

Annual Environmental Report

GLENALLA LANDFILL SITE (Waste Licence Ref. W0125-1)

Donegal County Council
For
Environmental Protection Agency

Reporting Period: January to December 2008

March 2009

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1. INTRODUCTION

- 1.1 This Annual Environmental Report (AER) has been prepared to meet the requirements of Schedule E and F of Waste Licence W0125-1 for Glenalla Landfill. This report provides an environmental review of the site from the 1st of January 2008 to the 31st of December 2008.
 - 1.2 On the 4th of December 2001 the Environmental Protection Agency granted the Council a Waste Licence (registration number W0125-1) for the orderly closure, capping and restoration of the landfill facility, in accordance with the Third Schedule of the Waste Management Act, 1996. Donegal County Council ceased operational activity at Glenalla Landfill Site after the Christmas period in December 2001. Subsequently, Donegal County Council was only permitted to accept inert waste for disposal for the purposes of restoration and aftercare of the site. The quantity of inert waste to be accepted is limited to 46,000 tonnes. The Council has managed the facility to ensure that activities have not caused environmental pollution and carries out regular environmental monitoring. All monitoring data is submitted to the EPA. The site was formally restored in 2005/6.
 - 1.3 Glenalla Landfill is an unlined facility, historically operated on the dilute and disperse principle, whereby leachate generated by rainfall infiltration and the decomposition of the landfilled waste is allowed to disperse into the surrounding environment. The landfill site is situated in a low-lying hollow that has been infilled by peat deposits constituting an area of blanket bog. These deposits can represent an effective hydraulic barrier to the downward percolation of leachate. The disposal of waste was undertaken by the landraise method, whereby tipping took place directly onto the stripped ground surface raising its level to form an elevated landform flanked by low graded banks. As mentioned above the site was formally restored in 2005/6.
- 1.4 The landfill is situated in a fully rural setting, some 4km east of Milford in an area of moderate relief that forms part of the upper catchment of the Glenalla River. This watercourse dissects the southwest boundary of the landfill site. The ground surface of the closed hollow in which the landfill is based generally falls in a south to south westerly direction under a shallow gradient towards the Glenalla River. The downstream extent of the landfill is therefore represented by a small area situated on the southern site boundary. The area to the north and northeast of the site represents the principal upstream area.

2. WASTE ACTIVITIES CARRIED OUT AT THE FACILITY

2.1 Type of Waste

The licensed disposal activities, in accordance with the Third Schedule of the Waste Management Act, 1996 are restricted to those listed as follows

- Class 1 Deposit on, in or under land (including landfill): This activity is limited to the deposition of inert waste.
- Class 4 Surface impoundment, including placement of liquid or sludge discards into pits, ponds or lagoons: This activity is limited too leachate collection and treatment
- Class 13 Storage prior to submission to any activity referred to in a preceding paragraph of this Schedule, other than temporary storage, pending collection, on the premises where the waste concerned is produced: This activity is limited to leachate collection and storage prior to treatment.

3. QUANTITIES AND COMPOSITION OF WASTE

3.1 Quantities of Waste for Restoration

In accordance with Condition 1 of the waste licence only inert waste may be deposited at the facility. A maximum of 46,000 tonnes shall be accepted for the purposes of restoration and aftercare. The quantity of waste received during the reporting period and each previous year at the facility are presented in Table 3.1.

3.2 Glenalla landfill site was closed in 2001 and no material was been imported or exported until restoration works commenced during 2005. The material imported during 2005 was inert and specifically for the purpose of restoring the site.

Table 3.1 Waste quantities accepted (tonnes)

Waste types	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Total	550	1,565	5,722	10,093	0	0	0	34,474	0	0	0

4. SUMMARY REPORT OF EMISSIONS

4.1 Groundwater

4.1.1 Introduction

Groundwater is monitored at the locations shown on drg. no. 5234.30/04. GW1 is located upstream of the landfill and GW3 and GW2 are downstream. GW2 was redrilled during 2006. Parameters to be monitored and frequencies as required by the Waste Licence are listed in Appendix A. All results in tabular and graphical format are contained in Appendix B. Results are compared against EC (Quality of Water Intended for Human Consumption) Regulations 1988; EC (Drinking Water) Regulations 2000 and EPA Interim Guideline Values.

4.1.2 Summary of Results

The site was developed on the dilute and disperse principal, however the groundwater receives some protection against contamination from the peat underlying the landfill and the landfill is now fully restored. Results again indicate a slight impact on downstream groundwater from the landfill.

4.2 Surface Water

4.2.1 Introduction

Surface water monitoring is carried out at SW1, SW2, and SW3 as shown on Drawing No. 5234.30/102. SW1 is reflective of the quality of the surface water upstream of the landfill site. The parameters and frequencies of monitoring required by the Waste Licence are listed in Appendix A. The results of monitoring in tabular and graphical format are presented in Appendix B. Results are compared against EC (Quality of Surface Water Intended for the Abstraction of Drinking Water) Regulations 1989.

During the reporting period it was agreed with the EPA to locate a new surface water monitoring point further downstream of the landfill as both SW2 and SW3 are very close to the waste body. A location for SW4 was established in November 2008.

4.2.2 Summary of Results

On the basis of the hydrogeology of the site, surface water represents the principal receptor of leachate emissions from the site. Surface water results previously did indeed indicate that leachate was being released from the facility into the surrounding environment. Following restoration levels of emissions to surface water had been reducing. There was a slight rise in levels again at the start of this period, and two spikes in ammonia levels during the year. An investigation is underway into these levels.

4.3 Leachate Composition

4.3.1 Leachate is monitored at one location at the facility, L1, as shown on Drawing No. 5234.30/04. The results are contained in Appendix B and have been compared with typical leachate quality as reported in EPA Landfill Manual – Landfill Operational Practices (see Section 5.3). All parameters are consistent with typical leachate composition and comparable with levels recorded during the last reporting period.

4.4 Landfill gas

4.4.1 Landfill gas is monitored at three locations at the facility as shown on Drawing No. 5234.30/04. LG1, LG2, and LG3 are all located in waste. Both LG1 and LG3 were replaced during restoration works. Gas levels appear to be similar to those measured at the end of the last reporting period.

4.5 Dust Monitoring

4.5.1 Dust monitoring was not undertaken in this reporting period.

5. RESULTS & INTERPRETATIONS OF MONITORING INCLUDING PLANS & UPDATES OF MONITORING LOCATIONS.

5.1 Groundwater

- 5.1.1 Locations, parameters and monitoring frequencies, as required by the Waste Licence are listed in Appendix A. Locations are shown in Drg no. 5234.30/04. Results of the monitoring programme are listed in Appendix B. These results have been compared to EC Quality of Water Intended for Human Consumption Regulations, 1988, the European communities (Drinking Water) Regulations, 2000 and the EPA Interim Report, Towards Setting Guidelines Values (IGV) for the Protection of Groundwater in Ireland. The majority of the parameters are below the recommended limits.
- 5.1.2 Upstream groundwater shows levels in excess of the MAC's for SS, Chloride, Boron & Phenols.
- 5.1.3 Downstream, levels of Ammonia, SS, Chloride, Iron and Manganese, Boron, Phenols and Phosphate levels are slightly elevated.

5.2 Surface Water

- 5.2.1 Locations, parameters and monitoring frequencies, as required by the Waste Licence are listed in Appendix A. Locations are shown in Drg no. 5234.30/04. The results are presented graphically and in tabular format in Appendix B. These results have been compared to EC Quality of Surface Water (Intended for the Abstraction of Drinking Water) Regulations, 1989.
- 5.2.2 Upstream of the site, results showed elevated levels of Chloride and Zinc.
- 5.2.3 Downstream, levels of Ammonia, Conductivity, COD Chloride and Phosphate are elevated.

5.3 Leachate

5.3.1 Leachate quality can vary during the lifetime of landfill site depending on the phase of decomposition of the waste. Leachate results for the reporting period are presented in Appendix B and some of the characteristic parameters of the leachate are listed in Table 5.1 below.

Tab	le 5.1: Raw Lea	chate Concent	trations 2008		
	Glenalia L	andfill Site	landfills a	mples from U ccepting dom Results in mo	estic
PARAMETER	Min.Conc	Max.Conc	Min.Conc	Max.Conc	Mean
Ammonia (mg/N)	73	149	<0.2	1700	491
BOD	1.4	61	4.5	>4800	>834
COD	69	1402	<10	33,700	3078
Chloride (mg/l)	96.98	354.96	27	3410	1256
Iron (mg/l)	-	196	0.4	664	54.4
Potassium (mg/l)	-	89.4	2.7	1480	491
TON (mg/l N)	0	0.79	1	1	1
Conductivity (mS/cm)	1874	2109	503	19,200	7789
рН	7.16	7.56	6.4	8	7.2

5.3.2 Leachate results have been compared to "Typical Leachate Composition of 30 Samples from UK/Irish Landfills accepting mainly Domestic Waste" (Landfill Operational Practices). All parameters are consistent with typical leachate composition.

5.4 Landfill Gas

Levels this period are consistent with those recorded post restoration. Maximum and minimum levels are shown in Table 5.2 below and full results and graphs are contained in Appendix B. These wells are all located within waste.

Table 5.2 Methane and Carbon Dioxide Max & Min for Gas Wells in Waste

	200	06	200)7	20	08
Parameter	Max	Min	Max	Min	Max	Min
Methane	68.4%	2.9%	65.0%	0.0%	63.2%	12.7%
Carbon Dioxide	39.4%	0%	34.7%	0.0%	31.4%	1.4%

5.5 Dust

Dust monitoring was not undertaken during this period.

6. VOLUME OF LEACHATE PRODUCED AND VOLUME OF LEACHATE DISCHARGED

- 6.1 A water balance calculation has been undertaken and is contained in Appendix C. This indicates that the estimated volume of leachate produced at the site for 2008 was approximately 2547m³.
- 6.2 Leachate is typically tankered from the collection lagoon on the site one day per week, although frequency was varied during this period. The total volume of leachate tankered during the last reporting period was 1924m³.

7. TOPOGRAPHICAL SITE SURVEY

7.1 A topographical survey of the site was carried out in May 2006 post restoration. Copies of the survey were forwarded to the Agency in March 2007.

8. REPORTED INCIDENTS AND COMPLAINTS SUMMARIES

- 8.1 Donegal County Council reports on an on-going basis all occasions where either surface waters or groundwaters are found to contain in excess of 0.2mg/l ammonia, or where perimeter gas wells are found to contain greater than either 1% methane or 1.5% carbon dioxide. These are reported as incidents each six-monthly reporting period or when the results become available.
- 8.2 Apart from the on-going emissions exceedance reporting referred to above, no incidents have been reported to the Environmental Protection Agency during this reporting period.
- 8.3 No complaints where received during this reporting period.

9. REVIEW OF NUISANCE CONTROLS

9.1 General

As the facility is not operational, and all areas formerly used for placement of municipal waste have been fully restored, the following list of nuisances are no longer deemed likely to cause problems. Regular site inspections carried out by environmental scientists check for evidence of any of the following. Where any sign of these is detected appropriate control measures would be introduced.

- Flies and vermin:
- Dust;
- Litter;
- Birds;
- Noise;
- Odours.

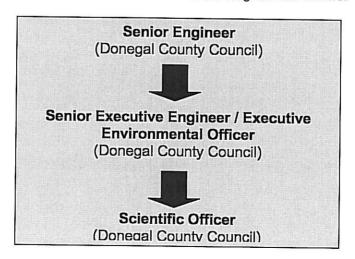
9.2.1 EMS

As part of the Environmental Management System a procedure has been developed to ensure that the site is inspected for each of the above-mentioned nuisances on a quarterly basis. This will ensure that should any nuisance arise, the situation is identified and dealt with appropriately.

10. MANAGEMENT STRUCTURE OF SITE

10.1 Organisation

The management of the landfill site is illustrated in the diagram that follows.



10.2 Management Responsibility

<u>Senior Engineer:</u> Overall responsibility for the management of the site and ensuring compliance with the Waste Licence. Delegation of authority and responsibility to ensure the effective management of the facility and licence compliance.

<u>Senior Executive Engineer:</u> Responsible for the day-to-day management of the facility as directed by the Senior Engineer.

Executive Environmental Officer: Responsible for compliance with EPA Licence.

<u>Scientific Officer:</u> Carry out environmental monitoring of emissions and reporting in accordance with licence requirements.

11. PROGRAMME FOR PUBLIC INFORMATION

A public communication programme has been initiated in accordance with Condition 2 of the Waste Licence to ensure that information concerning the environmental performance is available at reasonable times. The public may view environmental records at the Donegal County Council Environmental Headquarters at Three Rivers Centre in Lifford. Details regarding this programme are contained in Section 2 of the Environmental Management System Manual.

12. CAPPING AND RESTORATION OF THE SITE.

- 12.1 The site was fully restored in 2005/6 in accordance with the approved Restoration and Aftercare Plan dated May 2004.
- 12.2 It was agreed with the Agency in July 2006 that monitoring and reporting frequency would be reduced to bi-annually. It is hoped that when the benefits of restoration have been fully demonstrated that the Council can surrender the licence for this facility.

13. REPORT ON STAFF TRAINING

- 13.1 As the site is no longer operational, management is as per Section 10. The Scientific Officers are scheduled for the following types of training courses:
 - FAS Waste Management Training Programme;
 - FAS Waste Operatives Training;
 - Manual Handling.

- 14. REPORT ON DEVELOPMENT WORK UNDERTAKEN DURING THE REPORTING PERIOD, AND A TIME SCALE FOR THOSE PROPOSED DURING THE COMING YEAR.
- 14.1 No development work currently planned.

APPENDIX A

MONITORING LOCATIONS, FREQUENCIES AND PARAMETERS

Table A1: Monitoring Locations

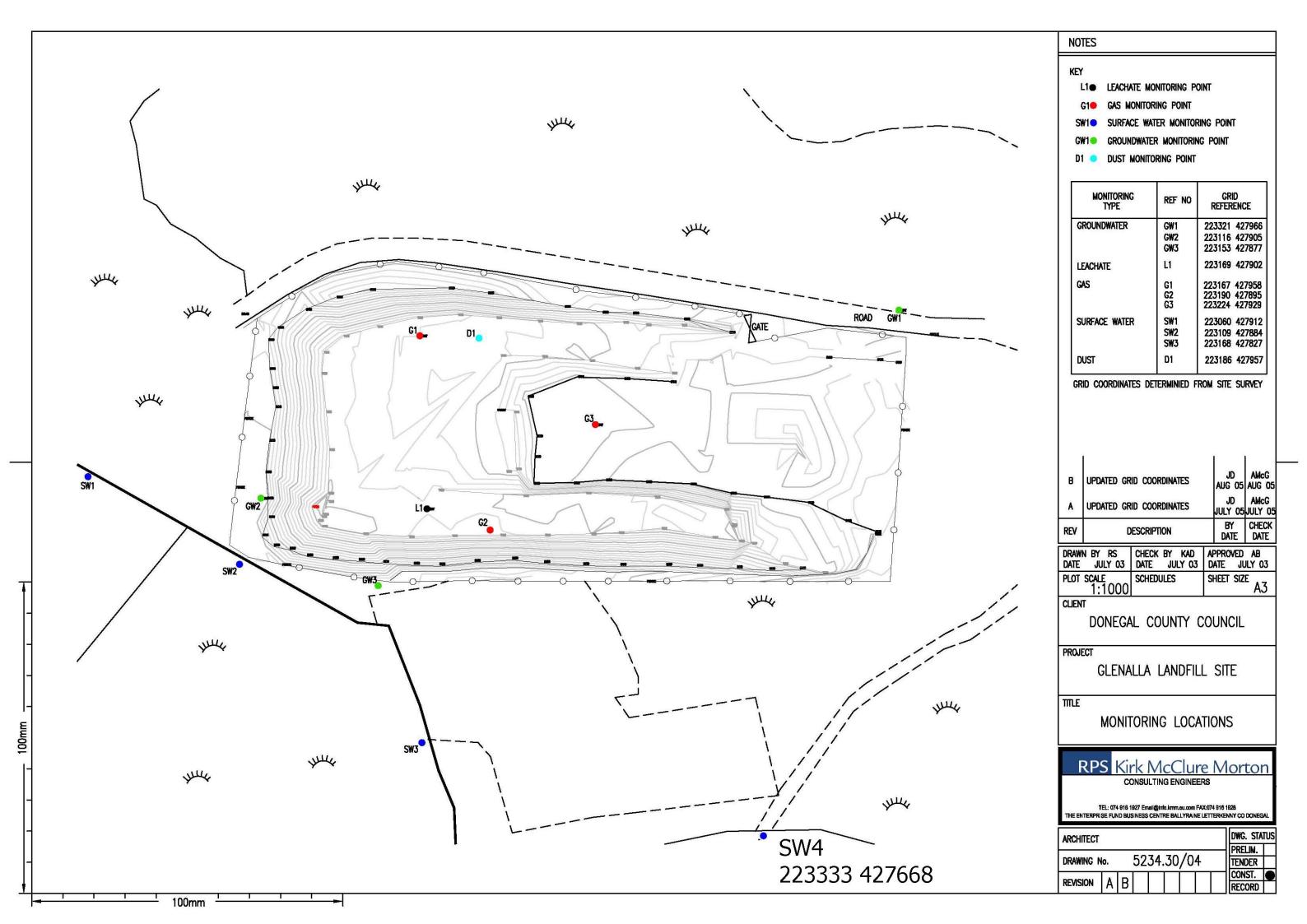
Туре	Label	Location (Grid Ref.)
Landfill Gas	G1	223167 427958
	G2	223190 427895
	G3	223224 427989
Dust	D1	TBC
Groundwater	GW1	223391 427948
	GW2	223154 427882
	GW3	223116 427905
Leachate	L1	223169 427902
Surface Water	SW1	223060 427912
	SW2	223109 427884
	SW3	223168 427827
	SW4	223333 427668

Table A2: Groundwater Parameters & Monitoring Frequencies

Bi-annually	A	Annually
Chloride	Boron	Magnesium
Dissolved Oxygen	Cadmium	Manganese
Sodium	Calcium	Mercury
TON	Chromium	Orthophosphate
TOC	Copper	Zinc
Phenols	Cyanide	Residual on evaporation
Ammoniacal Nitrogen	Fluoride	
Electrical Conductivity	Lead	
pH	List I/II substances	
Iron	Sulphate	
Potassium		
Temperature		
Groundwater Level		

Table A3 Surface Water Parameters & Monitoring Frequencies

Bi-Annually	A	Annually
Chloride	Iron	Magnesium
Dissolved Oxygen	Cadmium	Manganese
COD	Calcium	Mercury
Visual Inspection /Odour	Chromium	Orthophosphate
Ammoniacal Nitrogen	Copper	Zinc
BOD	Sodium	Potassium
Electrical Conductivity	Lead	TON
рН	List I/II substances	Sulphate
Suspended Solids		
Temperature		

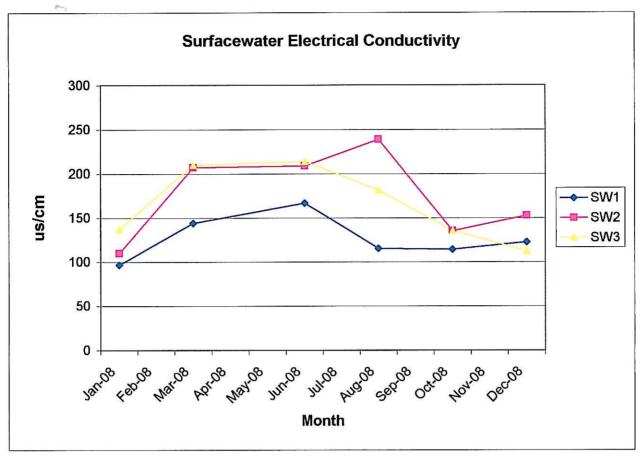


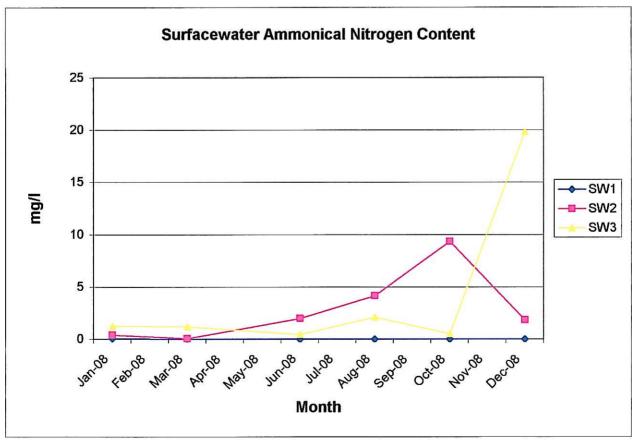
APPENDIX B MONITORING RESULTS

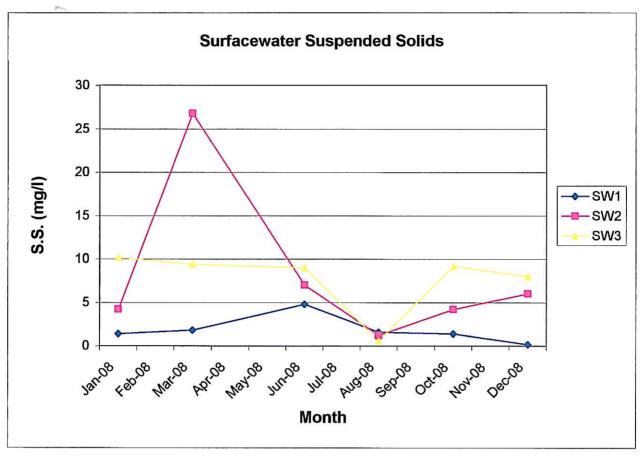
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	Site No) Inc	are water					
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Marie 0.056 1.0	Electrical Conductivity	uS/cm	97		77.01	+	1	14.53		17.0	H	9.51		0.7
Mile 135 125	Ammonical Nitrogen	/bu	0.08		100	1	1	167.0		115.4	L	1143	+	420
Mail 1251 1254	COD	/em	12			1	!	0.00	1	0	L	080	+	122.7
The color of the	BOD	/bu	20.0		7	1	!	19	ŀ	15		2003	1	0.015
Trigit 1.4	Dissolved Oxygen]/om	42 44	1	1.68	1	1	0.36		0.79	1	000	1	10
Ministry 1.44 1.45 1.4	SS	I/VE	12.11	-	11.51	1	1	9.74	ı	8 64		7,00	I	1.88
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Mail	Calclum	1/6II)	1	I	1	1	1	1		-		1.4	1	0.2
Digition Colored Col	Gadminm	I/Bn	1	1	1	1	1	11820					1	
Mail	Chromina	I/Bn	1	1	1	1	1	707		!	1		1	1
Migric	HID III O	l/Bn	1	1				100	1	1	1	1	1	ŀ
Mail	cnloride	l/gm	1		14 99		!	50.05	I	I	1	I	1	
Mg/I	Chlorine	l/gm	1		2			37.39	1	21.99	i	15.99		
Might Migh	Copper	l/bn	1			+	1	I	1	ı	1			
ugfl <td>Cyanide</td> <td>l/om</td> <td>i</td> <td></td> <td></td> <td>1</td> <td>1</td> <td>2</td> <td>1</td> <td> </td> <td>ı</td> <td> </td> <td></td> <td> </td>	Cyanide	l/om	i			1	1	2	1		ı			
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mg/l <td>Boron</td> <td>l/bn</td> <td>1</td> <td> </td> <td>ı</td> <td></td> <td></td> <td>1</td> <td>1</td> <td></td> <td>1</td> <td>1</td> <td>1</td> <td>1</td>	Boron	l/bn	1		ı			1	1		1	1	1	1
mg/l <td>Flouride</td> <td>mg/l</td> <td>1</td> <td>1</td> <td>!</td> <td></td> <td></td> <td>1</td> <td>1</td> <td>i</td> <td></td> <td>1</td> <td>1</td> <td>1</td>	Flouride	mg/l	1	1	!			1	1	i		1	1	1
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Toxic Units	Phosphorous	l/bm	ı	1			1	!		1	ı	1		
Toxic Units	Selenium	l/bm	1	!				1	-	1	ı	1		
Toxic Units	Silver]/bm	ı						1	1	ı	ı		
Toxic Units	Mircrotox	Toxic Units	1				-		1	1	ı			
mg/l 0.004 0.014	Microtox	Toxic Units	1	ı			1		1	1	ł	ı		
mg/l 0.1763 0.003 0.0094 0.004 0.004 0.000 0.000 0.030	Nitrite	l/bm	0.004		0.044	I	!		1	ı		1		1
mg/l 0.000	Nitrate	l/am	0.1763		0.014	1	1	0.009	-	0.0	I	0 004		100
Mig/I	Phosphate - ORTHO	ma/l	0000		0.0337	I	1	0.0094		0.00		0.030		0.000
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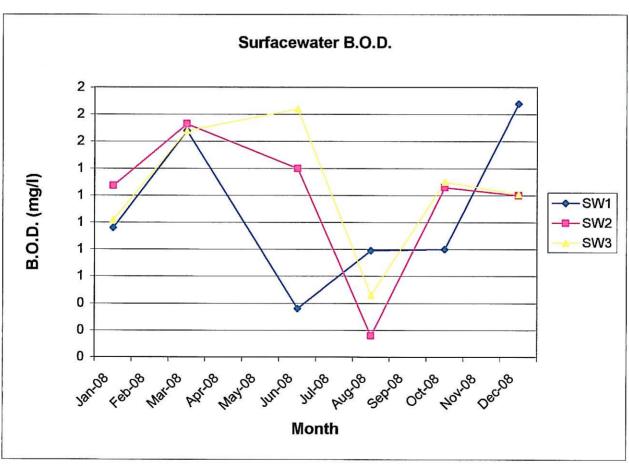
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Sample Type							surfac	surface water					
Site No							S	SWZ			· · · · · · · · · · · · · · · · · · ·		
Date of Sample		Jan	Feb	Mar	Apr	May	nnr	Juc	Aug	Sept	Oct	Nov	Dec
Lab No		1313	1	2237	1	1	3831	1	5441	1	6708	1	7653
STATES OF THE PERSON OF THE PE		7.33		7.16	I	1	7.05	1	7.01	-	969		7.00
Temp Temp	C	7.56		10.01	1	I	14.26	1	16.6	1	8.98	1	5.48
Electrical Conductivity	mS/cm	110	I	207	1	1	209	i	239	1	135.3	1	152.6
Ammonical Nitrogen	l/gm	0.40]	0.07	1	1	1.98	ı	4.16	1	9.33	-	1.83
COD	l/bm	14	1	22	1	I	20	1	27	1	19	ı	26
BOD	l/bm	1.27	I	1.73		1	1.4	I	0.16	1	1.26	Ì	1.2
Dissolved Oxygen	l/gm	12.02	1	11.25	ı	I	9.91	Ţ	7.6	ı	12.13	1	11.25
SS	l/gm	4.20	:	26.80	I	1	7.0	1	1.2	1	4.2	1	6.0
Residue on Evaporator	l/gm	I	I	ı	ı	I	I	I	1	I	1	1	1
Calcium	/bn	1	1	l	ı	I	15880	ı	1	1	1		
Cadmium	l/gu	I	1	I	1	1	<0.4	-	-	-	-		-
Chromium	l/bn	!	1	I	I	I	<0.05						
Chloride	l/gm	I	1	29.99	-	-	35.99		26.99		17.99		1
Chlorine	l/6m	I	I	1	-	-	1	1		ŀ	1	-	1
Copper	l/Bn	I	I	I	1		۲۷		-	-	-		l
Cyanide	l/6m	1	ı	ı	1	I	1	1	-				1
Dissolved Iron	l/Bn	1	1	1	1	-	156	-	ı	1			1
Lead Transfer	na/	-	1	1	1	-	۲۷	****	1		1		1
Magneslum	na/l		ı	-	1		4341	ı	1	1	ı	ı	1
Manganese	l/6n	ı	1		-	1	12	l	ı	ı	ı	1	1
Mercury	ng/l	-	1	1	1		<0.05	ı	ı	-	1	1	-
Nickel	l/6m	1	1	ı	ļ	-			1	-	ı	1	ı
Potassium	l/gm	1	ı	1	-		2.9	•			1	-	1
Sodium	l/6m	1	1			***	23.7	1	-	1	1	1	1
Sulphate	l/gm		1	1	1	-	20		-	-	1	1	ı
Zinc	l/bn	1	I	1	1		21	-			-	1	1
Total Alkalinity as CaCO3	l/gm	1	1	1		-	-	I	-	ı			I
Total Organic Carbon	l/gm	I	1	1	1	_	1	-	1	ı	-	1	-
Total Oxidised Nitrogen	l/gm	0.08	1	0.10	ı	1	0.28		00.00	-	060'0		0.10
Arsenic	l/gm	i	I	I		I	1	1	1		-		-
Barium	/bm	ļ	I	I	1	1	1	1	I	-	-		
Boron	l/6n	1	1	ı	1	I	I	I	1	-	-	1	
Flouride	l/gm	I	1	1	ł	ı	1	l	I	ı	l		-
Total Phenois	l/gm	ı	1	I	l	ı	1	I	I	1	1		:
Phosphorous	l/bm	1	I	1	I	l	ı	1	-	1	-		-
Selenium	l/gm	1	1	ı	1		ı	ı			ı	1	I
Silver	l/gm					-		ı		1	1	ı	i
Mircrotox	Toxic Units	1	1	1		i		ı	1	1	1	ı	ŀ
Microtox	Toxic Units	1	1	1	-			I		ı	ı	I	i
Nitrite	l/bm	0.005	1	900'0		ı	0.000	I	0.000	ı	0.000	ı	0.0
Nitrate	l/bm	0.0748		0.0915	1	1	0.2809	1	0.0000	1	0.090	I	0.10
Phosphate - ORTHO	l/gm	0.000		900.0		***	0.036	1	0.000	l	0.040	ı	0.07
Phosphate - TOTAL	l/6m	1	1	I	1	1	0.026			-		ı	1
Total Coliforms		-				-	l	ı	1	I		1	1
Facel Coliforms		37.79											
	WITH THE PERSON NAMED IN COMPANIES OF THE PERSON NAMED IN COMPANIE		1	I	ŀ	1	ı	1	-	١	ŀ	1	1

					TO STORY SERVICE STATE OF THE PARTY OF THE P	A STATE OF THE PERSON NAMED IN	The state of the s	The second second second	Total Agent Street Street Street			The second secon	
Sample Type							surfac	surface water					
Site No							S	SW3					
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	号	Aug	Sept	Oct	Nav	Dec
Lab No	IN STANSFALL BURNESSEE	1314	1	2238	1		3832	1	5442	1	6209	1	7654
Hd was a second	N MANAGEMENT OF THE PERSON NAMED IN	7.22	-	7.17	-	-	9.2		7.02		6.93		7.04
Temp	٥	7.43	1	9.91	ı	1	14.23	I	16.7	-	9.85		6.74
Electrical Conductivity	HD/SH	13/	1	210	ı	ı	214	ı	181.8	1	135.6		112.6
Ammonical Nitrogen	l/gm	1.25	I	1.20	ı	1	0.460	1	2.12		0.52	i	19.84
200	I/BEL	19	!	12	1	I	15	1	36	4	36	1	22
BOD	mg/l	1.0	ı	1.7	I	-	1.84		0.46	1	1.3	1	1.21
Dissolved Oxygen	l/6m	11.9	I	11.3	I	I	10.13	1	8.43	1	12.17	1	11.26
SS	l/gm	10.2	1	9.4	1		9.0	-	9.0		9.2	ı	8.0
Residue on Evaporator	mg/l	1	1	1	1	I		1	1	ı	I	1	1
Calcium	ug/l	-	-		1	-	15300	-	-	ı	1	1	ı
Cadmium	l/bn			-	-	ı	<0.4	1	1	ı	1	1	1
Chromium	l/bn	-	1	1	I	1	<0.05	1	1	1	ı	I	1
Chloride	l/bm	1	ı	24.99	1	1	35.99	ŀ	35.99		21.99	-	:
Chlorine	l/bm	1	l		l		1	I		I	1	-	ı
Copper	l/on		1	1		I	ⅳ	ı	ı		ı	!	!
Cvanide		1	1	ı	1	1	I			I			
Dissolved Iron	J/on	Ì	l	1	!	ı	170	l					
Lead	//on	ł	ı	ļ	ı	ı	V	ı		l	ı	l	1
Magnesium	l/bn	ı	ı	!	I	I	4414	ŀ	1	I	1		!
Manganese	l/6n	1	1	I	I	ı	8	ı	ı	ŀ	-	-	I
Mercury	l/bn		1	1	1	1	<0.05	1	1	ı	-	1	1
Nickel	mg/l	-	-	1	-	-		-	1	ŀ	I	-	1
Potassium	mg/l	1	1	I	1	1	2.8	-					1
Sodium	mg/l	-	-			1	22.6	-	****		1	1	1
Sulphate	l/gm	ı	****			1	22	1	1		1	1	ı
Zinc	ng/l	-		ı	-	-	18	ı	I		1		1
Total Alkalinity as CaCO3	mg/l		-		1	1	-		1				ŀ
Total Organic Carbon	mg/l		-	-			****	1	1		1	1	ı
Total Oxidised Nitrogen	mg/l	0.89		0.10	ı	1	0.450	1	00.00	1	0.000		90.0
Arsenic	I/bm	-		-		-	1	*****	1	1	1	1	1
Barlum	mg/l	1	1	1	1	1		-	-	-		***	1
Boron	l/6n	1	1	I	1	1	-	-				:	1
Flouride	l/gm	1	1	l	1	1	1	ı	-		-		
Total Phenois	l/gm	1	I	1	1	ı	-	-	-	1	1		-
Phosphorous	l/gm	1	I	1	1	1	1	1			-	-	
Selenium	/bm	1	I	1	1	1	-	1			-	1	1
Silver	mg/l	1	-	8			-			!	1	ı	ŀ
Mircrotox	Toxic Units		1	1	-	-	1	I		l			
Microtox	Toxic Units	-	1	1	-	1	1	ı	1	I	ı	1	1
Nitrite	I/bm	0.005	1	0.008	1	1	0.000	1	0.000	-	0.000	-	0.0
Nitrate	I/bm	0.8861	ı	0.0938	1	1	0.450	1	0.0000	ł	0.000	I	0.06
Phosphate - ORTHO	l/bm	0.001	1	0.004	1	1	0.015	1	00000	1	0.040	1	0.06
Phosphate - TOTAL	I/bm	1	1	ı	1	1	0.037	1	1	ı	ı	1	1
Total Coliforms		ı	1	1	ı	1	1	1	-	-	1	ı	-
Caral Colleanne	THE RESERVE OF THE PERSON NAMED IN COLUMN TWO												
ו שנכו ככוווסו	Contract of the Contract of th	1	I	-		1	I	1	l			1	





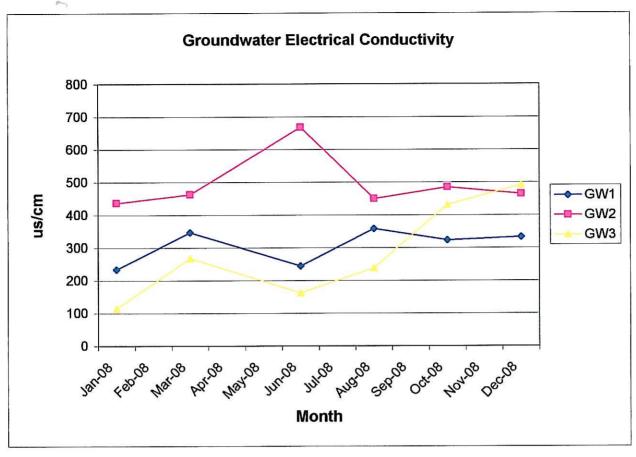


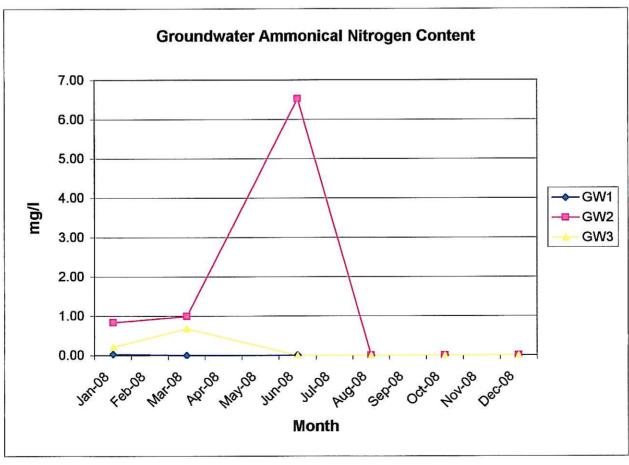


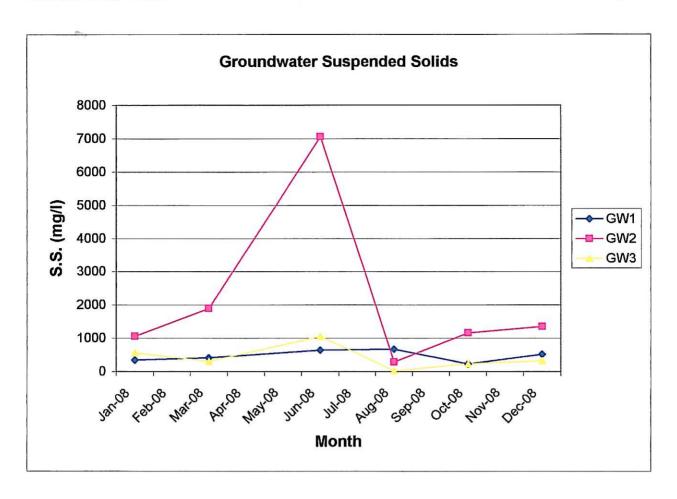
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Sample Type							groun	groundwater					
Site No							Ð	GW1			STATE STATE STATE		
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	E.	Aug	Sept	Oct O	Nov	Dec
Lab No		1315	1	2239	ı	ł	3833	١	5443	ı	6710	ı	7655
		96.9	1	6.86	I	1	6.80	1	6.9	1	6.75		6.73
Temp	C	69'6		10.18	1	1	14.35	ı	16.4	1	10.08	1	8.00
Electrical Conductivity	uS/cm	234	1	347	1	1	245	1	358	I	323.3	1	333
Ammonical Nitrogen	mg/l	0.04	1	00.0		1	0.00	ı	0.020	1	0.037	1	0.005
COD	l/bm		1	13	ı	1	17				1		
BOD	l/bm	1	1		I	l	l	1		1	1	1	l
Dissolved Oxygen	I/bm	5.31	ı	4.95	1	1	3.26	ı	4.57	1	4.66		4 44
SS	I/bm	347	1	412	ı	1	649.2	1	669.4	1	229.5	1	516
Residue on Evaporator	l/gm	ŀ	1	1	1	ı	212	1]			I	1
Calcium	I/6n	ı	i	I	1	1	57190	1	1	1	1	1	1
Cadmlum	I/bn	1	1	I	ı	ı	<0.4	1	I	ŀ	1	-	I
Chromium	l/bn	1	1	I			<0.05		-	ŀ	!	****	1
Chloride	l/bm	ı	1	15.99	I	ı	37.99	1	22.99		16.99	ŀ	1
Chlorine	l/bm	1	1	1	ı			ı	1	1	I	-	I
Copper	l/bn	-	1	1	1	1	₹	1	1	1			ı
Cyanide	l/bm	ı	1	1	I	ı	<0.05	1				ı	ı
Dissolved Iron	l/6n	1	ı	ı	1	l	71	ı	ı	1	<2	I	ı
Lead	l/bn	I	1	ı	1	1	۲			1		I	ı
Magnesium	l/bn	ł	1	ı	1	ı	7017	ı			I	1	I
Manganese	l/bn	****	 -	1	1	1	22	ı	1	1	ı	1	1
Mercury	I/bn	I	1	ı	1	1	<0.05	1	1	-	ı	ı	I
Nickel	l/bm	ı	1	I	ı	ı	1	1	l	1	ı		ı
Potassium	mg/l		-	-	1	1	3.5	ı	1	1	3.5	1	1
Sodium	mg/l	-	1	-			21.9	ı	1	ı	21.2	ı	ı
Sulphate	mg/l	-	1	-	1		22	ı	1	ı	1	I	1
Zinc	l/gn	***			****	. —	18		-	1	ı	1	1
Total Alkalinity as CaCO3	mg/l	1	1	-	-	-		1	****	V		1	ı
Total Organic Carbon	mg/l		(A-1-4)		-		***	-	ı	1	2	1	1
Total Oxidised Nitrogen	mg/l	1.12	1	0.23		****	00'0	l	90.0	I	0.093	1	0.148
Arsenic	mg/l	I	1	-	1				-	-		1	I
Barlum	mg/l		-		1	1	I	I	i	I	1	ı	1
Boron	ug/l	-			1	1	15		-	ı	-	-	I
Flouride	mg/l		1	-	1		<0.1	1	-	1	1	1	I
Total Phenols	∏ mg/l		-	1	ı	ı	0.02	1	I	1	<0.01	I	1
Phosphorous	l/bm		1	Ţ		ı	1	I			ı		I
Selenium	l/bu		1	1	1	1		ı		1			1
Silver	mg/l		ı	ı	ı	1	1	1	ı	1	1	1	I
Mircrotox	Toxic Units		1		-	ı	1	1			1	1	I
Microtox	Toxic Units	-	ı	1	1	1	1	1	1	1	ı		I
Nitrite	l/bu	0.007	1	0.000	*****	1	0.004	1	0.035	1	0.007	1	0.024
Nitrate	I/bm	1.1086	-	0.2340	ı	1	000000	1	0.0300	ı	060'0		0.12
Phosphate - ORTHO	l/bm	0.000	-	0.159			000'0	1	0.004	1	0.000	1	0.0
Phosphate - TOTAL	I/bm	-		1	-		0.487	1	1	ı	1	1	-
Total Coliforms		-		ı	ı	1	1	1	1			1	1
Facel Coliforms	To State Sta	1	0				0.0000000000000000000000000000000000000	-					
					-		l	!		1	1	1	-

							Cichana, minora do Bonega						
Sample Type							groun	groundwater					
Site No							15	GW2					
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	Jin	Aug	Sept	Oct	Nov	Dec
Lab No		1316	1	2240	1	ı	3834	ı	5444	1	6711	1	7656
He was the second of the secon		7.02	-	7.31	***		7.16	***	7.40	1	6.82	l	7.16
Тетр	ပ	9.02	1	11.13	1	1	14.41	W-770	16.6	1	1.22	I	8.62
Electrical Conductivity	uS/cm	437	1	463	1	I	699	I	450	1	486	1	465
Ammonical Nitrogen	l/gm	0.84	I	1.00	1	I	6.53	I	0.78	1	1.10	1	1.0
COD	l/gm	l	I					1	-	1		1	1
BOD	mg/l	-	1	1	ı	ı		ı	1	1	1	ı	ı
Dissolved Oxygen	l/bm	1.77	1	4.66	1	1	1.82	ı	3.28	ı	2.84	1	4.36
SS	l/6m	1058	1	1900	1	1	7064	1	292	1	1163	ı	1362
Residue on Evaporator	//bm	l	I	1	1	1	1201	1	1	I	1	ı	I
Calcium	l/bn	•	-		1	1	86970	1	ı	ı	1	1	1
Cadmium	l/bn	1	1	I	ı	ı	<0.4	1				I	1
Chromium	I/bn	ı	1	1	1	1	<0.05	I	1	1	1	1	
Chloride	l/bm		-	26.99	1	1	44.99	1	43.99	ı	36.99	1	I
Chlorine	l/pm	1	1	ı	ı	1	1	I	ı		ı	1	1
Copper	l/bn	1	1		ı	ı	۲۷	1	I	ı	l	-	1
Cyanide	l/bm	I		ı	I		<0.05	ı	ŀ	ŀ	1	1	ı
Dissolved Iron	I/bn	I		ı	ı	1	279	l	ı	!	<2	1	į
Lead	l/bn	1	1	I	1	ı	V	1	-	!	1	1	ı
Magnesium	l/bn	1	1	1	1	I	12770	1	1	1	1		ŀ
Manganese	l/bn	1	1	I	1	1	914	ı	1	1	1	1	1
Mercury	l/gu					ŀ	<0.05		-		1	1	1
Nickel	mg/l		ı	1	-		-	****	1				ı
Potassium	mg/l	1	1	10000			6.3		1		3.3		
Sodium	l/gm	1	I	1	1	1	62.7	-	ı		27.1		-
Sulphate	l/gm	1	1	1	1	1	7		-	-	-	****	
Zinc	l/bn	1	ı	i	I	I	18	1	1	1			1
Total Alkalinity as CaCO3	//bm	-	1	I	I	i	1	1	1	1	1	-	1
Total Organic Carbon	∏bm	1	i	I	1	l	***	I	I	I	2	1	1
Total Oxidised Nitrogen	mg/l	0.00	ı	0.03	1	1	0.00		00.00		0.000		0.0
Arsenic	mg/l	1	-	-	1	ı				1			1
Barium	//bm	1	1	1	I	ı	ı	I	I	ı	1		-
Boron	l/Bn	1	1	ı	1	1	51	-		-	1		1
Flouride	mg/l	I	ı	1	i	1	9.0	1	l	1	1		-
Total Phenois	∏/6m	1	ı	1	Î	1	0.02	1	1		<0.01		1
Phosphorous	l/gm	I	I	1	I	1	ı	I	1		1	-	-
Selenium	l/bm	1		ı	i		1	I	ı	1	1		ı
Silver	mg/l	ı	1	1	1	1	1	1	ı	-	1		I
Mircrotox	Toxic Units	l		i	I	1	I	1	1	1	-		
Microtox	Toxic Units	1	1	*****	i	I	-	ı	I	1	1	-	1
Nitrite	l/gm	0.000	1	0.000	avenue.	ı	0.000	1	0.000	1	0.000	1	0.0
Nitrate	П/6ш	0.000.0	1	0.0260	I	ı	0.000	li	0.0000		0.000		0.0
Phosphate - ORTHO	mg/i	0.050	I	0.148	1	1	0.036	1	0.000	1	0.040		0.16
Phosphate - TOTAL	l/gm	1	1	1	1	1	0.36	ı		-	1	I	1
Total Coliforms		ı	1	1	1	I	ı	1	-	1			ł
Facel Coliforms		ı	-	I	1	ı	ı			1		STATIS	00000

Location					The same of the sa				man				
Sample Type							groun	groundwater					
Site No							G	GW3					
Date of Sample		Jan	Feb	Mar	Apr	May	Jun	马	Aug	Sept	Oct	Nov	Dec
Lab No		1317	1	2241	ı	ı	3835	1	5445	ı	6712		7657
Hamilton PH (Company)	THE STREET, SHE WAS A STREET, SAN THE STREET,	6.77	-	6.33	-	-	6.03	-	6.09	ł	6.75	1	6.68
Temp	F REPUBLICATION	8.98	1	11.75	ı	1	14.20	I	16.2	1	11.30		7.73
Electrical Conductivity	uS/cm	115	1	268			162.9	****	239		432		493
Ammonical Nitrogen	mg/l	0.21		69.0	***		0.00	ı	1.33	1	2.15	1	2.64
COD	l/bm		-		l	1	ı	ı	1		1		1
BOD	l/bm	ı	ı	ı	1	1	I	ı		1	1	1	1
Dissolved Oxygen	I/bm	7.02	1	7.23	l	1	2.94	1	4.72		3.22	1	4.34
SS	l/bm	558	ı	310	1		1060.8	i	31	1	240		326
Residue on Evaporator	l/bm	1	ı	1	1	1	113	I	ŀ	1	1	-	1
Calcium	l/bn	1	ŀ	ŀ	1	1	21450	I	ı	1	1	1	1
Cadmlum	l/bn	1	I	-	i	I	<0.4	ĺ	1	!	1	1	1
Chromium	l/a/l	1	1	1	I	!	<0.05	1	ı	1	1	!	
Chloride	ma/l	ı	l	32.99	1		26.99	ı	45.99	ı	42 99	I	1
Chlorine	l/bu		I	ı	1	I			,	!	ı		1
Copper	l/on	1	1		ı	ŀ	7	1	I		ı		1
Cvanide	ma/l			ŀ	ı	1	<0.05	1	!			1	I
Dissolved Iron	l/on		I	1	ı		331	ı	ı	ı	2170		!
Cad Share Lead	l/bn	1	l	1	I		8	1	1	1	ı	1	!
Magnesium	I/bn	1	1	:	1	1	1750	1	i	1	1	1	I
Manganese	I/bn	1	1	1	ı	1	24	ı	I	1	ı		1
Mercury	l/bn	i	1	1	1	1	<0.05	ı	1	1	1	-	1
Nickel	l/bm	I	1	1	ı	1	1	ı	ı	ı	1	1	1
Potassium	l/bm		1			-	9.0		I	ı	2.9	1	1
Sodium	mg/l		1	-		-	14.5	1	1	1	18.2	1	1
Sulphate	mg/l	1	-		1	-	18	***		-			1
Zinc	l ng/l	I	1	-		-	21	****		***			1
Total Alkalinity as CaCO3	mg/l	1	I	1	1	1	-		-	1	-	-	
Total Organic Carbon	mg/l		1	-			***	-	****	1	14		ı
Total Oxidised Nitrogen	mg/l	0.00		0.08	1	-	0.00		0.00	1	0.160	I	0.0
Arsenic	l/bm	-	1	1	1	-				I			1
Barium	mg/l	1	1	1	I	1	1	-		1			1
Boron	l/6n	1	1	1	1	I	19	1	****				-
Flouride	l/Bm	l	l	1	1	-	<0.1	-	-	I		-	
Total Phenols	mg/l				-	-	0.02			ı	<0.01		1
Phosphorous	l/bm		-	-	1		-		1	1	ı	ı	1
Selenium	mg/l	-	-		-	1	i	1	1	ı	1		1
Silver	mg/l	-		-	1	-		1	1	ı	1	1	1
Mircrotox	Toxic Units		1	1	1	1	1	1	1	1	ı	1	1
Microtox	Toxic Units	1	-	-	1	-	-		ı	1	1		1
Nitrite	l/bm	0.000		0.000	1	-	000.0	ſ	0.000	1	0.000	1	0.0
Nitrate	l/bm	0.0000		0.0840	-		0.0000		0.0000	-	0.160	-	0.0
Phosphate - ORTHO	I/6m	0.040	I	0.167	1	1	0.036	I	0.000	1	0.050		90.0
Phosphate - TOTAL	∏/6m		1	1	-	l	0.26	1	-	i	****		-
Total Coliforms		-	1	-	-	-	-	1		1			-
Facel Coliforms			1	1	I	1	ı	1	1	-	ı		





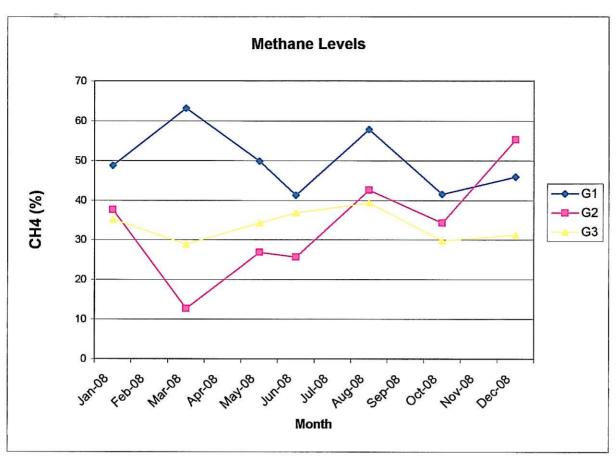


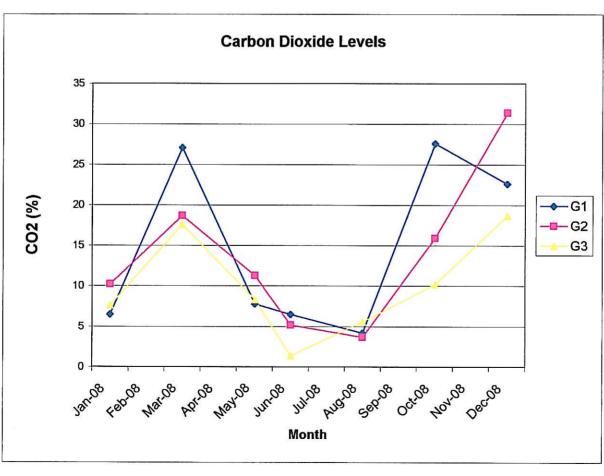
TOCONTO I													
Sample Iype							Dal	echate			THE PERSONAL PROPERTY.		
Site No								THE STATE OF					
Date of Sample		Jan	qө J	Mar	Apr	May	- Jun	in?	Aug	Sept	Oct	Nov	Dec
Lab No		1318	ı	2242	I	ı	3836	ı	5446	I	6713	1	7658
And the second of the second second		7.43		7.37	-	****	7.37	1	7.54	I	7.22	1	7.16
Temp	O.	12.13	1	14.28	ı	1	15.01	ı	16.4	1	12.09	-	9.52
Electrical Conductivity	m2/cm	1962	1	2250	l	l	1997	1	2010	!	2010	l	2109
Ammonical Nitrogen	l/gm	149.00	1	73.02	1	1	133.00	I	92.4	S	96.4	1	101
COD	l/bm	97	1	69	1	1	98	-	1402	i	882		1198
BOD	l/gm	31.0000	1	19.8000	1.00	1	61	!	17.7	1	8.1	1	1.4
Dissolved Oxygen	l/bu	2.26	****	3.51	I	1	0.68	1	2.02	1	2.79	ı	1.57
SS	l/bm	970	t	1584	l	1	1894	1	729.6		1224	1	754
Residue on Evaporator	l/bm	ı	ı	ı	ı	1	I	1	1	1	I	ı	1
Calclum	I/6n	ı	ı		ı	ı	92000		i	-	I	1	I
Cadmium	I/bn	ı	1	1		ı	<0.4		i	1	I	-	ŀ
Chromium	l/6n	I	1	ı]	ı	<0.05	1		i		1	
Chloride	l/bm	1	1	96.98	1	I	164.95	ı	354.96	ı	289.86	1	ı
Chlorine	l/bm	ı			1	1	I	ŀ	1	I	1	ı	1
Copper	l/bn	ı		ı	I	ı	۷	l		ı		ı	
Cyanide	I/bm	ı	1	I	:	ı	<0.05	,		1			
Dissolved Iron	l/on	1	ı	1	ı	ı	1960	1				l	1
Lead	[/DO	1	1	1	1	1	,	1	1			1	
Magnesium	I/bn	ı	ł	1	ı	I	65150	*****	ı	1	I	1	1
Manganese	I/bn	1	I	1	ļ	I	221	1	1	ı	1		1
Mercury	[/bn	ı	1	I	i	1	<0.05	ŀ	1	1	1	1	1
Nickel	I/bm	ı	1	ı	ı	ı	1	1	1	ı	ı		1
Potassium	l/6m	I	1	1	ı	ı	89.4	1				-	
Sodium	l/bm	1	1	1	1	1	134.8	I	-	ı	ı		1
Sulphate	I/bm	1	1	1			33	1	-	1	ı		1
Zinc	I/bn	1	I	ı	1		25	1			ı		1
Total Alkalinity as CaCO3	mg/l				ı	1		I	1		ı		1
Total Organic Carbon	l/bm	1	1	1	1	ı	1	ı		-	I		ŀ
Total Oxidised Nitrogen]/bm	0.79		0.13		1	0.00	ı	0.00	ı	0000		0.0
Arsenic	l/Bm	1	-		-	1		-	1	1	ı	1	1
Barium	l/Bm	-		-		-	-	I	1	1	1	1	1
Boron	Ug/l	1		1	-	1	1148	***		-	1	1	1
Flouride	l/gm	1		-		1	0.3	1	1	-	1	1	1
Total Phenois	l/Bm				-	1	ı	1		ı	I	ı	ŀ
Phosphorous	mg/l					-	1	1	I	l			
Selenium	l/Bm					-	1	-	ı	I	ı	1	1
Silver	l/gm	I		1		1	-			1	ı	ı	1
Mircrotox	Toxic Units	1	((1000)			-	****		1	ı	1	1	!
Microtox	Toxic Units	1	1			-	-			-	!	1	1
Nitrite	l/bu	0.200	-	0.000	1	1	0.000		0.000	-	0.000	1	0.0
Nitrate	mg/l	0.5900	I	0.1250	1	-	0.0000		0.0000	***	0.000	-	0.0
Phosphate - ORTHO	mg/l	0.050	ì	0.038		1	0.710		0.000		0.023	I	0.32
Phosphate - TOTAL	l/gm	l	l	1		-	1.64		1		-	1	1
Total Coliforms		ı	1	-	ı	-	-	***		-			1
Facel Collforms		1	1	-									
			0.0000000000000000000000000000000000000		•	l	I	1	ŀ	I	1	1	!

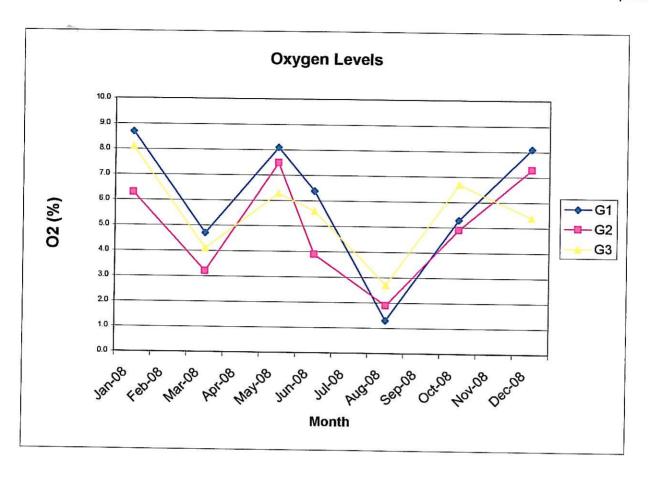
Location						Gle	Glenaila, Milford Co Donegal	Co Donega	ıı,				
Sample Type							Landfill Gas levels	Bvels					
Site No							64						
Date of Sample	ø												
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08		27-Mar-08	1	27-May-08 24-Jun-08	24-Jun-08	-	26-Aug-08	1	30-Oct-08	1	10-Dec-08
Methane	%	48.8	1	63.2	l	49.9	41.3		57.9	1	41.6		45.9
Carbon Dioxide	%	6.5	-	27.1	1	7.8	6.5	1	4.2		27.6		22.6
Oxygen	%	8.7		4.7	I	8.1	6.4	-	1.3	1	5.3		8.1
Atmos. Pressure	mBar	1005	ŀ	986	1	986	666	-	1005		1002		980

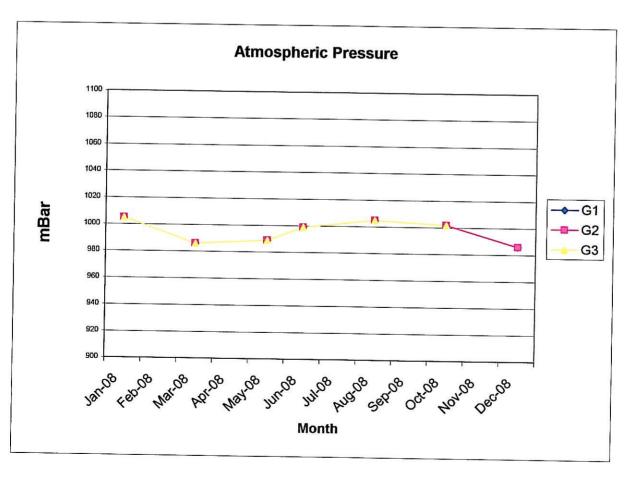
Location						3/5	Glenalla, Milford Co Donegal	d Co Done	egal				
Sample Type	9						Landfill Gas levels	as levels					
Site No							62	2					
Date of Sample)le												
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08	-	27-Mar-08		27-May-08 24-Jun-08	24-Jun-08	1	26-Aug-08	1	30-Oct-08	1	10-Dec-08
Methane	%	37.6		12.7		26.9	25.7	1	42.6		34.3	-	55.3
Carbon Dioxide	%	10.2		18.7		11.3	5.2	ı	3.7	l	15.9	ł	31.4
Oxygen	%	6.3	1	3.2		7.5	3.9	1	1.9	1	4.9	-	7.3
Atmos. Pressure	mBar	1005	ł	986	ì	686	666	-	1005		1002	1	986

Location						Glen	Glenalla, Milford Co Donegal	I Co Done	gal				
Sample Type	8						Landfill Gas levels	s levels					
Site No							63						
Date of Sample	ıle												
Parameters	Units	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date	Date
		30-Jan-08		27-Mar-08		27-May-08 24-Jun-08	24-Jun-08	I	26-Aug-08	1	30-Oct-08		10-Dec-08
Methane	%	35.2		28.9		34.3	36.9	1	39.4	1	29.8	1	31.3
Carbon Dioxide	%	9.2	-	17.6		8.3	1.4	1	5.6	1	10.2	1	18.7
Oxygen	%	8.1		4.1	1	6.3	5.6	1	2.7	1	6.7		5.4
Atmos. Pressure	mBar	1005		986		686	666	1	1005		1002	1	gRG









APPENDIX C WATER BALANCE CALCULATION

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sechete produced Lo(m3)	2547	2547
	2547	
Restored area Total Wide infiltration PCA(m3)	2547	
Restored	20500	
Temp Restored Inffitration IRCA(m3)		
Themp Restored Area	0	
Liquid Weste LW(m3)		
Action Area Inflimation R(AX(m²)		
Rents	1242.6	1243
	0	
119	-	
1	Closed	
i i	2008	Total

Fully Capped/Restored area Fully Capped/Restored area infiltration of mirrial estimated (2-10% of ER.) EPA Manual 10% % Area capped is 20,500. 20,500 m² Rainfall Data Data taken from Met Ereann Station Malin Head, Total Rainfall used. 124.2.8 mm	RCA=			
500. 20,500 at Efream Station Malin Head, Total Rainfall used.		Fully Capped/Restored area infiltration of minfall estimated (2-10% of ER) EPA Manual	10%	*
ot Efreann Station Main Head, Total Rainfall used.	Restored area	Area capped is 20,500,	20.500	2
of Erreann Staton Malin Head, Total Rainfall used.		1		
	Kaintali Data	et Eireann Station Malin Head, Total Rainfa	1242.8	E

APPENDIX D E-PRTR Regulations (AER Electronic Reporting System)

At the time of reporting passwords for the EPA's webbased database have not been issued for the 2008 period. Hard copy of this return will be forwarded to the Agency under separate cover when the return can be made.