SOUTH HOOK
LNG TERMINAL COMPANY LTD

Mr Lee Mills
Senior Officer
Industry and Waste Regulation
Southwest Wales Industry Regulation Team
Natural Resources Wales (NRW)

SA10 6JQ

[18/01/2023] Our Ref: SHLNG-TS-ENV-C-609

Dear Lee,

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 2022; and report(s) of the permit monitoring and assessments undertaken for 2022 and the period Q3 & Q4 2022 from 1 July 2022 to 31 December 2022.

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

Yours sincerely,

Luciano Tamilia

Health, Safety and Environmental Superintendent

Attachments:

- RPS: Annual Report 2021 Environmental Permit Reference EPR/XP3538LD
  - Form Number: Air1 18th November 2022
  - 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

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

ANNUAL REPORT 2022 ENVIRONMENTAL PERMIT REFERENCE EPR/XP3538LD

South Hook LNG Terminal

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Wayne Davies	Technical Director	18th January 2023

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Prepared by:

RPS

Rayhela Ahmed-Monju
Principal Consultant

20 Farringdon Street
London, EC4A 4AB

T +44 20 3691 0500
E rayhela.ahmed@rpsgroup.com

Prepared for:

South Hook LNG Terminal Company Ltd

Contents

Tables

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 re-gasified 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 re-gasified 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 2022 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 2022 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 2022, 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

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

2.2.1 During 2022, the National Physical Laboratory (NPL) carried out quarterly stack monitoring as follows:

Table 1 - Quarterly Monitoring Undertaken by National Physical Laboratory (NPL) During 2022

Monitoring Period	Dates of Monitoring	Number of SCV's Monitored
Quarter 1 (January – March 2022)	28th February - 3rd March 2022	10
Quarter 2 (April – June 2022)	24th – 26th April 2022	9
Quarter 3 (July – September 2022)	26th - 28th July 2022	7
Quarter 4 (October – December 2022)	4th – 6th October 2022	8

2.2.2 There were no breaches of permitted emissions limits recoded in the 2022 quarterly monitoring campaign undertaken by NPL.

2.2.3 Quarterly NOx levels recorded during the monitoring campaign in 2022 have been presented in Table 2 below. The annual mean NOx level was 56.9 mg/l.

Table 2 - 2022 Quarterly monitoring data for NOx levels

SCV Unit	NOx Level mg/l			
	Q1	**Q2**	**Q3**	**Q4**
SCV 1A		51.2	53.4	46.5
SCV 1B			58.8	
SCV 1C	51.4	64.7	61.6	46.1
SCV 1D	49.3	48		42.7
SCV 1E		75.1		75.6
SCV 1F	62.8	56.9		
SCV 1G	47.4			42.8
SCV 1H	55.3			
SCV 2A	74.7	53.3	55.7	
SCV 2B		53.9	61.4	55.1
SCV 2C			49.1	47.9
SCV 2D	83		64.4	
SCV 2E	60.3		59.4	
SCV 2F	64		62.3	
SCV 2G	60			49.3
Mean	**60.82**	**57.59**	**58.46**	**50.75**

Discontinuous (quarterly) NOx and CO Emissions – SVC A18

2.2.4 The MCP associated with point A18 has not been installed. The unit is described in Section 3.2 of this report. No monitoring of this point will take place until the MCP is in place.

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 2022 is presented below:

- **pH**
  - The permitted emission limit for pH is 6-9. There were no breaches recorded within 2022.
  - The average daily pH was 7.7 with the maximum being 8.2.
  - 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 2022 was 2.43 nephelometric turbidity units (NTUs), whilst the maximum was 44 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 2022 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 2022 was 3.1 mg/l; with an annual average of 2.09 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 2022
  - The average monthly copper concentration was 0.004 mg/litre with a maximum monthly concentration of 0.007 mg/litre in 2022.
  - The average monthly zinc concentration was 0.027 mg/litre with a maximum monthly concentration of 0.018 mg/litre in 2022.
  - The average monthly iron concentration was 0.008 mg/litre with a maximum monthly concentration of 0.049 mg/litre in 2022.

W2 (Process effluents)

2.3.2 The emissions performance of the permitted process effluents discharge (emissions point reference W2) for 2022 is presented below:

- **Flow**
  - The permitted emission limit for flow is 3,500 m^3 per day and a maximum of 164 m^3 per hour.
  - The maximum daily volume discharged during 2022 was 1076.86 m^3. The maximum hourly flow during 2022 was 104 m^3.
- **pH**
  - The permitted emission limit for pH is 6-9. There were no breaches recorded within 2022.
  - The average daily pH was 7.8 with the maximum being 8.7.
  - The daily minimum and maximum pH recorded in 2022 were 7.2 and 8.69 pH units respectively, with an annual daily average of 7.76 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 2022 were 11.0 mgN/l and 11.67 kgN/day, whilst the annual daily mean nitrates concentrations and loads were 7.33 mgN/l and 5.06 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 2022 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 2022 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 2022 was 31(ATU-5day), with an annual mean of 16.2 (ATU-5day),
- **Temperature**
  - The permitted emission limit for maximum daily temperature is 30°C.
  - The maximum temperature recorded in 2022 was 20.56°C with an average temperature of 15.88°C, demonstrating compliance with the permit.

3 ANNUAL REPORT 2022

3.1 Schedule 5 Notifications

3.1.1 There were no Schedule 5 notifications submitted in 2022.

3.2 Other Relevant Information

3.2.1 An Environmental Permit variation was issued on 18th November 2022 (reference EPR/XP3538LD/V005). The variation was required for the following:

- Removal of the requirements for CEMs on the submerged combustion vaporiser (SCVs) by removal of the requirement to continuously monitor NOx emissions from 2 No. (A8 and A11) of the installed SCVs (2 out of the current 16 permitted emission points).

3.2.2 Emission point A18 was incorporated into the permit in 2021 but this plant has not been installed. Hence there is no data provided in Form Air 1 for this location.

4 CONCLUSION

4.1.1 This report presents the results of the permit monitoring and assessments carried out in 2022, 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 2022.

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

Facility: South Hook LNG Terminal Form Number: Air1 / 18/11/2022

Reporting of emissions to air for the period from 01/01/2022 to 31/12/2022

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method [2]	Sample Date and Times [3]	Uncertainty [4]
A1 – A8 and A11 – A17	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	107 mg/m^3	One hour sample	Maximum - 83 mg/m^3 Mean - 57.09 mg/m^3	BS EN 14792	Maximum SVC A4 03/03/2022 @ 1245 Q1 28/02/2022 – 03/03/2022 Q2 24/04/2022 – 26/04/2022 Q3 26/07/2022 – 28/07/2022 Q4 04/010/2022-06/10/2022	22.92%
	Carbon monoxide	No limit set	Periodic	Mean - 247.44 mg/m^3	BS EN 15058	Q1 28/02/2022 – 03/03/2022 Q2 24/04/2022 – 26/04/2022 Q3 26/07/2022 – 28/07/2022 Q4 04/010/2022-06/10/2022	20.85%
A18	Oxides of nitrogen (NO and NO_2 expressed as NO_2)	100 mg/Nm^3	Periodic	Not tested in 2022	BS EN 14792	Not tested in 2022	-
	Carbon monoxide	No limit set	Periodic	Not tested in 2022	BS EN 15058	Not tested in 2022	-

[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 …… …… Date…….18/01/2023……..

(Authorised to sign as representative of Operator)

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 01/01/2022 to 31/12/2022

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method [2]	Sample Date and Times [3]	Uncertainty [4]
W1	pH	6 – 9	Maximum	Maximum - 8.2 Mean – 7.7	BS ISO 10523	24/01/2022 23/03/2022 26/03/2022 27/03/2022 28/03/2022 27/04/2022	2.02%
	Turbidity	No limit set	Not specified	Maximum - 44 NTU Mean - 2.433 NTU	BS EN ISO 7027	24/11/2022	44.97%
	Oil and grease	None visible	Spot sample	None visible	Visual check	All days	-
	TOC	No limit set	Spot sample	Maximum – 3.1 ppm Mean – 2.09 ppm	BS EN 1484	07/03/2022	11.4%
	List 2 metals (copper, zinc and iron only)	No limit set	Maximum	-	APHA 3120B	-	-
	Copper			0.007 mg/l		13/10/2022	3.01%
	Zinc			0.018 mg/l		10/02/2022	9.12%
	Iron			0.049 mg/l		08/12/2022	10.13%
W2	Flow	3500 m^3/day	24 hour period aligned with gas day	1076.86 m^3	Flow meter	29/11/2022	4.96%
		164 m^3/hour	Maximum	104 m^3		19/01/2022	4.96%
	pH	6 – 9	Daily maximum	8.7	BS ISO 10523	07/06/2022	2.02

Emission Point	Substance / Parameter	Emission Limit Value	Reference Period	Result [1]	Test Method [2]	Sample Date and Times [3]	Uncertainty [4]
	Nitrates as N	50 mg/L	Spot sample	Maximum – 11 mg/l Mean – 7.33 mg/l	APHA 4500-NO3-B	16/01/2022 17/01/2022	2.51%
		100 kgN/day	Spot sample	11.67 kgN/day		16/01/2022 17/01/2022	2.51%
		50 kgN/day annual mean	Annual average	5.06 kgN/day		-	2.51%
	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	19%
	Biological Oxygen Demand (BOD)	No limit set	Spot sample	Maximum – 31 Mean – 16.2	HMSO BOD5 II	04/08/2022 13/10/2022	11.04%
	Temperature	30 °C	Daily maximum	20.6ºc	Standard thermocouple	12/04/2022 @ 1032 hours	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 …….. Date…..18/01/2023……..

(Authorised to sign as representative of Operator)

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 2022

Water Source	Usage (m^3/year	Specific Usage (m^3/unit output)
Mains water	87078	0.009
Site borehole	0	0
River abstraction	0	0
TOTAL WATER USAGE	87078	

Operator's comments :

m^3/unit output = m^3/tonne natural gas produced

87078 / 9,490,979.30 =0.00917

Signed … ……. Date……18/01/2023……..

(authorised to sign as representative of Operator)

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 2022

Energy Source	Energy Usage Quantity	Primary Energy (MWh)	Specific Usage (MWh/unit output)
Electricity *	MWh	470,801.52	0.05
Natural Gas	MWh	1,669,113.23	0.16
TOTAL	-		

* Conversion factor for delivered electricity to primary energy = 2.4

Operator's comments :

Electricity metered readings = 196,167.3 MWh

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

Natural gas usage = 161859544.0238 Nm3 and converted using Net calorific value to MWhs. = (161859544.0238 x 37.1235917)/3600 = 1,669,113.23 MWh

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

Signed …… …….. Date……18/01/2023……..

(Authorised to sign as representative of Operator)

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 01/01/2022 to 31/12/2022

Parameter	Result
Natural gas produced (tonnes)	9,490,979.30

Operator's comments:

Signed …  …… Date……18/01/2023……..

(Authorised to sign as representative of Operator)