



January 14 2022

IQE Europe performance review 2021.
Environmental Operating Permit
EPR/KP3235SS

2021



Prepared on behalf of IQE Europe Ltd.
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Introduction

This report has been prepared for Natural Resources Wales “*the regulator*” in line with the requirements of IQE EU “*the operator*” environmental operating permit EPR/KP3235SS to satisfy permit condition 4.2.2.

General Information

This is the fifth report submitted by IQE since the issue of the consolidated operating permit by the regulator on 25th July 2017 and the first report after a minor technical variation on the current permit was granted in 2021. The permit variation was granted to allow IQE to increase the amount of ammonia on site from 2x500kg tanks to 4x500kg tanks. The contents of this report may continue to evolve as future iterations are submitted.

As per permit requirements in August 2021 the four yearly IQE Environmental Report was submitted, this report focused on the following requirements:

1.2 Energy Efficiency.

1.3 Efficient use of raw materials.

1.4 Avoidance, recovery and disposal of wastes produced.

During 2021 IQE sites across South Wales have engaged with Achilles to gain accreditation to ISO 14064-1. The standard specifies principles and requirements at the organization level for the quantification and reporting of greenhouse gas (GHG) emissions and removals. It includes requirements for the design, development, management, reporting and verification of an organization's GHG inventory. IQE envisage gaining this accreditation during 2022.

With IQE Newport’s mass-manufacturing plant operating with ten reactors significant VCSEL R&D and some legacy products remain prevalent at the IQE Europe plant, along with GaAs edge-emitter products, using arsine. Phosphine-related production has increased significantly and has been captured wholly by the IQE Europe plant and future demand looks strong. As a result, phosphine-related production will remain here for the foreseeable future. G5+ ammonia-based reactor is projected to become more productive, having been largely in R&D mode, hence ammonia-related use will also continue for the foreseeable future.

Monitoring Results (Condition 4.2.2 (a))

The table below summarises the results from the latest round of emission monitoring conducted in line with the requirements of permit condition 3.3.1 (a) and table S3.1 of KP3235SS for emission points A1 and A3.

Emissions to Air			
Emission Point	Substance/Parameter	Emission Limit Value	Result ⁽¹⁾
A1	Ammonia ⁽⁷⁾	10 mg/m ³	0.09mg/m ³
A1	Hydrogen Chloride	10 mg/m ³	0.06mg/m ³
A3	Arsine ⁽⁶⁾	0.42 mg/m ³	0.02mg/m ³
A3	Phosphine ⁽⁶⁾	0.42 mg/m ³	0.01mg/m ³
A3	Ammonia ⁽⁷⁾	9 mg/m ³	0.06mg/m ³

2020 v 2021 Comparison

Emission Point	Substance	Emission Limit Value	2020 Result	2021 Result	+ / - Balance
A1	Ammonia	10mg/m ³	1.13mg/m ³	0.09mg/m ³	-1.04mg/m ³
A1	Hydrogen Chloride	10mg/m ³	0.04mg/m ³	0.06mg/m ³	+0.02mg/m ³
A3	Arsine	0.42mg/m ³	0.01mg/m ³	0.02mg/m ³	+0.01mg/m ³
A3	Phosphine	0.42mg/m ³	0.02mg/m ³	0.01mg/m ³	-0.01mg/m ³
A3	Ammonia	9mg/m ³	0.25mg/m ³	0.06mg/m ³	-0.19mg/m ³

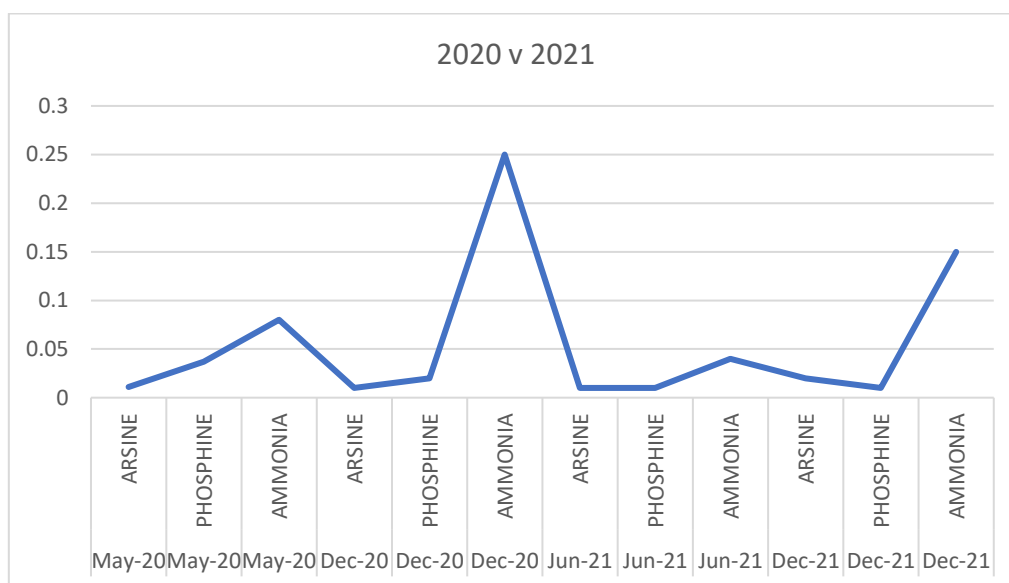
As we can see from the data table 'Emissions to Air' IQE EU remains significantly lower than the emission limit value of 10mg/m³ for ammonia & hydrogen chloride for emissions point A1.

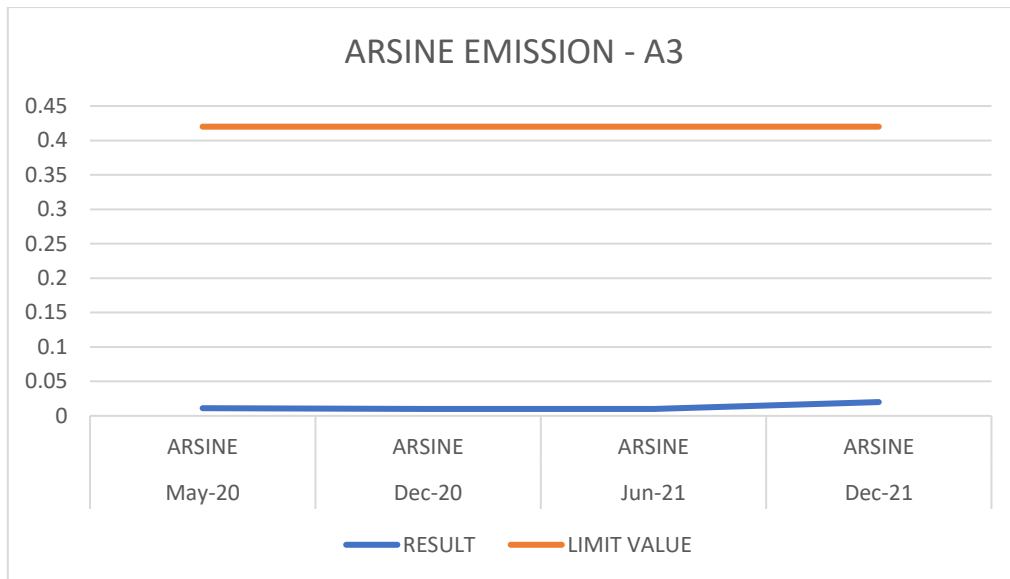
A3 Arsine, Phosphine & Ammonia limits are also significantly lower than the ELV's.

Data Review

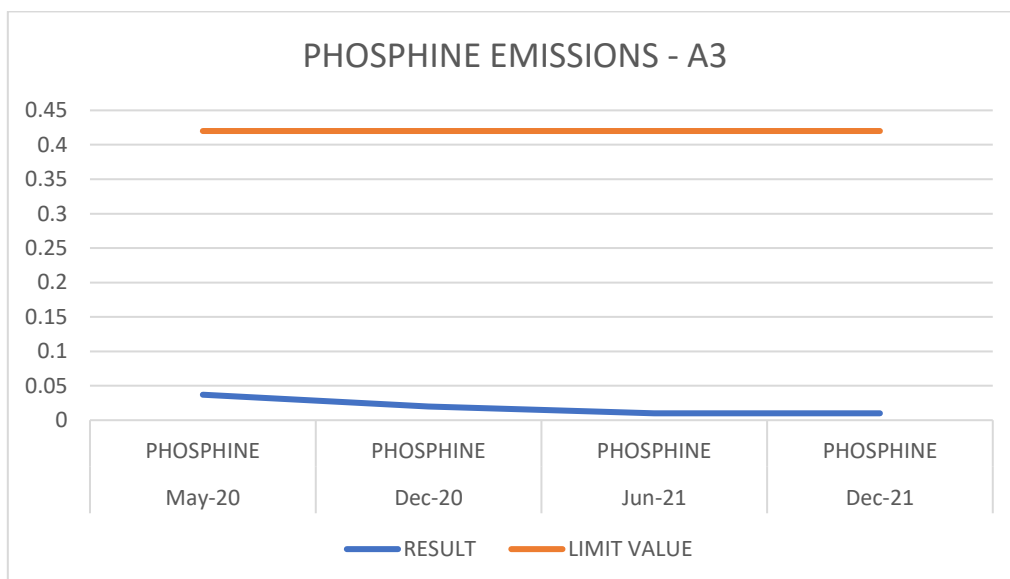
Evaluation of 2021 monitoring results for arsine emissions via point A3 against 2020 show a very slight increase in emissions from 0.01mg/m³ to the current result of 0.02mg/m³ obtained on the 14th December 2021.

Emissions remain significantly lower than the limit value of 0.42 mg/m³.

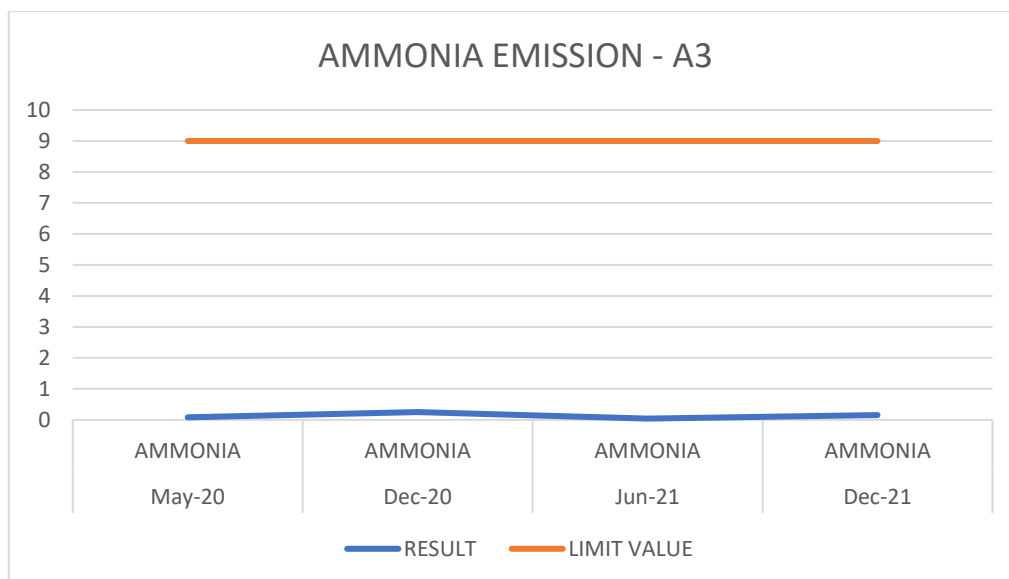




The EU facility continues to operate a minimum of three production tools where phosphine is required. Phosphine emissions remain well within limits set as evidenced in the chart below.



2020 to 2021 ammonia emissions remain steady. Emissions to air remain below the prescribed limit.



As required under permit condition 4.2.2 (table S4.2) for the period 01/01/21 – 31/12/21 the annual amount of raw ammonia used was 1500kg / 1.5tonnes.

All emissions to atmosphere from emission point A3 are significantly below prescribed limits and IQE EU continues to operate in compliance with the conditions laid down in EPR/KP3235SS.