

HyNet Hydrogen Production Plant 1 – Technical Note

EPR Response 15a - Demineralisation Plant Effluent-Flow Rate Discrepancy

Summary

Clarify the discrepancy between the flow rate figures for the effluent from the demineralisation plant stated in table 2-6 (also confirmed in response to the non-duly made request for additional information responded on 07/12/2021) and Table 6-3 of the Application Supporting Document.

Background

Snapshots of tables 2-6 and 6-3 along with respective section paragraphs are provided below for ready reference:

Table 2-6 Demin Plant Saline Effluent

Parameter	Value
Temperature (°C)	24.2
pH	7.6
Actual volume flow (m ³ /h)	14.1
Design volume flow (m ³ /h)	17.0
TSS (mg/l)	0.00
COD (mg/l)	8.030
BOD (mg/l)	5.996

Demin Water Treatment and Supply

- 2.3.15 The purpose of the final water treatment stage will be to demineralize the filtered water stream – to provide a final polish – to ensure its suitability for use in the reforming process. The water will be pumped from the Filtered Water Tank, dosed with sodium bisulphite and sodium hydroxide, and routed to the Water Demineralization Plant. This plant, details of which will be confirmed at the next phase of engineering, will demineralize the filtered water (probably by a process of reverse osmosis and electrodeionisation) to produce a demineralized water stream and a saline effluent stream.
- 2.3.16 The demineralized water will drain to the Demin Water Storage Tank from where it will be pumped back to the process (for use in the Steam System, CO₂ Removal Unit, the Cooling Medium System, and plant dosing systems). The saline effluent stream will be routed to the wider refinery drainage system for discharge. The composition of this effluent is given in Table 2.6.

Table 6-3 Proposed Emission Values for HPP Discharges to Water

Ref.	Source	Grid Reference	Parameter	Proposed Discharge Value (mg/l unless otherwise stated)	Existing W3 Limit (Table S3b)
TBD	Uncontaminated Surface Water	TBD	No limit proposed	-	-
T1	Water Demineralization Plant concentrate	344022, 375296	Temperature	24.2 °C	32.5 °C
			pH	7.59	6-9
			Flow (actual)	42.37 m ³ /h	3750 m ³ /h
			Flow (design)	50.85 m ³ /h	3750 m ³ /h
			TSS	0.00	25
			COD	8.030	125
			BOD	5.996	-
			Ammonia	-	20 (as Total N)
			Methane	-	-
			Ethylene - Pentane	-	-
			Methanol	-	-
			Ethanol	-	-
			Amine	-	-
			Phosphates	≤3 (Total P)	-
			Chlorides	TBD	-
			Iron	TBD	-
			Chromium	≤0.025	-
			Copper	≤0.05	-
			Zinc	≤0.3	-

		Nickel	≤0.02	0.02
		Hydrocarbon oil	-	10
		Hydrocarbon oil index	-	2.5
		Benzene, toluene, ethyl benzene, xylene (BTEX)	-	Benzene 0.05 mg/l
		Cadmium	-	0.002
		Mercury	-	0.0002
		Lead	-	0.002
		Vanadium	-	-
		Cyanide	-	0.02
		Sulphide	-	1

6.3 Discharges to Water

6.3.1 Discharges to water comprise:

- Discharge of uncontaminated site drainage to the wider refinery drainage system, which runs to the west of the HPP site [exact location(s) to be determined later in detailed design] and is transferred to the United Utilities (UU) water treatment plant at existing transfer point S1; and,
- Discharge of demineralizer plant concentrate at point T1 (at CT2, already included in the existing permit) This will then flow from CT2 to discharge through point N38 to existing permitted discharge point W3.

6.3.2 Proposed discharges are shown in Table 6-3.

Response

Indeed, the stream referred in tables 2-6 and 6-3 is the same brine stream.

The flowrates mentioned in table 2-6 are for one (1) train, i.e. HPP1. Phase-1 will require this first train only. The per train actual flowrate is 14.1 m³/hr and the design flow rate is 17.0 m³/hr.

The Phase-2 development (HPP2) will require another one (1) train but with double the capacity of Phase-1 for the demineralisation plant. Hence the total brine produced in Phase-2, will be:

- Actual flowrate = 14.1 X 3 = 42.3 m³/hr
- Design flowrate = 17 X 3 = 51 m³/hr

The flowrates mentioned in table 6-3 are Phase-2 flowrates, i.e. HPP1 + HPP2. Hence, they are higher than the ones in table 2-3.

References:

1. UFD – Demin Water Treatment (5194812-000-49DG02-4-0004-01, Rev. 06)
2. Water Balance (5194812-300-49EL-4-0002, Rev. 03)