

# 2014 Annual Performance Report

Aberthaw Power Station

Permit Number: RP3133LD

March 2015

## Summary

This document gives details on the performance of station activities over 2014, as required by condition 4.2.1 of the Station's Environmental Permit (EP), RP3133LD.

In 2014, there was one Environmental Permit variation;

- EPR/RP3133LD/V010 – amends the permit by adding an improvement condition requiring a cost benefit appraisal of the best available technique with reference to the Environment Agency “Safe Passage for Eel: Guidance on Exemptions” to ensure that the regulated facility will comply with the Eels (England and Wales) Regulations 2009.

The station's full load operating factor was equivalent to 52% with just over 7TWh generated. There was a routine major outage on U7 and interim outage on U8. The carbon capture pilot plant was fully commissioned and completed a period of limited operation before being decommissioned in the latter half of the year. Work continued on investigating the future operation of the power station under the Industrial Emissions Directive (IED) (2010/75/EU) and the station has secured investment to progress a retrofit of Low NOx boiler technology on Unit 9 during the major outage in 2015. The station was also successful in securing a generation contract in the capacity market auction for the period Quarter 4 2018 to Quarter 3 2019 under the UK Electricity Market Reform (EMR).

## CONTENTS

1.	Review of Results for Emission Monitoring	4
1.1.	Air Quality Review	4
1.2.	Water Quality Review	4
2.	Annual Improvement Targets Summary	7
3.	Performance Parameters	8
3.1.	Power Generated 2014 (Table S5.2 EP)	8
3.2.	Water Usage 2014 (Table S5.3, EP)	9
3.3.	Fuel usage 2014 (Table S5.3, EP)	9
4.	Contamination/Decontamination of Site	9
4.1.	Site Contamination	9
4.2.	Site Decontamination	10

## 1. Review of Results for Emission Monitoring

### 1.1. Air Quality Review

There have been no significant changes to the activities, assumptions or parameters used in the assessment of the impact of the air emissions submitted with the application. Since the original permit application in 2006 there has been a reduction in the Emission Limit Value (ELV) for oxides of nitrogen to reflect improvements made in NO<sub>x</sub> control.

Table 1 below summarises the results for point source emissions to air during 2014. The data shows that there have been no exceedences against EP ELVs and therefore, that the impacts of the activities will be less than the initial site assessment.

**Table 1: Summary of compliance with emission limits for point source emissions to air for 2014 (Table S4.1 and S4.4 EP)**

Emission Point	Parameter	EP Emission Limit Value		Reference Period	Measured Data		
Windshield A1	Particulate Matter	25	mg/m <sup>3</sup>	Calendar monthly average	9.17	mg/m <sup>3</sup>	Maximum
		55		48 hour mean as 97%ile	10.55		Annual 97%ile
	Sulphur Dioxide	400	mg/m <sup>3</sup>	Calendar monthly average	233.91	mg/m <sup>3</sup>	Maximum
		440		48 hour mean as 97%ile	295.76		Annual 97%ile
		15000	tonnes	Annual B Limit	5304.6	tonnes	Annual
	Oxides of Nitrogen	1100	mg/m <sup>3</sup>	Calendar monthly average	792.48	mg/m <sup>3</sup>	Maximum
		1210		48 hour mean as 95%ile	843.18		Annual 95%ile
		33,000	tonnes	Annual B Limit	22,230.7	tonnes	Annual

The measured concentrations at the Font-y-Gary and Highwayman Inn (Vale of Glamorgan Council) air quality monitoring stations indicate that there were no exceedences of the Air Quality Strategy (AQS) objectives for either Sulphur Dioxide or Oxides of Nitrogen during 2014. All values were significantly lower than the AQS targets. Hence, the aims of the Air Quality Strategy Management Plan for Aberthaw Power Station have been met.

### 1.2. Water Quality Review

There have been no significant changes to the activities, assumptions or parameters used in the assessment of the impact of the water emissions submitted with the application. Since the original permit application in 2006 the Mass ELVs for cadmium, lead and zinc have been removed because relatively high background levels compared to discharge concentrations have resulted in unreliable determinations of differential concentrations. Concentration ELVs for lead and zinc have been added to replace the annual mass ELV.

During 2014, the Station has continued to use the same independent external laboratory for analysing water samples which it changed to in September 2009 following difficulties with previous laboratories. Duplicate samples have continued to be collected for monthly samples which generally continue to show good repeatability. Table 2 below summarises the results for point source emissions to water during 2014. The data shows that for emission point W2, into the Bristol Channel, there have been no exceedences against EP ELVs and therefore, that the impacts of the activities will be less than the initial site assessment.

The monthly mercury ELV was exceeded in April by approximately 2.5 times and in May by approximately 4 times for SWTP1 (U7 FGD Absorber Outlet), however, the duplicate samples were below/at the ELV. The monthly mercury ELV was also exceeded in April for SWTP2 (U8 FGD Absorber Outlet) by approximately 2.5 times and again the duplicate sample was at the ELV. An investigation into these results has been unable to determine the cause of the elevated results. The laboratory was requested to retest the samples and they confirmed the original results as correct. If the laboratory reported uncertainty of 24% is taken into account the elevated results would remain above the ELV. There was no increase in the corresponding monthly W2 Cooling Water Outlet mercury concentrations or significant differences identified in operating conditions. The monthly mercury ELV was also nominally exceeded in July for SWTP3 (U9 FGD Absorber Outlet), although the duplicate was below the ELV and if the laboratory reported uncertainty of 24% is taken into account the elevated result would be below the ELV.

It should also be noted that annual marine sediment and biota surveys have been undertaken to assess trace element discharge impacts, which have confirmed that although there has been some minor increase in mercury in the immediate vicinity of the outfall, this declines to background levels within a few hundred metres and has shown no discernible impact on the populations of the target species or on the overall communities in Limpert Bay. The station has experienced many difficulties with the sampling and analysis regime for the FGD Absorber Outlets since it was implemented in 2008 and will continue to work with the regulator to resolve the issues.

The monthly zinc ELV was exceeded in October by approximately 4.5 times for SWTP1 (U7 FGD Absorber Outlet), in September by approximately 1.5 times for SWTP2 (U8 FGD Absorber Outlet) and in July by approximately 1.5 times for SWTP3 (U9 FGD Absorber Outlet). Duplicate samples showed similar results. An investigation into these results suggests they are outliers due to all other results being significantly below the ELV and no significant differences identified in operational conditions at the time of occurrence. The concentrations were also within the historical range of the CW Inlet concentrations.

**Table 2: Summary of compliance with emission limits for point source emissions to water for 2014 (Table S4.2, S4.3 and S4.4 EP)****a) Emission Point W2 (Cooling Water Outlet)**

Emission Point	Parameter	EP Emission Limit Value		Reference Period	Measured Data		
W2	Differential total suspended solids	50	mg/l	Weekly average of daily samples	10	mg/l	Maximum
	Ammoniacal nitrogen	0.1	mg/l	Monthly average of daily samples (above background)	0.008	mg/l	
	Differential temperature	13.5	°C	98%ile of continuous daily average values	10.1	°C	
	Total hydrocarbon oil	3	mg/l	Monthly average of daily samples	0.3	mg/l	
	pH	5.8	pH units	Instantaneous	5.9	pH units	Minimum
		6		95%ile of instantaneous measurements	6.0		
		8.5		95%ile of instantaneous measurements	8.5		Maximum
	Mercury	60	kg	Annual Mass Release	35.8	kg	Annual

**b) Emission Point SWTP1, SWTP2, SWTP3 (FGD Absorber Outlets)**

(Note: Brackets ( ) used to denote maximum value following exclusion of outlier.)

Emission Point	Parameter	EP Emission Limit Value		Reference Period	Measured Data		
SWTP1 (U7 FGD Absorber Outlet)	Mercury	0.001	mg/l	Maximum daily value (above background)	0.0007	mg/l	Maximum
	Mercury	0.0005		Monthly average value (above background)	0.0021 (0.0004)		
	Cadmium	0.0002			0.00000		
	Lead	0.004			0.0013		
	Zinc	0.01			0.045 (0.001)		
SWTP2 (U8 FGD Absorber Outlet)	Mercury	0.001	mg/l	Maximum daily value (above background)	0.001	mg/l	Maximum
	Mercury	0.0005		Monthly average value (above background)	0.0012 (0.0005)		
	Cadmium	0.0002			0.00007		
	Lead	0.004			0.0019		
	Zinc	0.01			0.015 (0.008)		
SWTP3 (U9 FGD Absorber Outlet)	Mercury	0.001	mg/l	Maximum daily value (above background)	0.0009	mg/l	Maximum
	Mercury	0.0005		Monthly average value (above background)	0.0006 (0.0004)		
	Cadmium	0.0002			0.00000		
	Lead	0.004			0.0024		
	Zinc	0.01			0.013 (0.004)		

## 2. Annual Improvement Targets Summary

Aberthaw Power Station continues to maintain its ISO 14001 Certification for the "Generation of electricity, by the combustion of fossil fuel and biomasses, together with the associated sale or disposal of ash". The station was recertified by Lloyds Register Quality Assurance during 2014 with two minor non-conformities. Table 3 provides details of the improvement targets for 2014 and the performance against those targets.

**Table 3: Environmental Performance 2014**

Objective	Target	Target Date	Responsible Person	Final Status
<b>Maintain a High Level of Environmental Compliance</b>	No more than 2 environmental incidents resulting in justified complaints.	End 2014	All employees	1 - Noise complaint from Quarry mobile plant incorrect reversing beepers.
	No more than zero exceedences of permit conditions which result or have potential to cause significant environmental harm. (Natural Resources Wales CCS Category 1 and 2).	End 2014	All employees	0
	Minimise exceedences of permit conditions which result or have potential to cause minor environmental harm. (Natural Resources Wales CCS Category 3). Fully investigate all exceedences of this type and implement improvements to minimise the likelihood of environmental harm.	End 2014	All employees	0
	No more than zero non-compliance with emissions limits or conditions as set out in EPR permits (Natural Resources Wales CCS Category 4). Submit all NRW reporting on time.	End 2014	Environmental Compliance Engineer	1 - Quarry SW Discharge above Sulphate ELV 400mg/l.
	Complete response to Improvement Condition 7 - Second Year Monitoring Report for acidification and eutrophication deposition and ecological effects at Usk Bat Sites SAC/Mynydd Llangatwyg SSSI.	Q4 2014	Environmental Compliance Engineer	Submitted 30/10/14.
	Complete response to Improvement Condition 26 - Commissioning of Carbon Capture Pilot Plant Report	Q3 2014	Environmental Compliance Engineer	Submitted 18/12/14.
	Review the reporting methodology for determining mercury mass water releases.	Q3 2014	Environmental Compliance Engineer	Agreed methodology based on emission factors.
<b>Ensure Efficient Uses of Resources</b>	Waste - < 15 segregation non-compliances. Non-compliance definition: - >10% wrong material in the skip. - Waste causing a safety or environmental hazard.	End 2014	All employees	0
	Monitor and regularly report waste disposal and recycling statistics to identify minimisation opportunities.	Ongoing	Environmental Compliance Engineer	2013 stats collated and discussed at Waste CIG.
	Water - 5% reduction on 2013 target < 110 m3/GWh process water (Ely Wells and St Lythans supplement).	End 2014	All employees	117m3/GWhr.
	Monitor and regularly report process and potable water use to identify minimisation opportunities.	Ongoing	Section Head Performance and Commercial Section Head Regulation	Process water leak identified from redundant fire main by meter readings.

Objective	Target	Target Date	Responsible Person	Final Status
	Complete implementation of the funded Energy Action Plan to include updating light fittings and installing energy control units.	End 2014	Section Head Maintenance	Lighting and Heaters modified across Station.
<b>Be Responsive to Concerns and Complaints regarding our Operations</b>	Provide response to public enquiries and complaints within 48hrs of normal office hours.	Ongoing	Section Head Regulation Environmental Compliance Engineer	Compliant.
<b>Be Accountable by Publicly Reporting our Environmental Performance</b>	Hold a Local Liaison Committee.	July 2014	Station Manager Section Head Regulation	Held 25/09/14.
<b>Reduce the Carbon Intensity of Electricity Generated</b>	Complete operation of a 3MW carbon capture pilot plant to test the feasibility of CO2 capture from power station flue gases and plan decommissioning.	Q2 2014	Section Head Production Section Head Regulation	Operation completed and decommissioning planned.
	To meet the business plan targets for biomass burn and thermal efficiency.	End 2014	Section Head Performance & Commercial	Biomass -33%. TEMP -0.34%.
<b>Drive Continuous Improvements in Standards of Environmental Management</b>	Ensure the Environmental Management System is successfully re-certified to ISO 14001.	Ongoing	Section Head Regulation Environmental Compliance Engineer	2 Minor NCs - Energy efficiency survey on ACUs / Part E's HazWaste and SIC Codes
	Ensure all staff and residential contractors (managers and first line supervisors) have completed the new environmental training program.	Q4 2014	Section Heads Technical Officers	Staff - 73% Contractors - 100%
	Hold 2 Waste Continuous Improvement Groups.	End 2014	Environmental Compliance Engineer	Outage waste management meeting held 11/04. Meet held 23/09/14.
	Hold 1 Water Continuous Improvement Group.	End 2014	Station Chemist	No meeting held.
	Install oil in water monitor in the site drainage system at P2.	Q4 2014	Station Chemist	Carry forward.
	Install a weather station at Aberthaw Centre for Energy and the Environment.	Q2 2014	Section Head Electrical, Control & Instrumentation	Equipment ordered and awaiting installation.

### 3. Performance Parameters

#### 3.1. Power Generated 2014 (Table S5.2 EP)

Aberthaw Units 7-9 (Gross Generation, no deductions for works power)	7,263	GWh
Aberthaw OCGTs 7-9	0.382	GWh
<b>Total Site Power Generated:</b>	7,263.382	GWh



### 3.2. Water Usage 2014 (Table S5.3, EP)

#### Seawater cooling water (CW)

Aberthaw seawater CW usage	984,167,756	m <sup>3</sup>
<b>m3/unit output:</b>	135,504	<b>m<sup>3</sup>/GWh</b>

Note: The CW discharge volume is the same as the abstracted volume.

#### Abstracted Water

Ely Wells (borehole abstraction)	870,716	m <sup>3</sup>
<b>m3/unit output</b>	120	<b>m<sup>3</sup>/GWh</b>

#### Towns Water

St Lythans (Town Mains supplement)	147,291	m <sup>3</sup>
Town Mains water usage (excluding St Lythans supplement)	40,320	m <sup>3</sup>
<b>m3/unit output</b>	26	<b>m<sup>3</sup>/GWh</b>

### 3.3. Fuel usage 2014 (Table S5.3, EP)

Coal	2,454,104	tonnes
	64,443,982	GJ
High Carbon Ash	14,972	tonnes
	211,679	GJ
Gas Oil	133	tonnes
	5706	GJ
Heavy Fuel Oil	20,034	tonnes
	812,070	GJ
Processed Fuel Oil	0	tonnes
	0	GJ
Solid Biomass	73,549	tonnes
	596,643	GJ
Liquid Biomass	2,163	tonnes
	80,983	GJ

Note: Data is as submitted to EU Emission Trading Scheme which has been subject to final year end accounting and external verification.

## 4. Contamination/Decontamination of Site

### 4.1. Site Contamination

There have been no incidents or emissions which may have caused any site contamination during 2014.

#### 4.2. Site Decontamination

There have been no requirements to decontaminate the site during 2014.