Susan Anderson

From: Jenny Edwards <jedwards@iconichem.com>
Sent: 23 May 2025 12:36
To: Susan Anderson
Subject: Re: EPR/FP3032RH/V005 We Need More Information About Your Application CRM:0346106
Attachments: CRHA - Dissolving of Battery Cathode Material Rev1.doc; Fluoride Species in Black Mass.docx; J4028005382R1 DEKRA Report.pdf

Categories: DMS to be saved

Sue

Further to your email and call, attached is some further info.

Before I begin I would like to take to opportunity to invite you and any interested colleges to visit site to meet our team, see how the process works, is controlled and the actual materials involved.

As discussed I spoke with Paul Croft our Operations Director regarding any published work coming out of the projects we have been involved with but he says what has been published is rather generic. We are happy to share any knowledge we have gained via our involvement in the Faraday and Innovate projects and processing material onsite with you.

Our usual dissolution route is via a nitric acid dissolve with hydrogen peroxide added if required. For your info hydrogen peroxide is used as a reducing agent in the process to add the dissolution of metal species. This route was selected many years ago as a basis of safety as nitric acid will produce NOx fumes which are easier to control than the hydrogen fumes that are formed if other acids are used. The most commonly used acid for dissolution is sulphuric as it is cheap and easy to obtain. The issue is that when precipitating the solution, usually done with sodium hydroxide, you will be left with significant amounts of sodium sulphate to dispose of and high sulphate in the product which is undesirable for our current customers. Once the black mass material has been dissolved and precipitated with sodium hydroxide (caustic) it is treated similarly to our usual raw material processes as per flowsheet previously provided.

Attached is one of many external studies (lots of stuff done inhouse but only the more successful stuff goes forward to external testing) as an example of some of the testing that we undertake as part of our usual new raw material process. Study J4028005382R1 undertaken in 2020 involved three different black mass materials, pyrolyzed and non pyrolyzed. The 'new black mass is similar to our current material and is non pyrolyzed. As you can see from the results (thou they are quite wordy) the non pyrolyzed material when dissolved in nitric or sulphuric acid with peroxide added later produces carbon dioxide, oxygen and a trace amount of toluene. The pyrolyzed materials and 'new black mass' produce only oxygen during the hydrogen peroxide step. Pyrolyzed materials are harder to recover and generally require more reagents and produce lower yields.

From testing both internally and externally CHRA is produced, see example attached which is for a material similar to 'new black mass' tested above. These shows the chemistry of what is happening and what engineering requirements are need to safely move forward.

With regard to specific pollutant concerns you raised in your email;

- Particle size analysis is completed on new materials to ensure they can be handled safely such as when discharged into vessels. The dissolution vessels are attached to wet scrubbers, which remove any particulate matter. Further down the process some materials are dried to form powders (rather than crystals) these areas of the process are no different to current and are controlled using bag and HEPA filters. These are non continuously monitored and reported to EA.

- VOCs, PCBs, PCDD/F, BFRs have not been seen in any of our studies. VOCs would be removed in the water separation process. Any residual plastics in the black mass material would not dissolve in nitric acid and would end up in the graphite stream
- Metals. Metallic contamination can cause NOx to be formed but the current process is designed to control this. The metals and salts present are tested for safety and to ensure the metal content we pay for is there. Metals in solution are recovered prior to effluent in the metals recovery plant.
- Sulphuric acid and Sulphur Dioxide these would not be expected as we dissolve in Nitric acid as discussed above
- Hydrogen Chloride any chlorine present would react to form chlorine on addition of peroxide, plant area monitors are installed but chlorine would be analysed as part of acceptance testing. We have not seen this in any of our studies.
- Hydrogen Fluoride. Fluorine would be removed in the water separation process. Fluorine would be analysed as part of acceptance testing. We have seen low levels of in materials received but these would not produce hazardous levels of HF, see attached lab note.
- Ammonia. We have not seen this in any of our studies but the plant has an ammonia stripper which would remove and ammonia in the solution prior to moving to metal recovery and effluent.

Hope this helps

Jenny Edwards
Process Safety Manager

ICoNiChem Widnes Ltd
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Direct: 0151 422 3528
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SafeStart is an important part of the overall commitment to safety at ICoNiChem Widnes Ltd.

From: Susan Anderson <Susan.Anderson@environment-agency.gov.uk>
Sent: 16 May 2025 3:46 PM
To: Jenny Edwards <jedwards@iconichem.com>
Cc: Paul Croft <pcroft@iconichem.com>; SM-Defra-RESP-notifications (DEFRA) <RESP-notifications@defra.gov.uk>
Subject: RE: EPR/FP3032RH/V005 We Need More Information About Your Application CRM:0346106

Hello Jenny

I have left a voicemail to say I am minded to duly make your variation application shortly but I have a couple of queries regarding the potential air emissions from the recovery of materials from black mass. These questions are a result of information we have from other permit applications where black mass is a raw material for recovery of metal salts. Whilst the chemical recovery processes, such as yours, are well established, the use of black mass as a raw material (its status as a hazardous waste notwithstanding) is still novel and we have very little data on process emissions where it is being utilised.

Our draft guidance for shredding of lithium-ion batteries to produce Black Mass suggests there is potential for the following pollutants as point source emissions to air depending upon the type and composition of the waste batteries treated and nature of the treatment processes utilised.

- Particulate Matter (Total and PM_{10})
- TVOC (Total Volatile Organic Compounds)
- Speciated VOCs
- Dioxin-like Polychlorinated biphenyls (PCBs)
- Dioxins and Furans (PCDD/F)
- Brominated flame retardants (BFRs)
- Metals and metalloids excluding mercury (including As, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sb, Se, Tl, V)
- Total mercury
- Sulphuric acid
- Hydrogen Chloride
- Hydrogen Fluoride
- Sulphur Dioxide
- Ammonia

It is possible then that the same substances may be present in black mass produced from shredding and hence be present at the start of the chemical recovery stages. You have given some information in your supporting document Black Mass RFI about the chemical processes but do not say whether the above substances have actually been considered and monitored as potential emissions from your processes. I have the following queries:

1. Have you considered the above list of pollutants likely to be present in black mass and if so, what evidence/information do you have regarding presence of these substances in the black mass you propose to accept?
2. Do you have a set of written Waste Acceptance Criteria (WAC) that set out the specification the black mass must meet in order to be processed through your facility, that considers the above list of substances?
3. Have you carried out any sampling and monitoring of your chemical processes to specifically test for the presence of the above list of substances?

If you could respond to the questions above, I will be able to advise on the need for an AQ risk assessment which could be submitted ahead of your application moving to the determination stage. If you would like to discuss the above questions, please contact me.
Kind regards
Sue

Sue Anderson
Installations | Principal Permitting Officer – Manufacturing Team
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From: Jenny Edwards <jedwards@iconichem.com>
Sent: 08 May 2025 19:40
To: SM-Defra-RESP-notifications (DEFRA) <RESP-notifications@defra.gov.uk>
Cc: Susan Anderson <Susan.Anderson@environment-agency.gov.uk>; Paul Croft <pcroft@iconichem.com>
Subject: RE: EPR/FP3032RH/V005 We Need More Information About Your Application CRM:0346106

> You don't often get email from jedwards@iconichem.com. Learn why this is important

Please find attached the requested Information.

Document 'Black Mass RFI' is the main response, and the other attached documents are referenced with it.

Accounts have been requested to pay the extra monies and a copy of the remittance will be sent to Susan Anderson.

I hope this is sufficient please do not hesitate to contact me should you require anything further.

Regards

Jenny Edwards
Process Safety Manager

ICoNiChem Widnes Ltd
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Switch: 0151 424 9156

SafeStart is an important part of the overall commitment to safety at ICoNiChem Widnes Ltd.

From: SM-Defra-RESP-notifications (DEFRA) <RESP-notifications@defra.gov.uk>
Sent: Monday, April 14, 2025 11:33 AM
To: Jenny Edwards <jedwards@iconichem.com>
Cc: Anderson, Susan <Susan.Anderson@environment-agency.gov.uk>
Subject: EPR/FP3032RH/V005 We Need More Information About Your Application CRM:0346106

[redacted]

Dear Jenny Edwards

Environmental Permitting (England and Wales) Regulations 2016

Application reference: EPR/FP3032RH/V005

Operator: ICONICHEM WIDNES LIMITED

Facility: ICoNiChem Widnes Ltd - EPR/FP3032RH, Moss Bank Road, Widnes, WA8 0RU

Thank you for your application received on 10/03/2025. The following is to confirm our conversation of 11/04/2025.

Unfortunately the application payment you sent is incorrect. This is because you have applied for a waste treatment activity for your proposals to recover metal compounds from shredded lithium batteries (known as *black mass*). Whilst black mass is a waste material, we consider the activities used to recover metals and/or metal inorganic compounds from black mass to be Installation activities falling under *The Environmental Permitting (England and Wales) Regulations 2016* (EPR) as either *Schedule 1, Part 2, Chapter 2, Section 2.2 Non-ferrous metals* **and/or** *Section 4.2 Inorganic Chemicals*.

You indicated you are not intending to recover metals from black mass, only metal compounds, using processes for which you are already permitted, under EPR, Section 4.2, namely *Part A(1)(a)(iv) Producing inorganic chemicals such as salts* etc; therefore the correct application should be a substantial variation to your existing activities.
We consider that a substantial variation is appropriate due to the level of assessment we will need to carry out as a result of your proposals receiving a waste material, with the potential to contain numerous polluting substances.

1. Variation Charges - with reference the EA's charging scheme the correct application charge for this falls under *charging code 1.4.5* which attracts a charge of £14,819. Further, your site location falls within the screening distance for protected species and habitats; the nature of the changes to your activity requires we assess the impact of your proposals on protected species and habitats. This attracts a further charge of £779, making a total application charge of £15,598.

You have already paid £4058, leaving a balance of £11,540 to pay.

2. Missing Information - in applying for a substantial variation, we need to ask you for some missing information before we can do any more work on your application. Please provide us with more information, as follows:

With reference to Application Form C2 - General – varying a bespoke permit

- **Q2c Consolidating (combining or updating) existing permits** - it is advantageous for you to receive a consolidated permit since your original permit has been varied a number of times with no previous

consolidation. The substantial variation fee provides sufficient monies to cover the work we will do to consolidate all previous variations into the newest permit when issued.
Please acknowledge acceptance of receiving a modern-style permit.

- **Q3d Management systems** - please provide a summary of your environmental management system - please note that where you will be accepting black mass, you should have regard to updating your EMS with all relevant risks identified, controlled and mitigated. This specifically refers to the receipt of black mass under written Waste Acceptance Criteria Waste classification technical guidance - GOV.UK. and should include procedures for storage and handling of received black mass in compliance with technical guidance specified below.

- **Q5a Provide a plan or plans for the site** - we will require a simplified plan for the consolidated permit which provides a date and reference number and must be drawn accurately using a defined scale. The outline of the site must be clearly marked. It will be helpful if local features are shown on the plant to help us place the site in its local environment e.g. road names. Emission and discharge points, and waste and raw materials storage areas should also be indicated.

- **Q5c Provide a non-technical summary of your application** - write a summary that explains your application, in non-technical language as much as possible, avoiding technical terms, detailed data and scientific discussion. This should include a summary of the regulated facility, a summary of the key technical standards and control measures arising from your risk assessment, including the use of abatement.
  It would help with the writing of the modern-style permit for you to submit process flow diagrams that show the sequence of material flow from receipt of raw materials (including waste black mass) through the chemical recovery processes, covering any hydrometallurgical, pyrometallurgical or electrolytic processes.

- **Q6 Environmental risk assessment** (see also below Effluent Treatment Activities) - chemical recovery of materials from black mass is an emerging field with no directly applicable guidance to the activities. In the absence of specific guidance, we consider the most apt technical guidance to be that relating to recovery of precious metals where there is information on hydrometallurgical and pyrometallurgical processes (specifically within Chapter 7 Processes to Produce Precious Metals) . We consider the technical guidance set out below to be appropriate:

Non-ferrous Metals Industries | EU-BRITE - for many of the techniques, outputs and controls, the BAT Reference Document for the Non-Ferrous Metals Industries (NFM BREF) should be followed in your permit application with specific reference to Chapter 7 – recovery of precious metals where chemical processes are relevant.
Additional guidance for: The Inorganic Chemicals Sector (EPR 4.03)

Following the technical guidance will allow you to develop a full set of proposals for your intended operations, including the nature, quantities and sources of your foreseeable emissions to air, water and land. You should now describe the environmental risk posed by your proposals in the form of an environmental risk assessment which should follow the methodology set out in 'Risk assessments for your environmental permit' at www.gov.uk/government/ organisations/environment-agency. Where you wish to use a different methodology, that methodology must address the same issues to an equivalent level of detail. The purpose of the environmental risk assessment is to demonstrate that the impacts of your proposals will be acceptable.

3. Effluent Treatment Activities – whilst your proposals do not refer to potential changes in the effluent discharged from site, our duties to assess risk to surface waters from indirect emissions (i.e.sewer discharges under trade effluent consents) do form part of our assessment where a new waste stream is being processed on site requiring an assessment of the pollutants that may be present in abatement liquors.

Please include in your risk assessment, details of your effluent treatment process, including nature of effluent (hazardous or non-hazardous, treatment type e.g.pH adjustment, flocculation etc) and the maximum capacity of your treatment processes (ie the **maximum amount** of treated effluent capable of being discharged in any 24-hour period (maximum capacity, **not** actual volume discharged).

Please reply directly to this email with your information and copy in susan.anderson@environment-agency.gov.uk.

We normally require further information to be provided within 10 working days of the request, in this case however, we acknowledge public bank holidays (Easter) and annual leave periods. Therefore, the date for receipt of this information and additional payment is **9th May 2025.**

Details of how to pay are given in Part F of the application form Guidance notes Part F1 - charges and declarations

If we do not receive this by this deadline we will return your application.

If we receive what is missing by the deadline, we will continue to check your application. We'll check to see if there's enough information for the application to be 'duly made'. Duly made means that we have all the information we need to begin determination. Determination is where we assess your application and decide if we can allow what you've asked for.

We'll let you know by email whether your application can be duly made. If it can't be duly made, we'll return your application to you.

If we do have to return your application we'll send you a partial refund of your application payment. We'll retain 20% of the correct application charge to cover our costs in reviewing your application. This maximum amount we'll retain is capped at £1,500. Further information on charging can be found at: https://www.gov.uk/government/publications/environmental-permits-and-abstraction-licences-tables-of-charges

Note: Our email system has a file size limit of 25MB, if your returns exceed this limit you will have to arrange an online file transfer. Please ensure the file transfer link does not have a time limit on it.

If you have any questions please contact me using the details below.
Yours sincerely,
Sue

Sue Anderson
Principal Permitting Officer - Installations
National Permitting Service ♦♦♦♦ Part of Operations: Regulation, Monitoring & Customer
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