

Natural Resources Wales permitting decisions

Hydro Aluminium Deeside Limited

Decision Document

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Variation

The variation number is:

BK3638IF/V006

The operator is: Hydro Aluminium Deeside Limited

The Installation is located at: Wrexham Aluminium Works, Bridge Road, Wrexham Industrial Estate, Wrexham, LL13 9PS

We have decided to issue the variation for Wrexham Aluminium Works operated by Hydro Aluminium Deeside Limited.

We consider in reaching that decision we have taken into account all relevant considerations and legal requirements and that the permit will ensure that the appropriate level of environmental protection is provided.

The variation is to add a twin-chamber pre-heating furnace for aluminium ingot. This equipment will utilise waste heat in furnace off-gases, ensuring safe charging of dry material and reducing energy use in the melting and holding furnaces. Moisture trapped inside cracks and cavities in ingots of aluminium can cause a powerful explosion when charged into molten metal. The ingot preheater will use waste heat from the melting and holding furnace off-gases to heat ingots to a temperature of >150°C over a four-hour cycle. Pre-heated ingots would then be charged to the melting furnace as dry material and would enable reduced heat input from the furnace burners, in turn saving energy and direct CO₂ emissions from gas consumption. The preheater is of a twin chamber design to enable continuous treatment of prime ingot. The design incorporates separate auxiliary burners serving each chamber. These are natural gas-fired and rated at 800kw thermal input. A burner can be used to raise temperatures during start-up and will enable effective temperature regulation during the pre-heat cycle. The burners are not used simultaneously (2 burners, one will be in standby mode whilst the other is operating). Combustion gases from burner operations will exhaust to atmosphere via the existing filtration plant and associated flues (release points A1 and A12). If the preheater is operated solely with the gas burner, the inlet of furnace gases and outlet to the abatement plant would be automatically sealed-off in

order to maintain steady operation and avoid the risk of the existing fume abatement plant shutting down due to the temperature being exceeded.

Purpose of this document

This decision document:

- explains how the application has been determined
- provides a record of the decision-making process
- shows how all relevant factors have been taken into account
- justifies the specific conditions in the permit other than those in our generic permit template.

Unless the decision document specifies otherwise we have accepted the applicant's proposals.

Key issues of the decision

Receipt of application

Confidential information

A claim for commercial or industrial confidentiality has not been made.

Consultation

The consultation requirements were identified and implemented. The decision was taken in accordance with RGN 6 High Profile Sites, our Public Participation Statement and our Working Together Agreements.

No external consultations were carried out due to the nature of the variation and is in line with NRW guidance.

A copy of the Application and all other documents relevant to our determination (see below) are available for the public to view. Anyone wishing to see these documents could arrange for copies to be made.

The facility

The regulated facility is an installation which comprises the following activities listed in Part 2 of Schedule 1 to the Environmental Permitting Regulations and the following directly associated activities.

- 2.2A(1)(b) - Melting, including making alloys of, non-ferrous metals, including recovered products and the operation of non-ferrous metal foundries where - (i) the plant has a melting capacity of more than 4 tonnes per day for lead or cadmium or 20 tonnes per day for all other metals, and (ii) any furnace (other than a vacuum furnace), bath or other holding vessel used in the plant for the melting has a design holding capacity of 5 or more tonnes.

The permit also includes the following Directly Associated Activities:

- Off-gas collection, abatement and discharge systems (including fugitives)
- Water discharges to controlled waters

- All handling of skimming's, dross and waste materials
- Pre-heating of furnace input materials using waste heat and auxiliary gas fired burners (800kw thermal input each, 2 burners – 1 operating and 1 for standby) which is added as part of this variation application.

The variation is to install a twin-chamber pre-heating furnace for aluminium ingot. This equipment will utilise waste heat in furnace off-gases, ensuring safe charging of dry material and reducing energy use in the melting and holding furnaces.

The design incorporates separate auxiliary burners serving each chamber. These are gas-fired and rated at 800kw thermal input. Only one burner shall operate at a time and is detailed as such in Table S1.1 of the permit under limits of specified activities. The burners can be used to raise temperatures during start-up and will enable effective temperature regulation during the pre-heat cycle.

Combustion gases from burner operations will exhaust to atmosphere via existing emission points A1 and A12 which will retain the same Emission Limit Values (ELV's). If the preheater is operated solely with a gas burner, the inlet of furnace gases and outlet to the abatement plant will be automatically sealed-off in order to maintain steady operation and avoid the risk of the existing fume abatement plant shutting down due to the temperature being exceeded.

Emissions from the pre-heat furnace will comprise combustion products only. These will be controlled and minimised as follows.

In normal operation the pre-heat furnace will receive hot off-gases from the melting and casting (holding) furnaces, which will be circulated in the two compartments to pre-heat aluminium ingots. The pre-heat furnace incorporates a gas-fired auxiliary burner to assist in heat-up and maintenance of a steady temperature to ensure evaporation of moisture from the ingots.

Operation consists of two phases for each of the two preheat chambers: • a 50 minute heat-up phase to attain a temperature over 175°C • a four hour heating phase with temperature increasing from 175 to 350°C over the cycle.

It is thought that the auxiliary burners will only be required very occasionally, with excess heat from the current furnace off-gases providing the vast majority of the heat input required by the ingot pre-heater. The preheater is of a twin chamber design to enable continuous treatment of prime ingot. The design incorporates a separate auxiliary burner serving each chamber. Only one burner shall operate at a time (i.e. duty and stand-by). Burners shall not operate simultaneously.

Regarding noise, the pre-heat furnace incorporates two fans to circulate air through the preheat chambers. These will be housed in an insulated enclosure adjacent to the pre-heat furnace. Supplier information indicates the noise will not exceed 85dB.

Legislation

NRW is satisfied that this decision is compatible with its general purpose of pursuing the sustainable management of natural resources in relation to Wales and applying the principles of sustainable management of natural resources

All applicable European directives have been considered in the determination of the application.

The site

The operator has provided a plan which we consider is satisfactory, showing the extent of the site of the facility.

A plan is included in the permit and the operator is required to carry on the permitted activities within the site boundary.

Site condition report

The variation application does not to look increase the installation site boundary. No Site Condition Report required. N/A.

Biodiversity, Heritage, Landscape and Nature Conservation

The application is within the relevant distance criteria of a site of heritage, landscape or nature conservation, and/or protected species or habitat .

European Protected Sites: Two SACs were identified within the 10km screening distance from the installation; River Dee and Bala Lake SAC – Approximately 3km away from installation and Johnstown’s Newt Site SAC approximately 6.7km away from the installation.

There are no SSSI’s within 2km of the installation. There are the following non-statutory sites within the 2km:

- Local Wildlife Sites: Cefn Park, Peter’s Dingle and Wrexham Industrial Estate.
- Ancient Woodlands : Several Ancient Semi Natural Woodlands 1 and Several Restored Ancient Woodlands Site 2.

However, by referring to AQTAG14 it can be ruled that there are no sites of heritage, landscape or nature conservation, and /or protected species or habitat within screening distance.

AQTAG 14 is due to be altered to take into account of the various fuel types that fall into the MCP permits and also the standard rules requirements. It is believed that the revised AQTAG14, a natural gas fired burner 0.8MWth (800kwth) has a screening distance of 500m. That would mean for designated sites there is no assessment required for this application. As per existing AQTAG14 guidance, alone a burner (0.8MWth each) would have a screening distance of 0m. If looking at the site as a whole, so with the other combustion emissions on site this would be an aggregated value of less than 20MWth which would equate to a screening distance of 500m for designated sites, as per the current guidance. There are no designated sites within 500m of the installation therefore no habitat assessment required. The nearest conservation site is the non-statutory site of Local Wildlife Sites over 700m away.

2.4 AQTAG14 sets out the following capacity based screening distances:

Size of individual combustion Process (MW)	Distance to European site (km)
>50	<10
20 – 50	<2
5 – 20	<0.5
<5	0

Each burner itself also falls out of scope of MCPD and therefore will not be assessed further. For MCP purposes we do not aggregate any units under 1 MWth input as they are not MCPs (MCP is only 1MWth – 50 MWth). No further action required.

These screening distances/approach has been deemed as a reasonable following discussions with Air Quality specialists and Lead Permitting specialists. The overall process contribution from the installation as a whole will increase slightly with the introduction of a new auxiliary gas burners. However, the operation of a burner is estimated to be a maximum of 4 hours a day or 1088 hours per year (as compared to the gas-fired burners in the melting furnace, holding furnace and homogeniser that operated for 6528 hours per year, based on 272 working days in 2019).

The existing emissions from the installation will already be firmly included within background levels. The permit was originally issued in 2002 which included emissions classed as combustion gases and the permit included the Emission Limit Values (ELV's) for NOx which is the main gas of concern with natural gas combustion plants. These ELV's are not changing as part of this variation. The inclusion of the new auxiliary gas burners will not significantly dilute other contaminants being emitted to air via the shared stack point as it is relatively small.

As the addition of the auxiliary burners for the pre-heater furnace is small (800kwth for each burner where one is only used at a time), natural gas fired, it falls out of scope of the Medium Combustion Plant Directive and if this was a burner operating on its own wouldn't need to be permitted.

Emissions from the preheat furnace will be ducted to the bag plants and released via stacks A1 and A12. These are already subject to monitoring requirements in the existing permit, as detailed in Table S3.1 of the permit. This includes continuous monitoring of particulate emissions using an MCERTS-certified CEM, and extractive sampling twice a year for all other parameters. Periodic monitoring is undertaken by MCERTS-qualified personnel. These additional emissions from the relatively small burners will remain within current ELV's set on the permit. These Limits have already been determined as acceptable through previous permit determinations and will

remain in force. There are no changes to ELV's and following commissioning of the equipment, a monitoring exercise will be undertaken to measure the combined emissions from the furnaces and preheat chamber, as released to air from stacks A1 and A12. This is incorporated into the permit as Improvement Condition, IC31. It is thought that the combined releases would still remain below the current permit emission limit values for the combustion products of carbon monoxide and oxides of nitrogen.

Based on above, no further assessment has been provided or is required for impacts on the identified Ancient Woodlands/Local Wildlife Sites or European Sites as any impact should be insignificant and emissions from the site will remain within currently permitted ELV's.

There is no pathway for any impact to SSSI's as there are none within screening distance so no impacts.

Environmental Risk Assessment

Air Quality

The Applicant has assessed the Installation's potential emissions to air against the relevant air quality standards, and the potential impact upon human health. These assessments predict the potential effects on local air quality from the Installation's stack emission.

The operator assessed the impacts to human health using the H1 tool. Using the currently permitted ELVs as inputs to H1, the results indicate that the statutory environmental quality standard for NO₂ is not at risk of being breached due to additional emissions from the preheat furnace.

Using permit emission limit values, the H1 assessment screens out the emissions of all parameters in both the long and short term, with the exception of nitrogen dioxide, which exceeds 1% of the long term EAL. With this value added to the background level the overall percentage of the EAL is 42.1%.

For air impact screening, both long and short term results are below the relevant thresholds, above which detailed modelling may be required (70% for Long Term %PEC of EAL and 20% Short Term %PC of headroom).

When combined with the existing background concentration of NO₂, the predicted environmental concentration is 42.1% of the long term EAL of 40µg/m³. This leaves “headroom” before the EAL is at risk of being breached. According to H1 Guidance, detailed dispersion modelling may be required if the PEC is 70% of the EAL, which is not the case. The short term result is well below the threshold for %PC of headroom.

The H1 tool gives you ‘worst case’ estimates. So the figures provided may be higher than if you calculate PCs or PECs using other methods, for example dispersion modelling software (which analyses how air pollutants disperse in the atmosphere). Assessment is based on one burner operating and thus limited to only operating one burner as detailed in Table S1.1 of the permit. Burners will not operate simultaneously.

It is thought that any further detailed modelling is likely to show a lower process contribution than that calculated in H1, and there are no air quality management areas nearby, or sensitive human or ecological receptors that will be impacted from the additional contribution of NO_x to air.

We are in agreement that this approach is reasonably precautionary.

Emission limits

We have decided that emission limits should remain as they are for the parameters listed in the permit.

As detailed above, the emissions from the pre-heater furnace including auxiliary gas burners will be emitted via existing emission points which have Emission Limit Values already set and are environmentally protective.

Following commissioning of the equipment, a monitoring exercise will be undertaken to measure the combined emissions from the furnaces and preheat chamber, as

released to air from stacks A1 and A12. It is thought that the combined releases would still remain below the current permit emission limit values for the combustion products of carbon monoxide and oxides of nitrogen. Average emissions over the last five years from stacks A1 and A12 are 39% and 25%, respectively of the permit ELVs for CO and NOx. Ongoing periodic monitoring would continue to measure the combined releases of the furnaces and preheat chamber via A1 and A12. An Improvement Condition has been set in the permit to verify this assumption.

Water

No emissions to water associated with this variation.

Soil

No emissions to ground/land associated with this variation.

Odour

It is considered unlikely that off-site pollution due to odour will occur as a result of the operation of the installation. The variation is to add a pre-heat furnace which includes a natural gas fired burner, odour is not expected to be an issue.

As we are satisfied that appropriate measures will be in place to prevent or, where that is not practicable to minimise odour and prevent pollution from odour, we consider that no odour management plan is needed and Permit conditions 3.3.1 and 3.3.2 are sufficiently protective.

Noise

Regarding noise, the pre-heat furnace incorporates two fans to circulate air through the preheat chambers. These will be housed in an insulated enclosure adjacent to the pre-heat furnace. Supplier information indicates the noise will not exceed 85dB.

The operator has detailed that Internal and external (environmental) noise monitoring will take place following installation of the pre-heat furnace. This will serve to update

personal noise exposure data and environmental noise data. There is an Improvement Condition (IC32) listed in the permit to carry out Noise monitoring to conclude no noise impacts. Monitoring is undertaken by an experienced contractor, using a standard methodology (BS4142). It is proposed to conduct this survey soon after commissioning of the new equipment.

Fugitive emissions

Based upon the information in the application we are satisfied that the appropriate measures will be in place to prevent or where that is not practicable to minimise fugitive emissions and to prevent pollution from fugitive emissions.

The installation of a pre-heat furnace and a small natural gas fired burners is not likely to give rise to fugitive emissions.

Monitoring

We have decided that monitoring should be carried out for the parameters listed in the permit, using the methods detailed and to the frequencies specified.

As emissions from the new equipment are via existing emission points, Emissions Limit Values and Monitoring requirements will remain the same for emission points A1 and A12. There is an IC to carry out monitoring to confirm assumptions that the addition of the pre-heat furnace and gas burners will not breach ELV's when combined with existing emissions via those emission points.

Based on the information in the application we are satisfied that the operator's techniques, personnel and equipment have either MCERTS certification or MCERTS accreditation as appropriate.

Reporting

We have specified reporting in the permit. Reporting measures will remain the same but with the addition of reporting on annual production/treatment of aluminium ingot.

Operating techniques

We have reviewed the techniques used by the operator and compared these with the relevant guidance notes.

We accept the operator's proposals for BAT relating to the environmentally insignificant emissions.

The sites Environmental Management System includes a register of significant environmental aspects. This will be updated to reflect the new equipment regarding both the potential negative impact of emission of combustion products to air from the natural gas burner, and the positive impact in respect of reduced gas use (and associated releases to air) in the Melting Furnace due to the use of waste heat to pre-heat furnace charge materials. An Improvement Condition has been added to the permit to request this information (IC30). The new equipment will need to be carefully managed to ensure that the temperature of gases passing to the bag plants does not drop below a minimum of 120°C to avoid condensation and subsequent corrosion in the system. During current operations it is more common for an “over temperature” situation to occur (flue gases >140°C). This forces the bag plants to switch off, in turn forcing the furnace burners to switch off until the temperature has reduced. A further benefit of the proposed pre-heat furnace is that these occurrences will be greatly reduced, allowing more stable, efficient furnace operations.

The pre-heat furnace will be operated and maintained in accordance with the manufacturer's requirements. Jasper GmbH will also be involved during the installation and commissioning of the equipment, and in the training of operations and maintenance personnel.

The equipment is considered to represent “BAT” for non-ferrous metal recycling. Indicative BAT for energy efficiency includes the use of hot process gases to dry feed materials, and the pre-heating of furnace charge materials using the energy content of furnace gases. [Non Ferrous BAT Conclusions, Section 1.3.4, Secondary Aluminium Production, 1.3.4.2 Energy, BAT 75 (a): preheating furnace charge with exhaust gas (applicable for non-rotating furnaces).]

The permit conditions

Improvement conditions

Based on the information on the application, we consider that we need to impose improvement conditions. Details of the improvement conditions used can be found at Annex 1.

Environment management system

There is no known reason to consider that the operator will not have the management systems to enable it to comply with the permit conditions. The decision was taken in accordance with RGN 5 on Operator Competence.

OPRA

The OPRA score at permit issue is 56.

ANNEX 1: Improvement Conditions

Reference	Requirement	Date
30	The operator shall submit an updated Environmental Management System to reflect the new equipment being installed as part of variation V006 – installation of pre-heat furnace including auxiliary gas fired burners as described in section 2 of the document entitled “Information to support an application to vary a bespoke environmental permit, March 2020”.	21/01/2021
31	The operator shall, following commission of the pre-heat furnace with auxiliary gas fired burners, submit to Natural Resources Wales a stack emissions monitoring report for the combined emissions from the furnaces and preheat chamber as releases to air from stacks A1 and A12 to ensure combined emission releases will remain below current emission limit values (ELV’s) as described in section 4 of the document entitled “Information to support an application to vary a bespoke environmental permit, March 2020”.	21/01/2021
32	<p>The operator shall, following commission of the pre-heat furnace with auxiliary gas fired burners, submit to Natural Resources Wales a noise monitoring assessment at the nearest receptor. This shall include:</p> <ul style="list-style-type: none">• A full noise monitoring survey and assessment meeting the BS4142:2014 standard including details of local conditions e.g. meteorological conditions (wind direction)• 1/3rd octave and narrow band (FFT) measurements to identify any tonal elements or low frequency noise• Reference to the World Health Organisation guidelines for community noise• Reference to the Noise Action Plan for Wales 2018-2023 Upon completion of the work, a written report shall be submitted to Natural Resources Wales. <p>The report shall refer to the expected noise levels in the document produced as part of the application entitled “Information to support an application to vary a bespoke environmental permit, March 2020”. If rating levels are likely to cause adverse impact at sensitive receptors, the report shall include an assessment of the most suitable abatement techniques, an estimate of the cost and a proposed timetable for their installation.</p>	21/01/2021