



Great Island Generating Station

IPPC Licence Reg. No. P0606-02

Annual Environmental Report 2010



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1. Introduction

1.1. IPPC Licence Number P0606-02

This is the Annual Environmental Report of Great Island Generating Station for the year ending 31st of December 2010, in compliance with requirements of Integrated Pollution Control Licence Register No. P0606-02.

1.2. Name and Location of site

Endesa Ireland,
Great Island Generating Station,
Campile,
New Ross,
County Wexford.

1.3. Description of Activities

“The production of energy in combustion plant, rated thermal input of which is greater than 50 MW”.

The plant is located on the Barrow/Suir estuary. It has three generating units, giving a total electricity generating capacity of 240 MW. All are conventional steam generating units, two of the conventional units have capacities of 60 MW, the third being 120 MW. Each unit is independent and consists of a boiler, steam turbine and auxiliary plant. The station is fired on heavy fuel oil shipped directly to site and stored in the station’s own oil farm area.

1.3.1. Running Regime in 2010

During 2010 there has been a reduction in overall running hours for the station (reducing approximately 40% if we compare it to 2009) caused by increased wind generation and lower energy demands. The running of the station is also dependant on its age, reliability and market conditions; hence the station no longer operates on a base load mode. A trend of decrease for the station total running hours might also be foreseen for the following years.

From a global amount of 1,003 running hours in the station during 2010:

- *Unit 1 had a total running hours of 130 hrs, which is the equivalent of 12.92% of the station’s total running time for 2010 for Great Island.*
- *Unit 2 ran a total running hours of 126 hrs, which is the equivalent of 12.58% of the station’s total running time.*
- *Unit 3 ran for a total of 747 hrs, which is the equivalent of 74.50% of the station’s total running time.*

Table 1.3.1 Total Running Hours 2006 - 2010

Year	Total Run Hrs for Station	G1 Run Hrs	G2 Run Hrs	G3 Run Hrs
2010	1,003	130	126	747
2009	1,665	340	145	1,180
2008	2,314	382	242	1,690
2007	2,761	684	295	1,782
2006	4,906	1,487	1,295	2,124

Comment

Each unit had a scheduled outage period during the year for maintenance purposes.

1.4. Environmental Policy



Endesa Ireland's Environmental Policy

Endesa Ireland regards environmental excellence as a fundamental value in the performance of its activities. Accordingly, it respects the environment and responds to the principles of sustainable development and sound environmental management, undertaking in this way to harness and conserve the resources it uses effectively.

To meet its environmental commitments, **Endesa Ireland** applies the following basic principles, which are included as key factors in its Environmental Policy:

- **Integration** of environmental management and sustainable development concept in the Company's corporate strategy, using environmental criteria documented in all planning and decision making processes.
- **Rational use** of resources and reduction of waste production, emissions, discharges and any other type of environmental impact, through the application of continuous improvement programmes and the establishment of environmental objectives and targets.
- **Commitment** to the compliance with all relevant legislative and other requirements by means of a permanent monitoring of the environmental practices in all of its facilities and locations, reporting on the obtained results.
- **Conservation** of the power plants' surroundings by adopting measures designed to protect flora and fauna species and their natural habitats.
- **Implementation** of cleaner and more efficient technologies, as long as they are available and are economically affordable for the Company, encouraging research and development of renewable energies when suitable.
- **Promotion** of its employee's awareness with regard to the environmental protection and respect by communicating the Environmental Policy and making it public and available to all of them, developing specific training programmes and interacting with all types of stakeholders (authorities, institutions, local associations and interest groups).
- **Requiring** its contractors and suppliers the implementation and development of environmental policies aligned with those of **Endesa Ireland's** Environmental Policy, which shall be communicated to all of them.
- **Promotion** of rational use and energy consumption among users and society in general.

This strong commitment and the above basic principles of **Endesa Ireland's** Environmental Policy are applied consistently across all the environmental processes and activities that are carried out at all **Endesa Ireland's** facilities (Head Office and Power Plants).

Signed: Padraig Dunleavy

Station Manager

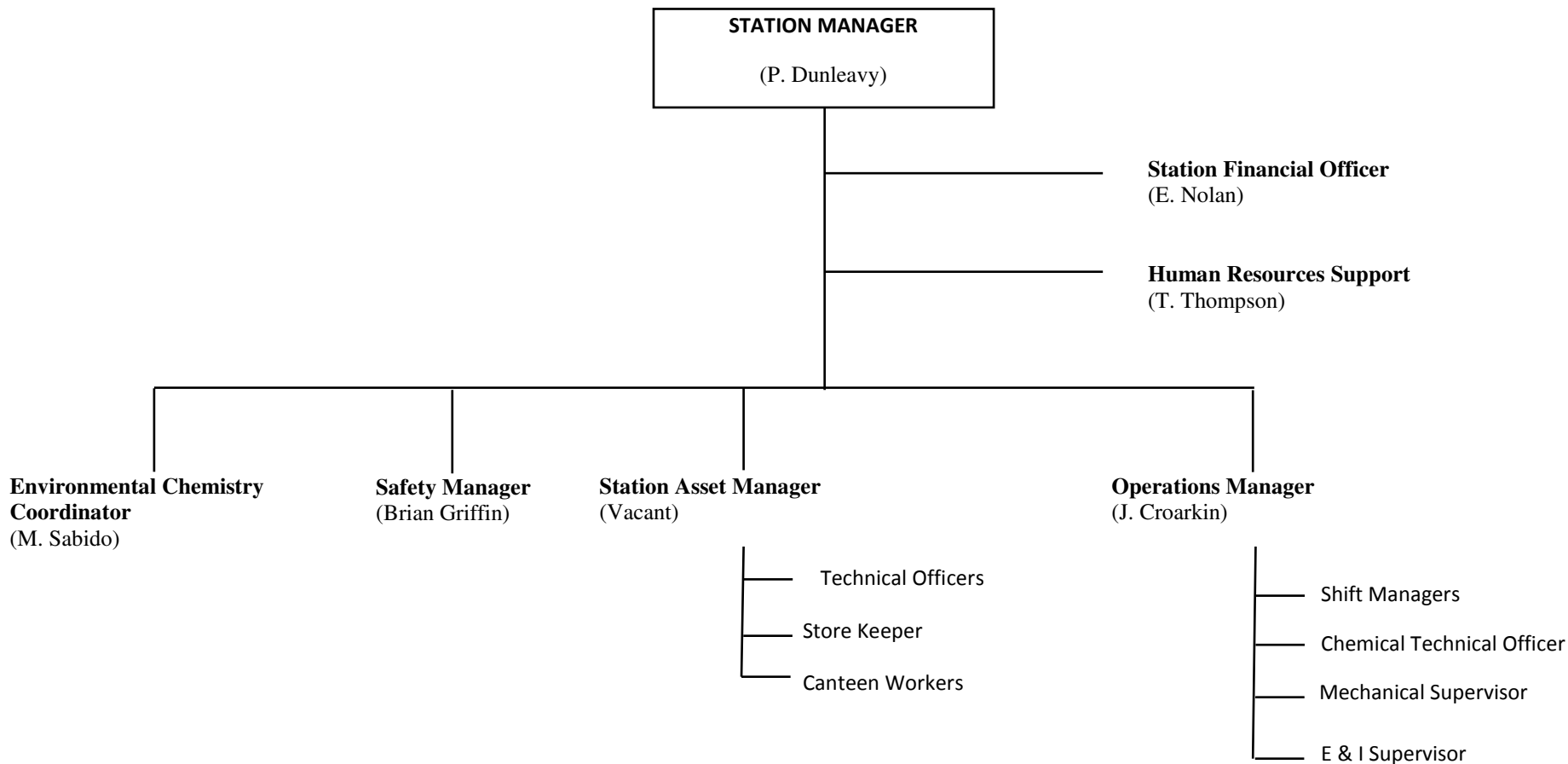
(On behalf of the management and staff)

1.5. Environmental Management Structure and Responsibility

Environmental Management is fully integrated into all aspects of management on site. The management structure is shown in Figure 1. The Environmental Chemistry Coordinator is responsible for the coordination of all environmental activity at the station. The Environmental Chemistry Coordinator works with the management team and environmental management group to ensure that:

- The station complies with or better the requirements of any environmental provisions specified under its IPPC licence, other licences, planning permission and environmental legislation.
- The station's EMS is operated and maintained to the ISO 14001 environmental standard.
- By way of audit and review cycle, the EMS is effective, is adaptive to changing circumstances and is delivering continuous improvement.

Figure 1. Great Island Generating Station Organisation Chart



2. Summary of Emissions

2.1. Emissions to Water Report

Schedule 2 (i) of Great Islands IPPC Licence sets out the requirement to monitor Emissions to Water having regard to Licence Conditions 3 and 6.

Great Island Generating Station has twelve licensed emission points discharging to the Barrow Estuary:

- SW1 Surface Water - Tank farm.
- PE2 Process Emission - Condenser cooling water.
- SW3 Surface Water - Sewage Treatment.
- SW4 Surface Water - Station drainage South.
- PE5 Process Emission - Boiler blow down B Station.
- PE6 Process Emission - Boiler blow down A Station.
- PE7 Process Emission - Engine Rooms Drains.
- PE8 Process Emission - Screen wash water.
- SW10 Surface Water – Station Drainage West.
- SW11 Surface Water - Reservoir drainage.
- SW12 Surface Water – Station drainage South.
- PE13 Process Emission – Water Treatment Neutralisation Tank.

A summary of the monitoring results for each point required by the licence is given below.

2.1.1. Process Emissions**Emission Point Reference: PE2: Condenser Cooling Water**➤ **Temperature**

The ELV for delta T is 12.5°C (98% ile of hourly values over a year).

Table 2.1.1A. CW Chlorine and Temperature rise 2010

2010	Chlorine (ppm)	Delta T (°C)
Average	0.36	2.81
Max.	0.4	3.6
Min.	0.3	1.8
2009	Chlorine (ppm)	Delta T (°C)
Average	0.35	3.5
Max.	0.4	6.2
Min.	0.3	3
<i>Emission Limit Value</i>	<i>0.5</i>	<i>15</i>

Comment

The average Chlorine and Temperature change for PE2 Condenser Cooling Water were within license ELV for both Parameters. The maximum and minimum values were also within the stated ELVs.

Table 2.1.1B. Monthly Average of the CW Temperature rise 2010

	CW Delta T Avg 2010	CW Delta T Avg 2009
January	1.62	1.32
February	1.18	1.58
March	1.72	0.64
April	1.14	1.5
May	1.2	1.17
June	1.31	1.33
July	0.73	1.11
August	0.89	1.88
September	0.74	2.07
October	1.23	1.29
November	4.23	1.67
December	1.6	1.61

Figure 2 shows a graph of the Monthly average CW temperature rise.

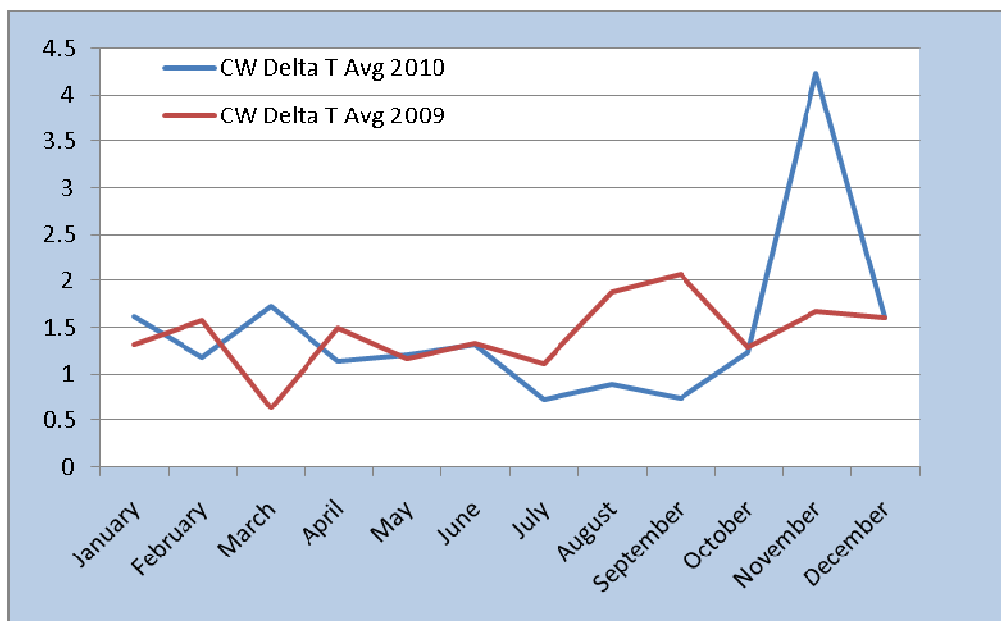


Figure 2. CW Temperature in 2010

Comment

The records of condenser cooling water temperature differential for the period of January 2010 to December 2010 show no excursions above the IPPC License limit of 12.5°C (98% ile of hourly values over a year) for the monitoring period. There are slight deviations in temperature differential figures from previous years, due to the changes in the running regimes of the units. The peak in November/December would have arisen due to the freezing weather conditions, when there was an increased demand.

➤ **Flow**

The maximum permissible volume to be emitted in any one day (1,204,080 m³) and the maximum rate per hour (50,170 m³) have not been exceeded in the reporting period. Although flow is not measured on a continuous basis operation, the technical staff can accurately estimate it, based on the maximum rating of the CW pumps and the number of pumps that are running at any given time.

Emission Point Reference: PE5 Boiler Blowdown B Station**Table 2.1.1C. pH and Suspended Solids concentration for PE5 in 2010**

2010	pH	SS mg/l
First Quarter	7.8	1.8
Second Quarter	8.0	1
Third Quarter	7.9	1
Fourth Quarter	7.3	<1
2009	pH	SS mg/l
First Quarter	7.63	6.0
Second Quarter	7.06	6.1
Third Quarter	7.49	2.1
Fourth Quarter	7.66	2.0
<i>Emission Limit Value</i>	<i>6.0 - 10.0</i>	<i>No Limits within IPPCL</i>

Comment

- pH is monitored on a weekly basis. The results in the Table above are averages of all the weekly pH for each Quarter. The ELV was not exceeded at any point during the 2010 monitoring of pH.
- The Suspended Solids figure ranged between <1 and 1.8 mg/l. There is no ELV on Suspended Solids in the IPPC License for PE5. However, compared to other emissions points (i.e. PE13), the level in PE5 is low and under the 100 mg/l ELV which is specific to PE13.

Emission Point Reference: PE6 Boiler Blowdown A Station**Table 2.1.1D. pH, Suspended Solids and Mineral Oil concentrations for PE6 in 2010**

2010	pH	SS mg/l	Mineral Oil mg/l
First Quarter	7.4	2.6	<10
Second Quarter	8.0	2	0.01
Third Quarter	8.0	1	0.02
Fourth Quarter	7.7	3	0.071
2009	pH	SS mg/l	Mineral Oil mg/l
First Quarter	7.31	9.5	0.64
Second Quarter	7.70	7.6	0.03
Third Quarter	8.49	10.0	<10
Fourth Quarter	7.80	1.1	0.31
<i>Emission Limit Value</i>	<i>6.0 - 10</i>	<i>No limit within IPPCL</i>	<i>20 mg/l</i>

Comment

The ELV was not exceeded at any point during the 2010 monitoring of pH at PE6.

Suspended Solids which are analysed did not occur above 3 mg/l.

Mineral Oil figures never raised above 10 mg/l and therefore within the IPPC License limits for PE6.

Emission Point Reference: PE7 Engine Room Drains**Table 2.1.1E. Mineral Oil and COD concentrations for PE7 in 2010**

2010	Mineral Oil mg/l	COD mg/l
First Quarter	<10	36
Second Quarter	0.017	41
Third Quarter	0.085	14
Fourth Quarter	0.016	<4
2009	Mineral Oil mg/l	COD mg/l
First Quarter	0.01	16
Second Quarter	0.01	5
Third Quarter	<10	7
Fourth Quarter	<10	4
<i>Emission Limit Value</i>	<i>20 mg/l</i>	<i>No limit within IPPCL</i>

Comment

Results obtained for monitoring of Mineral Oil at PE7 were under the 20mg/l limit.

There is no specified limit for COD but results obtained were acceptable. Endesa have set an action limit on COD of > 100mg/l to maintain water quality standards.

Emission Point Reference: PE8 Cooling Water Screen Wash water**Table 2.1.1F Chlorine concentration for PE8 in 2010**

	Chlorine ppm 2010	Chlorine ppm 2009	Chlorine ppm 2008
First Quarter	0.35	NS	NS
Second Quarter	NS	0.3	0.3
Third Quarter	NS	NS	0.35
Fourth Quarter	NS	0.3	NS
<i>Emission Limit Value</i>	<i>0.5</i>	<i>0.5</i>	<i>0.5</i>

Note:

- Where NS has been entered in the tables this means that No Sample was available on the day that monitoring was conducted. Some discharge points will have no flow when the plant is not running (process drains) or in dry conditions (surface water drains).
- Infrequent running hrs during 2010 meant that at certain times no samples were available to take when monitoring for emissions. Table 1.3.1 Total Running Hours 2006 – 2010 indicates the reduced running hours of the station during the reporting period. Therefore quarterly samples were unobtainable at the time of sampling as a result of the units being either off load or No sample being present at the time of sampling.

Comment

The emission limit value was not breached for residual chlorine during 2010. The results are similar to those reported in previous years. Samples were unattainable for a most of the year due to low load operation and therefore a less of a requirement for cooling water.

Emission Point Reference: PE 13 Water treatment neutralisation tank**Table 2.1.1G. Suspended Solids and Ammonia concentrations for PE13 in 2010**

2010	SS (ppm)	Ammonia (kg/Day)
First Quarter	89	0.2
Second Quarter	18	0.16
Third Quarter	5	0.12
Fourth Quarter	8	0.09
2009	SS (ppm)	Ammonia (kg/Day)
First Quarter	7.4	1.0
Second Quarter	23.2	0.85
Third Quarter	59	0.8
Fourth Quarter	85	0.25
<i>Emission Limit Value</i>	<i>100 ppm</i>	<i>34 kg/Day</i>

Comment

No exceedances of the ELV for the quarterly samples were detected in 2010 for Suspended Solids and Ammonia.

Table 2.1.1H. Monthly Average of pH PE13

	pH Average 2010	pH Average 2009	pH Max. Average 2010	pH Min. Average 2010
January	7.1	7.90	7.3	6.9
February	7.6	7.87	7.9	7.3
March	8.1	7.83	8.3	7.8
April	8.6	7.80	9.0	8.3
May	7.6	8.58	8.1	7.0
June	8.0	8.63	8.8	7.6
July	7.5	7.75	8.1	7.1
August	8.2	6.90	8.6	7.8
September	8.1	7.26	8.3	7.8
October	8.2	8.70	8.5	8.0
November	7.0	8.21	7.2	6.7
December	7.9	8.67	8.2	7.7
Emission Limit Value	6 - 9		9	6

Comment

There were no pH excursions outside the ELV set between 6 and 9 for the monthly pH mean values for 2010. The min and max pH for 2010 were within specified the ELVs.

2.2. Surface Water Monitoring Report

Schedule 4 (i) requires Surface Water discharge monitoring points to be monitored on a quarterly basis for COD.

Emissions Reference points: SW1, SW3, SW4, SW10, SW11, SW12

Table 2.2A. Quarterly COD on Surface Water

	SW1 COD mg/l (Oil Farm Drain)		SW3 COD mg/l (Septic Tank)		SW4 COD mg/l (Surface Drain by road)		SW10 COD mg/l (110 KV Drain)		SW11 COD mg/l (Over- Flow Reservoir Drain)		SW12 COD mg/l (Oil Trap Unit 3 culvert)	
Year	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009
Quarter 1	12	7	12.4	41	NS	16	19	4	NS	4	11	41
Quarter 2	4	12	NS	NS	NS	NS	7	23	NS	14	120	245
Quarter 3	6	8	NS	NS	NS	NS	11	12	6	NS	NS	380
Quarter 4	<4	10	NS	34	NS	NS	<4	NS	NS	NS	<4	<4

Comment

There is emission limit value stated in the IPPC License for COD at surface water sampling points. COD results ranged from <4 to 120 mg/l in 2010, from the sampling locations listed above. In 2009, COD results at SW12 increased dramatically for a period but declined after the area was cleaned. A similar event occurred in 2010 during Quarter 2 and results have returned below action levels.

Emission Reference point: SS01, SS03, SS04**Table 2.2B. Annual Results on Surface Water**

Year	SS01		SS03		SS04*		EQS for Surface Waters
	2010	2009	2010	2009	2010	2009	
Aluminium (ppb)	<10	39	<10	23	<10	33	200 ug/l
Arsenic (ppb)	<1	25	2	28	<1	30	10 ug/l
Mineral Oil (ppm)	0.013	<0.01	0.023	<0.01	0.012	<0.01	0.01 mg/l
PAH (ppb)	<0.2	<0.01	<0.2	<0.01	<0.2	<0.01	0.2 ug/l
TPH (ppm)	0.098	<0.01	0.085	<0.01	0.043	<0.01	0.01mg/l
pH	8.6	7.8	8.2	7.6	8.7	7.9	6.5-9.5

Comment

Aluminium and Arsenic has shown a significant decrease compared to previous years, whilst TPH and Mineral Oil have demonstrated an increase in concentration. This matter has been analysed and explained in Endesa Ireland's "Groundwater Monitoring Report 2010" submitted to the agency in December 2010. PAH has remained constant.

2.3. Groundwater Monitoring Report

Emission Reference Point: BH2, BH3, MW101, MW107, MW200.

Table 2.3A. Annual Results on Groundwater

2010	BH2	BH3	MW203	MW200	MW101	MW107	IGV
Aluminium (ppb)	17	<10	NS	<10	<10	<10	200 ug/l
Arsenic (ppb)	<1	<1	NS	<1	12	<1	10 ug/l
Mineral Oil (ppm)	0.018	<0.01	NS	0.025	<0.01	0.026	0.01 mg/l
PAH (ppb)	<0.20	<0.20	NS	0.23	<0.20	<0.20	0.20 µg/L
TPH (ppm)	0.054	0.057	NS	0.065	0.054	0.059	0.01 mg/l
pH	7.6	8.0	NS	7.1	8.4	7.1	6.5 - 9.5
2009	BH2	BH3	MW203	MW200	MW101	MW107	IGV
Aluminium (ppb)	142	136	NS	90	217	<10	200 ug/l
Arsenic (ppb)	2.0	41	NS	3.7	33	16	10 ug/l
Mineral Oil (ppm)	0.07	<0.01	NS	<0.01	<0.01	<0.01	0.01 mg/l
PAH (ppb)	<0.05	<0.05	NS	<0.05	<0.05	<0.05	0.20 µg/L
TPH (ppm)	0.05	<0.01	NS	<0.01	<0.01	<0.01	0.01 mg/l
pH	7.6	7.4	NS	6.9	8.2	6.8	6.5 - 9.5

Comment

There has been a demonstrated decrease in the concentration of Aluminium and Arsenic from previous years. MW101 exceeded the Arsenic IGV with a result of 12 ug/l but has demonstrated a significant decrease in relation to previous year's results.

As discussed in Endesa Ireland's "Groundwater Monitoring Report 2010" submitted to the Agency in December 2010, MW202 is due to replace MW203 in the 2011 sampling regime, as a sample is unattainable due to the bore being blocked.

Mineral Oil and TPH levels rose slightly from the normal trend in 2010 and shall be closely monitored in the next sampling round during 2011.

PAH has remained constant.

Table 2.3B. Emission Reference Point: BH5, BH7, BH8 and BH10 (Additional Monitoring)

	BH5	BH7	BH10	IGV
Vanadium (ppb)	130	10	<10	NV
Lead (ppb)	<2	<2	<2	10 µg/L
Chromium (ppb)	<1	<1	<1	30 µg/L
PAH (ppb)	<0.20	<0.20	<0.20	0.20 µg/L
TPH (ppm)	0.19	0.072	0.11	0.01mg/l
pH	7.4	6.9	7.9	6.5 -9.5

Comment

BH9 (MW201) listed in the Schedule 4(ii) Groundwater monitoring of Great Island Generation Station's License was found to be blocked and no samples are retrievable. The replacement bore has been proposed in Endesa Ireland's "Groundwater Monitoring Report 2010" submitted to the agency in December 2010.

All parameters were within IGV for 2010, except TPH which shall be closely monitored in the next sampling round during 2011.

2.4. Emissions to Sewer

According to Condition 6.6 of IPPCL P0606-02 which states that the emission limit values for this discharge shall be 20 mg/l for BOD and 30 mg/l for Suspended Solids.

Table 2.4. BOD and Suspended Solids concentrations for SW3 in 2010

2010	SW3 BOD (mg/l)	SW3 SS (mg/l)
First Quarter	7.93	12.4
Second Quarter	NS	NS
Third Quarter	NS	NS
Fourth Quarter	NS	NS
2009	SW3 BOD (mg/l)	SW3 SS (mg/l)
First Quarter	6.55	8.85
Second Quarter	6.47	NS
Third Quarter	6.47	6.03
Fourth Quarter	6.52	2.6
<i>Emission Limit Value</i>	<i>20 mg/l</i>	<i>30 mg/l</i>

Note

NS - No Sample, meaning no discharge from septic tank.

Comment

Samples were unattainable for the most part of 2010 from this point due to lack of flow. Samples retrieved were within IPPC License Limits.

Based on the conclusions from the soil, surface water and groundwater thoroughly monitored by URS in 2008 as part of the divestment process, a Plan of Action was described in the 2009 AER, the resulting actions are described below:

Item	Recommendation	Result Achieved
Surface water & Groundwater	Quantitative Risk Assessment	Completed during 2010
Coliforms - Former landfill area; Station grounds	Further investigation	Proposal submitted during 2010
Ammonia - Former disposal area wells	Additional groundwater monitoring wells	Proposal Submitted during 2010

As stated in Endesa Ireland's "Groundwater Monitoring Report 2010", the groundwater monitoring programme is to be restructured to include analysis of Ammonia and Coliforms in monitoring wells located on the site.

2.5. Emissions to Atmosphere Report

Schedules 1(i) and 1(ii) of Great Island IPPC licence requires the monitoring of emissions to atmosphere at Emission Point Reference Nos. A1-1, A1-2 and A1-3, having regard to Licence Conditions 3 and 5.

Table 2.5.A. Emission Point Reference No. A 1-1: Unit 1 exhaust stack

2010	Average NO_x (mg/m³)	Average SO₂ (mg/m³)	Average Particulates (mg/m³)
January	738.6	1,287	185.74
February	723.6	1,194	73.24
March	NR	NR	NR
April	NR	NR	NR
May	733.2	1,077	109.61
June	659.9	1,579	116.01
July	NR	NR	NR
August	NR	NR	NR
September	620.5	1,364	151.13
October	NR	NR	NR
November	643.5	1,376	124.75
December	662.7	1,357	161.09
Emission Limit Value	850 mg/m³	1,700 mg/m³	250 mg/m³

Note: "NR" stands for "Not Required" because the unit did not run during the indicated period

Comment

All NO_x, SO₂ and particulates were within the station's emission limit values as stated in the IPPC License for Unit 1 in 2010.

Table 2.5.B. Emission Point Reference No. A 1-2 : Unit 2 exhaust stack

2010	Average NO_x (mg/m³)	Average SO₂ (mg/m³)	Average Particulates (mg/m³)
January	732.0	1,236	132.84
February	693.9	1,206	119.43
March	NR	NR	NR
April	NR	NR	NR
May	789.4	1,087	73.28
June	781.8	1,441	80.03
July	NR	NR	NR
August	NR	NR	NR
September	803.2	1372	48.64
October	NR	NR	NR
November	670.8	1,408	89.44
December	725.1	1,359	68.52
Emission Limit Value	850 mg/m³	1,700 mg/m³	250 mg/m³

Note: "NR" stands for "Not Required" because the unit did not run during the indicated period

Comment

All NO_x, SO₂ and particulates were within the station's emission limit values as stated in the IPPC License for Unit 2 in 2010.

Table 2.5.C. Emission Point Reference No. A 1-3: Unit 3 exhaust stack

2010	Average NO_x (Nmg/m³)	Average SO₂ (Nmg/m³)	Average Particulates (Nmg/m³)
January	721.7	1,443.8	187.6
February	620.4	1,337.2	107.6
March	639.1	1,366.9	83.6
April	NR	NR	NR
May	616.8	1,422.2	167.2
June	682.7	1,571.0	131.3
July	638.9	1,425.0	124.7
August	687.0	1,489.5	102.4
September	749.8	1,583.3	171.2
October	F	F	F
November	F	F	F
December	681.1	1,571.8	93.5
<i>Emission Limit Value</i>	<i>900 mg/m³</i>	<i>1,700 mg/m³</i>	<i>200 mg/m³</i>

Note: “NR” stands for “Not required” because the unit did not run during the indicated period
“F” stands for “Fault”, CEMS Unit malfunction – data lost

Comment

Monitored monthly means for NO_x, SO₂ and Particulates for 2010 were within the IPPC License Emission Limit values for Unit 3. During Q4 of 2010, there were two CEMS Unit Malfunctions which led to data being lost. These faults were formally reported to the Agency and corrective actions were taken to ensure that this does not happen again in the future.

Table 2.5.D. Emissions to Atmosphere Non-compliance Summary

Date	Non-compliance	Cause	Corrective Action
12/01/2010	Unit 3 –Particulate Exceedance for daily mean	Fan Failure	Fan replaced
26/01/2010	Unit 1 – Particulate Exceedance	Combustion Problems	

Comment

The exceedance of Particulates for Unit 3 occurred in January, caused by one of the fans failing on the system. On the 12th, 13th and 14th of January particulates exceeded the IPPC License limit of 200mg/m³. The problem was identified on the 12th, but the Unit was requested to stay on load. The Unit was de-rated to 50MW. The fan was replaced once the unit came off load and readings returned to normal. This was reported to the agency in a letter dated 15th January 2010.

Particulates readings for Unit 1 were found to have exceeded IPPC License Limits on the 26th of January also. This was caused due to combustion, as one of the burners failed to ignite and therefore fuel was not burning efficiently. Burners are regularly serviced as part of operational control process. This was reported to the agency via telephone.

2.6. Waste Management Report 2010

Year	Total Waste Removed from Site (tonnes)
2010	168.26 (73% recycled)
2009	183.94 (53% recycled)

Waste leaving the site is recorded in the Waste Register, held in the Great Island drive. The detailed summary of the types and quantities together with the disposal information is shown in the Tables 2.6A and 2.6B below.

EWC	Hazardous	Quantity T/year	Description	Name of Waste Disposal Recovery Contractor	Waste Permit Details and issuing Authority	Ultimate Destination of Waste
20 03 01	No	19.7	General Waste	Advanced Environmental Solutions	W104-01	Wexford
15 01 02 15 01 01 20 01 01	No	24.6	Mixed Recyclables • Plastic • Cardboard • Paper	Advanced Environmental Solutions	W104-01	Tullamore (Recycling)
17 04 05	No	37.2	Scrap Metal	Hegarty Metal	WP05-04	Limerick (Recycling)
17 02 01	No	10	Timber	Advanced Environmental Solutions	W104-01	Tullamore (Recycling)
20 01 25	No	0.11	Cooking Oil	Frylite	WCP/KK/186/04	Dublin (Recycling)
16 02 14	No	0.94	WEEE Waste	KWK Metals	W0113-03	Offaly (Recycling)
17 04 11	No	0.20	Cables	Hegarty Metal	WP05-04	Limerick (Recycling)

Table 2.6.A Non-hazardous Waste Report 2010

EWC	Hazardous	Quantity T/year	Description	Name & Licence/Permit No. of Recoverer/Disposer/Broker	Waste Permit Details and issuing Authority	Ultimate Destination of Waste
15 02 02	Yes	6.3	Solid Oily Waste	ENVA Ireland Ltd.	W0184-1	Portlaois/KWA,Germany
20 01 21	Yes	0.1	Spent Lighting	Irish Lamp Recycling	WCP-DC-08-1115-01	Kildare (Recycling)
20 01 28	Yes	0.01	Printer cartridges	ENVA Ireland Ltd.	W0184-1	Laois (Recycling)
19 08 06*	Yes	4.5	Contaminated water	ENVA Ireland Ltd.	W0184-1	Portlaois
08 01 12*	Yes	2.75	Paint	ENVA Ireland Ltd.	W0184-1	Portlaois/Nehlsen, Germany
16 05 04	Yes	0.12	Aerosols	ENVA Ireland Ltd.	W0184-1	Portlaois/SBH, Germany
13 05 03 13 07 03 13 08 02 13 02 08 13 05 07	Yes	56.57	Oily Water Substances	ENVA Ireland Ltd.	W0184-1	Portlaois (Recycling)
16 02 12	Yes	5.1	Asbestos	O'Kellys Bros/ENVA	W1084-01	Dublin
17 06 01	Yes	0.05	Radiological source	Rilta Environmental Ltd	W0192-02	Dublin/Texas

Table 2.6.B Hazardous Waste Report 2010

2.7. Energy and Water Consumption Report

➤ Energy Consumption

Energy usage at Great Island includes Heavy Fuel Oil and Distillate Oil. Distillate consumption is only required during start-up of the units.

A total of 199.99 Tonnes of Gas Oil was consumed 2010.

Heavy Fuel Oil consumption was 12,219 Tonnes for the station in 2010.

Table 2.7.A Fuel consumption during 2010

Year	Heavy Fuel Oil Consumption (Tonnes)	Gas Oil Consumption (Tonnes)
2010	12,219	199.99
2009	20,632	262.20

➤ Water Consumption

Wexford County Council provides the main water supply. The following Table shows water consumption from 2009-2010. From the Table we can see a noticeable reduction in water consumption. This year consumption figure was 61,000 tonnes. The running hours of the station has reduced over the last number of years resulting in reduced consumption of water.

Table 2.7.B Water consumption during 2010

Year	Water Consumption (Tonnes)
2010	61,000
2009	66,623

2.8. Summary of Environmental Complaints and Incidents 2010

2.8.1 Complaints

Date	Complaint	Cause	Corrective Action
09/08/2010	Noise	Cold start on Unit meaning Quick start ejector required for longer than normal	Switched to Normal mode as soon as possible

2.8.2 Incidents

Date	Incident	Cause	Corrective Action
04/03/2010	Unit 3 - HFO Spill; Burners 6 & 7	Seal failure	Maintenance procedure reviewed
13/05/2010	Pump 2B - HFO Spill	Seal failure	Oil spill training provided to employees, & Emergency clean up service contracted.
09/07/2010	HFO Spill – Tank 4 Flange, Oil Farm	Flange failure	Oil removed from tank. Refurbishment works to be carried out as part of CCGT construction.
12/08/2010	Unit 3 - Oil Spill Centrifuge	Cooler Leak	Parts replaced
22/10/2010	Unit 3 - CEMS Failure	Optical module failure	Spare parts to be maintained by maintenance contractor for Endesa Ireland stations
20/11/2010	Unit 3 - CEMS Failure	Software license expired	24 hour SL Agreement included in maintenance contractor agreement
27/11/2010	Tank 3 Steam Outlet - HFO Spill	Leak in internal pipe	Valve sealed and tank to be emptied.

3. Management of the Activity

3.1. Schedule of Environmental Objectives and Targets for 2010

The achievement regarding the Schedule of Environmental Objectives and Targets for 2010 is described in the Table below.

Licence Objectives	Licensee Targets	Deadline	Update Comment
Reduction of Water usage	Reduce by 5 %	December 2010	Reduced by 8.4% from 2009 figures (See table 2.7B)
Increase recycling of waste within a Waste Framework contract	Increase by 3 %	December 2010	Complete proportion of recycled waste increased by 20% of 2009 figures
Retain ISO 14001 Certification 2010	No major non-conformances for both audits in 2010	October 2010	Successfully achieved
Reduce Energy usage	Reduce by 5 %	December 2010	Successfully achieved (See table 2.7 A)

The following is a list of environmental objectives and targets proposed for 2011.

Licence Objectives	Licensee Targets	Deadline
Recertify EMS to ISO 14001	No major non-conformances for audits in 2011	April 2011
Waste Management	Increase proportion of Recycled Waste	December 2011
Reduce Energy usage	Reduce by 5%	December 2011

Further Objectives and Targets are developed through the Environmental Management Programme as part of ISO 14001 accredited EMS.

3.2. Environmental Management Programme Report 2010

Objective No.	Description	Person Responsible	Target 2010	Situation as of December 2010
P1/2010	Bund Test Programme 2010: Including chem. store bund	Environmental Co-ordinator	All works: Dec 2010	Complete
P2/2010	Annual Inspection of Boiler Wash Tank	Asset Manager	All works: November 2010	Complete
P3/2010	Neutralisation sump: Clean out and inspect floor lining. Re-instate floor lining if required.	Environmental Co-ordinator/ Asset Manager	All works: Oct 2010	Completed in January
P4/2010	Internal partitions and troughs in the cooling tower	Asset Manager	All works: August 2010	Complete
P5/2010	Legionella control and monitoring programme: Annual monitoring programme.	Environmental Co-ordinator	All works: Dec 2010	Complete
P6/2010	Shower rationalisation	Environmental Co-ordinator	Completion: December 2010	Complete
P7/2010	Energy Usage - Review Draught Proofing Windows in Admin Block- Phase II	Environmental Co-ordinator/ Asset Manager	Completion : Dec 2010	Still in progress; delayed due to weather conditions. Due for completion end of February.
P8/2010	Energy Usage - Install PIR presence detection sensors: Toilets lighting	Environmental Co-ordinator	Completion: Dec 2010	Complete
P9/2010	Noise monitoring	Environmental Co-ordinator	Completion: Dec 2010	Not started due to low operational running & severe road conditions during running in December

P10/2010	ISO 14001 Compliance-EMS Review: Laboratory Procedures	Environmental Coordinator	Completion: Dec 2010	Not started, delayed to February in order to complete review of whole system
P11/2010	SGS Visit - ISO 14001	Environmental Coordinator	Completion: April 2010	Complete
P12/2010	Compliance with IPPCL and relevant legislation: Monitor compliance with IPPCL, ensure compliance with licence conditions. Track compliance with Environmental legislation through EMS 3 review, legislation updates from HO and through the internal auditing system.	Environmental Coordinator	Completion: Dec 2010	Complete
P13/2010	Training: Environmental awareness training; Environmental Management Systems and ISO 14001; Waste Management; Emergency preparedness; Internal auditing (Environmental); Legislation (Environmental); Handling of Chemical Products.	Environmental Coordinator	Completion: Nov 2010	Complete
P14/2010	Improve waste management: Increase proportion of recycled waste	Environmental Coordinator	Completion: Dec 2010	Complete
P15/2010	Reduce Water Consumption(AER)	Environmental Co-ordinator	Completion: Dec 2010	Complete

3.3. Environmental Management Programme Proposal 2011

2011 EMP			
Environmental Management Programme Proposal 2011			
EMP Task	Description	Person Responsible	Completion Date
P01/2011	Demonstrate Compliance to AG2	EHS Coordinator	May 2011
P02/2011	Replace Domestic Water storage system and associated piping	EHS Coordinator	Aug 2011
P03/2011	Review of ADR Procedures and Implementation	EHS Coordinator	May 2011
P04/2011	Conduct review of Non-hazardous Waste Agent site	EHS Coordinator	Dec 2011
P05/2011	Conduct review of Hazardous Waste Agent site	EHS Coordinator	Jan 2011
P06/2011	Review Environmental Management System	EHS Coordinator	May 2011
P07/2011	Reduce the number of Incidents	All station personnel	Dec 2011
P08/2011	Energy Usage Administration Building - Overhaul of Lighting System	E&I Manager	Nov 2011

2011 EMP (CONT)**Environmental Management Programme Proposal 2011**

EMP Task	Description	Person Responsible	Completion Date
P09/2011	Waste Management- Increase Proportion of Recycled Waste	Environmental Technician	Dec 2011
P10/2011	Achieve 14001 Recertification	EHS Coordinator	Apr 2011
P11/2011	Training; Chemical Spill Management, CEMS Maintenance and Checking	EHS Coordinator	Nov 2011

3.4. Pollution Emission Register Report 2010

“The licensee shall, not later than six months from the date of grant of this license and thereafter as part of the AER, agree with the Agency the list of substances to be included in the PER, and the methodology to be used in their determination”.

Mass emission figures in the PER summary report below for air emissions are based on CEMS data for 2010.

PER/NERP Report 2010

Facility Identification			
Name	Endesa Ireland Ltd. Great Island Generating Station		
IPPC Register No.	P0606-02		
Reporting Period	2010		
Pollutant Summary			
Pollutant Name	Output to Air (Tonnes)		
	A1-1	A1-2	A1-3
Nitrogen Oxides	9.23	9.24	75.61
Sulphur Dioxide	17.48	16.37	164.31
Dust	1.85	0.99	15.59
Carbon Dioxide	Station Total 39,830.5 (Tonnes)		
Annual Usage (Tonnes)			
Ammonia (33% conc.)	1.76		
Hydrazine (7.5% conc.)	1.00		

E-PRTR Calculation Spreadsheet for Endesa Ireland Power Stations
Emission data follows Eurelectric/VGB recommendations of January 2008
Specific Flue Gas Volumes - dry gas in nm³/GJ
Basis is normal conditions 0 deg c 1013 mb and Nett Calorific Value

Fuel	VGB/EE Recommended	Endesa Ireland Calculation	FG Conditions		
HFO	280		3% O ₂		
Diesel			3% O ₂		Boiler Plant
Fuel consumption					
HFO	12,219	40.67	GJ/t NCV	496946.7	GJ
Diesel	199.99	43.31	GJ/t NCV	8661.567	GJ
Total	12,418.99			505608.3	GJ

Substance	EF (g/GJ)	Emissions (Kg)	Comments on Data
Methane	0.8	404.4866136	VGB from IPCC 2006
CO	15	7584.124005	VGB from IPCC 2006
N2O	0.3	151.6824801	VGB from IPCC 2006
NH3	0	0	Report as nil - no SCR
NM VOC	0.6	303.3649602	VGB expert group
As	0.002	1.011216534	VGB expert group
Cd	0.002	1.011216534	VGB expert group
Cr	0.008	4.044866136	VGB expert group
Cu	0.008	4.044866136	VGB expert group
Hg	0.0003	0.15168248	VGB expert group
Ni	0.2	101.1216534	VGB expert group
Pb	0.02	10.11216534	VGB expert group
Zn	0.04	20.22433068	VGB expert group
Benzene	0.00062	0.313477126	VGB from US EPA AP42
PAHs	0.00007	0.035392579	VGB expert group
PCDD/PCDF	6.0010E-10/ 0.8	404.486	VGB expert group/VGB from IPCC 2006

4. Licence Specific Reports

4.1. Noise Monitoring Reports

Noise surveys were scheduled on three different occasions in coordination with the Units being called into operation by Eirgrid.

Surveys could not be completed as the Units were either called off – load as the noise consultant was starting the survey or the proposed operation of the Units did not occur as forecasted energy requirements were not met.

The station had a total load factor of 2.02% during 2010. Running the Units for the purpose of conducting these tests entails excessive costs in terms of operating costs and levies imposed by Eirgrid.

4.2. Bund Test Report 2010

No.	Bund	Location	Type	Test Result	Comment
1	T101	Exterior North Wall	Oil	Repaired and Tested in July 2009	Pass
2	T102	Exterior North Wall	Oil	Tested in Jan 2009	Pass
3	T141	Road to Oil Farm	Oil	Tested in Jan 2009	Pass
4	ST101	Exterior North Wall	Oil	Tested in Jan 2009	Pass
5	ST102	Exterior North Wall	Oil	Tested in Jan 2009	Pass
6	T2003	Exterior North Wall	Oil	Tested in Jan 2009	Pass
7	UT3	Behind U3 Transformer	Oil	Tested in Jan 2009	Pass
8	Heavy Fuel Oil	Lower Yard Site	Oil	Tested in Feb 2009	Pass
9	Light Fuel Oil	Lower Yard Site	Oil	Tested in February 2009	Pass
10	Stripping Tank	Lower Yard Site	Oil	Tested in Jan 2009	Pass
11	Sulphuric Acid	Water Treatment Plant	Chemical	Tested Feb 2009	Pass
12	Caustic Soda	Water Treatment Plant	Chemical	Tested Feb 2009	Pass
13	A Bulk Hydrazine	South Eastern Corner of Main Station Building	Chemical	Tested in Jan 2009	Pass
14	B Bulk Hydrazine	Eastern Side of Station	Chemical	Tested in Jan 2009	Pass
15	B Ammonia	Eastern Side of Station	Chemical	Tested in Jan 2009	Pass
16	Chem. Stores Bund	Exterior	Chemical	Not tested	Replaced

As all bunds on-site were tested during 2009, there was no requirement to complete any further testing during 2010. The Chemstore bunds which were not tested in the 2009 campaign were removed from site during 2010, and replaced with new certified Chemstore bunds. It is Endesa Ireland intention to carry out a risk assessment of the Main HFO Bund at Great Island during 2011, based on the screening tool from the Institute of Energy.

4.3. AST Crosscheck Reports

The Annual Surveillance tests that the IPPCL requires for the CEMS monitoring Units was also scheduled on three occasions in coordination with the Units being called into operation by Eirgrid.

Surveys could not be completed as the Units were either called off – load as the consultant was starting the survey, or the proposed operation of the Units did not occur as forecasted energy requirements were not met. The station had a total load factor of 2.02% during 2010.

Running the Units for the purpose of conducting these tests entails excessive costs in terms of operating costs and levies imposed by Eirgrid.

4.4. Residual Management Plan / ELRA

The Residual Management Plan and Environmental Liabilities Risk Assessment were sent to the Agency during 2009. No major amendments occurred nor are any required at this stage.

4.5. Total Annual Emission of SO₂, NO_x and Particulates 2010

Emission Point	Generating Unit	NO _x emissions (Tonnes)	NERP NO _x emissions limit (Tonnes)	SO _x emissions (Tonnes)	NERP SO _x emissions limit (Tonnes)	Particulates emissions (Tonnes)	NERP Particulates emissions limit (Tonnes)
A1-1	Unit 1	9.23	204	17.48	770	1.85	23
A1-2	Unit 2	9.24	191	16.37	723	0.99	21
A1-3	Unit 3	75.61	528	164.31	1,957	15.59	59
Total	Station	94.07	923	198.16	3,450	18.44	103

Comment

All NO_x, SO₂ and Particulates were within emission limit values during 2010 for each of the emission points in the station.

4.6. Amendments to Procedures

The Oil Spill Response Plan was reviewed during 2010 in conjunction with an external agent, responsible for development of Waterford Harbour Authority and Wexford County Council Oil Spill Response Plans. The plan was completed during October 2010. Employees were provided with specific training, which incorporated the contents of this Plan and a practical exercise in the management of oil spillages.

There were no major amendments to EMS procedures during 2010.

4.7. Total amount of Electricity Generated 2010

Unit	GWh Generated	GWh Exported
1	3.553	3.365
2	3.522	3.377
3	32.79	30.417
Station	39.865	37.158

Appendices

CEMS CALIBRATION REPORTS



Unit 24 Stadium Business Park
Ballycoolin Road
Dublin 11
Ireland

Tel. : 00353 1 8853954
Fax. : 00353 1 8853959
E-mail: mail@emsys.ie
www.emsys.ie

Customer
Endesa Ireland.
Great Island Generating Station,
New Ross,
Co. Wexford.
Location: Unit 1 & 2

Instrument
Sick Maihak S710 Multigas analyser
Serial No. 711803

Service Report No.: GH200510-1
Date: 20/05/10
Order No.: 4700189577
Contract No.: N/A

Service Requested/Fault
Fit regulator.

Work Carried Out

1. Carried out visual inspection of site. System okay.
2. Checked S710 analyser's parameters and status page. All okay
3. Replaced span gas regulator.
4. Leak checked span gas regulator and line. Both okay.
5. Carried out calibration. Drift results were too high, < 40% for NO span.
6. Carried out drift reset and recalibrated.
7. Checked for faults on CEMView. Intermittent Flow fault flagged on analyser.
8. Checked roto flow meter on analyser. Flow correct at 60L/min. Checked internal flow meter in analyser. Reading low. Carried out flow calibration. Flow meter okay.
9. Cleared all alarms on CEMView.
10. CEM system okay.

Time on Site: 1.5 Hours

Parts Used
1 x 2 stage stainless steel pressure regulator

Engineers Signature: Gary Heslin

Customers Signature: N/A



Customer

Endesa Ireland.
Great Island Generating Station,
New Ross,
Co. Wexford.

Location: Unit 1 & 2

Instrument

Sick Maihak S710 Multigas analyser

Serial No. 711803

Calibration Cert No.: GH200510-2

Date: 20/05/10

Order No.: 4700189577

Contract No.: N/A

Service Requested/Fault

Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site.
2. Carried out zero and span of analyser.
3. Instrument working correctly and within specification.

Calibration Values.

	NO		O2		SO2	
	Zero	Span	Zero	Span	Zero	Span
Gas Values:	0.0000 mg/M3	665.71 mg/M3	0.0000 %VOL	20.800 %VOL	0.0000 mg/M3	1498.6 mg/M3
Act Values:	-17.587 mg/M3	687.45 mg/M3	-0.0344 %VOL	20.833 %VOL	96.88 mg/M3	1556.3 mg/M3
	DRIFT in %		DRIFT in %		DRIFT in %	
ABS:	- 2.20%	3.265%	-0.16%	0.160%	4.844%	3.853%
DIF:	-2.20%	3.265%	-0.16%	0.160%	4.844%	3.853%
Drift Limits:	+/- 50%					
Calibration Date:	20/10/09					
Gas Data:	Nitric Oxide/ Sulphur Dioxide					
Cylinder No:	P2862ZD646890					
Cert No:	034126					
UN No:	1956					
Cert Date:	29/09/09					
Shelf Life:	12 Months					

Time on Site: 2.0 Hours

Parts Used

N/A

Engineers Signature: Gary Heslin

Customers Signature: N/A



Customer

Endesa Ireland.
Great Island Generating Station,
New Ross,
Co. Wexford.
Location: Unit 1 & 2

Service Report No.: GH110310-1

Date: 11/03/10

Order No.: N/A

Contract No.: 09/103

Instrument

Sick Maihak S710 Multigas analyser

Serial No.: /11803

Service Requested/Fault

Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site. System okay.
2. Checked S710 analyser's parameters and status page. All okay
3. Fitted new fibre glass filter and replaced hydrophobic filter.
4. Replaced peristaltic pump kit. Checked all sample and condensate tubing. All in very good condition.
5. Removed analyser from rack and replace sample pump kit and internal filter.
6. Replaced calibration gas and set up flows and pressures.
7. Programmed new calibration gas values in both the S710 and CemView.
8. Replaced analyser in rack.
9. Checked all electrical and pneumatic connections.
10. Powered up instrument and allowed to heat up.
11. Checked all parameters.
12. Zeroed and spanned instrument using on site gas. Instrument okay.
13. Span regulator not regulating outlet pressure. New regulator to be ordered and fitted. Auto calibration was disabled. Customer to carry out manual calibration weekly until new regulator is fitted.
14. Checked CEMView. All alarms okay. All calibration reports correct
15. CEM system okay.

Time on Site: 3.0 Hours

Parts Used

1 x 1 yr KIL SP2000 (2 030 462) 1 x Sun-Control WT20.5K Filters (5 313 317) 1 x F56 Filters 55mm Fibreglass (5 312 005) 1 x Peristaltic Pump Kit (2 027 976) 1 x Pump Hose i.d. 4x1 5.1M (5.313.443) 1 x Sample Pump Kit (2 028 438) 1 x Fi64 Filter (2 027 973) 1 x Hose Viton i.d. 3x1 1M (5.314 542)

Engineers Signature: Gary Heslin

Customers Signature: N/A



Customer

Endesa Ireland.
Great Island Generating Station,
New Ross,
Co. Wexford.
Location: Unit 1 & 2

Calibration Cert No.: GH110310-2

Date: 11/03/10

Order No.: N/A

Contract No.: 09/103

Instrument

Sick Maihak 5710 Multigas analyser
Serial No. /11803

Service Requested/Fault

Routine Service & Calibration

Work Carried Out

1. Carried out visual inspection of site.
2. Carried out zero and span of analyser.
3. Instrument working correctly and within specification.

Calibration Values.

	NO		O2		SO2	
	Zero	Span	Zero	Span	Zero	Span
Gas Values:	0.0000 mg/M3	665.71 mg/M3	0.0000 %VOL	20.800 %VOL	0.0000 mg/M3	1498.6 mg/M3
Act Values:	-1.9262 mg/M3	669.13 mg/M3	0.00470 %VOL	20.792 %VOL	-12.261 mg/M3	1491.6 mg/M3
	DRIFT in %		DRIFT in %		DRIFT in %	
ABS:	-0.36%	-37.2%	-0.53%	7.508%	18.75%	5.246%
DIF:	-0.24%	0.513%	0.022%	-0.04%	-0.61%	-0.46%
Drift Limits:	+/- 50%					
Calibration Date:	20/10/09					
Gas Data:	Nitric Oxide/ Sulphur Dioxide					
Cylinder No:	P2862ZD616890					
Cert No:	U34126					
UN No:	1956					
Cert Date:	29/09/09					
Shelf Life:	12 Months					

Time on Site: 3.0 Hours

Parts Used

N/A

Engineers Signature: Gary Heslin

Customers Signature: N/A

Opsis/Instrumatic O2000 service report

Control Serial No: <input style="width: 90%;" type="text"/>	ET No: <input style="width: 90%;" type="text"/>
Probe No: <input style="width: 90%;" type="text"/>	
Fault Message: <input style="width: 95%;" type="text" value="O2 high alarm"/>	

<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="background-color: #000080; color: white; text-align: center; padding: 2px;">PRE TEST DATA</th> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Calibration</td> </tr> <tr> <td style="padding: 2px;">Display at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">20.80%</td> </tr> <tr> <td style="padding: 2px;">Logger at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">20.80%</td> </tr> <tr> <td style="padding: 2px;">Display at 2%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">2.08%</td> </tr> <tr> <td style="padding: 2px;">Logger at 2%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">2.03%</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Tests</td> </tr> <tr> <td style="padding: 2px;">Response time</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">Slow</td> </tr> <tr> <td style="padding: 2px;">Alarm Test</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">Ok</td> </tr> <tr> <td style="padding: 2px;">Filter condition</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">Not checked</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> </table>	PRE TEST DATA		Calibration		Display at 21%	20.80%	Logger at 21%	20.80%	Display at 2%	2.08%	Logger at 2%	2.03%			Tests		Response time	Slow	Alarm Test	Ok	Filter condition	Not checked			<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="background-color: #000080; color: white; text-align: center; padding: 2px;">POST TEST DATA</th> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Calibration</td> </tr> <tr> <td style="padding: 2px;">Display at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td style="padding: 2px;">Logger at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td style="padding: 2px;">Display at 2%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td style="padding: 2px;">Logger at 2%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px;">Start Date/Time</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">08/08/10 14:18</td> </tr> <tr> <td style="padding: 2px;">End Date/Time</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">08/08/10 15:30</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> </table>	POST TEST DATA		Calibration		Display at 21%	As found	Logger at 21%	As found	Display at 2%	As found	Logger at 2%	As found			Start Date/Time	08/08/10 14:18	End Date/Time	08/08/10 15:30		
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Control Serial No: <input style="width: 90%;" type="text"/>	ET No: <input style="width: 90%;" type="text"/>
Probe No: <input style="width: 90%;" type="text"/>	
Fault Message: <input style="width: 95%;" type="text" value="O2 high alarm"/>	

<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="background-color: #000080; color: white; text-align: center; padding: 2px;">PRE TEST DATA</th> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Calibration</td> </tr> <tr> <td style="padding: 2px;">Display at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">20.80%</td> </tr> <tr> <td style="padding: 2px;">Logger at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">20.80%</td> </tr> <tr> <td style="padding: 2px;">Display at 2%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">2.01%</td> </tr> <tr> <td style="padding: 2px;">Logger at 2%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">2.00%</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Tests</td> </tr> <tr> <td style="padding: 2px;">Response time</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">Slow</td> </tr> <tr> <td style="padding: 2px;">Alarm Test</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">Ok</td> </tr> <tr> <td style="padding: 2px;">Filter condition</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">Not checked</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> </table>	PRE TEST DATA		Calibration		Display at 21%	20.80%	Logger at 21%	20.80%	Display at 2%	2.01%	Logger at 2%	2.00%			Tests		Response time	Slow	Alarm Test	Ok	Filter condition	Not checked			<table style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="background-color: #000080; color: white; text-align: center; padding: 2px;">POST TEST DATA</th> </tr> <tr> <td colspan="2" style="text-align: center; padding: 2px;">Calibration</td> </tr> <tr> <td style="padding: 2px;">Display at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td style="padding: 2px;">Logger at 21%</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td style="padding: 2px;">Display at %</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td style="padding: 2px;">Logger at %</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">As found</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> <tr> <td style="padding: 2px;">Start Date/Time</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">08/08/10 14:18</td> </tr> <tr> <td style="padding: 2px;">End Date/Time</td> <td style="border: 1px solid #000080; text-align: center; padding: 2px;">08/08/10 15:30</td> </tr> <tr> <td colspan="2" style="padding: 2px;"> </td> </tr> </table>	POST TEST DATA		Calibration		Display at 21%	As found	Logger at 21%	As found	Display at %	As found	Logger at %	As found			Start Date/Time	08/08/10 14:18	End Date/Time	08/08/10 15:30		
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Erwin Sick OMD 41 service report

Control Serial N o:	ET No:
Transceiver Serial N o:	
Reflector Serial N o:	
Fault Message: None at present although Zero ≥ 2% reported	

PRE TEST DATA	POST TEST DATA
Zero	Calibration
Expected span	Zero
Actual Span	Expected span
Contamination	Actual span
Range	Contamination
Filter condition	
Shutters	

Control Serial N o: 10886.00	ET No: 0
Transceiver Serial N o:	0
Reflector Serial N o:	0
Fault Message:	

PRE TEST DATA	POST TEST DATA
Zero	Calibration
Expected span	Zero
Actual Span	Expected span
Contamination	Actual span
Range	Contamination
Filter condition	
Shutters	

RMF 001 Pre-Cal	RMF 001 Post-Cal
Expected	Expected
Zero	Zero
0.021	No post cal
0.048	No post cal
0.084	
0.176	
0.233	
0.378	
0.830	
1.231	
Zero	

<u>Post-Service/Repair Measurements</u>						<u>Post Ref Calibration Tests</u>				
Path	Gas	Conc	Dev	Light	System check		Gas	Conc	Dev	Light
A	NO	6.2	0.6	10.9	Wheel speed 1	0.06	NO	-0.2	0.1	44.9
A	SO2	2	0	82.8	Wheel speed 10	0.04	NO2	-0.0		93.0
A	NO2	0.7	0.1	87.5	Grating type	Movable	SO2			91.0
A	H2O	0.1	0	44.5	P1	-1.00				
		0	0	0	P2	5022.00				
		0	0	0	P3	41.00				
		0	0	0	P4	0.00	Residuals check			
B	NO	8.7	0.3	23.4	P5	15.74	Gas	Shift	Correlation	
B	SO2	6.1	0.1	87.1	Comvis software ver	1.0 22	NO	0	0.22	
B	NO2	1.8	0	91.8	Analyser software ver	7.21	SO2	0	0.22	
B	H2O	0.1	0	50.4	Data backed up	Yes	NO2	1	0.29	
		0	0	0	Lux level 1	nc	H2O	0	0.33	
					Lux level 2	nc				

System checks are a way of checking that the analyser is working within limits

Lux level is the amount of light seen at the receiver, the larger the figure the better

Ref, or Reference calibration, is the equivalent to zero calibration on conventional equipment, 0 is ideal, but can vary

Wavelength precision checks are to ensure that the analyser is measuring at the correct part of the spectra for the gas being measured -40 to +40 is ok, accuracy is dependant on analyser condition, the higher the better

Residuals are a way of looking at the dip in light levels caused by the absorption of the gas being measured, shift of 0 -10 is ok, correlation depends on the gas concentration

Calibration Results (all results are expressed in mg/m3)

Gas	NO			NO2			SO2		
Cell length m.m.	Expected	Initial	Final	Expected	Initial	Final	Expected	Initial	Final
0	0.0	-0.4	-0.4	0.0	-0.3	-0.3	0.0	-0.2	-0.2
50	44.7	48.6	43.9	2.6	2.4	2.6	96.2	99.0	100.5
98	87.5	93.6	87.4	5.2	4.7	5.0	188.6	189.1	187.4
148	132.2	141.9	132.1	7.8	7.4	7.7	284.8	301.2	290.2
701	626.2			36.9			1349.0		
849	758.4			44.7			1633.8		
	Cal path	1.5		Cal path	1.5		Cal path	1.5	
	Span	1	0.98	Span	1.3	1.3	Span	0.94	0.925
	Offset	0	0	Offset	0	0	Offset	0	0
	Cylinder conc	1000ppm		Cylinder conc	38.5 ppm		Cylinder conc	1000 ppm	

FIGURES

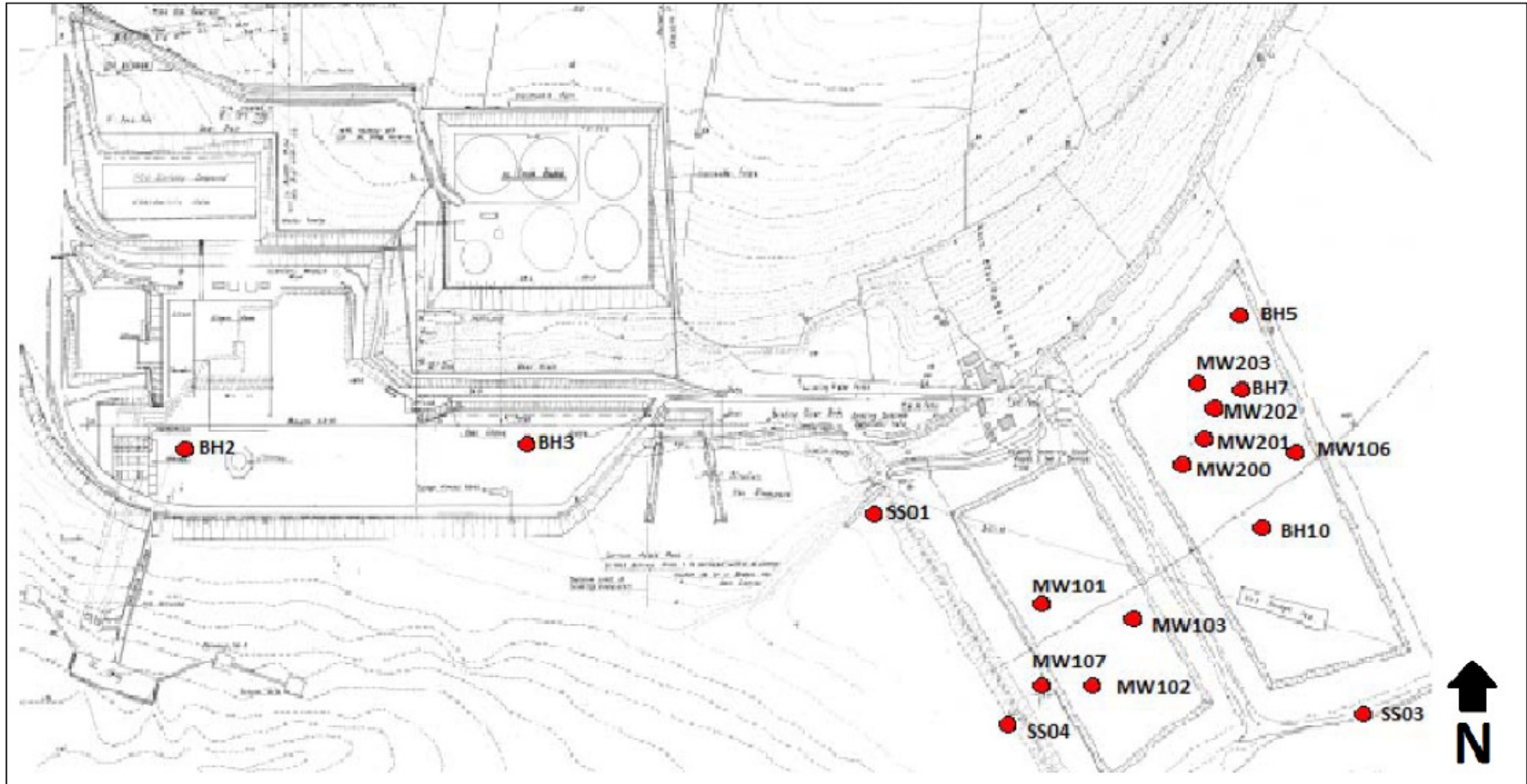


FIGURE 1: LOCATION OF EXISTING BORES

● Monitoring bore location

DATE; 09 December 2010



