Non-Technical Summary

A substantial variation to the permit EPR/GP3536AC is required due to a site technology upgrade called Project Summer. The current variation of permit EPR/GP3536AC is V003. This version was issued in December 2021, having been reviewed & revised by Andy Bett and Daniel Ros of the EA Permitting Team due to the publication of the LVOC BAT Conclusions in December 2017.

The aim of Project Summer is to meet the requirements of the latest LVOC and CWW BRefs and supporting BAT conclusions, namely:

a) Large Volume Organic Chemicals (LVOC) BATc

- Section 1 (General BAT conclusions BATc 1-19)
- Section 10 (BAT conclusions for Ethylene Dichloride and Vinyl Chloride Monomer Production (BATc 75-85, although items only specific to Vinyl Chloride Monomer production will not be applicable as Vynova Runcorn is solely an EDC production & purification installation)

b) Common Waste Water / Waste Gas Treatment / Management Systems in the Chemical Sector (CWW) Horizontal BATc

- All BAT conclusions (BATc 1-23)

Under this project EDC manufacture will cease on the EDC1/2 Plant and the DC3 Plant will be modified with the installation of a new reactor technology train and a new effluent treatment facility, as well as other rationalisation and improvement work across the Vynova site e.g. new DCS/SIS systems for all assets, shutdown of VDC4 Plant road loading and dual-bay operation at 6th Avenue road loading facility.

With the closure of EDC1/2 and VDC Plant areas, essentially the DC3 plant will be become known as the HPE Plant (High Purity EDC), and this is what the Installation will be referred to from now on.

The main purpose of the installation remains the same (i.e. the existing activities authorised by the EPR permit will still apply) and the plant capacity will not change as a result of the project.

The project will install two new Low Temperature Direct Chlorination EDC reactors and an EDC wash system using OxyVinyls technology under Licence.

This new reactor operation will be supported by a series of process & infrastructure improvements including:

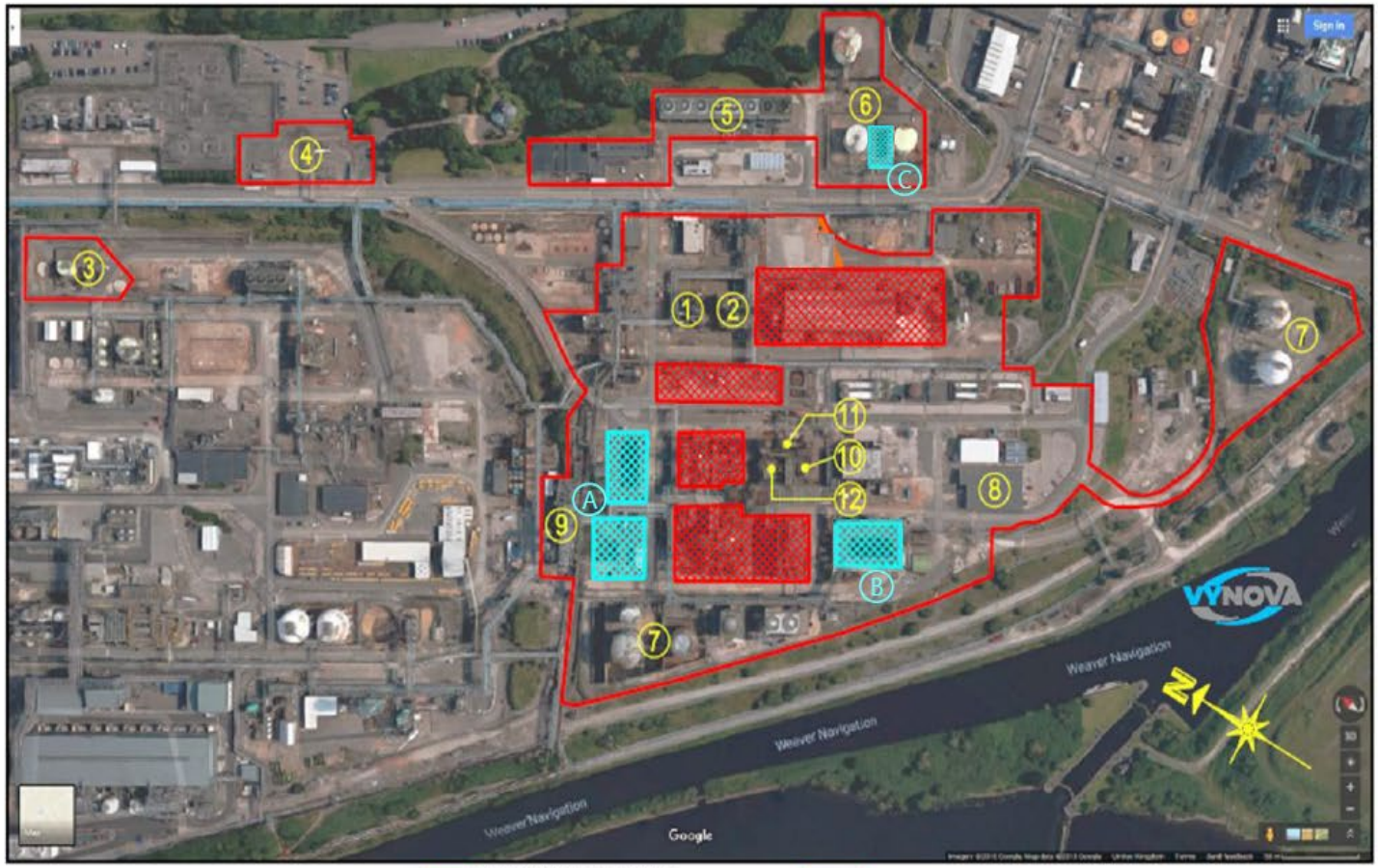
- Installation of new Wet & Dry Vents Scrubbers
- Installation of new reactors vent refrigeration system
- Modifications to existing tanker loading area
- New intermediate pressure Chlorine pipeline from MCP
- New Hydrochloric acid off-loading facility
- Process pipework and controls systems to provide improved storage and shipping of raw materials and final product
- Electrical infrastructure upgrade with a new package substation and main distribution boards
- Upgraded plant control system with a new distributed control system
- The replacement of fire and safety systems integrated into the overall process controls system.

As a result of the project implementation, the EDC 1/2 Plant will be decommissioned together with significant parts of the DC3 Plant. A pictorial overview of new, upgraded and closed plant sections is shown below.

Project Summer will reduce the environmental risks on site, namely:

- Reducing the number of EDC reactors from 4 to 2 and also thereby reducing the associated supply and delivery pipelines
- Reducing the number of EDC stock tanks from 4 to 2, dropping capacity by around 4,000 m^3
- By installing ROSOVs on storage tanks and reaction train
- By installing deluge systems protecting reactors, wash vessels and stock tanks with the installation of dedicated firewater pumps on Vynova site
- By adding loading containment and the removal of surge issues at 6th avenue EDC tanker loading
- Total removal of Carbon Tetrachloride from site
- Finally a new onsite effluent plant replaces part of the treatment that was previously carried out at the INEOS Inovyn Central Effluent Plant (EIP).

Project Summer - Overview



Key

1. EDC 1 - Close
2. EDC 2 - Close
3. VDC 4 loading - Close
4. 6th Ave loading - Upgrade
5. No 5 Cooling Tower – Close
6. EDC Tank farm – Close (except T302 to firewater duty)
7. DC3 Tank Farm – Upgrade
8. DC3 Control – New DCS/SIS
9. Incineration – Refurbish
10. DC Reactors – Close
11. EDC Wash – Close
12. EDC Distillation – Refurbish

A. New HPE Reactors, Wash, Vent scrubbers, Fridge, etc.
B. New Effluent Treatment plant
C. New Firewater Deluge Pumps

The Introductory note on the existing permit could therefore be revised as follows:-
{using revision marking ~~Red~~ for deletions and **Blue** for inserted text}

The main features of the installation are as follows:

Vynova Runcorn Limited Installation

The Installation is located in Runcorn, Cheshire. The centre of the Vynova site being at National Grid Reference SJ 50~~6~~**5** 801. The site is within 2km of the Mersey Estuary Special Protected Area/RAMSAR site/Site of Special Scientific Interest. The installation ~~consists of two main plants: DC3 and EDC1/2, which are~~ **is** located in a central position on the industrial chemicals complex known as the Runcorn Manufacturing Site.

The primary purpose of the Installation is the production of high purity ethylene dichloride (1,2-dichloroethance, EDC), which is exported from the site to ship loading facilities to supply other Vynova production plants in Europe or external customers. **The Installation is referred to as the HPE Plant (High Purity EDC Plant).**

Up to 335,000 tonnes per annum of **high purity** EDC is produced by 'direct chlorination' – the reaction of chlorine and ethene. All EDC produced is processed through the ~~DC3~~**HPE** distillation section prior to storage and export.

The ~~DC3~~**HPE** plant includes a liquid residues incineration plant, compliant with the Industrial Emissions Directive. A separate vents incinerator **(thermal oxidiser)** treats **process** vents from the ~~DC3 process and certain locations elsewhere on the~~ Vynova Runcorn installation. The combustion gases from this equipment are scrubbed to form hydrochloric acid which is reused on plant or sold to third parties for use elsewhere on Runcorn Site.

The permit enables the import of residues from elsewhere in the Vynova group or external companies as part of the incinerator feedstock provided they are similar (same EWC code) to those produced by the EDC process on site and there is no increase in the originally assessed throughput.

Process descriptions (this description does not form part of the Permit)

~~DC3~~**HPE Plant**

Direct chlorination (on the 200 Unit) produces EDC by the reaction of ethene and chlorine in liquid EDC. The exothermic reaction is catalysed by corrosion derived iron at about ~~60~~**55**°C in two reactors. EDC is recovered from reactor off-gas by ~~two stage~~**refrigeration** condensation. The non-condensable gas stream passes to the incinerator (or a caustic scrubber at times of incinerator unavailability). The ~~DC3~~**HPE** reactors have a crude EDC production capacity of approximately ~~135~~**440,000** tonnes per annum~~, which is mixed with the EDC produced from reactors on the EDC1/2 plant as described below~~.

The crude EDC ~~from both reaction routes~~**produced** is initially washed with water and sodium hydroxide on 200 Unit, then dried and distilled in 300 Unit. The pure EDC is stored and exported.

Emissions to Air

Under normal operation the ~~The most significant~~ emissions from the ~~DC3~~**HPE** plant are **minimal**~~EDC and ethene~~. The plant has refrigerated condensers (to recover mainly EDC) and an incinerator (**thermal oxidiser -** to treat all the ~~major~~ organics vent streams). **Under abnormal operating conditions the most significant emissions are EDC and ethene.**

Emissions to Water

~~The DC3 Aqueous Treatment Plant mixes process effluents and steam strips the organics.~~ **A new Effluent Treatment Plant (ETP – 600 Unit) receives effluent from around the Vynova site, which contain various aqueous acidic and caustic effluents which may also contain EDC, as well as rainwater from potentially contaminated bunds.**

The main purpose of 600 Unit is to pass the effluent through a steam stripping column to remove the EDC and recycle it back into the main plant wash system. The plant also neutralises the effluent and removes carbonate. The **vent gases** ~~organics rich air stream passes~~ **are sent** to the vents incinerator**, or diverted to a local scrubber if the main header is off-line.** ~~and t~~The stripped effluent passes to the **Runcorn site Central Effluent Plant** (EIP) ~~Environmental Improvement Project (EIP) plant~~**which is** owned and operated by **INEOS Inovyn**~~INOVYN ChlorVinyls Limited~~**, for solids removal and final discharge to the Weaver Canal**. ~~Surface water, which has the potential to be contaminated, flows through an organics separator pit (BASF) before passing to the EIP plant.~~ Uncontaminated surface water from the ~~DC3~~**HPE** plant area either passes to ~~the EIP plant via the BASF pit~~**Outfall 49 (south areas)** or ~~directly~~ to Outfall 56 **(north areas)**.

Vent Gas and Liquid Residue Incineration

There are two incinerators at the ~~DC3~~**HPE** plant; the vents incinerator, which destroys the volatile organic compounds (VOCs) in the ~~DC3~~ plant vents, and the residues incinerator which destroys the liquid residues from ~~DC3~~**HPE** plant ~~and EDC 1&2 plants~~. Some similar permitted wastes from off-site may also be accepted for treatment.

Process gases passing through the vents incinerator combustion chamber are maintained at about 1100^{o}C for at least two seconds to ensure efficient destruction. Hot combustion exhaust gases generate steam for use on the ~~DC3~~**HPE** plant. The exhaust gas is quenched and scrubbed by successive contact with water, caustic soda and sodium bisulphite. The resulting gases pass through a demister before venting to atmosphere via a 60 metre stack. Whenever the incinerator is unavailable for operation the process gases pass to local vents.

~~There is a connection to the DC3 plant vent header from the nearby PVC Pilot Plant, operated by INEOS Technologies (Vinyls) Limited, to utilise the vent incinerator to abate the vent at the end of the Research and Development batch processes.~~

Up to 30,000 tonnes per annum of process liquid residues pass to a separate combustion chamber for incineration at about 1200^{o}C for at least two seconds. In order to minimise the formation of dioxins and furans, there is no heat recovery on the exhaust and gases pass directly to a quench. Exhaust gases then pass to the scrubbing system which also serves the vent incinerator. There ~~are two 300 m^{3} residues tanks on DC3 and one 1,600m^{3} residue tank on EDC1/2~~ **is a 1900m^{3} residues stock tank** giving buffer storage to allow for maintenance on the residues incinerator.

~~**The EDC 1/2 Plant**~~

~~Ethylene dichloride (1,2 dichlorethane, EDC) is manufactured by addition of chlorine gas supplied from Runcorn MCP Limited on the Runcorn site via pipeline to ethene supplied off-site by pipeline. The EDC1/2 plant reactors (2 off) have a crude EDC production capacity of approximately 305,000 tonnes per annum.~~

~~The EDC produced is sent to the crude EDC bulk storage tank of approx. capacity 4000 te and then sent for washing and purification by distillation on the DC3 plant.~~

~~The EDC reaction vent streams pass through quaternary refrigerated condensation, to recover as much as possible of the product before being diluted with a large excess of air (for safety reasons) and passing to caustic scrubbers where chlorine and hydrogen chloride in the vent stream are absorbed. The non-condensable materials that are not absorbed within the scrubbers are discharged via the EDC scrubber vent stacks.~~

~~**The VDC plant**~~

~~There are no production processes on the VDC plant. EDC is transferred to the VDC Plant for storage prior to road tanker loading and despatch from site.~~