



**Gypsum Industries Limited**

**IPPC Licence No. 519-02**

***Annual Environmental Report***  
***Reporting Period Jan - Dec 2010***

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## **1.0 INTRODUCTION**

## **1.0 Introduction**

This Annual Environmental Report of Gypsum Industries Limited (GIL) covers the period from January 2010 to December 2010.

Founded in 1936 and now employing 106 people, Gypsum Industries Limited is situated close to the town of Kingscourt, Co Cavan, eighty five kilometres from Dublin. In addition to the process site, the 118 acre site contains storage silos, warehouses, workshops, a landfill and water lagoon system.

Irish Gypsum is situated close to the town of Carrickmacross, Co Monaghan, ninety kilometres from Dublin. In addition to the mining and quarry operation, the 206 acre site contains the Crushing plant, homogeniser, Lorry loading facility, office buildings, workshops, and lagoon systems.

Gypsum Industries Limited (GIL) manufactures plaster and plaster boards for the construction industry. Gypsum is mined underground and quarried opencast. The site is located 4.5km southwest of Carrickmacross.

Gypsum is a non metallic mineral, which is found in rock form. It is composed of Calcium Sulphate di-hydrate. After mining Gypsum is crushed and transported by road to the processing facility where it is calcined and then converted to cement, gypsum plaster boards or builders plaster.

## **1.1 Production Process**

The process of making Gypsum plaster and plaster board products is shown schematically overleaf and can be summarised as follows:

1. Raw material is mined, crushed, homogenised and tested before delivery to the process site or direct to customers
2. The crushed rock is transported by road to the process site.
3. The rock is fed into 'Raymond Mills' where the particle size is further decreased.
4. This material is fed into Kettles which calcine (drive off some of the chemically bound water) the Gypsum material to make Stucco
5. Stucco is then fed to the board plant or plaster mill where the ingredients are added to make the various products.

Figure 1.0 Process Flow – Process Site

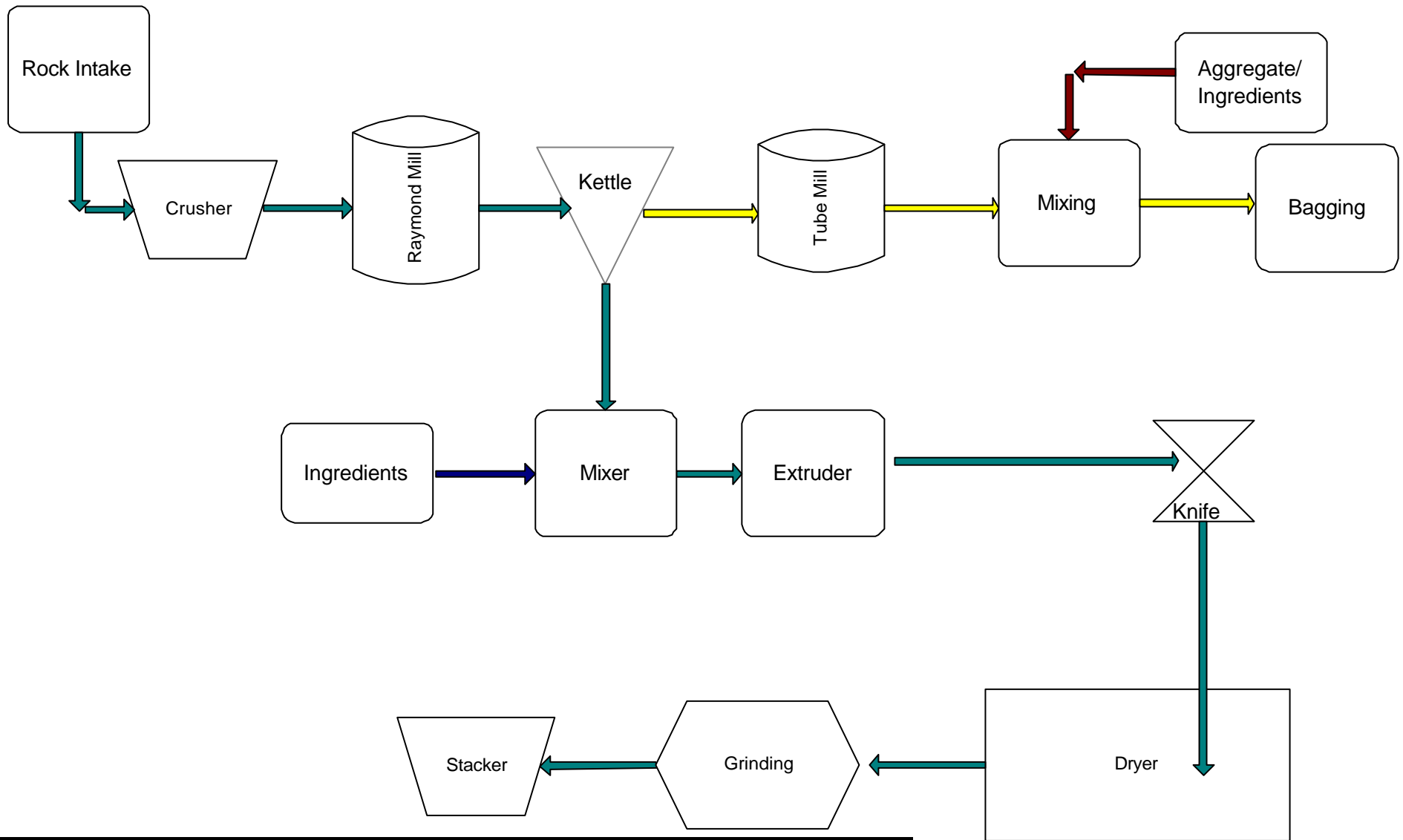
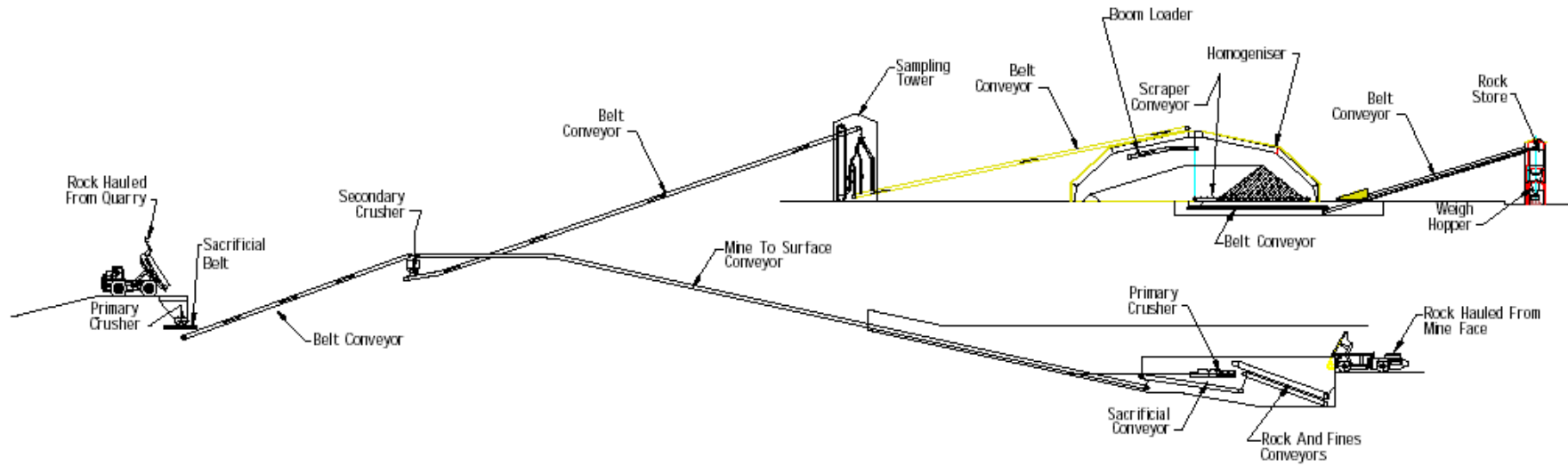


Figure 1.1 Process Flow – Mine Site



## **1.2 Environmental Issues**

As an organisation involved in the mining and manufacturing process there is a strong awareness of environmental issues. Since GIL was established, the company has demonstrated their commitment to good business and environmental standards and practice. This commitment has been shown through registration to the following standards and achievement of awards:

- 1990 Registered to ISO 9002:1990
- 2002 Obtained Integrated Pollution Control Licence.
- 2003 Registered to ISO 9001:2000
- 2004 Registered to ISO 14001 2004
- 2008 Registered to ISO 9001:2008
- 2009 Registered to OHSAS 18001
- 2010 Registration to IS EN 16001

In line with legislative requirements GIL applied for and was issued with an Integrated Pollution Prevention and Control Licence (IPPC) by the Environment Protection Agency in July 2002 (License No. P0519-02). Procedures are in place to achieve compliance with ISO 14001 and the IPPC Licence.

## **1.3 Environmental Policy**

Our environmental policy was updated in Q1 of 2010 and is attached as Appendix (i)

## **2.0 EMISSIONS TO ATMOSPHERE**

## **2.0 Summary of Process Emissions to Atmosphere:**

There are eight IPPC licensed process air emission points. A brief description of each is presented below.

### **Electrostatic Precipitator (AE-1)**

The electrostatic precipitator was replaced by a bag filtration system in order to comply with the limits specified in our IPPC licence.

A combination of four 'Raymond Mills' (R1-R4) and three kettles (K3-K5) exhaust through this bag filtration system. These units all operate on natural gas

Cyclones at the top of the kettles and Raymond mills collect the majority of the stucco carried by the air flowing through the kettles and Raymond mills. The remaining exhaust gases from the kettle and Raymond mill circuits, which contain excess hot air, products of combustion and particulate matter are passed through the bag filtration system. Kettles also exhaust steam.

The particulate matter is removed from the gas stream and the remaining emissions are discharged to atmosphere via the AE-1 stack.

The concentration of particulates is monitored continuously using a PCME SC 600 opacity monitor which is located in the kettle control room.

The NOX air emissions from AE1 have decreased this year. Air emissions are measured on AE1 quarterly. The average mass emission rate was 1.2411 Kg/hr, (based on measurements of 0.7560, 1.2729, 1.1640 and 1.7715 kg/hr respectively). The average emission value was 26.225 mg/m<sup>3</sup>, (based on measurements of 20.2, 28.4, 32.7 and 23.6 mg/m<sup>3</sup> respectively). This is within the limit of 130 mg/m<sup>3</sup>.

The Particulate air emissions from AE1 have slightly increased this year. The average mass emission rate was 0.2417 Kg/hr, (based on measurements of 0.0819, 0.1171, 0.7226 and 0.0450 kg/hr respectively). The average emission value was 6.65 mg/m<sup>3</sup>, (based on measurements of 1.3, 4.4, 20.3 and 0.6 mg/m<sup>3</sup> respectively). This is within the limit of 50 mg/m<sup>3</sup>. Although particulate emissions have increased, the increase is not significant.

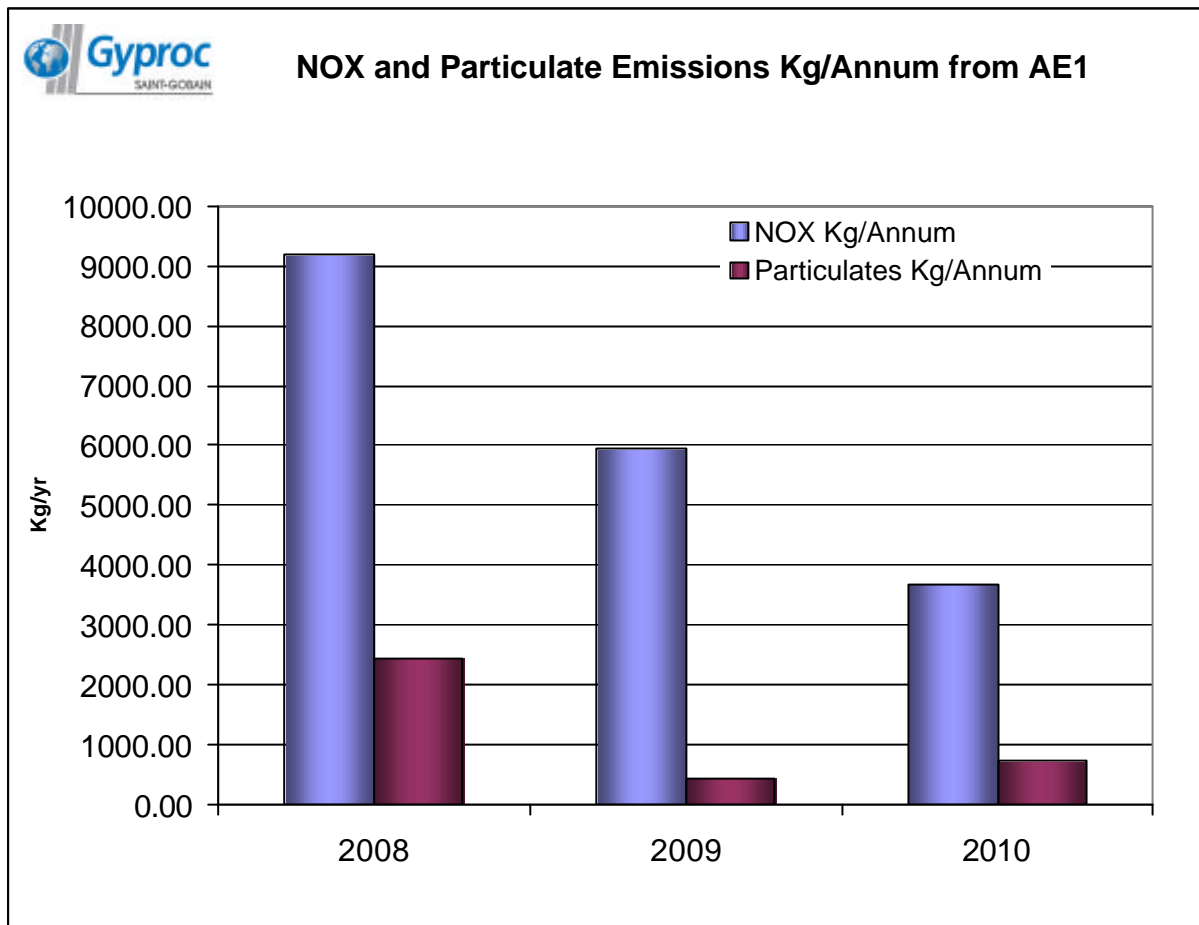
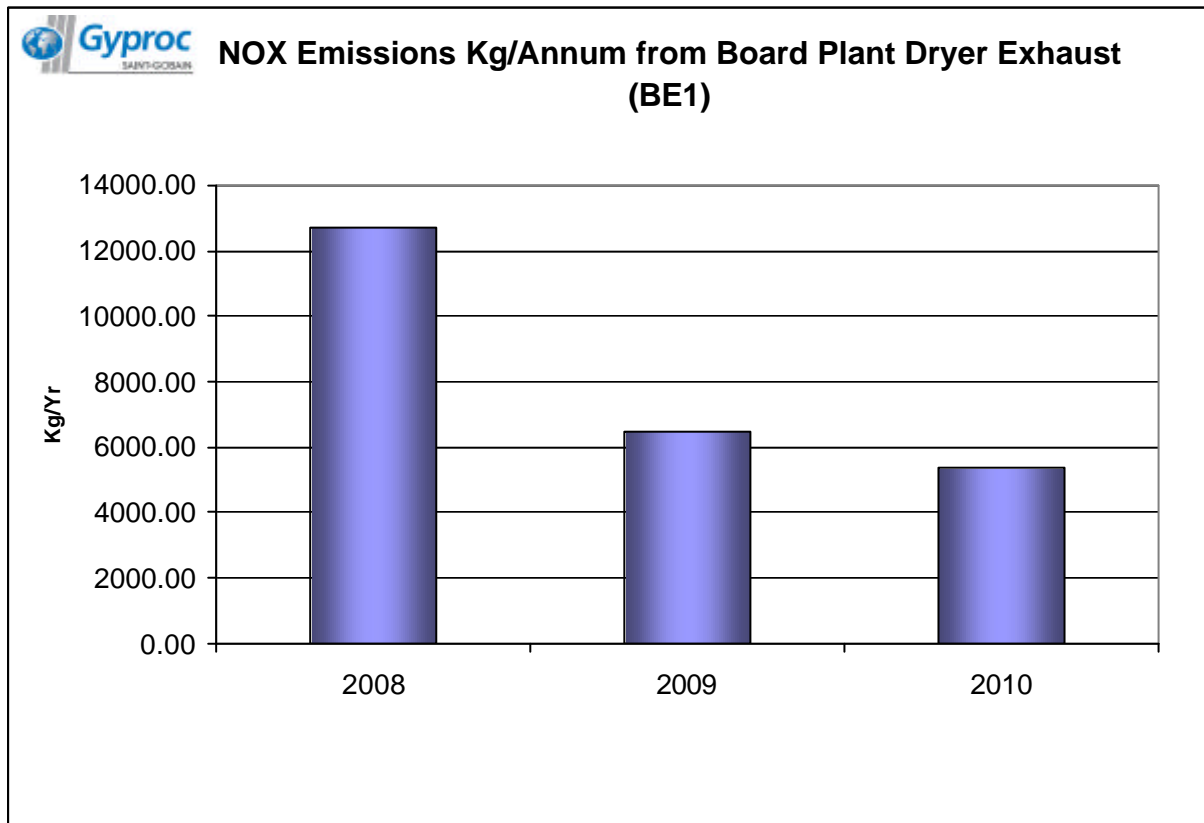


Figure 2.1 NOX and Particulates Emissions Kg/ Annum from (AE-1)

## Board Plant Drier exhaust (BE-1)

In the board plant, plaster boards are dried in a 10 deck flat bed dryer which is fired on Natural gas. Wet board is passed through five small pre zone burners and three main zones in the dryer. The zones differ in temperature and humidity and drive water vapour off the product. The exhaust gases from the pre-zones and zones 1 and 2 are run through a heat exchanger for energy efficiency purposes. They are used to pre heat supply air for combustion and process air.

The exhaust gases for the board plant drier are hot air, steam and the products of combustion.



*Figure 2.2 NOX Emissions Kg/ Annum from Board Plant Dryer Exhaust (BE-1)*

The NOX air emissions from BE1 have decreased this year. Air emissions are measured on BE1 quarterly. The average mass emission rate was 2.001 Kg/hr, (based on measurements of 2.62259, 1.46948, 1.67223 and 2.23936 Kg/hr). The average emission value was 32.33 mg/m<sup>3</sup>, (based on measurements of 38.7, 28.8, 30.8 and 31 mg/m<sup>3</sup>). This is within the limit of 130 mg/m<sup>3</sup>.

### **Perlite and Vermiculite expanders (AE 10)**

Raw perlite and vermiculite is fed into rotary expanders. These expanders are heated using natural gas. The heat causes the perlite / vermiculite to expand. The expanded material is passed through a cyclone and then to storage bins.

The exhaust gases from the cyclones are then passed through a single bag filtration system. Exhaust gases include the products of combustion and particulates.

GIL applied for and received a technical amendment during 2008 for this emission point. Technical amendment C. The technical amendment was granted in late November 2008. Air emissions on AE-10 are monitored bi-annually.

The average mass emission rate for particulates was 0.0389 Kg/hr, (based on measurements of 0.0171 and 0.0607 Kg/hr). The average emission value was 1.3 mg/m<sup>3</sup>, (based on measurements of 0.1 and 2.5 mg/m<sup>3</sup>). This is within the limit of 20 mg/m<sup>3</sup>.

The average mass emission rate for NOX was 0.4274 Kg/hr, (based on measurements of 0.7529 and 0.1020 Kg/hr respectively). The average emission value was 4.3 mg/m<sup>3</sup>, (based on measurements of 4.4 and 4.2 mg/m<sup>3</sup>). This is within the limit of 50 mg/m<sup>3</sup>.

### **Kettle Exhausts (BE 4, BE 5, BE 6)**

Kettles calcine the graded material from the 'Raymond mills'. Kettle 3, 4 and 5 are multi-tubed kettles. There are two burners on each kettle. The Submerged (Top) burner utilises direct heat into the product, while the bottom burner uses indirect heat to heat the product.

The Submerged (Top) burner exhausts pass through cyclones and then onto the bag filtration system on AE-1.

The exhaust from the bottom burners contains the products of combustion and particulates. These exhaust gases are used to preheat the Raymonds through a computerised PLC system. Each Kettle has an individual exhaust. Kettle 3 - BE 4, Kettle 4 – BE5, and Kettle 5 – BE-6. The monitoring frequency is annually.

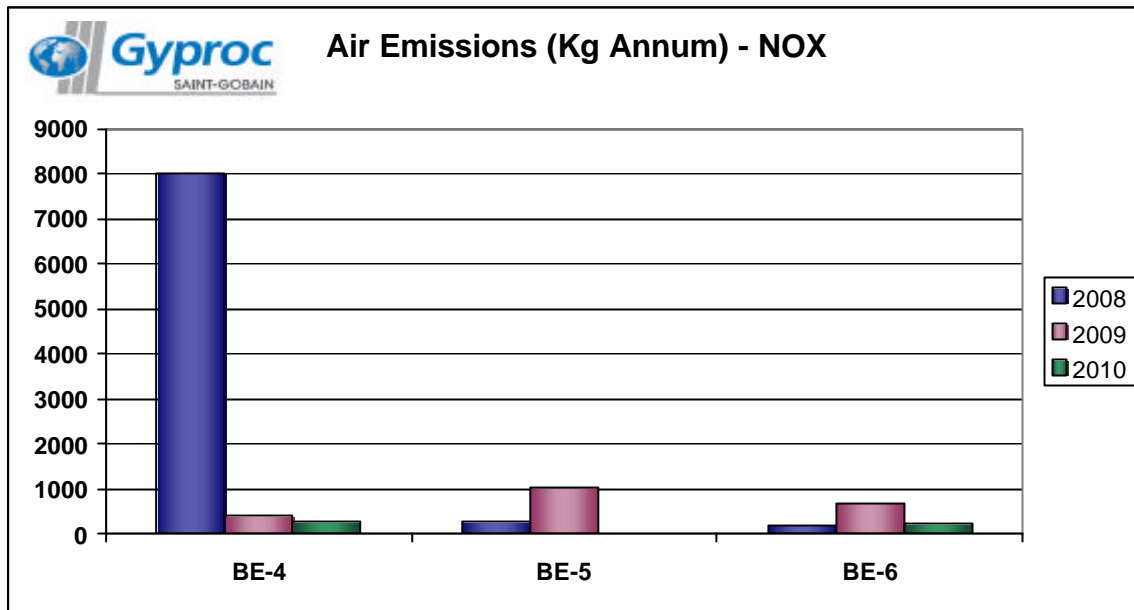


Figure 2.3 NOX Emissions Kg/ Annum from Kettles 3,4 and 5 (BE-4, BE-5, BE-6)

The NOX emissions to air from BE4 have decreased this year. The mass emission rate was 0.164 Kg/hr. The emission value was 57.4 mg/m<sup>3</sup>. This is within the limit of 200 mg/m<sup>3</sup>.

The NOX air emissions from BE5 have decreased this year. The mass emission rate was 0.0 Kg/hr. The emission value was 0.0 mg/m<sup>3</sup>. The measured value was below the limit of detection. This is within the limit of 200 mg/m<sup>3</sup>.

The NOX air emissions from BE6 have decreased this year. The emission value measured was 209 mg/m<sup>3</sup> against a limit of 200 mg/m<sup>3</sup>. The mass emission rate was 0.15 Kg/hr against a limit of 1.18kg/hr.

### Kettle No 6 Exhausts (AE-8)

Kettle 6 is a conical kettle utilising direct fired heating. Kettle No 6 works in conjunction with Raymond mill 5 to calcine the material to supply stucco to the board plant.

Kettle No 6 is connected to an independent cyclone and bag filtration system. The exhaust gases from Kettle 6 include steam, the products of combustion and particulates.

The exhaust from this stack was previously connected into the AE-1 exhaust. A technical amendment was granted in June 2008, allowing GIL to divert the exhaust from kettle 6 directly through AE-8. NOX and particulates are monitored annually by external consultants.

There were 4,978 Kg of NOX emitted from AE-8 in 2010. The mass emission rate was 1.864 Kg/hr. The emission value was 86.9 mg/m<sup>3</sup>. This is within the limit of 130 mg/m<sup>3</sup>.

There were 120.29 Kg of particulates emitted from AE-8 in 2010. The mass emission rate was 0.045 Kg/hr. The emission value was 2.1 mg/m<sup>3</sup>. This is within the limit of 50 mg/m<sup>3</sup>.

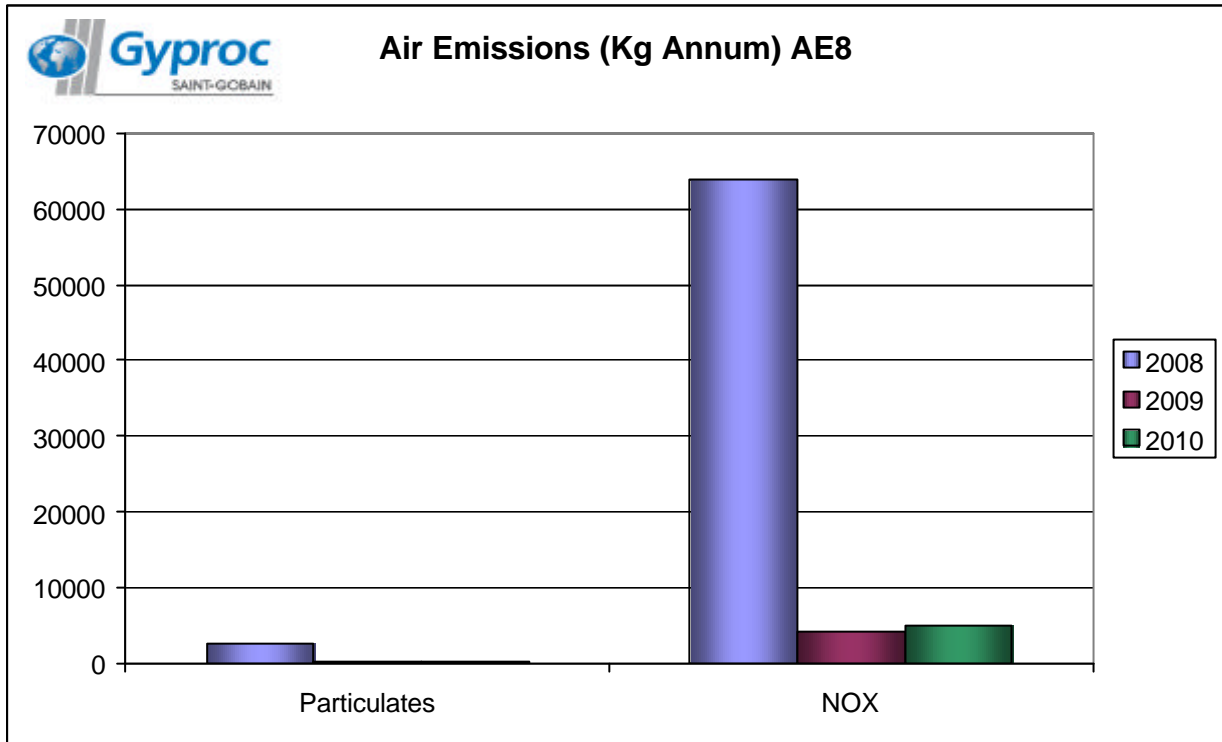


Figure 2.4 Air Emissions (Kg Annum) AE8 2008 - 2010

**Raymond Mill No 5 Exhausts (AE-9)**

Raymond Mill 5 grinds crushed rock down to 150 um to supply Kettle No 6. Surface drying is also completed in Raymond Mill 5.

Raymond Mill 5 is connected to an independent cyclone and bag filtration system. The exhaust gases contain the products of combustion and particulates.

NOX and particulates are monitored annually by external consultants.

There were 730.6 Kg of NOX emitted from AE-9 in 2010. The mass emission rate was 0.274 Kg/hr. The emission value was 11.3 mg/m<sup>3</sup>. This is within the limit of 130 mg/m<sup>3</sup>.

There were 420.3 Kg of particulates emitted from AE-9 in 2010. The mass emission rate was 0.158 Kg/hr. The emission value was 6.5 mg/m<sup>3</sup>. This is within the limit of 50 mg/m<sup>3</sup>.

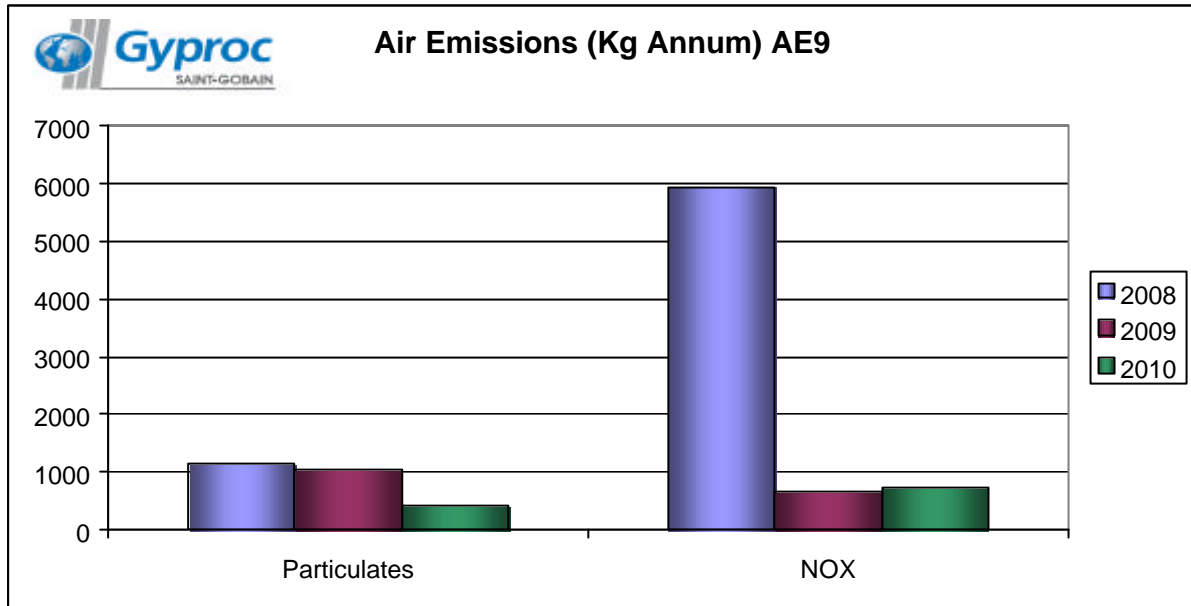


Figure 2.5 Air Emissions (Kg Annum) AE9 2008 - 2010

## **3.0 EMISSIONS TO WATER**

### 3.0 Summary of Emissions to Water:

#### MSE1 (Mine Site)

Effluent is discharged from the mine site at MSE1. Surface water run off from the quarry and the underground mine are collected in a series of settling lagoons before being discharged to two settling tanks and subsequently to the River Bursk.

Parameter	IPPC Limit (Kg/Year)	2008 (Kg/Year)	2009 (Kg/Year)	2010 (Kg/Year)	%Compliance 2010
BOD	5,035	4,803	1,824	1,661	100%
COD	40,280	9,742	10,262	5,913	100%
Suspended Solids	25,175	20,935	6,350	8,439	98%
Settleable Solids	5,035	9,184	898	782	100%
Sulphate		1,655,809	1,176,815	1,042,509	100%
Total Ammonia	805	93	60	39	100%
Nitrate	11,077	856	696	209	100%
Total Phosphorous	62	107	27	11.5	100%
Mineral Oils	302	48	19	5.2	100%
Copper	40	5	1.4	2.2	100%
Manganese	251	33	13.46	15.8	100%
Chlorides	201,400	28,563	30,882	31,527	100%

*Table 3.1 Summary of Mass emissions to water MSE-1*

Suspended Solids accounts for 1 exceedence at MSE-1 in 2010. Generally there has been a reduction in mass emissions from MSE-1 in all parameters in 2010 with the exception of Copper, Manganese, Suspended Solids and Chlorides which recorded slight increases.

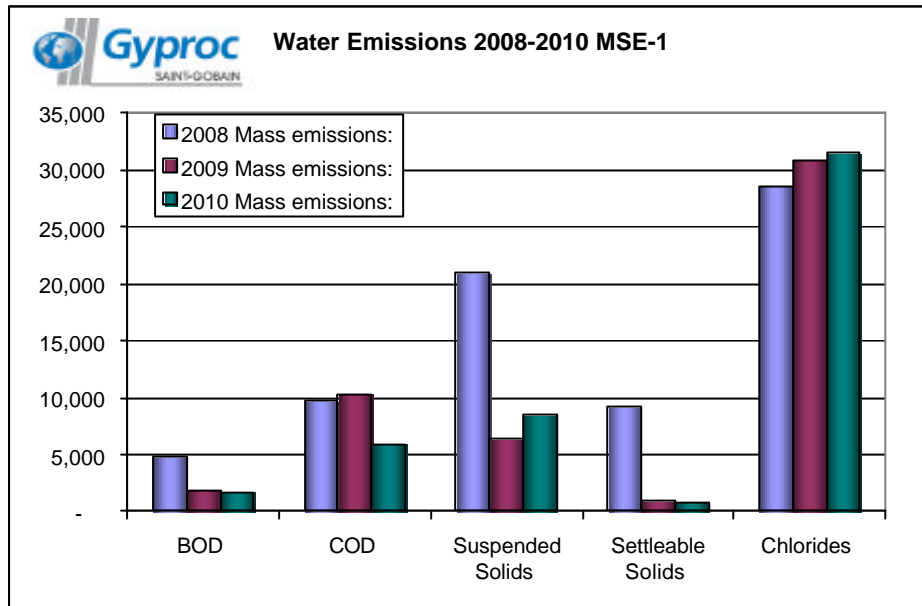


Figure 3.1 Water Emissions at MSE-1: 2008 - 2010

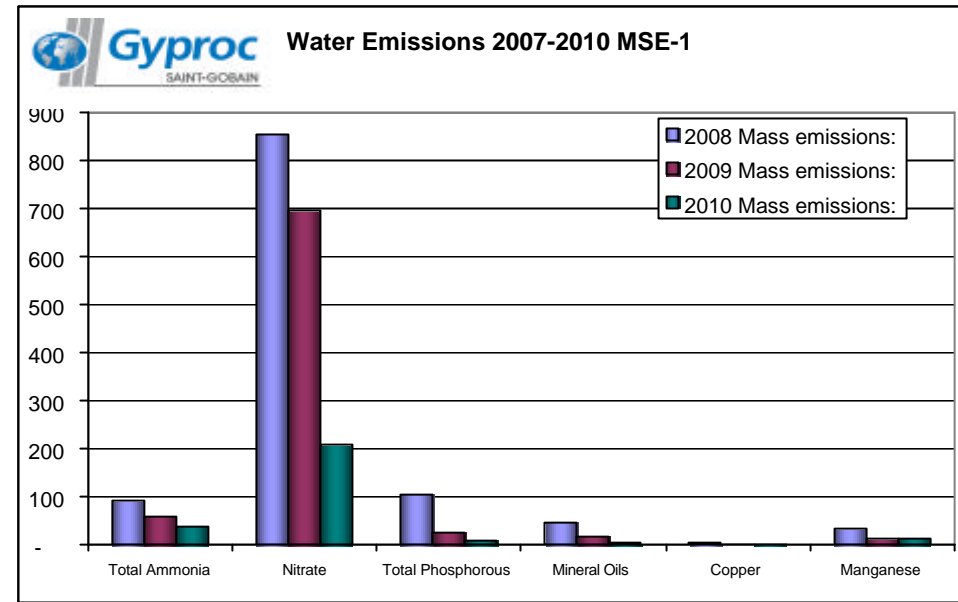


Figure 3.2 Water Emissions at MSE-1: 2008 - 2010

**CP1 (Mine Site)**

CP1 is situated 70m downstream of MSE1 on the River Bursk.

Parameter	IPPC Limit (mg/l)	2008 Average (mg/l)	2009 Average (mg/l)	2010 Average (mg/l)	%Compliance 2010
Conductivity (uS/cm)	1000	478.7	488.96	525.15	100%
Sulphate (mg/l)	200	113.2	118.38	127.28	90.4%
Temperature (°C)		10.4	9.17	7.92	
Nitrate (mg/l N)		1.2	2.07	0.97	
Suspended Solids (mg/l)		19.0	4.70	3.27	
BOD (mg/l)		3.0	2.50	2.00	
Total Phosphorous (mg/l)		0.48	0.06	0.04	

Table 3.2 CP1 Monitoring Results

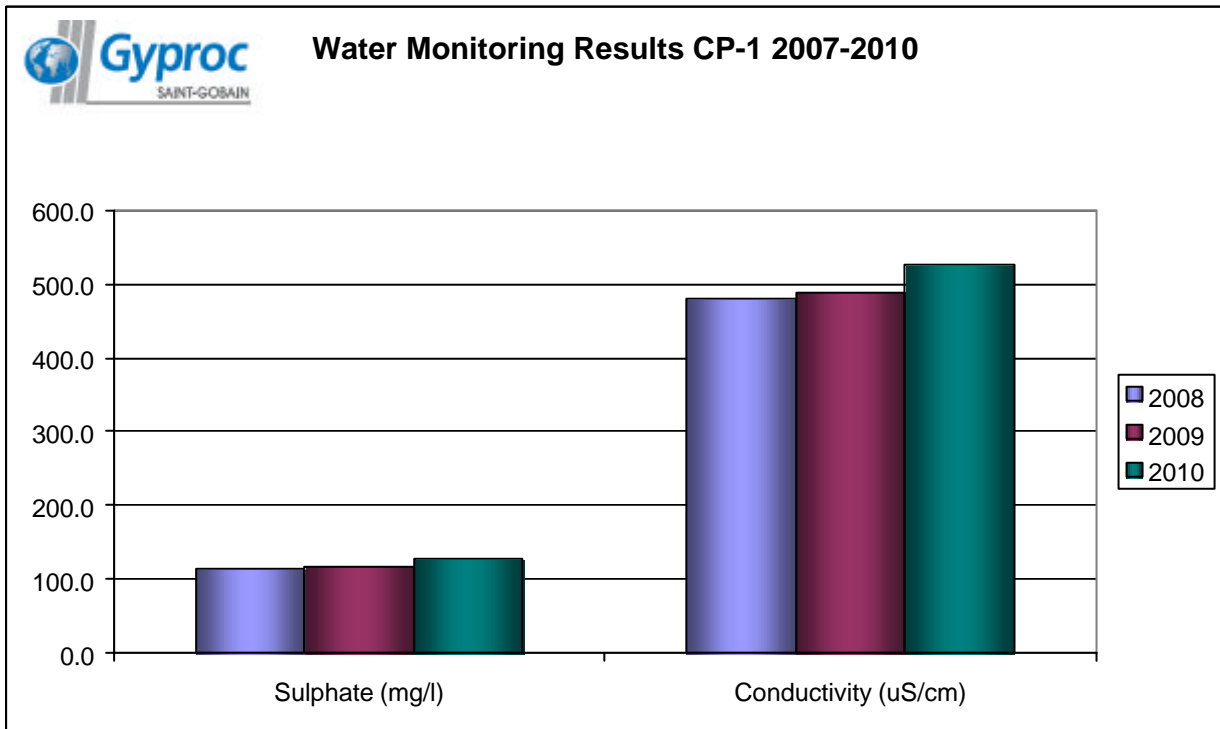


Figure 3.3 Water Monitoring Results at CP1 against IPPC limit

There has been no significant change in the average ELV at CP1-1 for Sulphate.

There has been no significant change in the average ELV at CP1-1 for Conductivity.

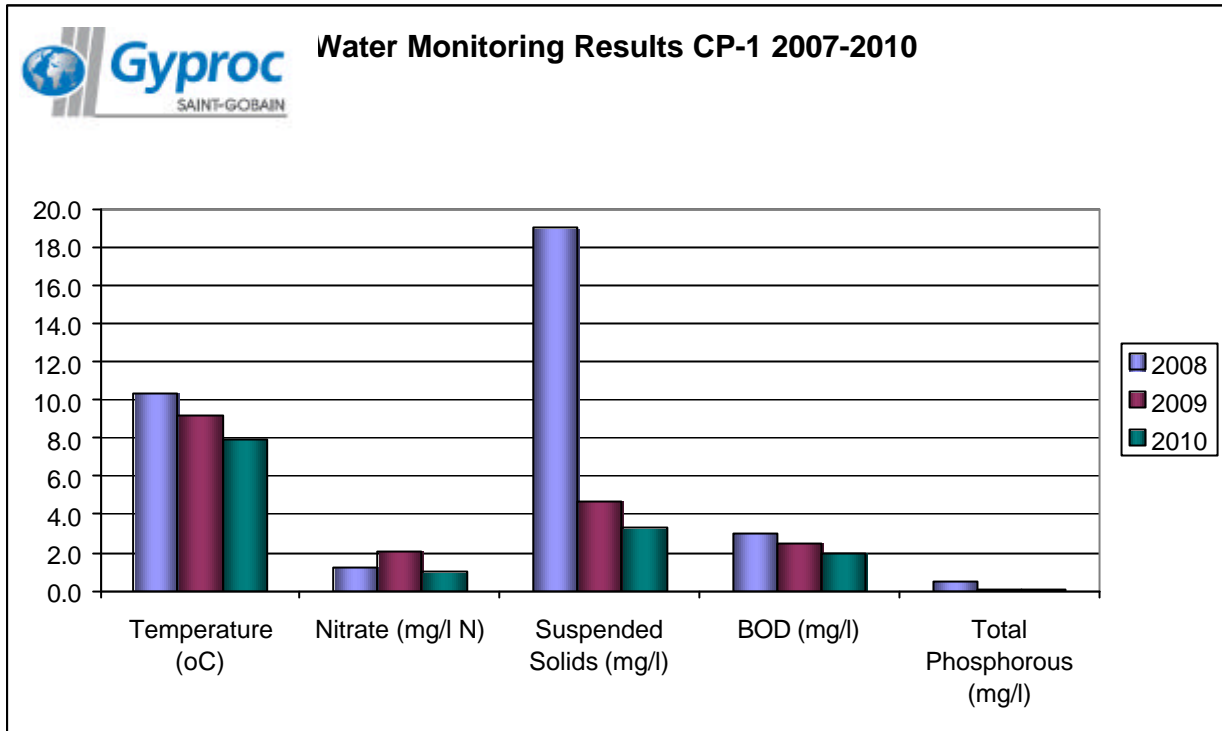


Figure 3.4 Water Monitoring Results at CP1

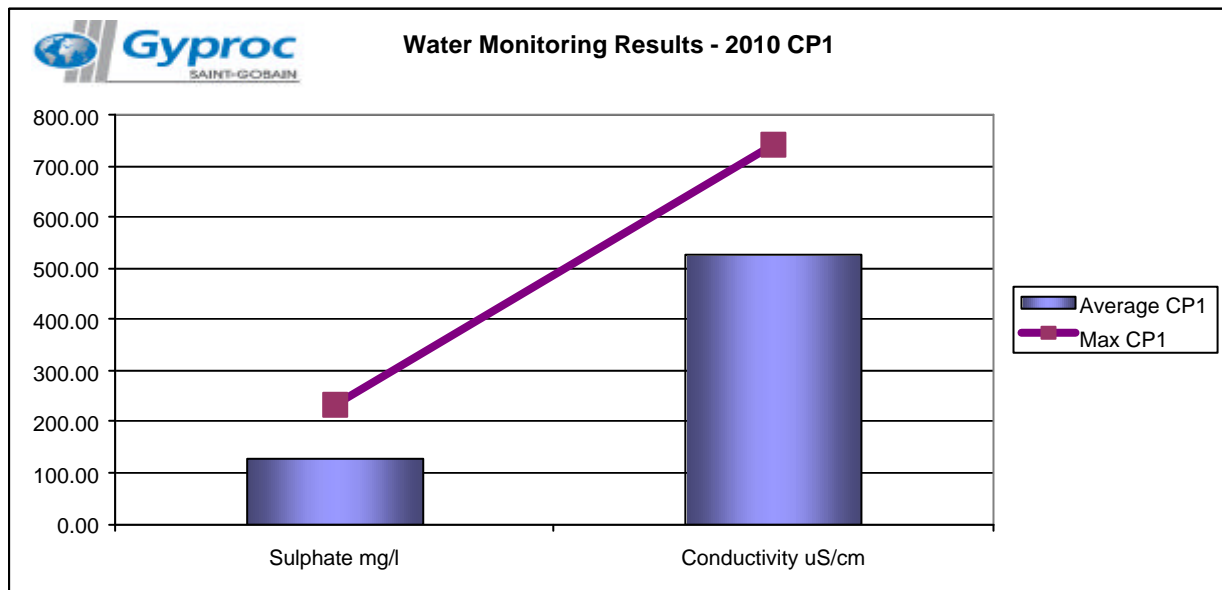


Figure 3.5 2010 Water Monitoring Results at CP1

The highest Sulphate emission value measured 234.29 mg/l against a limit of 200 mg/l on 15/06/10. There were 5 breaches of the Sulphate limit in 2010. 4 of the breaches occurred during installation and commissioning, none exceeded 1.5 times the limit value. There were no breaches of the Conductivity limit in 2010. The sulphate control system was installed and commissioned in August 2010.

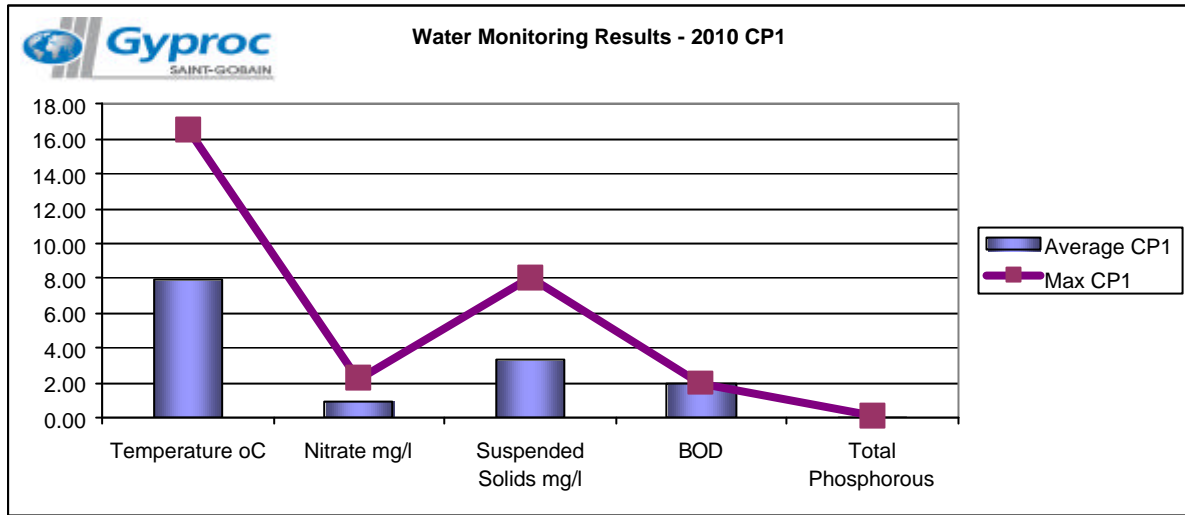


Figure 3.6 2010 Water Monitoring Results at CP1

**S8 (Process Site)**

The discharge point S8 comes from a lagoon which collects leachate from the landfill and surface water from the process site. Where possible surface water is collected on site and used in the manufacture of plaster board. Therefore it is not necessary to discharge from S8 continuously. There was 1601.9 M<sup>3</sup> discharged from S8 in 2010.

Parameter	IPPC Limit (mg/l)	2010 Average (mg/l)	2010 Max (mg/l)	2010 Kg/yr	%Compliance 2010
COD (mg/l)	30	19	19	30.44	100%
BOD (mg/l)	10	4	4	6.41	100%
Suspended Solids (mg/l)	30	14	14	22.43	100%
Settleable Solids (ml/L)		<1	<1	<1.6	100%
Sulphate (mg/l)	1500	495.6	495.6	793.92	100%
Total Phosphorous (mg/l)	0.3	<0.007	<0.007	<0.01	100%
pH	6-8.5	7.68	7.68		100%
Conductivity (uS/cm)	2000	1322	1322		100%
Temperature (°C)	25	3.1	3.1		100%
OFG (mg/l)		6	6	9.61	100%
Flow -Total (m3)		1601.9			

*Table 3.3 Summary of emissions to water S8*

There were no exceedences at S8 in 2010.

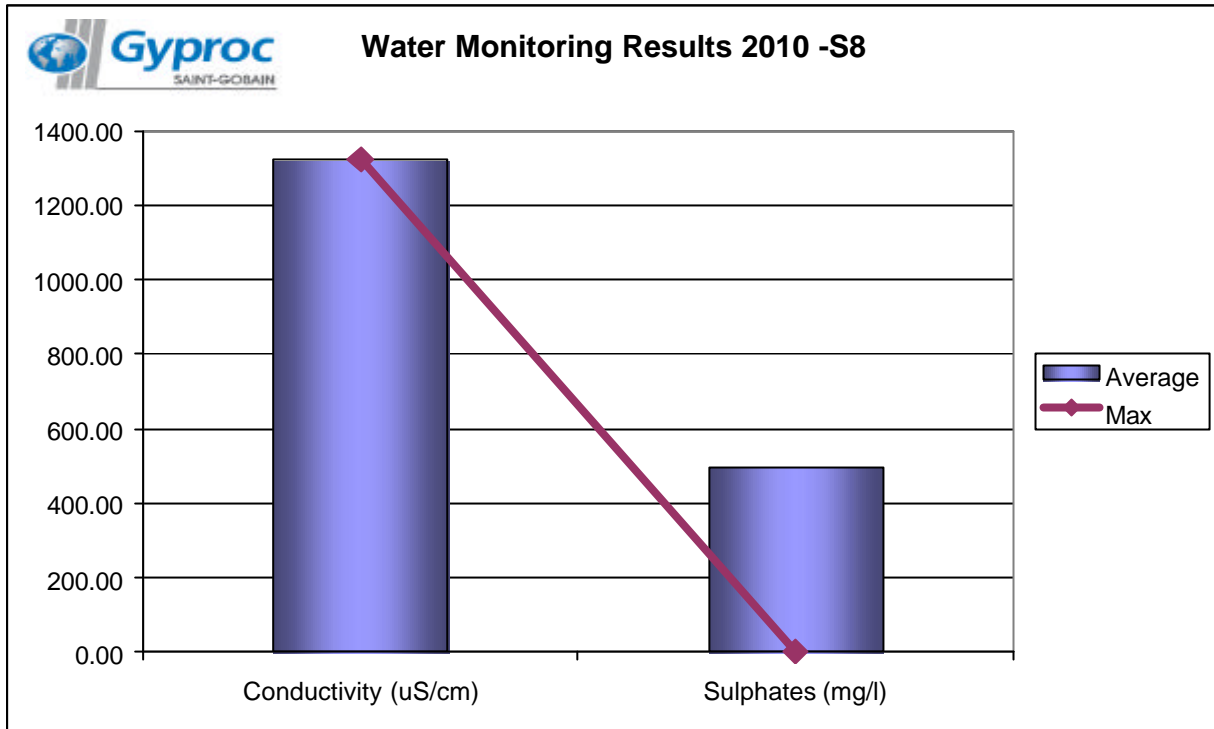


Figure 3.7 2010 Water Monitoring Results at S8

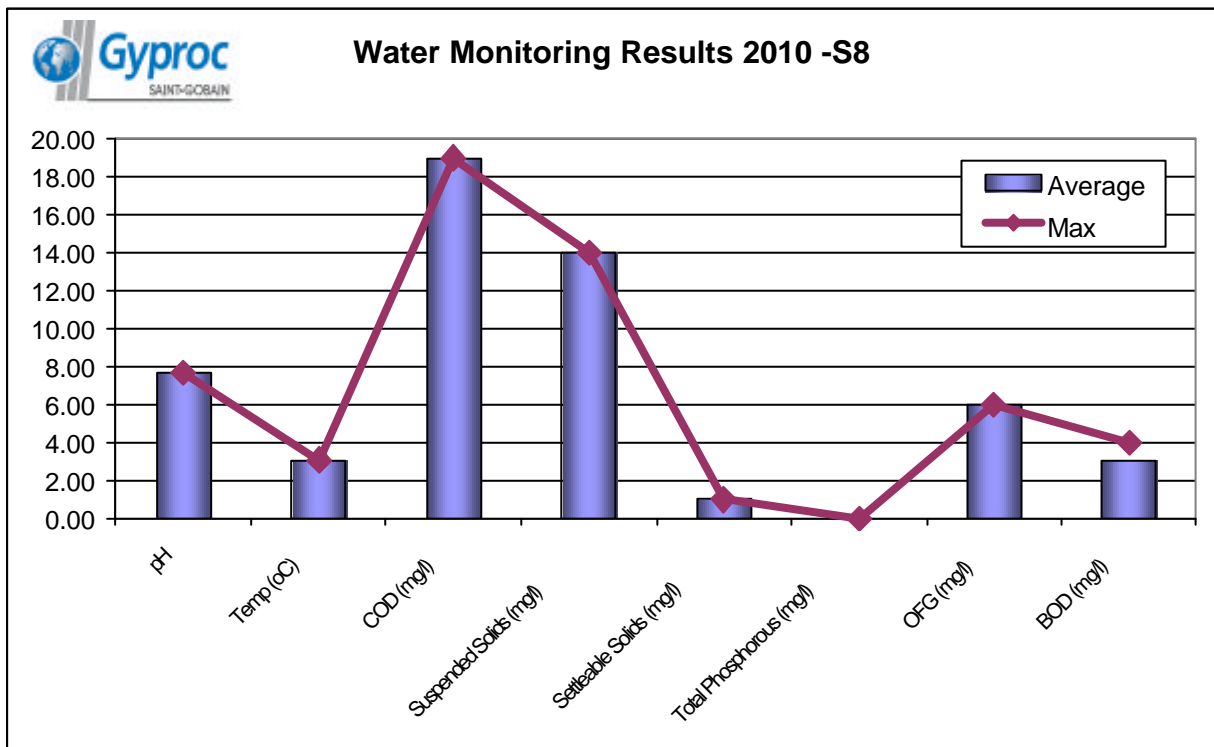


Figure 3.8 2010 Water Monitoring Results at S8

There were 30.44 Kg of COD emitted from S8 in 2010. There was one emission of 19 mg/l against a limit of 30 mg/l. Note: Sample taken in January 2011 due to adverse weather.

There were 6.41 Kg of BOD emitted from S8 in 2010. There was one emission of 4 mg/l against a limit of 10 mg/l.

There were 22.43 Kg of Suspended Solids emitted from S8 in 2010. There was one emission of 14 mg/l against a limit of 30 mg/l. There was one settleable solids emission of <1 ml/L. Less than 1.6 Kg of settleable solids was discharged from S8 in 2010.

The temperature of the S8 discharge was 3.1°C. The pH value for the S8 discharge was 7.68, below the limit of 8.5.

There were <0.01 Kg of Phosphorous emitted from S8 in 2010.

There were 9.61 Kg of Oils, Fats and Greases emitted from S8 in 2010.

<b>Parameter</b>	<b>2009 Kg/yr</b>	<b>2010 Kg/yr</b>
COD (mg/l)	136.19	30.44
BOD (mg/l)	13.62	6.41
Suspended Solids (mg/l)	46.69	22.43
Settleable Solids (mg/l)	7.78	<1.6
Sulphate (mg/l)	8001	793.9
Total Phosphorous (mg/l)	0.65	<0.01
OFG (mg/l)	5.84	9.61
Flow -Total (m3)	7,782	1,601.9

**Table 3.4 Comparison of the mass load from S8. 2009 V'S 2010**

There was a decrease in 2010 of mass load emitted from S8 for all parameters monitored with the exception of Oils, Fats and Grease. This is accounted for by there being only 1 discharge from S8 for 2010 compared to 4 discharges in 2009.

## Summary of Heavy metal content

A heavy metal scan is carried out on

- Effluent discharges at MSE-1 on a quarterly basis
- Monitoring point CP-1 (+70M downstream of MSE-1) on a bi-annual basis
- Monitoring point S-8 on a monthly basis (only when discharging)

as outlined in Schedule 2(iii) of the IPPC licence.

The results of this monitoring are outlined below. Samples of water discharge from MSE-1, CP-1 and S-8 are monitored at the required frequency. Euro Environmental completed the required analysis for all 4 quarters.

Parameter (ug/l)	Q1	Q2	Q3	Q4	Average 2009	Average 2010
Arsenic	1	0.7	0.7	0.6	0.96	0.75
Antimony*	<2.9	<2.9	<2.9	<2.9	0.35	<2.90
Cadmium	0.01	0.01	0.02	0.01	0.40	0.01
Chromium	0.58	0.6	0.58	0.58	3.43	0.59
Copper	1.1	12.5	5.5	3.2	1.53	5.58
Lead	0.02	1	0.1	0.02	3.07	0.29
Mercury*	<0.03	<0.03	<0.03	<0.03	12.61	<0.03
Nickel	3.6	3.5	2.5	2.1	5.93	2.93
Selenium	0.7	1.4	0.54	0.54	1.55	0.80
Tellurium*	<5	<5	<5	<5	5.25	<5.00
Thallium*	<0.05	<0.05	<0.05	<0.05	0.40	<0.05
Tin*	<2.8	<2.8	<2.8	<2.8	2.35	<2.80

*Table 3.5 2010 Heavy Metal Monitoring at MSE-1*

*\* Less than Limit of detection of equipment.*

Parameter (ug/l)	BA1	BA2	Average 2009	Average 2010
Arsenic	0.40	1.00	0.98	0.70
Antimony	2.90	2.90	0.57	2.90
Cadmium	0.01	0.03	0.55	0.02
Chromium	1.00	0.58	0.97	0.79
Copper	8.00	4.70	5.60	6.35
Lead	0.02	0.02	0.69	0.02
Mercury	0.03	0.03	25.10	0.03
Nickel	2.00	1.80	21.05	1.90
Selenium	0.54	0.54	0.87	0.54
Tellurium	5.00	5.00	3.00	5.00
Thallium	0.05	0.05	0.60	0.05
Tin	2.80	2.80	1.90	2.80

Table 3.6 Heavy Metal Monitoring at CP-1 2009 vs. 2010

Parameter (ug/l)	11/01/11	Average 2009	Average 2010
Arsenic	2.90	0.77	2.90
Antimony	0.73	0.70	0.73
Cadmium	0.01	4.31	0.01
Chromium	1.25	8.40	1.25
Copper	9.01	1.46	9.01
Lead	1.34	33.40	1.34
Mercury	0.03	5.30	0.03
Nickel	3.70	1.73	3.70
Selenium	0.54	2.33	0.54
Tellurium	5.00	0.73	5.00
Thallium	0.05	1.93	0.05
Tin	2.80	0.77	2.80

Table 3.7 2010 Heavy Metal Monitoring at S8 2010

Note: Sample taken in January 2011 due to adverse weather.

## **4.0 EMISSIONS TO SURFACE WATER**

#### 4.0 Summary of Surface Water Monitoring

Surface water discharges are monitored as outlined in Schedule 4(i) of the IPPC licence. The monitoring emission points are S3 at the process site and MSW-1 at the mine site.

Parameter	2008 Average (mg/l)	2009 Average (mg/l)	2010 Average (mg/l)	2010 Max (mg/l)
COD (mg/l)	16.2	18.2	21.4	32.0
BOD (mg/l)	8.6	2.0	2.0	2.0
Suspended Solids (mg/l)	9.4	6.3	9.4	17.0
Settleable Solids (mg/l)	5.0	1.0	1.2	3.0
Sulphate (mg/l)	247.8	247.1	275.6	357.5
Total Phosphorous (mg/l)	0.1	0.1	0.1	0.2
Conductivity (uS/cm)	740.9	805.2	933.6	1149.0
OFG (mg/l)	1.0	1.0	1.0	1.0

*Table 4.1 2010 S-3 Monitoring Results*

Average emission values have increased slightly for monitoring conducted at S3 but still remain relatively constant when compared to the preceding two years.

Parameter	2008 Average (mg/l)	2009 Average (mg/l)	2010 Average (mg/l)	2010 Max (mg/l)
Temperature (°C)	8.55	9.65	10.78	16.7
pH	7.7	7.40	7.06	7.32
BOD (mg/l O <sub>2</sub> )	5	2.25	7.33	18
Calcium (mg/l)	219.175	174.31	194.75	337.3
Sulphate (mg/l)	598.7	563.44	463.31	707.02
Total Phosphorus (mg/l)	0.0925	0.06	0.20	0.582
Total Nitrogen (mg/l)	4.75	2.98	3.67	4.98
Conductivity (µS/cm)	1017.75	1112.50	1145.00	1711

*Table 4.2 2010 MSW-1 Monitoring Results*

BOD, Calcium, Total Phosphorous, Total Nitrogen, Temperature and Conductivity average emission values have slightly increased for monitoring conducted at MSW-1. The Sulphate and pH average emission values decreased slightly. Overall, average emission values remain relatively constant when compared to the preceding two years.

## Surface Water Heavy metal content

A heavy metal scan is carried out on surface water monitoring points on a quarterly basis at Monitoring point S3. Analysis was conducted by Euro environmental services in all 4 quarters.

Parameter (ug/l)	Q1	Q2	Q3	Q4	Ave 2009	Ave 2010
Antimony*	<2.9	<2.9	<2.9	<2.9	0.35	2.90
Arsenic	0.4	0.5	0.9	0.5	0.97	0.58
Cadmium	0.01	0.05	0.02	0.05	0.32	0.03
Chromium	0.58	1.2	1.4	0.9	1.58	1.02
Copper	1.3	1.8	4.6	4.2	6.85	2.98
Lead	0.7	1.4	0.02	0.7	0.54	0.71
Mercury*	<0.03	<0.03	<0.03	<0.03	12.61	0.03
Nickel	1.1	0.9	1.8	0.5	3.68	1.08
Selenium*	<0.54	<0.54	<0.54	<0.54	1.68	<0.54
Tellurium*	<5	<5	<5	<5	5.25	<5.00
Thallium*	<0.05	<0.05	<0.05	<0.05	0.40	<0.05
Tin*	<2.8	<2.8	<2.8	<2.8	2.35	<2.80

*Table 4.3 Heavy Metal Monitoring at S3 - 2010*

*\* Less than Limit of detection of equipment.*

## **5.0 AMBIENT SURFACE WATER MONITORING**

## 5.0 Summary of Ambient Surface Water Monitoring

Ambient Surface water discharges are monitored as outlined in Schedule 4(iii) of the IPPC licence.

The monitoring emission points are S1, S2 and S13 at the process site and, A, B and D at the mine site.

S1 and S2 are situated upstream of the process site at Kingscourt and S13 is situated one mile downstream of the process site.

<b>Parameter Average (mg/l)</b>	<b>2010 S1</b>	<b>2010 S2</b>	<b>2010 S13</b>
pH	7.6	7.8	7.5
Conductivity uS/cm	344.5	839.5	730.0
Temperature	8.2	9.5	7.6
Dissolved Oxygen	9.2	8.2	8.8
BOD	2.0	2.0	2.0
Suspended Solids	5.5	5.0	10.0
Nitrate	2.1	0.7	1.9
Nitrite	0.0	0.0	0.0
Ammonium	0.0	0.0	0.1
Sulphate	14.1	216.0	147.4
Chloride	12.4	14.1	21.9
Total Phosphorous	0.1	0.0	0.3

**Table 5.1 Monitoring at S1, S2 and S13 2010**

The average emission value for conductivity at S13 (730 uS/cm) shows no significant increase from those of the upstream monitoring points S1 (344.5 uS/cm) and S2 (839.5 uS/cm). Conductivity at S13 (730.0 uS/cm) is slightly lower than S3 (933.6 uS/cm), which demonstrates effective dilution is occurring post surface water discharges from the site.

The average emission value for Phosphorous is slightly higher at S13 than at S1, S2, however the average discharge at S3 (Final surface water discharge from the processing

site) is 0.1 mg/l, so it is likely that agricultural activity in the area influences the Phosphorous levels at S13.

<b>Parameter Average (mg/l)</b>	<b>2010 A</b>	<b>2010 B</b>	<b>2010 D</b>
Conductivity (uS/cm)	289.17	304.08	554.67
BOD (mg/l)	<2.00	<2.00	<2.00
Suspended Solids (mg/l)	2.92	3.00	4.02
Sulphate (mg/l)	21.92	21.92	152.30
Nitrate (mg/l N)	0.93	0.82	0.75
Total Phosphorous (mg/l)	0.05	0.05	0.05

*Table 5.2 Monitoring at A, B and D 2010*

Monitoring locations A and B are situated upstream of the mine site and D is situated 2 Kilometres downstream of the mine site.

Average conductivity, suspended solids and sulphate emission limit values are higher downstream of the mine site. BOD and Total Phosphorous levels are similar up and down stream of the mine site. Nitrate average emission values are lower than those recorded upstream.

### Ambient Surface Water Heavy metal content

A heavy metal scan is carried out on ambient surface water monitoring points on a bi-annual basis. Samples from S1, S2 and S13 at the process site are collected bi-annually. Samples from monitoring points A, B and D at the mine site are collected bi-annually. Analysis was conducted by Euro Environmental on behalf of GIL.

Parameter (ug/l)	S1		S2		S13	
	2009 Average	2010 Average	2009 Average	2010 Average	2009 Average	2010 Average
Antimony	0.57	1.6	0.57	0.3	0.57	0.45
Arsenic	0.98	1.8	0.98	2.90	0.98	2.90
Cadmium	0.55	0.02	0.55	0.015	0.55	0.02
Chromium	1.47	0.8	1.97	0.79	4.40	0.79
Copper	8.60	5.455	10.65	1.955	7.80	1.71
Lead	1.19	0.31	2.25	0.8	0.85	0.02
Mercury**	*25.10	<0.03	*25.10	<0.03	*25.10	<0.03
Nickel	2.15	1.15	3.65	1.05	4.40	1.60
Selenium	2.10	0.92	1.45	0.54	1.45	0.54
Tellurium**	3.00	<5.00	3.00	<5.00	3.00	<5.00
Thallium**	0.60	<0.05	0.60	<0.05	0.60	<0.05
Tin**	1.90	<2.80	1.90	<2.80	1.90	<2.80

**Table 5.3 Monitoring at S1, S2 and S13 2009 V's 2010**

\* Bi-annual 1 analysis completed by QED (Alcontrol) in 2009. The limit of detection for Mercury is <0.05 mg/l

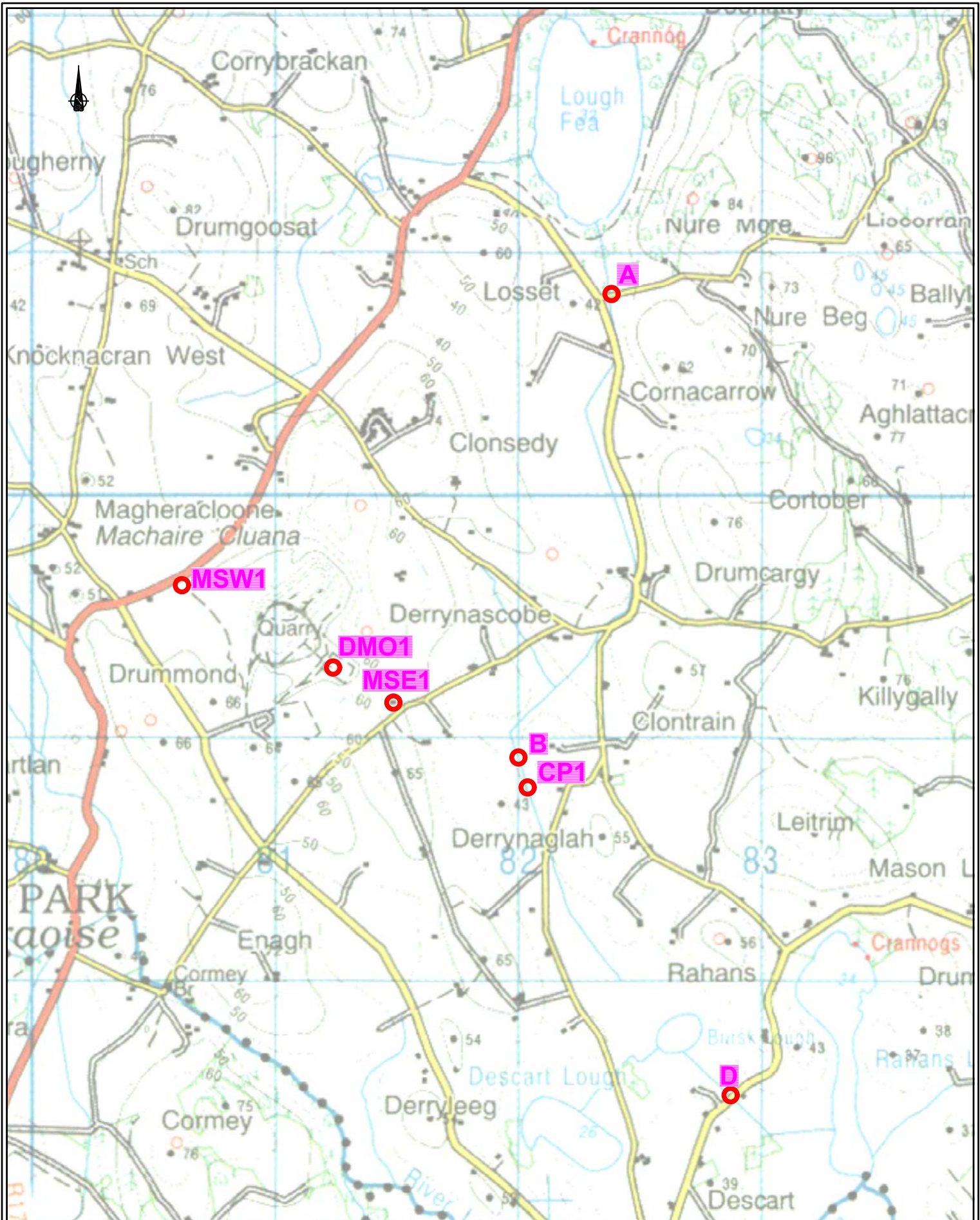
\*\* Less than Limit of detection of equipment.

Parameter (ug/l)	A		B		D	
	2009 Average	2010 Average	2009 Average	2010 Average	2009 Average	2010 Average
Antimony	0.98	4.45	0.98	2.90	0.98	2.90
Arsenic	0.57	0.85	0.57	0.70	0.57	0.65
Cadmium	0.55	<0.01	0.55	0.02	0.55	0.02
Chromium	1.47	1.4	0.97	0.58	0.97	3.30
Copper	6.60	1.755	6.60	1.86	7.60	0.21
Lead	1.69	0.7	0.69	0.02	1.19	0.11
Mercury	*25.1	0.03	*25.10	0.03	*25.10	0.03
Nickel	2.45	1.45	2.70	1.80	2.95	1.55
Selenium	1.60	0.72	2.05	0.54	0.87	0.54
Tellurium**	3.00	<5.00	3.00	<5.00	3.00	<5.00
Thallium**	0.60	<0.05	0.60	<0.05	0.60	<0.05
Tin**	2.40	<2.80	4.40	<2.80	1.90	<2.80

*Table 5.4 Monitoring at A, B and D 2009 V's 2010*

\* Biannual 1 analysis completed by QED (Alcontrol) in 2009. The limit of detection for Mercury is <0.05 mg/l

\*\* Less than Limit of detection of equipment.



Doc. no. KCENV MN 14  
 Date of Issue: 23/07/09  
 Rev. No.: 0

Title	Gypsum Industries Ltd - Knocknacran Surface Water Monitoring Locations	Survey	08-04-09
Drawn		Drawn	28-07-09
Gds	National	Datum	O.S.
		SCALE	1:20,000

**Irish Gypsum Ltd**  
 Drummond Mine, Magheracloone, Carrickmacross Co. Monaghan  
 Tel: 042-9698100 Fax: 042-9662215

Drawing No.  
 347-24-09  
 KCENV MN14

PLEASE NOTE : SAMPLE POINT S13 IS LOCATED 1.6Km. NORTH OF SAMPLE POINT S3



SITE NOTICE  
E 27861 N29223

TABLE OF SAMPLING/  
MONITORING POINTS

Ref. No.	LOCATION	
	East	North
S1	278609	292145
S6	278825	292084
S12	278981	292069
S4	279109	292087
S5	279109	292084
S2	279112	292066
S7	278978	292393
S8	279012	292474
S9	279024	292493
S10	279021	292490
S11	279015	292496
S3	279015	292642
S13	279415	294475

REV.	DESCRIPTION	REV BY	DATE

TITLE :		SCALE	NONE
SURFACE WATER MONITORING		DATE	16.11.09
POINTS (PROCESSING SITE)		SECTION	101
		DRAWN BY	J.S.
		ISSUE DATE	16.11.
DEPT.	ENVIRONMENT	SHEET NO.	XXXXXXXXXX
		DRAWING NO.	REV. NO.
		KCENVMN 15	REV.0

**6.0 SUMMARY OF BLAST, VIBRATION AND  
AIR OVER PRESSURE MONITORING**

**6.0 Summary of Blast, Vibration and Air Over-Pressure monitoring:**

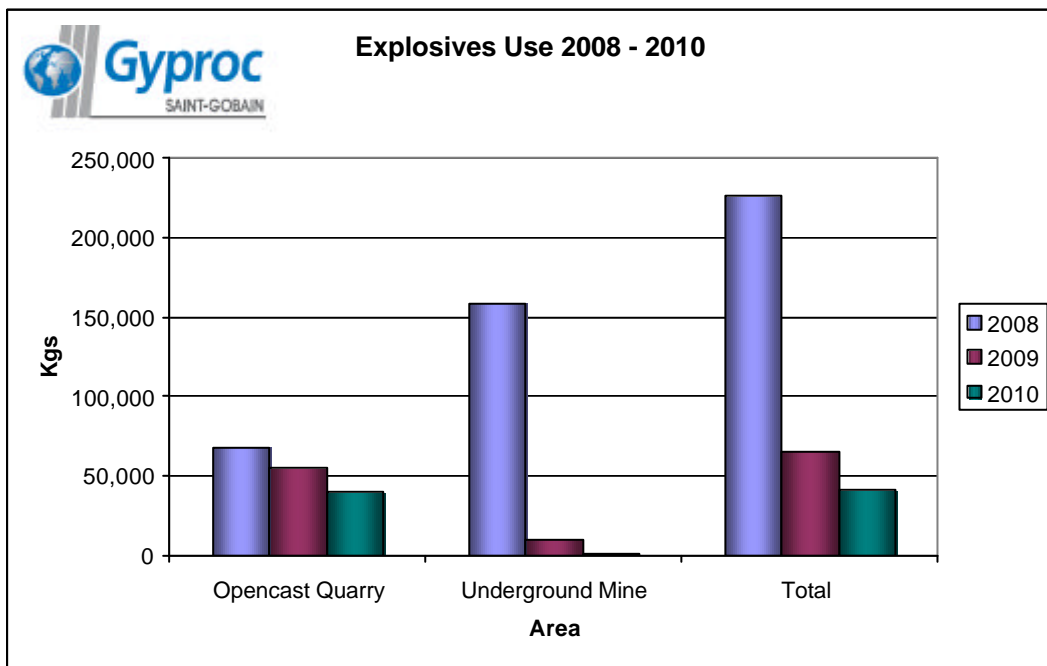
Blast, vibration and air over pressure monitoring is conducted as per Condition 8 of the IPPC licence.

Blast, vibration and air over pressure monitoring is conducted at monitoring locations MS-1, MS-2 and MS-3 in addition to other noise sensitive locations as appropriate.

There were 2 exceedences reported under Condition 8 in 2010: Both readings occurred at MS2. On 25<sup>th</sup> August 131dB and on 1<sup>st</sup> November 129dB readings of Air over Pressure were recorded against a license limit of 125dB.

	<b>ANFO (kg)</b>	<b>Kemgel (kg)</b>	<b>Total</b>
<b>2008</b>	25,650	42,400	68,050
<b>2009</b>	28,675	26,300	54,975
<b>2010</b>	21,900	16,925	38,825

*Table 6.1 Quantity of explosives used in opencast quarry 2008 - 2010*



*Figure 6.1 Quantity of explosives used at the mine site 2008 - 2010*

Location:	MS1				MS2				MS3			
Parameter	<i>L</i> mm/s	<i>T</i> mm/s	<i>V</i> mm/s	<i>AOP</i> dB	<i>L</i> mm/s	<i>T</i> mm/s	<i>V</i> mm/s	<i>AOP</i> dB	<i>L</i> mm/s	<i>T</i> mm/s	<i>V</i> mm/s	<i>AOP</i> dB
Highest:	6.6	5.7	5.5	124.0	0.8	0.8	0.5	131.0	Failed to trigger			
Lowest:	0.6	0.5	0.5	110.0	0.2	0.2	0.1	119.0	Failed to trigger			
Average	2.6	1.9	2.1	117.4	0.5	0.6	0.3	124.3	Failed to trigger			
Range	0.6 – 6.6	0.5 – 5.7	0.5 – 5.5	110 - 124	0.2 – 0.8	0.2 – 0.8	0.1 – 0.5	119 - 131	Failed to trigger			

*Table 6.2 Summary of vibration analysis at the mine site 2010*

The above table summarises the blast history at MS-1, MS-2 and MS-3 in 2010.

## **7.0 WASTE MANAGEMENT REPORT**

**7.0 Waste Management Report:****7.1 Hazardous Waste**

The hazardous wastes generated on-site in 2010 and the contractors approved for recovery or disposal are summarised in the following table.

<b>Waste type</b>	<b>Contractor</b>	<b>Licence / Permit Reference</b>
Fluorescent Tubes/bulbs	Irish Lamp Recycling	Waste Facility Permit: WFP-KE-08-0348-01 Waste Collection Permit WCP –DC-08-1115-01
Waste Oil Oily Water Waste grease & Waste Grease Containers Solid oily waste Oil Filters Interceptor Sludges	ENVA Ireland Limited  Rilta Environmental Ltd.	Waste Licence W0184-01 Waste Collection Permit WCP-DC-08-1116-01 Waste Facility Permit: W0192-03 Waste Collection Permit: WCP-DC-09-1192-01
Batteries	Rilta Environmental Ltd.	Waste Facility Permit: W0192-03 Waste Collection Permit: WCP-DC-09-1192-01
Degreaser Fluid	Safety Kleen	Waste Licence W0099-01 Waste Collection Permit WCP-DC-09-1223-01 Solvent Resource Management Waste Permit TP3334SF
Laboratory and process chemicals Empty IBC's with process chemical residue	Enva Hazardous Waste (Shannon Environmental Services)	Waste Licence W0041-01 Waste Collection Permit WCP-DC-08-1116-01 Lindenschmidt KG Umwelt License No. E97095037

*Table 7.1 Hazardous Waste Contractor information*

---

<b>Waste type</b>	<b>Contractor</b>	<b>Licence / Permit Reference</b>
Paint Aerosol Cans	Enva Hazardous Waste (Shannon Environmental Services)	Waste Licence W0041-01 Waste Collection Permit WCP-DC-08-1116-01 Lindenschmidt KG Umwelt License No. E97095037
Waste Electrical and Electronic Equipment	Irish Lamp Recycling	Waste Facility Permit: WFP-KE-08-0348-01 Waste Collection Permit WCP –DC-08-1115-01
Waste Asbestos	Midland Waste	Waste Licence No:W0131-02 Waste Collection Permit WCP 1/04/08/601/01

*Table 7.1 Hazardous Waste Contractor information continued*

## 7.2 Non-hazardous waste

The non-hazardous wastes generated on-site in 2010 and the contractors approved for recovery or disposal are summarised in the following table.

Waste Type	Contractor	Licence / Permit Reference
Dewatered Sludge	Owen Duffy	Waste Collection Permit WCP MH/2001/29D Carrickmacross Sewerage Treatment Plant.
General Site waste	Midland Waste Ltd	Waste Licence No:W0131-02 Waste Collection Permit WCP 1/04/08/601/01
Metal	Charlie Byrne	Waste Collection Permit: WCP MH/2005/95C
Cardboard	Midland Waste Ltd	Waste Licence No:W0131-02 Waste Collection Permit WCP 1/04/08/601/01
Timber Pallets	Midland Waste	Waste Licence No:W0131-02 Waste Collection Permit WCP 1/04/08/601/01

*Table 7.2 Non Hazardous Waste Contractor information*

### 7.3 Waste management indices

**Gross WaMI =** 
$$\frac{[\text{Waste Produced (t)} / \text{Raw Material Usage (t)}] \times 100$$

**Nett of Process WaMI =** 
$$\frac{[\text{Waste Produced (t)} - \text{Amount Recovered on Site (t)}]}{\text{Raw Material (t)}} \times 100$$

**Nett of Site WaMI =**  

$$\frac{[\text{Waste Produced (t)} - \text{Amount Recovered on Site (t)} - \text{Amount Recovered off Site (t)}]}{\text{Raw Material Usage (t)}} \times 100$$

Raw Material (Nett): 182348 tonnes  
 Waste Produced on Site: 8201.49 tonnes  
 Amount Recovered On-Site: 7,110 tonnes  
 Amount Recovered Off-Site: 561.88 tonnes

Index	2008	2009	2010
<b>Gross WaMI</b>	9.75	4.15	4.50
<b>Nett of Process WaMI</b>	4.26	1.39	0.60
<b>Nett of Site WaMI</b>	4.09	1.23	0.29

Table 7.3 Summary of Waste Management Indices 2008 - 2010

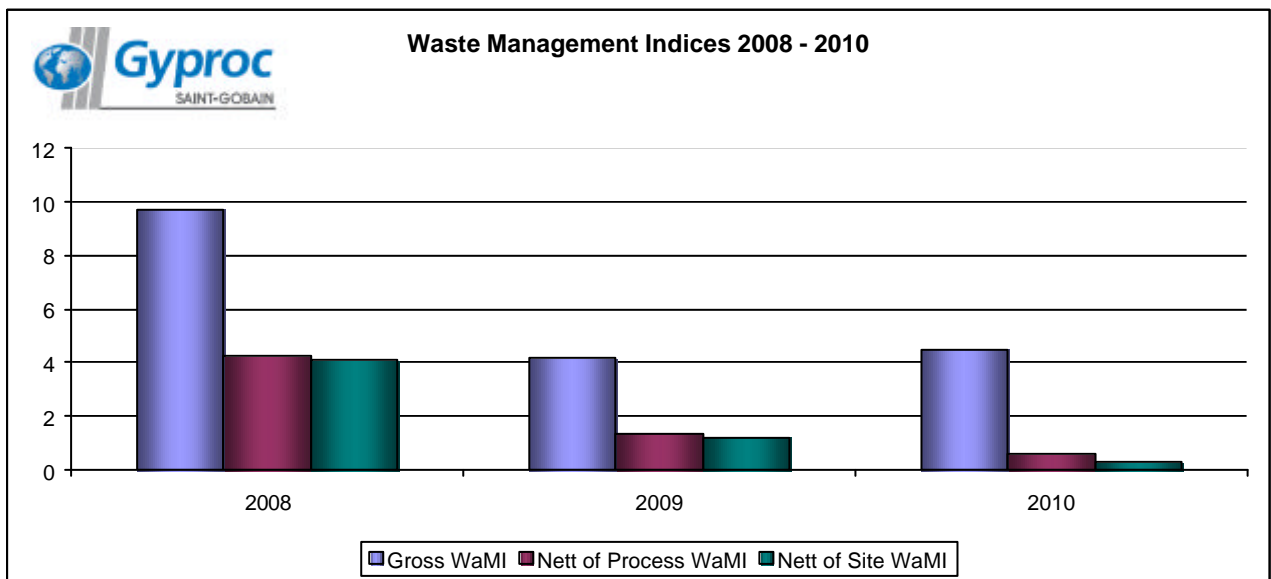


Figure 7.1 Summary of Waste Management Indices 2008 - 2010

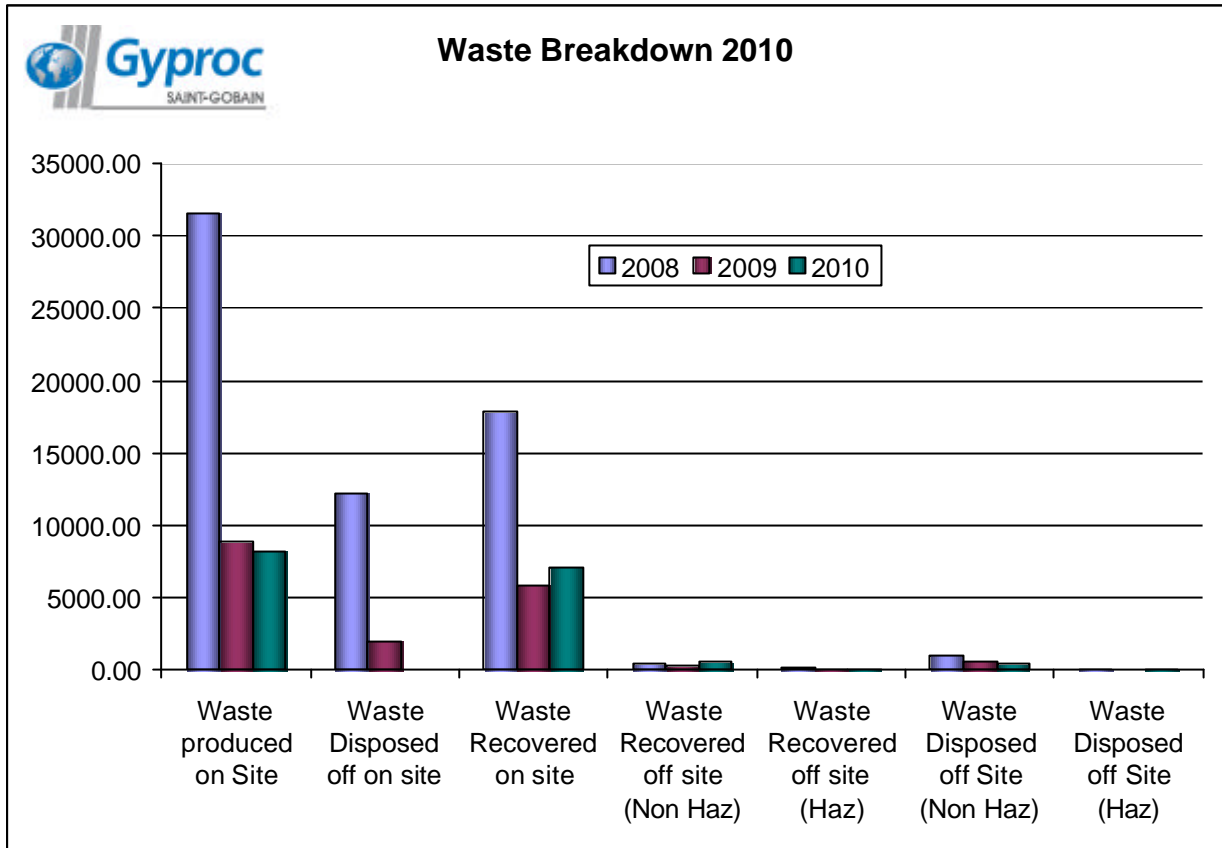


Figure 7.2 Waste Breakdown 2010

#### **7.4 Landfill Status Report:**

Gypsum Industries Limited operated a landfill site within the boundaries of the processing site at Kingscourt, Co. Cavan. Waste plasterboard incorporating Gypsum and paper has been landfilled at the landfill site. Landfilling of Gypsum material ceased in July 2009.

The landfill comprises of a 15.5 Acre site, which is situated to the East of the process site. The landfill is un-lined. Leachate from the landfill is collected in drains and channelled to settling lagoons, situated north of the landfill site.

Responsibility for the operational management of the landfill lies with Jim Tierney. Jim is a civil engineer. He has also completed the FÁS Waste Management course.

Landfilling ceased in July 2009 and no material was landfilled in 2010. The Cramp for the landfill is currently being revised.

A drawing of the landfill is attached as Appendix (ii)

#### **Landfill gas monitoring:**

Monitoring of landfill gas was conducted in March, June, September and November in 2010. This was completed by Euro Environmental Services and a report detailing the results is attached as Appendix (iii). The frequency of landfill gas monitoring has been increased to monthly.

### 7.5 Surface Water Monitoring at the landfill:

There are two surface water monitoring points situated either side of the landfill. S5 is situated prior to the landfill and S9 is situated at the landfill exit. Samples were taken on 16<sup>th</sup> February 2010 and on 17<sup>th</sup> November 2010.

	S5	S9	Comment:
Parameter (mg/l)	Average	Average	
pH	7.67	7.54	Decrease
Conductivity	553.00	558.00	No change
Dissolved Oxygen	7.73	7.96	No change
Temperature	7.45	7.65	Slight increase
BOD (mg/l)	2.00	2.00	No significant change
Settleable Solids (ml/l)	1.00	1.00	No change
Suspended Solids (mg/l)	3.00	3.50	Slight increase
Total Phosphorous (mg/l)	0.17	0.16	Slight decrease
Total Aluminium (ug/l)	192.35	265.80	Increase
Calcium (ug/l)	160.01	163.43	Slight increase
Copper (ug/l)	0.91	1.46	Slight increase
Iron (ug/l)	356.40	569.45	Increase
Magnesium (ug/l)	2.34	2.74	Slight increase
Manganese (ug/l)	32.03	85.48	Increase
Chloride (mg/l)	28.16	27.87	Slight decrease
Sulphate (mg/l)	257.63	214.14	Decrease
Sulphide (mg/l)	0.01	0.01	No Change
Ammoniacal Nitrogen as No (mg/l)	0.68	0.73	Slight Increase
COD (mg/l)	20.50	24.50	Slight Increase

*Table 7.4 Summary of Surface water monitoring at the landfill 2010*

The above results show limited change in the quality of surface water passing through the landfill. Iron, Manganese and Aluminium have increased while Sulphate and pH have decreased comparing upstream to downstream samples.

## **7.6 Closure, Restoration and Aftercare Management Plan:**

A Closure, Restoration and Aftercare Management Plan was completed for the activity in September 2007.

We commissioned the services of RPS to prepare a separate Closure, Restoration and Aftercare Management Plan for the landfill during 2009. Landfilling of Gypsum material to our on site landfill ceased in July 2009.

The closure plan was forwarded to the agency in September 2009. The agency requested some follow up information, which was progressed as part of the annual objective and target programme 2010. This included:

- Gas monitoring wells; Construction details, proposed locations and proposed landfill gas mitigation measures.
- Landfill gas monitoring report.
- Groundwater risk assessment.
- Re-grading works proposal.
- Consultation with local authority on planned after care use.

In 2010 Minerex were asked to complete the following:

- Audit 3 existing wells
- Drill and install four new gas wells in the landfill waste
- Drill and install four new gas wells outside the landfill waste.
- Located and audit 2 existing groundwater monitoring boreholes
- Drill & install 1 groundwater borehole in sand and gravel horizon downgradient of landfill
- Sample groundwater / leachate for analysis.

Outcome:

- Waste consists of homogenous gypsum plasterboard waste
- The depth of waste body varies between 5.8-15.5m
- The waste body is underlain by sandy, clayey gravel
- Peat was located beneath waste at BH7 which equates to drumlin geology
- Water / leachate was encountered high in the waste body suggesting steep hydraulic gradients & low permeability

- Discontinuous unconfined water table in waste body with downward hydraulic gradient driven by rainfall recharge
- Continuous confined water table in sandy, clayey gravel horizon beneath waste body with upward hydraulic gradient
- Conflicting gradients result in seepages at waste faces but most rainfall becomes runoff (80-90%)
- Conflicting gradients also protect groundwater from contamination by landfill leachate

Conclusions:

### **Risk to groundwater**

Drilling, surveying & water level monitoring suggest that risk to groundwater is low due to upward hydraulic gradient in gravel beneath waste body.

### **Risk to surface water hydrochemistry**

Water quality at S5 (upstream) and S3 (downstream) very similar but very different from leachate chemistry suggesting risk to surface water is low.

### **Hydraulic gradients**

Upward hydraulic gradient protecting gravel from offsite leachate migration

Downward hydraulic gradient in waste body

Potential for Stream 2 to receive groundwater from GRAVEL where unsealed

### **Gas**

Monitoring suggests that landfill gas is not migrating offsite via culverted Stream 2 or via gravel horizon

A site layout map is attached as appendix (vi)

The landfill gas monitoring frequency has been increased from quarterly to monthly and the groundwater monitoring frequency has been increased from bi-annually to quarterly. The results will be sent to the agency quarterly.

## **8.0**

# **RESOURCE CONSUMPTION SUMMARY**

## **8.0 Resource Consumption Summary:**

### **8.1 Water Consumption**

Process water is supplied primarily from the settling lagoons at the process site. The back up supply is from the nearby Milltown River.

The volume of river water consumption over the last three years is summarised below:

<b>Year</b>	<b>Total Water Usage M3/Year</b>	<b>Surface Water Re-use M3/Year</b>	<b>River/ Mains Water M3/Year</b>
<b>2008</b>	<b>126,667</b>	<b>48,711</b>	<b>77,956</b>
<b>2009</b>	<b>101,705</b>	<b>56,786</b>	<b>44,919</b>
<b>2010</b>	<b>92,971</b>	<b>42,857</b>	<b>50,114</b>

*Table 8.0 River water consumption 2008 - 2010:*

Due to adverse weather conditions during 2010, periods of low rainfall and extreme cold spells, surface water could not be accessed and reused at all times during the year. Surface water could not be re-used due to frozen pipes and low surface water levels.

Efforts continue to re-use surface water on site where possible. Over 42,800 M<sup>3</sup> of surface water was re-used in 2010.

A small proportion of water is also supplied from the Ballynaclose group water scheme. This is used for domestic purposes only. This is estimated in the region of 18 M<sup>3</sup>/day.

## 8.2 Energy Consumption

There are three sources of energy used at GIL; Natural Gas, Diesel Oil and Electricity. The following graph and table illustrates utilities usage at the process site for the past three years.

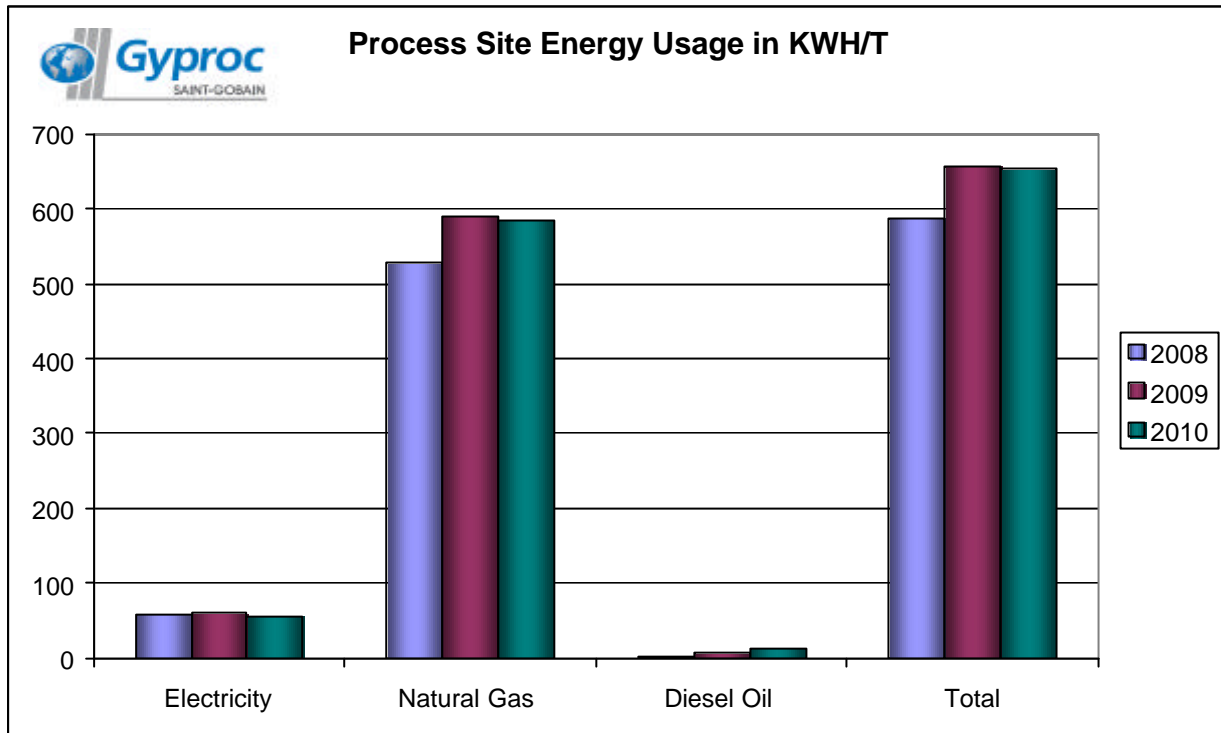


Figure 8.0 Process site energy usage KWH/T

	Electricity (KWH/T)	Gas (KWH/T)	Diesel Oil (KWH/T)	Total (KWH/T)
2008	58.47	527.44	0.87	586.79
2009	59.07	590.78	6.36	656.86
2010	55.69	584.04	13.51	653.24

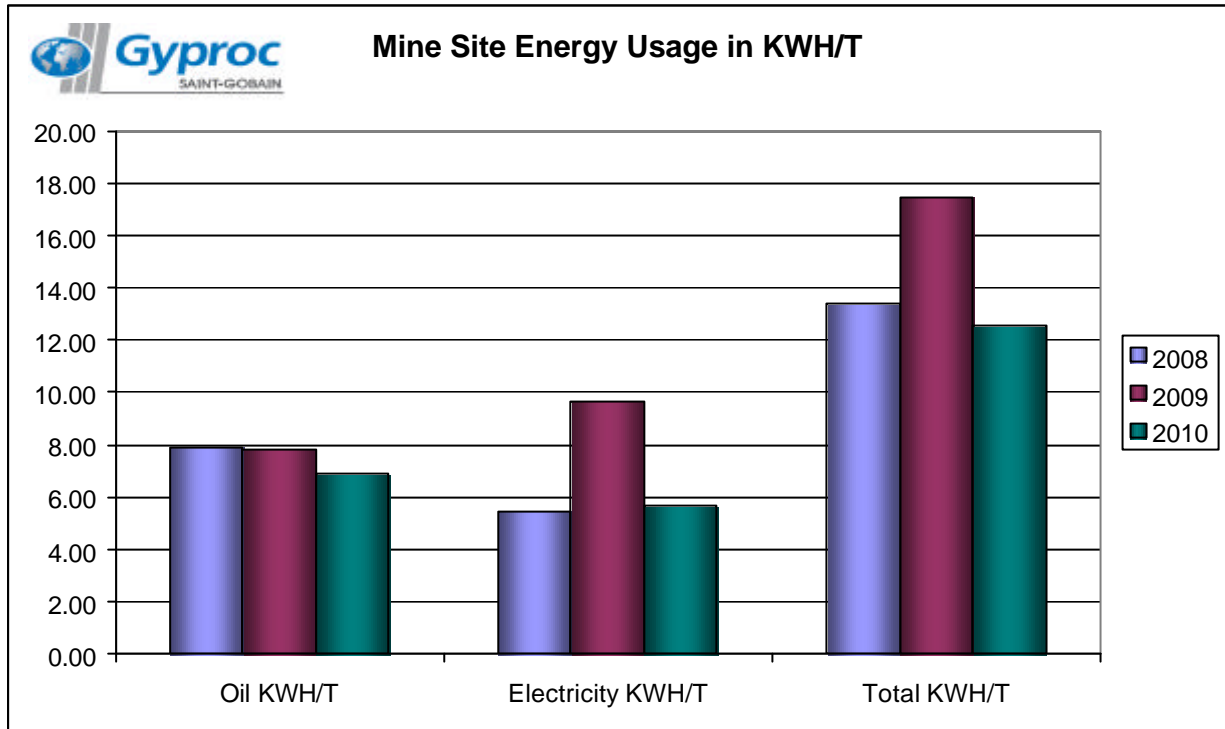
Table 8.1 Process Site Energy Consumption 2008-2010:

There were \*\*19,732 Tonnes of CO<sub>2</sub> produced from the production process at GIL in 2010, this is reduced significantly from 2009 when 23,284 Tonnes of CO<sub>2</sub> were produced and 2008 when 35,058 Tonnes of CO<sub>2</sub> were produced. The reduction is accounted for as a result in a downturn in market conditions and improvements made on Kettle 3 refractory.

(\*\*This figure includes CO<sub>2</sub> produced from Natural gas, Diesel and LPG as verified by Verification Services for our AIER)

**Mine Site:**

There are two sources of energy used at GIL Mine site; Diesel Oil and Electricity. The following graph and table illustrates utilities usage at the process site for the past three years.



**Figure 8.1 Mine site energy usage KWH/T**

	Electricity (KWH/T)	Diesel Oil (KWH/T)	Total (KWH/T)
2008	5.46	7.92	13.38
2009	9.64	7.82	17.46
2010	6.89	5.65	12.52

**Table 8.2 Mine Site Energy Consumption 2008 - 2010:**

**9.0 COMPLAINTS AND INCIDENT SUMMARY**

## 9.0 Complaints and Incident Summary:

### 9.1 Complaints Summary

There were two complaints received in 2010. Both complaints related to blast and vibration.

<b>Complaint No 1</b>	
Date of Complaint:	20/05/2010
Received from:	Lorraine Duffy
Nature of complaint:	Blast and Vibration
Details:	Lorraine Duffy made contact with the site on 20/05/10 to complain that she felt the blast from the mine site had caused high vibrations levels at her residence. Catherina McGuirk contacted Lorraine on 21/05/2010 to establish the details relating to her complaint. Lorraine said that she heard the pre blast warning siren around 4 pm. After that she could feel the vibration levels while standing in her kitchen.
Investigation:	Catherina McGuirk contacted the Mine Surveyor who confirmed that the blast was on the north east corner of the open cast in the lower seam of the quarry. Analysis of the vibration results confirmed that the blast vibration was within the conditions of our IPPC licence (Condition 8.4, limit125dB). The blast monitoring result at MS1 (closest proximity to the blast) gave an air over pressure result of 122.0 dB, and at MS2 gave an air over pressure result of 125.0 dB. The vibographs at MS3 failed to trigger. The Duffy residence is located between MS1 and MS3. Catherina McGuirk explained to Lorraine Duffy that the blast monitoring results were within the limits specified in our IPPC licence Catherina noted Lorraine Duffy's concerns and committed to investigate the matter further in addition to arranging monitoring at her residence when the next blast occurred. Catherina informed Lorraine that she would get back to her with the results and arrangements for future monitoring and also confirmed that she would inform the EPA that a complaint had been made. Blast 694 was similar to other blasts fired in the quarry
Corrective Actions:	All blasts at the time were in the lower seam and located over the mine workings. No problems were encountered during the blast plan and the blast proceeded as normal. The weather conditions were good at the time of the blast; dry, sunshine, very little cloud cover and a slight breeze from a north westerly direction. There was high pressure and humidity which may have attributed to the conditions noted by Lorraine Duffy.

*Table 9.1 Complaint No 1*

<b>Complaint No 2</b>	
Date of Complaint:	01/11/2010
Received from:	Pat Rafferty
Nature of complaint:	Blast and Vibration
Details:	Mr Pat Rafferty made contact with the site following the blast on Monday 01/11/2011 to complain that he felt the blast from the mine site had caused high vibration levels at his residence. The mine manager Mr Dave Edwards contacted Mr Rafferty the following day to establish details relating to his complaint. The mine manager offered to install monitoring equipment at the residence for the following blast. Mr Rafferty stated that he was not interested in having the monitoring station set up at his property for the time being. The mine manager committed to ensure the incident was investigated and to take all necessary corrective actions to prevent reoccurrence.
Investigation:	A detailed risk assessment was conducted prior to the blast. There were no lost, blocked or wet holes and nothing dramatic reported by the driller. This was taken into consideration in preparation of the blast plan. The Wind direction was from MS3 towards the blast site. The orientation of the free face of the blast was NW to SE relative to the blast site. MS2 was in a SW direction, directly in front of the blast. There does not appear to be any obvious explanation for this level of reading at MS2, particularly as the wind direction was SE
Corrective Actions:	We will increase the burden on the front holes from 4.5 m to 5 m when working in this area (burden is the distance between the lines of shot holes at right angles to the free face of the blast). This will result in poorer fragmentation but will reduce AOP. The closer to the face that the first line of holes is, the more throw you get on the blast and often better fragmentation. If the ground is compromised due to fracturing, jointing, damage from earlier blasts, etc it could result in more air overpressure as the subsequent lines of holes are less confined. We did not notice this in preparation of this blast plan, but will take the above into consideration when blasting in this section of the mine site. Irish Industrial Explosives have also consulted with mine site personnel and we have reviewed our procedures for setting up monitoring equipment.

**Table 9.2 Complaint No2**

The agency was informed of both complaints made. Details of the complaints, investigations and corrective actions taken were communicated to the agency and the complainants.

## 9.2 Incident Summary

There was one reportable incident in 2010.

<b>Incident No 1</b>	
Date of Incident:	19/01/2010
Received from:	Dave Edwards Mine Manager
Nature of incident:	Spill
Details:	Catherina McGuirk received notification from the mine manager Dave Edwards at 9am on 19/01/2010, that there was an accumulation of red liquid at a small bridge located on the Irish Gypsum site at Drumgoosat. The EPA, Inland fisheries Ireland, and Monaghan County Council were informed of the incident.
Investigation:	Irish Gypsum Limited has no oil storage vessels in the vicinity of this area. No heavy plant or equipment had recently operated in the area. The diesel oil present was not caused by Irish Gypsum activities. Irish Gypsum examined the section of water up stream of the accumulation. There was no evidence of diesel present. There was a slight natural hue on the water, from which there was no diesel odour. The section of stream after the bridge did still have evidence of diesel present.
Corrective Actions:	During the clean up operation, a local resident approached Catherina McGuirk and informed her that her parents heating oil tank had recently cracked and that a substantial spill had occurred in their yard. This is in close proximity to the area in question. Diarmuid Ryan from Inland Fisheries Ireland confirmed that there was no evidence of diesel contamination in the vicinity of Lough Fea.

Details of the incident were communicated to the EPA, Inland Fisheries Ireland and Monaghan County Council.

## **10.0 OBJECTIVES AND TARGETS**

## 10.0 OBJECTIVES AND TARGETS

### 10.1 OBJECTIVES AND TARGETS 2011

Ref	Objective	Annual target - 2011
1.0	Reduce Process / Fugitive emissions from the activity.	Complete Phase 1 of Rock Shed Improvement – Q4 2011
		Install barrier at wheel wash station in Kingscourt. Link the barrier to the operation of the spray nozzles to ensure wheels are cleaned effectively – Q1 2011
		Apply for technical amendment for flow rate on AE-1. 140,000 nm <sup>3</sup> / HR – Q1 2011
2.0	Reduce the impact of effluent and surface water discharges on the River Bursk/ Lagan	Review relationship between Sulphate, Conductivity and Temperature. Implement findings of report into the new Sulphate control system – Q4 2011
		Complete Phase 1 of Rock Shed Improvement – Q4 2011
		Implement a number of recommendations from Sulphate reduction plan Q1 2011 <ol style="list-style-type: none"> <li>1. Position the S8 discharge in Lagoon 4.</li> <li>2. Install a weir at S3 to quantify flow and discharge from the site</li> <li>3. Ensure all surface water run off at S11 is routed into the lagoon system.</li> </ol>
		Investigate options to improve settling of suspended solids or take off methods at the mine site lagoons.
		Document the operation of the new Sulphate control system as an environmental procedure. Identify key personnel who require training. Complete training and check for effectiveness of training.
		Improve Access Arrangements at Sampling Locations A and B
		Install a cover over the control cabinet at Monitoring point B

Ref	Objective	Annual target - 2011
3.0	Reduce overpressure and Vibration levels experienced off site.	Establish warning and action levels for MSW1
		<p>Review blast procedure, add the following into the procedure and check sheets:</p> <p>Driller to supply additional information on the “Blasthole Drill Log”:</p> <p>Loss of dust / chippings from hole. Drilling dust coming from: cracks in face, cracks in surface or from drilled holes. Wet holes and depth at which water was encountered. Visual check of drill holes for cavities using a torch.</p>
4.0	Reduce energy consumption on site	Complete an assessment on the fitting of Econotherm heat exchanger Q1 2011
		Install Econotherm heat exchanger Estimated Savings 1708 MWh. Q2 2011
		Establish the relationship between the identified energy factors (plant throughput, rock purity, degree days, evaporative load and product mix) and the energy consumption associated with the significant energy aspects on site. Q3 2011
		Complete an assessment of compressed air system including pipe work. Improve the efficiency of the compressed air distribution system to allow a saving of 3%
		Board Weight – Ensure Board weight is on target taking into consideration Rock purity and Average / Standard deviation

Ref	Objective	Annual target - 2011
5.0	Waste Management and Prevention	Implement recommendations from REPAK on Board Plant Pallet design.
		Implement recommendations from REPAK on Plaster Mill Pallet design.
		Improve hazardous waste storage and segregation area.
		Cover lube oil bund at the mine site
		Reduce the waste generated from the foiling area by 20%
		Investigate options to enable the recycling of waste plasterboard from customer sites.
		Install and Commission WWTP at the mine site
6.0	Biodiversity	Complete a biodiversity assessment and develop a Biodiversity action plan from findings.
7.0	Minimise Risk Posed to Groundwater	Monitor gas wells, stream manifolds and discharge point for Carbon Dioxide, Oxygen, Hydrogen Sulphide, Methane and Carbon Monoxide on a monthly basis. Report to EPA quarterly.
		Increase sampling frequency for ground water monitoring at the process site to quarterly. Include new borehole in monitoring programme. Report Quarterly to EPA.
		Review gas monitoring results and ground water monitoring results Consider findings with regard to the suitability of the CRAMP for the landfill. Consult with EPA on progressing CRAMP implementation.
		Implement findings of bund integrity study.
		Complete modifications to pipe work in FB 101 to allow the decommissioning of the DERV road diesel tank.
		Review storage arrangements for glycol reservoir at Raymond mill 5.
8.0	Improve the effectiveness of the ISO 14001 system	Finalise the test of underground tanks and pipelines as per condition 9.4.5 of IPPC Licence P0519-02. Develop plan from findings raised.
		Use WCM problem solving tools for environmental corrective action requests.

## 10.2 SUMMARY REPORT ON OBJECTIVES AND TARGETS 2010

Ref	Objective	Resp	Annual target - 2010	Reason
1.0	Reduce Process / Fugitive emissions from the activity.	DE	Upgrade ground works at the wheel wash station at the mine site. Q2 2010.  Alternative wheel wash arrangements identified, work needs to be completed during a shutdown due to the time required for the concrete to cure. Not suitable for Christmas shutdown due to weather conditions. Planned for Easter shutdown 2011	EMP, Sig effect, 3/8 exceedences, 1/2 complaints
		VK	Develop system to load Agrigyp containers inside the Agrigyp storage area. Q2 2010  Containers now loaded inside storage area. Complete Q3 2010.  Further opportunity for improvement identified –Installation of Dust suppression system. This is currently in progress.	EMP, Sig Effect, 10/14 exceedences
		DE	Cover and re-seed a section of the external berm at the mine site Q2 2010  Completed in September 2010. No further work necessary at present.	EMP, Sig effect, 3/8 exceedences, 1/2 complaints
		VK	Install doors at rear of plaster mill. Q1 2010 Complete Q2 2010  Develop mechanism to cover bin at rear of plaster mill (External) Q1 2010  Bin moved inside and roller door installed. Complete Q2 2010	EMP, Sig Effect, 10/14 exceedences
		DB	Establish required flow rate for AE-1. Q2 2010. Kettle 3 was not operating as the refractory required upgrading. Kettle 3 Refractory installed and Kettle commissioned. Q2 2010. Flow rates determined after a period of run time in Q3 2010	EMP, Sig Effect, 3/14 exceedences

Ref	Objective	Resp	Annual target - 2010	Reason
2.0	Reduce the impact of effluent and surface water discharges on the River Bursk/ Lagan	DE	Upgrade the PLC and system which controls sulphate levels discharged at MSE-1 APR 2010.  System installed and commissioned in Aug 2010.	IPPC Requirement  EMP, Sig Effect,  3/8 exceedences
		JT	Implement a number of recommendations from Sulphate reduction plan (Subject to epa approval)  <ol style="list-style-type: none"> <li>1. Position the S8 discharge in Lagoon 4. APR 2010</li> <li>2. Maximise surface water re-use - Complete</li> <li>3. Install a weir at S3 to quantify flow and discharge form the site Q3 2010</li> <li>4. Ensure all surface water run off at S11 is routed into the lagoon system. Q2 2010 – All water channelled to lagoon system.</li> </ol> Moved to Annual plan 2011	IPPC requirement  EMP, Sig Effect,  1/14 exceedences

Ref	Objective	Resp	Annual target - 2010	Reason
3.0	Reduce overpressure and Vibration levels experienced off site.	DE	Investigate alternative blast design methods for quarry and underground blasts. Q2 2010  Investigation ongoing will continue into 2011. Added to Annual plan 2011	EMP, Sig Effect,  1/8 exceedences
4.0	Reduce energy consumption on site	AK	Install heat recovery system on Raymond 5 from Kettle 6. Q2 2010.  Estimated savings 768,000 KWH per annum.  Project modified to K6 heat recovery – moved to Annual plan 2011	EMP  Cost Deployment  Sig Effect
		DB	Establish system to have access to gas meter readings on site. Q1 2010  Complete Q 3 2010	Cost deployment  Sig effect
		DB	Rebuild Kettle 3 refractory. Estimated savings 2,434,560 KWH per annum. Q2 2010  Complete Q2 2010	EMP  Cost Deployment  Sig Effect

Ref	Objective	Resp	Annual target - 2010	Reason
4.0	Reduce energy consumption on site	MS	Reduce the MDQ from 950,000KWH to 885,000KWH. Jan 2010 Complete Jan 2010	Cost Deployment
		VK	Ensure MDQ is not breached. Q4 2010 - Complete	
		EM	Reduce evaporative load from 436 to 410. Estimated savings are 2.77 M KW Annum. Manage system to ensure evaporative load is reduced to 410 and remains stable thereafter. Q4 2010. Average Evaporative load for 2010 was 430.	EMP Cost Deployment Sig Effect
		AK	Shut off the trace heating to the electrostatic precipitator. Estimated savings of 262,800 KWH per annum. Q2 2010  Complete Q2 2010	EMP, Cost Deployment, Sig Effect
5.0	Waste Management and Prevention	TC	Improve bund facilities at the mine site  1. Finish covering the diesel bund at the garage APR 2010 - Complete 2. Replace the office oil tank and bund with a double skinned tank Q3 2010 - Complete 3. Cover the lubrication oil bund - in progress	EMP, Sig Effect, Cost Deployment
		CMD	Implement requirements of PCB Study Q4 2010. Assessment complete, all findings communicated to the EPA.	EPA Audit

Ref	Objective	Resp	Annual target - 2010	Reason
5.0	Waste Management and Prevention	VK	<p>Establish the weight of packaging per m2 of board and set target to reduce this</p> <p>Establish the weight of packaging per Tonne of plaster and set target to reduce this. Q1 2010.</p> <p>Implement packaging reduction programme in the Board Plant Q4 2010.</p> <p>Trials complete, however some quality problems were experienced. A new trial was developed and this was successful and has been rolled out to include the plaster mill.</p>	Cost Deployment
6.0	Minimise Risk Posed to Groundwater	<p>CMG</p> <p>JT</p> <p>CMG</p> <p>JT</p>	<p>Prepare a proposal for the agency detailing additional gas monitoring wells in the landfill area. Ensure the proposal contains construction details for the wells, proposed locations and consideration of proposed landfill gas mitigation measures. APR 2010. Complete Q2 2010</p> <p>Install additional wells and conduct monitoring Q4 2010 Complete.</p> <p>Submit a proposal to the agency detailing further investigation works required in order to assess the risks posed to groundwater from the landfill activity. APR 2010. Complete</p> <p>Complete further site investigative works to assess the risk posed to groundwater from the landfill activity. Q4 2010</p> <p>Complete. See Section 7.6 Closure restoration and Aftercare Management Plan.</p>	EMP, Sig Effect, IPPC Requirement CRAMP, Cost Deployment

Ref	Objective	Resp	Annual target - 2010	Reason
6.0	Minimise Risk Posed to Groundwater	JT	Detail the quantities of waste requiring excavation within the landfill closure plan. Detail waste handling procedures and odour mitigation levels. Refer to Section 3.3.3 of the proposed landfill CRAMP. APR 2010.  Report MGE0204RP0001 Regrading works plan Appendix (v)	EMP, Sig Effect, IPPC Requirement CRAMP Cost Deployment
		JT	Consult with the local authority on the proposed final profile, landscape consideration and after-use of the landfill area. APR 2010. All communications regarding the landfill have been forwarded to Meath County Council.	EMP, Sig Effect, IPPC Requirement CRAMP
		JT	Complete a test of underground tanks and pipelines as per condition 9.4.5 of IPPC Licence P0519-02 Q3 2010 – Complete. Awaiting final report	EMP, Sig Effect, IPPC Requirement
7.0	Improve the effectiveness of the ISO 14001 system	CMG/ EM	Improve incident investigation, corrective and preventive action system using WCM tools. Q2 2010 Completed Standard Kiazen training. Currently using Standard Kiazen for Sulphate reduction plan.	ISO 14001, Sig Effect
		CMG	Establish and implement effective EMAT audit system. Q1 2010  Complete Q 1 2010.	ISO 14001, WCM

**11.0 ENVIRONMENTAL MANAGEMENT  
PROGRAMME**

**11.0 Environmental Management Programme**

<b>Project No:</b>	<b>Target</b>
1.0	Reduce Process / Fugitive emissions from the activity.
2.0	Reduce the impact of effluent and surface water discharges on the river Bursk/Lagan
3.0	Reduce overpressure and vibrations levels experienced off site
4.0	Reduce energy consumption on site
5.0	Waste Management and Prevention
6.0	Biodiversity
7.0	Minimise Risk posed to ground water
8.0	Improve the effectiveness of the ISO 14001 environmental management system.

*Table 11.0 Environmental Management Programme.*

**12.0      POLLUTION RELEASE AND TRANSFER  
REGISTER**

## 12.0 Pollution Release and Transfer Register:

Outlined below is a list of releases to air and water from our facility which have been reported in compliance with S1123 of 2007.

### *Air*

- Nitrous Oxides
- Carbon Monoxide
- Particulate matter

### *Water*

- Arsenic and compounds
- Cadmium and compounds
- Chlorides
- Chromium and compounds
- Copper and compounds
- Lead and compounds
- Nickel and compounds
- Total phosphorous
- Mercury and compounds
- Ammonia
- Antimony
- BOD
- COD
- Manganese
- Mineral Oils
- Nitrate
- Selenium
- Sulphate
- Suspended Solids
- Tellurium
- Tin
- Total Heavy Metals
- Fats, Oils and Greases

Details of the emissions are recorded in the EPA AER Returns Worksheet in Appendix (vi)

## **13.0 NOISE MONITORING REPORT**

**13.0 Noise Monitoring Report:**

Noise monitoring is scheduled to be carried out annually, as outlined in condition 8.1 of the IPPC licence. During 2010, monitoring was completed by NAM acoustics. Day time levels were monitored on Wednesday 2<sup>nd</sup> of June. Night time levels were monitored on 30<sup>th</sup> and 31<sup>st</sup> of June. A report detailing the results of the monitoring is attached as Appendix (vii).

**14.0 GROUND WATER MONITORING SUMMARY**

**14.0 Groundwater Monitoring Summary:**

Ground water monitoring is scheduled to be carried out bi-annually, as outlined in Schedule 4(ii) of the IPPC licence. During 2010, both sets of monitoring were completed by Minerex. The results for the monitoring completed in 2010 are summarised in Appendix (viii). Monitoring at the process site is quarterly, commencing Quarter 1 2011.

## **15.0      AMBIENT AIR MONITORING SUMMARY**

## 15.0 Ambient Air Monitoring Summary:

There are nine IPPC ambient air emission monitoring stations.

There are four monitoring stations at the mine site; MS1, MS2, MS3 and MS4.

There are five monitoring stations at the process site; D1, D2, D3, D4 and D5.

Total dust deposition is monitored continuously. Samples are collected on a monthly basis.

The limit for total dust deposition is 350 mg/m<sup>2</sup>/day. This limit is a licence condition for the mine site and has been included for the dust monitoring points at the process site under Technical Amendment B.

### 15.1 Mine Site:

2010 Results	Dust Deposition Results			Compliance
	mg/m <sup>2</sup> /day			
Monitoring Station	Average	Lowest	Highest	
MS1	372.3	33	3490	91.6%
MS2	129.5	12	424	83.3%
MS3	111.3	8	348	100%
MS4	247.8	31	747	83.3%

*Table 15.1 Dust Deposition analysis at the mine site 2010*

Monitoring Station	Dust Deposition Results mg/m <sup>2</sup> /day	
	Average 2009	Average 2010
MS1	148.4	372.3
MS2	202.1	129.5
MS3	107.8	111.3
MS4	235.4	247.8

*Table 15.2 Dust Deposition analysis at the mine site 2009 V's 2010*

The average dust deposition at MS1 has increased. The average dust deposition at MS2 has decreased. Average dust deposition at MS3 and MS4 shows little change.

## 15.2 Process Site:

2010 Results	Dust Deposition Results mg/m <sup>2</sup> /day			Compliance
Monitoring Station	Average	Lowest	Highest	
D1	100.5	19	184	100%
D2	107.1	26	328	100%
D3	311.1	29	1755	75%
D4	93.7	36	292	100%
D5	180.4	31	311	100%

*Table 15.3*

*Dust Deposition analysis at the process site 2010*

Monitoring Station	Dust Deposition Results mg/m <sup>2</sup> /day	
	Average 2009	Average 2010
D1	117.3	100.5
D2	106.5	107.1
D3	403.3	311.1
D4	165.0	93.7
D5	303.5	180.4

*Table 15.4 Dust Deposition a nalysis at the process site 2009 V's 2010*

Average dust levels at D1, D3, D4 and D5 have reduced compared to 2009. D2 dust deposition levels remained constant.

Where dust deposition limits were exceeded the presence of foreign objects, leaves, insects etc was noted. A dust stand survey was completed in August 2010 which identified opportunities for improvement on our dust stands. This work was carried out in October 2010.



*Fig 15.1 Dust Stand D3*

The work completed included:

1. Clearing the area of all vegetation
2. Fencing off the area around the stand
3. Laying down a mesh to prevent re-growth of vegetation
4. laying stone on the area
5. Re-setting the height of the stands to the correct height.

**16.0 BUND INTEGRITY TESTING REPORT**

**16 Bunding:**

A Bund Integrity Assessment was undertaken in 2010. This assessment was conducted in December 2010 by Brian Kavanagh from Thomas Garland and Partners, Consulting Civil and Structural Engineers.

Both the mine and process site bunds were inspected. The purpose of the inspection was to ascertain if the bunds could be certified as being watertight.

The normal method of certifying bunds is to carry out a water retention test in accordance with BS8007 (1987) and measure the loss of water over a 24-hour period. This method naturally means that there is not capacity for the escape of the hydrocarbons during the period of the test.

**16.1 Process Site Inspection**

There were four fixed bunds assessed at the process site in 2010.

<b>Bund No</b>	<b>Location/ Description Construction</b>	<b>Bund Capacity (L)</b>	<b>Tank Volume (L)</b>	<b>Comment</b>
FB 100	Lorry wash -Gas oil tank	68000	45000	Oil tank no longer in use. All oil removed from tank. Tank was also removed from site in 2010.
FB 101	Garage - Transport and Waste oils	58000	71,000 (Total)	Repairs to action 2008 required repairs were undertaken. However further repairs are required from 2010 bund integrity study.
FB 102	Board Plant - Process additives	43891	65,000 (Total)	Unsatisfactory, some cracks in bund wall require repair and damage to bund floor.
FB 103	Lubrication store	1942	10 * 205L drums	Satisfactory and no issues.

*Table 16.1 Fixed Bund locations at the process site*

**FB 100**

The contents of the oil tank and the tank itself were been removed from the site in 2010.

**FB 101**

This is a very large concrete enclosure which contains several different tanks.

Repairs to action 2008 integrity report findings were undertaken. However further repairs are required from the 2010 bund integrity study. These repairs will be undertaken in 2011.

**FB 102**

This is a large bunded area within the board plant containing two large tanks.

From the 2010 Thomas Garland & partners report, repairs to this bund are required with some cracks in bund wall and damage to bund floor.

These repairs will be undertaken in 2011.

**FB 103**

This bund is used to store 205 litre drums of lubricating oil.

The 10 No. drums are stored in a proprietary stacking system, which has a stated self bund capacity of 66 gallons.

While it was not possible to fully inspect the concrete bund itself, a detailed inspection of the blockwork walls outside the bund was completed. No signs of leakage were noted and the bund appeared to be satisfactory.

## 16.2 Mine Site

There are five fixed bunds currently in use at the mine site.

Bund No	Location/ Description Construction	Bund Capacity (L)	Tank Volume	Comment
FB 104	Main workshop - Transport Oil	31,117 (10.4*3.4*0.88)	28,000	Satisfactory and no issues.
FB 105	Main Workshop - Lubrication and waste oils	28,971 (8.7*3.7*0.9)	9,900 (Total)	Satisfactory and no issues.
FB 106	Main Workshop - Lubrication oil store	Decommissioned	N/A	Decommissioned and no longer in use and replaced with FB109.
FB 107	East of workshop on access road to underground mine – Transport oil (self banded unit)	N/A		Self Banded Tank.
FB 108	Office – Heating Oil	2,880	2,700	Self Banded Tank.
FB109	Main workshop – New Lubrication Oil Store	6,498 (9.525 x 3.360 x 0.203)	205 litre drums	Satisfactory and no issues.

*Table 16.2 Fixed Bund locations at the mine site*

### FB 104

This is a large capacity steel tank beside the workshop at the mine site.

The entire tank and bund have been covered to prevent rainwater entering the bund and reducing bund capacity.

Since the last bund inspection in 2008, all timber spaces within the concrete bund walls have been cut out and refilled with non shrink concrete.

All minor cracks noted have been pressure grouted.

### FB 105

This concrete bund is located beside the workshop at the mine site and houses 5 tanks of varying capacity.

Since the last bund inspection in 2008, the entire tank and bund have been covered to prevent rainwater entering the bund and reducing bund capacity.

All minor cracks noted in the 2008 report have been pressure grouted.

**FB106**

This bund has been decommissioned and was replaced by a new bund, FB109.

**FB107**

There is a large self banded diesel tank along with 2 No. water tanks and a fuel pump located on the access road to the underground mine site.

As the diesel tank is self banded there is no requirement for a concrete bund.

**FB108**

Since the 2008 bund integrity report, the old oil tank has been replaced with a new self banded tank. As the tank is self banded there is no requirement for a concrete bund.

**FB109**

This is a newly constructed, covered bund and no issues with integrity were identified in the 2010 Thomas Garland and partners report

**Follow Up:**

The findings of the bund integrity report have been reviewed by the environmental manager and facilities Engineer. Responsibility for the follow up on items raised has been assigned to the facilities engineer.

## **17.0 CRAMP and ELRA**

## **17 CRAMP and ELRA review**

Review of the our arrangements with regard to

1. Environmental Liability Risk Assessment ; ELRA,
2. Closure Restoration and Aftercare Management Plans; CRAMP and
3. Financial Provisions FP.

### **Risk Category:**

G5: The extraction and processing (including size reduction, grading and heating) of minerals within the meaning of the Minerals Development Acts 1940 to 1999, where an activity involves—(a) a metalliferous operation, or (b) any other operation where either the level of extracted or processed minerals is greater than 200,000 tonnes per annum or the total operational yield is greater than 1,000,000 tonnes, and storage of related mineral waste.

### **ELRA**

The ELRA was completed by Byrne and O’Cleirigh in July 2006. The report was forwarded to the agency in Aug 2006. The method employed in carrying out the assessment was a risk based approach, in accordance with the methodology for ELRA’s outlined in the then Draft Guidance on Environmental Liabilities Risk Assessment and Residuals Management Plan.

### **CRAMP**

The first RMP was completed and submitted to the agency in December 2003, it was revised in July 2004. A full review of the CRAMP was completed in September 2007.

### **Financial Provisions:**

Our environmental liabilities are covered under St Gobain's general environmental liabilities insurance. This provides an indemnity limit of not less than €60 Million subject to a deductible of €450K.

Our Closure, Restoration and Aftercare Management Plan CRAMP costs are estimated at €2,082,716 for the mine site and €2,975,000 for the process site.

The mine site closure costs are covered by one bond which incorporates the three bonds originally held and put in place as conditions to our planning permission at the mine site. The bonds total €2.2 Million. The process site CRAMP costs are underwritten by Saint Gobain.

**APPENDIX (i) ENVIRONMENTAL POLICY**

# INTEGRATED MANAGEMENT SYSTEMS



Subject	HEALTH & SAFETY, ENVIRONMENTAL & QUALITY POLICY			
Owner:	Brian Dolan	Document No. 66	Kingscourt	✓
Author:	Noel Molloy/Catherina McGuirk/Anita Thomas	Rev. 3	Parkwest	✓
Date of Issue:	05/03/2010		Mining	

Gypsum Industries Limited is the market leader in plasterboard and plaster manufacturing in Ireland. Our vision is to be the preferred choice for interior building systems that provide innovative design solutions.

## It is our policy

- To achieve and maintain the highest standards in **Health & Safety** and **Environmental Responsibility**, and in product **Quality**, throughout the company and in all our activities.
- To comply with all applicable national and international legislation as well as Saint-Gobain policies and standards related to **Health & Safety, Environmental** and **Quality** matters.
- To identify hazards and eliminate or minimise risks so as to
  - prevent injury or ill health to employees, contractors and visitors
  - prevent and control adverse environmental impact

## We are committed to

- Ensuring that Health and Safety at work is a core business value.
- The efficient use of resources, minimisation of waste and the prevention of pollution.
- Serving the needs of our customers by providing products and services that meet or exceed their requirements

We will routinely set and review achievement of specific objectives and targets for continuous improvement in the fields of **Health & Safety, Environmental** and **Quality** Management, and comply with the standards of independently verified management systems including OHSAS 18001, ISO 14001 and ISO 9001.

We will use appropriate training, involvement, development and communication with all our employees and other relevant parties to actively promote

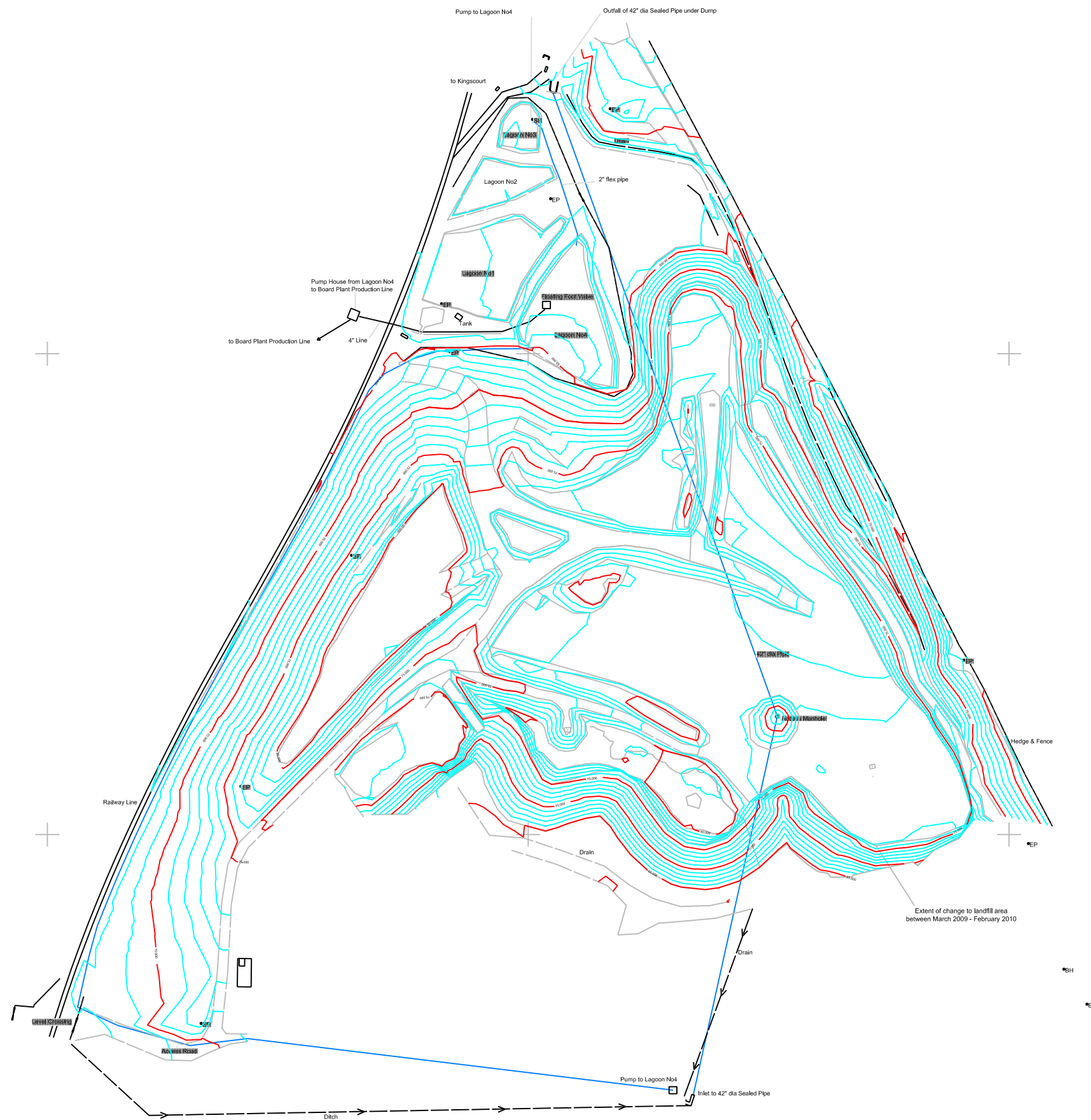
- awareness of **Health & Safety**,
- responsibility towards the **Environment**,
- understanding of product **Quality**.

We will devote sufficient resources to ensure that this policy is implemented throughout the company.

We require and expect our employees and others on our sites to take responsibility for their compliance with this policy and its related procedures and practices.

**Brian Dolan**  
**Managing Director**  
5<sup>th</sup> March 2010

**APPENDIX (ii) LANDFILL DRAWING**



Gypsum Ind. Ltd. Factory Landfill  
at February 2010

 GYPSUM INDUSTRIES PLC KNICKNACRAN, ORENGAST Kingscourt, Co. Cavan, Ireland	Drawing No. <b>351-24-10</b>
	Surveyed: 19-02-10 Drawn: 20-02-10 Grid: Local Datum: Local Scale 1:1000

**APPENDIX (iii) LANDFILL MONITORING REPORT**

**Gypsum Industries Ltd.**  
Kingscourt, Co. Cavan

**P0519-02**  
Landfill Gas Report – March 2010

Report Date:

29<sup>th</sup> March 2010

**EURO environmental services**

Unit 35A, Boyne Business Park, Drogheda, Co Louth

Report No. 5290/M14

## 1.0 Introduction

Landfill gas monitoring was carried out at Gypsum Industries landfill by Victor Olmos and Aadil Khan of EURO environmental services on the 22<sup>nd</sup> March 2010.

## 2.0 Analysis Methods

Oxygen (O<sub>2</sub>), Carbon Dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>), Carbon Monoxide (CO), Hydrogen Sulphide (H<sub>2</sub>S) and Atmospheric Pressure were carried out using a GA 2000 gas analyser. CH<sub>4</sub> and CO<sub>2</sub> were measured by infra-red light and O<sub>2</sub> by electrochemical cell measurement.

## 3.0 Calibration

The GA 2000, serial no. GA05213 was calibrated in the month of February 2010, and has a valid calibration until August 2010. Calibration was carried out by CSL Ltd.

## 4.0 Interpretation of Results

### 4.1 Gas Monitoring Wells

Landfill gas was monitored at the following locations at the Gypsum Industries Landfill (See attached Site Monitoring Map for Landfill Gas Monitoring Locations):

The trigger levels for emissions of landfill gas are:

- Methane;  $\geq 1.0\%$  v/v
- Carbon Dioxide;  $\geq 1.5\%$  v/v

BH1: No methane was detected during monitoring. No carbon monoxide or hydrogen sulphide was present either. Carbon dioxide was detected within the trigger values, it averaged at 0.3%.

BH2: Methane readings were within the limits with an average value of 0.1%. CO<sub>2</sub> levels were high, averaging 3.9% and exceeding the trigger value of 1.5%. High concentration of hydrogen sulphide was detected and exceeded above the range of detection of the Gas analyzer (>500 ppm). CO was not detected.

BH3: Methane readings were within the limits with an average value of 1.0%. CO<sub>2</sub> levels were quite high, averaging 19.1% and exceeding the trigger value of 1.5%. H<sub>2</sub>S and CO values were above the range of detection of the Gas analyzer (>500 ppm).

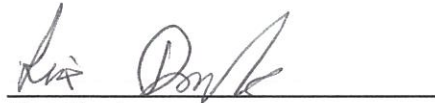
BH2 OD4: No methane, CO<sub>2</sub> or CO was detected during monitoring. H<sub>2</sub>S values were low reaching 1 ppm.

## 5.0 Conclusions

None of the wells showed methane values above the limit of 1.0%.

BH2 and BH3 had readings of CO<sub>2</sub> above the limit of 1.5%.

BH3 is the most active landfill gas well monitored, having the highest values of CH<sub>4</sub>, CO<sub>2</sub>, and H<sub>2</sub>S. This indicates that sulphate in the landfill is still degrading into hydrogen sulphide.



Lisa Doyle  
Environmental Technician

29<sup>th</sup> March 2010



Victor Olmos  
Field Services Manager

Appendix 1: Landfill Gas Monitoring Average Results – 22<sup>nd</sup> March 2010

Ref. No.	CH <sub>4</sub> %	CO <sub>2</sub> %	O <sub>2</sub> %	Balance %	H <sub>2</sub> S ppm	CO ppm	Barometric mb	Relative mb
BH1	0.0	0.3	19.8	79.6	0	0	998	-0.21
BH2	0.1	3.9	18.2	77.8	> LIMIT	0	998	-0.21
BH3	1.0	19.1	3.4	76.4	> LIMIT	> LIMIT	997	-0.21
BH2 OD4	0.0	0.0	20.2	79.7	1	0	999	-0.34

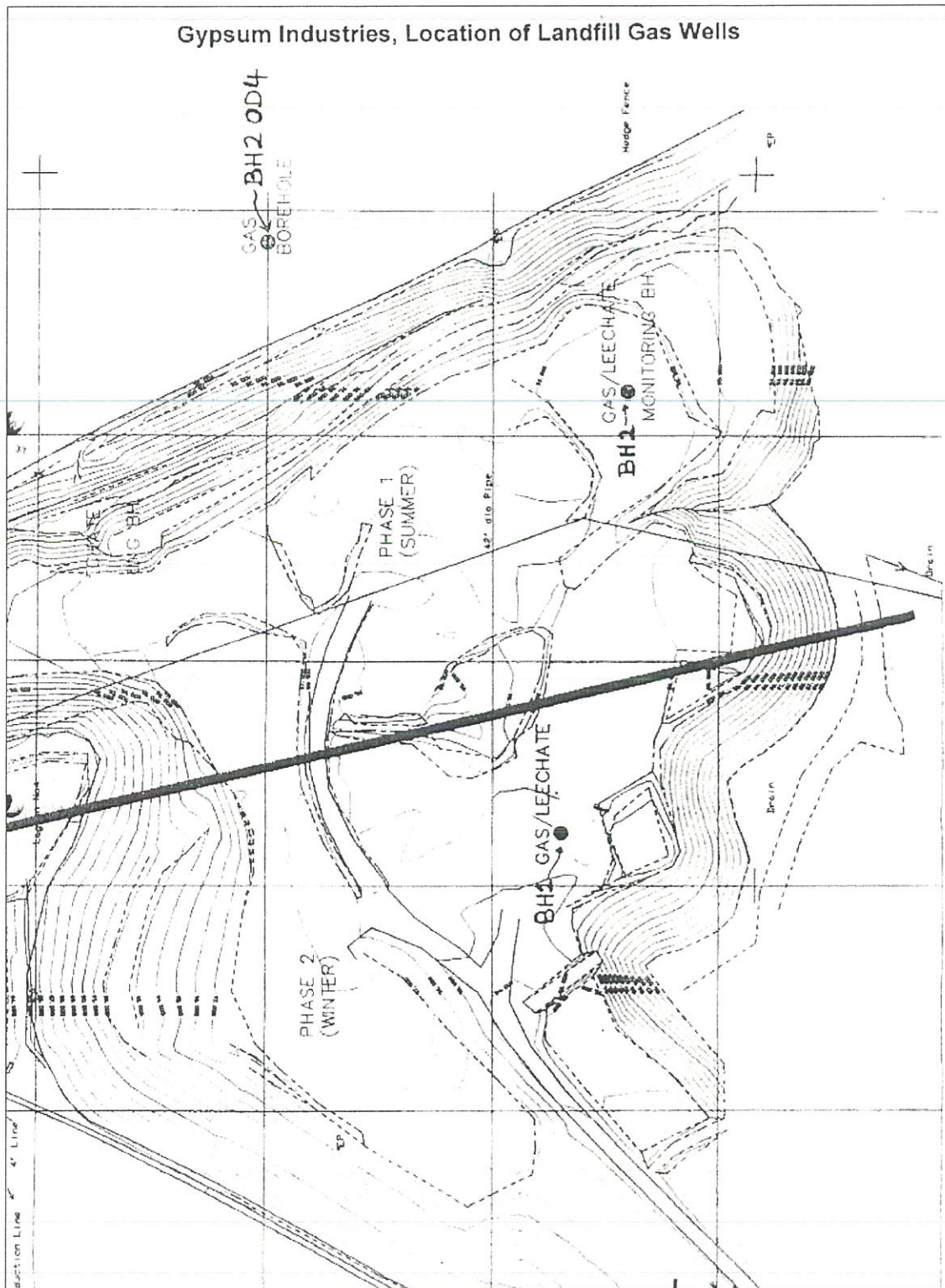
BH1	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	BAL (%)	H <sub>2</sub> S (ppm)	CO (ppm)	BAR PRESSURE (mb)	REL PRESSURE (mb)
	0.0	2.1	17.8	80.2	0	0	998	-0.21
	0.0	0.6	19.4	79.8	0	0	998	-0.21
	0.0	0.4	19.7	79.8	0	0	998	-0.21
	0.0	0.3	19.7	79.9	0	0	998	-0.21
	0.0	0.2	19.9	78.8	0	0	998	-0.21
	0.0	0.2	20.0	78.8	0	0	998	-0.21
	0.0	0.2	20.0	79.7	0	0	998	-0.21
	0.0	0.2	20.0	79.7	0	0	998	-0.21
	0.0	0.1	20.1	79.6	0	0	998	-0.21
	0.0	0.1	20.1	79.7	0	0	998	-0.21
	0.0	0.1	20.2	79.6	0	0	998	-0.21
	0.0	0.1	20.3	79.7	0	0	998	-0.21
	0.0	0.1	20.3	79.7	0	0	998	-0.21
	0.0	0.1	20.1	79.7	0	0	998	-0.21
	0.0	0.1	20.1	79.7	0	0	998	-0.21
	<b>0.0</b>	<b>0.3</b>	<b>19.8</b>	<b>79.6</b>	<b>0</b>	<b>0</b>	<b>998</b>	<b>-0.21</b>

<b>BH2</b>	<b>CH4 (%)</b>	<b>CO2 (%)</b>	<b>O2 (%)</b>	<b>BAL (%)</b>	<b>H2S (ppm)</b>	<b>CO (ppm)</b>	<b>BAR PRESSURE (mb)</b>	<b>REL PRESSURE (mb)</b>
	0.0	1.2	19.6	79.4	211	0	998	-0.21
	0.0	3.8	18.3	77.6	> LIMIT	0	998	-0.21
	0.1	4.2	18.1	77.6	> LIMIT	0	998	-0.21
	0.1	4.0	18.0	77.8	> LIMIT	0	998	-0.21
	0.1	4.1	18.0	77.7	> LIMIT	0	998	-0.21
	0.1	4.2	18.0	77.7	> LIMIT	0	998	-0.21
	0.1	4.1	18.1	77.7	> LIMIT	0	998	-0.21
	0.1	4.1	18.0	77.7	> LIMIT	0	998	-0.21
	0.1	4.4	17.8	77.6	> LIMIT	0	998	-0.21
	0.1	4.0	18.1	77.7	> LIMIT	0	998	-0.21
	0.1	3.9	18.2	77.6	> LIMIT	0	998	-0.21
	0.1	4.1	18.1	77.6	> LIMIT	0	998	-0.21
	0.1	4.0	18.2	77.6	> LIMIT	0	998	-0.21
	0.1	4.3	18.0	77.5	> LIMIT	0	998	-0.21
	0.1	4.0	18.0	77.7	> LIMIT	0	998	-0.21
	<b>0.1</b>	<b>3.9</b>	<b>18.2</b>	<b>77.8</b>	<b>211</b>	<b>0</b>	<b>998</b>	<b>-0.21</b>

<b>BH3</b>	<b>CH4 (%)</b>	<b>CO2 (%)</b>	<b>O2 (%)</b>	<b>BAL (%)</b>	<b>H2S (ppm)</b>	<b>CO (ppm)</b>	<b>BAR PRESSURE (mb)</b>	<b>REL PRESSURE (mb)</b>
	1.0	15.3	5.3	77.0	> LIMIT	> LIMIT	997	-0.21
	1.1	10.4	8.6	76.5	> LIMIT	> LIMIT	997	-0.21
	1.0	19.6	3.5	75.4	> LIMIT	> LIMIT	997	-0.21
	1.1	21.2	1.2	76.3	> LIMIT	> LIMIT	997	-0.21
	1.2	22.0	0.5	76.3	> LIMIT	> LIMIT	997	-0.21
	1.1	21.4	1.0	76.3	> LIMIT	> LIMIT	997	-0.21
	1.0	15.0	5.3	76.8	> LIMIT	> LIMIT	997	-0.21
	1.1	21.1	2.7	75.4	> LIMIT	> LIMIT	997	-0.21
	1.2	22.3	0.2	76.2	> LIMIT	> LIMIT	997	-0.21
	1.2	22.2	0.0	76.4	> LIMIT	> LIMIT	997	-0.21
	1.2	22.2	0.0	76.4	> LIMIT	> LIMIT	997	-0.21
	1.2	22.2	0.0	76.4	> LIMIT	> LIMIT	997	-0.21
	1.2	22.2	0.0	70.5	> LIMIT	> LIMIT	997	-0.21
	0.7	13.7	7.5	78.0	> LIMIT	> LIMIT	997	-0.21
	0.3	15.3	15.3	82.7	> LIMIT	> LIMIT	997	-0.21
	<b>1.0</b>	<b>19.1</b>	<b>3.4</b>	<b>76.4</b>	<b>&gt; LIMIT</b>	<b>&gt; LIMIT</b>	<b>997</b>	<b>-0.21</b>

<b>BH2 04D</b>	<b>CH4 (%)</b>	<b>CO2 (%)</b>	<b>O2 (%)</b>	<b>BAL (%)</b>	<b>H2S (ppm)</b>	<b>CO (ppm)</b>	<b>BAR PRESSURE (mb)</b>	<b>REL PRESSURE (mb)</b>
	0.0	0.0	20.1	79.8	1	0	999	-0.34
	0.0	0.0	20.2	79.7	2	0	999	-0.34
	0.0	0.0	20.2	79.8	1	0	999	-0.34
	0.0	0.0	20.2	79.7	2	0	999	-0.34
	0.0	0.0	20.2	79.7	2	0	999	-0.34
	0.0	0.0	20.3	79.6	1	0	999	-0.34
	0.0	0.0	20.2	79.7	1	0	999	-0.34
	0.0	0.0	20.3	79.6	2	0	999	-0.34
	0.0	0.0	20.2	79.6	2	0	999	-0.34
	0.0	0.0	20.2	79.6	1	0	999	-0.34
	0.0	0.0	20.2	79.6	1	0	999	-0.34
	0.0	0.0	20.3	79.6	1	0	999	-0.34
	0.0	0.0	20.3	79.6	1	0	999	-0.34
	0.0	0.0	20.2	79.6	1	0	999	-0.34
	0.0	0.0	20.3	79.7	1	0	999	-0.34
	<b>0.0</b>	<b>0.0</b>	<b>20.2</b>	<b>79.7</b>	<b>1</b>	<b>0</b>	<b>999</b>	<b>-0.34</b>

Appendix 2: Landfill Gas Monitoring Locations












**APPENDIX (iv) LANDFILL SITE LAYOUT MAP**

# Appendix A Site layout map

Gypsum Industries Limited  
Kingscourt, County Cavan

Drawing Ref.: 1632-008  
(PROCESSING SITE).cdr  
STATUS - UPDATED - JR 04/01/11

## Common legend

-  Stream
-  Culvert
-  Shallow groundwater flow
-  Surface water monitoring point
-  Existing groundwater monitoring borehole
-  Newly installed groundwater monitoring borehole
-  Existing gas monitoring well
-  Newly installed gas monitoring well
-  Possible extent of gravel deposits

N (National Grid)



## NOTES

- Basemap courtesy of Ordnance Survey of Ireland

**Minerex**  
Environmental Limited

Hydrogeological, Environmental & Geophysical Services  
Tel 01-2964435, Fax 01-2964436, Email: Enquiries@minerex.ie



S13  
1 mile  
downstream

100m

Streams 1 and 2 emerge  
at S9 beyond lagoons

Runoff  
drain

Runoff  
drain

Runoff & leachate  
pumped from  
collection pond

Stream 2

Stream 1

Stream 1

Stream 2

Lagoon 3

Lagoon 2

Lagoon 1b

Lagoon 1a

Lagoon 4

BH04-03D

BH04-03S

95A

S4

S5

S2

S1

S3

S8

S9

S10

BH08-03D

BH07-03S

BH01-03S

BH03-03D

BH03-03S

BH02-03S

BH 6

BH 5

BH 7

BH 3

BH 4

BH2-04S

BH2-04D

BH 10

BH 8

BH 1

BH 2

BH 11

BH05-03S

96A

BH06-03D

BH09-03S

BH09-03D

BH10-10S

BH 9

BH01-04S

BH01-04D

96A

## **APPENDIX (v) REGRADING WORKS PLAN**



## **Gypsum Industries Landfill**

# **RESPONSE TO EPA CLARIFICATION - REGRADING WORKS PLAN**

**June 2010**

MGE0204CR0001

**RPS**





# Gypsum Industries Landfill

## RESPONSE TO EPA CLARIFICATION - REGRADING WORKS PLAN

### DOCUMENT CONTROL SHEET

Client	Gypsum Industries Landfill					
Project Title	Gypsum Industries Landfill - Response to EPA Clarification					
Document Title	Response to EPA Clarification - Regrading Works Plan					
Document No.	MGE0204RP0001					
This Document Comprises	DCS	TOC	Text	List of Tables	List of Figures	No. of Appendices
	1	1	10	1	-	3

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F01	Final Issue	K Garvey M. Doherty	<i>W. Madden</i>	<i>W. Madden</i>	Galway	01/06/10



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## APPENDICES

<b>APPENDIX A</b>	<b>Drawings</b>
<b>APPENDIX B</b>	<b>Sample Odour Survey Field Sheet</b>
<b>APPENDIX C</b>	<b>Draft Site Odour Incident Plan</b>



# 1 INTRODUCTION

## 1.1 TERMS OF REFERENCE

RPS has been commissioned by Gypsum Industries to prepare a response to the EPA Request for Clarification letter dated 19<sup>th</sup> November 2009 with regard to the Closure, Restoration and Aftercare Management Plan (CRAMP) for the Gypsum Industries Landfill, Kingscourt, Co, Cavan which was submitted to the EPA on 9<sup>th</sup> September 2009.

This report deals specifically with the following item in the EPA Request for Clarification letter:

*“Section 3.3.3 (of the Closure, Restoration and Aftercare Management Plan August 2009) refers to the requirement to excavate waste, as part of regrading works. The licensee shall submit to the Agency a detailed plan for these works including quantities requiring excavation for each phase, waste handling procedures and odour mitigation measures”*

## **2 PROPOSED REGRADING WORKS**

### **2.1 EXISTING SITE TOPOGRAPHY**

The landfill facility occupies the eastern area of the Gypsum processing plant and is accessed through the main processing site. The site is positioned within a valley which trends southeast to northwest. The eastern edge of the landfill is bounded by the eastern slope of the valley. To the west the landfill is bounded by a disused railway line immediately beyond which is the main processing facility.

Agricultural land exists to the north and south of the site. Four surface water/leachate lagoons used for the settlement of landfill leachate are located immediately to the north-west of the landfill landform. The lagoons receive pumped water collected in drainage ditches at the toe of the slope of the landfill landform. Water from the settlement lagoons is reused in the plasterboard manufacture process.

The landfill facility occupies approximately 7 hectares of land to the east of the main processing area with land rising steeply to the east beyond the landfill. The site is triangular in shape and comprises a significant land-raise which extends approximately 12 m above the surrounding ground level with slope gradients of approximately 1:2.

As part of the restoration works a slope that is deemed sympathetic to the surrounding environment will be achieved and any visual impact from the perimeter zone of the landfill will be compensated for by additional hedging/planting as required.

The existing layout of the site is presented in Drawing No. DG0001-01 in Appendix A.

### **2.2 REGRADING WORKS**

#### **2.2.1 Proposed Restoration Phasing**

It is proposed that the landfill area will be restored on a phased basis over 5 years. The first phases of restoration will be carried out in the areas which require the largest volumes of waste to be excavated for the regrading works. These areas are predominantly on the east and south of the landfill.

It is proposed that the works will be carried out each year during suitable meteorological conditions.

## 2.2.2 Regrading Works Overview

The regrading works will include for the regularisation of the slopes and the top of the landfill to allow for the placement of the capping system in a safe manner. The slopes of the landfill are currently between 1:1.5 and 1:3 in gradient. It will be necessary to regrade these slopes to a maximum gradient of 1:2.5 for safe tracking of machines. Regrading the slopes of the landfill will require the excavation of large volumes of waste and replacement of this waste on the top of the landfill. Excavated waste may also be used to regularise the indented profile of the slope. The restored final profile has been designed to minimise the amount of excavation of the slopes in regrading works and the additional fill material required to regularise the landfill profile. The top of the landfill will be graded to a slope of approximately 1:25 to allow for drainage.

## 2.2.3 Revised Regraded Profile

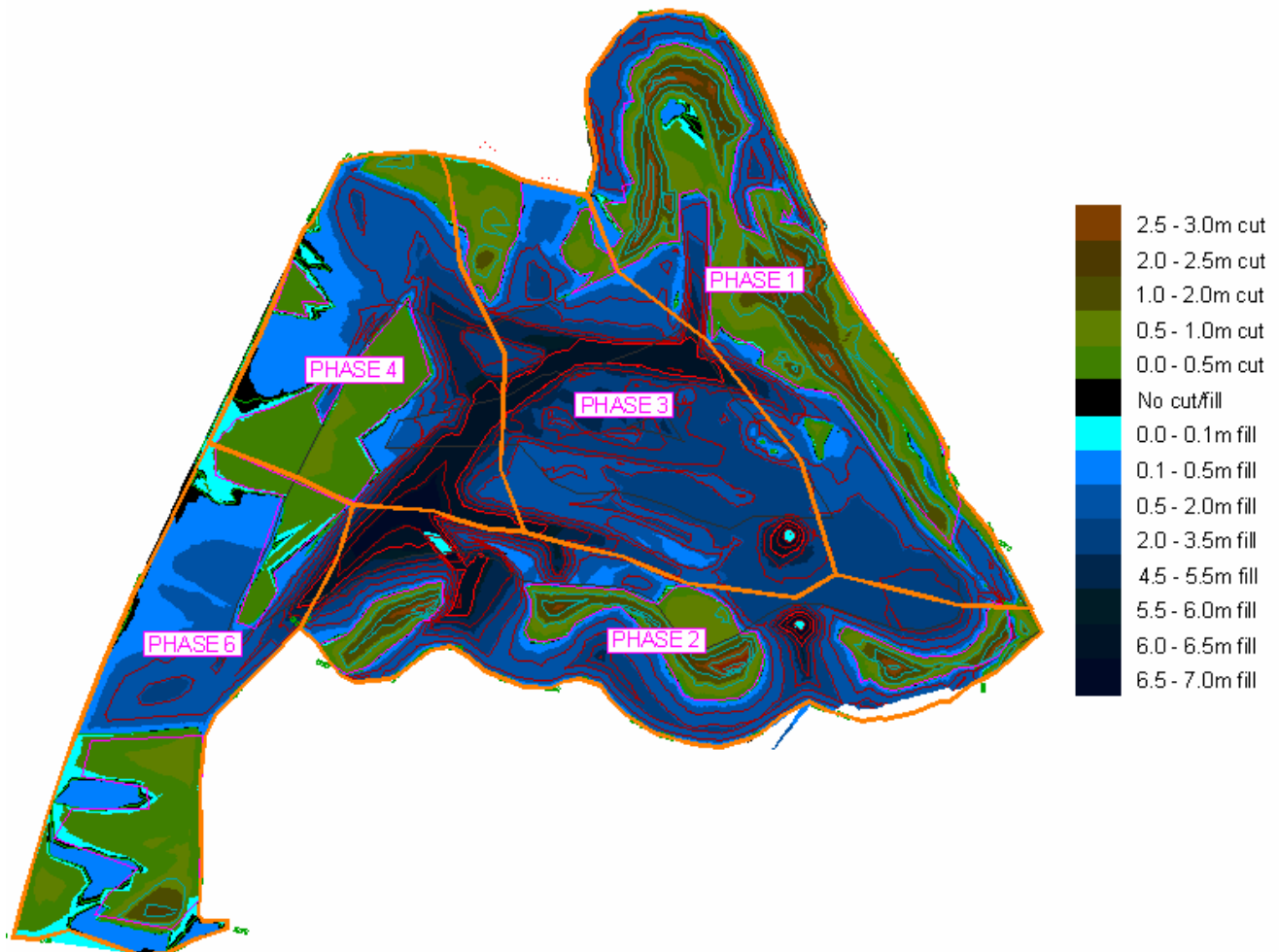
Following a review of the final profile submitted as part of the Closure, Restoration and Aftercare Management Plan (CRAMP), it is now proposed that in order to reduce the depth of excavation on the northern, eastern and southern slopes of the landfill during the regrading works, **the toe of the regraded slope will be offset from its existing position by up to 5 metres (where space is available) as shown in Drawing No. DG0002-01**. The revised final landfill profile is now shown on DG0002-01 in Appendix A. Long sections through the capped landfill and toe drain details are shown in Drawing Nos. DG0003-01 and DG0003-02 respectively in Appendix A.

In order to maintain the existing leachate management system during and after the restoration works, the existing drain around the toe of the landfill will be filled with clean stone and a perforated pipe will be installed in the drain as shown in Drawing No. DG0003-02. The capping system will then cover the leachate collection drain and surface water from the capped landfill will be collected in a separate drain from where it will outfall to the local stream network.

## 2.2.4 Regrading Works Quantities

Figure 2.1 shows the proposed phasing plan of the landfill restoration and the areas of cut and fill for the regrading works. The deepest areas of cut will occur on the north, northeastern and southern slopes where the current gradients range from approximately 1:1.5 to 1:1.7.

**Figure 2.1 Cut and Fill Areas for Regrading Works**



Excavation and fill volumes and areas for the regrading works are detailed in Table 2.1.

**Table 2.1: Excavation and Fill Waste Quantities in Each Phase of Restoration**

	Cut Volume (m <sup>3</sup> )	Fill Volume (m <sup>3</sup> )	Max. Depth of Excavation (m)	Area of Cut (m <sup>2</sup> )	Area of Fill (m <sup>2</sup> )	Plan Area (m <sup>2</sup> )
<b>Phase 1</b>	8,309	9,772	3	7,257	7,364	14,621
<b>Phase 2</b>	3,490	21,542	3	3,404	10,145	13,549
<b>Phase 3</b>	1,028	29,706	1.6	1,278	11,559	12,837
<b>Phase 4</b>	1,518	15,662	1.2	2,486	8,019	10,505
<b>Phase 5</b>	1,549	5,338	0.6	3,603	7,508	11,111
<b>Total</b>	<b>15,894</b>	<b>82,020</b>		<b>18,028</b>	<b>44,595</b>	<b>62,623</b>

**Note: Figures shown are approximate and will be subject to re-measurement at detailed design stage**

### **2.2.5 Surface Preparation**

Following the regrading works the slopes and top of the landfill will require clearing. Any protruding objects (stones, thick vegetation roots, etc.) on the surface of the landfill will be removed or rolled-in prior to placement of the capping system as these could damage the lining materials.

### 3 ODOUR MANAGEMENT

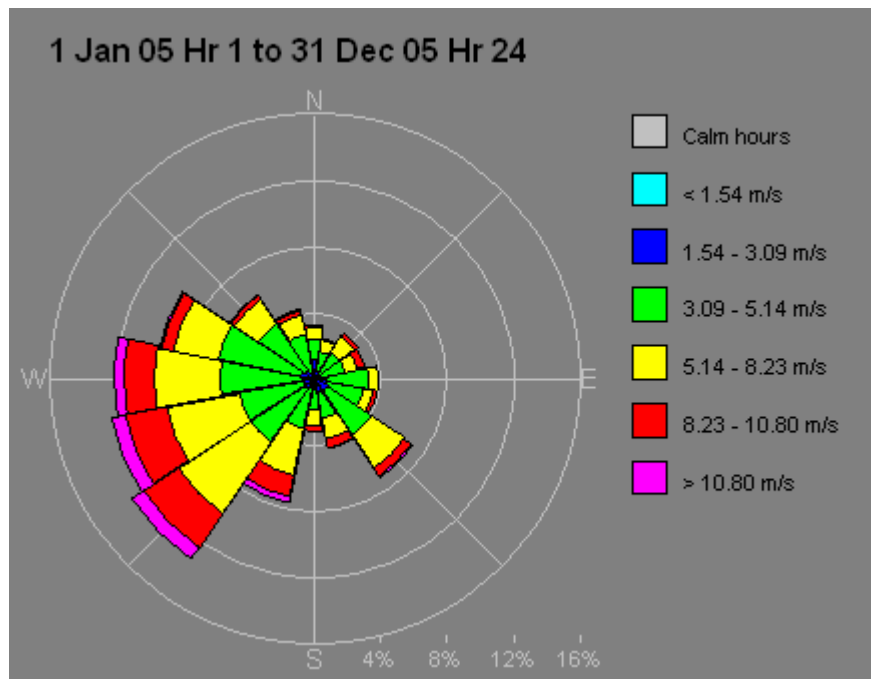
#### 3.1 ODOUR MANAGEMENT OVERVIEW

The predominant waste stream to the landfill in recent years has been:

- **Wet waste:** 'Out of spec' gypsum boards identified prior to the drying process
- **Dry Edging Waste:** Off-cuts of boards following the drying process
- **Dry Board Waste:** 'Out of spec' completed gypsum boards
- **Paper Waste:** Waste paper that cannot be reused in the plasterboard manufacture process

The overall composition of the waste stream in recent years is estimated to be 96% plasterboard and 4% paper. Plasterboard waste generates hydrogen sulphide under anaerobic conditions such as those at the landfill site. Disturbance of the waste body during regrading work has the potential to release hydrogen sulphide gas and other odourous compounds.

The most important parameters governing dispersion of pollutants and odour in the atmosphere are wind speed, wind-direction and the stability or turbulence of the atmosphere. These parameters along with the ambient temperature and pressure have a significant impact on the location and extent of potential odour nuisance. As an example of prevailing winds, a wind rose for Dublin Airport 2005 is presented in Figure 3.1. Wind direction and speeds at the Gypsum site will vary from those presented in Figure 3.1, however the general direction of prevailing winds will be similar. The prevailing winds are west, southwest.

**Figure 3.1 Windrose for Dublin Airport 2005**

The landfill site is positioned within a valley. The eastern edge of the landfill is bounded by the eastern slope of the valley. To the west, the landfill is bounded by a disused railway line immediately beyond which is the main processing facility. Agricultural land is present to the north and south of the site. The nearest receptors to the landfill are located to the southeast and south of the site. The nearest receptor is located approximately 150m from the site boundary.

**Taking the above factors into account, the highest risk of odour complaints will be during calm conditions, temperature inversions or light northerly, northwesterly breezes.**

Regrading the slopes of the landfill will involve the excavation of large volumes of waste and replacement of this waste on the top of the landfill. Excavated waste may also be used to regularise the indented profile of the slope.

There is therefore a risk of landfill gas release during the excavation work. The extent of gas release will depend greatly on the condition of the excavated waste. Further assessment of the waste characteristics in the excavation areas will be required prior to commencement of the regrading works.

### 3.2 WASTE HANDLING AND ODOUR MITIGATION MEASURES

The following measures are proposed to minimise the generation of odours and potential impact of odours off-site.

- A small area will be excavated initially to ascertain the condition of the waste. A simple qualitative odour assessment of the waste can be carried out once this area has been excavated to assess the likely odour nuisance potential.
- A specialised deodoriser/neutraliser will be employed on the site. A topical deodoriser and contact agent will be applied directly to solid surfaces such as an open area of excavated waste to neutralise odours and act as a temporary biofilter. These deodorisers are non-toxic, biodegradable and will not pose a threat to nearby surfacewaters.
- The occupational exposure limit for H<sub>2</sub>S gas is 5ppm over an 8 hour working day. It is not anticipated that this limit will be exceeded during the works. However, care will be taken when working in depressions or excavations as H<sub>2</sub>S gas is heavier than air and can accumulate in pockets. Monitoring will be set up where the risk is deemed high due to the nature of the excavation, wind condition etc.
- It is proposed to continually spray this deodoriser/neutraliser onto the active face using a tractor and bowser throughout the works in order to mitigate odours from this source.
- The excavation area will be maintained to the minimum exposure area (less than 30m<sup>2</sup>) to minimise the potential for odours. This will be achieved through the use of a dedicated dozer at the works.
- Regrading works will be restricted to the facility operational hours and will allow a half hour before close of business for covering of the exposed areas.
- It is proposed that qualitative odour surveying will be carried out at the perimeter of the site prior to and during excavation work. A sample odour survey field sheet is included Appendix B.

In addition to the above proposed mitigation measures, there are a number of additional good working practices that will be required in order to mitigate potential odours at source. These mitigation measures are those presented in the UK Environment Agency's "Internal Guidance for the Regulation of Odour at Waste Management Facilities" and the relevant measures are listed below:

- The excavated areas should be covered with impermeable cover sheet at evenings and weekends and covered with daily cover of 250mm of soil/stabilised compost etc. material. Woodchip may only be used as cover material if the woodchip does not give rise to odour nuisance itself.
- Odour surveying should be carried out routinely to determine potential for nuisance and to respond to complaints if they arise.
- An Odour Incident Plan should be put in place whereby in the event of odour nuisance being detected off site suitable measures will be undertaken such as immediate cessation of excavation, covering of exposed areas, dosing with deodoriser, etc. This plan should be based on a risk assessment that defines the appropriate measures required in the event of an incident. A copy of the draft site Odour Incident Plan is included in Appendix C.
- It would be advisable for the landfill management to engage with local residents and commercial enterprises to inform them of dates where there are high risk of odours at the site and the potential intensity and duration of the odours. All local residents will be briefed on the proposed works and provided with arrangements for contacting site personnel.
- The operation should take note of the meteorological conditions on each day of operation. Odour nuisance will be acutely affected by changes in the wind speed and direction as well as other climatic factors such as rainfall and temperature inversions. The operator should be aware which meteorological conditions pose the greatest risk for odour nuisance and plan the days operations accordingly. The level of mitigation should be reviewed on a daily basis to allow for the meteorological conditions.

Prior to commencement of the project, the final odour mitigation measures should be agreed by all parties (contractor, site management, site supervision staff and the EPA). The Odour

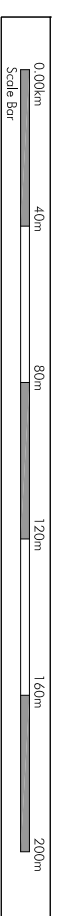
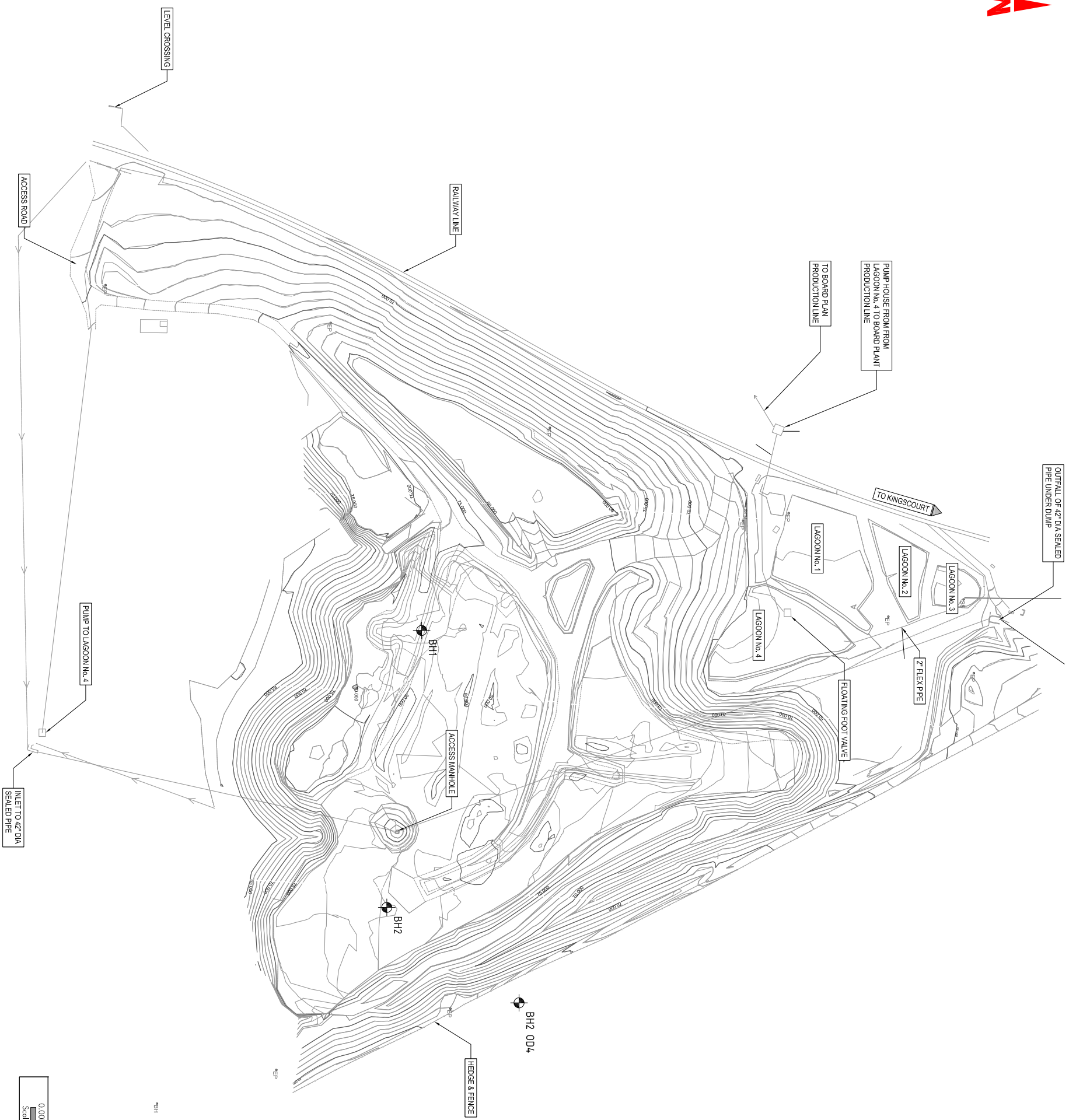
Incident Report should be available at the site office and a log of complaints and their closeout should be maintained.

## **APPENDIX A**

### **Drawings**

- DG0001-01 Existing Site Layout
- DG0002-01 Proposed Final Profile
- DG0003-01 Long Sections A-A and B-B Through  
Capped Landfill
- DG0003-02 Toe Drain Details





LEGEND	
	BH2 BOREHOLE LOCATION

**NOTES**

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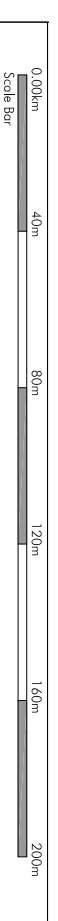
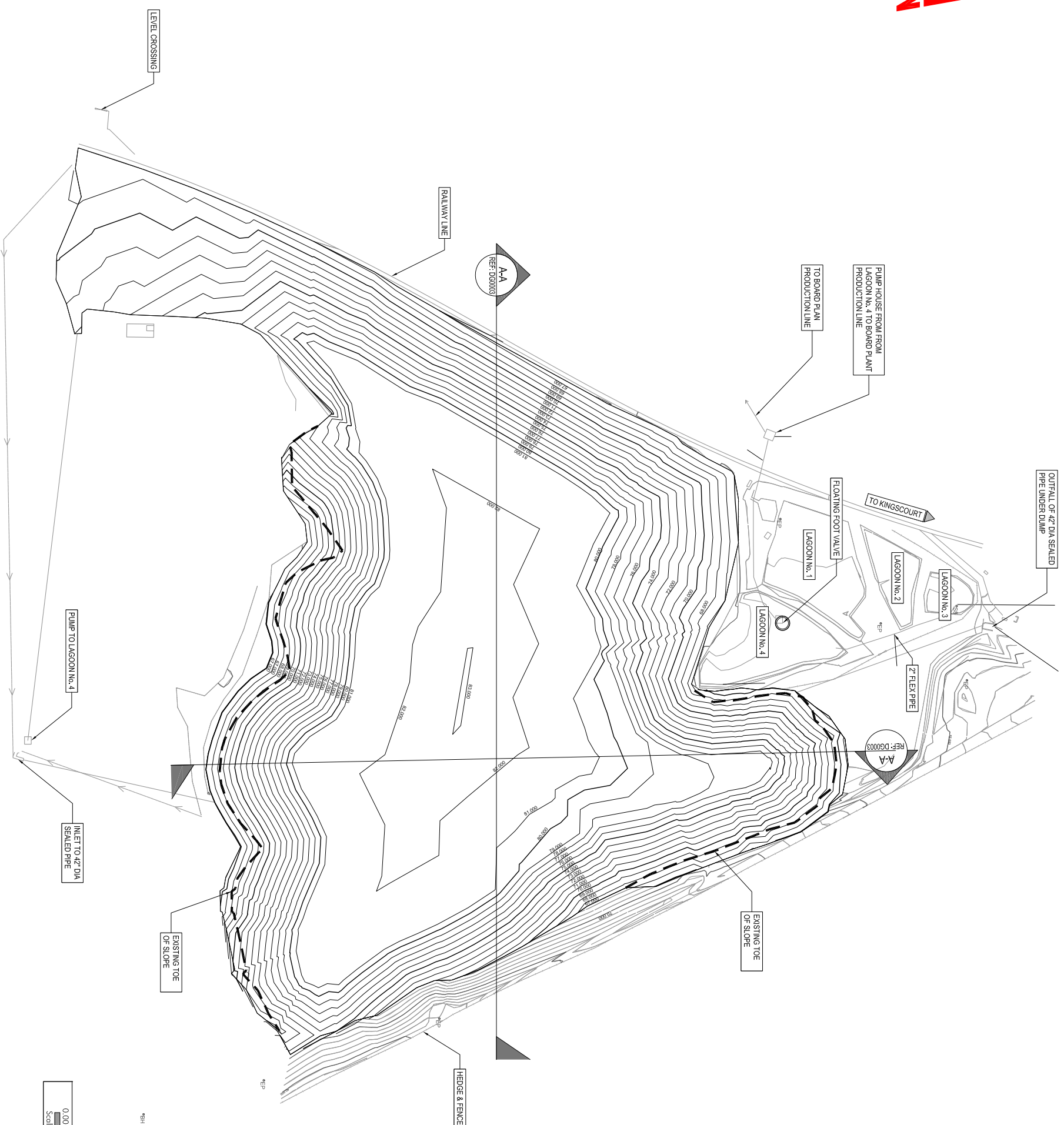
No.	Date	W/L	K/G	AMC	App
A01	09.02.10				

Client					
GYPSUM INDUSTRIES Ltd Kingscourt, Co Cavan.					
Drawn By	Checked By	Approved By	Date		
W.L.	K.G.	W.M.	Febr. '10		

Project		
GYPSUM INDUSTRIES LANDFILL -RESPONSE TO EPA CLARIFICATION ON GRAMP		
Drawing Status	Scale	Sheet Size
APPROVAL	1:2000	A3

Drawing Number		Rev
MGE0204/DG0002-01		A01
Title		
EXISTING SITE LAYOUT		





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3. DO NOT SCALE, use figured dimensions only, if in doubt ask.

No.	Date	W/L	K/G	App
A01	09.02.10			

Client  
**Gypsum Industries Ltd**  
 Kingscourt, Co Cavan.

Project  
**Gypsum Industries Landfill - Response to EPA Clarification on CRAMP**

Drawing Number  
**MGE0204/DG0002-01**

Rev  
**A01**

Drawing Status  
**APPROVAL**

Scale  
**1:2000**

Sheet Size  
**A3**

Drawn By  
 W.L.

Checked By  
 K.G.

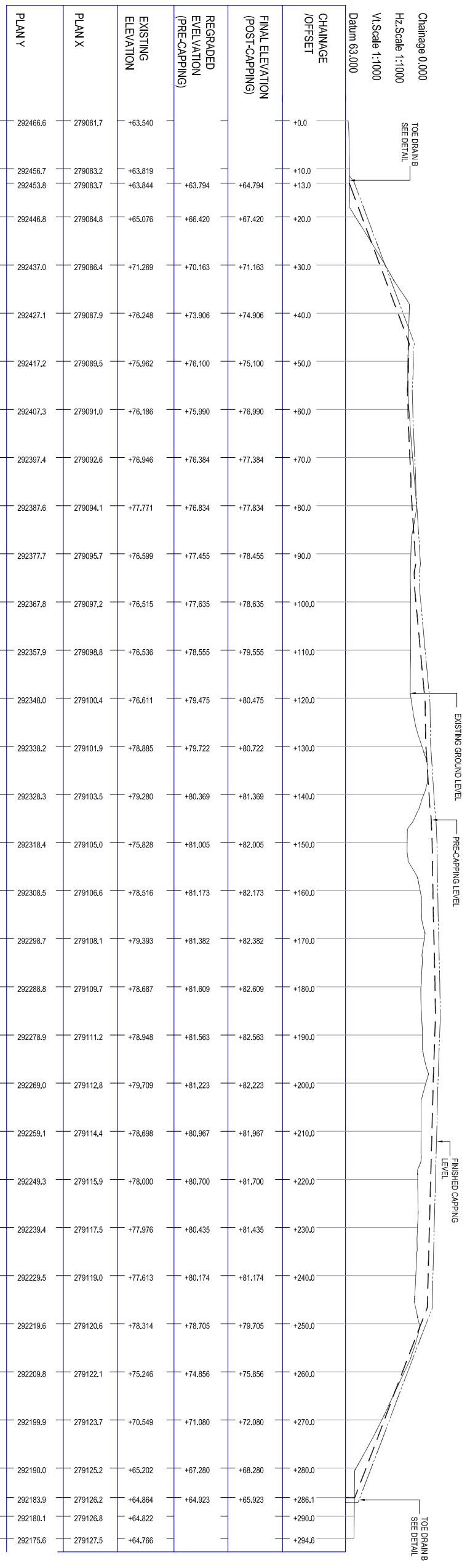
Approved By  
 W.M.

Date  
 Febr. '10

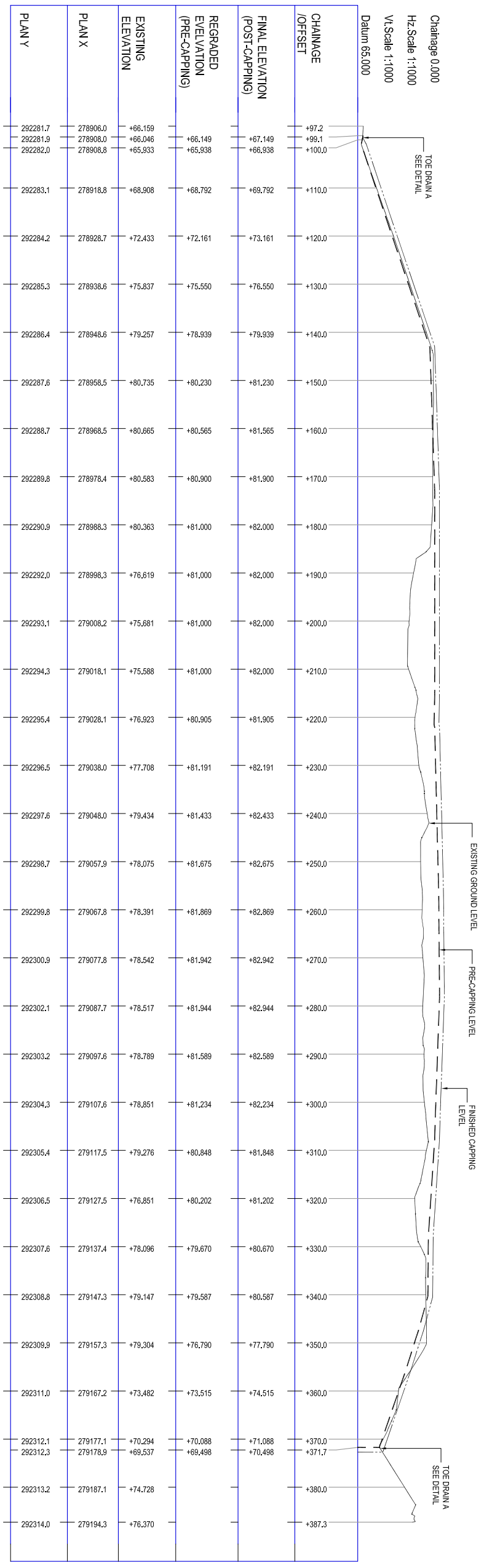
ISSUE FOR APPROVAL

DO NOT SCALE, use figured dimensions only, if in doubt ask.





**SECTION A-A**  
 HORIZONTAL SCALE: 1:1000  
 VERTICAL SCALE: 1:1000  
 FOR DETAILS REF: DG00002-02



**SECTION B-B**  
 HORIZONTAL SCALE: 1:1000  
 VERTICAL SCALE: 1:1000  
 FOR DETAILS REF: DG00002-02

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No.	Date	Dr. Ck.	App
A01	09.02.10	W.L.	W.M.
ISSUE FOR APPROVAL			
Amendment / Issue			

**Client**



**GYPSUM INDUSTRIES Ltd**  
 Kingscourt, Co Cavan.

Drawn By	Checked By	Approved By	Date
W.L.	K.G.	W.M.	Febr. '10

**Project**



**GYPSUM INDUSTRIES LANDFILL**  
 -RESPONSE TO EPA CLARIFICATION ON GRAMP

Drawing Status	Scale	Sheet Size
APPROVAL	1:50	A3

**Drawing Number**

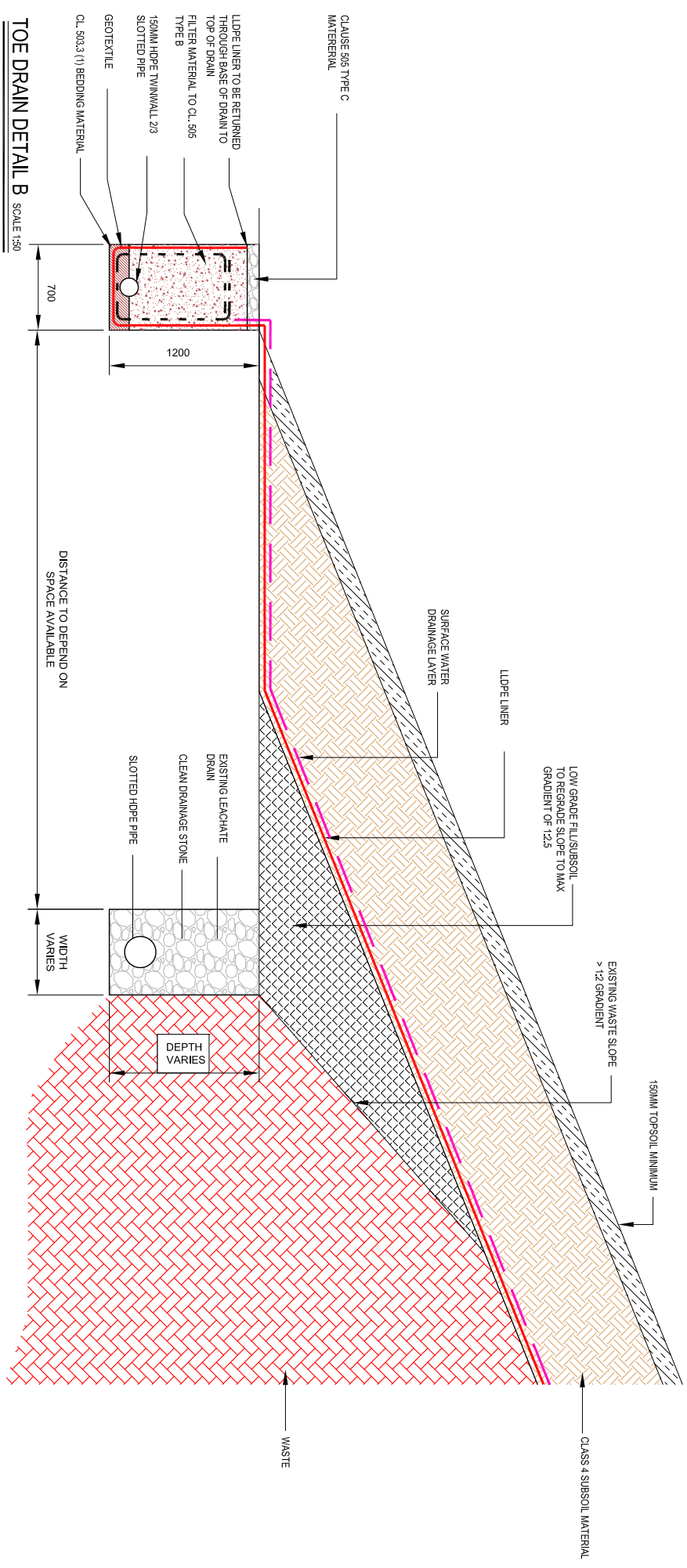
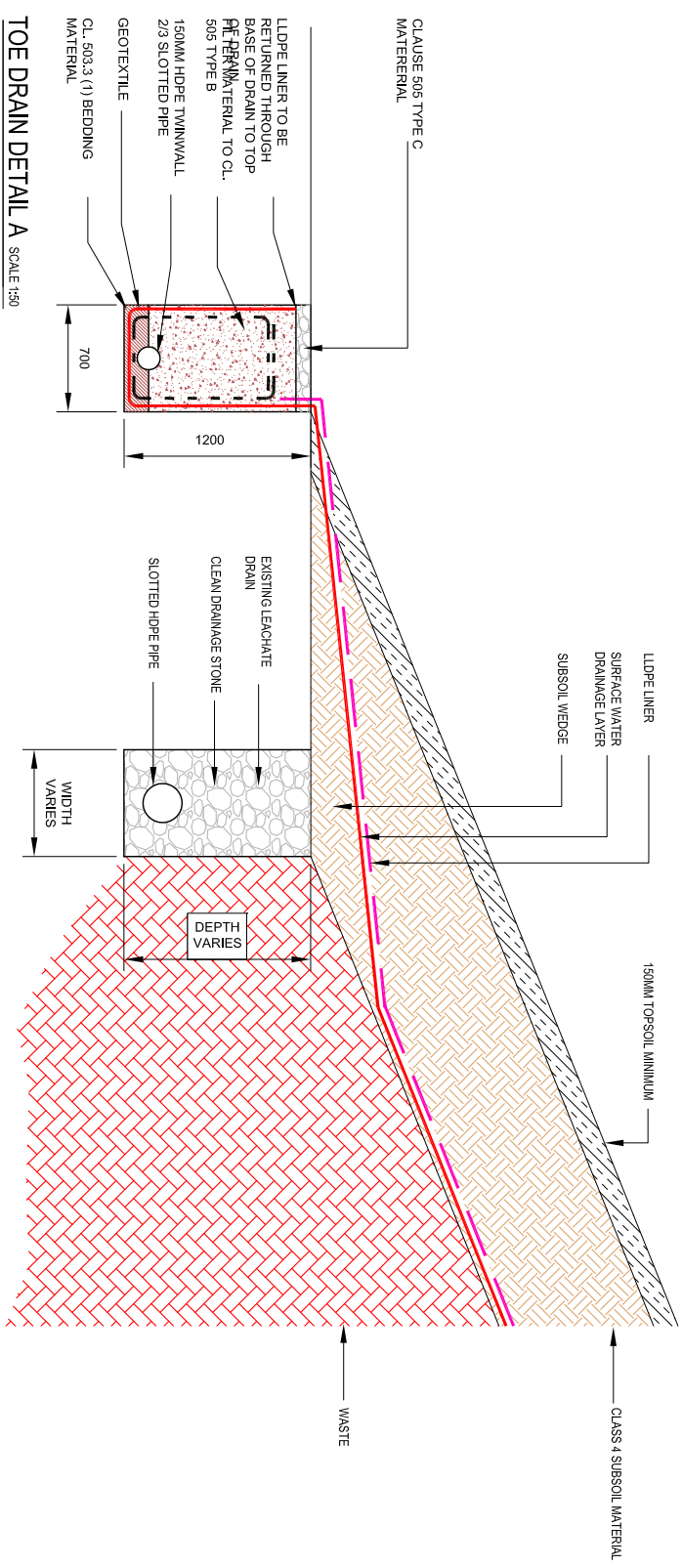
**MGE0204/DG0003-01**

**Rev**

**A01**

**LONG SECTIONS A-A & B-B THROUGH CAPPED LANDFILL**





**NOTES**

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No.	Date	Dr. Ck.	W.L.	KG.	App
A01	09.02.10				

Client: **GYPROC** GYPSUM INDUSTRIES Ltd  
Kingscourt, Co Cavan.

Drawn By: W.L.  
Checked By: K.G.  
Approved By: W.M.  
Date: Febr. '10

Project: **RPS** GYPSUM INDUSTRIES LANDFILL  
-RESPONSE TO EPA CLARIFICATION ON GRAMP

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E: ireland@rpsgroup.com

Drawing Number	Rev
MGE0204/DG0003-02	A01
Title: TOE DRAIN DETAILS	



## **APPENDIX B**

### **Sample Odour Survey Field Sheet**







## **APPENDIX C**

### **Draft Site Odour Incident Plan**



## ODOUR INCIDENT PLAN

### 1.0 Site Personnel

Role	Name	Mobile
Odour Monitoring		
Site Resident Engineer		
Landfill Manager		
Excavation Works Foreman		

### 2.0 Odour Incident Response

Nature of Nuisance Odour	Potential Works Source	Treatment Action	Person Responsible
Waste Odour	Excavation works	<ul style="list-style-type: none"> <li>• Cease excavation works immediately.</li> <li>• Identify exact source of odour</li> <li>• Treat source with Deodoriser</li> <li>• Increase deodoriser application in area</li> <li>• Do not continue excavation until cessation of odour nuisance has been confirmed at receptor</li> </ul>	
	Excavated area	<ul style="list-style-type: none"> <li>• Cease excavation works immediately.</li> <li>• Treat source with Deodoriser</li> <li>• Reassess odour nuisance level</li> <li>• If persistent, temporarily reinstate excavated material to mitigate source</li> <li>• Do not continue works until cessation of odour nuisance has been confirmed at receptor</li> </ul>	
	Excavated waste pile	<ul style="list-style-type: none"> <li>• Cease any temporary stockpiling of exposed waste</li> <li>• Treat existing stockpile with Deodoriser</li> <li>• Remove existing stockpiled material to working face</li> <li>• Increase deodoriser application in area</li> <li>• Do not continue excavation until cessation of odour nuisance has been confirmed at receptor</li> </ul>	
	Working face	<ul style="list-style-type: none"> <li>• Cease deposition at working face immediately.</li> <li>• Treat face with Deodoriser</li> <li>• Reassess odour nuisance level</li> <li>• If persistent, install cover material to mitigate source</li> <li>• Do not continue works until cessation of odour nuisance has been confirmed at receptor</li> </ul>	



**APPENDIX (vi) EPA AER RETURNS WORKSHEET**

**(PRTR)**



[ PRTR# : P0519 | Facility Name : Gypsum Industries Limited | Filename : P0519\_2010(1).xls | Return Year : 2010 ]

[Guidance to completing the PRTR workbook](#)

# AER Returns Workbook

Version 1.1.11

<b>REFERENCE YEAR</b>	2010
-----------------------	------

**1. FACILITY IDENTIFICATION**

Parent Company Name	Gypsum Industries Limited
Facility Name	Gypsum Industries Limited
PRTR Identification Number	P0519
Licence Number	P0519-02

Waste or IPPC Classes of Activity

No.	class_name
1.3	#####

Address 1	Kingscourt
Address 2	Co. Cavan
Address 3	
Address 4	
Country	Ireland
Coordinates of Location	-6.80316 53.8729
River Basin District	GBNIIENB
NACE Code	0729
Main Economic Activity	Mining of other non-ferrous metal ores
AER Returns Contact Name	Catherina McGuirk
AER Returns Contact Email Address	Catherina.McGuirk@saint-gobain.com
AER Returns Contact Position	Environmental Manager
AER Returns Contact Telephone Number	042-9698104
AER Returns Contact Mobile Phone Number	
AER Returns Contact Fax Number	042-9667221
Production Volume	0.0
Production Volume Units	
Number of Installations	0
Number of Operating Hours in Year	0
Number of Employees	0
User Feedback/Comments	
Web Address	

**2. PRTR CLASS ACTIVITIES**

Activity Number	Activity Name
3(a)	Underground mining and related operations

**3. SOLVENTS REGULATIONS (S.I. No. 543 of 2002)**

Is it applicable?	
Have you been granted an exemption ?	
If applicable which activity class applies (as per Schedule 2 of the regulations) ?	
Is the reduction scheme compliance route being used ?	



A.2 RELEASES TO WATERS LINK TO PROVIDE STATE AGENCIES DATA

NOTE: Only 15 mg/L Flow Limit (Upper bound) Limit. Temp: 60°F. Electrical Demand: None

11/02/2011 09:00

SECTION A: SECTOR SPECIFIC POINT POLLUTANTS

RELEASES TO WATERS

Click on column headings of quantities in this section to sort

Please enter all quantities in this section in KG

No. Above 1	POLLUTANT	Name	M/C/E	Method Code		Designation or Description	Emission Point 1		Emission Point 2		Emission Point 3		QUANTITY			
				Method Code	Volume Used		SI	MSR-1	SI	MSR-1	SI	MSR-1	A (kg/year)	F (kg/year)	A (kg/year)	F (kg/year)
17	Asbestos and compounds (as As)		M	OTH		ICPMS AWWA method	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	Carbon and compounds (as C)		M	OTH		ICPMS AWWA method	1.1707	0.0079	1.7736	0.028	0.0	0.0	0.0	0.0	0.0	0.0
19	Carbon and compounds (as CO)		M	OTH		ICPMS AWWA method	0.016	0.01	0.036	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	Chloride (as Cl)		M	OTH		Asst. C I	0.0	31500.0040	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	Chromium and compounds (as Cr)		M	OTH		ICPMS AWWA method	2.0006	0.4464	2.4472	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	Copper and compounds (as Cu)		M	OTH		ICPMS AWWA method	2.14213	0.2272	2.3693	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	Lead and compounds (as Pb)		M	OTH		ICPMS AWWA method	0.918	2.2318	3.2099	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	Nickel and compounds (as Ni)		M	OTH		ICPMS AWWA method	0.0112	11.4030	11.5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	Total phosphorus		M	OTH		ICPMS AWWA method	14.4	4.4	18.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0

\* Based on flow by double-counting on the Pollutant Name Column (B) from table for release table.

SECTION B: REMAINING POINT POLLUTANTS

RELEASES TO WATERS

Please enter all quantities in this section in KG

No. Above 1	POLLUTANT	Name	M/C/E	Method Code		Designation or Description	Emission Point 1		Emission Point 2		Emission Point 3		QUANTITY			
				Method Code	Volume Used		SI	MSR-1	SI	MSR-1	SI	MSR-1	A (kg/year)	F (kg/year)	A (kg/year)	F (kg/year)
26	Heavy and compounds (as Hg)		M	OTH		ICPMS AWWA method	0.0481	0.0289	0.072	0.0	0.0	0.0	0.0	0.0	0.0	0.0

\* Based on flow by double-counting on the Pollutant Name Column (B) from table for release table.

SECTION C: REMAINING POLLUTANT EMISSIONS (AS APPLIED TO YOUR FACILITY)

RELEASES TO WATERS

Please enter all quantities in this section in KG

Pollutant No.	POLLUTANT	Name	M/C/E	Method Code		Designation or Description	Emission Point 1		Emission Point 2		Emission Point 3		QUANTITY			
				Method Code	Volume Used		SI	MSR-1	SI	MSR-1	SI	MSR-1	A (kg/year)	F (kg/year)	A (kg/year)	F (kg/year)
228	Asbestos (as Hg)		M	OTH		Colorimetric AWWA method	0.0	38.3715	38.3715	0.0	0.0	0.0	0.0	0.0	0.0	0.0
229	Asbestos (as Pb)		M	OTH		ICPMS AWWA method	4.8455	2.312	6.6075	0.0	0.0	0.0	0.0	0.0	0.0	0.0
230	BOD		M	OTH		Method 5210 B	4.078	1428.0472	1504.4560	0.0	0.0	0.0	0.0	0.0	0.0	0.0
231	COD		M	OTH		Colorimetric AWWA method	38.4301	9912.8782	9940.3140	0.0	0.0	0.0	0.0	0.0	0.0	0.0
232	Hexachlorocyclopentadiene (as Hg)		M	OTH		ICPMS AWWA method	0.0	15.7655	15.7655	0.0	0.0	0.0	0.0	0.0	0.0	0.0
233	Hexachlorocyclopentadiene (as Pb)		M	OTH		ICPMS AWWA method	0.0	5.1655	5.1655	0.0	0.0	0.0	0.0	0.0	0.0	0.0
234	Hexachlorocyclopentadiene (as Ni)		M	OTH		ICPMS AWWA method	0.0	208.7241	208.7241	0.0	0.0	0.0	0.0	0.0	0.0	0.0
235	Hexachlorocyclopentadiene (as Cu)		M	OTH		ICPMS AWWA method	0.0665	0.8588	0.7258	0.0	0.0	0.0	0.0	0.0	0.0	0.0
236	Hexachlorocyclopentadiene (as Ni)		M	OTH		Colorimetric AWWA method	703.9177	104209.2095	104203.1342	0.0	0.0	0.0	0.0	0.0	0.0	0.0
237	Hexachlorocyclopentadiene (as Pb)		M	OTH		ICPMS AWWA method	22.4360	8438.4899	8497.8245	0.0	0.0	0.0	0.0	0.0	0.0	0.0
238	Hexachlorocyclopentadiene (as Cu)		M	OTH		ICPMS AWWA method	8.0856	3.8842	11.8947	0.0	0.0	0.0	0.0	0.0	0.0	0.0
239	Hexachlorocyclopentadiene (as Ni)		M	OTH		ICPMS AWWA method	4.4833	2.2329	0.7178	0.0	0.0	0.0	0.0	0.0	0.0	0.0
240	Total heavy metals		M	OTH		ICPMS AWWA method	25.0704	17.2001	42.8705	0.0	0.0	0.0	0.0	0.0	0.0	0.0

\* Based on flow by double-counting on the Pollutant Name Column (B) from table for release table.

**SECTION A : PRTR POLLUTANTS**

**OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE WATER TREATMENT OR SEWER**

No. Annex II	POLLUTANT	METHOD		Please enter all quantities in this section in KGs		
		Method Used	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
		MC/E		0.0	0.0	0.0

\* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

**SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your licence)**

**OFFSITE TRANSFER OF POLLUTANTS DESTINED FOR WASTE WATER TREATMENT OR SEWER**

Pollutant No.	POLLUTANT	METHOD		Please enter all quantities in this section in KGs		
		Method Used	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year
		MC/E		0.0	0.0	0.0

\* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

**4.4 RELEASES TO LAND**

[Link to previous years emissions data.](#)

[PRTTR# : P0519 | Facility Name : Gypsum Industries Limited | Filename : P0519\_2010(1).xls | Return Year : 2010 ]

11/03/2011 06:18

**SECTION A : PRTTR POLLUTANTS**

POLLUTANT		RELEASES TO LAND		METHOD		Please enter all quantities in this section in KGs		QUANTITY	
No. Annex II	Name	M/C/E	Release Class	Method Used	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	0.0
						0.0	0.0	0.0	0.0

\* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

**SECTION B : REMAINING POLLUTANT EMISSIONS (as required in your Licence)**

POLLUTANT		RELEASES TO LAND		METHOD		Please enter all quantities in this section in KGs		QUANTITY	
Pollutant No	Name	M/C/E	Release Class	Method Used	Designation or Description	Emission Point 1	T (Total) KG/Year	A (Accidental) KG/Year	0.0
						0.0	0.0	0.0	0.0

\* Select a row by double-clicking on the Pollutant Name (Column B) then click the delete button

5. ON-SITE TREATMENT & OFF-SITE TRANSFERS OF WASTE

Please enter all quantities on this sheet in Tonne

Transfer Destination	European Waste Code	Hazardous	Quantity (Tonne per Year)	Description of Waste	Waste Treatment Operation	Method Used		Location of Treatment	DRC (DRA) Name and Licence No. (if applicable)	SRI (SRI) Address of Receiving Facility	Name and Address of Receiving Facility (if different from SRI)	Actual Address of Final Destination (if Final Recovery / Deposit the Hazardous Waste (RM.V))
						Waste Treatment Operation	Method Used					
Within the County	15 01 01	No	47.54	paper and cardboard packaging	R3	M	Weighted	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	15 01 03	No	76.38	wooden packaging	R3	M	Weighted	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	16 01 17	No	96.87	terrous metal	R4	M	Weighted	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	20 03 01	No	410.36	mixed municipal waste	D1	M	Weighted	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	20 03 01	No	313.2	mixed municipal waste	D1	E	Volume Calculation	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	20 03 01	No	79.88	mixed municipal waste Dry Recyclables	R3	E	Volume Calculation	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	15 01 02	No	0.34	plastic packaging	R3	M	Weighted	Offsite in Ireland	Medana Waste Waste Licence W0131-02 Waste Collection Permit: WCP 10402601101	Poudstown, Newen Co. Meath, Ireland		
Within the County	20 03 04	No	172.9	septic tank sludge	D8	M	Weighted	Offsite in Ireland	Open Duff, Waste Collection Permit: W01201020	Church, Salsburgh, Co.Ld		
To Other Countries	20 01 21	Yes	0.088	fluorescent tubes and other mercury containing waste	R5	M	Weighted	Abroad	Iron Lamp Recycling Waste Facility permit: WFR-KE-06-0348-01, Waste Collection Permit: DC-08-115-01	Woodstock Industrial Estate, Kilkenny Road, Aghy, Co. Kildare, Ireland	Chamhus Metals Mercury contaminated flourescent tubes and sludge, 8, Madford Bridge, Mad Conery Co. Meath, Ireland	2009441, Zimwoda, ... , Netherland
Within the County	20 01 35	Yes	2.043	discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 22 containing hazardous components	R4	M	Weighted	Offsite in Ireland	Iron Lamp Recycling Waste Facility permit: WFR-KE-06-0348-01, Waste Collection Permit: DC-08-115-01	Woodstock Industrial Estate, Kilkenny Road, Aghy, Co. Kildare, Ireland	Woodstock Industrial Estate, Kilkenny Road, Aghy, Ireland	
Within the County	13 02 08	Yes	4.2	other engine, gear and lubricating oils	R9	M	Weighted	Offsite in Ireland	Enna Waste Licence W0041-01 Waste Collection Permit: WCP-DC-06-116-01	Corrigan Industrial Estate, Portlaoise, Co. Laois, Ireland	Corrigan Industrial Estate, Portlaoise, Co. Laois, Ireland	
Within the County	13 05 07	Yes	13.9	oil water from oilwater separators (from Bunds)	R9	M	Weighted	Offsite in Ireland	Enna Waste Licence W0041-01 Waste Collection Permit: WCP-DC-06-116-01	Corrigan Industrial Estate, Portlaoise, Co. Laois, Ireland	Corrigan Industrial Estate, Portlaoise, Co. Laois, Ireland	

To Other Countries	12 02 08	Yes	0.11 other engine, gear and lubricating oils	R3	M	Weighted	Aboard	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Underschiedl KG Linweh Salva, E7016037, Krombach her Strab. 42 46 Kreuztal 57223 Germany
To Other Countries	13 08 99	Yes	0.083 wastes not otherwise specified	R1	M	Weighted	Aboard	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Underschiedl KG Linweh Salva, E7016037, Krombach her Strab. 42 46 Kreuztal 57223 Germany
To Other Countries	13 08 99	Yes	0.172 Greases containing wastes not otherwise specified -Waste	R4	M	Weighted	Aboard	Rita Environmental Lil Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01 Co. Dublin, Ireland	Rita Environmental Waste Facility License W0192-03 WCP-DC-08-1192-01 Greens Drive 402 Greengogue Business Park, Rathcoole Co. Dublin, Ireland
To Other Countries	15 02 02	Yes	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by 4.28 dangerous substances	R1	M	Weighted	Aboard	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Underschiedl KG Linweh Salva, E7016037, Krombach her Strab. 42 46 Kreuztal 57223 Germany
To Other Countries	15 02 02	Yes	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by 2.876 dangerous substances	R3	M	Weighted	Aboard	Rita Environmental Lil Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01 Co. Dublin, Ireland	ATM Meerijk, 821790, NL 4782, P/W Meerijk, Noord- Brabant, Netherlands
To Other Countries	16 02 02	Yes	absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by 0.48 dangerous substances	R1	M	Weighted	Aboard	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Underschiedl KG Linweh Salva, E7016037, Krombach her Strab. 42 46 Kreuztal 57223 Germany
Within the Country	13 05 03	Yes	13.488 incinerator sludges	R0	M	Weighted	Onshore in Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116- Lisboa, Ireland
To Other Countries	16 08 01	Yes	0.024 lead batteries	R4	M	Weighted	Aboard	Rita Environmental Lil Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01 Co. Dublin, Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116- Lisboa, Ireland
To Other Countries	16 08 04	No	0.169 asbestos batteries (except 16 06 01)	R4	M	Weighted	Aboard	Rita Environmental Lil Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01 Co. Dublin, Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116- Lisboa, Ireland
Within the Country	15 01 10	Yes	packaging containing residues of or contaminated by dangerous substances	R5	M	Weighted	Onshore in Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116- Lisboa, Ireland
To Other Countries	15 01 10	Yes	packaging containing residues of or contaminated by dangerous substances 9.203 Empty Ink Drums	R4	M	Weighted	Aboard	Rita Environmental Lil Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01 Co. Dublin, Ireland	Rita Environmental Lil Waste Facility License W0192-03 WCP-DC-08-1192-01 Greens Drive 402 Greengogue Business Park, Rathcoole Co. Dublin, Ireland
Within the Country	13 07 01	Yes	0.6 bar oil and diesel	R0	M	Weighted	Onshore in Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116-01 Lisboa, Ireland	Enva Waste License W0041 - 01 Waste Collection Permit WCP-DC-08-116- Lisboa, Ireland
Within the Country	16 05 06	Yes	Laboratory chemicals, consisting of or containing dangerous substances, including 0.0735 mixtures of laboratory chemicals	R1	M	Weighted	Onshore in Ireland	Rita Environmental Lil Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01 Co. Dublin, Ireland	ATM Meerijk, 4201780, NL 4782, P/W Meerijk, Noord- Brabant, Netherlands

To Other Countries	11 01 13	Yes	depressing wastes containing dangerous substances	R2	M	Weighted	Aboard	Safety Kieran Ireland Ltd Waste License W0209-01 Waste Collection Permit WCP-DC-08-1223-01	Alton River Ltd 5 Traigh Dubh Salsburgh	Solvent Resource Management Ltd, 1753549F Wealand Road, Northey West Yorkshire WF11 8DZ, United Kingdom	Weland Road, Northey West Yorkshire WF11 8DZ, United Kingdom
To Other Countries	16 06 04	Yes	gases in aerosol containers (including halons) containing dangerous substances	R4	M	Weighted	Aboard	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	Ria Environmental Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland
To Other Countries	16 01 10	Yes	poisoning containing residues of or contaminated by dangerous substances - 0.03 Plant Containers	R4	M	Weighted	Aboard	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	Bluck GmbH & Co. KG, Adorfstrasse 2 Regensburg, Weiskamp DE 21692 Germany	Neuland GmbH & Co. KG, 1013122000, Niederhausen Neuland-Strieg, Louis Krugstrasse 10, Bremen, 28207 Germany
To Other Countries	17 06 03	Yes	construction materials containing asbestos	D1	M	Weighted	Aboard	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	Bluck GmbH & Co. KG, Adorfstrasse 2 Regensburg, Weiskamp DE 21692 Germany	Regensburg, Weiskamp DE 21692 Germany
Within the Country	13 07 01	Yes	13 04 fuel oil and diesel	R2	M	Weighted	Onsite in Ireland	Enna Waste License W0041-01 Waste Collection Permit WCP-DC-08-1192-01	Enna Waste License W0041-01 Waste Collection Permit WCP-DC-08-1192-01	Enna Waste License W0041-01 Waste Collection Permit WCP-DC-08-1192-01	Enna Waste License W0041-01 Waste Collection Permit WCP-DC-08-1192-01
Within the Country	13 05 03	Yes	36.0 heterocyclic sludges	R9	M	Weighted	Onsite in Ireland	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	Ria Environmental Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland
Within the Country	17 05 03	Yes	oil and sludge containing dangerous substances	R3	M	Weighted	Onsite in Ireland	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	ATM Meerik, 821738, NL 4792, PW Meerik, Noord-Batavi, Netherlands	ATM Meerik, 821738, NL 4792, PW Meerik, Noord-Batavi, Netherlands
Within the Country	13 22 08	Yes	oil, engine, gear and lubricating oils (OJ 0 4 Filter)	R1	M	Weighted	Onsite in Ireland	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	ATM Meerik, 821738, NL 4792, PW Meerik, Noord-Batavi, Netherlands	ATM Meerik, 821738, NL 4792, PW Meerik, Noord-Batavi, Netherlands
Within the Country	13 05 07	Yes	oil, water from oil-water separators (from 432 Bund)	D0	M	Weighted	Onsite in Ireland	Ria Environmental Ltd Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland	Ria Environmental Waste Facility License W0192-03 Waste Collection Permit WCP-DC-08-1192-01	Garris Drive 402 Greenogue Business Park, Rathcoole Co. Dublin, Ireland
Within the Country	17 06 02	No	80-part-based construction materials other than those mentioned in 17 06 01	R5	M	Weighted	Onsite in Ireland	80-part-based construction materials other than those mentioned in 17 06 01	80-part-based construction materials other than those mentioned in 17 06 01	80-part-based construction materials other than those mentioned in 17 06 01	80-part-based construction materials other than those mentioned in 17 06 01
Within the Country	17 89 02	No	83-95 than those mentioned in 17 06 01	R5	M	Weighted	Onsite in Ireland	83-95 than those mentioned in 17 06 01	83-95 than those mentioned in 17 06 01	83-95 than those mentioned in 17 06 01	83-95 than those mentioned in 17 06 01

\* Grants a flow by weight category per Description of Waste over 200 kg net weight

[Link to previous years waste audit data](#)  
[Link to previous years waste summary data & percentage change](#)

## **APPENDIX (vii) NOISE REPORT**

# **Noise Survey Report 2008**

for

**Gypsum Industries Limited  
IPC Licence No. P0519-02**

## **Mining Operation:**

**Knocknacran, Magheracloone, Drummond, Derrynascobe, Derrynaglah, Ballycartlan,  
Enagh Carrickmacross, County Monaghan.**

## **Processing Operation:**

**Lisnabow, Kilmainhamwood, Kells, County Meath.**

by

## **Q.E.D. Engineering Ltd**

M-TEK Building 2  
Armagh Road  
Monaghan  
Tel: 047 72060  
Fax: 047 72061

**June 2008**

## 1. Introduction

Noise levels were measured at both the mining operation and processing operation of Gypsum Industries Limited at the site boundary on the 16<sup>th</sup> and 17<sup>th</sup> June 2008 by Q.E.D. Engineering Ltd, as part of the company's IPPC Licence No. P0519-02, Condition 8.2.

Daytime and night-time noise measurements were taken at 5 locations along the site boundary of the processing operation and 3 locations along the site boundary of the mining operation. A map showing noise measurement locations is presented in Appendix 1 and 2.

The objective of the noise survey is to fulfil the requirements of Condition 8.2 and Condition 3.5.1 (i) of the Company's IPPC Licence, to ensure that the site activities do not give rise to noise levels off-site at noise sensitive locations, which exceed the following sound pressure limits (Leq,15 minute):

Daytime	55dB (A)
Night-time	45dB (A)

And Condition 3.5.1 (i) "Noise from the activity shall not give rise to sound pressure levels (Leq, 15 minutes) measured at noise sensitive locations which exceed the limit value(s) by more than 2dB(A)."

## 2. Methodology and Instrumentation

Noise monitoring was carried out by Patricia Murtagh, BSc, MSc, Diploma in Acoustics and Noise Control of Q.E.D Engineering Limited, following the EPA "Environmental Noise Survey Guidance Document".

Noise monitoring was carried out using the following noise meters;

1. Noise levels were measured using a Castle GA123 Integrated Datalogging Octave Band Sound Level Meter, Serial No. 036015 and microphone Serial No. 27101. This meter was last calibrated on 29/04/08. A GA607 Dual Level Calibrator, Serial No. 036023 was used to calibrate the sound level meter and this was last calibrated on 20/02/08.
2. Rion NA-27 Real Time 1/1, 1/3 Octave Band Logging SLM, Serial No. 00380685. This meter was last calibrated on 14/05/08. A GA607 Dual Level Calibrator, Serial No. 036341 was used to calibrate the sound level meter and this was last calibrated on 12/05/08.

Certificates of calibration of both noise meters are provided at the end of the report.

Both instruments were checked for calibration to 94dB(A) before and after measurements and were found to be working satisfactorily. Weather conditions during the day monitoring were overcast, damp and with a slight breeze. During the night-time monitoring weather conditions were dry and calm. A standard windshield was used on both instruments during the survey. Noise monitoring took place on 16/6/08 between 22.00-00.15 at both sites on 17/6/08 between 9.30-12.30.

Monitoring results are given in  $L_{eq}$  i.e. continuous equivalent sound level. In addition, the  $L_{A90}$  and  $L_{A10}$  are also given.  $L_{A90}$  is the noise level exceeded for 90% of the measurement time and the  $L_{A10}$  is the noise level exceeded for 10% of the measurement time. The  $L_{A90}$  is generally indicative of the background noise level. It is generally lower than the average noise - the  $L_{eq}$ . The  $L_{A10}$  is generally indicative of intermittent noise emissions and is generally higher than the  $L_{Aeq}$ . A small difference in  $L_{A10}$ ,  $L_{Aeq}$  and  $L_{A90}$  will indicate a relatively constant noise emission (or a lack of intermittent noise). Therefore the greater the difference between the  $L_{A10}$ ,  $L_{Aeq}$  and  $L_{A90}$ , this indicates intermittent noise such as traffic.

### 3. Results

#### 3.1 Boundary Noise Measurements at Mining Operation

Location No.	Date	Time	$L_{Aeq}$ dBA 15 mins	$L_{A10}$ dBA 15 mins	$L_{A90}$ dBA 15 mins	Tonal/ Impulsive	Comments
MS1	17/06/2008	12.07-12.22	53	55	47	Yes	Impulsive noise – rock breaker
	16/06/2008	00.01-00.16	51	49	24	Tonal @ 16Hz	Cars coming out from football pitch, dog barking
MS2	17/06/2008	11.51-12.07	54	58	44	Tonal @ 25Hz	No mine noise audible
	16/06/2008	23.48-00.11	55	55	34	Tonal @ 16Hz	No mine noise audible
MS3	17/06/2008	11.27-11.43	39	41	37	Tonal @ 16, 40 and 80Hz	Mine barely audible, site vehicles audible
	16/06/2008	22.27-23.42	37	36	33	Tonal @ 16Hz	Mine barely audible

Tonal noise results for the mine are displayed in the following section.

### 3.2 1/3<sup>rd</sup> Octave Boundary Noise Measurements at Mining Operation

Hz	MS1		MS2		MS3	
	Day	Night	Day	Night	Day	Night
	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)
<b>12.5</b>	68.5	32.5	41	37.9	47.8	46.2
<b>16</b>	67.7	<b>58.7</b>	48.3	<b>55.4</b>	<b>59.3</b>	<b>62.1</b>
<b>20</b>	62.6	46.3	45.9	42.5	48.5	50.1
<b>25</b>	57.7	31.1	<b>54</b>	33.2	45.4	45.2
<b>31.5</b>	56.6	36.5	47.4	35.6	45.4	47.4
<b>40</b>	53.4	34.5	48.8	35.7	<b>52.7</b>	39.2
<b>50</b>	52.2	38.4	52.6	32.2	49.1	42.8
<b>63</b>	51	38.3	49.1	31.4	39.1	38.4
<b>80</b>	54.9	32.1	49.5	30	<b>44.8</b>	32.5
<b>100</b>	48.8	32.6	44.7	30.3	39.8	31.4
<b>125</b>	40.8	33.7	39.7	27.3	32.8	26.8
<b>160</b>	40.6	29.3	38.1	30.9	28.3	23.9
<b>200</b>	39	23.1	33.2	24.5	27.7	22.7
<b>250</b>	35.2	24.3	35.9	28	30.8	26.4
<b>315</b>	35.1	31	35.8	33.8	37.4	36.5
<b>400</b>	33.7	34.8	36.2	32.7	39.3	34.7
<b>500</b>	33.1	35	36.7	31.7	37.7	33.1
<b>630</b>	32.8	40.2	37.6	34.1	40.3	34
<b>800</b>	33.7	42.7	40.3	47	43.9	44.7
<b>1k</b>	32.8	50.3	43.1	47	41.3	42.8
<b>1.25k</b>	31.6	51.4	41.7	47.7	37.5	43.3
<b>1.6k</b>	34.9	44.2	38.4	44.5	35.3	34.1
<b>2k</b>	32.4	40.9	36	34	33.9	32.8
<b>2.5k</b>	31.8	40.3	33.7	37.4	32.4	28.9
<b>3.15k</b>	30.5	42.7	31.9	36.3	30.7	29.5
<b>4k</b>	29.4	41.7	30	32.5	28.7	25.7
<b>5k</b>	28.7	43.8	28.6	34.6	27.3	26.2
<b>6.3k</b>	27.7	37.3	26.5	26.2	23.6	24.3
<b>8k</b>	25.8	40.6	26.5	21.1	19.5	20.4
<b>10k</b>	22.5	42.1	25.3	22.7	17.5	20.4
<b>12.5k</b>	18.6	34.9	21.7	19.3	13.6	16

The Environmental Noise Standard ISO1996-2 details that a prominent tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by 5dB or more.

### 3.3 Boundary Noise Measurements at Processing Operation

Location No.	Date	Time	L <sub>Aeq</sub> dBA 15 mins	L <sub>A10</sub> dBA 15 mins	L <sub>A90</sub> dBA 15 mins	Tonal/ Impulsive	Comments
N1	17/06/2008	9.43-9.58	65	69	54	No	Hum from factory & Road Traffic
	16/06/2008	22.16-22.32	62	66	49	No	Factory (board plant) audible and forklift, Road Traffic
N2	17/06/2008	9.31-9.46	63	67	54	No	Board plant noise, forklift bleeping inside, lorries in and out
	16/06/2008	22.04-22.19	57	60	50	No	Noise from factory audible, cars on road plus lorries going in & out of the factory
N3	17/06/2008	10.03-10.27	48	50	45	Tonal @ 50Hz	Noise from a few passing cars
	16/06/2008	22.36-23.02	45	46	42	No	Noise from a few passing cars
N4	17/06/2008	10.18-10.33	46	48	39	No	Few cars passing
	16/06/2008	22.51-23.06	41	42	38	Tonal @ 16Hz	Factory barely audible, quiet road
N5	17/06/2008	9.26-9.41	63	67	53	Tonal @ 160Hz	Building works inside, noise from factory also, lot of cars and lorries on road
	16/06/2008	22.00-22.15	59	62	44	No	Traffic on road, very little factory noise

Tonal noise results for the process site are displayed in the following section.

### 3.4 1/3<sup>rd</sup> Octave Boundary Noise Measurements at Process Operation

Hz	N1		N2		N3		N4		N5	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)	BPL (dBL)
12.5	54.7	62.2	62.7	56.2	68	46.7	61.1	50.8	66.9	60.8
16	59.8	56.2	62.9	65.1	64.8	55.4	58.9	<b>56.5</b>	62.9	69.3
20	56	56.3	65.8	67.5	59.8	59.6	62.6	50.9	63.8	68.9
25	60	57.3	66.8	68.8	57.2	58.5	58.2	50.6	65.6	63.7
31.5	65.3	58.8	68.4	67	58.3	53	48.8	54.4	66.4	65.7
40	68.3	59.6	62	70	57.4	58.5	45.8	49	58.1	59.7
50	60.9	59.1	66.3	66.4	<b>65.6</b>	54.6	43.6	49.4	61.5	58.3
63	56	60.3	62.6	57.7	46.3	43.2	40.3	41.4	58.3	54.5
80	61	58.5	58.9	56.9	46.5	48.9	41.8	44.9	57.7	51.9
100	58.9	62.9	55.8	54.2	46.1	51.7	44.9	45.2	50.6	51.1
125	58.1	58.3	54.6	48	38.7	41.1	38.5	39.4	50	49.5
160	56.5	52.2	60.7	51.7	34.9	39.6	29.3	32.1	<b>56.4</b>	45.6
200	52.8	43.9	56.7	47.7	36	41.2	26.9	23	50.7	41.1
250	46.7	36.6	52.4	48.5	40.4	38.8	24.7	24.5	49.2	43
315	43.5	41.2	51.7	46.9	42.7	40.3	27.7	28.9	51.5	44.9
400	46.2	44.7	49	44.1	42.8	39.9	27.2	28.8	48.2	42.4
500	51.5	47.2	47.8	45.3	42.4	38.3	27.5	31	47.2	41.3
630	50.6	43.7	50.4	48.3	39.5	37.6	27.8	30.8	47.5	44.7
800	53.6	48.2	49	41.5	46.2	45.7	28.7	31.4	50.5	46.3
1k	47	51.4	50.3	41.1	45.8	45.6	28.2	29.3	57.2	45.4
1.25k	46.9	51.5	51.8	39.3	43.3	42.2	28	27.2	58.3	45.8
1.6k	45.2	47.7	49.1	34.4	40.1	37.2	24.1	26	52	44.6
2k	41	44.8	48	32.6	37	30.8	22.2	21.3	49.4	39.1
2.5k	39.2	45.7	46	32.1	36	27.7	20.7	20.9	45.9	34.3
3.15k	37.1	45.4	48.5	28.3	35.5	23.1	21.1	19.2	43.3	31.4
4k	34.9	40.6	43	27.2	38.9	22.8	22	16.5	39.5	26.5
5k	30.6	43.8	38.5	25	45.8	23.1	34.1	15.2	37	22.9
6.3k	26.6	35.3	34.2	19.7	42	20.7	29.7	14.1	34.3	20.7
8k	21.7	29.8	32.6	17.2	28.8	17.7	24.5	12.7	32.5	17.2
10k	17.7	22.7	27.1	14.7	24.7	13.3	13.7	11.1	28.8	15.5
12.5k	14.7	18.8	21.8	10.7	23.7	13	12.5	11.1	25.5	13.7

The Environmental Noise Standard ISO1996-2 details that a prominent tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by 5dB or more.

## 4. Discussion

### 4.1 Ambient Noise Measurements at the Mining Operation

Ambient noise measurements were taken at 3 boundary locations around the Mine site during day and night time. Looking at each individual location and the results of the  $L_{A90}$  and  $L_{A10}$ , the following was found:

#### MS1

MS1 at the back of the mine had an  $L_{Aeq}$  reading of 53dBA during the day. The difference of 8dBA between the  $L_{A10}$  reading of 55dBA and the  $L_{A90}$  reading of 47dBA indicates intermittent noise at this location, caused by road traffic and from a rock breaker on the site. The noise at this location was impulsive, but due to the location of the rock breaker below normal ground level in this area, it was not audible beyond the immediate site boundary at MS1. The daytime  $L_{Aeq}$  reading at this location is within the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 51dBA during the night. The difference of 22dBA between the  $L_{A10}$  reading of 46dBA and the  $L_{A90}$  reading of 24dBA indicates a lot of intermittent noise at this location, caused by cars coming from the football pitch nearby and road traffic. No site noise was audible at this location and no impulsive noise audible. Tonal at 16Hz was measured during the night time noise monitoring. Sound below the frequency wave of 20Hz is termed infrasound and is below the normal threshold of hearing so the source of this tone is unknown (e.g. could be from power lines) but as no factory noise was audible it was not from site operations. Given that the  $L_{A90}$  reading of 24dBA at this location, it can be reasonably assumed that this is the typical background noise level at this location, in the absence of road traffic. Therefore the night time  $L_{A90}$  reading at this location is well within the IPPC night time limit of 45dBA.

#### MS2

MS2 at the side of the mine near the shop had an  $L_{Aeq}$  reading of 54dBA during the day. The difference of 14dBA between the  $L_{A10}$  reading of 58dBA and the  $L_{A90}$  reading of 44dBA indicates a lot of intermittent noise at this location, caused by traffic passing on the main road. The noise at this location was not impulsive and was tonal at 25Hz during the day time noise monitoring. No mine noise was audible at this location so the tone is attributed to traffic on the main road. The daytime  $L_{Aeq}$  reading at this location is below the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 55dBA during the night. The difference of 21dBA between the  $L_{A10}$  reading of 55dBA and the  $L_{A90}$  reading of 34dBA indicates a lot of intermittent noise at this location, caused by traffic passing on the main road. No site noise was audible at this location. The noise at this location was not impulsive and was tonal at 16Hz. Sound below the frequency wave of 20Hz is termed infrasound and is below the normal threshold of hearing so the source of this tone is unknown (e.g. could be from power lines) but as no factory noise was audible it was not from site operations. Given that the  $L_{A90}$  reading of 34dBA at this location, it can be reasonably assumed that this is the typical background noise level at this location, in the absence of road traffic. Therefore the night time  $L_{A90}$  reading at this location is well within the IPPC night time limit of 45dBA.

### **MS3**

MS3 had an  $L_{Aeq}$  reading of 39dBA during the day. The difference of 4dBA between the  $L_{A10}$  reading of 41dBA and the  $L_{A90}$  reading of 37dBA indicates a small amount of intermittent noise at this location, caused by traffic passing on the road. The noise at this location was not impulsive and was tonal at 16Hz, 40Hz and 80Hz during the day. These tones were sourced from road traffic noise. No houses are located in the vicinity of MS3, although there are some a small distance away. The daytime  $L_{Aeq}$  reading at this location is well within the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 37dBA during the night. The difference of 3dBA between the  $L_{A10}$  reading of 36dBA and the  $L_{A90}$  reading of 33dBA indicates a very small amount of intermittent noise at this location. The noise at this location was not impulsive and was tonal at 16Hz. Sound below the frequency wave of 20Hz is termed infrasound and is below the normal threshold of hearing so the source of this tone is unknown (e.g. could be from power lines) but as no factory noise was audible it was not from site operations. The night time  $L_{Aeq}$  reading at this location is well within the IPPC daytime limit of 45dBA.

## **4.2 Ambient Noise Measurements at the Processing Operation**

Ambient noise measurements were taken at 5 boundary locations around the processing site. These noise measurements were taken both during the day and at night as the site operates at both times. Looking at each individual location and the results of the  $L_{A90}$  and  $L_{A10}$ , the following was found:

### **N1**

N1 close to the lorry car park had an  $L_{Aeq}$  reading of 65dBA during the day. The difference of 15dBA between the  $L_{A10}$  reading of 69dBA and the  $L_{A90}$  reading of 54dBA indicates a lot of intermittent noise at this location, caused by traffic on the main road. No impulsive or tonal noise was evident at this location during the day. One house is located a small distance across the road from N1. Given that the  $L_{A90}$  daytime reading of 54dBA at this location, it can be reasonably assumed that this is the typical background noise level at this location, in the absence of road traffic. Therefore the daytime  $L_{A90}$  reading at this location is within the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 62dBA during the night. The difference of 17dBA between the  $L_{A10}$  reading of 66dBA and the  $L_{A90}$  reading of 49dBA indicates a lot of intermittent noise at this location, caused by traffic on the main road and some noise from a forklift operating on site. No impulsive or tonal noise was evident at this location during the night. The background noise at this location ( $L_{A90}$ ) slightly exceeds the night time noise limit of 45dBA.

### **N2**

N2 close to the lorry entrance of the site had an  $L_{Aeq}$  reading of 63dBA during the day. The difference of 13dBA between the  $L_{A10}$  reading of 67dBA and the  $L_{A90}$  reading of 54dBA indicates a lot of intermittent noise at this location, caused by passing traffic on the main road, lorries entering and leaving the site and a forklift inside the board plant. The noise at this location was not impulsive or tonal during the daytime noise survey. Given that the  $L_{A90}$  daytime reading of 54dBA at this location, it can be reasonably assumed that

this is the typical background noise level at this location, in the absence of road traffic. Therefore the daytime  $L_{A90}$  reading at this location is within the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 57dBA during the night. The difference of 10dBA between the  $L_{A10}$  reading of 60dBA and the  $L_{A90}$  reading of 50dBA indicates a lot of intermittent noise at this location, caused by traffic entering and leaving the factory and passing on the main road. The noise at this location was not impulsive or tonal during the night time noise survey. The background noise at this location ( $L_{A90}$ ) slightly exceeds the night time noise limit of 45dBA.

### **N3**

N3 at the back of the site had an  $L_{Aeq}$  reading of 48dBA during the day. The difference of 5dBA between the  $L_{A10}$  reading of 50dBA and the  $L_{A90}$  reading of 45dBA indicates a low level of intermittent noise at this location, caused by some passing traffic on the road. The noise at this location was not impulsive and was tonal at 50Hz during the day time noise survey. This tone was sourced from road traffic noise. The daytime  $L_{Aeq}$  reading at this location is below the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 45dBA during the night. The difference of 4dBA between the  $L_{A10}$  reading of 46dBA and the  $L_{A90}$  reading of 42dBA indicates intermittent noise at this location caused by some passing traffic. The noise at this location was not impulsive or tonal during the night time survey. The night-time  $L_{Aeq}$  reading at this location is below the IPPC daytime limit of 45dBA.

### **N4**

N4 at the back of the site had an  $L_{Aeq}$  reading of 46dBA during the day. The difference of 9dBA between the  $L_{A10}$  reading of 48dBA and the  $L_{A90}$  reading of 39dBA indicates some intermittent noise at this location caused by a passing traffic. The noise at this location was not impulsive or tonal during the day time noise survey. The daytime  $L_{Aeq}$  reading at this location is below the IPPC daytime limit of 55dBA.

This location had an  $L_{Aeq}$  reading of 41dBA during the night. The difference of 4dBA between the  $L_{A10}$  reading of 42dBA and the  $L_{A90}$  reading of 38dBA indicates some intermittent noise at this location. The noise at this location was not impulsive and was tonal at 16Hz. Sound below the frequency wave of 20Hz is termed infrasound and is below the normal threshold of hearing so the source of this tone is unknown (e.g. could be from power lines) but as no factory noise was audible it was not from site operations. The night time  $L_{Aeq}$  reading at this location is below the IPPC daytime limit of 45dBA.

### **N5**

N5 close to the offices had an  $L_{Aeq}$  reading of 63dBA during the day. The difference of 14dBA between the  $L_{A10}$  reading of 67dBA and the  $L_{A90}$  reading of 53dBA indicates a lot of intermittent noise at this location, caused by building works on site and traffic entering and leaving the factory and passing on the main road. The noise from this location was not impulsive and it was tonal at 160Hz. Given that the  $L_{A90}$  daytime reading of 53dBA at this location, it can be reasonably assumed that this is the typical background noise level at

this location, in the absence of road traffic. Therefore the daytime  $L_{A90}$  reading at this location is within the IPPC daytime limit of 55dBA.

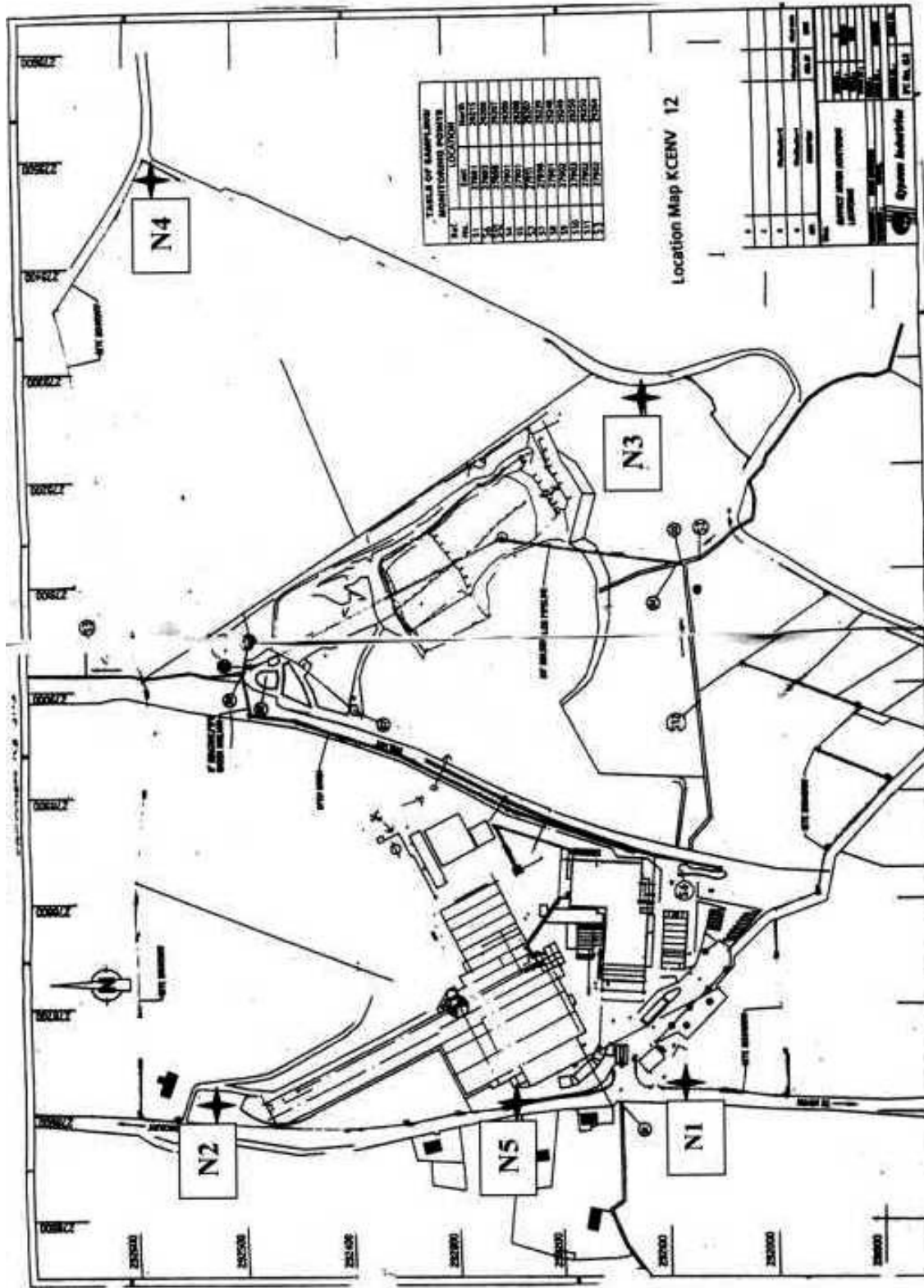
This location had an  $L_{Aeq}$  reading of 59dBA during the night. The difference of 18dBA between the  $L_{A10}$  reading of 62dBA and the  $L_{A90}$  reading of 44dBA indicates a lot of intermittent noise at this location caused by road traffic. The noise from this location was not impulsive or tonal during the night time survey. The  $L_{A90}$  night time reading of 44dBA within the IPPC limits.

## 5. Conclusion

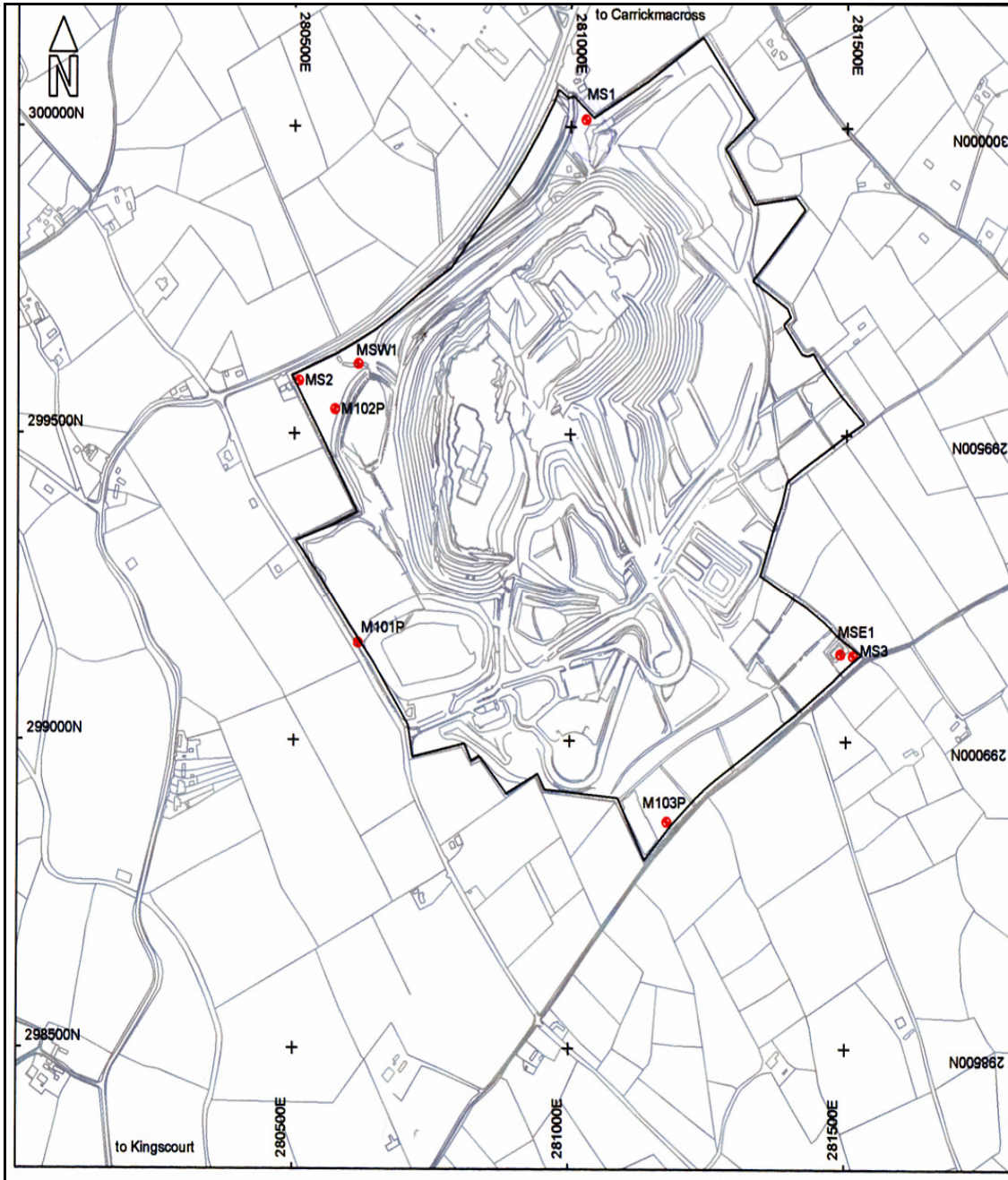
Monitoring points adjacent to the roadway, particularly at locations MS1, N1, N2, N3, N4 and N5 are affected by road traffic. However, in general, ambient noise levels around the mine site are low and not problematic to neighbouring properties. Ambient noise levels around the processing site are higher than at the mine and in general boundary locations have noise levels within IPPC limits. However two locations; N1 & N2 had noise levels slightly in excess of IPPC limits during the night. No houses are located directly beside N1 & N2, so the noise level at nearby noise sensitive locations will be lower than at the boundary.

The next noise survey as part of Gypsum Industries IPPC requirements is due in 2009.

### Appendix 1 Noise Monitoring Locations at Gypsum Process Site



## Appendix 2. Noise Monitoring Locations at Gypsum Mine



**APPENDIX (viii) GROUNDWATER MONITORING  
REPORT**

Gypsum Industries Limited  
IPPC Licence No. PO519-02  
Groundwater Monitoring

**Annual groundwater monitoring report  
for Gypsum Industries mine and processing sites  
2010**

Minerex Work item G3 & G4  
MEL Doc. Ref: 1632-1224 (Final)  
Date: Tuesday, January 18, 2011

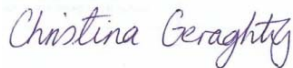
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**Approved by :**



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**Cecil Shine** PGeo EurGeol  
M.Sc.

Project Director



**REPORT TO**

Irish Gypsum Industries  
IPPC License No. PO519-02  
Annual Groundwater Monitoring Report - 2010

**REPORT BY**

Minerex Environmental Limited  
Doc Ref 1632-1224 (Final)  
1 of 20

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**REPORT TO**

Irish Gypsum Industries  
 IPPC License No. PO519-02  
 Annual Groundwater Monitoring Report - 2010

**REPORT BY**

Minerex Environmental Limited  
 Doc Ref 1632-1224 (Final)  
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## Appendices

<b>Appendix</b>	<b>Title</b>	<b>Pages</b>	<b>Minerex Doc. Ref.</b>
A	<b>MINE SITE – Bedrock geology &amp; monitoring locations</b>	1 x A3	1632-024.ppt
B	<b>MINE SITE – Monitoring location geology</b>	1 x A4	1632-008.cdr
C	<b>PROCESSING SITE – Bedrock geology &amp; monitoring locations</b>	1 x A4	1632-024.ppt
D	<b>PROCESSING SITE – Monitoring location geology</b>	1 x A4	1632-008.cdr
E	<b>BOTH SITES – Groundwater level graphs</b>	2 x A4	1632-010.xls
F	<b>MINE SITE – Analytical results</b>	2 x A4	1632-010.xls
G	<b>PROCESSING SITE – Analytical results</b>	2 x A4	1632-010.xls
H	<b>MINE SITE – Chart of groundwater results (2007-2010)</b>	10 x A4	1632-010.xls
I	<b>PROCESSING SITE - Chart of groundwater results (2005-2010)</b>	12 x A4	1632-010.xls
J	<b>BOTH SITES – Table of upper and lower guideline values.</b>	2 x A4	1632-011.xls
K	<b>BOTH SITES – Certificates of analysis</b>	76 x A4	1632-030.pdf

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3. This report may not be relied upon by any other party without the prior and express written permission from MEL.
4. Interpretations contained in this report are derived from available information of the site conditions, the likely environmental responses and the experience of the company.
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# 1. INTRODUCTION

## 1.1 Background and purpose

Gypsum Industries Limited (GIL) operate mining and processing facilities in the Kingscourt area of Co. Monaghan, which are subject to conditions of IPPC Licence No. 688/ P0519-02 (Ref. 1). Minerex Environmental Limited (MEL) have undertaken hydrogeological and environmental investigations at GIL since October 2003 for compliance with their IPPC Licence and additional Environmental Protection Agency (EPA) requirements.

In 2010, MEL were commissioned by GIL to undertake the biannual groundwater monitoring programme required under Condition 11.1 and Schedule 5 (ii) of their IPPC licence. This work was undertaken by QED Engineering Limited between 2005 and 2008 and MEL during 2009 and consists of biannual groundwater sampling at both the mine and processing sites.

Sampling for the first biannual event (B3: January to July 2010) was undertaken between the 6<sup>th</sup> and 9<sup>th</sup> of April 2010, while sampling for the second biannual event (B4: July to December 2010) was undertaken between the 26<sup>th</sup> of October and the 2<sup>nd</sup> of November 2010. This report combines the data acquired and laboratory analysis for the sampling events in 2010, and states the results and conclusions.

## 1.2 Site description

GIL operate an opencast and underground mine site in Knocknacran, Co. Monaghan at E681066 N799620 and a gypsum processing site in Lisnabow, Co. Louth at E678730 N792290. The facility at Knocknacran consists of an opencast pit area with associated earthworks and slopes, process areas, workshops and offices and settlement lagoons. The planned final footprint of the underground mine is 830,000m<sup>2</sup>, which lies entirely to the south of the opencast pit. The gypsum processing site consists of process areas, workshops, offices, a landfilling area and four settlement lagoons.

## 1.3 Mine site (Knocknacran) monitoring locations

A total of 14 groundwater monitoring points have been monitored within 1.5km of the mine site at Knocknacran. The geology of these monitoring points is shown in Appendix A and the locations in Appendix B. These are as follows:

<b>Monitoring point ID</b>	<b>Hydrogeological unit</b>	<b>Aquifer type<sup>1</sup></b>
01JP-S	Upper gypsum	Aquiclude
01JP-D	Dolerite in middle mudstone	Aquitard - BROKEN
MW1-P3	Upper mudstone	Aquiclude
MW1-P1	Dolerite in middle mudstone	Aquitard
MW2-P1	Overburden	N/A
MW3-P2	Middle mudstone	Aquiclude – DRY (October 2010)
MW3-P1	Namurian/ Westphalian	Poor aquifer
MW4-P1	Dolerite in lower mudstone	Aquitard
MW5-P2	Overburden	N/A

<sup>1</sup> *Aquicludes* restrict the flow of groundwater from one aquifer to another and are characterised by low permeabilities, while *aquitards* are characterised by low flow rates and by low permeabilities.

MW5-P1	Dolerite in middle mudstone	Aquitard
MW6-P1	Namurian/ Westphalian	Locally important aquifer
M102PA	Overburden	N/A
95A1-D	Middle mudstone	Aquiclude – DRY (October 2010)
95A1-S	Overburden	N/A – DRY (April and October 2010)

## 1.4 Processing site (Lisnabow) monitoring locations

A total of 12 groundwater monitoring points have been installed in the vicinity of the processing site at Lisnabow. The geology of these monitoring points is shown in Appendix C and the locations in Appendix D. These are as follows:

<b>Monitoring Point ID</b>	<b>Hydrogeological unit</b>	<b>Aquifer type</b>
BH1-04D	Mudstone	Aquiclude
BH2-04S	Overburden	N/A
BH2-04D	Mudstone	Aquiclude
BH3-03S	Gravels	Locally important aquifer
BH3-03D	Dolerite	Aquitard
BH4-03D	Gypsum & mudstone	Aquiclude
BH5-03S	Overburden	N/A
BH6-03D	Gypsum & mudstone	Aquiclude
BH9-03S	Gravels	Locally important aquifer
95A	Dolerite	Aquitard
96A	Mudstone	Aquiclude
96B	Mudstone	Aquiclude

## 1.5 Mine site geology

- 1.5.1 According to subsoil mapping compiled by Teagasc, the area in which the mine site is located is underlain by tills chiefly derived from Lower Palaeozoic rocks, while the area immediately surrounding the site consists of made ground and rock at the surface (Ref. 2). Based on the results of drilling at the mine site, as undertaken by GIL and MEL, the overburden ranges in thickness from 5m to 21m.
- 1.5.2 According to bedrock geology mapping compiled by the Geological Survey of Ireland, the mine site is underlain by the Kingscourt Gypsum Formation, which is described as mudstone with gypsum and anhydrite of Permian age and is part of the Kingscourt Outlier (Ref. 3). A typical sequence within the Kingscourt Gypsum Formation consists of a basal conglomerate member of some 0-18m in thickness, which is overlain by marl and mudstone which are collectively termed the lower mudstone, the thickness of which varies between 2-25m (Appendix A) (Ref. 3). Overlying the lower mudstone is the lower gypsum, which is separated from the upper gypsum by the middle mudstone of between 6-12m in thickness. The upper gypsum is overlain by the upper mudstone, which is between 26-35m in thickness. Dolerite sills occur in the Kingscourt Gypsum Formation, with the principal intrusion in the middle mudstone between the two gypsum members, with a maximum thickness of 60m (Ref. 4). A secondary intrusion is generally restricted to the lower mudstone with a maximum thickness of 8m.
- 1.5.4 The Kingscourt Gypsum formation is underlain by Carboniferous undifferentiated micaceous shale, siltstone and sandstone, and occasional thin coal beds of Westphalian and Namurian age, which do not outcrop in the mine site but to the south and north of the Kingscourt Outlier (Appendix D).

## 1.6 Processing site geology

- 1.6.1 According to subsoil mapping compiled by Teagasc, the area in which the processing site is located is identified as made ground while the area immediately surrounding the site consists of tills chiefly derived from Lower Palaeozoic rocks (Ref. 2). Based on the results of drilling at the processing site, as undertaken by Bord Na Mona, the site is underlain by glacial tills, between 3-13m in thickness, while the area surrounding the landfill is underlain by sands and gravels, between 4.5-11.5m in thickness (Ref. 5).
- 1.6.2 The processing site is underlain by the Kingscourt Gypsum Formation, which overlies the Westphalian rocks unconformably (Appendix D). The Kingscourt Gypsum is faulted against the Clontail Formation of Namurian age, which is described as shale, siltstone and thin sandstones; by the Kingscourt Fault which lines the main road to the front of the facility in a north-south orientation (Ref. 3). Both the Namurian rocks and the Kingscourt Gypsum Formation are intruded by doleritic sills, which run across the facility in a southeast-northwest direction (Appendix D).

## 1.7 Site hydrogeology

Despite some evidence of karstification within the gypsum units, the gypsum deposits and the mudstones of the Kingscourt Gypsum Formation are essentially *aquicludes*, which restrict the flow of groundwater from one aquifer to another and are characterised by low permeabilities. The dolerites of the Kingscourt Gypsum Formation are essentially *aquitards*, which are characterised by low flow rates and by low permeabilities. The dolerites of the Kingscourt Gypsum Formation are interpreted to have been hydrothermally altered as they were being intruded, resulting in susceptibility to weathering and enhanced permeability *relative* to the mudstones and gypsum (Ref. 4).

## 1.8 Weather conditions

The following table details the recorded rainfall for each month of the first ten months of 2010 (January to October 2010) and the 30-year (1962-1991) monthly mean recorded rainfall for Ballyhaise, the closest meteorological station which is approximately 40km to the north-west (Ref. 8).

<b>Monthly</b>	<b>Monthly rainfall (mm) (2010)</b>	<b>Monthly rainfall (mm) (30 year average)</b>
January	49	93
February	32	68
March	84	75
April	68	58
May	28	66
June	37	67
July	101	60
August	68	83
September	180	81
October	71	98
<b>TOTAL</b>	<b>718</b>	<b>749</b>

The monthly rainfall totals for the 2010 period January to October are slightly lower than the 30-year average over all, with the monthly exceptions of March, April, July and September which are higher than average. The first ten months of 2010 has 31mm less rainfall than the 30-year average.

## **2. METHODOLOGY**

### **2.1 Groundwater levels**

A total of 26 water levels were monitored at the mine and processing site monitoring boreholes in April and October/November 2010, locations shown in Appendix A and Appendix B. Prior to purging, the static groundwater level was measured in each monitoring location with an electronic dipper against the assigned reference point. MEL carried out groundwater level measurements according to MEL best practice. The details of monitoring point ID, hydrogeological unit, total depth of the monitoring piezometer and depth of screened interval are shown in Appendix B and Appendix D.

### **2.2 Sampling methodology**

The sampling methodology followed standards and protocols based on ISO 5667 standard methods, EPA guidelines and MEL best practice, whereby every practical effort was made to purge each monitoring borehole prior to a sample being taken and generally be consistent from one sampling period to the next to enable realistic comparisons to be made between the results of each sampling event and to ensure samples taken are representative of the overall chemistry in the aquifer at the monitoring wells. Wells with less than 50mm internal diameter were purged and sampled using watterra inertial pumps. Watterra inertial pumps had to be used as a wasp 12V pump would not fit into these wells and water levels were too low to use a peristaltic pump. Wells with an internal diameter greater than 50mm were purged and sampled using wasp 12V electric pumps.

Electrical conductivity, pH and temperature were monitored while purging during sampling events. Measurements were executed using HANNA™ handheld probes.

Samples were taken and preserved as applicable. All samples were stored in a cooler box, at 4°C or less, until and during transport to the laboratory. Samples were collected from MEL office by a courier and delivered to Alcontrol laboratories for analysis. A chain of custody was completed and accompanied the samples to the laboratory.

### **2.3 Parameters monitored**

The following table lists the parameters for analysis as required within the IPPC licence for the mine and processing site monitoring locations (Ref. 1). Electrical conductivity and pH were recorded at the time of sampling using hand held probes at the mine and processing site.

<b>Mine Site</b>	<b>Processing Site</b>
Alkalinity	Ammoniacal Nitrogen
Ammoniacal Nitrogen	Dissolved Barium
Dissolved Calcium	Dissolved Calcium
Chloride	Chloride
Dissolved Magnesium	COD
Nitrate	Dissolved Manganese
Dissolved Potassium	Sulphate
Dissolved Sodium	
Sulphate	

## 2.4 Reference concentrations

The gypsum geology in the vicinity of GIL is unique within Ireland and therefore the hydrochemistry has a natural background concentration which is not comparable with average natural background concentrations within Ireland. GIL submitted guideline values for groundwater quality in both the mine site and the processing sites to the Environmental Protection Agency (EPA) which are based on the Agency's 2003 publication 'Towards setting guideline values for the protection of groundwater in Ireland' (Ref.6) and/or 'the natural groundwater chemistry found in the area of the mine and processing site', (Ref. 7) for use in evaluating the results of groundwater monitoring (please see table below).

The guideline values and EPA interim guideline values which are used for assessment of the groundwater water quality within the different geologies at the mine and processing site are listed in Appendix J.

<b>Type</b>	<b>Surface water, Groundwater or Soil</b>	<b>Reference to Legislation, guidance, baseline or trends</b>	<b>Minerex Doc Ref.</b>
<b>Guidance</b>	Groundwater	<b>Interim Guideline values (IGV's)</b> - Towards Setting Guideline Values For The Protection of Groundwater In Ireland (EPA Interim Report, 2006).	F827
<b>Baseline / Background –</b>	Groundwater	<b>Upper guideline values</b> <b>Lower guideline values</b>	1632-756.pdf
<b>Trends</b>	Groundwater	<b>Overall trends in concentrations over time (2005-2010) for monitoring locations</b>	See section 3.2, 3.3 and Appendix H, I

## 2.5 Classification of Exceedances

An exceedance of the referenced standards is considered to be within one of the following categories. This categorisation is proposed by MEL in the absence of any known formal published categorisation. It is considered a reasonable approach for comparison of site chemistry:

<b>Classification category</b>	<b>Comment</b>
Minor Exceedance (ME)	A monitored parameter value which exceeds the reference standard by < 1.5 times.
Moderate Exceedance (MoE)	A monitored parameter value which exceeds the reference standard by 1.5 to 3 times.
Significant Exceedance (SE)	A monitored parameter value which exceeds the reference standard by >3 times.

## 3. RESULTS & INTERPRETATION

The relevant parameters listed in section 2.3, relevant reference concentrations listed in section 2.4 and relevant exceedance category listed in 2.5 above are used to interpret the results for the mine and processing site monitoring locations. The results (Appendix F and Appendix G) for all of the parameters monitored are graphed (Appendix H and Appendix I) and addressed below in section 3.2 (Mine Site) and 3.3 (Processing Site) with additional details of the monitoring locations and trends if in exceedance of reference concentrations.

### 3.1 Water levels

The water levels measured at the mine and processing site monitoring boreholes are presented in Appendix E. At the mine site, only 10 of the 14 monitoring boreholes are currently monitorable for water levels. Of these, 7 monitoring boreholes show a stable trend in water levels from 2007 to 2010 monitoring events and the remainder are commented upon below:-

<b>Site</b>	<b>Monitoring point</b>	<b>Geology</b>	<b>Trend in Water Level</b>
Mine	MW1-P3	Upper mudstone	Highly variable trend
Mine	MW1-P1	Dolerite in the middle mudstone	Highly variable trend since March 2009
Mine	MW3-P2	Middle mudstone	Stable trend since November 2008

There are fewer water level records at the processing site and therefore a period of 2005-2009 is considered. The 12 monitoring boreholes at processing site show rising (BH6-03D, BH2-04D and BH9-03S) or stable water levels from 2005-2010.

### 3.2 Mine site sampling

#### 3.2.1 Alkalinity

The analytical results for alkalinity range from 22mg/l to 1,910mg/l in April 2010 and 110mg/l to 11,200mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	MW2-P1 (SE) MW1-P1 (ME)	MW5-P1 (SE)
Lower guideline value	M102PA (ME) MW6-P1 (ME) 95A1-D (ME)	M102PA (ME)
EPA Interim Guideline Value	M102PA (ME) MW2-P1 (SE) MW1-P1 (SE)	MW2-P1 (SE) MW5-P1 (SE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	MW2-P1 Upward Trend MW1-P1 Upward Trend MW5-P1 Upward Trend M102PA Stable Trend MW6-P1 Stable Trend 95A1-D Downward Trend	

#### 3.2.2 Dissolved Calcium

The results for dissolved calcium range from 11.6mg/l to 591mg/l in April 2010 and 6.59mg/l to 681mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	MW1-P1 (ME)	MW1-P1 (ME)
Lower guideline value	MW3-P1 (SE) MW3-P2 (ME)	MW3-P1 (SE)
EPA Interim Guideline Value	MW2-P1(ME) 01JP-S (MoE) MW3-P1 (MoE) MW1-P3 (MoE) 95A1-D (MoE) MW1-P3 (MoE)	01JP-D (MoE) MW3-P1 (MoE) MW4-P1 (MoE) MW1-P3 (MoE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	MW1-P1 Upward Trend MW3-P1 Downward Trend MW3-P2 Downward Trend MW2-P1 Downward Trend 01JP-S Downward Trend MW1-P3 Downward Trend MW4-P1 Upward Trend 95A1-D Downward Trend	

**3.2.3 Chloride**

The analytical results for chloride range from 11.8mg/l to 37.4mg/l in April 2010 and 5.6mg/l to 31.4mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	MW2-P1 (MoE) MW4-P1 (ME)	MW2-P1 (ME) MW1-P1 (ME) MW5-P1 (ME)
EPA Interim Guideline Value	MW2-P1 (ME) MW3-P2 (ME)	MW1-P1 (ME)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	MW2-P1 Downward Trend MW4-P1 Downward Trend MW3-P2 Upward Trend MW1-P1 Upward Trend MW5-P1 Stable Trend	

**3.2.4 Dissolved Magnesium**

The analytical results for dissolved magnesium range from <0.036mg/l to 77mg/l in April 2010 and <0.036mg/l to 55.6mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	M102PA (MoE) MW3-P1 (ME) MW1-P1 (ME) MW3-P2 (ME)	M102PA (MoE) MW3-P1 (ME) MW1-P1 (ME)
EPA Interim Guideline Value	M102PA (MoE) MW3-P1 (ME) MW3-P2 (ME)	M102PA (MoE) MW3-P1 (ME) MW4-P1 (ME)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	M102PA Stable Trend MW3-P1 Variable Trend MW1-P1 Downward Trend MW3-P2 Variable Trend MW4-P1 Downward Trend	

**3.2.5 Nitrate**

The analytical results for nitrate range from <0.3mg/l to 2.06mg/l in April 2010 and <0.3mg/l to 7.03mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No guideline limit	No guideline limit
Lower guideline value	No guideline limit	No guideline limit
EPA Interim Guideline Value	No exceedances	No exceedances
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	MW5-P2 Variable Trend MW1-P1 Variable Trend 95A1-D Upward Trend MW2-P1 Upward Trend MW4-P1 Upward Trend	

**3.2.6 Potassium**

The analytical results for potassium range from 2.61mg/l to 19.2mg/l in April 2010 and <2.34mg/l to 21.4mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	M102PA (MoE) 95A1-D (SE)	M102PA (MoE)
EPA Interim Guideline Value	M102PA (MoE) O1JP-S (SE) MW4-P1 (ME) MW1-P1 (ME) 95A1-D (SE) MW3-P2 (MoE)	M102PA (ME) O1JP-S (SE) MW3-P1 (MoE) MW4-P1 (ME)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	M102PA Stable Trend O1JP-S Downward Trend MW4-P1 Variable Trend MW1-P1 Downward Trend 95A1-D Upward Trend MW3-P2 Upward Trend	

### 3.2.7 Dissolved Sodium

The analytical results for dissolved sodium range from 10mg/l to 66mg/l in April 2010 and 6.79mg/l to 150mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	M102PA (ME)	M102PA (ME) MW3-P1 (ME)
EPA Interim Guideline Value	No exceedances	No exceedances
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	M102PA Stable Trend MW3-P1 Downward Trend	

### 3.2.8 Sulphate

The analytical results for sulphate range from 21.7mg/l to 1580mg/l in April 2010 and 13.2mg/l to 1460mg/l in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	M102PA (ME) MW3-P1 (MoE) MW1-P1 (MoE) MW3-P2 (ME)	M102PA (ME) 01JP-S (ME) MW3-P1 (ME) MW1-P1 (MoE) MW3-P2 (ME)
EPA Interim Guideline Value	M102PA (MoE) MW2-P1 (ME) 01JP-S (SE) MW3-P1 (SE) MW4-P1 (MoE) MW1-P1 (SE) 95A1-D (SE) MW3-P2 (SE)	M102PA (MoE) MW2-P1 (ME) 01JP-S (SE) MW3-P1 (SE) MW4-P1 (MoE) MW1-P1 (SE) 95A1-D (SE) MW3-P2 (SE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	M102PA Stable Trend MW2-P1 Downward Trend 01JP-S Upward Trend MW3-P1 Downward Trend MW4-P1 Downward Trend MW1-P1 Variable Trend 95A1-D Downward Trend MW3-P2 Downward Trend	

### 3.2.9 Electrical Conductivity

The analytical results for electrical conductivity range from 362uS/cm to 2,522uS/cm in April 2010 and 84uS/cm to 1,981uS/cm in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	MW3-P1 (ME) MW1-P1 (ME) 95A1-D (ME) MW1-P3 (ME)	MW3-P1 (ME) MW1-P1 (ME)
EPA Interim Guideline Value	M102PA (ME) 01JP-S (MoE) MW3-P1 (MoE) 95A1-D (MoE) MW3-P2 (MoE)	M102PA (ME) 01JP-S (MoE) MW3-P1 (MoE) MW4-P1 (MoE) MW1-P1 (MoE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	MW1-P1 Variable Trend 95A1-D Downward Trend MW1-P3 Stable Trend M102PA Upward Trend MW3-P1 Downward Trend 01JP-S Downward Trend MW4-P1 Variable Trend	

### 3.2.10 pH

The analytical results for pH range from 7.04 to 12.91pH units in April 2010 and 6.53 to 11.97pH units in October 2010 (Appendix F and Appendix H).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	MW6-P1 (ME)	No exceedances
Lower guideline value	M102PA (ME) MW2-P1 (ME) MW5-P2 (ME) 01JP-S (MoE) MW3-P1 (ME) MW4-P1 (ME) 95A1-D (MoE) MW3-P2 (MoE)	M102PA (ME) MW5-P2 (ME) 01JP-S (MoE) MW3-P1 (ME) MW1-P3 (MoE)
EPA Interim Guideline Value	01JP-S (ME) 95A1-D (ME)	01JP-S (ME)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	MW6-P1 Upward Trend M102PA Stable Trend MW2-P1 Variable Trend MW5-P2 Upward Trend 01JP-S Downward Trend MW3-P1 Stable Trend MW4-P1 Upward Trend 95A1-D Downward Trend MW3-P2 Variable Trend	

### 3.3 Processing site sampling

#### 3.3.1 Ammoniacal Nitrogen

The analytical results for ammoniacal nitrogen range from <0.2 to 2.98mg/l in April 2010 and <0.2 to 0.465mg/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value*	BH4-03D (ME) BH3-03S (SE) 95A (ME)	BH4-03D (ME) BH1-04D (ME) BH3-03S (SE) 95A (ME)
EPA Interim Guideline Value**	BH4-03D (ME) BH3-03S (SE) 95A (SE)	BH4-03D (MoE) BH1-04D (ME) BH3-03S (SE) 95A (SE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH4-03D Downward Trend BH1-04D Variable Trend BH3-03S Variable Trend 95A Downward Trend	

\* Further to the exceedances listed above, the limit of detection for ammoniacal nitrogen analysis of <0.2mg/l is higher than the lower guideline value for gypsum and mudstone (0.19mg/l), overburden (0.08mg/l) and mudstone (0.12mg/l) formations; therefore it is unclear if these results exceed these guidance values.

\*\* Further to the exceedances listed above, the limit of detection for ammoniacal nitrogen analysis of 0.2mg/l is higher than the EPA interim guideline value of 0.15mg/l; therefore it is unclear if these results exceed these guidance limits.

#### 3.3.2 Dissolved Barium

The analytical results for dissolved barium range from 4.16 to 119ug/l in April 2010 and 3.76 to 154ug/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	BH2-04S (ME)	BH2-04S (ME)
EPA Interim Guideline Value	BH2-04S (ME)	BH2-04S (MoE) BH9-03S (ME)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH2-04S Variable Trend BH9-03S Downward Trend	

### 3.3.3 Dissolved Calcium

The analytical results for dissolved calcium range from 56.7 to 563mg/l in April 2010 and 48.2 to 509mg/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	BH4-03D (ME) 96A (ME) BH1-04D (MoE) 95A (MoE)	BH4-03D (ME) BH6-03D (ME) 96A (ME) BH1-04D (MoE) 95A (ME)
EPA Interim Guideline Value	BH4-03D (MoE) BH6-03D (MoE) 96A (MoE) BH1-04D (MoE) BH2-04D (ME) 95A (MoE)	BH4-03D (MoE) BH6-03D (MoE) 96A (MoE) 96B (ME) BH1-04D (MoE) BH2-04D (ME) 95A (MoE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH4-03D Variable Trend BH6-03D Variable Trend 96A Variable Trend 96B Variable Trend BH1-04D Upward Trend BH2-04D Upward Trend 95A Variable Trend	

### 3.3.4 Chloride

The analytical results for chloride range from 11.3 to 291mg/l in April 2010 and 10.4 to 86mg/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	BH5-03S (SE)	BH5-03S (SE)
Lower guideline value	BH9-03S (ME) BH3-03D (ME)	BH9-03S (ME)
EPA Interim Guideline Value	BH5-03S (SE)	BH5-03S (SE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH9-03S Stable Trend BH3-03D Stable Trend BH5-03S Downward Trend	

**3.3.5 COD**

The analytical results for COD range from <7 to 50.6mg/l in April 2010 and <7 to 874mg/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	BH1-04D (SE) BH3-03S (SE)
Lower guideline value	BH3-03S (SE)	BH2-04S (SE)
EPA Interim Guideline Value	No guideline value	No guideline value
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH1-04D Upward Trend BH3-03S Upward Trend BH2-04S Downward Trend	

**3.3.6 Dissolved Manganese**

The analytical results for dissolved manganese range from <0.04 to 9,290ug/l in April 2010 and <0.388 to 9,130ug/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	BH3-03S (SE)	BH4-03D (ME) BH3-03S (MoE) 95A (ME)
EPA Interim Guideline Value	BH4-03D (SE) BH6-03D MoE) 96B (MoE) BH1-04D (MoE) BH3-03S (SE) BH9-03S (ME) BH3-03D (SE) 95A (SE)	BH4-03D (SE) BH6-03D (SE) 96A (MoE) 96B (ME) BH1-04D (MoE) BH3-03S (SE) BH9-03S (ME) BH3-03D (SE) 95A (SE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH4-03D Upward Trend BH6-03D Variable Trend 96A Downward Trend 96B Downward Trend BH1-04D Downward Trend BH3-03S Upward Trend BH9-03S Downward Trend BH3-03D Downward Trend 95A Variable Trend	

### 3.3.7 Sulphate

The analytical results for sulphate range from 25.2 to 1,960mg/l in April 2010 and 14.9 to 1,640mg/l in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	BH4-03D (MoE) 96A (ME) BH1-04D (ME) 95A (ME)	BH4-03D (MoE) BH6-03D (ME) 96A (ME) BH1-04D (ME) 95A (ME)
EPA Interim Guideline Value	BH4-03D (SE) BH6-03D (MoE) 96A (SE) 96B (MoE) BH1-04D (SE) BH2-04D (MoE) BH5-03S (MoE) BH3-03S (MoE) 95A (SE)	BH4-03D (SE) BH6-03D (SE) 96A (SE) 96B (MoE) BH1-04D (SE) BH2-04D (MoE) BH5-03S (MoE) BH3-03S (MoE) 95A (SE)
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH4-03D Stable (since April 2009) Trend BH6-03D Variable Trend 96A Downward (since December 2009) Trend 96B Variable Trend BH1-04D Stable (since April 2009) Trend BH2-04D Variable Trend BH5-03S Downward (since September 2008) Trend BH3-03S Stable Trend 95A Downward Trend	

### 3.3.8 Electrical Conductivity

The analytical results for electrical conductivity range from 365 to 2,980uS/cm in April 2010 and 314 to 2,203uS/cm in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	No exceedances	No exceedances
Lower guideline value	BH6-03D (ME) 96A (ME) BH1-04D (MoE) BH5-03S (SE) BH3-03S (ME) 95A (SE)	BH4-03D (ME) BH1-04D (ME)
EPA Interim Guideline Value	BH4-03D (MoE) BH6-03D (MoE) 96A (MoE) 96B (ME) BH1-04D (MoE) BH2-04D (ME) BH5-03S (MoE)	BH4-03D (MoE) BH6-03D (MoE) 96A (MoE) BH1-04D (MoE) BH2-04D (ME) BH5-03S (MoE) 95A (MoE)

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	BH3-03S (MoE) 95A (MoE)	
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH4-03D Variable Trend BH6-03D Variable Trend 96A Downward Trend 96B Downward (since September 2009) Trend BH1-04D Downward Trend BH2-04D Variable (since September 2009) Trend BH5-03S Downward Trend BH3-03S Downward Trend 95A Downward Trend	

**3.3.9 pH**

The analytical results for pH range from 6.73 to 10.75 pH units in April 2010 and 6.75 to 9.03 pH units in October 2010 (Appendix G and Appendix I).

<b>Reference concentrations</b>	<b>Monitoring points in exceedance of reference concentrations &amp; associated trends</b>	
	<b>April</b>	<b>October</b>
Upper guideline value	BH9-03S (ME) 95A (ME)	No exceedances
Lower guideline value	BH4-03D (ME) BH6-03D (ME) 96A (MD) 96B (ME) BH1-04D (ME) BH2-04D (ME) BH5-03S (ME) BH3-03D (ME)	BH6-03D (ME) 96A (ME) 96B (ME) BH1-04D (ME) BH2-04D (ME) BH5-03S (ME) BH2-04S (ME) BH9-03S (ME) BH3-03D (ME) 95A (ME)
EPA Interim Guideline Value	BH5-03S (ME)	No exceedances
Overall trends in concentrations over time (2005-2010) for monitoring locations which show exceedances of referenced concentrations	BH2-04S Variable Trend BH2-04D Downward Trend BH3-03S Variable Trend BH4-03D Downward (since April 2009) Trend BH5-03S Variable Trend BH9-03S Downward (since April 2009) Trend 95A Variable Trend 96A Downward Trend 96B Upward Trend	

## 4. CONCLUSIONS

### 4.1 Mine site

#### 4.1.1 Groundwater levels

The water levels measured at the mine site show that 7 of the 10 monitorable boreholes appear to have a stable trend from 2007 to 2010; while 2 monitoring boreholes show a highly variable trend and the final 1 showing a stable trend since November 2008.

#### 4.1.2 Groundwater sampling

The analytical results of groundwater sampling in April 2010 show exceedances of the **upper guideline values** for **Alkalinity** at **MW2-P1** by a significant amount and **MW1-P1** to a moderate extent, **Dissolved Calcium** at **MW1-P1** by a moderate extent and **pH** at **MW6-P1** by a moderate extent. All parameter mentioned above exhibit in general an upward trend.

The analytical results of groundwater sampling in October 2010 show exceedances of the **upper guideline values** for **Alkalinity** at **MW5-P1** by a significant extent and **Dissolved Calcium** at **MW1-P1** by a moderate extent, both of which exhibit a general upward trend.

These exceedances are considered to be as a result of naturally occurring fluctuations within the hydrogeological system. Mining and karstification in places are likely to have increased the permeability of the shallow hydrogeological units, which has then increased susceptibility to hydrochemical fluctuation similar to an extent to the chemical variations in surface waters. No mitigation is considered necessary for these naturally occurring parameters. In general the monitored parameters show stable or downward trends with the exception of Alkalinity and Dissolved Calcium, which exceed the upper guideline values.

## 4.2 Processing site

### 4.2.1 Groundwater levels

The water levels measured at the processing site show that 9 of the 12 monitoring locations to have a stable trend from 2005 to 2010; 3 monitoring locations show a rising trend.

### 4.2.2 Groundwater sampling

The analytical results of groundwater sampling in April 2010 show exceedances of the **upper guideline values** for **Chloride** at **BH5-03S** by a significant extent and **pH** at **BH9-03S** and **95A** by a significant extent, all of which exhibit downward, downward and variable trends respectively.

The analytical results of groundwater sampling in October 2010 show exceedances of the **upper guideline values** for **Chloride (BH5-03S)** and **COD (BH1-04D and BH3-03S)** which exhibit a downward, upward and upward trend respectively.

These exceedances are considered to be as a result of naturally occurring fluctuations with some anthropogenic influences. Potential anthropogenic sources are agricultural fertilisers or wastewater treatment systems external to the site. The successful closure of the historical landfill at the processing site was in accordance to the EPA guidance and EU Directive (Ref. 9 & 10). This closure is detailed in the Closure, Restoration and Aftercare Management Plan (CRAMP) reporting, which was submitted by GIL to the EPA in September 2009 (Ref. 11). Some parameters may remain elevated in the vicinity of the landfill but are closely monitored by CRAMP. The mitigation of these elevated parameters is considered to be addressed in part by the EPA approved sulphate reduction plan and CRAMP landfill closure plan currently underway at the processing site. In general the monitored parameters show stable or downward trends with the exception of COD, which exceeds the upper guideline value, and Dissolved Manganese, which exceeds the lower guideline value only.

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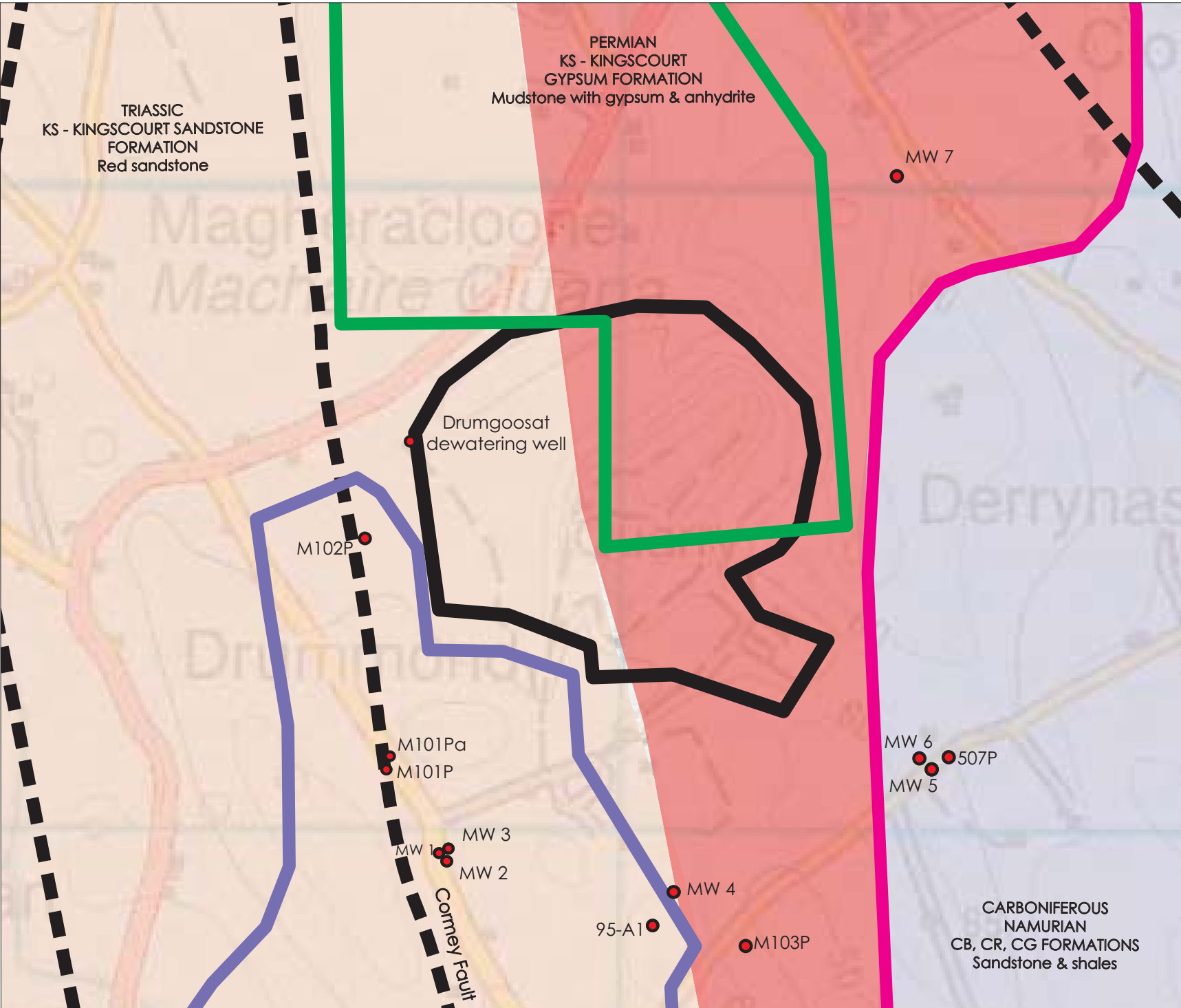
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# Appendix A



Appendix A  
Bedrock geology &  
groundwater monitoring  
points

Irish Gypsum Limited  
Kingscourt, County Cavan

Drawing Ref.: 1632-008 (GEOLOGY).cdr  
STATUS - UPDATED - JG 14/10/09

- Common legend
-  Drumgoosat Mine (decommissioned)
  -  Drummond Underground Mine (in production)
  -  Approximate extent of Knocknacran open pit (in production)
  -  Mapped geological faults
  -  Groundwater monitoring point
  -  Kingscourt Outlier



NOTES  
- Basemap courtesy of Ordnance Survey of Ireland

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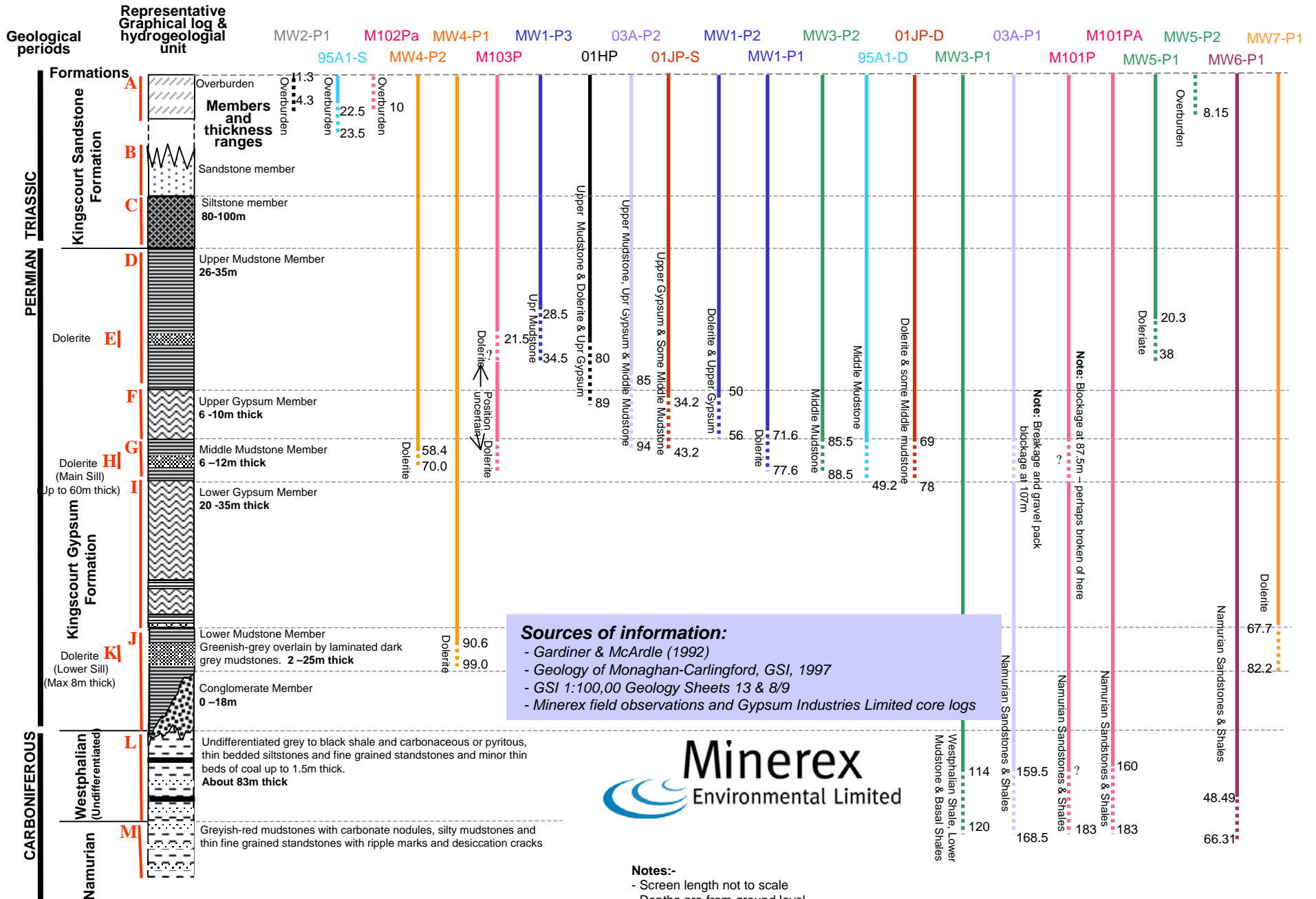
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## Appendix B

# Geological positions of groundwater monitoring points at mine site



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Annual Groundwater Monitoring Report - 2010



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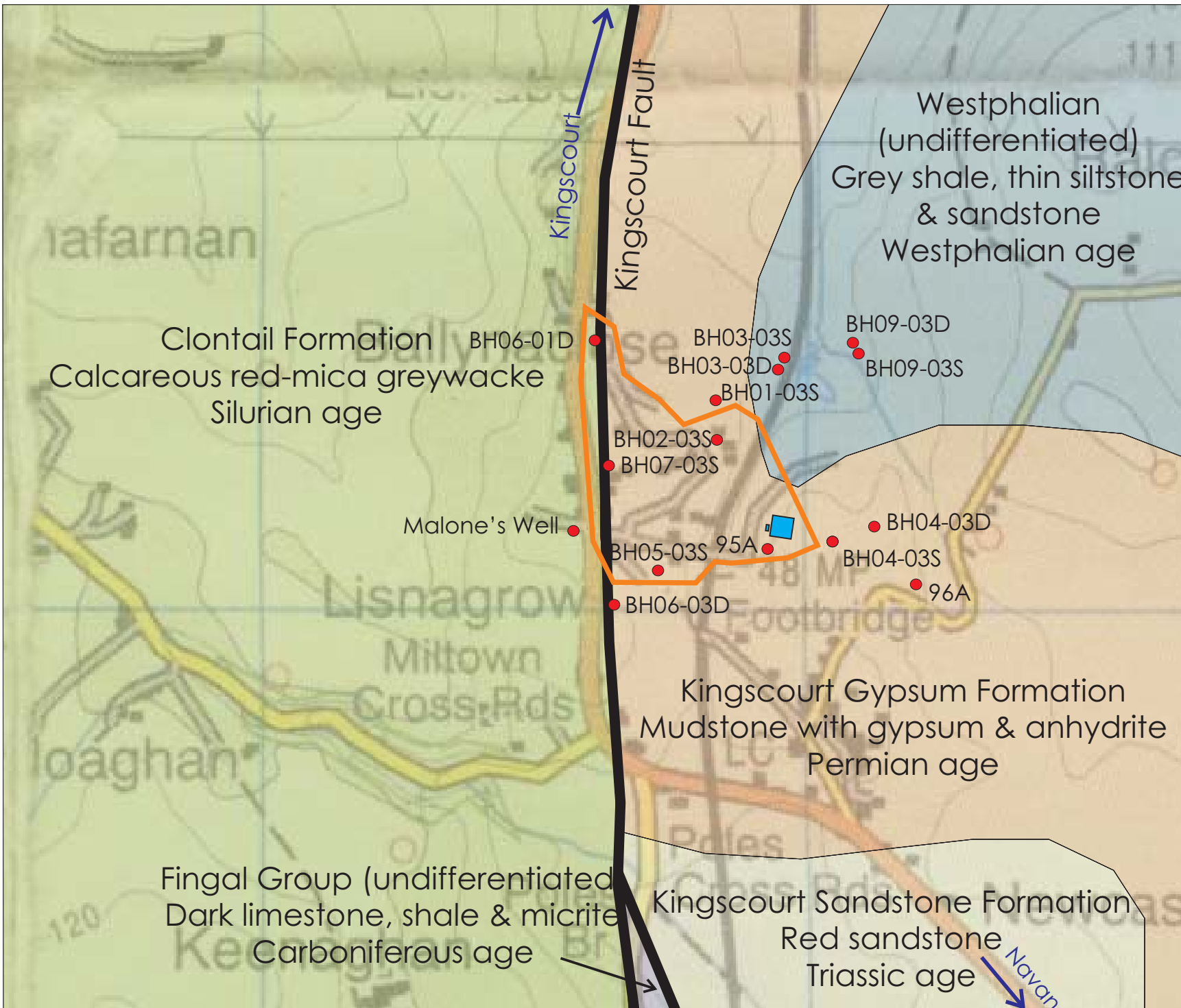
## Appendix C

Common legend

-  Mapped geological faults
-  Groundwater monitoring point
-  Wastewater treatment plant
-  Site Extent



NOTES  
- Basemap courtesy of Ordnance  
Survey of Ireland



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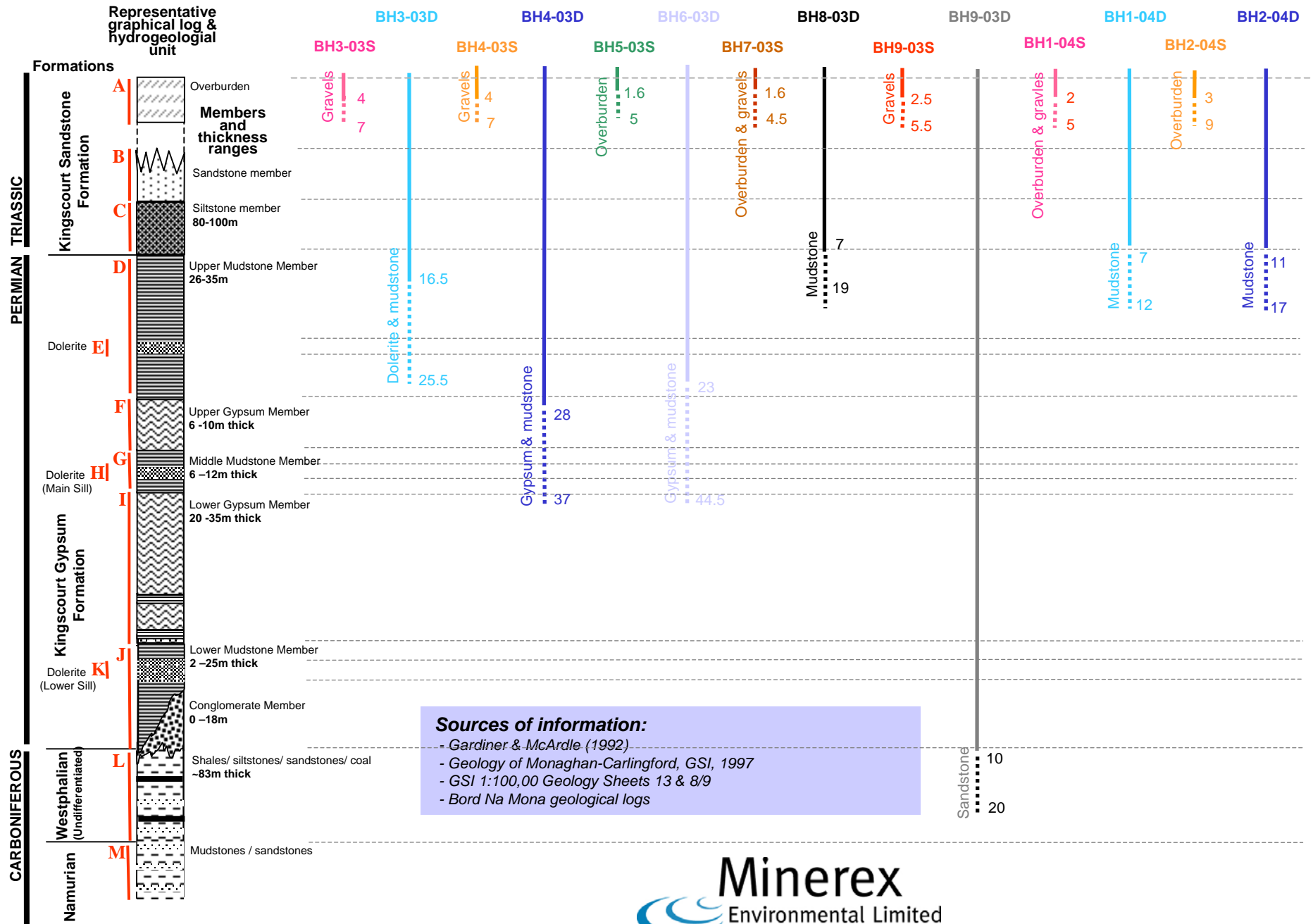
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## Appendix D

# Geological positions of groundwater monitoring points at processing site



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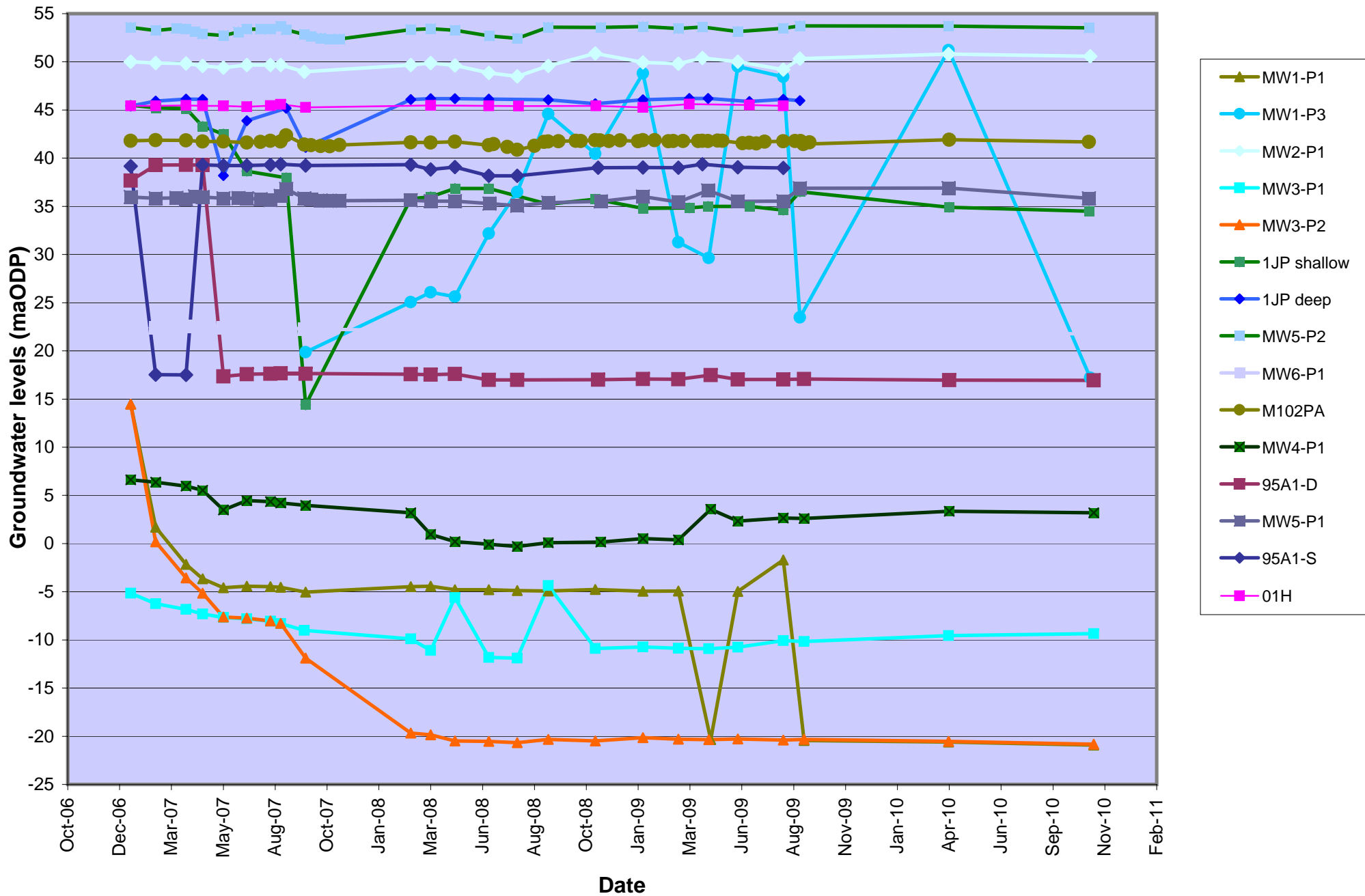
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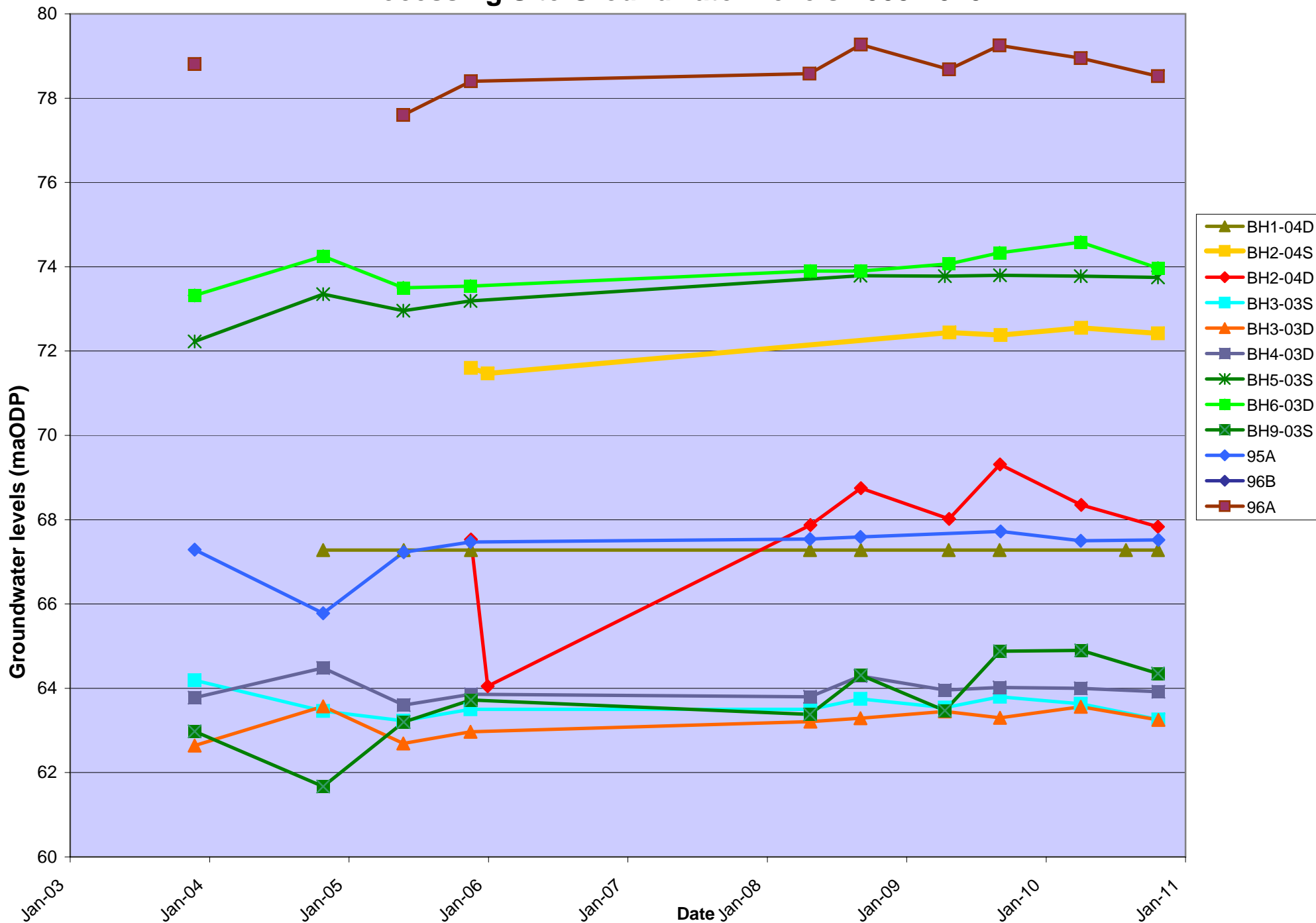
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## Appendix E

### Mine Site Groundwater levels 2007 to 2010



### Processing Site Groundwater Levels 2005-2010



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# Appendix F

Mine Site - Grounwater Hydrochemistry - 2010				EPA Interim Guideline Values (IGV) 2000	Dolerite in Mudstone					Mustone									
Parameter	Units	Reported parameter	Month/ year		MW4-P1-D	Lower	MW1-P1	Middle	MW5-P1	Middle	Lower guideline value	Upper guideline value	95A1-D	Middle	MW3-P2	Middle	MW1-P3	Upper	Lower guideline value
Alkalinity - total	mg/l	CaCO3	Apr-10	No Abnormal change	130		1910	150		188	1000		320	130	22			304	1190
Ammonia	mg/l	N	Apr-10	0.15	<0.2	<0.2	<0.2						1.03	<0.2	<0.2				
Calcium - dissolved	mg/l		Apr-10	200	111	591	69.8	301	574	315	529	11.6	405	1081					
Chloride	mg/l	Cl	Apr-10	30	22.5	17.3	19.7	21	54	24.3	37.4	11.8	50	378					
Electrical conductivity	uS/cm		Apr-10	1000	880	2013	414	1716	3478	2729	1922	2522	2451	5483					
Magnesium - dissolved	mg/l	Mg	Apr-10	50	23.6	47.3	19.7	35	85	0.636	58.4	1.01	45	167					
Nitrate	mg/l	N	Apr-10	25	0.3	1.01	0.3			3.11	0.3	0.3							
pH			Apr-10	>6.5 <9.5	8.62	8.37	8.01	8.5	13.3	10.1	7.89	7.85	9.2	13.8					
Potassium	mg/l	K	Apr-10	5	5.47	6.04	3.18	12	116	38	8.71	3.47	12	55					
Sodium	mg/l	Na	Apr-10	150	66	24.9	14.4	83	625	55.8	63.6	10	122	693					
Sulphate	mg/l	SO4	Apr-10	200	397	1560	152	962	3459	763	1540	24.2	1224	4288					
Alkalinity - total	mg/l	CaCO3	Oct-10	No Abnormal change	115	130	11200	188	1000									304	1190
Ammonia	mg/l	N	Oct-10	0.15	<0.2	0.257	<0.2												
Calcium - dissolved	mg/l	Ca	Oct-10	200	465	681	60.7	301	574				405	1081					
Chloride	mg/l	Cl	Oct-10	30	18.5	31.4	22.3	21	54				50	378					
Electrical conductivity	uS/cm		Oct-10	1000	1758	1981	483	1716	3478				2451	5483					
Magnesium - dissolved	mg/l	Mg	Oct-10	50	55.6	48.5	15.4	35	85				45	167					
Nitrate	mg/l	N	Oct-10	25	2.08	0.3	0.3					0.3							
pH	pH units		Oct-10	>6.5 <9.5	7.45	7.41	7.92	8.5	13.3			9.23	9.2	13.8					
Potassium	mg/l	K	Oct-10	5	6.14	4.89	<2.34	12	116				12	55					
Sodium	mg/l	Na	Oct-10	150	53.2	24.4	12.3	83	625				122	693					

higher than lower guideline value  
higher than upper guideline value

Mine Site - Grounwater Hydrochemistry - 2010					Overburden					Upper Gypsum			Namurian/ Westphalian			
Parameter	Units	Reported parameter	Month/ year	EPA Interim Guideline Values (IGV) 2000	M102PA	MW2-P1	MW5-P2	Lower guideline value	Upper guideline value	01JP-S	Lower guideline value	Upper guideline value	MW6-P1	MW3-P1	Lower guideline value	Upper guideline value
Alkalinity - total	mg/l	CaCO3	Apr-10	No Abnormal change	240	1430	185	214	466	170	666	3000	225	105	168	538
Ammonia	mg/l	N	Apr-10	0.15	<0.2	<0.2	<0.2			0.831			<0.2	<0.2		
Calcium - dissolved	mg/l		Apr-10	200	150	210	56.3	212	529	350	673	1252	61	527	351	864
Chloride	mg/l	Cl	Apr-10	30	16.1	33.3	13.5	22	53	14.1	25	70	15.6	17.9	26	164
Electrical conductivity	uS/cm		Apr-10	1000	1205	987	362	1299	2231	2013	3748	11638	409	2044	1562	3186
Magnesium - dissolved	mg/l	Mg	Apr-10	50	77	35.5	16	50	100	<0.036	52	148	20	62.9	57	284
Nitrate	mg/l	N	Apr-10	25	0.3	0.3	2.06			0.3			0.3	0.3		
pH			Apr-10	>6.5 <9.5	7.58	7.04	7.84	7	12.8	12.91	9	13.8	8.08	7.83	7	8
Potassium	mg/l	K	Apr-10	5	7.93	3.1	2.61	4.3	9	19.2	32	162	3.95	7.45	9	69
Sodium	mg/l	Na	Apr-10	150	64.5	21.5	19.1	50	96	44.3	122	296	23.7	50	57	168
Sulphate	mg/l	SO4	Apr-10	200	546	276	21.7	504	1775	880	1164	3197	117	1580	1018	2533
Alkalinity - total	mg/l	CaCO3	Oct-10	No Abnormal change	240	152	195	214	466	174	666	3000	151	110	168	538
Ammonia	mg/l	N	Oct-10	0.15	<0.2	0.237	<0.2			0.923			<0.2	0.407		
Calcium - dissolved	mg/l	Ca	Oct-10	200	151	145	55.5	212	529	541	673	1252	45.9	564	351	864
Chloride	mg/l	Cl	Oct-10	30	15.3	24.7	12.4	22	53	17.7	25	70	24.2	17.6	26	164
Electrical conductivity	uS/cm		Oct-10	1000	1280	966	418	1299	2231	1932	3748	11638	408	1978	1562	3186
Magnesium - dissolved	mg/l	Mg	Oct-10	50	76.1	21.1	16.1	50	100	0.374	52	148	14	67.3	57	284
Nitrate	mg/l	N	Oct-10	25	0.3	7.03	1.65			0.3			0.3	0.3		
pH	pH units		Oct-10	>6.5 <9.5	7.44	6.53	7.76	7	12.8	11.97	9	13.8	8.83	7.45	7	8
Potassium	mg/l	K	Oct-10	5	6.13	<2.34	2.57	4.3	9	21.4	32	162	2.76	8.98	9	69
Sodium	mg/l	Na	Oct-10	150	60.6	16	18.4	50	96	59.5	122	296	42.8	61.6	57	168

higher than lower guideline value  
higher than upper guideline value

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## Appendix G

Processing Site - Grounwater Hydrochemistry - 2010				EPA Interim Guideline Values (IGV) 2000	Overburden				Gravels				Dolerite			
Parameter	Units	Reported parameter	Month sampled		BH5-03S	BH2-04S	Lower guideline value	Upper guideline value	BH3-03S	BH9-03S	Lower guideline value	Upper guideline value	BH3-03D	95A	Lower guideline value	Upper guideline value
pH	pH units		Apr-10	>6.5 <9.5	10.75	7.04	7.5	11.7	6.73	8.01	7.2	7.9	7.96	9.31	7.3	8.8
Electrical conductivity	us/cm		Apr-10	1000	2980	556	1907	3000	1176	466	1165	2310	365	2761	1407	2971
Calcium - dissolved	mg/l	Ca	Apr-10	200	167	71.8	337	599	161	73.5	214	447	56.7	516	295	775
Barium - dissolved	ug/l	Ba	Apr-10	100	45	119	108	314	49.1	117	126	196	25.2	4.16	58	245
Manganese - dissolved	ug/l	Mg	Apr-10	50	0.584	0.198	120	406.3	9290	52.3	3911	10110	190	246	386	6950
COD	mg/l		Apr-10		14.1	33.8	39	156	50.6	<7	39	197	7.03	<7	61	476
Sulphate	mg/l	SO4	Apr-10	200	395	40.4	1026	1586	301	80.5	596	2515	25.2	1960	1447	7002
Ammonia	mg/l	N	Apr-10	0.15	<0.2	<0.2	0.08	0.221	2.98	<0.2	1.9	5.5	<0.2	0.54	0.39	4.4
Chloride	mg/l	Cl	Apr-10	30	291	16.8	23	78.1	11.3	15.1	14.5	28.2	14	12.7	13	17
pH	pH units		Oct-10	>6.5 <9.5	8.78	7.53	7.5	11.7	6.75	7.78	7.2	7.9	7.74	7.5	7.3	8.8
Electrical conductivity	us/cm		Oct-10	1000	1020	559	1907	3000	935	416	1165	2310	314	2135	1407	2971
Calcium - dissolved	mg/l	Ca	Oct-10	200	151	108	337	599	188	67.2	214	447	48.2	388	295	775
Barium - dissolved	ug/l	Ba	Oct-10	100	42.9	154	108	314	79.1	111	126	196	30.8	3.76	58	245
Manganese - dissolved	ug/l	Mg	Oct-10	50	0.656	18	120	406.3	9130	60.8	3911	10110	160	430	386	6950
COD	mg/l		Oct-10		15.2	132	39	156	874	11.2	39	197	<7	<7	61	476
Sulphate	mg/l	SO4	Oct-10	200	434	90	1026	1586	382	81.6	596	2515	14.9	1640	1447	7002
Ammonia	mg/l	N	Oct-10	0.15	<0.2	<0.2	0.08	0.221	3.27	<0.2	1.9	5.5	<0.2	0.465	0.39	4.4
Chloride	mg/l	Cl	Oct-10	30	86	12.8	23	78.1	13.3	14.6	14.5	28.2	12	10.4	13	17

Higher than lower guideline value  
Higher than upper guideline value

Processing Site - Grounwater Hydrochemistry - 2010				EPA Interim Guideline Values (IGV) 2000	Gypsum & Mudstone						Mudstone			
Parameter	Units	Reported parameter	Month sampled		BH4-03D	BH6-03D	96A	96B	Lower guideline value	Upper guideline value	BH1-04D	BH2-04D	Lower guideline value	Upper guideline value
pH	pH units		Apr-10	>6.5 <9.5	7.41	7.82	9.6	7.52	7.4	11.1	7.68	7.49	7.1	7.7
Electrical conductivity	us/cm		Apr-10	1000	1675	2008	1999	1030	1740	3809	1977	1293	1506	2737
Calcium - dissolved	mg/l	Ca	Apr-10	200	563	303	534	140	416	745	503	210	292	554
Barium - dissolved	ug/l	Ba	Apr-10	100	13.1	21.7	4.85	28.8	40	174	10	64.5	153	572
Manganese - dissolved	ug/l	Mg	Apr-10	50	481	115	26.4	75.8	559.3	1679	102	<0.04	360	1611
COD	mg/l		Apr-10		<7	9.17	<7	<7	49	408	<7	10.7	21	61
Sulphate	mg/l	SO4	Apr-10	200	1730	501	1230	245	1040	2891	1140	377	841	2455
Ammonia	mg/l	N	Apr-10	0.15	0.291	<0.2	<0.2	<0.2	0.19	2.25	<0.2	<0.2	0.12	0.3
Chloride	mg/l	Cl	Apr-10	30	17.1	13.3	17.5	18	18.5	56	16.4	21.1	24	61
pH	pH units		Oct-10	>6.5 <9.5	7.17	7.63	9.03	7.63	7.4	11.1	7.32	7.11	7.1	7.7
Electrical conductivity	us/cm		Oct-10	1000	2203	1613	1578	889	1740	3809	1626	1139	1506	2737
Calcium - dissolved	mg/l	Ca	Oct-10	200	509	481	438	208	416	745	452	269	292	554
Barium - dissolved	ug/l	Ba	Oct-10	100	21.8	22.1	5.59	21.1	40	174	9.44	82.7	153	572
Manganese - dissolved	ug/l	Mg	Oct-10	50	935	199	131	53.4	559.3	1679	89	0.388	360	1611
COD	mg/l		Oct-10		<7	23.2	<7	<7	49	408	145	15.5	21	61
Sulphate	mg/l	SO4	Oct-10	200	1610	1050	1140	456	1040	2891	1080	512	841	2455
Ammonia	mg/l	N	Oct-10	0.15	0.264	<0.2	<0.2	<0.2	0.19	2.25	0.217	<0.2	0.12	0.3
Chloride	mg/l	Cl	Oct-10	30	14.8	12.8	16.1	16	18.5	56	15.7	15.4	24	61

Higher than lower guideline value  
Higher than upper guideline value

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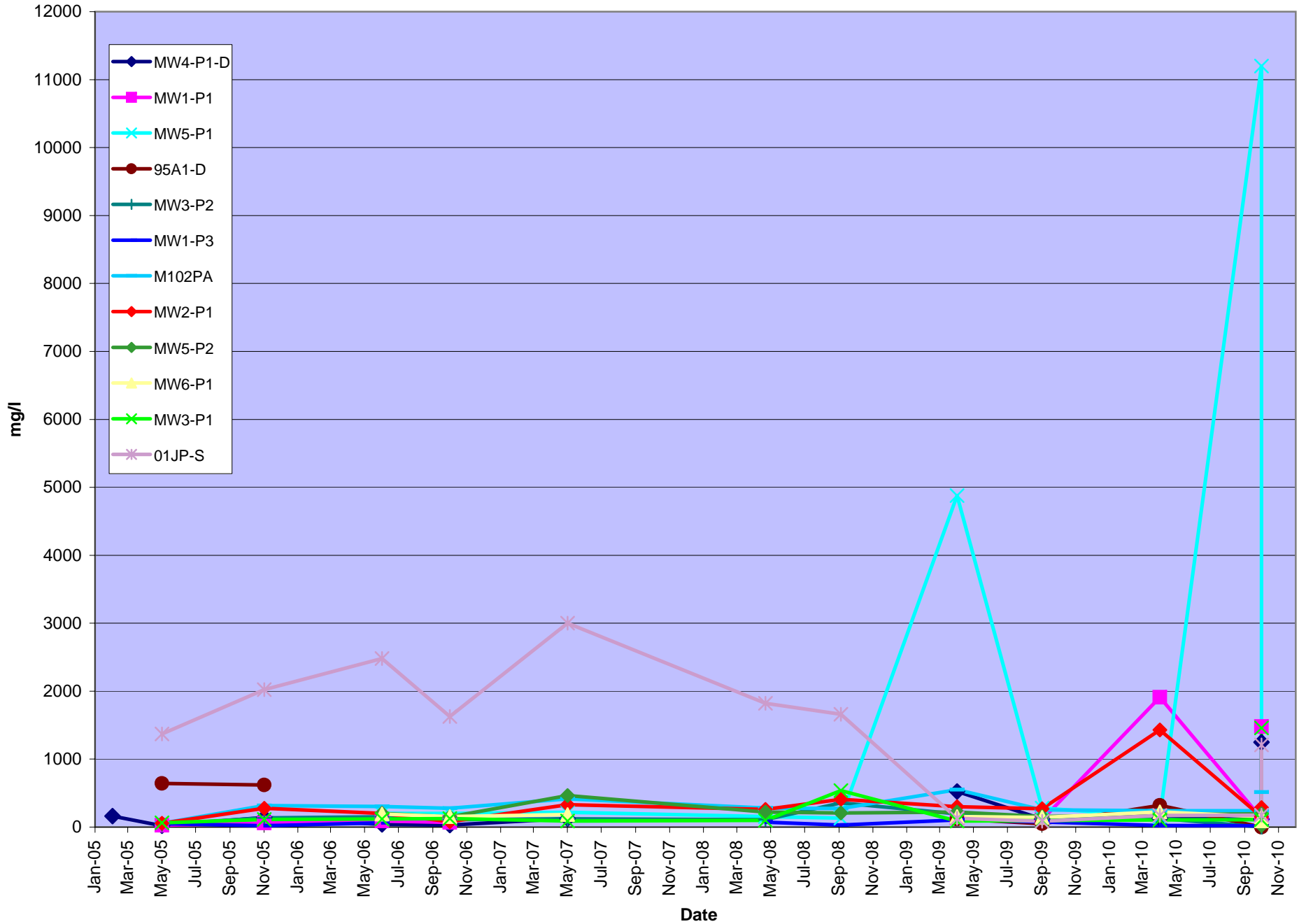
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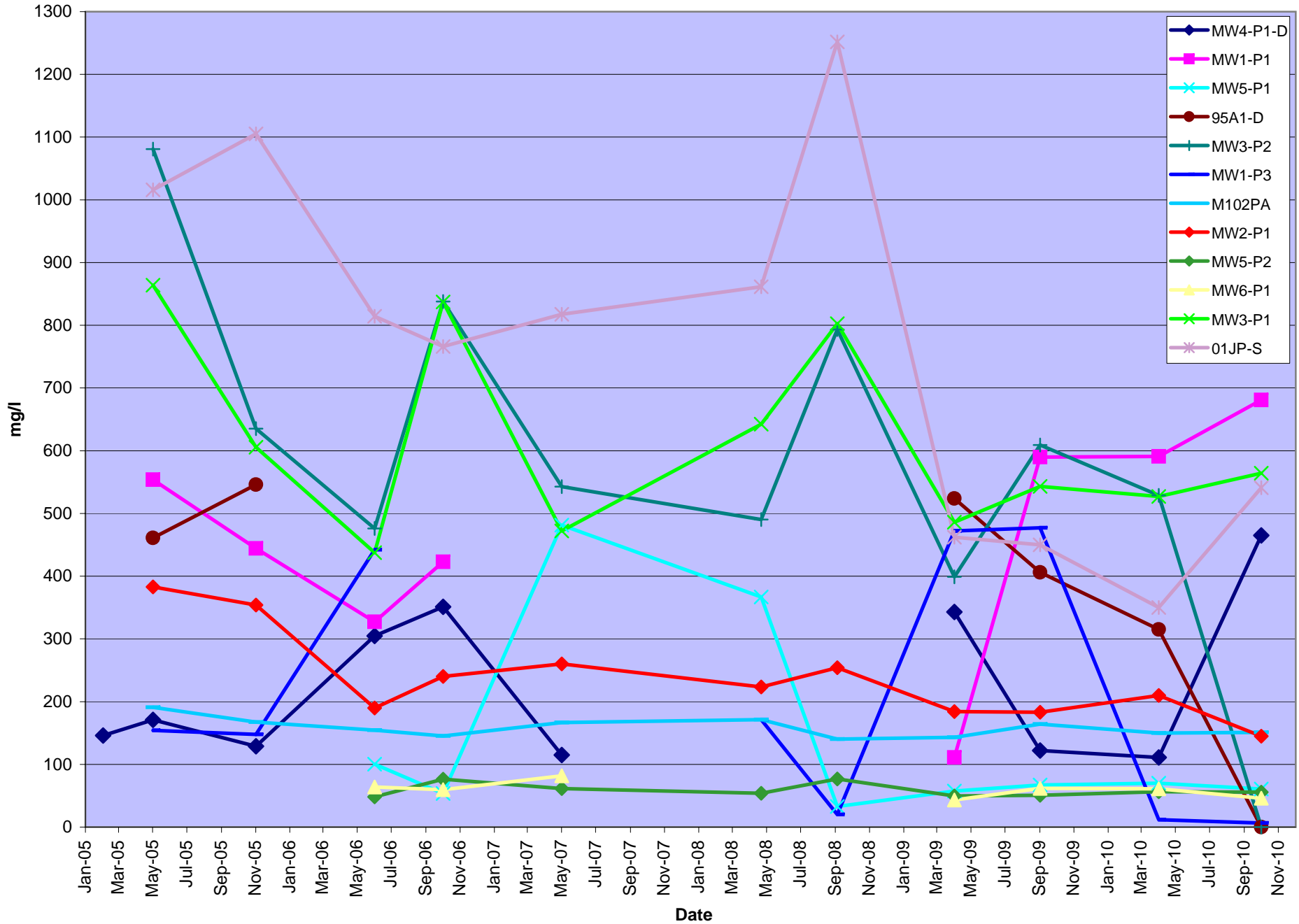
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## Appendix H

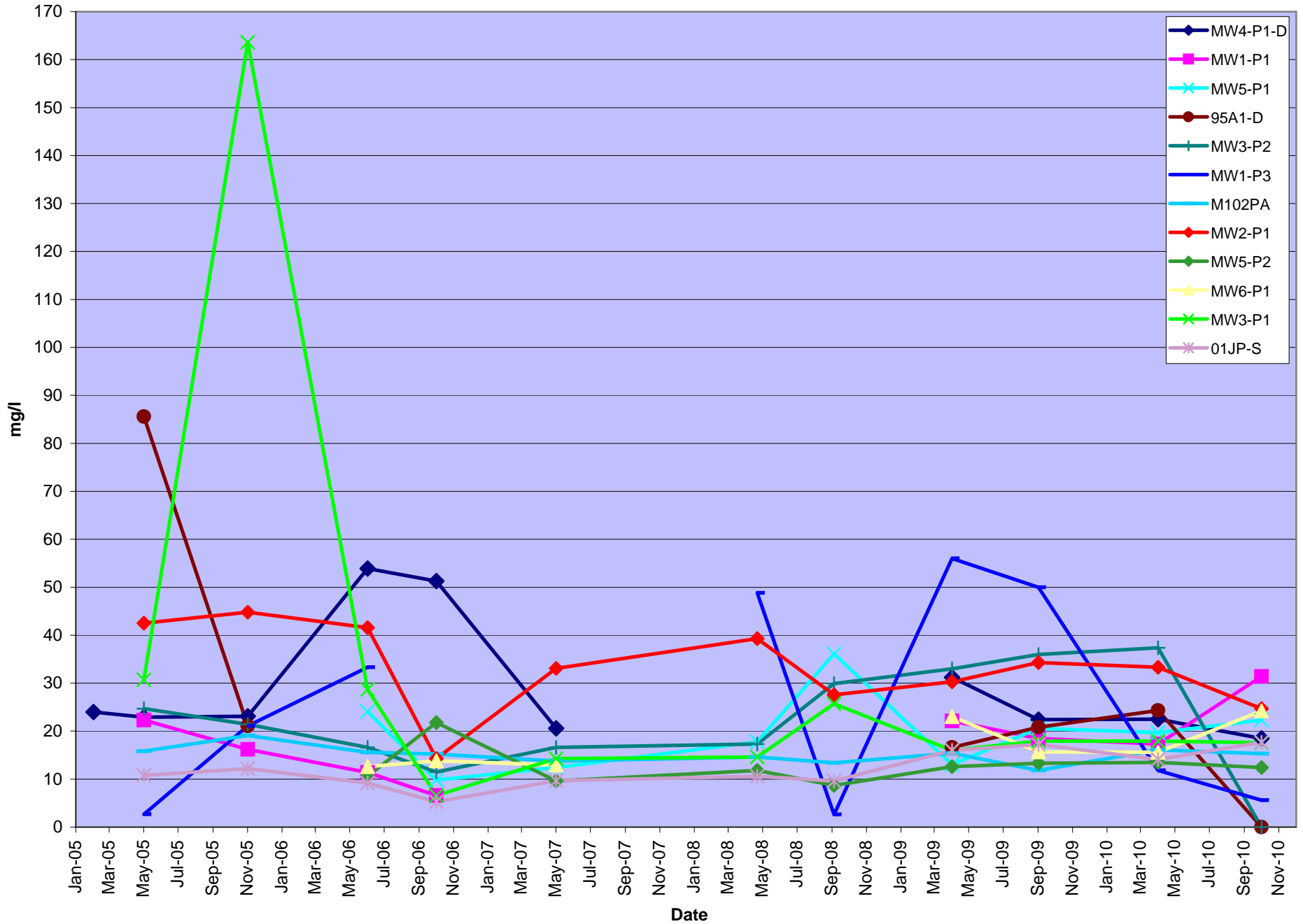
# Alkalinity - Total



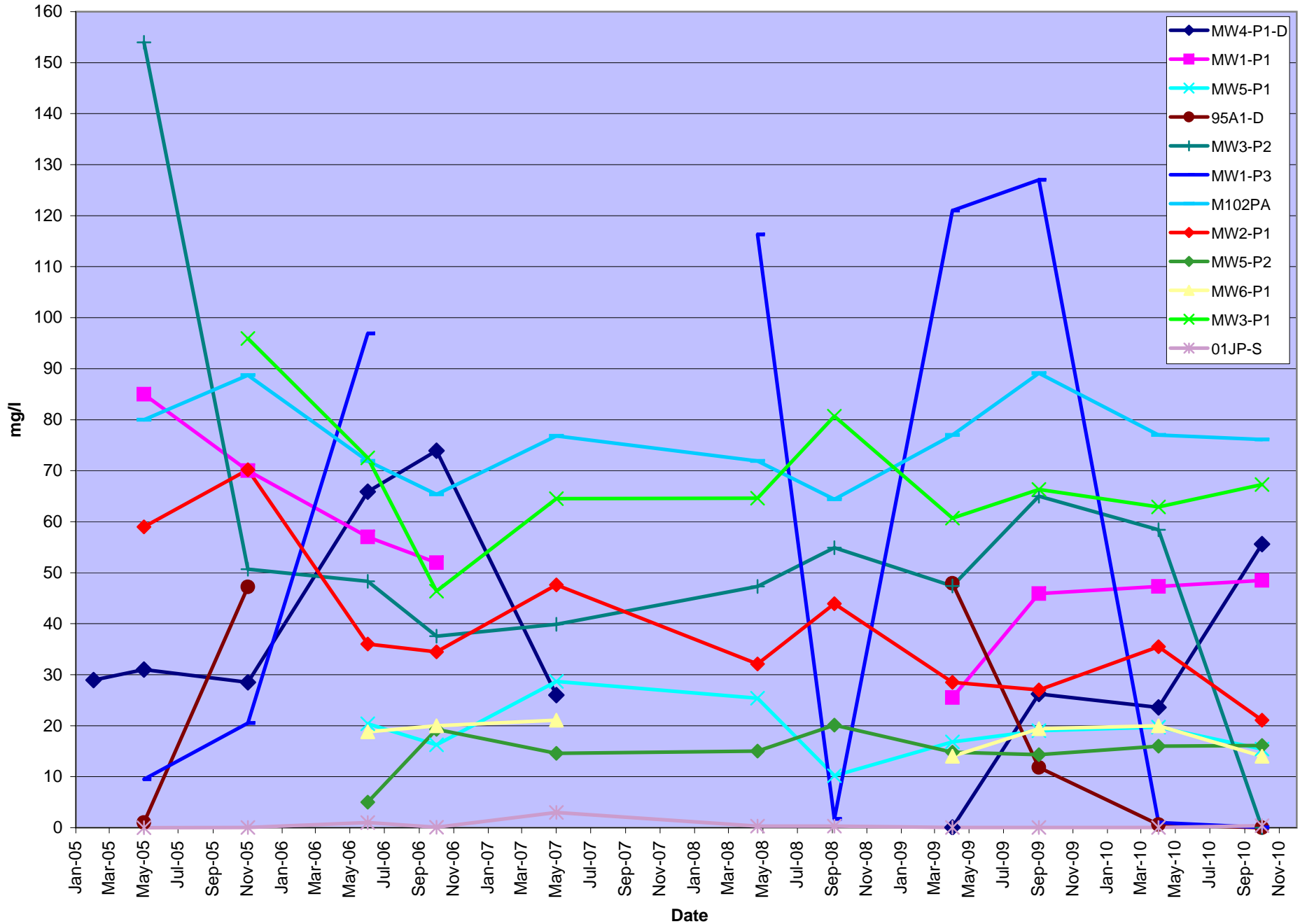
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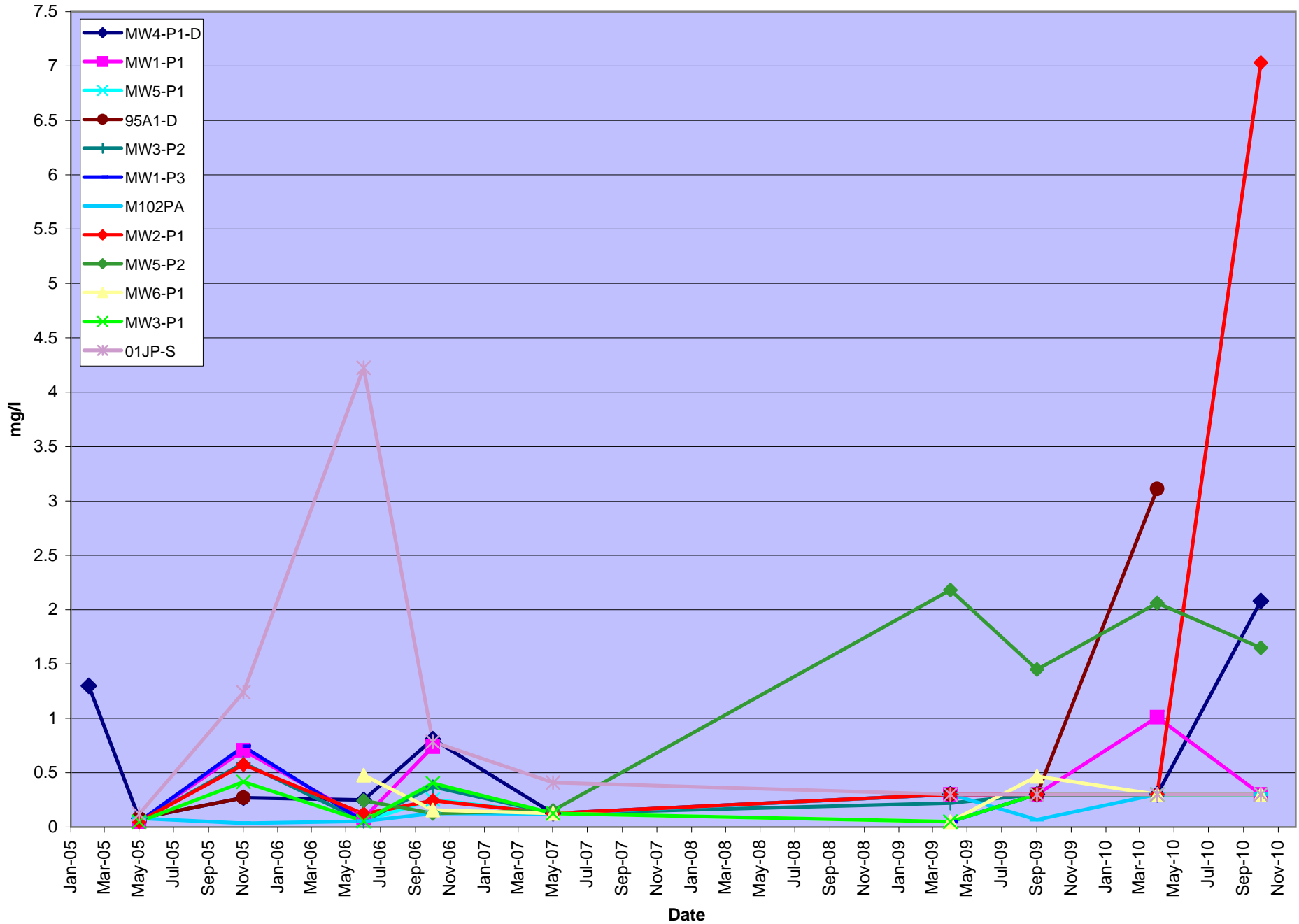
# Chloride



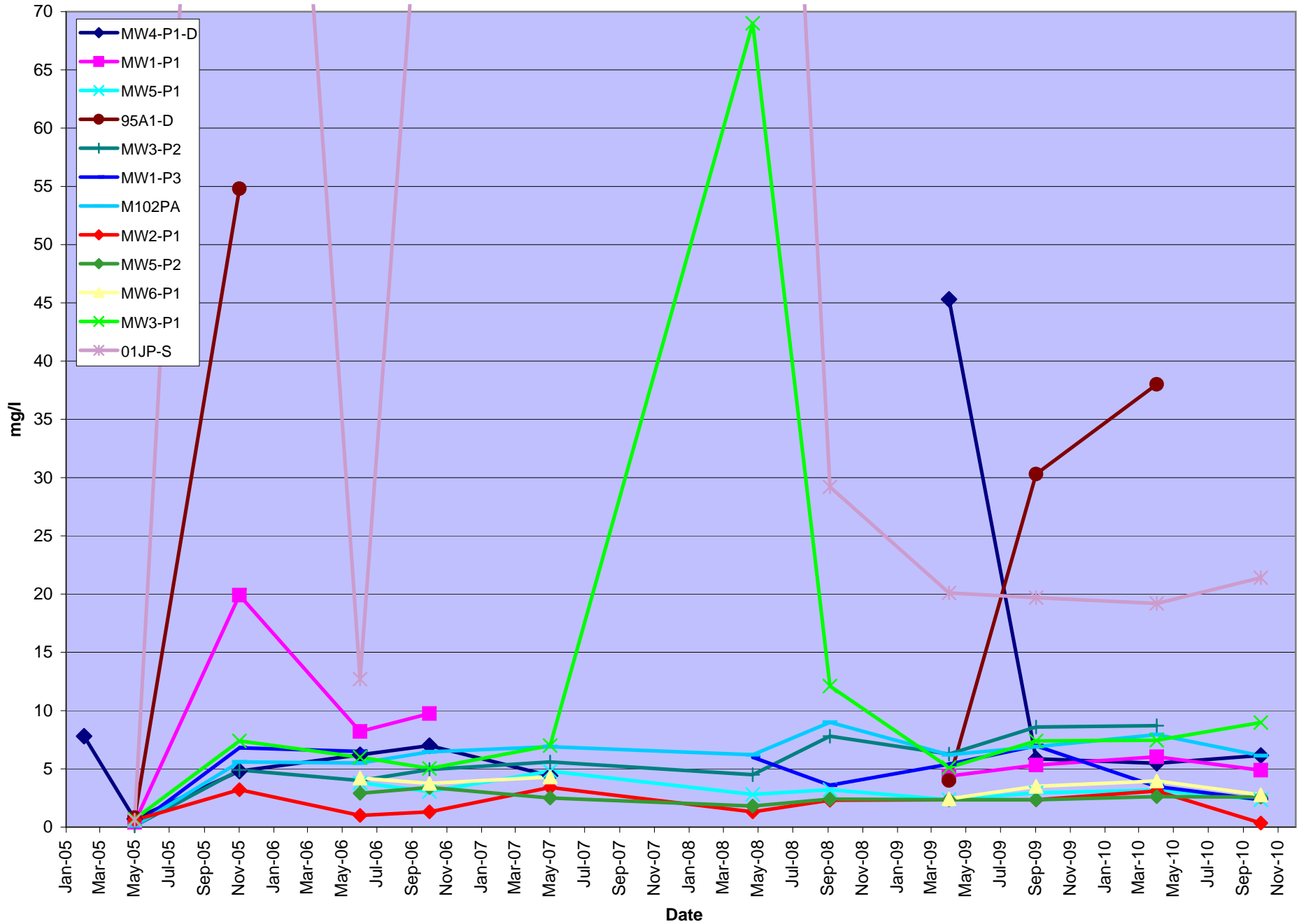
# Magnesium - Dissolved



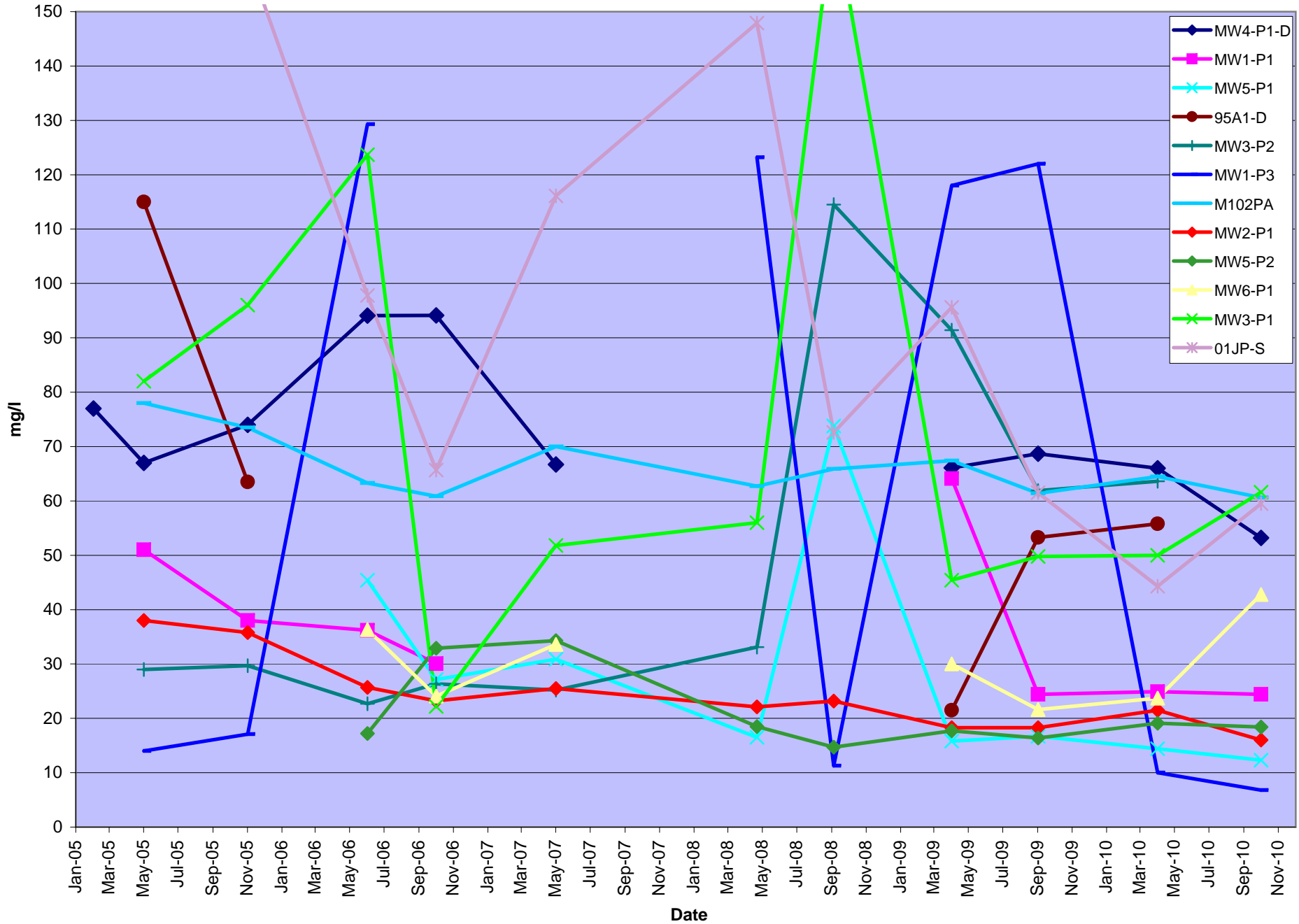
# Nitrate



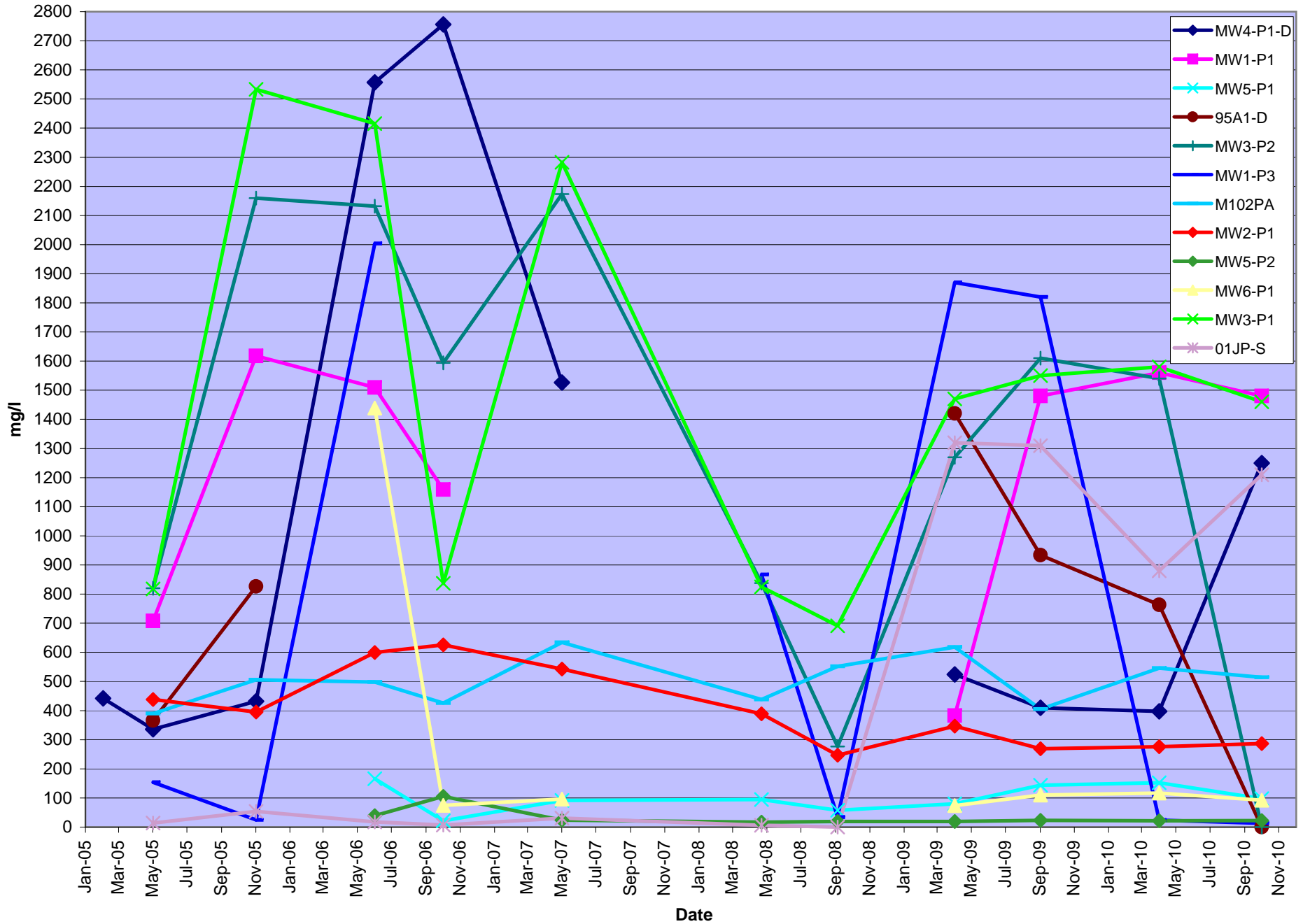
# Potassium



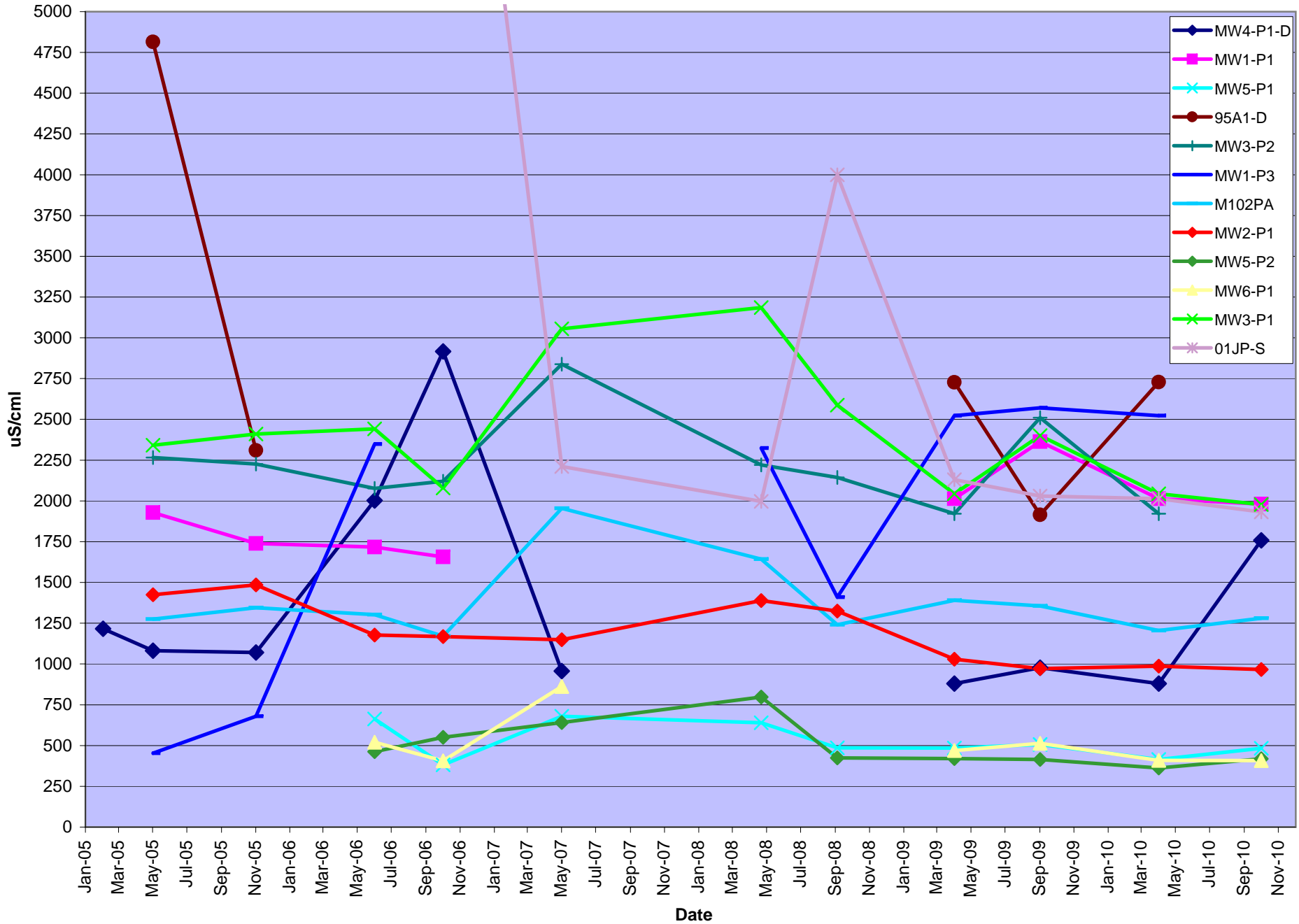
# Sodium



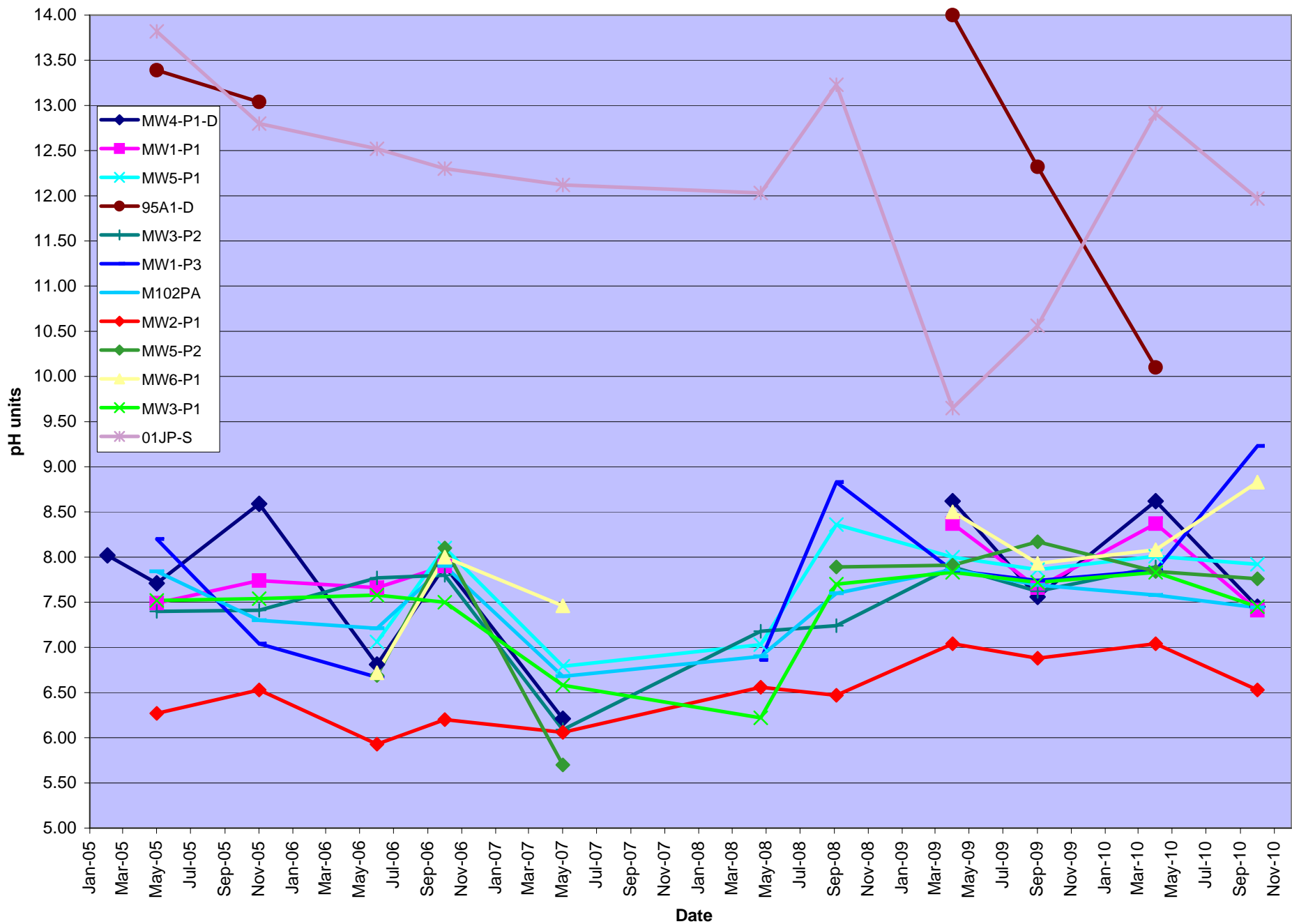
# Sulphate



# Electrical Conductivity



# pH



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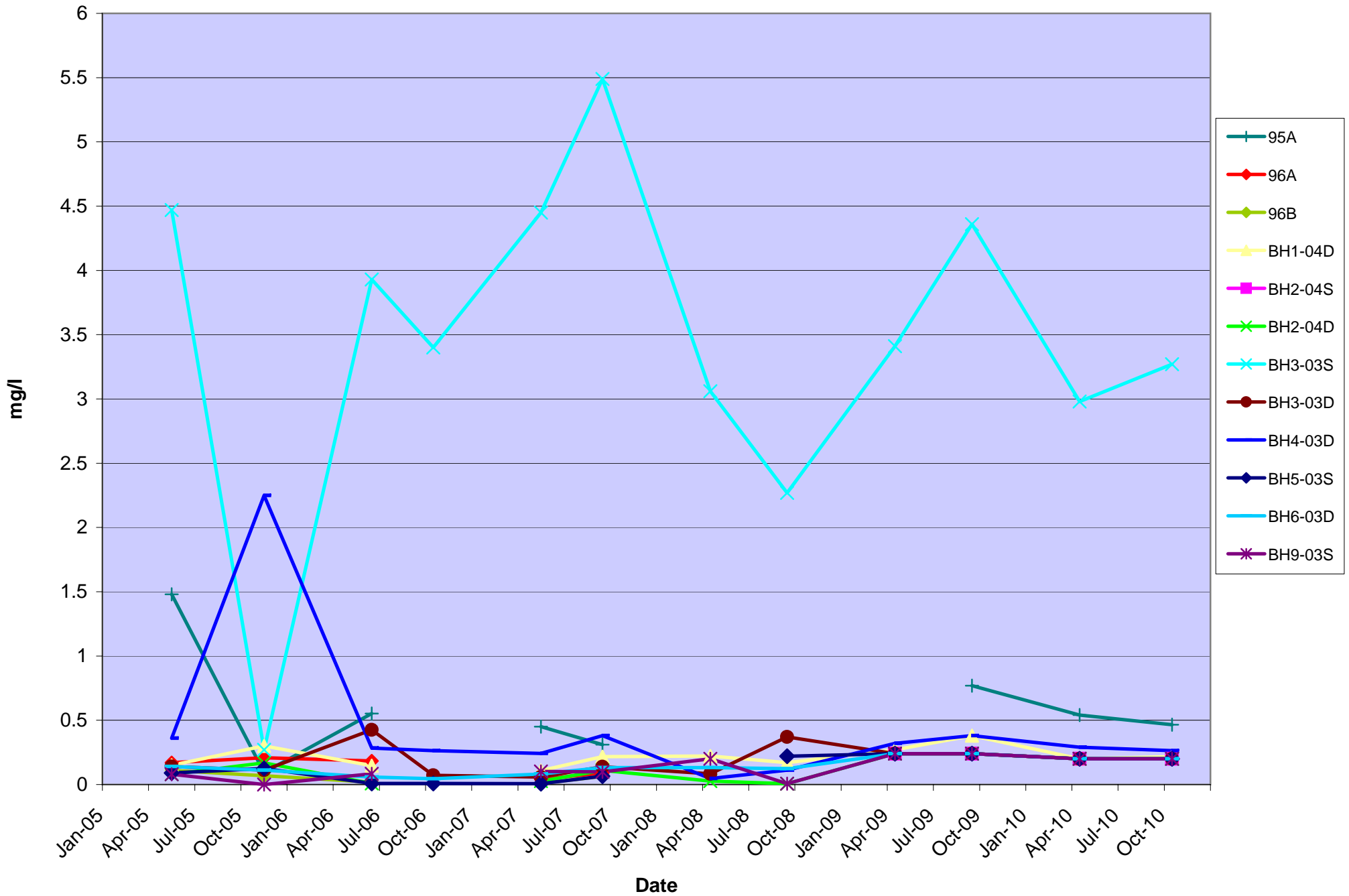
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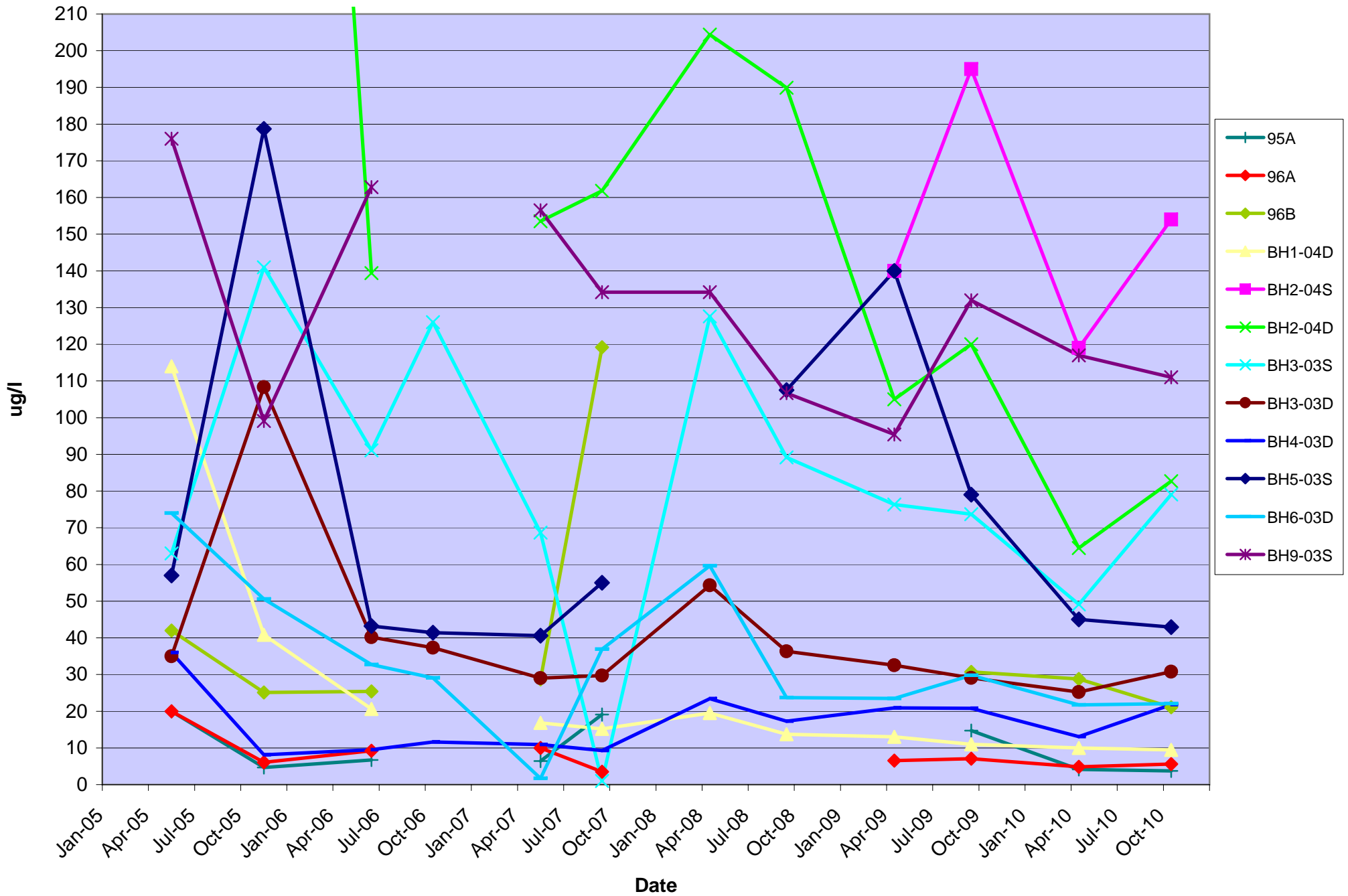
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# Appendix I

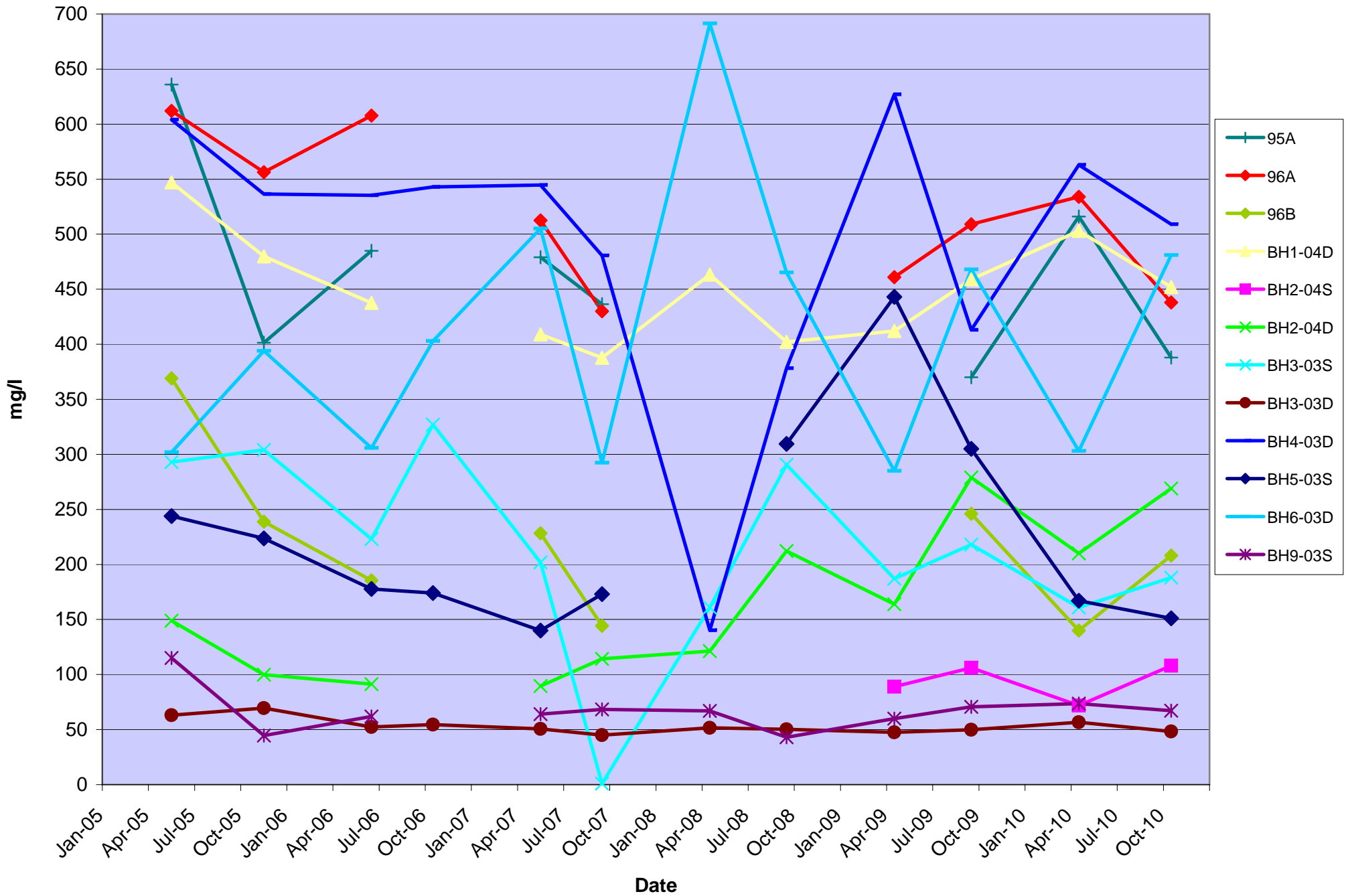
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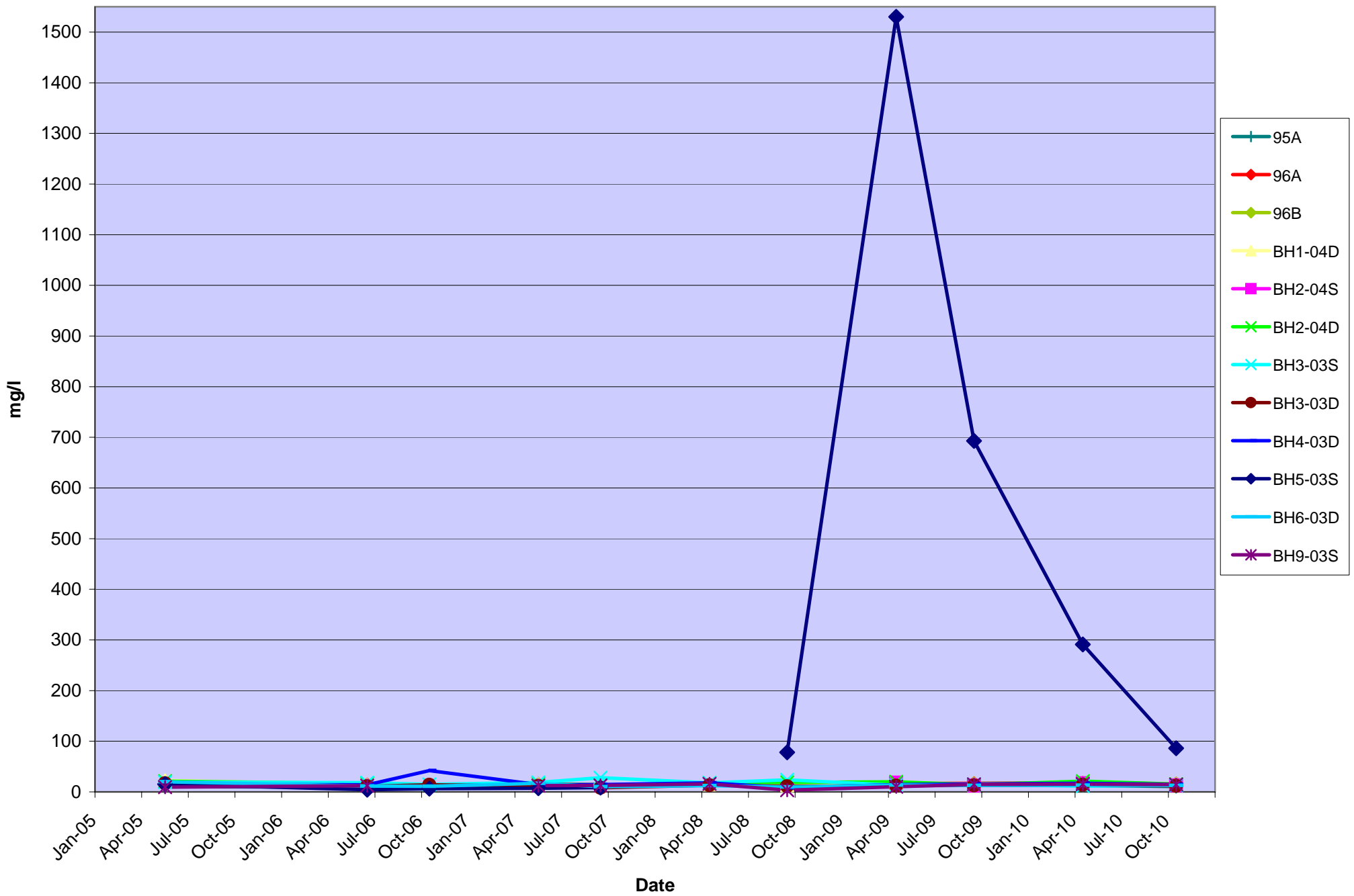
# Barium - Dissolved



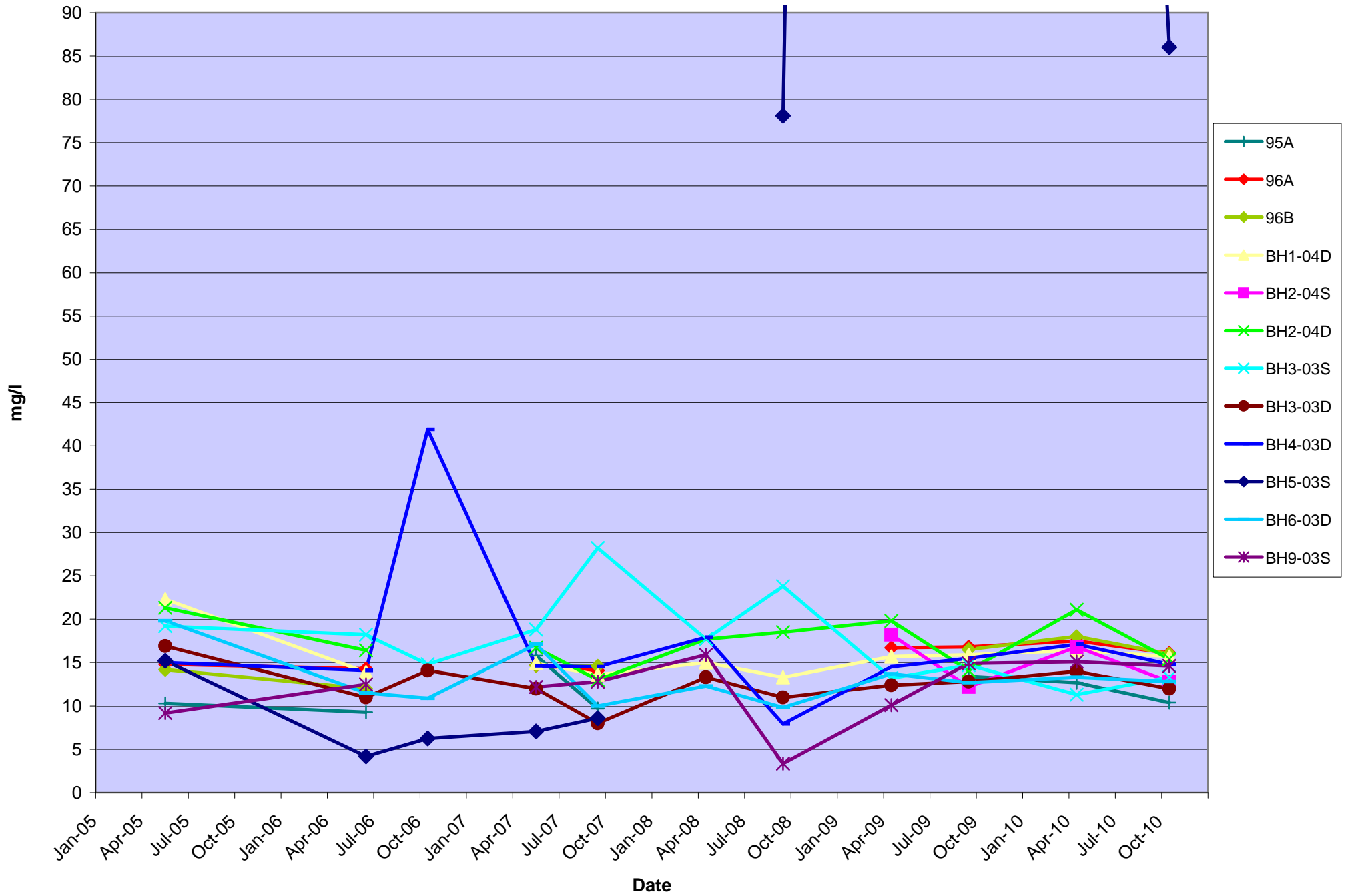
### Calcium - Dissolved



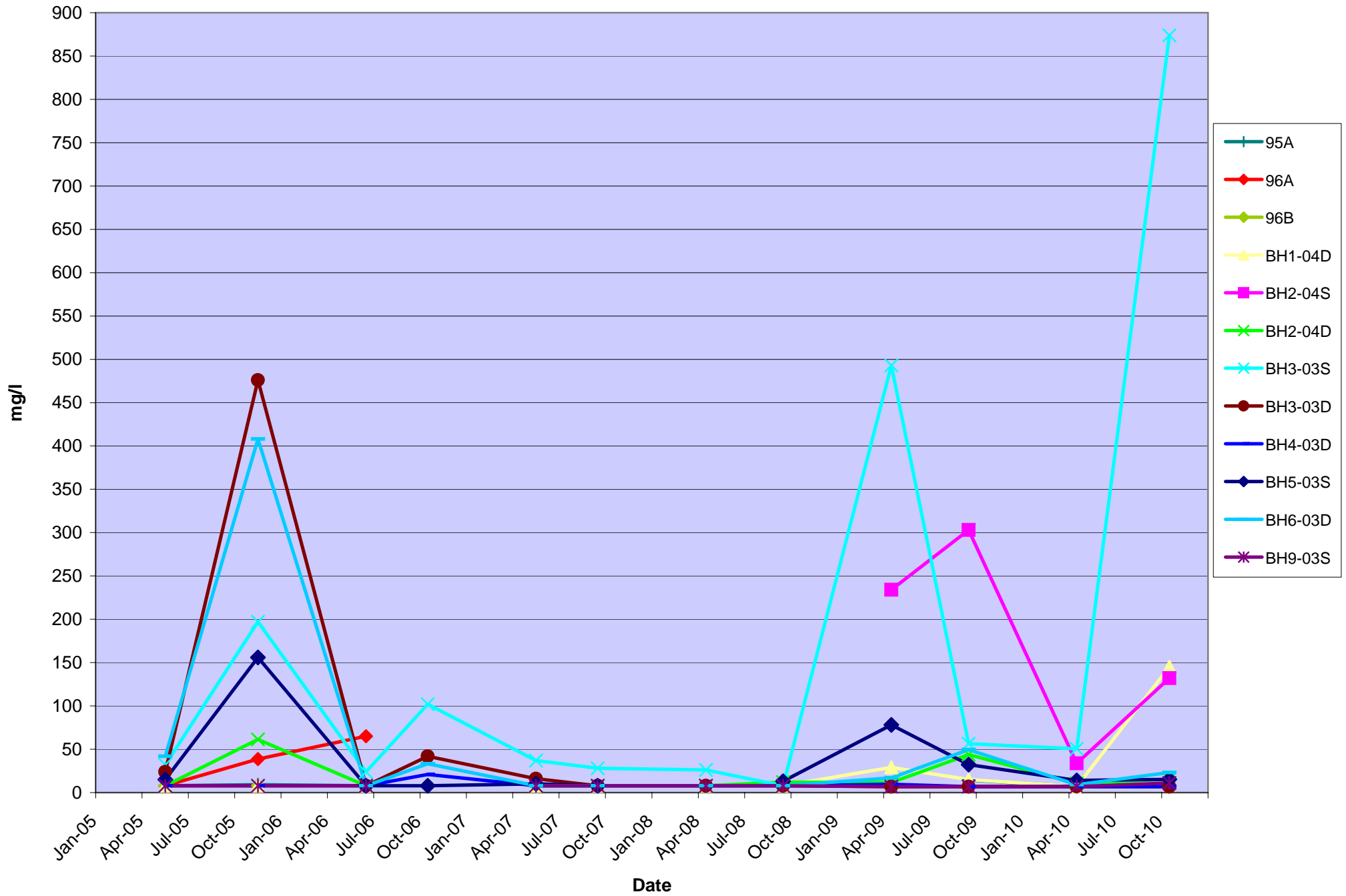
### Chloride (including elevated value from BH5-03S)



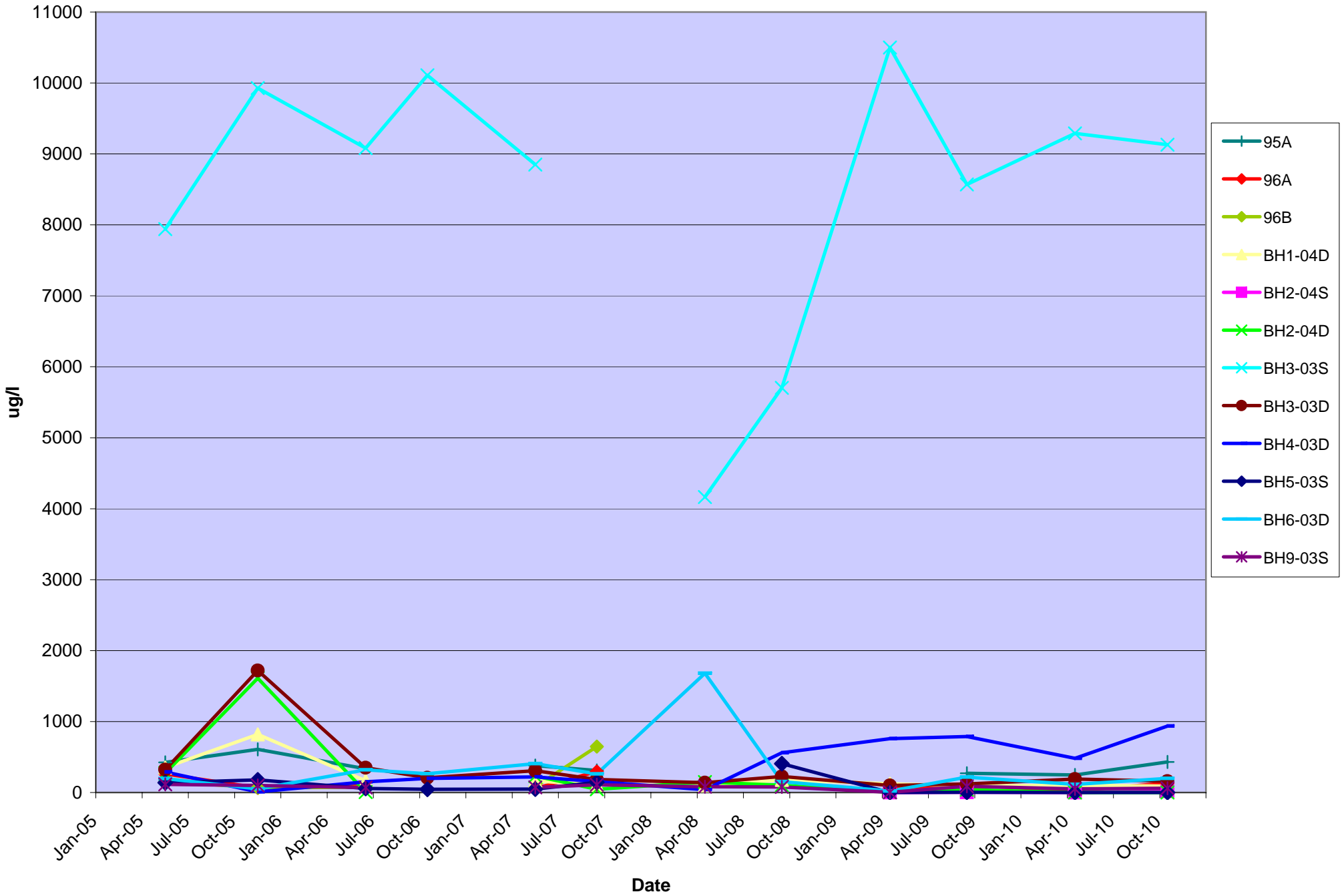
### Chloride (excluding elevated value from BH5-03S)



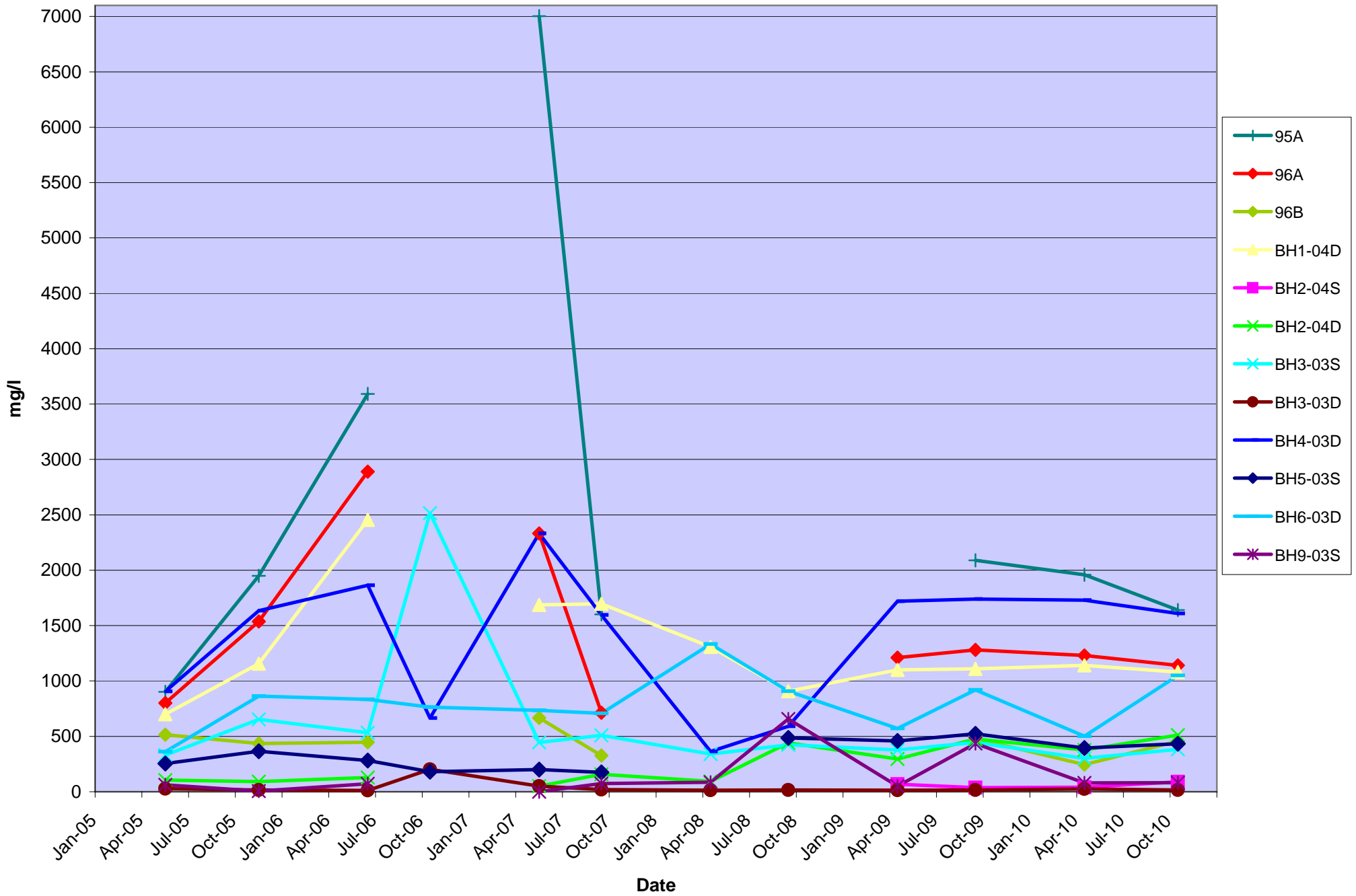
# COD



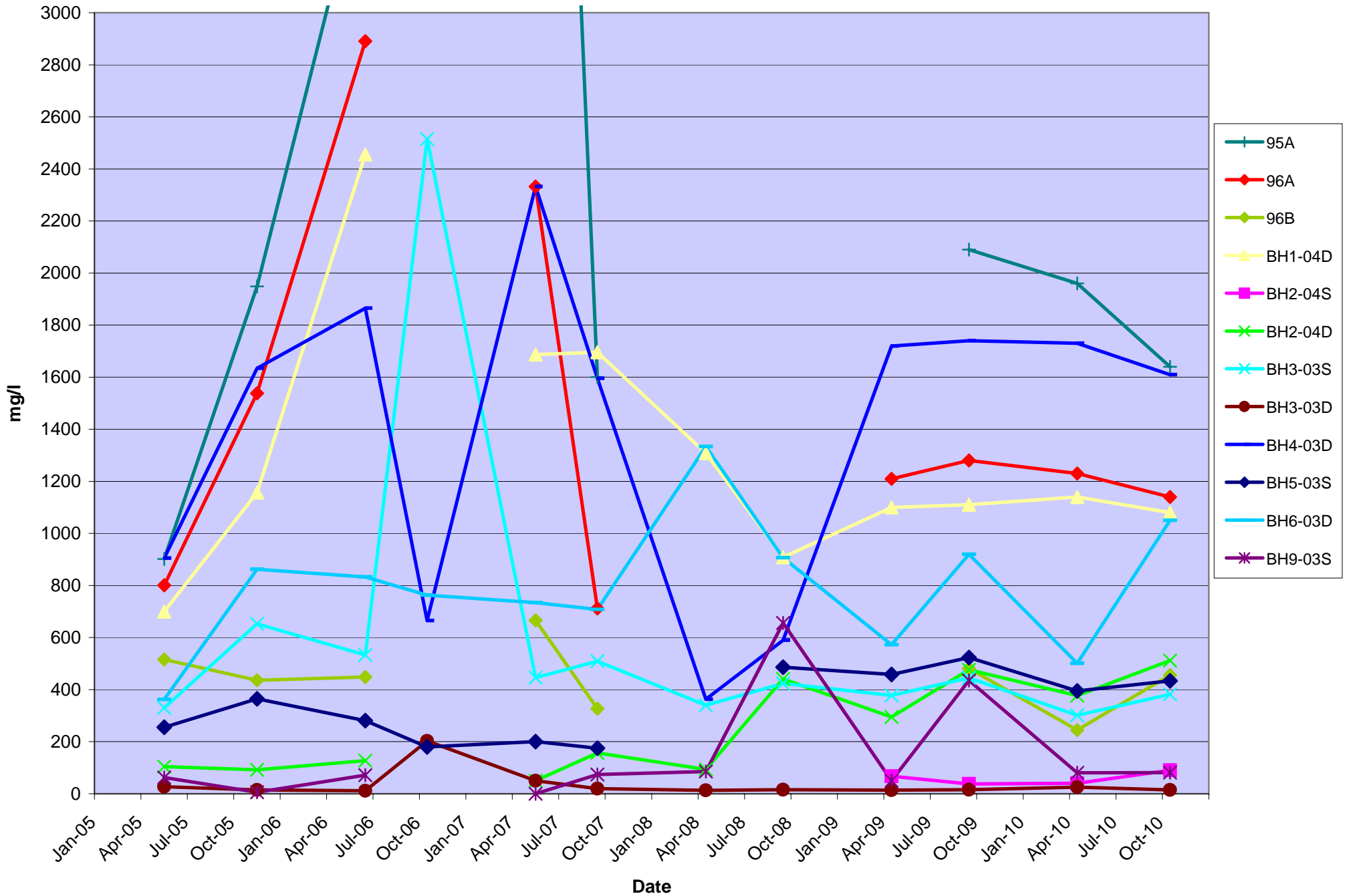
# Manganese - Dissolved



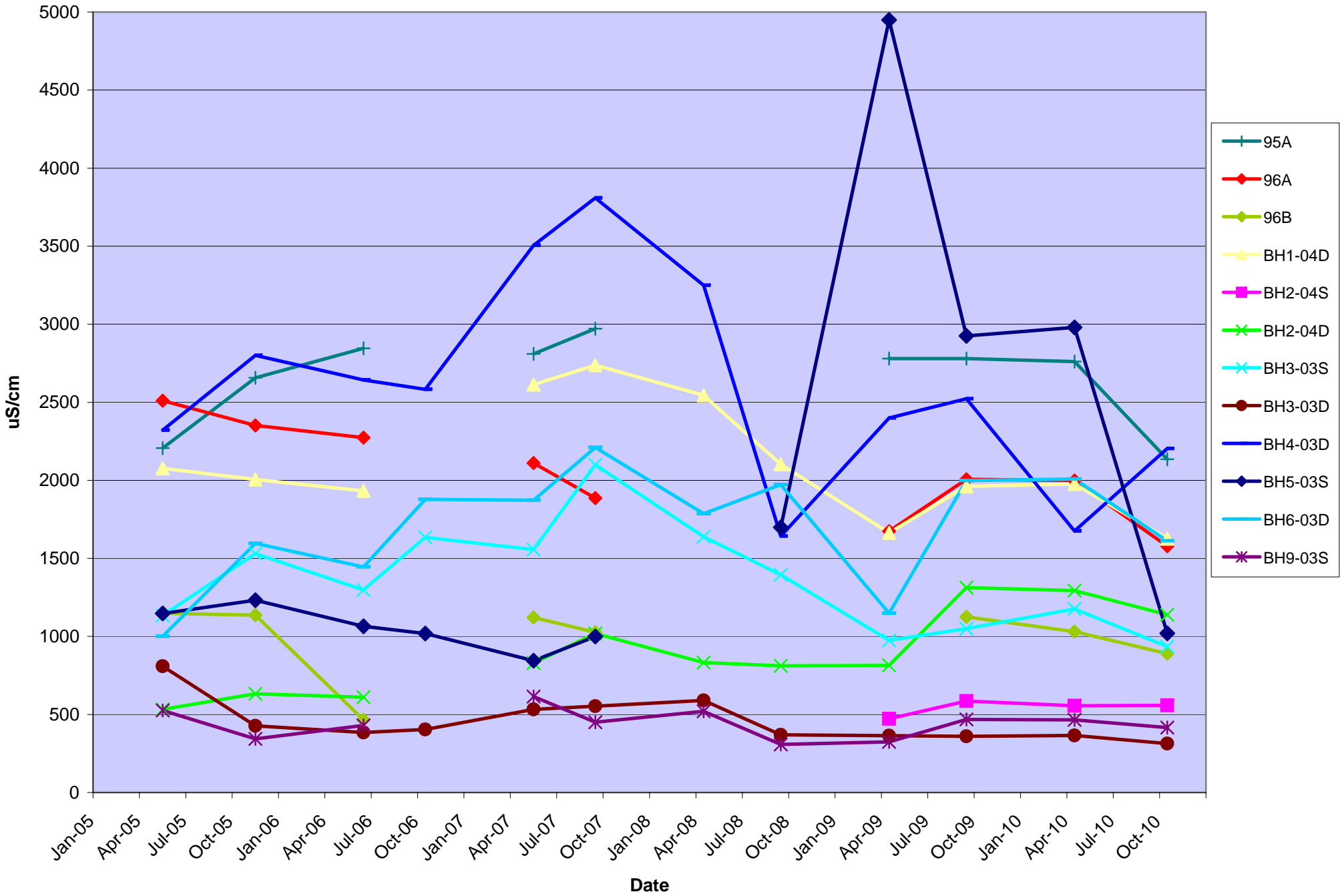
### Sulphate (including elevated value from 95A)



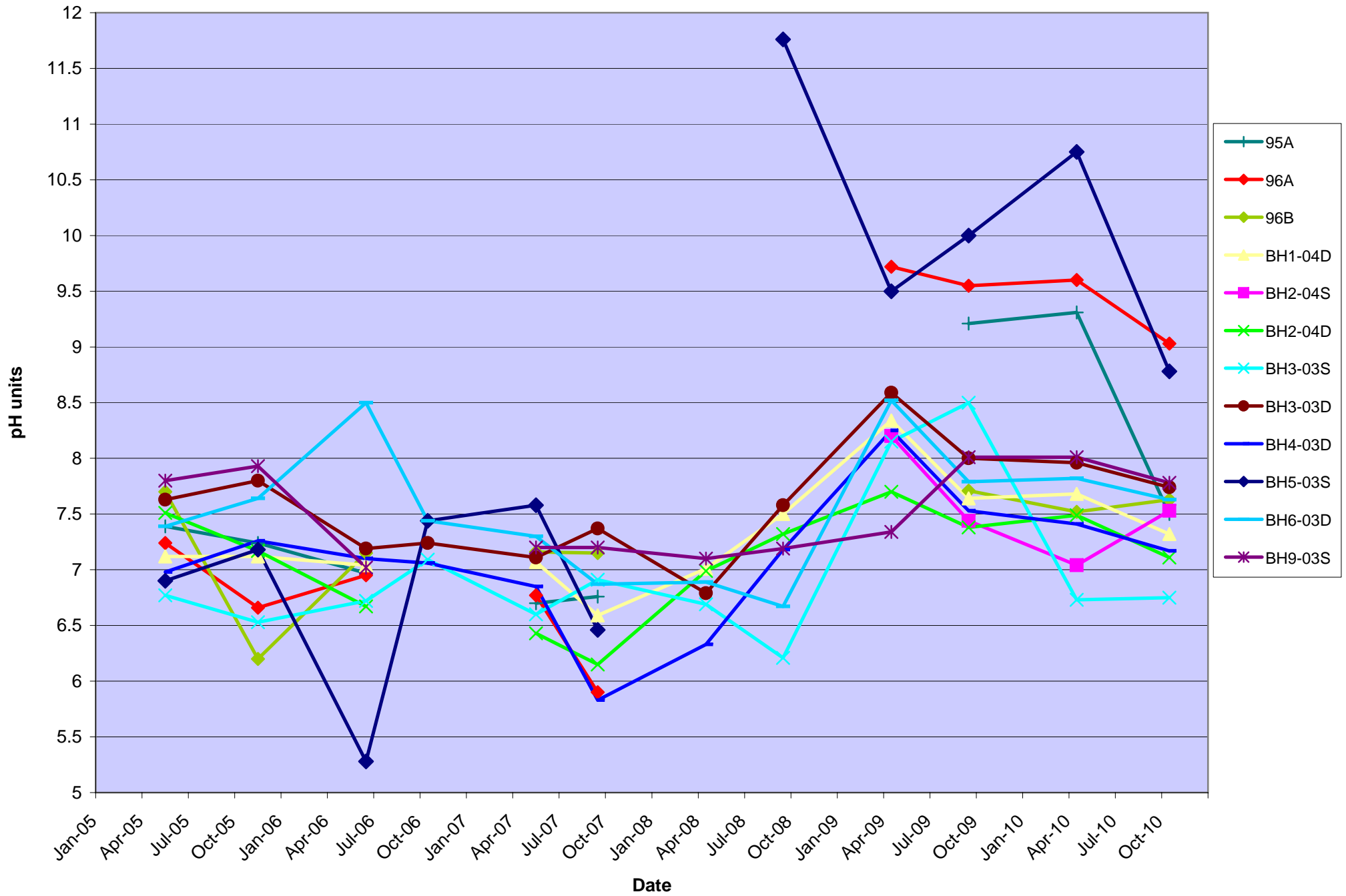
### Sulphate (excluding elevated value from 95A)



# Electrical Conductivity



# pH



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## Appendix J

Mine Site - Upper and Lower Guideline Values			Dolerite in Mid. Mudst.	Dolerite in Mid. Mudst.	Upper Mudst.	Upper Mudst.	Overburden	Overburden	Upper Gypsum	Upper Gypsum	Namurian/Westphalian	Namurian/Westphalian
Parameter	Units	Reported parameter	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value
Alkalinity - total	mg/l	CaCO3	188	1000	304	1190	214	466	666	3000	168	538
Calcium - dissolved	mg/l		301	574	405	1081	212	529	673	1252	351	864
Chloride - dissolved	mg/l	Cl	21	54	50	378	22	53	25	70	26	164
Electrical conductivity	uS/cm		1716	3478	2451	5483	1299	2231	3748	116.38	1562	3186
Magnesium - dissolved	mg/l	Mg	35	85	45	167	50	100	52	148	57	284
pH			8.5	13.3	9.2	13.8	7	12.8	9	13.8	7	8
Potassium	mg/l	K	12	116	12	55	4.3	9	32	162	9	69
Sodium	mg/l	Na	83	625	122	693	50	96	122	296	57	168

Processing Site - Upper and Lower Guideline Values			Geology	Overburden	Overburden	Sand & Gravel	Sand & Gravel	Dolerite	Dolerite	Gypsum & Mudstone	Gypsum & Mudstone	Mudstone	Mudstone	EPA Interim Guideline Value's for groundwater
Parameter	Units		Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value	Lower guideline value	Upper guideline value		
pH	pH		7.5	11.7	7.2	7.9	7.3	8.8	7.4	11.1	7.1	7.7	6.5-9.5	
Electrical conductivity	us/cm		1907	3000	1165	2310	1407	2971	1740	3809	1506	2737	1000	
Calcium - dissolved	mg/l		337	599	214	447	295	775	416	745	292	554	200	
Barium - dissolved	ug/l		108	314	126	196	58	245	40	174	153	572	100	
Manganese - dissolved	ug/l		120	406.3	3911	10110	386	6950	559.3	1679	360	1611	50	
COD	mg/l		39	156	39	197	61	476	49	408	21	61		
Sulphate	mg/l		1026	1586	596	2515	1447	7002	1040	2891	841	2455	200	
Ammonia	mg/l		0.08	0.221	1.9	5.5	0.39	4.4	0.19	2.25	0.12	0.3	0.15	
Chloride - dissolved	mg/l		23	78.1	14.5	28.2	13	17	18.5	56	24	61	30	

**REPORT TO**

Irish Gypsum Industries  
IPPC License No. PO519-02  
Annual Groundwater Monitoring Report - 2010

**REPORT BY**

Minerex Environmental Limited  
Doc Ref 1632-1224

---

# Appendix K



Minerex Environmental  
Taney hall  
Eglinton Terrace  
Dundrum  
Dublin  
Dublin 14

**Attention:** Conor Quinlan

## CERTIFICATE OF ANALYSIS

**Date:** 07 April 2010  
**Customer:** D\_MINEREX\_DUB-179  
**Sample Delivery Group (SDG):** 100326-102 **Report No.:** 79294  
**Your Reference:** 1632-028 (COC17)  
**Location:** 1632-028 (COC17)

We received 4 samples on Friday March 26, 2010 and 4 of these samples were scheduled for analysis which was completed on Wednesday April 07, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

**Iain Swinton**

Operations Director - Land UK & Ireland



<b>SDG:</b>	100326-102	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-179	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC17)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC17)	<b>Report No:</b>	79294

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Sampled Date
1298584	1632-COC17-E5 S 18		25/03/2010
1298618	1632-COC17-E8 N 24		25/03/2010
1298540	1632-COC17-LAGAN 1		25/03/2010
1298552	1632-COC17-S 16		25/03/2010

Only received samples which have had analysis scheduled will be shown on the following pages.



<b>SDG:</b>	100326-102	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-179	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC17)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC17)	<b>Report No:</b>	79294

### Test Completion dates

SDG reference: 100326-102

Lab Sample No(s)	1298540	1298552	1298584	1298618
Customer Sample Ref.	2-COC17-LAG	632-COC17-S	132-COC17-E5	S32-COC17-E8 N
Depth				
Type	LIQUID	LIQUID	LIQUID	LIQUID
Alkalinity as CaCO <sub>3</sub>	01/04/2010	01/04/2010	01/04/2010	01/04/2010
Ammonium	30/03/2010	30/03/2010	30/03/2010	30/03/2010
Anions by Kone (w)	01/04/2010	01/04/2010	01/04/2010	01/04/2010
Coliforms (W)	07/04/2010	07/04/2010	07/04/2010	07/04/2010
Dissolved Metals by ICP-MS	30/03/2010	30/03/2010	30/03/2010	30/03/2010
Faecal Streptococci (W)	07/04/2010	07/04/2010	07/04/2010	07/04/2010
Metals by iCap-OES Dissolved (W)	31/03/2010	31/03/2010	31/03/2010	31/03/2010
Total Nitrogen	30/03/2010	30/03/2010	30/03/2010	30/03/2010



## Table of Results - Appendix

SDG Number : 100326-102

Client : Minerex Environmental

Client Ref : 1632-028 (COC17)

### REPORT KEY

				Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10 <sup>-7</sup>			
NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>
SUB		Subcontracted Test	
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples	
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser	
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS	
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers	
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection	
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES	

<sup>1</sup> Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

# APPENDIX

## APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:  
NRA Leach tests, flash point, ammonium as NH<sub>4</sub> by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.  
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 – C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

**LIQUID MATRICES EXTRACTION SUMMARY**

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

**SOLID MATRICES EXTRACTION SUMMARY**

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOX THERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOX THERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOX THERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOX THERM	HPLC
Phenols by GCMS	WET	DCM	SOX THERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

## **Identification of Asbestos in Bulk Materials**

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

### **Visual Estimation Of Fibre Content.**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.**

**The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

### **Asbestos Type**

### **Common Name**

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



Minerex Environmental  
Taney hall  
Eglinton Terrace  
Dundrum  
Dublin  
Dublin 14

**Attention:** Conor Quinlan

## CERTIFICATE OF ANALYSIS

**Date:** 19 April 2010  
**Customer:** D\_MINEREX\_DUB-186  
**Sample Delivery Group (SDG):** 100408-58 **Report No.:** 80817  
**Your Reference:** 1632-028 (COC18)  
**Location:** 1632-028 (COC18)

We received 13 samples on Wednesday April 07, 2010 and 13 of these samples were scheduled for analysis which was completed on Monday April 19, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

**Iain Swinton**

Operations Director - Land UK & Ireland



<b>SDG:</b>	100408-58	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-186	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC18)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC18)	<b>Report No:</b>	80817

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Sampled Date
1362609	1632-COC18-95A1-D		07/04/2010
1362680	1632-COC18-mine sediment		07/04/2010
1362567	1632-COC18-MW1 P3		06/04/2010
1362580	1632-COC18-MW102PA		07/04/2010
1362625	1632-COC18-MW1-P1		06/04/2010
1362473	1632-COC18-MW2P1		06/04/2010
1361899	1632-COC18-MW3-P1		06/04/2010
1362433	1632-COC18-MW3-P2		06/04/2010
1362652	1632-COC18-MW4-P1		07/04/2010
1362495	1632-COC18-MW5 P1		06/04/2010
1362454	1632-COC18-MW5P2		06/04/2010
1362509	1632-COC18-MW6 P1		06/04/2010
1362545	1632-COC18-O1 JPS		07/04/2010

Only received samples which have had analysis scheduled will be shown on the following pages.

SDG: 100408-58  
 Job: D\_MINEREX\_DUB-186  
 Client Reference: 1632-028 (COC18)  
 Location: 1632-028 (COC18)

Customer: Minerex Environmental  
 Attention: Conor Quinlan  
 Order No.:  
 Report No: 80817

## LIQUID

Results Legend	Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Container	Total
<b>X</b> Test					
<b>N</b> No Determination Possible					
	1362652	1632-COC18-MW4-P1		PLUS BOT (D) H2SO4 (Dublin)	
	1362625	1632-COC18-MW1-P1		PLUS BOT (D) H2SO4 (Dublin)	
	1362609	1632-COC18-95A1-D		PLUS BOT (D) H2SO4 (Dublin)	
	1362580	1632-COC18-MW1-02PA		PLUS BOT (D) H2SO4 (Dublin)	
	1362567	1632-COC18-MW1-P3		PLUS BOT (D) H2SO4 (Dublin)	
	1362545	1632-COC18-O1-JPS		PLUS BOT (D) H2SO4 (Dublin)	
	1362509	1632-COC18-MW6-P1		PLUS BOT (D) H2SO4 (Dublin)	
	1362495	1632-COC18-MW5-P1		PLUS BOT (D) H2SO4 (Dublin)	
	1362473	1632-COC18-MW2-P1		PLUS BOT (D) H2SO4 (Dublin)	
	1362454	1632-COC18-MW5-P2		PLUS BOT (D) H2SO4 (Dublin)	
	1362433	1632-COC18-MW3-P2		PLUS BOT (D) H2SO4 (Dublin)	
	1361899	1632-COC18-MW3-P1		PLUS BOT (D) H2SO4 (Dublin)	
Alkalinity as CaCO3	All				0 12
Ammonium	All				0 12
Anions by Kone (w)	All				0 12
Dissolved Metals by ICP-MS	All				0 12
Metals by iCap-OES Dissolved (W)	All				0 12
Total Nitrogen	All				0 12

SDG: 100408-58  
 Job: D\_MINEREX\_DUB-186  
 Client Reference: 1632-028 (COC18)  
 Location: 1632-028 (COC18)

Customer: Minerex Environmental  
 Attention: Conor Quinlan  
 Order No.:  
 Report No: 80817

## SOLID

Results Legend	Lab Sample No(s)	1362680			Total
	Customer Sample Ref.	1632-COC18-mine sediment			
	Depth (m)				
	Container	40g Tub	40g Tub	JAR (D)	
Anions by Kone (w)	All	X			0 1
CEN Readings	All	X			0 1
Dissolved Metals by ICP-MS	All	X			0 1
Dissolved Organic and Inorganic Car	All	X			0 1
EPH by FID	All			X	0 1
Fluoride	All	X			0 1
GRO BTEX MTBE GC (S)	All		X		0 1
Loss on Ignition in soils	All			X	0 1
Mercury Dissolved	All	X			0 1
Metals by iCap-OES (Soil)	Antimony			X	0 1
	Arsenic			X	0 1
	Barium			X	0 1
	Cadmium			X	0 1
	Chromium			X	0 1
	Copper			X	0 1
	Lead			X	0 1
	Mercury			X	0 1
	Molybdenum			X	0 1
	Nickel			X	0 1
	Selenium			X	0 1
	Zinc			X	0 1
	Mineral Oil	All			X
PAH micro by GCMS	All			X	0 1

<b>SDG:</b>	100408-58	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-186	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC18)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC18)	<b>Report No:</b>	80817

		1362680	1632-COC18-mine sediment	Total	
		JAR (D) 60g VOC Dublin 40g Tub			
PAH Value of soil	All		X	0	1
PCBs by GCMS	All		X	0	1
pH	All	X		0	1
Phenols by HPLC (W)	All	X		0	1
Sample description	All		X	0	1
Total Dissolved Solids (Grav)	All	X		0	1
Total Organic Carbon	All		X	0	1

<b>SDG:</b>	100408-58	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-186	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC18)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC18)	<b>Report No:</b>	80817

### Sample Descriptions

**Grain Sizes:**

<0.063mm very fine,  
0.063mm - 0.1mm fine,  
0.1mm - 2mm medium,  
2mm - 10mm coarse,  
>10mm very coarse

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions
1362680	1632-COC18-mine		Dark Brown	Silt Loam	0.063 - 0.1 mm	Stones

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

<b>SDG:</b>	100408-58	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-186	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC18)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC18)	<b>Report No:</b>	80817

### Test Completion dates

SDG reference: 100408-58

Lab Sample No(s)	1361899	1362433	1362454	1362473	1362495	1362509	1362545	1362567	1362580	1362609	1362625	1362652
Customer Sample Ref.	2-COC18-MW3	2-COC18-MW3	2-COC18-MW3	2-COC18-MW2	2-COC18-MW5	2-COC18-MW6	2-COC18-O1	J2-COC18-MW1	2-COC18-MW10	2-COC18-95A	2-COC18-MW1	2-COC18-MW4
Depth												
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Alkalinity as CaCO3	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	19/04/2010	13/04/2010	12/04/2010	12/04/2010	12/04/2010	11/04/2010
Ammonium	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010
Anions by Kone (w)	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010
CEN Readings												
Dissolved Metals by ICP-MS	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010
Dissolved Organic/Inorganic												
EPH by FID												
Fluoride												
GRO BTEX MTBE GC (S)												
Loss on Ignition in soils												
Mercury Dissolved												
Metals by iCap-OES (Soil)												
Metals by iCap-OES Dissolved (W)	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010
Mineral Oil												
Moisture Meter												
PAH by GCMS												
PAH Value of soil												
PCBs by GCMS												
pH												
Phenols by HPLC (W)												
Sample description												
Total Dissolved Solids (Grav)												
Total Nitrogen	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010	14/04/2010
Total Organic Carbon												

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1362680
OC18-mine sec
SOLID
13/04/2010
12/04/2010
13/04/2010
13/04/2010
15/04/2010
13/04/2010
15/04/2010
14/04/2010
13/04/2010
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14/04/2010
12/04/2010





**SDG:** 100408-58  
**Job:** D\_MINEREX\_DUB-186  
**Client Reference:** 1632-028 (COC18)  
**Location:** 1632-028 (COC18)

**Customer:** Minerex Environmental  
**Attention:** Christina Geraghty  
**Order No.:**  
**Report No.:** 80817

Results Legend		Customer Sample Ref.	1632-COC18- -mine sedi				
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	subcontracted test.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.						
		<b>Depth (m)</b>					
		<b>Sample Type</b>	Soil/Solid				
		<b>Date Sampled</b>	07/04/2010				
		<b>Date Received</b>	07/04/2010				
		<b>SDG Ref</b>	100408-58				
		<b>Lab Sample No.(s)</b>	1362680				
Component	LOD/Units	Method					
Moisture	%	PM114	27				
Moisture content ratio	%	PM114	37				
Dry matter content ratio	%	PM114	73				
Mineral oil >C10-C40	<1 mg/kg	TM061	287	#			
Surrogate Value	-	TM061	60.7				
EPH Surrogate % recovery**	%	TM061	106				
Mineral Oil Surrogate % recovery**	%	TM061	121				
EPH Band >C10-C12	<35 mg/kg	TM061	<35	#			
EPH Band >C12-C16	<35 mg/kg	TM061	<35	#			
EPH Band >C16-C21	<35 mg/kg	TM061	59.5	#			
EPH Band >C21-C28	<35 mg/kg	TM061	127	#			
EPH Band >C28-C40	<35 mg/kg	TM061	176				
EPH Band >C35-C40	<35 mg/kg	TM061	43.8				
EPH Band >C28-C35	<35 mg/kg	TM061	128				
EPH Band >C10-C28	<35 mg/kg	TM061	231				
EPH Range >C10 - C40	<35 mg/kg	TM061	391	M			
Organic Carbon, Total	<0.2 %	TM132	0.343	#			
pH	1 pH Units	TM133	7.6	M			
PCB congener 28	<3 µg/kg	TM168	<3	M			
PCB congener 52	<3 µg/kg	TM168	<3	M			
PCB congener 101	<3 µg/kg	TM168	<3	M			
PCB congener 118	<3 µg/kg	TM168	<3	M			
PCB congener 138	<3 µg/kg	TM168	<3	M			
PCB congener 153	<3 µg/kg	TM168	<3	M			
PCB congener 180	<3 µg/kg	TM168	<3	M			
PCBs, Total ICES 7	<3 µg/kg	TM168	<3				
Antimony	<0.6 mg/kg	TM181	0.751	#			
Arsenic	<0.6 mg/kg	TM181	9.58	M			
Barium	<0.6 mg/kg	TM181	109	#			
Cadmium	<0.02 mg/kg	TM181	<0.02	M			
Chromium	<0.9 mg/kg	TM181	53.7	M			
Copper	<1.4 mg/kg	TM181	32.7	M			
Lead	<0.7 mg/kg	TM181	10	M			
Mercury	<0.14 mg/kg	TM181	<0.14	M			
Molybdenum	<0.1 mg/kg	TM181	1.32	#			
Nickel	<0.2 mg/kg	TM181	92.6	M			
Selenium	<1 mg/kg	TM181	<1	#			
Zinc	<1.9 mg/kg	TM181	79	M			
Coronene	2 mg/kg	TM213	<2				









## CEN 10:1 ONE STAGE BATCH TEST

REF-CEN12457-3

<b>Client Reference</b>	1632-028 (COC18)	<b>Client Location</b>	1632-028 (COC18)
<b>Mass Sample taken (kg)</b>	0.123	<b>Moisture Content Ratio (%)</b>	37.0
<b>Mass of dry sample (kg)</b>	0.175	<b>Dry Matter Content Ratio (%)</b>	73.0
<b>Particle Size &lt;4mm</b>	>95%		

**Case**

<b>SDG</b>	100408-58
<b>Lab Sample Number(s)</b>	1362680
<b>Sampled Date</b>	07-Apr-2010
<b>Customer Sample Ref.</b>	1632-COC18-mine sediment
<b>Depth (m)</b>	

**Solid Waste Analysis**

Total Organic Carbon (%)	0.343	-	-	-
Loss on Ignition (%)	3.56	-	-	-
Sum of BTEX (mg/kg)	<0.01	-	-	-
Sum of 7 PCBs (mg/kg)	<0.003	-	-	-
Mineral Oil (mg/kg)	287	-	-	-
PAH Sum of 17 (mg/kg)	<10.0	-	-	-
pH (pH Units)	7.60	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

**Eluate Analysis**

	Conc <sup>n</sup> in 10:1 eluate C <sub>2</sub>	10:1 conc <sup>n</sup> leached A <sub>2</sub>	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l	mg/kg			
Arsenic	0.000568	0.00568	-	-	-
Barium	0.0191	0.191	-	-	-
Cadmium	<0.0001	<0.001	-	-	-
Chromium	0.0013	0.013	-	-	-
Copper	0.00588	0.0588	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.0001	-	-	-
Molybdenum	0.00741	0.0741	-	-	-
Nickel	0.0133	0.133	-	-	-
Lead	<0.00002	<0.0002	-	-	-
Antimony	0.00105	0.0105	-	-	-
Selenium	0.0025	0.025	-	-	-
Zinc	0.00211	0.0211	-	-	-
Chloride	<2	<20	-	-	-
Fluoride	<0.5	<5	-	-	-
Sulphate (soluble)	1580	15800	-	-	-
Total Dissolved Solids	-	-	-	-	-
Total Monohydric Phenols (W)	<0.015	<0.15	-	-	-
Dissolved Organic Carbon	<3	<30	-	-	-

**Leach Test Information**

Date Prepared	09-Apr-2010
pH (pH Units)	7.48
Conductivity (µS/cm)	2,210.00
Temperature (°C)	20.10
Volume Leachant (Litres)	0.867
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

## CEN 10:1 ONE STAGE BATCH TEST

REF-CEN12457-3

<b>Client Reference</b>	1632-028 (COC18)	<b>Client Location</b>	1632-028 (COC18)
<b>Mass Sample taken (kg)</b>	0.123	<b>Moisture Content Ratio (%)</b>	37.0
<b>Mass of dry sample (kg)</b>	0.175	<b>Dry Matter Content Ratio (%)</b>	73.0
<b>Particle Size &lt;4mm</b>	>95%		

**Case**

<b>SDG</b>	100408-58
<b>Lab Sample Number(s)</b>	1362680
<b>Sampled Date</b>	07-Apr-2010
<b>Customer Sample Ref.</b>	1632-COC18-mine sediment
<b>Depth (m)</b>	

**Solid Waste Analysis**

Total Organic Carbon (%)	0.343	-	-	-
Loss on Ignition (%)	3.56	-	-	-
Sum of BTEX (mg/kg)	<0.01	-	-	-
Sum of 7 PCBs (mg/kg)	<0.003	-	-	-
Mineral Oil (mg/kg)	287	-	-	-
PAH Sum of 17 (mg/kg)	<10.0	-	-	-
pH (pH Units)	7.60	-	-	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

**Eluate Analysis**

	Conc <sup>n</sup> in 10:1 eluate C <sub>2</sub>	10:1 conc <sup>n</sup> leached A <sub>2</sub>	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	mg/l	mg/kg			
Total Dissolved Solids (Grav)	2320	23200	-	-	-

**Leach Test Information**

Date Prepared	09-Apr-2010
pH (pH Units)	7.48
Conductivity (µS/cm)	2,210.00
Temperature (°C)	20.10
Volume Leachant (Litres)	0.867
Volume of Eluate VE1 (Litres)	

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable

Stated limits are for guidance only and ALcontrol cannot be held responsible for any discrepancies with current legislation

Mcerts Certification does not apply to leachates

## Table of Results - Appendix

SDG Number : 100408-58

Client : Minerex Environmental

Client Ref : 1632-028 (COC18)

### REPORT KEY

REPORT KEY		Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10 <sup>-7</sup>					
NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>
PM001		Preparation of Samples for Metals Analysis	Dry
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material	Wet
PM114		Leaching Procedure for CEN Two Stage Batch Test 2:1/8:1 Cumulative	
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step	
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition	Dry
TM021	Method 2540C, AWWA/APHA, 20th Ed., 1999	Determination of total dissolved solids in waters by gravimetry.	
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples	
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)	Dry
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)	
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water	
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser	
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser	
TM132	In - house Method	ELTRA CS800 Operators Guide	Dry
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter	Wet
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS	
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils	Dry
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES	Dry
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry	
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers	
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection	
TM213	In-house Method	Rapid Determination of PAHs by GC-FID	Wet
TM218	Microwave extraction – EPA method 3546	Microwave extraction - EPA method 3546	Wet
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES	
TM259			

<sup>1</sup> Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

**Extractable Petroleum Hydrocarbons (EPH) By GC-FID  
EPH (DRO) (C10-C40)**

<b>SDG Number</b>	100408-58	<b>Client</b>	D_MINEREX_DUB		
<b>Matrix (Units)</b>	mg/kg	<b>Client Ref</b>	1632-028 (COC18)		
Sample No	Customer Sample Ref.	Depth	Matrix	EPH	Interpretation
1376921	1632-COC18-mine sediment		SOLID	391	PAHS

Extractable Petroleum Hydrocarbons (formally Diesel Range Organics) :- Any compound extractable in n-hexane within the carbon range C10-C40, includes Aliphatic (Min Oil), Aromatic (PAHs) and naturally occurring compounds.

# APPENDIX

## APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:  
NRA Leach tests, flash point, ammonium as NH<sub>4</sub> by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.  
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 – C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

**LIQUID MATRICES EXTRACTION SUMMARY**

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

**SOLID MATRICES EXTRACTION SUMMARY**

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOX THERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOX THERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOX THERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOX THERM	HPLC
Phenols by GCMS	WET	DCM	SOX THERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

## **Identification of Asbestos in Bulk Materials**

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

### **Visual Estimation Of Fibre Content.**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.**

**The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

### **Asbestos Type**

### **Common Name**

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



Minerex Environmental  
Taney hall  
Eglinton Terrace  
Dundrum  
Dublin  
Dublin 14

**Attention:** Conor Quinlan

## CERTIFICATE OF ANALYSIS

**Date:** 14 April 2010  
**Customer:** D\_MINEREX\_DUB-188  
**Sample Delivery Group (SDG):** 100409-70 **Report No.:** 80273  
**Your Reference:** 1632-028 (COC19)  
**Location:** 1632-028 (COC19)

We received 12 samples on Friday April 09, 2010 and 12 of these samples were scheduled for analysis which was completed on Wednesday April 14, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

**Iain Swinton**

Operations Director - Land UK & Ireland



<b>SDG:</b>	100409-70	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-188	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC19)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC19)	<b>Report No:</b>	80273

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Sampled Date
1371371	1632-COC19-95A		09/04/2010
1371306	1632-COC19-96A		09/04/2010
1371388	1632-COC19-96B		09/04/2010
1371245	1632-COC19-BH1-04D		09/04/2010
1371331	1632-COC19-BH2-04D		09/04/2010
1371349	1632-COC19-BH2-04S		09/04/2010
1371191	1632-COC19-BH3-03D		09/04/2010
1371214	1632-COC19-BH3-03S		09/04/2010
1371131	1632-COC19-BH4-03D		09/04/2010
1371111	1632-COC19-BH5-03S		09/04/2010
1371274	1632-COC19-BH6-03D		09/04/2010
1371151	1632-COC19-BH9-03S		09/04/2010

Only received samples which have had analysis scheduled will be shown on the following pages.



<b>SDG:</b>	100409-70	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-188	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC19)	<b>Order No.:</b>	
<b>Location:</b>	1632-028 (COC19)	<b>Report No:</b>	80273

### Test Completion dates

SDG reference: 100409-70

Lab Sample No(s)	1371111	1371131	1371151	1371191	1371214	1371245	1371274	1371306	1371331	1371349	1371371	1371388
Customer Sample Ref.	2-COC19-BH5	2-COC19-BH4	2-COC19-BH9	2-COC19-BH3	2-COC19-BH3	2-COC19-BH1	2-COC19-BH6	632-COC19-96	2-COC19-BH2	2-COC19-BH2	632-COC19-95	632-COC19-96
Depth												
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Ammonium	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010
Anions by Kone (w)	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010
COD Unfiltered	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010	12/04/2010
Conductivity (at 20 deg.C)					12/04/2010							
Dissolved Metals by ICP-MS	13/04/2010	13/04/2010	13/04/2010	13/04/2010	14/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010
Metals by iCap-OES Dissolved (W)	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010	13/04/2010
pH Value					12/04/2010							





## Table of Results - Appendix

SDG Number : 100409-70

Client : Minerex Environmental

Client Ref : 1632-028 (COC19)

### REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10<sup>-7</sup>

NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser	
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit	
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter	
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS	
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers	
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES	
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter	

<sup>1</sup> Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

# APPENDIX

## APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:  
NRA Leach tests, flash point, ammonium as NH<sub>4</sub> by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.  
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 – C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

**LIQUID MATRICES EXTRACTION SUMMARY**

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

**SOLID MATRICES EXTRACTION SUMMARY**

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOX THERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOX THERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOX THERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOX THERM	HPLC
Phenols by GCMS	WET	DCM	SOX THERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

## **Identification of Asbestos in Bulk Materials**

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

### **Visual Estimation Of Fibre Content.**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.**

**The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

### **Asbestos Type**

### **Common Name**

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



Minerex Environmental  
Taney hall  
Eglinton Terrace  
Dundrum  
Dublin  
Dublin 14

**Attention:** Conor Quinlan

## CERTIFICATE OF ANALYSIS

**Date:** 03 November 2010  
**Customer:** D\_MINEREX\_DUB-263  
**Sample Delivery Group (SDG):** 101028-38 **Report No.:** 102232  
**Your Reference:** 1632-028 (COC 21)  
**Location:** Gypsum - Kingscourt

We received 13 samples on Wednesday October 27, 2010 and 13 of these samples were scheduled for analysis which was completed on Wednesday November 03, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

**Iain Swinton**

Business Director - Land, UK & Ireland



<b>SDG:</b>	101028-38	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-263	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC 21)	<b>Order No.:</b>	1632-028 (COC21)
<b>Location:</b>	Gypsum - Kingscourt	<b>Report No:</b>	102232

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
2303554	1632-COC21-01 JPS			27/10/2010
2303164	1632-COC21-96A			27/10/2010
2303196	1632-COC21-96B			27/10/2010
2303444	1632-COC21-BH1-04D			27/10/2010
2303325	1632-COC21-BH2-04D			27/10/2010
2303335	1632-COC21-BH2-04S			27/10/2010
2303377	1632-COC21-BH5-03S			27/10/2010
2303345	1632-COC21-BH6-03D			27/10/2010
2303412	1632-COC21-BH9-03S			27/10/2010
2303541	1632-COC21-M102PA			27/10/2010
2303460	1632-COC21-MW5 P1			27/10/2010
2303506	1632-COC21-MW5 P2			27/10/2010
2303491	1632-COC21-MW6 P1			27/10/2010

Only received samples which have had analysis scheduled will be shown on the following pages.



**SDG:** 101028-38  
**Job:** D\_MINEREX\_DUB-263  
**Client Reference:** 1632-028 (COC 21)  
**Location:** Gypsum - Kingscourt

**Customer:** Minerex Environmental  
**Attention:** Conor Quinlan  
**Order No.:** 1632-028 (COC21)  
**Report No:** 102232

### Test Completion Dates

Lab Sample No(s)	2303164	2303196	2303325	2303335	2303345	2303377	2303412	2303444	2303460	2303491
<b>Customer Sample Ref.</b>	1632-COC21-96A	1632-COC21-96B	1632-COC21-BH2-04D	1632-COC21-BH2-04S	1632-COC21-BH6-03D	1632-COC21-BH5-03S	1632-COC21-BH9-03S	1632-COC21-BH1-04D	1632-COC21-MW5 P1	1632-COC21-MW6 P1
<b>AGS Ref.</b>										
<b>Depth</b>										
<b>Type</b>	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
<b>Alkalinity as CaCO3</b>									03/11/2010	02/11/2010
<b>Ammonium</b>	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010
<b>Anions by Kone (w)</b>	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010
<b>COD Unfiltered</b>	30/10/2010	30/10/2010	30/10/2010	30/10/2010	30/10/2010	30/10/2010	30/10/2010	30/10/2010		
<b>Conductivity (at 20 deg.C)</b>									01/11/2010	01/11/2010
<b>Dissolved Metals by ICP-MS</b>	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	01/11/2010	02/11/2010	02/11/2010
<b>Metals by iCap-OES Dissolved (W)</b>	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	29/10/2010	01/11/2010	01/11/2010
<b>pH Value</b>									01/11/2010	01/11/2010
<b>Total Nitrogen</b>									02/11/2010	02/11/2010

Lab Sample No(s)	2303506	2303541	2303554
<b>Customer Sample Ref.</b>	1632-COC21-MW5 P2	1632-COC21-M102 PA	1632-COC21-01 J PS
<b>AGS Ref.</b>			
<b>Depth</b>			
<b>Type</b>	LIQUID	LIQUID	LIQUID
<b>Alkalinity as CaCO3</b>	01/11/2010	02/11/2010	02/11/2010
<b>Ammonium</b>	01/11/2010	01/11/2010	01/11/2010
<b>Anions by Kone (w)</b>	02/11/2010	02/11/2010	02/11/2010
<b>Conductivity (at 20 deg.C)</b>	01/11/2010		01/11/2010
<b>Dissolved Metals by ICP-MS</b>	01/11/2010	02/11/2010	01/11/2010
<b>Metals by iCap-OES Dissolved (W)</b>	29/10/2010	01/11/2010	29/10/2010
<b>pH Value</b>	01/11/2010		01/11/2010
<b>Total Nitrogen</b>	02/11/2010	02/11/2010	02/11/2010

**SDG:** 101028-38  
**Job:** D\_MINEREX\_DUB-263  
**Client Reference:** 1632-028 (COC 21)  
**Location:** Gypsum - Kingscourt

**Customer:** Minerex Environmental  
**Attention:** Conor Quinlan  
**Order No.:** 1632-028 (COC21)  
**Report No:** 102232

Results Legend		Customer Sample Ref.	1632-COC21-01 J	1632-COC21-96A	1632-COC21-96B	1632-COC21-BH1-04D	1632-COC21-BH2-04D	1632-COC21-BH2-04S
#	ISO17025 accredited.		PS	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
M	mCERTS accredited.	Depth (m)	27/10/2010	27/10/2010	27/10/2010	27/10/2010	27/10/2010	27/10/2010
aq	Aqueous / settled sample.	Sample Type	101028-38	101028-38	101028-38	101028-38	101028-38	101028-38
diss.filt	Dissolved / filtered sample.	Date Sampled	2303554	2303164	2303196	2303444	2303325	2303335
tot.unfilt	Total / unfiltered sample.	Date Received						
*	subcontracted test.	SDG Ref						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.	Lab Sample No.(s)						
		AGS Reference						
Component	LOD/Units	Method						
Alkalinity, Total as CaCO3	<2 mg/l	TM043	174					
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	0.923	<0.2	<0.2	0.217	<0.2	<0.2
COD, unfiltered	<7 mg/l	TM107		<7	<7	145	15.5	132
Conductivity @ 20 deg.C	<0.014 mS/cm	TM120	1.95					
Arsenic (diss.filt)	<0.12 µg/l	TM152	1.22					
Barium (diss.filt)	<0.03 µg/l	TM152		5.59	21.1	9.44	82.7	154
Cadmium (diss.filt)	<0.1 µg/l	TM152	<0.1					
Copper (diss.filt)	<0.85 µg/l	TM152	4.38					
Lead (diss.filt)	<0.02 µg/l	TM152	<0.02					
Manganese (diss.filt)	<0.04 µg/l	TM152	0.102	131	53.4	89	0.388	18
Nickel (diss.filt)	<0.15 µg/l	TM152	10.3					
Phosphorus (diss.filt)	<6.3 µg/l	TM152	<6.3					
Zinc (diss.filt)	<0.41 µg/l	TM152	<0.41					
Sulphate	<3 mg/l	TM184	1210	1140	456	1080	512	90
Chloride	<2 mg/l	TM184	17.7	16.1	16	15.7	15.4	12.8
Nitrate as NO3	<0.3 mg/l	TM184	<0.3					
Nitrogen, Total	<1 mg/l	TM212	1.04					
Calcium (diss.filt)	<0.012 mg/l	TM228	541	438	208	452	269	108
Sodium (diss.filt)	<0.076 mg/l	TM228	59.5					
Magnesium (diss.filt)	<0.036 mg/l	TM228	0.374					
Potassium (diss.filt)	<2.335 mg/l	TM228	21.4					
Iron (diss.filt)	<0.019 mg/l	TM228	<0.019					
pH	<1 pH Units	TM256	8.04					

**SDG:** 101028-38  
**Job:** D\_MINEREX\_DUB-263  
**Client Reference:** 1632-028 (COC 21)  
**Location:** Gypsum - Kingscourt

**Customer:** Minerex Environmental  
**Attention:** Conor Quinlan  
**Order No.:** 1632-028 (COC21)  
**Report No:** 102232

Results Legend		Customer Sample Ref.	1632-COC21-BH5-03S	1632-COC21-BH6-03D	1632-COC21-BH9-03S	1632-COC21-M102 PA	1632-COC21-MW5 P1	1632-COC21-MW5 P2
#	ISO17025 accredited.		Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)	Water(GW/SW)
M	mCERTS accredited.	Depth (m)						
aq	Aqueous / settled sample.	Sample Type						
diss.filt	Dissolved / filtered sample.	Date Sampled	27/10/2010	27/10/2010	27/10/2010	27/10/2010	27/10/2010	27/10/2010
tot.unfilt	Total / unfiltered sample.	Date Received	101028-38	101028-38	101028-38	101028-38	101028-38	101028-38
*	subcontracted test.	SDG Ref	2303377	2303345	2303412	2303541	2303460	2303506
**	% recovery of the surrogate standard to check the efficiency of the method. The results of the individual compounds within the samples are not corrected for this recovery.	Lab Sample No.(s)						
		AGS Reference						
Component	LOD/Units	Method						
Alkalinity, Total as CaCO3	<2 mg/l	TM043				240	11200	195
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
COD, unfiltered	<7 mg/l	TM107	15.2	23.2	11.2			
Conductivity @ 20 deg.C	<0.014 mS/cm	TM120					0.476	0.412
Arsenic (diss.filt)	<0.12 µg/l	TM152				7.53	1.08	3.56
Barium (diss.filt)	<0.03 µg/l	TM152	42.9	22.1	111			
Cadmium (diss.filt)	<0.1 µg/l	TM152				<0.1	<0.1	<0.1
Copper (diss.filt)	<0.85 µg/l	TM152				<0.85	<0.85	<0.85
Lead (diss.filt)	<0.02 µg/l	TM152				<0.02	<0.02	0.069
Manganese (diss.filt)	<0.04 µg/l	TM152	0.656	199	60.8	238	53.9	147
Nickel (diss.filt)	<0.15 µg/l	TM152				3	4.17	1.87
Phosphorus (diss.filt)	<6.3 µg/l	TM152				7.87	17.3	11.3
Zinc (diss.filt)	<0.41 µg/l	TM152				<0.41	<0.41	0.775
Sulphate	<3 mg/l	TM184	434	1050	81.6	514	97.6	22.2
Chloride	<2 mg/l	TM184	86	12.8	14.6	15.3	22.3	12.4
Nitrate as NO3	<0.3 mg/l	TM184				<0.3	<0.3	1.65
Nitrogen, Total	<1 mg/l	TM212				<1	<1	<1
Calcium (diss.filt)	<0.012 mg/l	TM228	151	481	67.2	151	60.7	55.5
Sodium (diss.filt)	<0.076 mg/l	TM228				60.6	12.3	18.4
Magnesium (diss.filt)	<0.036 mg/l	TM228				76.1	15.4	16.1
Potassium (diss.filt)	<2.335 mg/l	TM228				6.13	<2.34	2.57
Iron (diss.filt)	<0.019 mg/l	TM228				<0.019	<0.019	<0.019
pH	<1 pH Units	TM256					8.04	8.42



## Table of Results - Appendix

SDG Number : 101028-38

Client : D\_MINEREX\_DUB

Client Ref : 1632-028 (COC 21)

### REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10<sup>-7</sup>

NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>	Surrogate Corrected
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter		

<sup>1</sup> Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

# APPENDIX

## APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:  
NRA Leach tests, flash point, ammonium as NH<sub>4</sub> by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 – C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

**LIQUID MATRICES EXTRACTION SUMMARY**

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

**SOLID MATRICES EXTRACTION SUMMARY**

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOX THERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOX THERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOX THERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOX THERM	HPLC
Phenols by GCMS	WET	DCM	SOX THERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

## **Identification of Asbestos in Bulk Materials**

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

### **Visual Estimation Of Fibre Content.**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.**

**The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

### **Asbestos Type**

### **Common Name**

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



Minerex Environmental  
Taney hall  
Eglinton Terrace  
Dundrum  
Dublin  
Dublin 14

**Attention:** Conor Quinlan

## CERTIFICATE OF ANALYSIS

**Date:** 03 November 2010  
**Customer:** D\_MINEREX\_DUB-264  
**Sample Delivery Group (SDG):** 101029-80 **Report No.:** 102182  
**Your Reference:** 1632-028 (COC22)  
**Location:** Gypsum - Kingscourt

We received 6 samples on Friday October 29, 2010 and 6 of these samples were scheduled for analysis which was completed on Wednesday November 03, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

**Iain Swinton**

Business Director - Land, UK & Ireland



<b>SDG:</b>	101029-80	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-264	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC22)	<b>Order No.:</b>	
<b>Location:</b>	Gypsum - Kingscourt	<b>Report No:</b>	102182

## Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
2314043	1632-COC22-95A			28/10/2010
2314074	1632-COC22-BH3-03-D			28/10/2010
2314093	1632-COC22-BH3-03-S			28/10/2010
2314014	1632-COC22-BH4-03-D			28/10/2010
2314113	1632-COC22-MW1-P3			28/10/2010
2314129	1632-COC22-MW2-P1			28/10/2010

Only received samples which have had analysis scheduled will be shown on the following pages.



<b>SDG:</b>	101029-80	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-264	<b>Attention:</b>	Jenny Rush
<b>Client Reference:</b>	1632-028 (COC22)	<b>Order No.:</b>	
<b>Location:</b>	Gypsum - Kingscourt	<b>Report No:</b>	102182

### Test Completion Dates

Lab Sample No(s)	2314014	2314043	2314074	2314093	2314113	2314129
Customer Sample Ref.	1632-COC22-BH4-03-D	1632-COC22-95A	1632-COC22-BH3-03-D	1632-COC22-BH3-03-S	1632-COC22-MW1-P3	1632-COC22-MW2-P1
AGS Ref.						
Depth						
Type	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID	LIQUID
Alkalinity as CaCO3					01/11/2010	01/11/2010
Ammonium	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010	02/11/2010
Anions by Kone (w)	01/11/2010	03/11/2010	03/11/2010	03/11/2010	03/11/2010	03/11/2010
COD Unfiltered	30/10/2010	30/10/2010	30/10/2010	30/10/2010		
Dissolved Metals by ICP-MS	02/11/2010	03/11/2010	03/11/2010	03/11/2010	03/11/2010	03/11/2010
Metals by iCap-OES Dissolved (W)	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010	01/11/2010
Total Nitrogen					02/11/2010	02/11/2010



## Table of Results - Appendix

SDG Number : 101029-80

Client : D\_MINIREX\_DUB

Client Ref : 1632-028 (COC22)

### REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10<sup>-7</sup>

NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>	Surrogate Corrected
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		

<sup>1</sup> Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

# APPENDIX

## APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:  
NRA Leach tests, flash point, ammonium as NH<sub>4</sub> by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.  
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 – C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

**LIQUID MATRICES EXTRACTION SUMMARY**

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

**SOLID MATRICES EXTRACTION SUMMARY**

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOX THERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOX THERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOX THERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOX THERM	HPLC
Phenols by GCMS	WET	DCM	SOX THERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

## **Identification of Asbestos in Bulk Materials**

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

### **Visual Estimation Of Fibre Content.**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.**

**The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

### **Asbestos Type**

### **Common Name**

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-



Minerex Environmental  
Taney hall  
Eglinton Terrace  
Dundrum  
Dublin  
Dublin 14

**Attention:** Conor Quinlan

## CERTIFICATE OF ANALYSIS

**Date:** 08 November 2010  
**Customer:** D\_MINEREX\_DUB-269  
**Sample Delivery Group (SDG):** 101103-93 **Report No.:** 102716  
**Your Reference:** 1632-028 (COC23)  
**Location:** Gypsum - Kingscourt

We received 3 samples on Wednesday November 03, 2010 and 3 of these samples were scheduled for analysis which was completed on Monday November 08, 2010. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Asbestos testing - we are not accredited for screening soil samples for asbestos fibres. We are only accredited to identify asbestos fibres in bulk material (ACM).

Approved By:

**Iain Swinton**

Business Director - Land, UK & Ireland





<b>SDG:</b>	101103-93	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-269	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC23)	<b>Order No.:</b>	
<b>Location:</b>	Gypsum - Kingscourt	<b>Report No:</b>	102716

### Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
2339810	1632-COC23-MW1-P1			02/11/2010
2339824	1632-COC23-MW3-P1			02/11/2010
2339833	1632-COC23-MW4-P1			02/11/2010

**Only received samples which have had analysis scheduled will be shown on the following pages.**

<b>SDG:</b>	101103-93	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-269	<b>Attention:</b>	Conor Quinlan
<b>Client Reference:</b>	1632-028 (COC23)	<b>Order No.:</b>	
<b>Location:</b>	Gypsum - Kingscourt	<b>Report No:</b>	102716

<b>LIQUID</b>  <b>Results Legend</b>   Test   No Determination Possible	Lab Sample No(s)	2339810	2339824	2339833	
	Customer Sample Ref.	1632-COC23-AMW1-P1	1632-COC23-AMW3-P1	1632-COC23-AMW4-P1	
	AGS Ref.				
	Depth (m)				
	Container	H2SO4 (Dublin) PLAS BOT (D)	H2SO4 (Dublin) PLAS BOT (D)	H2SO4 (Dublin) PLAS BOT (D)	
Alkalinity as CaCO3	All	NDPs: 0 Tests: 3	X	X	X
Ammonium	All	NDPs: 0 Tests: 3	X	X	X
Anions by Kone (w)	All	NDPs: 0 Tests: 3	X	X	X
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 3	X	X	X
Metals by iCap-OES Dissolved (W)	All	NDPs: 0 Tests: 3	X	X	X
Total Nitrogen	All	NDPs: 0 Tests: 3	X	X	X

<b>SDG:</b>	101103-93	<b>Customer:</b>	Minerex Environmental
<b>Job:</b>	D_MINEREX_DUB-269	<b>Attention:</b>	Jenny Rush
<b>Client Reference:</b>	1632-028 (COC23)	<b>Order No.:</b>	
<b>Location:</b>	Gypsum - Kingscourt	<b>Report No.:</b>	102716

### Test Completion Dates

Lab Sample No(s)	2339810	2339824	2339833
Customer Sample Ref.	1632-COC23-MW1-P1	1632-COC23-MW3-P1	1632-COC23-MW4-P1
AGS Ref.			
Depth			
Type	LIQUID	LIQUID	LIQUID
Alkalinity as CaCO3	05/11/2010	05/11/2010	05/11/2010
Ammonium	05/11/2010	05/11/2010	05/11/2010
Anions by Kone (w)	05/11/2010	08/11/2010	05/11/2010
Dissolved Metals by ICP-MS	05/11/2010	05/11/2010	05/11/2010
Metals by iCap-OES Dissolved (W)	05/11/2010	08/11/2010	05/11/2010
Total Nitrogen	05/11/2010	05/11/2010	05/11/2010



## Table of Results - Appendix

SDG Number : 101103-93

Client : D\_MINEREX\_DUB

Client Ref : 1632-028 (COC23)

### REPORT KEY

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10<sup>-7</sup>

NDP	No Determination Possible	#	ISO 17025 Accredited	*	Subcontracted Test	M	MCERTS Accredited
NFD	No Fibres Detected	PFD	Possible Fibres Detected	»	Result previously reported (Incremental reports only)	EC	Equivalent Carbon (Aromatics C8-C35)

Note: Method detection limits are not always achievable due to various circumstances beyond our control

Method No	Reference	Description	Wet/Dry Sample <sup>1</sup>	Surrogate Corrected
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples		
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM212	SO/TR 11905-2: 1997. Water quality – Determination of nitrogen –Part 2:Determination of bound nitrogen, after combustion and oxidation to nitrogen dioxide, chemiluminescence detection.	Determination of Total Nitrogen by High Temperature Catalytic Oxidation followed by Chemiluminescence Detection		
TM228	US EPA Method 6010B	Determination of Major Cations in Water by iCap 6500 Duo ICP-OES		

<sup>1</sup> Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

# APPENDIX

## APPENDIX

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following:  
NRA Leach tests, flash point, ammonium as NH<sub>4</sub> by the BRE method, VOC TICS, SVOC TICS, TOF-MS SCAN/SEARCH and TOF-MS TICS.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for both soil jars, tubs and volatile jars. All waters and vials will be discarded 10 days after the analysis is completed (e-mailed). All material removed during an asbestos containing material screen and analysed for the presence of asbestos will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, the individual sub sample scheduled will be screened in house for the presence of large asbestos containing material fragments/pieces. If no asbestos containing material is found this will be reported as 'no asbestos containing material detected'. If asbestos containing material is detected it will be removed and analysed by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If asbestos containing material is present no further analysis will be undertaken. At no point is the fibre content of the soil sample determined.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace or sediment is present in the volatile sample. This will be flagged up as an invalid VOC on the test schedule or recorded on the log sheet.
8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.
9. NDP – No determination possible due to insufficient/unsuitable sample.
10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
11. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.
12. Results relate only to the items tested
13. **Surrogate recoveries** – Most of our organic methods include surrogates, the recovery of which is monitored and reported.  
For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 – 130 %.
14. **Product analyses** – Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.
15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol).
16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 14).
17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.
18. Our MCERTS accreditation for PAHs by GCMS applies to all product types apart from Kerosene, where naphthalene only is not accredited.
19. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.
19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.
20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.
21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.
22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials – whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.
23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C4 – C10 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

**LIQUID MATRICES EXTRACTION SUMMARY**

ANALYSIS	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
PAH MS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
EPH	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
EPH CWG	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
MINERAL OIL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC FID
PCB 7 CONGENERS	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GC MS
PCB TOTAL	HEXANE	STIRRED EXTRACTION (STIR-BAR)	GS MS
SVOC	DCM	LIQUID/LIQUID SHAKE	GC MS
FREE SULPHUR	DCM	SOLID PHASE EXTRACTION	HPLC
PEST OCP/OPP	DCM	LIQUID/LIQUID SHAKE	GC MS
TRIAZINE HERBS	DCM	LIQUID/LIQUID SHAKE	GC MS
PHENOLS MS	DCM	SOLID PHASE EXTRACTION	GC MS
TPH by INFRA RED (IR)	TCE	LIQUID/LIQUID EXTRACTION	HPLC
MINERAL OIL by IR	TCE	LIQUID/LIQUID EXTRACTION	HPLC
GLYCOLS	NONE	DIRECT INJECTION	GC FID

**SOLID MATRICES EXTRACTION SUMMARY**

ANALYSIS	D/C OR WET	EXTRACTION SOLVENT	EXTRACTION METHOD	ANALYSIS
Solvent Extractable Matter	D&C	DCM	SOX THERM	GRAVIMETRIC
Cyclohexane Ext. Matter	D&C	CYCLOHEXANE	SOX THERM	GRAVIMETRIC
Thin Layer Chromatography	D&C	DCM	SOX THERM	IATROSCAN
Elemental Sulphur	D&C	DCM	SOX THERM	HPLC
Phenols by GCMS	WET	DCM	SOX THERM	GC-MS
Herbicides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
Pesticides	D&C	HEXANE:ACETONE	SOX THERM	GC-MS
EPH (DRO)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Min oil)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH (Cleaned up)	D&C	HEXANE:ACETONE	END OVER END	GC-FID
EPH CWG by GC	D&C	HEXANE:ACETONE	END OVER END	GC-FID
PCB tot / PCB con	D&C	HEXANE:ACETONE	END OVER END	GC-MS
Polyaromatic Hydrocarbons (MS)	WET	HEXANE:ACETONE	Microwave TM218.	GC-MS
C8-C40 (C6-C40)EZ Flash	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Polyaromatic Hydrocarbons Rapid GC	WET	HEXANE:ACETONE	SHAKER	GC-EZ
Semi Volatile Organic Compounds	WET	DCM:ACETONE	SONICATE	GC-MS

## **Identification of Asbestos in Bulk Materials**

The results for asbestos identification for soil samples are obtained from possible Asbestos Containing Material, removed during the 'Screening of soils for Asbestos Containing Materials', which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

### **Visual Estimation Of Fibre Content.**

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -

Trace – Where only one or two asbestos fibres were identified.

**Further guidance on typical asbestos fibre content of manufactured products can be found in MDHS 100.**

**The identification of asbestos containing materials falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**

### **Asbestos Type**

### **Common Name**

Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-