Ms. Linda Dalton,
Inspector,
Environmental protection Agency,
Inniscarra,
Co. Cork.

24th April 2009

Re:- Derryconnell Landfill Site W0089-02, 2008 Annual Environmental Report

In accordance with condition 11.12 of Waste Licence W0089-02, please find enclosed an original and 2 copies of the Annual Environmental Report for the year 2008.

I trust that this is to the satisfaction of the Agency.

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Deirdre Williams
Facility Manager

Annual Environmental Report 2008

1899 ~ 1999

A Century of Service

Derryconnell Landfill and Civic Amenity Site

WASTE LICENCE REGISTRATION NO. W00089-01

Prepared By: -
Deirdre Williams
Facility Manager

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1. INTRODUCTION

1.1. Scope and Purpose of the Report

The Environmental Protection Agency (EPA) issued Cork County Council with a Waste Licence (Waste Licence No. W00089-01) for Derryconnell Landfill site on 25th October 2000. In accordance with the requirement of Condition 2.8.1 of the waste licence,

> *'The licensee shall submit to the Agency for its agreement, within thirteen months from the date of grant of this licence, and within one month of the end of each year thereafter, an Annual Environmental Report (AER).'*

1.2. Reporting Period

This is the seventh AER to be submitted under Condition 2.8 of the licence and covers the reporting period 1st January 2008 to 31st December 2008.

1.3. Site Location

The facility address and contact numbers are detailed below:
Derryconnell Landfill,
Derryconnell,
Schull,
Co. Cork
Tel. (028) 37048
Fax: (028) 37742

The National Grid Reference for the site is E9627, N3396.

2 DESCRIPTION OF THE SITE

2.1 Waste Management Activities at the Facility

Waste Activities at the Derryconnell landfill site are restricted to those outlined below: -

Waste Management Act, 1996: Third Schedule

Class 1: This refers to normal landfilling operations up to a maximum of 14,000 tpa in any one-year.
Class 4: The storage of leachate and contaminated water pending its disposal at another appropriate facility.
Class 5: Landfilling operations in lined cells up to a maximum of 14,000 tonnes per annum.
Class 13: Temporary storage of waste, which is unsuitable for deposit at the facility and which has been duly notified to the Agency.

In accordance with Schedule G of the Waste licence the waste categories and quantities acceptable at the facility are as shown in Table 2.1.

Table 2.1: Waste Categories and Quantities Acceptable at the Facility

Waste Type	Maximum Tonnes Per Annum
Household	**10,800**
Commercial	**1,200**
Construction and Demolition	**2,000**
Total	14,000

2.2. Management and Staffing Structure of the Facility.

The site employs four full-time site staff: -

- One Facility Manager
- One Machine Operator (operates compactor).

- Two personnel acting as Deputy Facility Operator/Site Caretaker/General Operative.
- In addition there is one part-time relief Caretaker / General Operative.

Table 2.2: Managerial Staff

Position	Employee Contact Details
Senior Executive Officer	Cork County Council,
Ms Grainne O'Mahony	Hume House, Wolfetone st,
	Clonakilty, Co. Cork.
	Telephone No: 023-58812
	Fax No: 023 58814
Senior Executive Engineer	Cork County Council,
Mr. Paudie Hegarty BE MIEI	Hume House, Wolfetone st,
	Clonakilty, Co. Cork.
	Telephone No: 023-58812
	Fax No: 023 58814
Assistant Engineer	Cork County Council,
Ms Mairead Hales BE MIEI	Hume House, Wolfetone st,
	Clonakilty, Co. Cork.
	Telephone No: 023-58812
	Fax No: 023 58814
Facility Manager	Derryconnell Landfill Site,
Ms Deirdre Williams Bsc	Derryconnell,
	Schull, Co.Cork.
	Telephone: 028-37742 Fax No: 028-37742

Table 2.3: Site Staff

Employee	Position	Duties and Responsibilities	Experience / Qualifications
Mr. John Hurley	Compactor Operator	Spreading, compacting and covering waste safely and economically, checking waste loads spreading & compacting.	Over 20 years experience of work on landfill at Derryconnell.
Mr. Joe Newman	Site Caretaker/ Deputy Facility Manager	Site upkeep, collection of charges and maintenance of on-site records and implementation of waste acceptance procedures.	Approximately 10 years experience at Derryconnell. Completed Module 4 & 6 of Fas Waste Management Training Course. Was present for the day training in the running of the Flare and is responsible for the daily opening of valves and the overall care of the machine. Completed the Waste Management Operative Training 22-23/11/05.
Mr. Frank Cronin	Deputy Site Caretaker/ Site Operative	Site upkeep, collection of charges and maintenance of on-site records and implementation of waste acceptance procedures.	Approximately 10 years experience at Derryconnell. Completed Module 4 & 6 of Fas Waste Management Training Course. Was present for the day training in the running of the Flare and is responsible for the daily opening of valves and the overall care of the machine. Will attend the Waste Management Operative Training in Jan 06.
Mr. Jerry McCarthty	General Operative	Site upkeep, collection of charges and maintenance of on-site records and implementation of waste acceptance procedures during holiday periods.	Joined Cork County Council in May '02. Previously worked with ESB & Telecom Eireann. Undergone Safe Pass Course. Will attend the Waste Management Operative Training in Jan 06

2.3. Waste Quantities and Composition

The quantity and composition of the waste received and disposed of during the reporting period, at the facility is recorded below.

Table 2.4: Quantities of Waste received and disposed/landfilled (tonnes) of During the Reporting Period January 2008 to December 2008.

Waste Deposited at Derryconnell Landfill - 2008				
Month	**Household**	**Commercial**	**Construction & Demolition**	**Total**
January	635.02	87.8		722.82
February	602.4	86.84		689.24
March	565.76	37.7		603.46
April	583.16	69.24		652.4
May	563.02	54.98		618
June	584.42	63.54		647.96
July	747.46	77.2		824.66
August	763.54	36.88		800.42
September	668.16	69.04		737.2
October	521.54	29.52		551.06
November	602.96	107.44		710.4
December	584.88	39.76		624.64
Totals	**7422.32**	**759.94**		**8182.26**

The quantity and composition of the waste received and recovered during the reporting period, at the facility is recorded below.

Table 2.5: Quantities of materials recovered during the reporting period.

Service Provider	***Waste Type Recovered***
Greenstar	*Paper, Cardboard & Plastic.*
Rehab	*Glass & Aluminium Cans*
Green Dragon	*Food Tins*
Cedar/KMK	*Waste Electrical & Electronic Equipment*
Enva Ireland Ltd	*Batteries and Aerosols*
Bantry Skip Hre	*Scrap Metal & Timber - transported by Bantry Skip Hire*
Irish Lamp Recycling	*Light Bulbs*
Enva Ireland Ltd	*Waste Oil*
Clothes Recycling Ire Ltd	*Clothes – transported by African Clothing Exports Ltd*

Month	**Greenstar**	**Rehab**	**Green Dragon**	**WEEE Ireland /KMK**	**Enva Ireland Ltd**	**Bantry Skip Hire**	**Irish Lamp**	**Enva Ire Ltd Aerosol**	**Enva Ire Ltd Oil**	**Clothes Recycling Ire Ltd**	**Tot. Mth**
January	23.72	1.88/12.46	1.62	11.1	1.32	5.78/8.74		0.12			**66.74**
February	18.82	0.2/7.22	1.26	15.3		11.6/14.76				**2.64**	**71.8**
March	18.94	0.26/6.62	0.72	9.8	2.0	10.88/14.28	0.16	0.08	1.3	**1.7**	**66.74**
April	23.44	0.12/13.12	0.74	9.42		9.9/12.52				**1.06**	**70.32**
May	22.5	0.3/6.58	0.92	8.96	1.14	10.82/12.14	0.16			**1.2**	**64.72**
June	23.24	0.14/7.19	0.58	11.88		4/6.48					**53.51**
July	30.92	0.26/18.88	0.8	13.96	1.84	17.78/14.32	0.04	0.12	1.24	**2.16**	**102.32**
August	32.58	0.3/13.18	1.18	13.74	2.5	12.9/14.9				**1.46**	**92.74**
September	21.36	0.24/7.46	0.64	15.74		15.24/8.64				**3.82**	**67.32**
October	23.74	0.06/7.34	1.12	8.1	1.18	12.82/13.3		0.14		**1.72**	**69.52**
November	20.34	0.16/8.42	0.92	17.34		12.72/9.3			1.6	**1.7**	**72.5**
December	23.34	0.22/11.98	0.62	6.82	2.64	14.06/5.84		0.1		**0.42**	**66.04**
Totals	**282.94**	**4.14/120.45**	**11.12**	**142.16**	**12.62**	**138.50/135.22**	**0.56**	**0.56**	**4.14**	**17.88**	**870.29**
Total 2008											**870.29**

2.4 Site Capacity

The filling sequence outlined below is based on the current landfill rates.

Table 2.6: Phasing of Filling and Restoration Operations

Phase	Available Capacity (m3)	Available Capacity Months	Filling Commencement Date	Filling Completion Date	Restoration Completion Date
Cell 1	0	0	Feb 2004	Nov 2004	March 2005
Cell 2	0	0	Nov 2004	Aug 2006	July 2007
Cell 3	Approx 5,000	4-5	Sept 2006	July 2009	September 2009
Total		**5**			

3 SITE DEVELOPMENT WORKS

3.1 Works During 2008

No major construction works were carried out on site at Derryconnell Landfill Site in 2008. The works, which commenced, are as follows:

- Replacement of TOC machine due to lightning in January 2008.
- Repairs to netting around cell 3.
- Improvements of Civic Amenity area.

4. EMISSIONS AND ENVIRONMENTAL MONITORING DATA:

4.1 Monitoring points

All surface water, ground water, leachate, gas, noise and dust monitoring points are shown on drawing no.1. These consist of the following:

Groundwater	5 no. (GW1, GW2, GW4, GW5, GW6, GW7 & GW8)
Surface water	9 no. (SW1, SW2, SW3, SW4, SW5, SW6, SW7, SW8, SW9)
Leachate	7 no. (L1, L2, L3, L4, L5, L6, L7, L8)
Dust	4 no. (D1, D3, D6 and D8)
Noise	8 no. (N1, N2, N3, N4, N5, N6, N7, N8)
Gas	7 no. (L1, L2, L3, L4, L5, L6, L7 GW1, GW2, GW4, GW5, GW6, GW7 & site office

All sampling and monitoring on site is carried out by Cork County Council personnel. Following a request from the EPA in 2004 reporting is via two biannual reports, which replace the programme of quarterly reporting previously in operation at Derryconnell.

4.2 Leachate

4.2.1 Leachate generation

Waste was deposited in Cell 2 until its closure in August 2006. Cell3 was then opened and Cell 2 remains uncapped to date.

The leachate lagoon was operational through out the year. The total volume of leachate removed from the lagoon in 2008 was 22378.4 m3. All leachate was removed to Bandon treatment plant in 2008. It is

noted that the amount of leachate removed was higher than the predicted leachate volume as determined by the monthly water balance calculations. Although it is noted that predictions of leachate generation can vary considerably the use of rainfall data from Cork Airport may significantly underestimate rainfall in the coastal area of West Cork in which the landfill is located. Appendix 1 details the water balance calculations and a summary of the monthly water balance calculations is shown in Table 4.1

Table 4.1 Water balance calculations

Month	**Predicted Leachate generation (m3)**
January	3323.45
February	3217.21
March	2628.97
April	605.79
May	575.75
June	438.53
July	1013.54
August	1774.86
September	1755.45
October	2873.29
November	2104.54
December	2067.04
Cumulative total	**22378.4**

4.2.2 Leachate monitoring results

Schedule E.5 of licence W00089-01 specifies that monitoring of leachate is to be undertaken at eight locations: L1, L2, L3, L4, L5, L6, L7 and the leachate lagoon. Cork County Council carried out monitoring of the leachate lagoon weekly.

During 2006, four leachate wells L1, L2, L4 and L8 were redrilled beside each of the original wells. Samples were not successfully sampled from leachate wells L1 and L4 due to low levels in volume.
A low volume sample was taken from L1 in April 2008; samples were taken from L4 on two occasions in June and November 2008.
Samples were taken from the leachate lagoon on a weekly basis and these showed the chemical results to be within the normal range for leachate.

4.3 Air Emissions

The following are included under this category:
Dust
Landfill Gas

4.3.1 Dust

Schedule E.3 of licence W00089-01 specifies that monitoring of dust levels is to be undertaken at four locations: D1, D3, D6 and D8. Dust monitoring is required three times per year, twice during the period May to September and once between October and April. Dust monitoring during the current recording period was undertaken in August, September and December.

Dust levels were satisfactory at all four monitoring locations during August, September and December and the values detected were lower than the limit of 350 mg/m2/day, specified by the licence.

4.4 Landfill gas

Schedule E.1 of EPA licence W00089-01 specifies that landfill gas monitoring is to be undertaken at stations L1, L2, L3, L4 L5, L6, L7, L8 and the site office. Weekly gas monitoring is carried out at leachate wells L5 and L6, at groundwater wells GW6, GW7 and GW8. Monthly

gas monitoring is carried out on all leachate and groundwater wells on site, L1, L2, L3, L4, L5, L6, L7, L8, GW1, GW2, GW4, GW5, GW6, GW7 and GW8. Schedule E.1 notes that monitoring is to be undertaken monthly at all stations excluding the site office where weekly monitoring is required.

Measurement of the following parameters is specified: methane (CH_4), carbon dioxide (CO_2), oxygen (O_2), atmospheric pressure and temperature. Schedule F.2 of the licence specifies methane and carbon dioxide limits of 1% v/v and 1.5% v/v respectively in any building on or adjacent to the landfill, including the site office. Monitoring of landfill gas is undertaken directly by Cork County Council personnel. Monitoring is carried out using a portable Gasdata LMSxi real-time infrared analyser.

Sampling period January-June 2008

The highest levels of methane were being produced within the landfilled area at the four boreholes L1, L2, L4, and L8 with no methane being produced at L3, L5, L6 and L7 during this sampling period.

The highest levels of methane were recorded at L8 in January at 65%. High values were also recorded for leachate wells L1, L2 and L4 ranging from 57% to 63%. Following a request from the Agency to change the gas monitoring on site the Leachate wells L1, L2, L4 and L8 are now only used for levels and sampling, the gas balancing wells W1 – W13 are now monitored on a monthly basis for gas monitoring to replace the 4 leachate wells within the landfill. Methane levels were generally consistent during the first two months of 2008 at L1, L2, L4 and L8 with greater fluctuations recorded at L8 coming into the summer months. The highest levels of methane were produced at wells W2 with a value of 75.2% in April. At L5 carbon dioxide was detected throughout the sampling period ranging from 0.1% to 1.3%.

For L6 the carbon dioxide values detected through out this monitoring period ranging from a low 0% in January to a high 1.4% in May and June. For L3 the carbon dioxide values were found to be continuously very low during this six month sampling period.
No methane was detected at either of the groundwater wells GW1, GW2, GW4, GW5, GW7 and GW8 during the period January to June 2008. At GW6 methane was detected on three sampling occasions ranging from 0.1% in March and 0.2% in February and April 2008. The highest detected level of carbon dioxide was at GW2 and GW6 with a value of 1.4% carbon dioxide. No exceedances of landfill gas concentration limits specified in the licence were recorded at the site office, methane was not detected and carbon dioxide was detected on 4 occasions with the highest value recorded at 0.1%.

Sampling period July-December 2008

Results of the 2008 Quarters 3 & 4 monitoring programme indicate that as expected the highest levels of methane are being produced within the landfilled area in the gas monitoring wells W1 – W13. The highest methane value was recorded at gas monitoring well W2 with a value of 69.5% in December 2008. High values for methane were also recorded at the remaining gas monitoring wells ranging from 52% up to 68.9% at W13. There are two accessible leachate wells located outside of the landfilled area: L5 and L6. At L5 methane was only found on one occasion at 0.1% in October 2008.
Carbon dioxide was detected through out the monitoring period at L5 with the exception of four samples. No methane was detected at L6. Carbon dioxide was detected through out the monitoring period at L6 with the exception of one sample in November. At L7 no methane was detected. Carbon dioxide was detected on all sampling occasions.
No methane was detected at L3 and carbon dioxide was only detected on two of the six sampling occasions at L3.

No methane was detected at the existing groundwater well GW1, GW2, GW4, GW5, GW7 and GW8. For GW1, carbon dioxide was found to range from 0% to 0.9%. For GW2, carbon dioxide values ranged from 0.1% to 1.3% in August 2008. For GW4, carbon dioxide values ranged from 0.1% to 0.3%. For GW5, carbon dioxide values ranged from 0% to 0.5% in August. For GW6 methane values ranged from 0% to 0.2% in October 2008, Carbon dioxide values ranged from 0.3% in August to 1.4% in August and October 2008. For GW7, carbon dioxide values ranged from 0% to 0.9% in December 2008. Finally for GW8, carbon dioxide values ranged from 0% for most of this sampling period to 0.2% in December 2008.

Methane was not detected at the site office during this sampling period. Carbon dioxide was detected at a very low level of 0.1%. No exceedances of landfill gas concentration limits specified in the licence were therefore recorded at the site office.

4.5 Noise

An annual noise survey is specified in schedule E.4 of licence W00089-01. The schedule specifies that monitoring of noise levels is to be undertaken at eight locations on and adjacent to the landfill site: N1, N2, N3, N4, N5, N6, N7 and N8. In addition, the licence stipulates that monitoring is to be carried out at an offsite noise sensitive location situated 400 m west of the landfill and designated NSL1.

During 2004 it was agreed with the EPA that monitoring stations would be revised to include only N1, N6, N8 and NSL1. Table E.4.2 of licence W00089-01 specifies that a 30-minute noise interval is to be used at each monitoring location. From data recorded, the L_{Aeq}, L_{A10} and L_{A90} parameters are to be determined. One-third octave band frequency analysis is also required. Schedule F.1 of the licence specifies maximum noise levels, which are applicable to the noise

sensitive location NSL1. The limits specified are 55 dB during daytime periods and 45 dB at night-time. The EPA document *Integrated Pollution Control Licensing – Guidance note for noise in relation to scheduled activities* (1995) states that daytime hours are those between 0800 and 2200 hours.

The noise survey was undertaken on Monday 01.12.08 at stations N1, N6, N8 and NSL1. Measurements were recorded using a Bruel & Kjaer Type 2260 integrating sound level meter, which was calibrated before and after the survey. The survey was conducted by Damian Brosnan on behalf of Dixon.Brosnan. Following survey completion recorded data were uploaded to PC for subsequent analysis using task-specific software. All measurements were recorded in accordance with International Standard International Standard ISO 1996: 1982 *Acoustics – Description and measurement of environmental noise, Part 1: Basic quantities and procedures.*

The $L_{Aeq\ 30min}$ recorded at noise sensitive location NSL1 was 37 dB, significantly lower than the daytime limit of 55 dB specified in licence W00089-01. No noise was audible from the landfill at this location. Passing site traffic in close proximity to N8 resulted in an elevated $L_{Aeq\ 30min}$ level of 60 dB. Noise limits specified in the site waste licence does not apply to this station. No persistent audible tones were noted at any of the measurement stations. Overall, noise levels recorded were satisfactory.

4.6 Surface water

Schedule E.5 of licence W00089-01 specifies that monitoring of surface water quality is to be undertaken at seven locations: SW1, SW2, SW3, SW4, SW5, SW6 and SW7. Two additional stations – SW8 and SW9 – were subsequently agreed with the Environmental

Protection Agency. Stations SW5 and SW9 are located up gradient of the landfill to its east and northwest respectively. All other stations are located on a number of watercourses downgradient of the landfill. Following the completion of the surface water management system on the site, surface water discharging from the site was monitored continuously for total organic carbon, pH and conductivity.

Surface water samples were taken on the following dates:

Table 4.2 Sampling dates

Date	**Station**
8th April 2008	All stations SW1-SW9
16thMay 2008	SW1, SW3, SW4, SW5 and SW7
30thMay 2008	SW1, SW3, SW4, SW5 and SW7
6th June 2008	SW1, SW3, SW5 and SW7
25th July 2008	SW1, SW3 and SW7
25th November 2008	SW1, SW2, SW3, SW4, SW5, SW7, SW8 and SW9.

Exceedances of the relevant limits recorded during 2008 are recorded below.

Table 4.3 Parameters for which limits were exceeded (January-June 2008)

Sampling station	Parameters for which limits were exceeded.
SW1	Ammoniacal nitrogen, COD, Total Phosphates
SW2	BOD and COD
SW3	Manganese and Iron
SW4	Manganese
SW5	BOD, COD, TSS, Manganese, Iron and Total Phosphate
SW6	None (this sample was dry for most of 2008)
SW7	Ammoniacal nitrogen
SW8	BOD, COD & TSS
SW9	BOD, COD & TSS

Table 4.4 Parameters for which limits were exceeded (July-December 2008)

Sampling station	Parameters for which limits were exceeded.
SW1	Ammoniacal nitrogen, Iron and Manganese
SW2	COD, TSS and Lead
SW3	COD, TSS, Manganese, Iron
SW4	Ammoniacal nitrogen, Iron, Manganese
SW5	COD, TSS, Iron, Manganese, Lead
SW6	Dry
SW7	Ammoniacal nitrogen, Manganese
SW8	No exceedances
SW9	Iron

It is noted that some of the sampling stations are located on watercourses with minimal flow in dry weather (i.e. SW2, SW8 and SW6) and in some cases there is strong algal growth (SW2 and SW8). It is noted that high BOD and ammoniacal nitrogen levels are probably related to low flows and in some instances high algae levels during the sampling period. It can be seen from the two tables of data above that in general the quality of surface water remained the same during the year with slight improvements in Ammoniacal nitrogen levels at all monitoring points when compared to 2007 results. It is noted that the limits specified under the relevant directives are used primarily for comparative purposes and that much of the variation noted in chemical concentrations is due to changes in flow rate and water level within the watercourses surrounding the landfill.

4.7 Groundwater

Under Schedule E.5 of licence W00089-01 monitoring of groundwater quality is to be undertaken at five locations: GW1, GW2, GW3, GW4 and GW5. Borehole GW3 has become incorporated into the landfilled area, and therefore the leachate monitoring schedule is now applied at this station (L8). Due to ongoing works at the landfill only wells GW4 and GW5 were accessible prior to June 2005 when new groundwater wells GW1, GW2, GW5, GW6, GW7 and GW8 were put in place.

Extra sampling took place on site from surface water and groundwater samples. A review of the chemical data for the period January-June 2008 for GW4 and GW5 showed that values for Total organic carbon, Total oxidised nitrogen, Phenols, Faecal and total coliforms were found to be slightly high in some cases. Over the four extra months of sampling it was found that TON, TOC, Phenols, BOD, COD, Iron,

Manganese, TSS, Faecal and Total coliforms were high on some occasions. GW4 is located at a higher point away from the landfill on the north eastern side of the site. Therefore it could be evident that the surroundings of this well may be influencing the results from these wells and may well not be the landfills influences. For GW5, much of the same parameters are found to be slightly elevated but this well is located in high peat bog area outside of the landfill grounds. It could be possible for its geology to be influencing its results. High values for TOC and TON were evident for all the remaining groundwater wells. GW2 and GW8 shown the best results and these are located very near to the landfill itself. A lot of the results that were high were high during the summer months and therefore there may have been low volumes available to sample which would have also influenced the results in some cases.

During the sampling period July – December 2008 samples were taken in July and November. A review of the chemical data for the period July-December 2008 shows that results showed no major differences from the previous six months in 2008. There was slight improvements seen at GW1, GW4 and GW8 but in general parameters remained the same in the second half of 2008. Iron levels were found to be high at groundwater wells GW4, GW5, GW6, GW7 and GW8. Total coliforms were found to be high for all of the groundwater wells during this six month sampling period. Manganese was found to be high for groundwater wells GW1, GW4, GW5, GW6 and GW7. Total suspended solids were high for groundwater wells GW2, GW4, GW5 and GW6. It is noted that elevated levels of iron may be due to the underlying geology.

4.7.1 Emissions to groundwater

It is expected that some emissions to groundwater will have occurred from the unlined section of the landfill, however due to the impermeability of the underlying bedrock these emissions were probably relatively low. Results from 2008 generally do not indicate that leachate from the unlined portion of the landfill is affecting groundwater quality.

4.8 Leachate Disposal Off-Site

Leachate arising from the facility is transported to, and disposed of, at Bandon Waste Water Treatment Plant. The amount of leachate is shown in the table below.

Table: 4.5
Leachate disposal per month 2008

Month	***Vol (L)***
January	3323448
February	3217205
March	2628974
April	605789
May	575749
June	438532
July	1013542
August	1774852
September	1755450
October	2873286
November	2104540
December	2067044
Total Leachate	**22378411L**

Note that the leachate removed from the site generally exceeded that estimated in the monthly water balance calculations of table 4.1.

4.9 Monitoring set-up on site:

4.9.1 SCADA parameters measured on-site:

The parameters measured on site through the SCADA system are TOC (Total Organic Carbon), pH, Conductivity, Temperature and Flow (Litres). Ammonia as N was introduced during 2007 and connected to the scada system late in 2007.

The different parameters that are measured on site were overall in good working order during 2008, with the exception of the lightning strike on site on the 8th of January 2008 which affected the Scada system on site, which in turn affected the results recorded on the Scada system as seen on the graphs attached to this report.

The Conductivity values for the year varied very little on average. The overall average Conductivity value for the year was 434mV which was a lot lower then last years average of over 600mV in 2007. No major problems occurred for Conductivity meter during the year. The pH limits are between 6-9. The average pH value during the year was 6.2. Due to the lightning strike at the start of 2008 a new TOC machine was put in place on site. The average TOC value for 2008 was 33.3mg/l. The average Ammonia value for 2008 was 0.21mg/l.

4.9.2 Flare Data:

The contractors AFS installed the flaring system in July and August 2005. The flaring system at Derryconnell landfill site ran efficiently during 2008.

There was a high methane value throughout 2008. The average methane value during 2008 was 23%. The average oxygen value was 9%. The machine was serviced by AFS at regular intervals during 2008.

The gas emissions monitoring was carried out in May by RPS and in November by EURO Environmental services. The final emission reports, for the flaring system for Derryconnell is included with this report.

5.0 ENERGY CONSUMPTION

5.1 General

During 2008, the site machinery comprising of an excavator, compactor, forklift and a site dumper, used 52,000 Litres of fuel. A water supply was installed at the site during 2002 but figures are not yet available for the volume of water used on the site in 2008. Electricity usage at the site during 2008 was estimated at approximately 92 kWh per day.

6.0 ENVIRONMENTAL INCIDENTS, NON-COMPLIANCES AND COMPLAINTS

6.1 Incidents

A schedule of Incidents and relevant action is detailed below.
Table 6.1: Incidents.

Date	Nature of Incident	Corrective Action
05/08/08	Reporting to the Agency of a Scada problem.	Investigation carried out and a technician was called to site to fix the Scada following a power failure to the main office.
29/08/08	Written notification of a problem with the Ammonia meter on site.	Notification to the service engineer and a re service and recalibration of the machine took place.
17/11/08	Reporting to the Agency of a Scada problem.	A service technician was called to site to fix the Scada following a power failure to the main office.
01/12/08	Problems with filter on TOC machine.	TOC filters where cleaned and machine returned to good working order.

6.2 Non-Compliance's

A schedule of non-compliance's and relevant action is detailed below.

Table 6.2 Non-Compliances.

Date	***Nature of Non Compliance***	***Corrective Action***
16/12/08	Size of working face.	The size of the working face has been greatly reduced.
16/12/08	Daily / Intermediate cover.	All areas not in use on a daily basis will be covered properly using the correct material.
16/12/08	Monitoring of ammonia in surface water discharge.	The instrument will be calibrated so that it does not take into account any background interferences.

6.3 Complaints

One complaint was received in 2008 to Cork County Council about Derryconnell Landfill site and Civic Amenity. The complaint was in relation to odours coming from the site. An odour log was put in place on site so as to help clarify the problem.

It was thought that the odour may have been due to the extremely cold winter that was experienced in the area and also the fact that cell 3 in open with two and a half and is near completion.

6.4 Nuisance Controls

6.4.1 Litter

In general litter control on site was maintained during 2008. In April 2004, an entire new litter netting system was put in place, which was double the height of the previous system. This system proved to be quite efficient in the prevention of litter blowing away from the working cell. During 2006 this netting was moved from cell 2 over to cell 3. In 2007 part of this netting was moved onto cell2 so that the

area of landfill between cell 2 and cell 3 could be used for waste disposal during 2007 and 2008.

6.4.2 Birds

In 2008, the facility started its bird control programme with Bird Control Ireland and then changed to Phoenix Bird Solutions. The projects consist of a monthly visit by the specialists. The facility keeps a supply of the following items to assist in the prevention of birds scavenging on the site.

Helekite
Hawk Kites
Helegas 7.82cuM & Regulator
Winch & Base plate
Planner |Board
Bird Scaring Pistol
50 M Bang Cartridge

6.4.3 Vermin & Flying Insects

Vermin and fly control is carried out under contract with Arrest A Pest Ltd. as required.

6.4.4 Scavenging

Scavenging does not take place on site. Cork County Council has installed a CCTV system on site at Derryconnell.

6.5 Programme for Public Information

6.5.1 Information Available to the Public

The site notice at the landfill entrance states that: -
Environmental monitoring information relating to the facility can be obtained by contacting the Sanitary Department, Cork County Council, Courthouse, Skibbereen, Co. Cork from 10.00 am to 1.00 pm and 2.00 pm to 4.00 pm, Monday to Friday.

Personnel associated with the facility are also available by appointment to meet with members of the public and answer queries regarding the facility if requested. The following information is held in a public file at these offices available for the public to inspect: -

- A copy of the waste licence application.
- A copy of the waste licence.
- A correspondence from the Agency relating to the facility.
- All correspondence from Cork County Council (West) to the Agency relating to the facility.
- Copies of biannual monitoring reports.

7. ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

7.1 Training

The site staff at Derryconnell Landfill under went additional training during 2008 as follows:

- Further training days in Health and Safety took place during 2008.
- Refresher training in first aid was attended by Joe Newman and Deirdre Williams.

Training proposed for site operative during 2009 will be for all 3 operatives on site to attend training in the use of teletruck operations. During 2009 Deirdre Williams and Joe Newman will attend the retraining in safe pass and manual handling.

7.2 Schedule of Objectives and Targets for Year 2008 & Implementation of Objectives and Targets From previous Year

The proposed Objectives & Targets for 2009 are as follows:

Objective 1: Capping of cell 2 and cell 3.
Objective 2: Investigate further waste streams for recycling.
Objective 3: Start clearing of site for a Waste Transfer Station

Objective 1: Capping of cell 2 and cell 3.

Subsoil and topsoil that has been stockpiled on site will be used for the capping of cell 2 and cell 3 during 2009. Part of this capping process will include reseeded this area to ensure that grass will grow successfully and will blend in with the existing areas of cell1 and the old existing landfill.

Objective 2: Invest in further waste streams for recycling.

If demands from the public manifest themselves during 2009 investigations will be undertaken as to what further waste streams may be accepted at the site for recycling.

Implementation of 2008 Objectives and Targets.

Objective 1: Capping of cell 2 and cell 3.

As Cell 3 was not filled during 2008, capping will not take place until 2009.

Objective 2: Investigate further waste streams for recycling.

No further waste streams were introduced during 2008. Timber and Clothes recycling was introduced in 2007 and were found to be a great success in 2008.

Objective 3: Start clearing of site for Waste Transfer Station.

Due to changes both financially and otherwise within the council the construction of the Waste Transfer Station will now not take place in the foreseeable future on site.

7.3 Summary of Procedures Associated with the Facility

7.3.1 LCD calls out on site:

A texting system is in place for a number of instruments on site. These instruments are as follows:
TOC meter
Flaring system
Surface Water valve opening/closing into the lagoon

For break-in on site the security company ADA telephones the general operatives on call at the time of the break-in.

7.3.2 Arrangements in Case of Break-ins on Site:

In the event of a break-in, the procedure that is in place is with the sounding of an alarm a text is received by the general operative on call from the security company ADA. The Gardai in Bantry are also notified at the time of the incident and will meet the general operative on site.

7.3.3 Procedure for the removal of leachate.

This procedure will apply to Derryconnell Landfill Site and describes the procedure for the safe and efficient removal of leachate form the facility. Leactate by definition is any liquid percolating through the deposited waste and emitted from or contained within a landfill. The facility manager will ensure that the procedure is implemented.
The general operatives will be responsible for the following procedure:

At Derryconnell:

1. An empty tanker is parked along side the leachate lagoon in Derryconnell Landfill, adjacent to the pumping kiosk.
2. Electronic probes, within the tanker unit, are connected to the pumping unit.
3. A hosepipe is connected to the rear of the tanker unit and locked into position.
4. The pumping unit is powered on and filling of the tanker commences.
5. As the cut out level near the top of the tanker unit is reached, the electronic probes cut out the pumping unit.
6. All remaining leachate remaining in the hosepipe is fed back to the lagoon by gravity.
7. The pumping unit is switched off and the hosepipe is unlocked and removed.
8. The electronic probes are disconnected.
9. The tractor unit removes the tanker after deposited an empty tanker unit for refilling.
10. The tractor unit transports the leachate to Bandon Wastewater Treatment plant for disposal.

At Bandon Wastewater Treatment Plant:

1. The tanker of leachate is parked alongside the empty tanker.
2. A hosepipe is disconnected from the rear of the empty tanker and connected to the full tanker.
3. The hosepipe is locked into position.
4. The adjacent pump is initiated and the leachate is discharged to the primary settlement tank.
5. The tractor unit transports the empty tanker to Derryconnell Landfill for filling.

7.3.4 Landfill Gas Flaring System:

At Derryconnell landfill site there is a general extraction system that extracts gas from around the landfill to the flare where it is burnt off in a controlled fashion.

This system burns off methane safely and efficiently from the site. The general maintenance of the system on site is the responsibility of the facility manager and the general operatives. This involves a routine check that the system is running efficiently and safely on site.

7.3.5 Procedure for testing for Ammonia using the Ammonia test strips:

1. Sample must be taken while pumps are pumping surface water into the sampling chamber on site.
2. When taking sample rinse the container twice with the surface water and then take your sample.
3. When the sample is taken shake the sample well and pour into the vial provided up to the top line with sample.
4. Dip the strip into the water sample. Vigorously move the strip up and down in the water sample for 30 seconds, making sure both pads are always submerged.
5. Remove the test strip and shake off excess water.
6. Hold the test strip level (horizontal) with the pad side upwards, for 30 seconds.
7. To read result, turn the strip over so that both pads are facing away from you.

8. Compare the colour of the small pad to the colour chart on the container. Read the results through the clear plastic of the test strip.
9. Rinse sample vial with tap water after each use.

7.3.6 Procedure for testing for Ammonia using the Ammonia test kit:

1. Fill the 25ml graduated cylinder with the appropriate volume required for example: for expected concentrations of NH3-N mg/l of between 0.01 – 0.08 no dilution is needed (normally the case for Derryconnell surface water samples), for concentrations of between 0.01 – 2.00 a 1/10 dilution would be needed.
2. Once you have distinguished which dilution is required (if any), 10ml of sample is measured using the graduated cylinder and it is poured into the sample cell.
3. A second 10ml cell is filled with 10ml of ammonia-free or deionised water. This becomes the blank.
4. Add the contents of one Ammonia Salicylate Powder Pillow to each cell. Cap and shake to mix.
5. Wait 3 minutes.
6. Add the contents of one Ammonia Cyanurate Powder Pillow to each cell. Cap and shake to dissolve.
7. Wait 15 minutes.
8. After 15 minutes, invert both cells a few times to mix.
9. Press the power key to turn the meter on. The arrow should indicate mg/L NH3-N.
10. Wipe the cell and place the yellow-coloured blank in the cell holder.
11. Cover the blank with the instrument cap.

12. Press ZERO/SCROLL. The display will show "---"then "0.00". Remove the blank from the cell holder.
13. Place the prepared sample in the cell holder. Cover the sample cell with the instrument cap.
14. Press READ/ENTER. The display will show "---", followed by results in mg/L ammonia as nitrogen (NH3-N).
15. If a dilution was carried out multiply the result by the dilution factor.

7.4 Financial Provision

Cork County Council has the ability to meet any financial commitments or liabilities incurred by the carrying out of the disposal activities relating to the Derryconnell Landfill. These commitments include compliance with the waste management licence (No. W00089-01) and restoration and aftercare of the site as specified in Condition 8 of the licence.

Under Section 38 of the Waste Management Act, 1996, Cork County Council "shall provide and operate, or arrange of, such facilities as may be necessary for the recovery and disposal of household waste arising within the functional area". Compliance with Section 38 and all other relevant sections of the Waste Management Act, 1996 is a statutory obligation of Cork County Council. Cork County Council annually, in the preparation of the 'Book of Estimates' and the passing of these estimates, shall make provision for any capital works and maintenance works required to fulfil conditions of the waste licence for the Derryconnell Landfill.

Appendices.

Appendix 2

Landfill Gas estimate at Derryconnell Landfill

An estimate of the annual and cumulative quantities of emissions of landfill gas at Derryconnell Landfill was provided in 2004 by RPS/MCOS using the GasSim (Version 1.02.0008) computer model. The estimated tonnage on which the model was based were estimated as follows:

Year	Waste landfilled (Tonnes)	Year	Waste landfilled (Tonnes)
1985	4,100	1997	4,100
1986	4,100	1998	6,500
1987	4,100	1999	9,500
1988	4,100	2000	13,675
1989	4,100	2001	14,000
1990	4,100	2002	11,957
1991	4,100	2003	9,600
1992	4,100	2004	9,600
1993	4,100	2005	9,600
1994	4,100	2006	9,600
1995	4,100	2007	9,600
1996	4,100	**2008**	**9,600**

Note on Landfilled Waste Volumes: The reduction in landfilled waste from 2003 onwards is due to the commencement of a pay-by-weight system.

It was assumed that the site was in operation since 1985. Prior to October 1998 the volume of waste landfilled per annum was 4,100 tonnes but this increased to approximately 14,000 tonnes per annum up to 2001. It was estimated that 96,975 tonnes of waste had been landfilled at the facility prior to November, 2001

The report by RPS/MCOS notes the following:

Model Results

Based on previous experience with GasSim software when used at landfill sites where gas pumping and flaring has taken place the software generally underestimates the volume of gas produced.

The model was compared with June 1999 "Article 12 Compliance Requirements" landfill gas production estimation. The 1999 estimation was calculated using the USEPA Landfill Air Emission Estimation Model. Considering the two above pieces of information the GasSim model outputted results were increased by 30%.

The adjusted results are tabulated below:

Year	**Total landfill gas Generated M3/hr**	**Year**	**Total landfill gas Generated M3/hr**	**Year**	**Total landfill gas Generated M3/hr**
1985	5	2015	47	2046	4
1986	21	2016	46	2048	3
1988	31	2018	33	2050	3
1990	34	2020	31	2052	3
1992	34	2022	30	2054	2
1994	43	2024	21	2055	2
1995	44	2025	20	2056	2
1996	46	2026	18	2058	1
1998	65	2028	14	2060	1
2000	72	2030	13	2062	1
2002	74	2032	10	2064	1
2003	117	2034	9	2065	1
2004	114	2035	8	2066	1
2005	114	2036	8	2068	1
2006	117	2038	7	2070	1
2008	**124**	2040	7	2072	1
2010	91	2042	5	2074	0
2012	65	2044	5	2075	0
2014	55	2045	4		

The estimated cumulative total of landfill gas produced calculated from the above is approximately 14, 246,400 m3 over the 85 years modelled. The adjusted GasSim model predicted a maximum gas production rate of 124 m3 per hour during 2008. (Source: Final Capping and Gas Management of Unlined Cells Landfill Gas Estimation Derryconnell Landfill Site-RPS-MCOS)

Appendix 1: Monthly Water Balance Calculations

Month	Rainfall (mm)	Potential Evapotrans. mm	Effective Rainfall mm	Waste Input tonnes	Active Area Sq. m	Intermediate Area Sq. m	Restored Area Sq. m	Intermediate Area Infiltration Rate %/100	Restored Area Infiltration Rate %/100	Active Area Infiltration Rate %/100	Intermediate Area Infiltration cu m	Restored Area Infiltration cu m	Liquid Waste Sludge cu m	Waste Absorptive Capacity cu m/t	Lagoon area	Rainfall on lagoon	Total leachate cu m	Cumulative Leachate cu m
jan	193.2	9.8	183.4	722.82	4915	0	20075	0.25	0.04	949.58	0.00	147.27	0.00	0.102	1296	237.69	1260.8	
feb	51.8	15.1	36.7	689.24	4915	0	20075	0.25	0.04	254.60	0.00	29.47	0.00	0.102	1296	47.56	261.3	261.33
mar	113.2	33.1	80.1	603.46	4915	0	20075	0.25	0.04	556.38	0.00	64.32	0.00	0.102	1296	103.81	662.95	924.3
april	54	53	0	652.4	4915	0	20075	0.25	0.04	265.41	0.00	0	0.00	0.102	1296	0	198.9	1123.2
may	75.6	73	0	618	4915	0	20075	0.25	0.04	371.57	0.00	0	0	0.102	1296	0	308.5	1431.7
june	128.9	85.6	0	647.96	4915	0	20075	0.25	0.04	638.46	0.00	0	0	0.102	1296	0	572.4	2004.1
july	155.8	71.2	84.6	824.66	4915	0	20075	0.25	0.04	765.76	0.00	67.93	0	0.102	1296	109.64	859.2	2863.3
august	165.1	57.7	0	800.42	4915	0	20075	0.25	0.04	811.47	0.00	0	0	0.102	1296	0	729.8	3593.1
sep	123.6	41	0	737.2	4915	0	20075	0.25	0.04	607.49	0.00	0	0	0.102	1296	0	532.3	4125.4
oct	139.8	22.6	117.2	551.06	4915	0	20075	0.25	0.04	687.12	0.00	34.11	0	0.102	1296	151.89	876.9	5002.3
nov	79.4	13.1	66.3	710.4	4915	0	20075	0.25	0.04	390.25	0.00	53.24	0	0.102	1296	85.92	456.95	5459.3
Dec	60.2	10.7	49.5	624.64	4915	0	20075	0.25	0.04	295.88	0.00	39.75	0	0.102	1296	64.15	336.1	**5795.3**

* For the purposes of this calculation where evapo-transpiration exceeds rainfall it is assumed that both are equal

The following equation which is detailed in the EPA landfill site design manual was used for monthly balance calculations:

L_0 = (ER(A) + LW = IRCA (I))-(aW)

$L_{0\ is}$ the leachate produced

ER= effective rainfall

A= area of cells

LW= liquid waste

IRCA= infiltration through restored and capped areas (m)

I = surface area of lagoon

a = absorptive capacity of the waste assumed to be 0.07 m3/tonne

w= weight of waste deposited (t).

Rainfall and evapo-transpiration data was received from Met EIreann forCork Airport.

Appendix 3: Calculation of emissions to groundwater due to the percolation of rain water through the protective cap.

Month	Rainfall (mm)	Potential Evapotrans. mm	Effective Rainfall mm	Waste Input tonnes	Active Area Sq. m	Intermediate Area Sq. m	Restored Area Sq. m	Intermediate Area Infiltration Rate %/100	Restored Area Infiltration Rate %/100	Active Area Infiltration Rate %/100	Intermediate Area Infiltration cu m	Restored Area Infiltration cu m	Liquid Waste Sludge cu m	Waste Absorptive Capacity cu m/t	Lagoon area	Rainfall on lagoon	Total leachate cu m	Cumulative Leachate cu m
jan	193.2	9.8	183.4	0	0	0	20075	0.25	0.04	0	0.00	147.27	0.00	0.102	0	0	147.3	
feb	51.8	15.1	36.7	0	0	0	20075	0.25	0.04	0	0.00	29.47	0.00	0.102	0	0	29.47	29.47
mar	113.2	33.1	80.1	0	0	0	20075	0.25	0.04	0	0.00	64.32	0.00	0.102	0	0	64.32	93.79
april	54	53	0	0	0	0	20075	0.25	0.04	0	0.00	0	0.00	0.102	0	0	0	93.79
may	75.6	73	0	0	0	0	20075	0.25	0.04	0	0.00	0	0	0.102	0	0	0	93.79
june	128.9	85.6	0	0	0	0	20075	0.25	0.04	0	0.00	0	0	0.102	0	0	0	93.79
july	155.8	71.2	84.6	0	0	0	20075	0.25	0.04	0	0.00	67.93	0	0.102	0	0	67.94	161.72
august	165.1	57.7	0	0	0	0	20075	0.25	0.04	0	0.00	0	0	0.102	0	0	0	161.72
sep	123.6	41	0	0	0	0	20075	0.25	0.04	0	0.00	0	0	0.102	0	0	0	161.72
oct	139.8	22.6	117.2	0	0	0	20075	0.25	0.04	0	0.00	34.11	0	0.102	0	0	94.1	255.84
nov	79.4	13.1	66.3	0	0	0	20075	0.25	0.04	0	0.00	53.24	0	0.102	0	0	53.24	309.1
Dec	60.2	10.7	49.5	0	0	0	20075	0.25	0.04	0	0.00	39.75	0	0.102	0	0	39.75	**348.82**

* For the purposes of this calculation where evapo-transpiration exceeds rainfall it is assumed that both are equal

The following equation which is detailed in the EPA landfill site design manual was used for monthly balance calculations:

L_0 = (ER(A) + LW = IRCA (I))-(aW)

$L_{0\ is}$ the leachate produced

ER= effective rainfall

A= area of cells

LW= liquid waste

IRCA= infiltration through restored and capped areas (m)

I = surface area of lagoon

a = absorptive capacity of the waste assumed to be 0.07 m3/tonne

w= weight of waste deposited (t).

Rainfall and evapo-transpiration data was received from Met EIreann forCork Airport.


OLD UNLINED CELL
ACTIVE CELL No.3.
CELL No.2
CELL No.1.
Security Fence
Security Fence
Topographical Survey
Cork County Council
Job No.:
Date:
Scale: