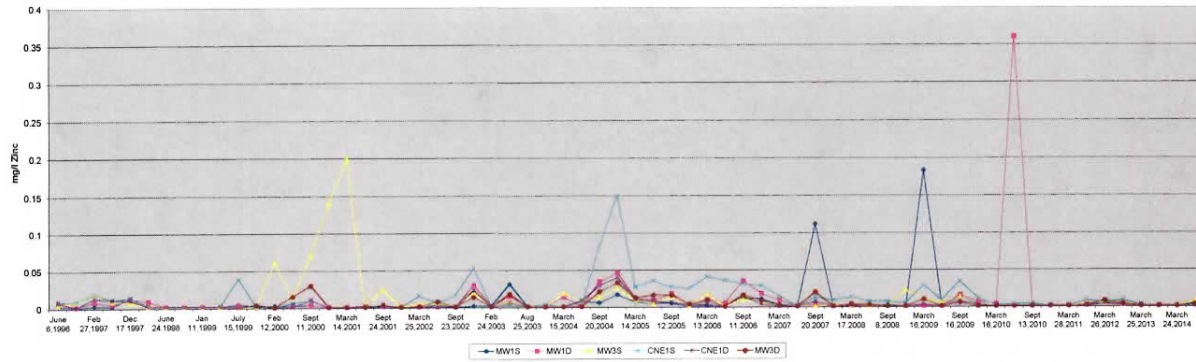
GROUP 3 WELLS TOTAL ORGANIC CARBON



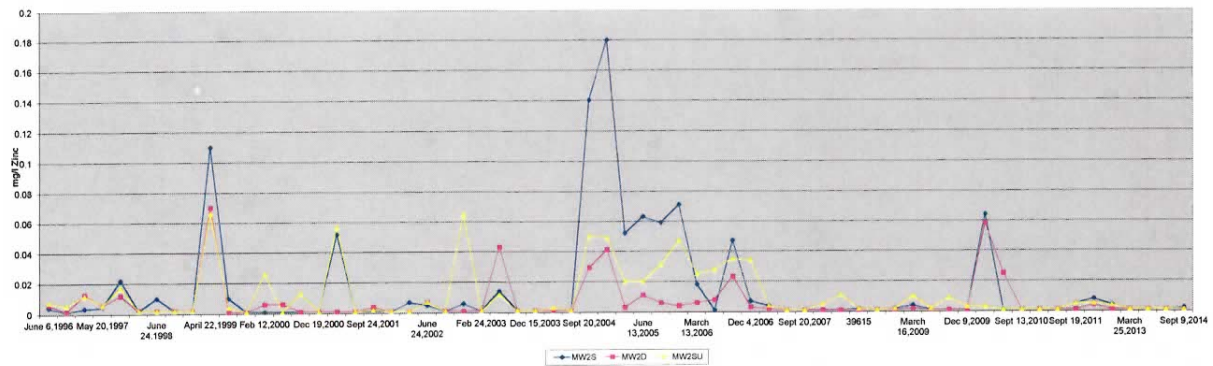
GROUP 4 WELLS TOTAL ORGANIC CARBON



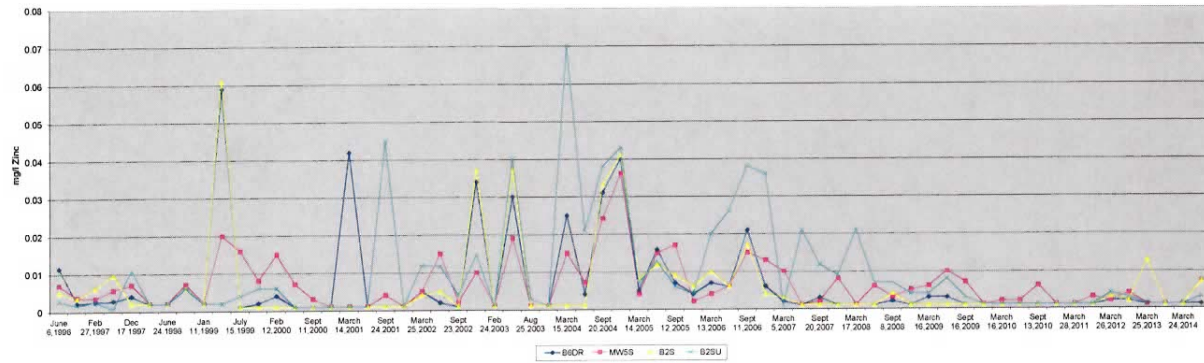
GROUP 1 WELLS DISSOLVED ZINC



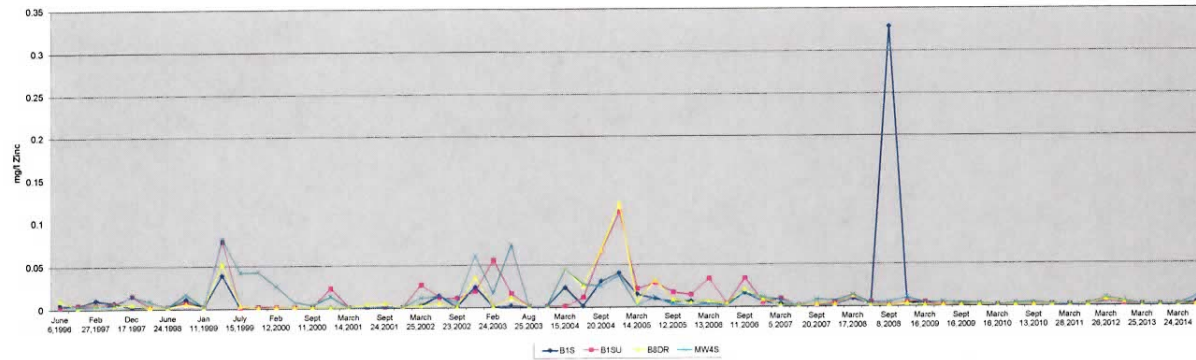
GROUP 2 WELLS DISSOLVED ZINC



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 June and September, 2014.

Centralia Landfill Perimeter Probe Data						
Date	Probe Number	Time	Barometric Pressure	Probe Pressure inches W. C.	% LEL	% Oxygen
6/6/2014	GP2	1130	29.98	0	0	17.1
6/6/2014	GP1	1135	29.98	0	0	20.5
6/6/2014	GP4A	1142	29.98	0	5	20.4
6/6/2014	GP4B		29.98	probe flooded		
6/6/2014	GP15	1042	29.98	0	1	5.4
6/6/2014	GP11	1046	29.98	0	0	20.9
6/6/2014	GP10	1050	29.98	0	0	19.2
6/6/2014	GP12	1055	29.98	0	0	20.9
6/6/2014	GP9	1100	29.98	0	0	20.9
6/6/2014	GP13	1105	29.98	0	0	13
6/6/2014	GP8	1110	29.98	0	0	20.9
6/6/2014	GP7	1115	29.98	0	1	20.6
6/6/2014	GP14	1117	29.98	0	0	20.9
6/6/2014	GP5R	1120	29.98	0	0	20.9
9/16/2014	GP2	1048	29.75	0	0	20.9
9/16/2014	GP1	1055	29.75	0	0	19.4
9/16/2014	GP4A	1103	29.75	0	5	0
9/16/2014	GP4B	1108	29.75	0	0	19.8
9/16/2014	GP15	935	29.75	0	0	14
9/16/2014	GP11	944	29.75	0	0	19.9
9/16/2014	GP10	950	29.75	0	0	19.8
9/16/2014	GP12	955	29.75	0	0	16.8
9/16/2014	GP9	958	29.75	0	0	18.9
9/16/2014	GP13	1010	29.75	0	0	20.7
9/16/2014	GP8	1014	29.75	0	0	19.5
9/16/2014	GP7	1021	29.75	0	0	20.9
9/16/2014	GP14	1027	29.75	0	0	18.1
9/16/2014	GP5R	1031	29.75	0	5	0.1