Jemma Blood-Halvorsen

From: Miriam Townshend
Sent: 29 May 2025 12:23
To: Jemma Blood-Halvorsen
Subject: RE: Air Quality question EPR/XP3631SE/V006

Follow Up Flag: Follow up
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Hi Jemma

This is a tricky one! Glad I don't have to do waste anymore. 😊

There is no value in assessing oxygen (O) and nitrogen (N) as emissions as they are naturally occurring in the atmosphere and won't have any impact on human health or habitats. As for the residual nitrous oxides (N2O), there also isn't any point trying to assess this because there is no environmental standard for N2O, it would be difficult to measure at the emission point and the emission would be diluted with the air extracted from the building meaning its concentration would be even lower so harder to monitor and would make modelling complex. The impact from N2O is due to its global warming potential, but we don't regulate such emissions with limits and monitoring but rather we would look to see if BAT is applied to ensure the release is minimised. Therefore, I don't think any assessment is needed – neither H1 or modelling.

I think in this case you should focus on controlling the operation of the destruction unit as this is what controls the release of N2O – via the op techs. There is some info that you have copied below that refers to automatic shutoff as the system monitors the releases. Presumably this is monitoring N2O rather than O and N which the response implies. You could add something to the process monitoring - provision of results - or ask for the number of events where the plant shuts - off in the performance tables.

Presumably emission point A1 is on the building and discharges extracted air from the building. If that is the case, you should just add some description to the table against A1 that refers to release from the destruction unit.

Hope that helps. Let me know if you need anything further.

Miriam

From: Jemma Blood-Halvorsen <Jemma.Blood@environment-agency.gov.uk>
Sent: 28 May 2025 17:29
To: Miriam Townshend <miriam.townshend@environment-agency.gov.uk>
Subject: Air Quality question EPR/XP3631SE/V006

Hi Miriam,

Hope that you're well. I have an application (EPR/XP3631SE/V006) that I'm validating. The operator wants to add a new S5.3A(1)(a)(ii) activity to a permit which already has a total of 10 individual listed activities under S5.3A(1)(a)(ii), as well as further activities under S5.3A(1)(a)(iii), S5.3A(1)(a)(iv) and S5.6A(1)(a). This permit is currently undergoing a reg 61 review, but the operator was informed we would need to determine this separately.

The activity they want to add is for a relatively new process so quite honestly, I'm not sure what I'm doing.

The new activity is to allow extraction of nitrous oxide from metal cannisters in a destruction unit, with the only releases being oxygen and nitrogen back to atmosphere. The destruction unit is housed within a building and the operator has stated that they will be adding an emission point to the permit (A1 – which already exists in the permit which also confused me) as a result of the variation but that the only emissions will be 65 tonnes of nitrogen per annum and 37.2 tonnes of oxygen per annum. Would we expect an emission point for oxygen and nitrogen? And if so, would we require an AQIA or anything like that? The operator hasn't given me anything like that because they're saying nitrogen and oxygen aren't pollutants but then I was speaking to the officer who is dealing with the associated reg 61 review and they bamboozled me a bit because they were concerned that if the destruction unit wasn't 100% effective that there would be potential for nitrous oxide to be emitted. But also said we wouldn't have a point source emission for the activity as the unit is a sealed unit within a building, and we would monitor and abate the building as a whole. The existing emission points are listed below.

Schedule 4 – Emissions and monitoring

Table S4.1 Point source emissions to air – emission limits and monitoring requirements

Emission point ref. & location	Parameter	Source	Limit (including unit)	Reference period	Monitoring frequency	Monitoring standard or method
A1 as identified on Drawing No. PPC-002 submitted as part of the Application	Ammonia	Extracted air from waste storage and treatment tanks, (via carbon pack for tanks T31 and T32), acid storage tanks, press house and reception pits via 2 stage chemical scrubber (Towers 7 & 8)	To be agreed as appropriate in accordance with improvement condition IP4			
A2 as identified on Drawing No. PPC-002 submitted as part of the Application	Ammonia	Extracted air from ammonia stripping process via single stage chemical scrubber	To be agreed as appropriate in accordance with improvement condition IP4			
A3 as identified on Drawing No. PPC-002 submitted as part of the Application	1, 2-dichloroethane	Extracted air from VOC stripping and large, small and batch redox processes via carbon pack/filter	To be agreed as appropriate in accordance with improvement condition IP4			
A5 as identified on Drawing No. PPC-002 submitted as part of the Application	NO_2	Boiler exhaust (unabated)	To be agreed as appropriate in accordance with improvement condition IP4			

The review team asked me to get some further information about the destruction unit which is below. I have also attached the NTS in case you need some context regarding the process as a whole. But my question is what do I need from the operator for validating this? I have everything else I need in terms of validation but don't want to validate it and potentially leave a big issue for the determining officer to pick up.

Question 6 – Additional Information About the Treatment Process

The following information has been provided by the supplier:

i. *What is the heated catalytic bed?*
The catalytic bed is a well-established palladium compound used to facilitate decomposition of N2O into Nitrogen and Oxygen

ii. *Is the catalyst regenerative or does it need replacing? If it needs replacing, what is the process for this?*
The catalyst has a life length that varies depending on environment and usage. The mass can be reused either for other purposes

or regenerated. A normal annual service determines if the catalyst is in need of replacement. If so, it is removed from the process chamber and replaced with new catalyst. The old catalytic mass is recycled.
Please note that the catalyst is expected to last for several years. In addition, automated process monitoring assesses effectiveness of treatment/decomposition of the nitrous oxide and will shut down the process in the event of a failure, which could be the result of deterioration of the catalyst, although annual servicing should pick this up before reaching that stage.

iii. *How is the heated catalytic bed heated? Is it powered by mains? Will the site use a generator?*
The process will use mains electricity.

iv. *How efficient is the heated bed? If the process is not 100% effective, what happens to any remaining nitrous oxide?*
This was covered in the Non-Technical Summary and Supporting Statement, section C2.6. Whilst the suppliers manuals quote destruction efficiency of 99%, the Validation Report included at appendix 6 of the application determined that destruction efficiencies up to 99.9% were achieved.
The residual nitrous oxide is vented in the outlet along with the nitrogen and oxygen. This needs to be kept in perspective as the residual emission of nitrous oxide is minimal at 1% to 0.1% (typically), which from a total daily throughput of 0.28 tonnes of nitrous oxide treated results in with the total flow of residual nitrous oxide in the range of 0.0028 tonnes to 0.00028 (typically) tonnes per day, diluted via the oxygen and nitrogen and thererfore at an insignificant level.

v. *Is the destruction unit fully sealed?*
Yes, the unit is fully sealed and only discharges treated nitrous oxide, with automated monitoring closing down the treatment process and discharge in the event of a failure of the treatment process.

vi. *How are the larger cannisters pierced?*
As described in the Non-Technical Summary and Supporting Statement, section C2.6, the larger cannisters are placed in a rack (holding up to 26 units) where the valves of the cannisters are connected up directly to pipework feeding the destruction process.

vii. *What procedures are in place in case of a leak? Nitrogen is a greenhouse gas and we need to ensure sufficient measures are in place to prevent any leaks of nitrogen or nitrous oxide.*
Please note that nitrogen is not a greenhouse gas. The process of removal of nitrous oxide from the smaller containers (whippets) is carried out in a sealed unit with an air lock system as described in section C2.6 of the Non-Technical Summary and Supporting Statement, which emptied cannisters only being released once pressures in the system have been reduced following removal of the nitrous oxide. The extraction of nitrous oxide from the larger cannisters is by direct connection to the valves on the cannisters via a sealed system and nitrous oxide is destroyed via a sealed process with automated process monitoring to prevent a discharge of untreated nitrous oxide (in accordance with process efficiency). Personnel carrying out processing are also equipped with personal nitrous oxide monitors and in the event of detection of a leak from the process the process will be shut down.

Kind Regards,

Jemma Blood-Halvorsen
Senior Permitting Officer (Installations)

INS INSTALLATIONS part of PERMITTING

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My working days are Monday - Friday

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