Report

Permit application for the recovery of lithium and other minerals from water and black mass

Non-Technical Summary

For Watercycle Technologies Limited

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Non-Technical Summary

This non-technical summary covers Watercycle Technologies Limited's ("Watercycle") application under the Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR) for a bespoke permit for an installation to recover lithium and other critical minerals from waste and non-waste product waters, and battery black mass.

The Site will recover critical minerals from refined black mass (RBM) and water (non-waste product waters and industrial wastewater) as metal salts and/or hydroxides. There will be two process lines, one for the black mass process and a second process line for the water process. No lithium-ion batteries (LIBs) or batteries of any other kind will be accepted at the Site. The Site will only accept RBM that has been produced and subject to pre-treatment at other off-site battery recycling facilities to remove other components of shredded battery material. There will be no further pre-treatment of the black mass at the site before it is introduced into the process.

The water process involves the addition of solid inorganic materials to blend, filter, crystallise, precipitate and dry the finished product, producing metal salts e.g., lithium carbonate or lithium phosphate. The black mass process involves the leaching of the black mass with sulphuric acid and hydrogen peroxide to precipitate out the relevant minerals at different stages. The materials are washed, concentrated, crystallised, processed via a filter press and dried to produce the required mineral products. Neither process produces metals in their elemental form.

The output products include:

- Lithium salts (carbonates or phosphates dependent on reagent used); and
- Mixed metal hydroxides (iron, aluminium, copper, nickel, manganese and cobalt).

Management Techniques

The Site will operate to an environment management system (EMS) that is accredited to ISO14001, and forms part of the overall Integrated Management System (IMS).

The following management plans have been developed to support the operation of the Site and minimise impacts:

- Fire Prevention Plan; and
- Accident Management Plan.

Emissions to Air

There are five point source emissions to air (A1-A5) associated with the process. These represent extracted off-gases either directly from reactors or through local exhaust ventilation (LEV) extraction points on raw material and product handling systems. All emission points, with the exception of A3 which will primarily include water vapour with only negligible quantities of VOCs, include abatement in the form of combinations of fabric filtration, carbon adsorption and/or caustic scrubbers dependent upon the pollutants present.

Emissions to Sewer

All areas of the Site involved with the storage, handling or transportation of waste and raw materials containing potentially polluting substances have a fully impermeable surface.

The only point source emissions to sewer during normal operation will be uncontaminated run-off from hardstanding areas of the facility not storing waste or other potentially polluting substances, including from roads and building roof areas. The sealed surface drainage system incorporates interceptors which can be isolated prior to the final discharge point from the installation boundary.

There will be no discharges of process effluents to sewer. Process effluents and waste process water are directed to 1,000 litre rigid IBCs with suitable bunding (minimum 110% of IBC volume) for subsequent transfer for off-site treatment at an appropriately licensed third party waste management facility.

Emissions to Soil and Groundwater

There are no releases to soil or groundwater from Site operations.

Waste Generation

Wastes generated on-site will be minimised through efficient management and control procedures, with residues re-used for other on-site purposes where possible. Watercycle sets out to optimise the reuse, regeneration, recycling and/or recovery of each waste stream and, where relevant, ensure the proper disposal route in accordance with the waste hierarchy. All wastes generated by the process will be subject to a comprehensive WM3 assessment to characterise the waste stream.

Noise and Vibration

There are a number of potential sources of noise and vibration associated with the operations. These include mobile sources e.g., delivery vehicles and forklift trucks, and stationary sources e.g., pumps and fans associated with the two process lines. An assessment of the Site using the Environment Agency's Noise Advisory Tool has been completed and identifies that, based upon the activities and the location, no quantitative assessment of noise nor a Noise Management Plan is required.

Odour

All handling and processing activities take place within a building, and materials handled are not intrinsically odorous. Odour is not expected to be an issue at the Site.

Monitoring

Monitoring of point source emissions to air will involve periodic/extractive monitoring techniques using stack testing laboratories accredited in accordance with the Environment Agency's Monitoring Certification Scheme (MCERTS). As diffuse emissions of VOCs are estimated to be less than 1 t/y, it is not proposed to perform routine monitoring of fugitive emissions of VOCs. However, a Leak Detection and Repair (LDAR) programme will be established under the IMS to support the identification and reduction of fugitive emissions to air. As there will be no discharges to water other than uncontaminated surface run-off, it is not proposed to routinely monitor emissions to water. However, samples of the process effluent that will be temporarily stored on-site in IBCs before being transferred to a suitably permitted off-site facility will be collected to support WM3 classification and to determine the presence of POPs or PFAS to support the development of a PFAS Management Plan.

Site Condition Report

A Site Condition Report has been prepared according to the Environment Agency's H5 guidance. The risk of ground contamination is considered to be low, and no ongoing monitoring of soil or groundwater is proposed. A baseline ground condition for the site is presented within the Site Condition Report.

Environmental Risk Assessment

A combination of qualitative and quantitative assessment of the potential risks to the environment has been undertaken as part of this permit application. The quantitative assessment includes an air quality assessment using detailed dispersion modelling. The environmental risk assessment concluded that the current mitigation measures are sufficient to minimise the risks to low levels and no significant impacts on human health or the environment are expected.

An assessment of the proposed activities and control measures against relevant sectoral Best Available Technique Conclusions and the Environment Agency's appropriate measures is provided to demonstrate the design and operation of the facility is consistent with these requirements.

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