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[25/01/2022]

Our Ref: SHLNG-TS-ENV-C-606

Dear Gary,

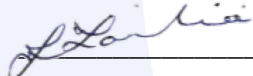
**RE: Operator: South Hook LNG Terminal Company LTD.
EPR Environmental Permit Number EPR/ XP3538LD
Condition 4.2.2a – A review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data.**

Please find enclosed the report(s) on the performance of the permitted activities over the previous year 2021; and report(s) of the permit monitoring and assessments undertaken for 2021 and the period Q3 & Q4 2021 from 1 July 2021 to 31 December 2021.

Please do not hesitate to contact me should you have any queries.

Yours sincerely,

Luciano Tamilia



Health and Safety Superintendent

Attachments:

- RPS: Annual Report 2021 Environmental Permit Reference EPR/XP3538LD
 - Form Number: Air1 / 15th April 2021
 - Form Number: Water 1 / 15th April 2021
 - Form Number: Water Usage1 / 14th October 2015
 - Form Number: Energy1 / 14th October 2015
 - Form Number: Performance1 / 15th April 2021
 - Form Number: Energy1 / 14th October 2015

cc. Mr Luciano Tamilia, Health and Safety Superintendent, Mr Stuart Kelly, Operations Manager & Mr Ken Hurley, Technical Services Manager

ANNUAL REPORT 2021 ENVIRONMENTAL PERMIT REFERENCE EPR/XP3538LD

South Hook LNG Terminal

JFR2006

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25 January 2022

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Prepared for:

South Hook LNG

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1 INTRODUCTION

- 1.1.1 The South Hook LNG Terminal permitted installation is operated by the South Hook LNG Terminal Company LTD, in compliance with environmental permit reference EPR/XP3538LD. The LNG Terminal receives stores and vaporises LNG to form natural gas for send out to the National Transmission System (NTS) operated by the National Grid (NG).
- 1.1.2 Following delivery, LNG is pumped from LNG Cargoes moored at the jetty site into insulated tanks where it is stored until needed. The LNG is converted back into natural gas through a process known as regasification.
- 1.1.3 Re-gasification of the LNG is currently achieved by operation of submerged combustion vaporisers (SCVs), the number of SCV units operating at any given time being dependent on gas send-out nominations, operational and maintenance constraints.
- 1.1.4 Each SCV comprises a stainless-steel tube bundle immersed in a warm water bath. The LNG flows through the tube bundle and is warmed and regasified by heat transferred from the water bath. The warm water temperature is maintained by supplying heat to the water in the SCVs through direct contact with hot gases resulting from the combustion of a small portion of the regasified natural gas produced at the LNG Terminal. There is also a capability to utilise boil off gas (BOG) as fuel gas in the SCVs.
- 1.1.5 The natural gas produced, supplies the National Transmission System (a network of gas pipelines that transports gas throughout the UK). The South Hook LNG Terminal has a total processing capacity of 15.6 million tonnes per annum, which is equivalent to around 20% of the current UK natural gas demand.
- 1.1.6 This document and its supporting appendices form the 2021 annual report as required by environmental permit reference EPR/XP3538LD.

1.2 Permitted Activities

- 1.2.1 The South Hook LNG facility has been permitted since July 2004 and is currently permitted for the following activity:
- Section 1.1 A (1) (a): Burning any fuel in an appliance with a rated thermal input of 50 megawatts or more – Reheating LNG to produce natural gas with fifteen combustion units (aggregated to above 50 MWth).
 - Schedule 25A Medium Combustion Plant: 1 x submerged combustion vapouriser
- 1.2.2 The permit also allows the following directly associated activities (DAAs)
- Receipt and storage of LNG

1.3 The Site

- 1.3.1 South Hook LNG terminal is located at Dale Road, Herbrandston, Milford Haven, Pembrokeshire, SA73 3SU.
- 1.3.2 The national grid reference for the installation is SM 8733 0638.

1.4 Operator Details

- 1.4.1 The operator of the site is South Hook LNG Terminal Company Limited, registered on Companies House as company number 04982132 and whose registered office is South Hook LNG Terminal Company Ltd Dale Road, Herbrandston, Milford Haven, Pembrokeshire, Wales, SA73 3SU.

2 REVIEW OF 2021 MONITORING DATA

- 2.1.1 Condition 4.2.2(a) of the EPR Permit requires the operator annually, to provide 'a review of the results of the monitoring and assessment carried out in accordance with the permit including an interpretive review of that data'.
- 2.1.2 A review is presented below of the permit monitoring and assessment for releases to air and water in 2021, as permitted in Schedule 3 of the South Hook LNG Terminal Company LTD. EPR environmental permit to operate, Permit Number EPR/XP3538LD. Interpretation of the results was carried out in accordance with the relevant permit conditions, including the emission limit values (ELVs).

2.2 Point Source Emissions to Air

Continuous Emission Monitoring (CEMS) NOx Emissions - SCVs AS & A11

- 2.2.1 NOx emissions from SCVs A8 (1H) & A11 (2A) were required to be monitored continuously whilst the SCVs were online throughout 2021, in compliance with the permit.
- 2.2.2 To support safe operations at variable and low/ minimum send out rates, the SCVs fitted with continuous emission monitoring systems (CEMS) for NOx have been unavailable, as follows:
- Minimum Send Out: from 1st July 2021 to the 6th October 2021.
- 2.2.3 The annual daily mean NOx concentration for 2021 was 66.34 mg/Nm³ for SCV A8 and 61.52 mg/Nm³ for SCV A11. There were no recorded breaches of permitted emissions limits throughout 2021.

Discontinuous (quarterly) NOx and CO Emissions - SCVs A1-A8 and A11-A17

- 2.2.4 During 2021, the National Physical Laboratory (NPL) carried out quarterly stack monitoring as follows:

Table 2.1 Quarterly Monitoring Undertaken by NPL During 2021

Monitoring Period	Dates of Monitoring	Number of SCV's Monitored
Quarter 1 (January – March 2021)	2 nd – 4 th March 2021	10
Quarter 2 (April – June 2021)	26 th – 29 th April 2021	10
Quarter 3 (July – September 2021)	20 th July 2021	2
Quarter 4 (October – December 2021)	11 th – 12 th October 2021 and 17 th – 18 th November 2021	6

- 2.2.5 There were no breaches of permitted emissions limits recorded in the 2021 quarterly monitoring campaign undertaken by NPL.

2.3 Point Source Emissions to Water

W1 (Site drainage)

- 2.3.1 The emissions performance of the permitted site drainage discharge (emissions point reference W1) for 2021 is presented below:
- pH
 - The permitted emission limit for pH is 6-9. There were no breaches recorded within 2021.
 - The average daily pH was 7.6 with the maximum being 8.

- The main contributor to the site drainage flow is rainfall related, so pH levels are not related to the permitted process.
- **Turbidity**
 - No emission limits are specified for turbidity. The average daily turbidity for 2021 was 2.08 nephelometric turbidity units (NTUs), whilst the maximum was 29 NTUs.
 - Elevated turbidity is often associated with high rainfall (run-off) events, as expected.
- **Oil and Grease**
 - No emission limits are specified for oil & grease, there is a requirement that there is no visible oil and grease on the W1 emission.
 - All daily visual assessments during 2021 recorded "none visible" for oil and grease demonstrating compliance with the permit.
- **TOC**
 - No emission limits are specified for TOC.
 - The maximum TOC result measured during 2021 was 4.4 mg/l; with an annual average of 2.4 mg/l.
- **List 2 Metals (copper, zinc and iron only)**

No emission limits are specified for List 2 metals (copper, zinc, and iron only). List 2 metals were monitored monthly throughout 2021

 - The average monthly copper concentration was 0.004 mg/litre with a maximum monthly concentration of 0.005 mg/litre in 2021.
 - The average monthly zinc concentration was 0.007 mg/litre with a maximum monthly concentration of 0.021 mg/litre in 2021.
 - The average monthly iron concentration was 0.035 mg/litre with a maximum monthly concentration of 0.059 mg/litre in 2021.

W2 (Process effluents)

2.3.2 The emissions performance of the permitted process effluents discharge (emissions point reference W2) for 2021 is presented below:

- **Flow**
 - The permitted emission limit for flow is 3,500 m³ per day and a maximum of 164 m³ per hour.
 - The maximum daily volume discharged during 2021 was 2,323.56 m³. The maximum hourly flow during 2021 was 96.82 m³.
- **pH**
 - The permitted emission limit for pH is 6-9. There were no breaches recorded within 2021.
 - The average daily pH was 7.6 with the maximum being 8.
 - The daily minimum and maximum pH recorded in 2021 were 7.3 and 8.84 pH units respectively, with an annual daily average of 7.81 pH units.
- **Nitrates as N**
 - The permitted emission limit for nitrates is 50 mg/litre, 100kgN/day and an annual average limit of 50 kgN/day.

-
- The annual daily maximum nitrates concentrations and loads recorded during 2021 were 11.0 mgN/l and 25.56 kgN/day, whilst the annual daily mean nitrates concentrations and loads were 7.12 mgN/l and 16.54 kgN/day respectively indicating compliance with the permitted emissions levels.
 - **Oil and Grease**
 - No emission limits are specified for oil & grease, there is a requirement that there is no visible oil and grease on the W2 emission.
 - All daily visual assessments during 2021 recorded "none visible" for oil and grease demonstrating compliance with the permit.
 - **Total Residual Oxidant (As Total Free Chlorine)**
 - The permitted emission limit for Total Residual Oxidant (as total free chlorine) is 0.1 mg/litre.
 - All monthly results for 2021 were measured at <0.02mg/l (Limit of Detection), demonstrating compliance with the permit.
 - **Biological Oxygen Demand (BOD)**
 - No emission limits are specified for BOD.
 - The maximum BOD recorded in 2021 was 64, with an annual mean of 30.64.
 - **Temperature**
 - The permitted emission limit for maximum daily temperature is 30°C.
 - The maximum temperature recorded in 2021 was 26.67°C with an average temperature of 16.27°C, demonstrating compliance with the permit.

3 ANNUAL REPORT 2021

3.1 Schedule 5 Notifications

- 3.1.1 There were no Schedule 5 notifications submitted in 2021. South Hook had one flaring event in 2021, which is a permitted activity based on safety grounds. SHLNG communicated this event via email to the NRW, for awareness only, on the day of the flaring (15/07/2021)

3.2 Other Relevant Information

- 3.2.1 An Environmental Permit variation was issued on 15th April 2021 (reference EPR/XP3538LD/V004). The variation was required for the following:
- To add a sixteenth submerged combustion vaporiser (SCV) and high-pressure send out pump (HPSO). The new SCV is considered a new Medium Combustion Plant (MCP) as it will be put into operation after 20 December 2019 and is a combustion unit with a thermal input between 1 MW and 50 MW, therefore the new SCV is subject to the MCP Directive (MCPD). Although the variation adds one additional SCV, the site is limited to no more than 15 in operation at any one time; and
 - The variation also enables the Operator to increase throughput of the SCVs, however, there was no change to the send-out capacity above the level currently permitted (812 GWh per day) or the thermal capacity at the site (600 MWth). Even at increased throughput each SCV is able to comfortably meet the currently permitted emission limit values and the original air emissions risk assessment remains valid.
- 3.2.2 There were additional changes made to the permit as part of the consolidation:
- A new emission point to air was added to the permit for a temporary portable air compressor; and
 - All references to EPR/XP3936NS for the South Hook CHP were removed from the permit. This installation was never operational, and the permit was subsequently surrendered in 2016.

4 CONCLUSION

- 4.1.1 This report presents the results of the permit monitoring and assessments carried out in 2021, in compliance with Condition 4.2.2(a) of the EPR environmental permit (Permit Number EPR/XP3538LD).
- 4.1.2 All monitoring was undertaken as required by Tables S3.1 and S3.2 of the environmental permit.
- 4.1.3 No non-compliance breaches of permitted emissions levels were recorded, and the site has remained in compliance throughout 2021.

Permit Number: **EPR/XP3538LD**

Operator: **South Hook LNG Terminal Company LTD.**

Facility: **South Hook LNG Terminal**

Form Number: **Air1 / 15/04/2021**

Reporting of emissions to air for the period from 01/01/2021 to 31/12/2021

Emission Point	Substance / Parameter	Emission		Reference Period	Result ^[1]	Test Method ^[2]	Sample Date and Times ^[3]	Uncertainty ^[4]
		Limit Value						
A1 – A8 and A11 – A17	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	107 mg/m ³	Daily mean (1 SCV in Phase 1 and 1 SCV in Phase 2 only)	SCV A8: Daily Mean – 66.34 mg/m ³ SCV A11: Daily Mean – 61.52 mg/m ³	EN 15267-3 In respect of QAL 1 only BS EN 14181 (1 SCV in Phase 1 and 1 SCV in Phase 2 only)	SCV A8: Maximum reading - 06/03/2021 @ 05:00:00 SCV A11: Maximum reading – 26/02/2021 @ 05:00:00	10.4%	
		107 mg/m ³	One hour sample	Mean – 56.88 mg/m ³	BS EN 14792	Q1: 02/03/2021 – 04/03/2021 Q2: 26/04/21 – 29/04/21 Q3: 20/07/2021 Q4: 11/10/2021 – 12/10/2021 & 17/11/2021 – 18/11/2021	14.3%	
	Carbon monoxide	No limit set	Not specified	Mean – 319.5 mg/m ³	BS EN 15058	Q1: 02/03/2021 – 04/03/2021 Q2: 26/04/21 – 29/04/21 Q3: 20/07/2021 Q4: 11/10/2021 – 12/10/2021 & 17/11/2021 – 18/11/2021	96.9%	

Emission Point	Substance / Parameter	Emission		Reference Period	Result ^[1]	Test Method ^[2]	Sample Date and Times ^[3]	Uncertainty ^[4]
		Limit Value						
A18	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	100 mg/Nm ³		Periodic	Not Sampled during 2021	BS EN 14792	-	-
	Carbon monoxide	No limit set		Periodic	Not Sampled during 2021	BS EN 15058	-	-

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.

[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with Natural Resources Wales is used, then the appropriate identifier is given. In other cases the principal technique is stated, for example gas chromatography.

[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.

[4] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed *Eamon O'Loughlin*
(Authorised to sign as representative of Operator)

Date.....25/01/2022.....

Permit Number: EPR/XP3538LD

Operator:

South Hook LNG Terminal Company LTD.

Facility: **South Hook LNG Terminal**

Form Number:

Water1 / 15/04/2021 Reporting of emissions to water for the

period from 01/07/2021 to 31/12/2021

Emission Point	Substance / Parameter	Emission		Reference Period	Result ^[1]	Test Method ^[2]	Sample Date and Times ^[3]	Uncertainty ^[4]
		Limit Value						
W1	pH	6 – 9	Maximum		8	BS ISO 10523	31/07/21 01/08/21 21/12/21 24/12/21 25/12/21 26/12/21 27/12/21 28/12/21	4.40%
	Turbidity	No limit set	Not specified		Maximum – 29 NTU Mean – 2.14 NTU	BS EN ISO 7027	Maximum – 02/11/2021	44.97%
	Oil and grease	None visible	Spot sample		None visible	Visual check	All days	-
	TOC	No limit set	Spot sample		Maximum – 4.4 ppm Mean – 2.4 ppm	BS EN 1484	Maximum – 04/10/2021	11.01%
	List 2 metals (copper, zinc and iron only)	No limit set	Maximum		-	APHA 3120B	-	-
	Copper				<0.003 mg/litre		All Samples	3.01%
	Zinc				0.021 mg/litre		02/12/2021	10.13%
	Iron				0.059 mg/litre		09/09/2021	9.12%
W2	Flow	3500 m ³ /day	24-hour period aligned with gas day		2,323.56	Flow meter	28/10/2021	0.56%
		164 m ³ /hour	Maximum		96.82		28/10/2021 @ 17:04	0.56%
	pH	6 – 9	Daily maximum		8.84	BS ISO 10523	07/07/2021 @ 09:00	4.40%

Emission Point	Substance / Parameter	Emission		Result ^[1]	Test Method ^[2]	Sample Date and Times ^[3]	Uncertainty ^[4]
		Limit Value	Reference Period				
	Nitrates as N	50 mg/L	Spot sample	Maximum – 11 mg/litre Mean – 7 mg/litre	APHA 4500-NO3-B	Maximum on 08/07/2021 10/07/2021 11/07/2021 12/07/2021	2.51%
		100 kgN/day	Spot sample	25.56 kgN/day		Maximum on 08/07/2021 10/07/2021 11/07/2021 12/07/2021	2.5%
		50 kgN/day annual mean	Annual average	16.57 kgN/day		-	2.5%
	Oil and grease	None visible	Spot sample	None visible	Visual check	All days	-
	Total Residual Oxidant (As Total Free Chlorine)	0.1 mg/L	Spot sample	<0.02 mg/litre	Hach DPD Chlorine test kit for Total Free Chlorine	All samples	20.10%
	Biological Oxygen Demand (BOD)	No limit set	Spot sample	Maximum – 64 Mean – 43.8	HMSO BOD5 II	Maximum – 12/08/2021	48.08%
	Temperature	30 °C	Daily maximum	26.67 °C	Standard thermocouple	21/07/2021 @ 11:33	0.20%

[1] The result given is the maximum value (or the minimum value in the case of a limit that is expressed as a minimum) obtained during the reporting period, expressed in the same terms as the emission limit value. Where the emission limit value is expressed as a range, the result is given as the 'minimum – maximum' measured values.

[2] Where an internationally recognised standard test method is used the reference number is given. Where another method that has been formally agreed with Natural Resources Wales is used, then the appropriate identifier is given. In other cases the principal technique is stated, for example gas chromatography.

[3] For non-continuous measurements the date and time of the sample that produced the result is given. For continuous measurements the percentage of the process operating time covered by the result is given.

[4] The uncertainty associated with the quoted result at the 95% confidence interval, unless otherwise stated.

Signed *Eamon O'Loughlin*
(Authorised to sign as representative of Operator)

Date... 25/01/2022

Permit Number: EPR/XP3538LD Operator: South Hook LNG Terminal Company LTD.

Facility: **South Hook LNG Terminal** Form Number: **Performance1 / 15/04/2021**

Reporting of other performance indicators for the period 01/01/2021 to 31/12/2021

Parameter	Result
Natural gas produced (tonnes)	5,221,708.65

Operator's comments:

Signed *Eamon O'Loughlin*
(Authorised to sign as representative of Operator)

Date..... 25/01/2022

Permit Number: EPR/XP3538LD

Operator: South Hook LNG Terminal Company Ltd.

Facility: **South Hook LNG Terminal**

Form Number: **WaterUsage1 / 14th October 2015**

Reporting of Water Usage for the year 2021

Water Source	Usage (m ³ /year)	Specific Usage (m ³ /unit output)
Mains water	107,891	0.02
Site borehole	0	0
River abstraction	0	0
TOTAL WATER USAGE	107,891	0.02

Operator's comments :

m³/unit output = m³/tonne natural gas produced

Signed *Camon O'Loughlin*
(authorised to sign as representative of Operator)

Date 25/01/2022

Permit Number: EPR/XP3538LD

Operator: South Hook LNG Terminal Company Ltd.

Facility: South Hook LNG Terminal

Form Number: Energy1 / 14th October 2015

Reporting of Energy Usage for the year 2021

Energy Source	Energy Usage		Specific Usage (MWh/unit output)
	Quantity	Primary Energy (MWh)	
Electricity *	MWh	326,220.24	0.06
Natural Gas	MWh	904,056.61	0.17
TOTAL	-		

* Conversion factor for delivered electricity to primary energy = 2.4

Operator's comments :

Electricity metered readings = 135,925.1 MWh

Electricity MWh/unit output = MWh/tonne of gas produced.

Natural gas usage = 87434709.3408 Nm3 and converted using Net calorific value to MWhs.

Natural Gas MWh/unit output = MWh/tonne of gas produced

Signed *Eamon O'Loughlin*
(Authorised to sign as representative of Operator)

Date.....25/01/2022.....