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*Our ref:* AC/SH11087/LET-030 *Date*: 25th February 2020

*Your ref:*

Environment Agency
Permitting and Support Centre
99 Parkway Avenue
Parkway Business Park
Sheffield
S9 4WF

**For the attention of Mr Mark Jones** **By email**

Dear Mark,

**EPR/ZP3537AT/A001, Keighley Energy from Waste Plant Response to Schedule 5 Notice**

We are writing to respond to your Schedule 5 Notice, dated 15th January 2020, regarding the Endless Energy Facility.

***Emissions to Air***

We understand that the new BAT Conclusions for Incineration have now been published. As the permit has yet to be issued the installation will be classed as a new plant and must comply with the new BAT standards for new sites.

The application was originally made on the basis of the following guaranteed emission levels. (all at 11% oxygen, 0 degrees Centigrade, % moisture)

- Oxides of nitrogen: 150 mg/Nm$^3$
- Sulphur dioxide: 18 mg/Nm$^3$
- Ammonia: 5 mg/Nm$^3$

Based on these emission concentrations, the air quality assessment provided with the permit application shows that emissions to air from the proposed facility will result in an impact of less than 1% of the applicable long-term, critical loads and levels, and less than 10% of the applicable short-term critical levels, at all Natura 2000 sites in the vicinity of the proposed facility.

We can confirm that the plant will comply with all of the revised tighter BAT-AELs for new plant as set out in the 2019 BAT Conclusions. In particular, the ammonia dosing system will be adjusted to reduce emissions of $NO_X$ to 120mg/$m^3$ or less. The technology provider has confirmed that they can meet this requirement using the previously proposed dry injection SNCR technology.

***Achieving lower emissions of $NO_X$***

In order to reduce emissions of $NO_X$ the company will use enhanced combustion, managing multiple injection points and controlling the temperature of gas injection, in order to optimise combustion air in the furnace and minimise the formation of $NO_X$. This will be coupled with the already proposed SNCR technology with increased ammonia dosing, converting more of the $NO_X$ to nitrogen and water.

There is potential for this increased dosing to achieve a reduction in $NO_X$ to lead to increased ammonia slip and ammonia emissions. Based on verified results from plants elsewhere in Europe, the potential daily maximum emission of ammonia would be increased to 8.5 mg/$Nm^3$. This is still within the new BAT-AEL, which suggests that emissions of ammonia should be between 2 and 10mg/$Nm^3$, depending on the technology applied (with SCR achieving slightly lower levels than SNCR).

There will be no change to the sulphur dioxide levels.

The new guaranteed daily maximum emission concentrations will be:

- Oxides of nitrogen: 120 mg/$Nm^3$
- Sulphur dioxide: 18 mg/$Nm^3$
- Ammonia: 8.5 mg/$Nm^3$

If necessary, a catalyzer for removal of ammonia will be installed to ensure that the guaranteed emission level for ammonia can be achieved. Whether or not this is required will be confirmed during the commissioning stage. Such equipment can be readily installed at the boiler flue gas outlet in the current building envelope without any further modification to the design. In this circumstance all other emission parameters for the proposed facility will remain unchanged.

***Impact on Protected Habitats***

Clearly, ammonia is also a pollutant of concern and it is necessary to demonstrate that this slight increase in emission levels will not impact on local protected habitats. An assessment by Air Quality Consultants, Ricardo, states that, based on these revised emission

concentrations, the updated maximum modelled impacts of the proposed facility at European sites are as follows:

*Table 1: Maximum modelled airborne concentrations at Natura 2000 sites as a percentage of applicable Critical Levels*

| Protected Site | Annual mean oxides of nitrogen | Annual mean sulphur dioxide | Annual mean ammonia | 24 hour mean oxides of nitrogen |
|---|---|---|---|---|
| South Pennine Moors SSSI, South Pennine Moors SAC, and South Pennine Moors Phase 2 SPA: Ilkley Moor section | 0.32% | 0.07% | 0.68% | 1.54% |
| South Pennine Moors SSSI, South Pennine Moors SAC, and South Pennine Moors Phase 2 SPA: Keighley Moor section | 0.068% | 0.015% | 0.145% | 0.75% |

*Table 2: Maximum modelled deposition rates at Natura 2000 sites as a percentage of applicable Critical Loads*

| Protected Site | Nitrogen deposition | Acid deposition |
|---|---|---|
| South Pennine Moors SSSI, South Pennine Moors SAC, and South Pennine Moors Phase 2 SPA: Ilkley Moor section | 0.90% | 0.99% |
| South Pennine Moors SSSI, South Pennine Moors SAC, and South Pennine Moors Phase 2 SPA: Keighley Moor section | 0.19% | 0.21% |

The results in Tables 1 and 2 show that emissions to air from the proposed facility will continue to result in an impact of less than 1% of the applicable long-term, critical loads and levels, and less than 10% of the applicable short-term critical levels, at all Natura 2000 sites in the vicinity of the proposed facility.

***Assessment of human health impacts***

The only released substance for which modelled emissions are forecast to increase is ammonia. The updated modelled levels of ammonia assessed against air quality guidelines for protection of human health are set out in Table 3.

*Table 3: Maximum modelled airborne concentrations of ammonia assessed against air quality standards and guidelines*

| Substance | Averaging time | AQ Standard/ Guideline (µg/m³) | Baseline (µg/m³) | Process contribution (µg/m³) | PC/ AQSG | Combined process + baseline (µg/m³) | Combined/ AQSG |
|---|---|---|---|---|---|---|---|
| **Ammonia** | **Annual mean** | 180 | 1.16 | 0.17 | 0.09% | 1.33 | 0.74% |
| **Ammonia** | **Maximum hourly mean** | 2500 | 2.32 | 15.6 | 0.62% | 17.9 | 0.72% |

The results in Table 3 show that emissions to air from the proposed facility will continue to result in an impact of less than 1% of the applicable long-term air quality guideline, and less than 10% of the applicable short-term air quality guideline, at all locations in the vicinity of the proposed facility. The impact of emissions to air of oxides of nitrogen will be reduced as a result of the change in the emissions benchmark. Both ammonia and oxides of nitrogen emissions will continue to have an insignificant impact on human health, but the overall result of this change will be a slight reduction in the effect of emissions to air from the proposed facility on human health.

Meeting the new emissions benchmark for oxides of nitrogen will result in a reduction in emissions of oxides of nitrogen, and an increase in emissions of ammonia. These changes will not result in any significant impacts on human health or nearby Natura 2000 sites. Specifically, the proposed facility will continue to result in an impact of less than 1% of any critical load or level at the nearby Natura 2000 sites.

***Electrical Efficiency***

You have also asked why the plant is not able to operate with an electrical efficiency towards the top end of the new BAT-AEEL. This requires that the plant should have an electrical efficiency of between 25% and 35%. Previously it was expected that the gross electrical efficiency would be just over 27%, which is within the range expected for new plants.

BAT 20 provides a range of techniques that may be used to increase efficiency, such as optimising the boiler design and ensuring proper insulation is used, these techniques will be employed at Keighley. The footnote to Table 2 of the BAT Conclusions (which sets out the AEELs for electrical efficiency) also says that the higher end of this range is possible where BAT 20 (f) is applied. BAT 20(f) suggests the use of high steam, that is turbines will operate

with steam heated to in 400°C or more and a pressure of 45Bar or more. In our Schedule 5 response of 1st July 2019 we confirmed that the installation has been designed to use high steam to maximise the electrical output.

Following your query, the Technology Provider has revisited their calculations. They have found that the way in which some auxiliaries were taken into account in the original calculation led to underestimating the efficiency. Revising the calculation, in accordance with figure 3.86 of the new BREF Note, gives an efficiency of 34.6%, much closer to the top end of the BAT-AEEL, as may be expected from a plant utilising high steam. A copy of the calculations is enclosed.

***Treatment of Acid Gases***

You have asked whether boiler sorbent injection will be used to control acid gases. This technique involves the injection of hydrated lime into the furnace or boiler in order to react with acid gases at temperatures between 800 °C and 1,200°C. This technique can provide high removal rates for sulphur dioxide and hydrogen fluoride. However other techniques may also be effective.

BAT 27 states that operators should use one, or a combination of the techniques, listed A to E. Any one of these five methods may constitute BAT. At Keighley method C., dry sorbent injection will be used. The system to be adopted ensures good contact between the reagent and acid gas and allows reactivation and reuse of lime from the bag filters, making the process very efficient. The system will remove acid gases effectively and so further treatment is not considered necessary.

***Odour Management***

You have queried whether the Odour Management Plan is appropriate for the range of wastes proposed within the permit. We do not believe that the management of odour would be any different for MSW and RDF than it would be for RDF alone. That is, in both cases waste will be received in enclosed vehicles and unloaded into the waste bunker inside the building. The roller shutter doors on the building will, as far as possible, be kept closed and will only open to allow the access and egress of vehicles. Air extraction is provided above the bunker so that a negative pressure is maintained in this area. Air extracted from the bunker is used as combustion air, burning off any odorous compounds.

Waste will be processed as quickly as possible and will not be allowed to remain in the bunker for long periods.

The majority of wastes listed in the permit are not expected to pose a high risk of odour, consisting of plastic, paper, card, plant tissue and wood. Municipal solid waste will also be accepted and this may pose a risk of odour, however the risk is likely to be of a similar magnitude to that posed from accepting refuse derived fuel (RDF). All of the wastes listed might form a constituent of RDF, which is likely to have been shredded and to be older waste, due to the time taken for sorting and treating. RDF therefore has the potential to be in a more advanced stage of decomposition. Potentially, the risk of odour is less with fresh wastes than it would be with RDF.

Paragraph 3.1.3 of the OMP has been revised to reflect the range of wastes that will be listed in the permit and a copy is enclosed.

***Proposed Noise Attenuation***

The buildings have been designed to minimise noise outbreak and each is designed with walls and roofs of concrete and/or insulated Kingspan panels to provide noise attenuation. You have requested, in particular, details of the cladding around the turbine hall. The walls and roof of the Turbine Hall will be constructed from Kingspan KS1000 RW trapezoidal Insulated panels. These panels have a sound reduction index of between 18dB and 47dB, dependent on the frequency of the sound and a single figure weighted sound reduction value (Rw) for each panel of 25dB. To ensure good noise reduction the walls and roof will have a double skinned construction, i.e. they will be two panels thick.

Ventilation will be provided using Slimshield acoustic louvre panels, designed to allow air into the building whilst minimising noise breakout. The acoustic louvres will provide attenuation of between 7dB and 30dB, again depending on the frequency, with better attenuation at higher frequencies. The louvre panels have a Rw of 26dB. Acoustic doors will also be provided, giving between 5dB and 40dB attenuation (dependent on frequency).

Noise attenuation has therefore been a consideration in the design of the building with materials (including ventilation louvres and doors) being selected to provide good sound reduction and with a double layer of panels being used to provide a high level of sound reduction. The specification of the wall panels, roof panels and louvres that are likely to be used are attached for information.

***Response to Noise Incidents***

During the operation of the plant any noise complaints that are received will be recorded in the site log. Each complaint will be investigated to identify the source of the noise and the

significance of the incident, appropriate measures will be taken to reduce noise as soon as possible, where this is necessary. This may include taking faulty equipment, which is generating excessive noise, out of use until it has been effectively repaired, or providing refresher training to staff to improve housekeeping, such as closing doors and minimising drop heights.

There will also be an annual audit of compliance with the Environmental Management System to maintain accreditation of the system. This will include a review of complaints received over the course of the previous year. Should this review highlight a consistent issue with noise from the site then consideration will be given to the sources of the noise and any further measures that can reasonably be taken to reduce noise.

This will lead to the formulation of an action plan to further control noise. The action plan will be agreed with the Environment Agency and may include measures such as maintenance or repair of existing infrastructure or provision of new infrastructure, for example acoustic housing around plant which has been identified as a cause of noise complaints or improved sound insulation to the buildings.

We trust this provides the reassurance that you require that the proposed facility is in line with the latest high standards and enable you to issue the permit.

**Yours sincerely**
**for Wardell Armstrong LLP**

**ALISON COOK**
**Associate Director**
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*Enc*
Calculation of electrical efficiency
Odour Management Plan Version 3
Specification of wall and roof panels