

Addendum to the AECOM Water Modelling Assessment 2022

Project title	Keadby 3 Low Carbon CCGT Generating Station
Job number	294953-00
File reference	294953-00
cc	Chris King
Prepared by	
Date	28 March 2024
Subject	Response to Schedule 5 (2)

12 Wellington Place Leeds LS1 4AP United Kingdom

t +44 113 242 8498

arup.com

1. Introduction

In June 2022, AECOM prepared a response to a Not Duly Made notification from the Environment Agency (EA) for the Keadby 3 Low Carbon CCGT Generating Station Environmental Permit variation application (Ref. EPR YP3133LL).

The Request for Further Information Response included a Water Modelling Assessment (as Appendix A to the response) (herein referred to as the “2022 Assessment”), which detailed a H1 screening assessment and Cormix modelling of emissions from the Keadby 2 and proposed Keadby 3 generation stations.

On 22nd March 2024 the EA issued additional questions to SSE to seek clarification over a number of outstanding issues in relation to the permit variation, namely:

1. Updating the H1 risk assessment for Copper emissions to determine whether modelling is required.
2. Confirming whether full flow thermal discharge from Keadby 2 and Keady 3 operating in tandem has been carried out.

This note aims to clarify these two outstanding issues.

2. Updated H1 Assessment

The presence of copper in the Keadby 3 discharge is associated with the concentrating up of existing contaminants present in the abstracted canal water utilised for cooling water make-up. Further analysis of the data used for the 2022 Assessment has shown that the value of 150µg/l used was based on an outlier result of canal water tested in 2015. The assumed maximum 150µg/l value was based on a maximum concentration of copper of 37µg/l, with a concentration factor of x 4 applied. Average results for the same period showed concentrations were typically 7.5µg/l, however this information was not made available for the 2022 Assessment.

Additional monitoring of the canal water during 2023 has demonstrated that the background concentrations are consistently significantly lower than those used in the 2022 Assessment, with typical concentrations below the limit of detection of 9µg/l.

An updated H1 assessment for emissions of Copper from Keadby 3 has been carried out using the 2023 canal water monitoring data, with an average concentration of 9µg/l and a maximum concentration of 13µg/l. A concentration factor of 4 has been applied to these values, as per the 2022 Assessment.

Job number 294953-00
 Date 28 March 2024

The annual average Environmental Quality Standard (EQS) for copper in TRac waters is 3.76ug/l when there is less than or equal to 1 milligram per litre of Dissolved Organic Carbon (DOC). Where DOC is over mg/l the following uplift factor can be applied:

$$3.76 + (2.677 \times ((\text{DOC}/2) - 0.5)) \mu\text{g/l}$$

The Environment Agency’s Water Quality Archive provides background concentrations for a range of pollutants at sample point MD-36693498 (River Trent at Keadby). DOC was measured at this point up until October 2015 with measured values between 2013 and 2015 being between 4.75 – 6.94mg/l, therefore suggesting that DOC is greater than 1mg/l. It is therefore considered appropriate to apply the uplift factor to the 3.76ug/l on this basis, and the lowest measured value of 4.75mg/l has been used in order to enable a conservative assessment to be carried out. This results in a EQS of 9.62µg/l.

Both annual average EQS values have been used in the assessment for completion.

There is no EQS for Maximum Allowable Concentrations (MAC).

The Access version of the H1 screening assessment tool has been used and provided with the assessment, however it should be noted that when Test 2 is applied in the tool, the TRac EQS reverts to that of the EQS for freshwaters of 1µg/l. Also, if adding a “user defined” EQS the Access tool does not carry the pollutant through to Tests 3, 4a and 4b. As such, the results of the screening assessment have been provided in Table 1.

Table 1: H1 Screening Assessment

Substance	Test 1			Test 2			Test 3		
	Annual Average EQS (ug/l)	Annual Average Release (ug/l)	Release Conc < 100% EQS	PC (ug/l)	PC / EQS	PC <4% of the EQS	PEC (ug/l)	PEC – BC/ EQS	PEC-BC >10% EQS
Copper (DOC <1mg/l)	3.76	36	Fail	0.25	6.6%	Fail	0.748	6.6%	Pass
Copper (DOC >1mg/l)	9.62	36	Fail	0.25	2.6%	Pass	-	-	

Screening tests 4a is also passed as the PEC is less than 100% of the EQS and screening test 4a is not applicable as it is associated with MAC.

It is therefore considered that the impacts of copper can be screened from requiring further assessment using the updated canal monitoring data, for both the copper EQS associated with DCO <1mg/l and the higher value applied for higher DOC values.

3. Keadby 3 Thermal Modelling

The 2022 Assessment included both pollutant dispersion modelling and thermal modelling for a number of scenarios, as detailed in Section 5.3.1 of the 2022 report. The thermal modelling scenarios are replicated here:

Job number 294953-00
Date 28 March 2024

- Scenario 3: Keadby 3 Option 1: effluent temperature = 25°C (summer), 12.2°C (winter)
- Scenario 4: Keadby 3 Option 2: effluent temperature = 31°C (summer), 18.2°C (winter)
- Scenario 5: Keadby 3 Option 2 + Keadby 2: worst combination of Scenario 4 and Keadby 2

It is therefore confirmed that full flow thermal discharge from Keadby 2 and Keady 3 operating in tandem has been carried out in Scenario 5 of the 2022 Assessment report.

DOCUMENT CHECKING

	Prepared by	Checked by	Approved by
Name	Helen Watson	Richard Lowe	Richard Lowe
