Original

ANNUAL ENVIRONMENTAL REPORT.

LISDEEN RECYCLING CENTRE & TRANSFER STATION , CEMETRY ROAD, LISDEEN, KILKEE, CO. CLARE

LICENCE REF. NO W0170-01

Submitted by

Environment Section,
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Block B
I.A.P.E.
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Date: 2009

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1) Reporting Period

1/01/08 – 31/12/08

2) Details of Activity

The principal waste activity of the Transfer Station is the compaction of solid waste into 30 m^3 closed containers for subsequent disposal to landfill in accordance with Class 12 of the Third Schedule of the Waste Management Act, 1996. Other waste activity is the storage of non-recoverable waste received at the facility, prior to disposal at an appropriate facility in accordance with Class 13 of the Third Schedule.

Other waste recovery activities include recycling or reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes) in accordance with Class 2 of the Fourth Schedule, recycling or reclamation of metals and metal compounds in accordance with Class 3 of the Fourth Schedule, and recycling or reclamation of other inorganic materials in accordance with Class 4 of the Fourth Schedule. This covers the acceptance of waste oils, cooking oils, beverage cans, white goods, other metals, and glass at the facility.

3) Volume and composition of waste received during the reporting period.

The quantity of municipal solid waste accepted at the facility during the reporting period(s) was as follows:

Public Domestic Waste delivered to site	854.19	tonnes
Recyclable material delivered to site	805.96	tonnes
Total	1660.15	tonnes

The quantity of waste materials accepted for subsequent recycling/recovery for 2008 is as outlined in Table 3.1 below

Table 3.1

1	2	3	4	5	6
Material Type	**E.W.C. Code**	**No. of collections**	**Tonnage**	**% of overall total**	**W.C.S.[Note 1] 2001 % quantities arising**
Domestic waste	20 00 00 20 03 01		854.19	51.45	
Metals for recycling	20 01 40		75.54	4.55	
Glass for recycling	20 01 02		110.41	6.65	4.0
Aluminium Cans	15 01 04		3.9	0.23	
Plastic bottles	20 01 39		14.08	0.85	
Steel cans	15 01 04		19.94	1.2	
Car Batteries	16 06 01*		6.479	00.39	
Newspapers	20 01 01		75.67	4.56	10.5
Waste Engine Oil	13 02 00		0.00	0.00	
Cardboard	20 01 01		107.92	6.5	7.3
Tetrapak	15 01 01		0.8	0.05	
Timber	20 01 38		129.26	7.785	
Textiles	20 01 11		12.64	0.76	4.5
WEEE	20 01 36		249.32	15.02	

Note 1: W.C.S. Waste Characterisation Survey 2001 See Appendix VIII

The quantities of waste allowed for acceptance the facility under Schedule A of the licence at are as outlined in Table 3.2 below:

Table 3.2:

Waste Type	**Maximum (Tonnes per annum)**
Municipal Waste	1,800
Wastes for recovery/recycling	200 [Note4]
Total	2,000

Note 4: The amount of wastes accepted for recovery/recycling may be altered as long as the total accepted at the facility does not exceed 2000 tonnes per annum.

4) Summary report on emissions, including wastes from silt traps and interception sumps.

No desludging of the septic tank has taken place since installation. Loading on the tank is quite small with one w.c. and sink as well as run-off from waste transfer area.

5) Foul Water Emissions

There is no direct foul water discharge. Foul water is diverted to a septic tank unit, which in turn is discharged to a reed bed. This foul water is collected from w.c., sink unit, the transfer station shed, from the compactor and the bin transverse area. It comprises wash water and rainwater falling on the contaminated areas.

6) Surface Water Emissions

Surface water runoff from site roads and uncontaminated surfaces discharges to the surface water drains. There are no other emissions of any environmental significance from the facility.

7) Summary of Results and Interpretation of Environmental Monitoring.

Table 7.1. Lisdeen Transfer Station (WL170-1) Monitoring Schedule

Schedule D	Monitoring
D.1	Monitoring Locations
D.2	Waste Water
D.3	Landfill Gas
D.4	Surface Water, Groundwater and Leachate

Monitoring was conducted at the specified locations and frequencies as indicated in each of the above referenced Schedules of the Waste Licence, unless otherwise noted in this report. Monitoring locations are shown in Appendix 1. Wastewater monitoring has not been carried out to date as the discharge from the septic tank is directly to a percolation area. The reed bed system is now commissioned; however due to the low flow, it was not possible to obtain a sample from the system.

7.1. Landfill Gas

During this reporting period, landfill gas monitoring was carried out on a monthly basis at landfill gas wells L1 and L2. Monitoring was carried out in accordance with Schedule D.3 of the waste licence. Gas monitoring locations are shown in Appendix 1. Completed landfill gas monitoring forms for the period is available for inspection at the facility and can be forwarded if required. Landfill gas results for L1 and L2 are graphed in figures 7.1 and 7.2 below:

Figure 7.1:

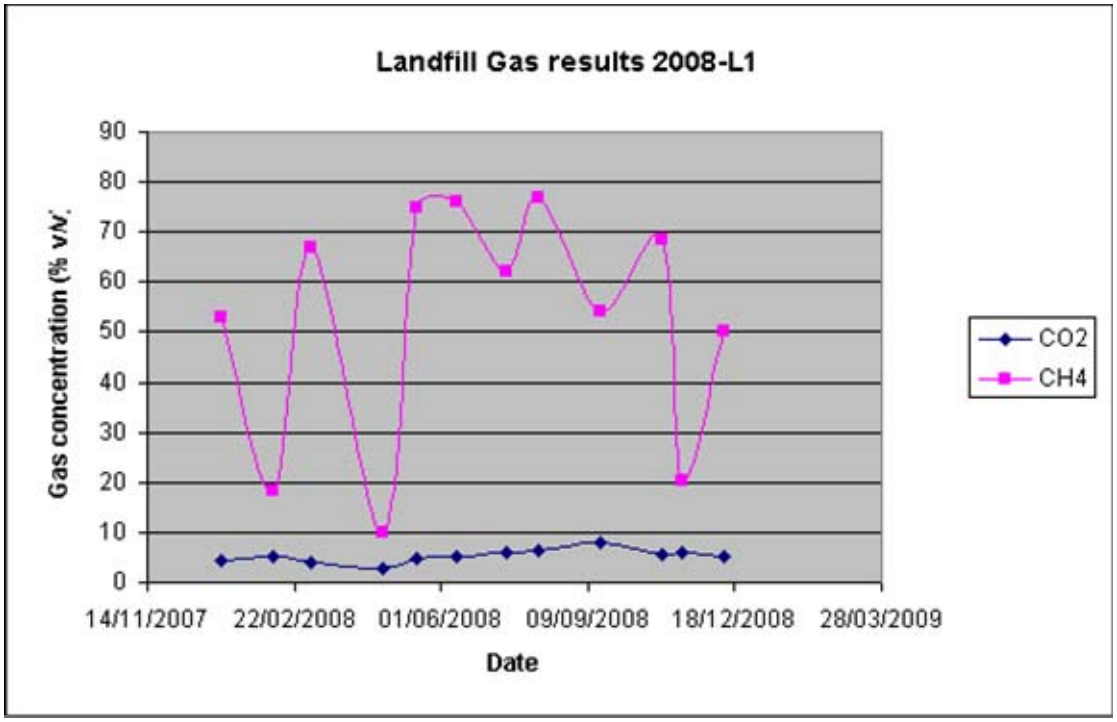
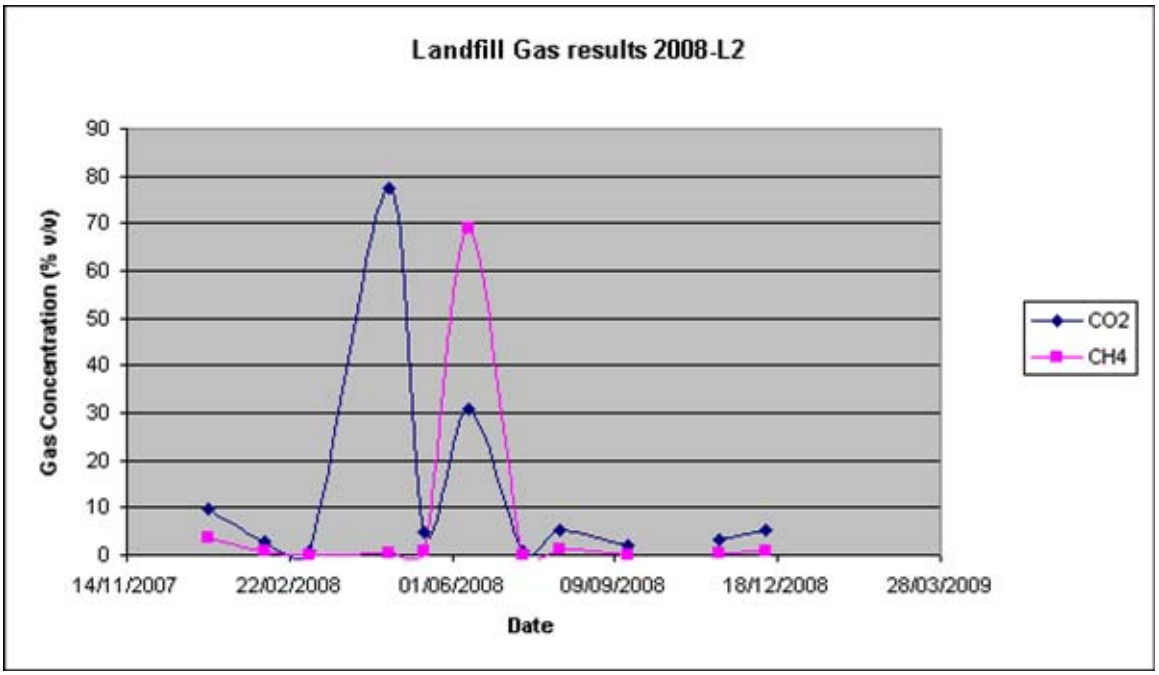


Figure 7.2:



The methane concentration at L1 is significantly higher than at L2 with the exception of the elevated methane levels at L2 (69%v/v) on the 11th June 2008 as displayed in Figure 7.1 and 7.2.

Both leachate wells are located in waste; L2 is located in the centre of the waste body and L1 is close to the northwest site boundary. Carbon dioxide levels for the majority of the year were similar at both locations with levels <10%v/v. However there were 2 exceptions to the low carbon dioxide levels with elevated results obtained on the 23rd April (77.6%v/v) and 11th June (31%v/v) at L2.

Landfill gas levels in the caretaker's office are continuously monitored using the online gas analyser. Periodic measurements using the GA 94 landfill gas analyser are also carried out as a back up method. No methane (<0.09%v/v) or carbon dioxide (<0.12%v/v) was detected in the caretaker's office by either monitoring method during the 2008 and are within trigger levels as stated in Condition 6.4.1 of Waste licence 170-1.

Surface Water, Groundwater and Leachate.

7.2 Surface Water

Surface water monitoring was conducted at SW1, SW3, SW5, SW5a and SW7 on the 19th August 2008. Surface water samples were collected for analysis as specified in Table D.4 of the Waste Licence. Temperature was carried out on site; Dissolved Oxygen was unable to be carried out due to an instrument error. TMS carried out all other analysis. Monitoring locations are shown in Appendix 1.

The proposed trigger values for BOD and Ammonia at the SW locations are presented in Table 4.1a .The trigger levels are considered to highlight a significant change in the water quality to normal results and require corrective action to be taken. The Ammonia at SW5 exceeded the trigger value, however as discussed below, that location is deemed stagnant.

Table 7.2a: Surfacewater trigger levels at Lisdeen Recycling facility

Monitoring well	**SW1**	**SW2**	***SW3***	***SW5***	***SW7***
Ammonia Concentration (ppm)	2.5	-	10	12.5	1.2
BOD Concentration (ppm)	38	-	10	36	10

Surface water monitoring results are attached in Appendix III. Graphs of surface water parameters, which are mentioned in this discussion, are presented in Appendix V (Figures 4.1-4.7).
Results are summarised below:

SW1

SW1 is located on Stream 1, upstream of the facility.
Concentrations of most parameters were similar to those obtained with previous surveys. The most noticeable decrease was in the BOD level (3ppm), which returned to pre 2006 (see Figure 4.1).

The fluctuating Iron levels at this location continue to fluctuate with a increase noted since 2007 (<2ppb→420ppb), which is consistent with the study which was carried out in November 2006 whereby elevated background iron levels were noted upstream of this location (see Figure 4.2).
Fluctuating results were also noted in the Chloride (326→77ppm), Sodium (210→40ppm), and Manganese (2314→5ppb) with significant decreases noted in the 3 parameters.

SW2

SW2 is located on Stream 2, upstream of the facility. TMS Environmental deemed this location inaccessible during the 2008 monitoring period.

SW3

Sample point SW3 is located on Stream 2 immediately downstream of the surface water discharge from the facility. It was noted in the 2007 AER that this location is the most saline of the surface water monitoring locations, however during the 2008 monitoring event there was a notable decrease in a number of parameters such as Boron (3547→1000ppb), Chloride (18076→64ppm See Figure 4.3), Magnesium

(991→277ppm), Conductivity (44000→9780µS/cm, see Figure 4.4) and Potassium (420→83ppm) indicating that during the time of monitoring the location may not have been under such tidal influence as previous monitoring events. Iron at this location increased ten fold since the last monitoring event (70→770mg/l see Figure 4.2). All other results were similar to those obtained during previous monitoring events.

SW5

Surface water sample SW5 is taken from the southern boundary drain, where the drain rises. As reported in the AER for 2007, it is now realised that this sample point is not the location that was originally agreed with the Agency. Monitoring at the existing SW5 location will continue however, as it provides information on the water quality of the site drain.

The results obtained for this location indicate poor water quality in comparison to the other surface water location monitored however this is to be expected as water in this drain was quite stagnant. Elevated results were obtained in Ammonia (19.6mg/l) and Suspended solids 2003mg/l)-see Figures 4.5,4.6. The Manganese (568→250ppb) and Iron (4076→310ppm) at this location has decrease since the previous monitoring event (see Figures 4.7 and 4.2). All other monitoring results were in line with previous survey results.

SW5a

As stated in the AER for 2006, no monitoring was carried out at this location prior to October 2007. This location is taken from Stream 3, which flows outside the site perimeter, parallel to the southern boundary drain (see drawing attached in Appendix II). Stream 3 receives the runoff from two land drains to the northwest and southwest of the site.

A decrease was noted for a number of parameters at this location since the previous monitoring event namely Boron (170→<50ppb), Chloride (805→64mg/l see Figure 4.3), Conductivity (2894→426µS/cm), Potassium (28→5mg/l) and Sodium (470→26mg/l).

The Iron level at this location had increased (49→110ppb) since the previous monitoring event. All other parameters at this location were satisfactory

SW7

SW7 is located on the main channel feeding to Poulnasherry Bay, downstream of all surface water discharges from the facility. This channel is cleansed by the tidal influx of salt water from Poulnasherry Bay. The Chlorine (24ppm-Figure 4.3) and Conductivity (1140μS/cm, Figure 4.4) were very low for this monitoring event indicating little/no tidal influence. A number of other parameter also displayed a reduction since 2007 namely Boron (110ppb), Calcium (55ppm), Potassium (14ppm), Magnesium (25ppm) and Sodium (133ppm). However increases in COD (105mg/l), Iron (740ppb Figure 4.2) and Suspended solids (216mg/l Figure 4.6) were apparent. All other monitoring results were in line with previous survey results.

7.3 Groundwater

Groundwater wells BH1, BH3s, BH3d, BH4s and BH4d were sampled on the 19th August 2008. Monitoring locations are shown in Appendix 1.

Groundwater samples were collected for analysis as specified in Table D.4 of the Waste Licence. Temperature measurements were made at the site by TMS Environmental staff. Dissolved oxygen could not be carried out due to an instrumentation problem on site. TMS carried out the analysis.

Groundwater monitoring results are attached in Appendix III. EPA Interim Guidance Values from *"Towards setting guidance values for the protection of groundwater in Ireland"* are shown on the result tables for comparative purposes. Graphs of a number of groundwater parameters, which are mentioned in the discussion, are presented in Appendix VI Figures 4.8-4.13.

Proposed trigger Ammonia values were set by Clare County Council for the Lisdeen groundwater wells as presented in Table 7.3a. The triggers levels are considered to highlight a significant change in water quality compared to historical results and require

corrective action to be taken. The Ammonia levels for the 2008 monitoring event did not exceed the trigger levels at any of the groundwater wells.

Table 7.3a: Groundwater trigger levels at Lisdeen Recycling facility				
Monitoring well	**BH1**	***BH3***	***BH3s***	***BH4***
Ammonia Concentration (ppm)	0.5	1.7	1.0	0.5

Results are summarised below:

BH1

BH1 is an artesian bedrock well located outside the site, adjacent to the northeast boundary.

In October 2006, a hydrogeologist carried out an investigation of the groundwater measurement at the Lisdeen recycling facility and it was confirmed that the groundwater well of BH1 is upgradient of the facility.

Results for BH1 in the 2007 monitoring period were similar to previous sampling events for this location. The results were satisfactory for all parameters except orthophosphate (0.389mg/l) and chloride (65mg/l) exceeding the interim guidance levels of 0.3mg/l and 30mg/l. The elevated chloride level (70ppm) is attributed to the tidal effects due to the proximity of the site to the Shannon estuary (see Figure 4.8). A number of metals have decreased in concentration since the previous monitoring event namely Iron (3→0.31ppb Figure 4.9), Chromium (9→<5ppb) and Manganese (538→68ppb Figure 4.10). As with all of the groundwater location TOC (<2→3.6ppm) increased at this location and Ammonia (0.3→<0.013ppm) reduced since the previous monitoring event.

All remaining parameters are consistent with 2007 results.

BH3d

BH3d is bedrock well located close to BH3s, downgradient of the main waste body.

This well displayed a similar trend to BH1 with chloride (61mg/l) and orthophosphate (0.458mg/l) outside the interim guidance values (see Figures 4.8). As with BH1 the elevated Chloride is attributed to the proximity to the Shannon estuary. A number of parameters also displayed a reduction at this location since the previous monitoring event namely Calcium (72.69→31ppm), Manganese (273→<5ppb) and Nickel (4→<0.02ppm). Boron levels increased at this location since 2007 (49→770ppb). As with all of the groundwater location TOC (<2→5.4ppm) increased at this location and Ammonia (0.3→<0.013ppm) reduced since the previous monitoring event.

All other parameters displayed a similar trend to the 2007-monitoring event.

BH3s

BH3 is an overburden well located within the landfill, close to the southern site boundary.

Elevated Chloride (63ppm Figure 4.8) and orthophosphate (0.559mg/l) were noted out interim guidance values at this location also.

Reductions were noted in Chromium (9→<5ppb Figure 4.14), Iron (<2→0.92ppm Figure 4.9) and Manganese (101→38ppb Figure 4.10) at this location since the previous monitoring event. As with all of the groundwater location TOC (<2→4ppm) increased at this location and Ammonia (<0.2→<0.013ppm) reduced since the previous monitoring event.

All remaining parameters remain almost unchanged since 2007.

BH4d

BH4d is a bedrock monitoring well located in waste and downgradient of the main waste body.

Like all the groundwater wells at the facility, chloride (65mg/l) and orthophosphate (0.387mg/l) exceeded the interim guidance values (see Figures 4.8). Likewards for the other groundwater wells a notable decrease was noted in a number of parameter such as Chromium (8→<5ppb Figure 4.14), Iron (3→0.13ppm) and Manganese (430→61ppb Figure 4.10). As with all of the groundwater location TOC (<2→5.3ppm) increased at this location and Ammonia (0.3→<0.013ppm) reduced since the previous monitoring event.

All other parameters displayed satisfactory results at this groundwater location for 2008.

BH4s

BH4s is an overburden well located within the landfill, close to the southern site boundary.

This is the third year in which this location has been monitored and therefore a trend is only beginning to be established. Chloride (66ppm) and orthophosphate (0.401mg/l) exceeded the interim limit values due to the close proximity to the coast and agriculture contamination respectively (see Figures 4.8). A decrease was noted in Chromium (9→<5ppb Figure 4.14) and Sulphate (27→<1ppm Figure 4.15). As with all of the groundwater location TOC (<2→4.8ppm) increased at this location and Ammonia (0.3→<0.013ppm) reduced since the previous monitoring event.

The remaining parameters displayed satisfactory results similar to 2007 monitoring event.

7.4 Leachate

Leachate monitoring was conducted at leachate wells L1 and L2 on the 19th August 2008, in accordance with Schedule D.4 of Waste Licence 170-1. The locations of leachate

monitoring wells are shown in Appendix 1. Leachate composition results for the period are included in Appendix III of this report. Graphs of leachate parameters that are mentioned in this discussion are presented in Appendix VII (Figures 4.11-4.12). Results are summarised below.

L1

Leachate well L1 is located to the northwest of the site.

The monitoring results obtained for 2008 for L1 were not similar to those obtained in 2007. This may have been due to the presence of lubrication oil contamination of this leachate well during 2007, which caused elevation in a number of parameters for the 2007-monitoring event or perhaps due unusually elevated volume of rainfall that occurred in August 2008, which may have contributed, to a dilution effect on the leachate. Therefore it is difficult to correlate the 2007 result with those obtained in 2008. However elevated results were obtained for a number of parameters in 2008, namely COD (285ppm), Iron (1100ppb) and Manganese (750ppb Figure 4.12). The remaining parameters were relatively low and similar to thoses obtained during previous monitoring events.

L2

L2 is located close to the centre of the waste body.

Because L2 is located in the body of the waste the concentrations of all parameters were significantly higher in L2 than L1. Monitoring results for L2 showed markable reduction in a number of parameters for 2008. This may be due to the extraordinarily high level of rainfall during August 2008 and therefore dilution effect of the leachate. There was a reduction in a majority of the parameters monitored. The only notable increases that were noted since 2007 were in Iron (173→8400ppb) and Manganese (1136→1800ppb), which are the 2 parameters that are present in natural background levels. All remaining parameters displayed a trend similar to that obtained for 2007.

8) Resource Consumption Summary

Diesel

800 litres of diesel was used to power the 3-phase generator on site.

Electricity

It is estimated that approximately 67413 units of electricity were used in 2008.

Water

Water supply to the site is via a connection to the group water scheme. Water usage on site is mainly for power washing yards, transfer station apron and hopper. 90,000 litres was the estimated use for 2008.

9) Development works undertaken during the period and timescale for proposed works.

There have been no development works undertaken during the reporting .

Clare County Council has received Part VIII Planning Permission to begin the remediation process. Clare County Council intend to begin works as soon as finances permit.

10) Full title and written summary of any procedures developed by the licensee during the previous year.

No procedures were developed during the past year.

11) Drum, Tank and Bund Testing.

In 2007 Clare Council purchased a new Bunded unit. We are currently awaiting the Certification of Integrity from the suppliers and will forward this to the EPA when received.

12) Reported Incidents and Complaints Summaries.

There were no complaints received during the year and no incidents recorded at the facility.

13) Review of nuisance controls

No review of nuisance controls was carried out during 2008; no nuisances were noted at the facility during 2008 therefore a review was not considered to be necessary.

14) Schedule of Environmental Objectives and Targets

Objective 1

Comply with all aspects of the licence.

> Target 1.1 - Every effort will be made to comply with all conditions of the waste licence by the prescribed dates.

The Senior Engineer, Executive Engineer in charge, Deputy Site Manager, Executive Chemist and Environmental Patrol Warden have responsibility for implementing this objective.

Objective 2

> Ensure that sufficient funds are available to comply with condition 12 of the licence.

Responsibility for ensuring compliance with this objective lies with the Finance Officer of Clare County Council.

Objective 3

Increase the quantity of waste collected for recycling at the facility.

Target 3.1-Increase the quantities of cardboard and newspaper collected at the Recycling Centre. Suitable containers for each waste type will be provided on site and the public will be informed by means of appropriate awareness campaigns.

Target 3.2-Increase the quantities of glass, aluminium cans, and steel cans collected at the Recycling Centre.

The Senior Engineer, Environmental Services has responsibility for implementing this objective with the assistance of the Executive Engineer in charge and the Environmental Awareness Officer in the Environment Dept.

Objective 4

Improve facilities at the facility.

Target 4.1 - Make facility more user-friendly by providing containers and providing clear instructions as to what these are for. This will allow for proper segregation of recyclable streams. All bulky wastes and hazardous wastes will be stored in one particular area of the facility and this area will be secured thus allowing for greater supervision when these recyclable streams are being deposited. This will also eliminate traffic hazards. On occasion there is difficulty with turning/reversing manoeuvres at the facility due to large stockpiles of white goods and large recycling receptacles.

Target 4.2 - Provision of additional recyclable streams by year-end.

The Executive Engineer in charge has responsibility for implementing this objective.

Objective 5

Improve correspondence with the E.P.A.

Target 5.1 - Council will make every effort to reply to letters of correspondence received from the Agency by the requested dates.

The Executive Engineer in charge and Senior Staff Officer have responsibility for implementing this objective.

Objective 6

Comply with condition 3.10.1

Target 6.1 - Install by mid-2008 an interceptor as per condition 3.10.1 of the waste license, as part of overall landfill remediation programme.

This has been incorporated into the remediation plan.
The Executive Engineer in charge will have responsibility for implementing this objective.

Objective 7

Advance the Restoration and Aftercare Plan.

Target 7.1 - Implement the first phase of the Restoration and Aftercare plan as agreed with the Agency.

The Senior Executive Engineer, Executive Engineer, Finance Officer and Senior Staff Officer have responsibility for implementing this objective.

Time scale

The time scale for achieving these objectives will by years end 2009.

Designation of Responsibilities

The Senior Engineer, Environmental Services Section of Clare County Council has overall responsibility for the implementation of these objectives. The specific responsibilities for each objective are outlined in the description.

15) Progress of objectives and targets

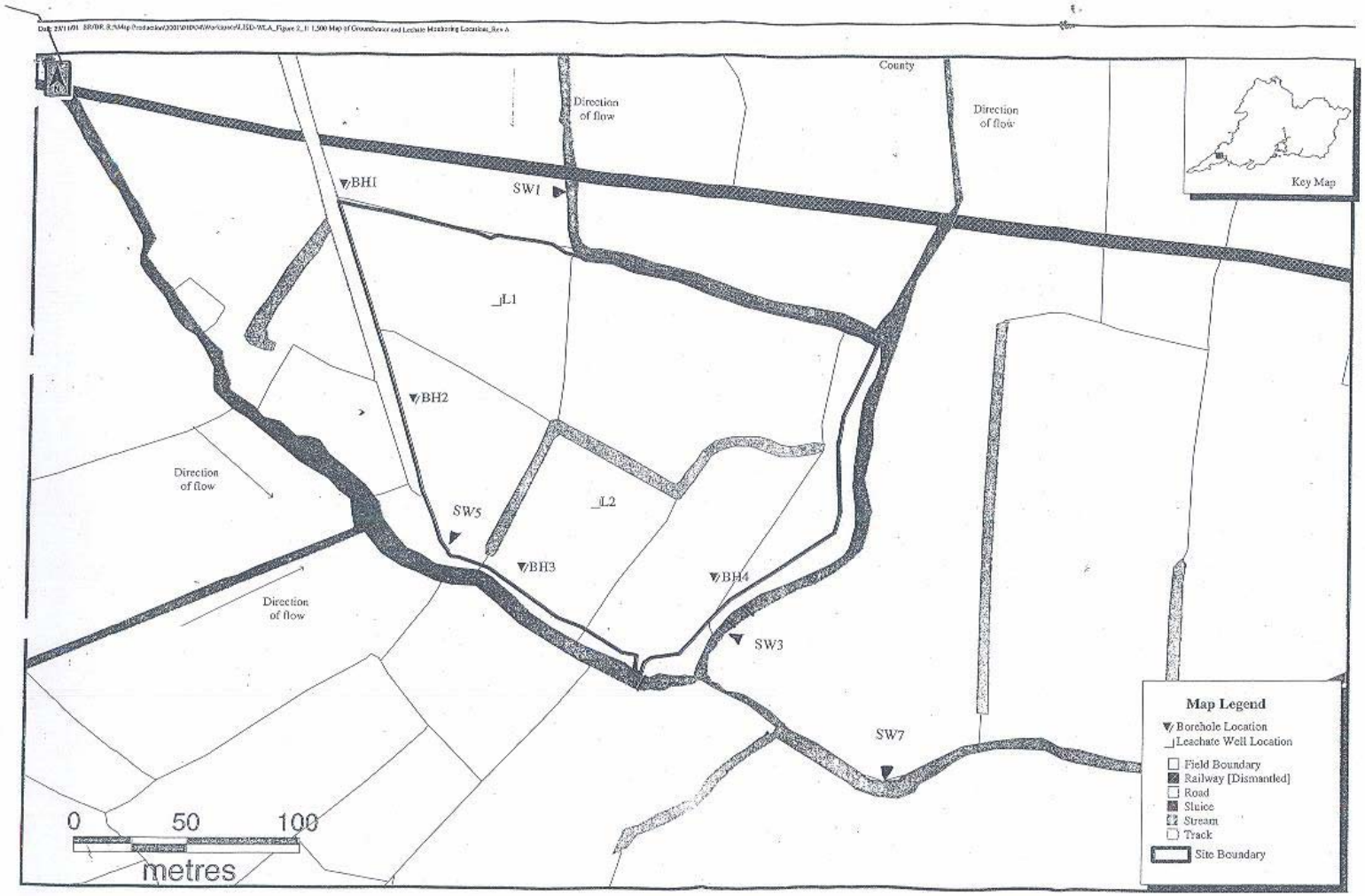
Objective 1	This is ongoing and mainly successful, the licensee will continue to aim for maximum compliance.
Objective 2	Funding has been made available and the licensee will continue to ensure funding is made available.
Objective 3	During 2008 we increased collections of non-municipal wastes to 48.5% of all material excepted onto site.
Objective 4	The licensee placed additional signage to improve user friendliness on the site. The licensee will continue to review the site layout in order to provide the best possible service. We introduced the following new waste streams: rigid plastics and flourescent tubes (WEEE).
Objective 5	Correspondence with EPA as set out by EPA is an ongoing objective, the licensee will continue to progress this objective.

Objective 6	Installation of the oil Interceptor will form part of the remediation project.
Objective 7	This project will proceed when funding becomes available

16) Financial Provision

A sum of €249,000 has been set aside in the 2008 Clare Co. Council Budget for the operation of the facility. Additional monies are being sought through grants from the Department of the Environment and Local Government for the capital works relating to the Restoration and Aftercare of the Site.

Appendix I
Location of Monitoring Points



Fehily Timoney & Company

1: 1,500 Map of Groundwater and Leachate Monitoring Locations

Figure 2

Appendix II
Summary of Surface Water Monitoring Results

Sample Type:	Surfacewaters					
Location:	Lisdeen Transfer Station					
Date:	19/08/2008					
Sampled By:	TMS Environmental					
Variables	SW1	SW2	SW3	SW5	SW5a	SW7
Biochemical Oxygen Demand (ppm)	3	n/s	3	3	<2	<2
Boron (ppb)	90	n/s	1000	240	<50	110
Calcium (ppm)	33	n/s	139	54	46	55
Cadmium (ppb)	<5	n/s	<5	<5	<5	<5
Chloride (ppm)	77	n/s	64	49	64	24
Chemical Oxygen Demand (ppm)	70	n/s	70	85	85	105
Electrical Conductivity (uS/cm)	528	n/s	9,780	572	426	1140
Chromium (ppb)	<5	n/s	<5	<5	<5	<5
Copper (ppb)	<5	n/s	<5	<5	<5	<5
Temperature (Celcius)	17.1	n/s	19	17.2	17.6	18.4
Iron (ppb)	420	n/s	770	310	110	740
Potassium (ppm)	2.1	n/s	83	11	5	14
Magnesium (ppm)	11	n/s	277	18	8.5	25
Manganese (ppb)	<5	n/s	11	250	5	5
Sodium (ppm)	40	n/s	212	34	26	133
Ammoniacal Nitrogen (ppm)	0.166	n/s	<0.013	19.6	<0.013	<0.031
Nickel (ug/l)	<20	n/s	<20	<20	<20	<20
Lead (ppb)	<10	n/s	<10	<10	<10	<10
pH	7.43	n/s	7.36	7.12	7.51	8.18
Total Suspended Solids (ppm)	9	n/s	30	203	5.5	216
Zinc (ppb)	<10	n/s	<10	<10	<10	<10

Appendix III
Summary of Groundwater Monitoring Results

Sample Type:	Groundwater					
Location:	Lisdeen Transfer Station					
Date:	19/08/2008					
Sampled By:	TMS Environmental					
Parameter	BH1	BH3	BH3s	BH4	BH4s	Limits(1)
Alkalinity (ppm)	326	346	344	330	331	No abnormal change
Barium (ppm)						
Boron (ppb)	73	770	86	82	80	1000
Calcium (ppm)	70	31	70	46	60	200
Cadmium (ppm)	<0.005	<0.005	<0.005	<0.005	<0.005	5
Chloride (ppm)	65	61	63	65	66	30
Cyanide (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Electrical Conductivity (uS/cm)	716	751	747	729	730	1000
Chromium (ppb)	<5	<5	<5	<5	<5	30
Copper (ppm)	<0.05	<0.05	<0.05	<0.05	<0.05	30
Iron (ppm)	0.31	0.019	0.92	0.13	2.1	200
Fluoride (ppm)	0.216	0.205	0.224	0.245	0.245	1
Mercury (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	1
Potassium (ppm)	3.5	4.3	4.2	3.8	3.8	5
Magnesium (ppm)	23	19	23	16	17	50
Manganese (ppb)	68	<5	38	31	1500	50
Sodium (ppm)	68	84	90	93	111	150
Total soilds (mg/l)	419	464	467	398	432	Not specfied
Temperature (Celsius)	13.1	13.8	14.2	14.4	14.8	25
Ammoniacal Nitrogen (ppm)	<0.013	<0.013	<0.013	<0.013	<0.013	0.15mg/l (ammonium)
Nickel (ppm)	<0.02	<0.02	<0.02	<0.02	<0.02	20
Orthophosphate P ppm	0.389	0.458	0.559	0.387	0.401	0.03 (Orthophosphate)
Lead (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	10
pH	7.54	7.49	7.57	7.52	7.53	6.5-9.5
Phenols (ppm)						
Sulphate (ppm)	6.48	7.17	12.5	6.23	<1	200
Total Organic Carbon (ppm)	3.6	5.4	4	5.3	4.8	No abnormal change
Total Oxidised Nitrogen (ppm)	0.8	0.9	0.8	<0.7	0.7	No abnormal change
Total phosphorus (ppm)	0.48	0.73	0.78	0.46	0.65	
Zinc (ppm)	<0.01	<0.01	<0.01	<0.01	<0.01	100
Semi volatiles (ppb)	<2	<2	<2	<2	<2	-
VOC's (ppb)	<1	<1	<1	<1	<1	-

Limits quoted are Interim Guidance Values from EPA document "Towards setting guidance values for protection of Groundwater in Ireland"

Appendix IV
Summary of Leachate Monitoring Results

Sample Type:	Groundwater	
Location:	Lisdeen Transfer Station	
Date:	19/08/2008	
Sampled By:	TMS Environmental	
Parameter	L1	L1
Alkalinity (ppm)	281	1200
Barium (ppm)	1.1	0.14
Biochemical Oxygen Demand (ppm)	<2	5
Boron (ppb)	0.39	0.33
Calcium (ppm)	70	199
Cadmium (ppb)	<5	<5
Chloride (ppm)	24	195
Cyanide (ppm)	<0.01	<0.01
Chemical Oxygen Demand (ppm)	285	90
Electrical Conductivity (uS/cm)	542	2450
Chromium (ppb)	16	11
Copper (ppb)	<50	<50
Iron (ppb)	1100	8400
Fluoride (ppm)	0.18	0.16
Mercury (ppb)	<10	<10
Potassium (ppm)	10	77
Magnesium (ppm)	9.4	67
Manganese (ppb)	750	1800
Sodium (ppm)	22	229
Ammoniacal Nitrogen (ppm)	0.15	57
Orthophosphate P	<0.1	<0.1
Lead (ppb)	15	23
pH	7.04	6.75
Sulphate (ppm)	4.1	9.5
Total Organic Carbon (ppm)	8	20
Total Oxidised Nitrogen (ppm)	0.7	77.6
Total phosphorus (ppm)	0.17	0.35
Zinc (ppb)	700	74
SVOC (ppb)	<2	<2
VOC (ppb)	<1	<1

Appendix V
Graphs of Surface waters

Figure 4.1: Surfacewater BOD levels

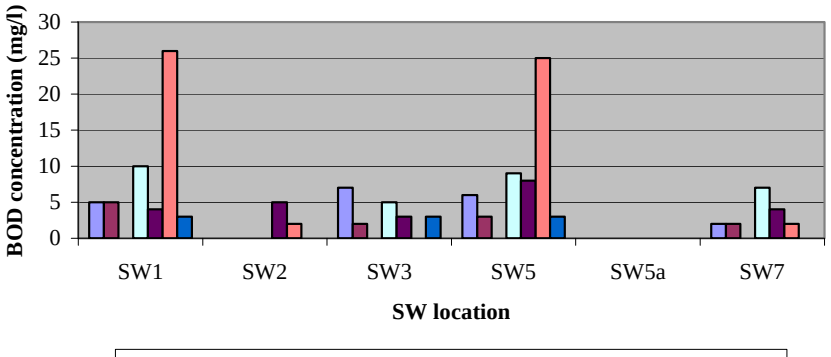


Figure 4.2: Surfacewater Iron levels

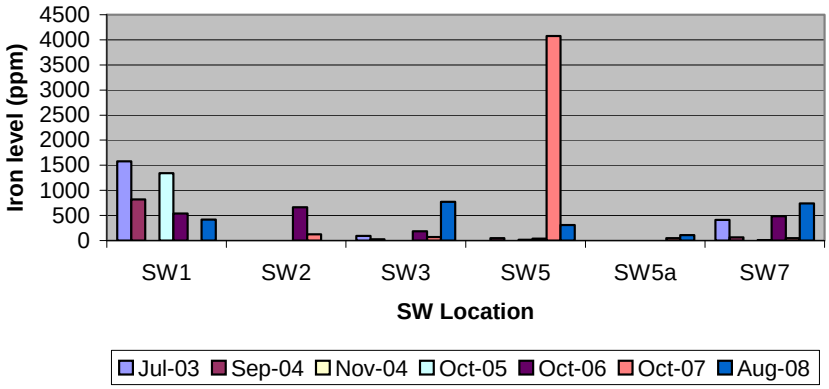


Figure 4.3: Surfacewater Chloride levels

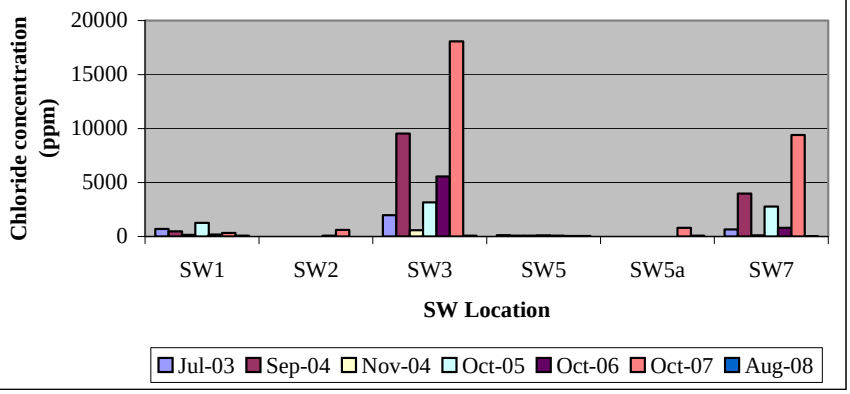


Figure 4.4: Surfacewater Conductivity levels

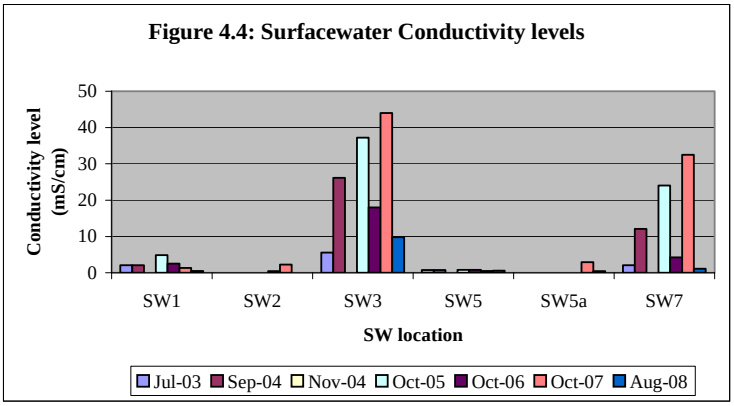


Figure 4.5: Surfacewater Ammonia levels

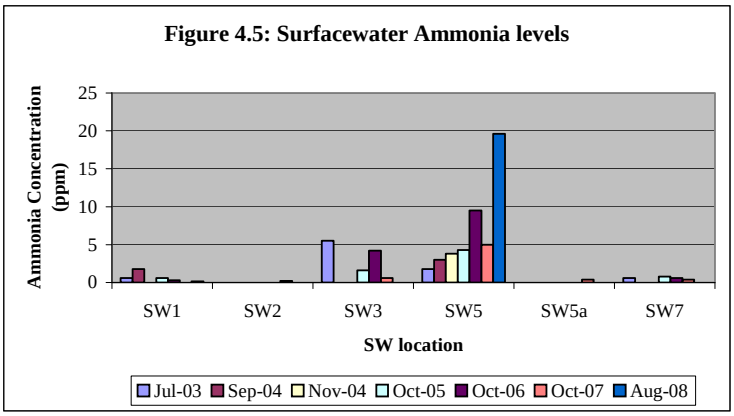


Figure 4.6:Surfacewater Suspended solid levels

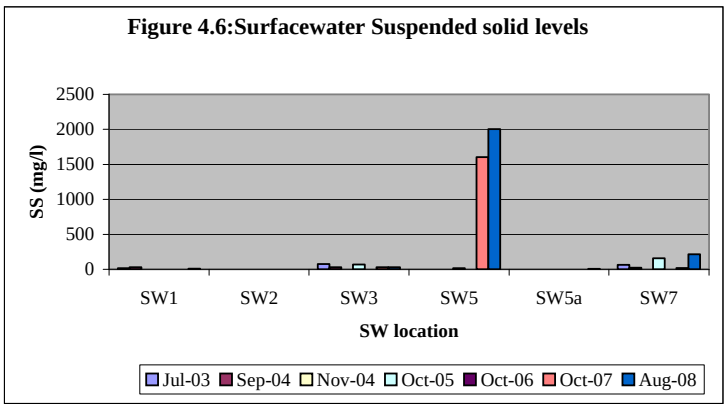
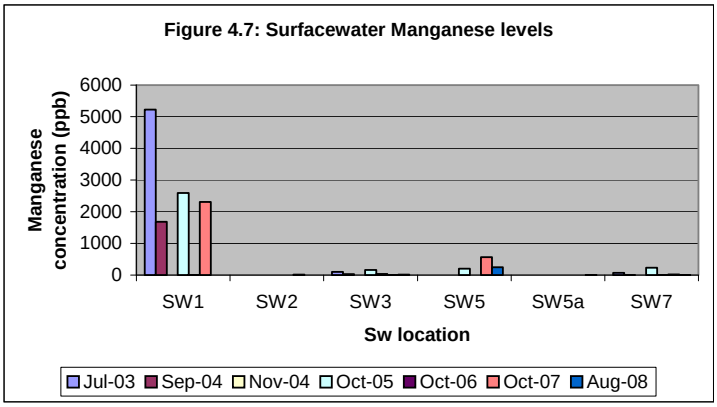


Figure 4.7: Surfacewater Manganese levels



Appendix VI
Graphs of Groundwaters

Figure 4.8:Groundwater Chloride levels

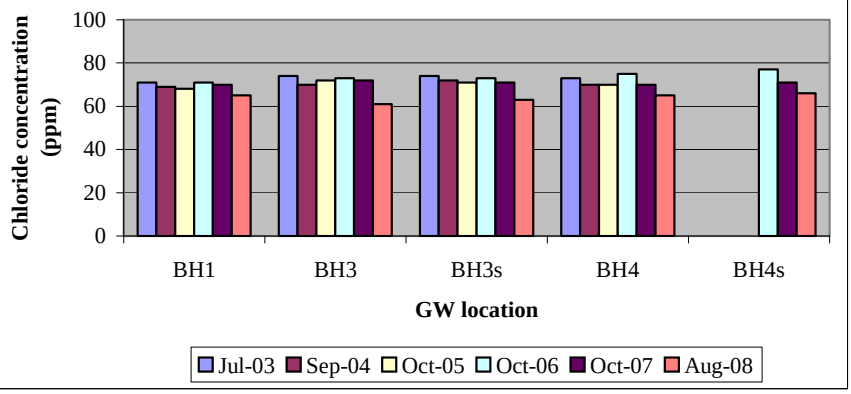


Figure 4.9:Groundwater Iron levels

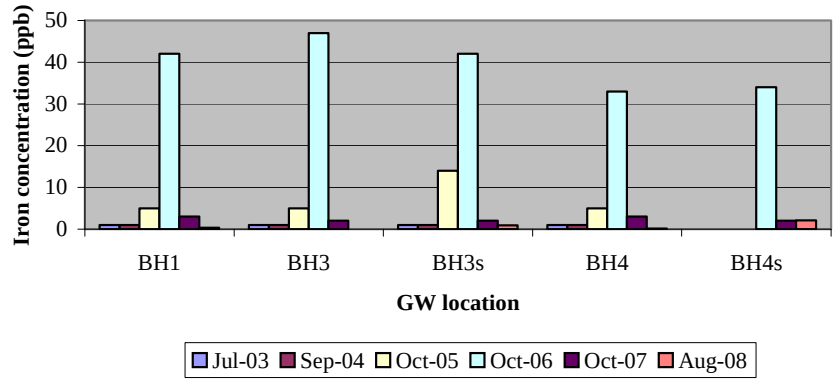
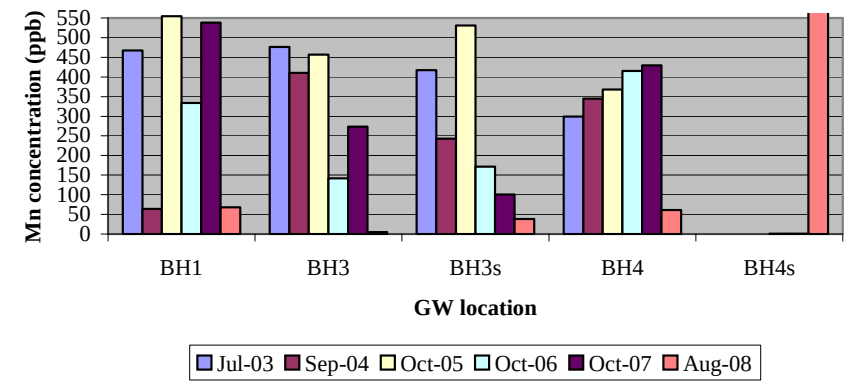


Figure 4.10: Groundwater Manganese levels



Appendix VII
Graphs of Leachate

Figure 4.11:Leachate Ammonia Levels

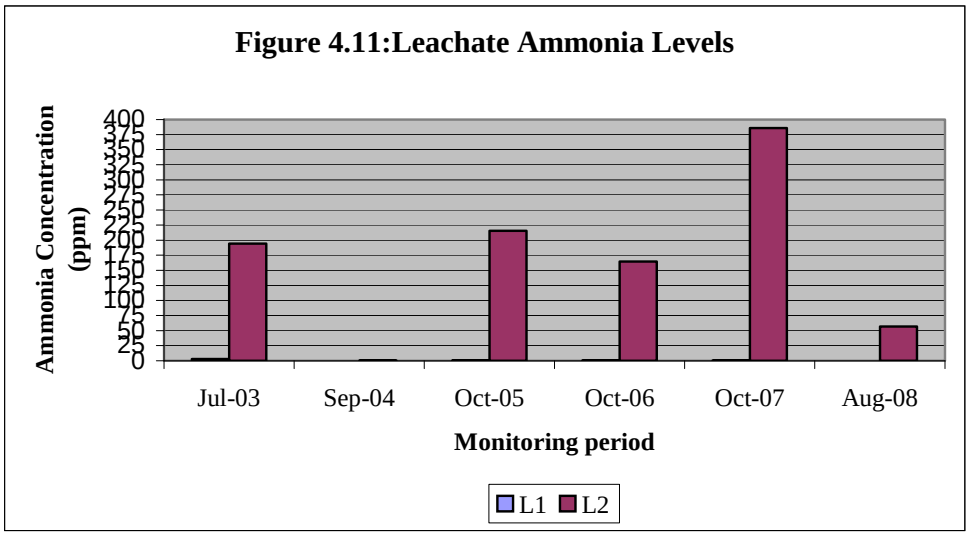


Figure 4.12:Leachate Manganese Levels