



Environmental Emissions Assessment for Sewage Treatment Plant Discharge at Pembroke Power Station

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Environmental Emissions Assessment for Sewage Treatment Plant Discharge at Pembroke Power Station

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1 Introduction

On the 4th December 2012 RWE applied for a variation to an Environmental Permit (DP3333TA) to incorporate the discharge from the permanent sewage treatment plant installed at the Pembroke Power Station. On the 20th December the Environment Agency (EA) requested that RWE submit a risk assessment for the proposed discharge from the sewage treatment plant within 10 working days.

The sewage treatment plant will combine with the main cooling water and other process streams (W1a and W1b) prior to discharging to the environment at release point W1 into the 'Saline' Milford Haven Waterway. An aqueous assessment of the discharges from W1 (excluding the sewage treatment plant), has previously been submitted and used by the EA for the determination of the main environmental permit.

The original assessment submitted with the main application (and the November 2010 revision) was carried out as a screening exercise using EA's normal H1 screening assessment approach which focuses on concentrations at an agreed point within the receiving water at which some mixing has occurred (represented through the use of a "dispersion rate"). However, the EA advised that for the purpose of the Pembroke CCGT assessment the use of a "dispersion rate" is not appropriate (Email, R.Hockley 20th Jan 2011). In line with EA's specific statement of requirements, the methodology was amended to focus on the point of discharge (POD) concentrations at the station's main combined process discharge point (W1). This revised assessment was submitted in January 2011 and gave the POD concentrations resulting from emission of the WTP effluent (W1a) and the boiler blowdown (W1b) and compared this combined discharge against environmental quality standards. Further versions of the aqueous assessments were submitted to the EA with the final version being report number ENV/476/2011, Version 4, submitted in October 2011.

RWE has reviewed the Environment Agency Horizontal Guidance Documents H1 Annex D and Annex E. Having risk assessed the scale of the discharge and in order to ensure consistency with the approach requested by the EA during the determination of the main environmental permit it was decided that the methodology that calculates the combined POD concentrations from W1 to the environment, as used in the main permit determination, would be most appropriate in this case. The use of point of discharge concentrations makes an assessment precautionary since, unlike H1, the process contributions and predicted environmental concentrations are evaluated at the point of discharge when compared with a point in the receiving waters after some degree of mixing.

The substances assessed are those deemed to be important when assessing treated sewage discharges and for which design data from the plant supplier exists. They are Ammonia, Suspended Solids and BOD. ,

The calculated POD concentrations have been compared against environmental quality standards (EQSs) where they exist, or expressed as a percentage of the ambient concentration if no EQS exists for that substance. In all cases where substances have EQSs, the calculated POD concentrations were all less than 4% of that EQS. In cases where no EQS exists for Saline Waters the POD concentrations are all less than the ambient concentrations of those substances.

2 Scope

This risk assessment considers the POD concentrations of emissions from W1 to the environment using the methodology requested by the EA during the determination of the main Environmental Permit.

3 Assessment

In order to determine the level of assessment required for this discharge RWE have reviewed the Environment Agency Horizontal Guidance Documents H1 Annex D and Annex E. Annex D states that there is no specific guidance for discharges, such as this, to estuarine and coastal waters. Based on the contribution of this discharge to the overall discharge to the environment at W1 and having regard to the methodology previously requested by the EA for discharges at W1 it has been decided that this method of risk assessment would be most appropriate. This ensures consistency with previous assessments.

Table 1 below displays the data used to assess the significance of the discharge of the relevant substances. It includes the following information for each of the substances:-

STP Discharge – these are the concentrations of substances quoted on the design data for the sewage treatment plant effluent.

Blowdown – these are the concentrations of substances contained in the boiler blowdown as a result of the addition of operational chemicals. As a precautionary approach where an environmental permit limit exists for the substance this has been used as the concentration.

WTP (incl RW) - these are the concentrations of substances contained in the water treatment plant effluent as a result of the concentrations from the raw water (as concentrated by the WTP process) and the addition of operational chemicals. Again, as a precautionary approach where an environmental permit limit exists for the substance this has been used as the concentration.

CW – these are average concentrations of substances contained in the cooling water after going through the plant. Recent RWE Milford Haven monitoring data has been used (2011 average) as there are no additions of Ammonia, Suspended Solids and BOD to the CW.

POD concentration – this is a flow weighted concentration at the discharge point into Milford Haven.

EQS-AA – these are the Annual Average UK Environmental Quality Standards. (These only exist for some substances.)

Ambient Concentration – Background (2011 average) RWE Milford Haven monitoring data has been used.

%age POD/EQS – this shows the POD concentration as a percentage of the EQS-AA.

%age POD/ambient – this shows the POD concentration as a percentage of the ambient (i.e. seawater) where no EQS exists.

The unionised fraction of the total ammoniacal nitrogen has been taken to be the same as seawater (2.2%, average from 2011).

The potential for significance of the point of discharge emissions to the Milford Haven waterway via W1 has been assessed against environmental quality standards for those substances for which standards are defined. The use of point of discharge concentrations makes this assessment precautionary since, unlike H1, the predicted environmental concentrations are evaluated at the point of discharge rather than at a point in the receiving waters.

As mean concentrations have been used in the assessment, releases have been assessed against relevant UK EQS-AA (annual average concentrations), where defined. For substances for which no EQS is defined, comparison with ambient seawater concentrations is presented.

In all cases where UK EQS-AAs exist the POD concentrations are below these. Where they do not exist the POD concentrations are below ambient seawater concentrations.

Table 1. Aqueous Emissions Assessment for W1 including Sewage Treatment Plant Discharge

Parameter	Units	STP Discharge (c)	Blowdown	WTP	CW (a)	POD Concentration	EQS-AA	Ambient Concentration (a)	%age POD/EQS	%age POD/Ambient
Flow	l/sec	0.0825	16.84	7.48	40000	-	-	-	-	-
Ammoniacal nitrogen (as N) (d)	mg/l	20	0.7760	0.2970	0.0180	0.0184	1.1	0.0180	1.67	-
Unionised ammoniacal nitrogen (as N) (b)	mg/l	0.4400	0.0171	0.0065	0.0004	0.0004	0.021	0.0004	2.09	-
TSS	mg/l	30	5.5	27.5611	14.0000	13.9990	-	14.0000	-	99.99
BOD	mg/l	20	-	-	1.5000	1.4991	-	1.5000	-	99.94

Notes:

- a) Values taken from 2011 Average values from RWE Npower Haven Water Quality Monitoring Programme
- b) Unionised fraction of total Ammoniacal nitrogen taken to be the same as seawater (2.2%, average from 2011)
- c) Sewage Treatment Plant Discharge Rate is Annual Average
- d) Indicative EQS from Decision Document for Main Environmental Permit EPR/DP3333TA

4 Conclusions

The assessment of the aqueous emissions to the environment from W1 at Pembroke Power Station demonstrates that 'point of discharge' concentrations are well below any defined UK EQS-AAs. They are also well below the 4% value in H1 Annex D, for screening out insignificant discharges. For those substances for which an EQS-AA is not defined, point of discharge concentrations are below those of the ambient seawater in Milford Haven.

The assessment above is precautionary as it considers POD concentrations rather than concentrations following dilution in the receiving water (as in H1).

During construction of the Pembroke Power Station a permit for the discharge from a temporary sewage treatment plant was granted to Alstom. This temporary discharge permit had higher loads than the permanent sewage treatment plant considered here. This temporary discharge was assessed by the EA in combination with the main cooling water discharge under the appropriate assessment for the main environmental permit. This assessment concluded that there would be no likely significant effect on the SAC, alone or in combination, from this discharge of higher load.

RWE concludes that the proposed aqueous emissions considered would lead to:

- no adverse effect on the conservation objectives of the Pembrokeshire Marine SAC
- no adverse effect on the site integrity of the Pembrokeshire Marine SAC

as there would be no exceedence of EQSs for substances for which an EQS is defined, for other substances, the point of discharge concentrations are lower than the concentrations within ambient sea water and a discharge with higher load that no longer exists has already been assessed and considered to have no likely significant effect.

Having considered all the information above RWE considers that there is no requirement for discharge limits on this insignificant discharge and no further assessment of this discharge is required.

5 References

Environment Agency, 2011, 'H1 Environmental Risk Assessment – Annex (d) Surface water discharges (basic)' Version 2.2, December 2011,

Environment Agency, 2011, 'H1 Environmental Risk Assessment – Annex (e) Surface water discharges (complex)' Version 2.1, December 2011,

RWE Npower, 2010, 'EPR H1 Assessment for Pembroke Power Station (ENV/367/2009)', February 2010,

RWE Npower, 2011, 'Aqueous Emissions Assessment (ENV/476/2011, Version 4)', October 2011,

Environment Agency, 2011, Appropriate Assessment for Environmental Permit (DP3333TA).

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