

ATTACHMENT E PLAIN-LANGUAGE SUMMARY

Huntsman Ethyleneamines LLC (Huntsman) is applying for renewal and major amendment of Underground Injection Control (UIC) Permit Nos. WDW-435, WDW-436 and WDW-437. The Huntsman ethyleneamines facility and the associated Huntsman injection well facility are located within Dow's chemical plant in Freeport, Texas at 307 County Road 624, A1 Gate, A38 Block. The Dow Barge Canal runs between the ethyleneamines facility and the injection well facility.

Huntsman manufactures ethyleneamines through the reaction of 1,2-dichloroethane (EDC) and aqueous ammonia. There are eight products and many blends sold into about 25 different applications including lube-oil and gasoline additives, epoxy hardeners, fabric softeners, surfactants, chelating agents, wet strength resins, and oil field chemicals. Product flexibility required to match the market needs is provided mainly by varying the ammonia/EDC feed ratio and by appropriate recycling of amines.

Wells WDW-435 and WDW-436 were completed in 2015 and have been in operation since 2019. WDW-437 has been permitted but has not been installed. The permitted injection zone for all three wells is within the Miocene Formations at the approximate depths of 5,020 to 6,700 feet below ground level. The permits currently authorize a maximum combined instantaneous injection rate of 600 gallons per minute (gpm) per well (maximum combined monthly average rate of 550 gpm) with a maximum combined annual injection volume for all wells of 289.08 million gallons (MG). The maximum operating surface injection pressure specified in the permit for each well is 926 psig for a maximum specific gravity of 1.2.

The application requests a major permit amendment to: (1) lower the maximum operating surface injection pressure to 885 psi for a maximum specific gravity of 1.2; (2) increase the maximum injection rate to 750 gpm per well (cumulative 1,500 gpm for all three wells) for up to 30 consecutive days; (3) increase the annual average injection rate from 550 to 650 gpm per well and for all three wells combined; (4) increase the maximum injection volume per well to 32,400,000 gallons per 30-day month (based on 750 gpm) and to 341,874,000 gallons per 365.25-day year (based on 650 gpm); and (5) increase the cumulative maximum injection volume for all three wells to 64,800,000 gallons per 30-day month (based on 1,500 gpm) and to 341,874,000 gallons per 365.25-day year (based on 650 gpm). These proposed changes are evaluated in the application and demonstrated to meet all applicable regulatory requirements.

The ethyleneamines production process generates a nonhazardous wastewater stream that comprises the vast majority of the waste stream that is disposed by underground injection. This process wastewater is highly saline and contains ammonia and other nitrogen compounds; it may also contain trace levels of organics. Minor contributions to the injection waste stream are generated intermittently and consist of stormwater falling within the plant area and cooling tower blowdown. Authorization for disposal of very low volume process wastes, consisting of equipment clearing water which is generated from occasional equipment cleaning or clearing prior to maintenance and spill/leak cleanup water, is also being sought by this application.

The injection wells are sited and engineered and have been or will be constructed and operated in accordance with TCEQ regulations and industry approved practices as follows:

- Thorough evaluation of geologic and hydrogeologic information demonstrates the geologic suitability of the facility and area for disposal of wastewater by underground injection. The injection zone is separated from the lowermost underground source of drinking water by approximately 3,800 feet of predominantly low permeability strata.
- Each well has been designed and has or will be constructed to prevent potential leaks from the well, to prevent the movement of fluids along the wellbore into or between underground sources of drinking water, to prevent movement of fluids along the well bore out of the injection zone, to permit the use of appropriate testing devices and workover tools, and to permit continuous monitoring of injection tubing, long string casing, and annulus.
- Each well is routinely operated to maintain the surface injection pressure below the limit determined to satisfy TCEQ performance standards, and the annulus pressure is maintained at least 100 psi greater than the injection tubing pressure to prevent leaks from the well into unauthorized zones and to detect well malfunctions.
- Mechanical integrity tests, as required by the TCEQ, are conducted annually to ensure that the well's tubing, casing, and packer continue to function as intended, preventing impacts to groundwater.
- When injection operations are permanently terminated at any of the injection wells, the well will be plugged by cementing the well from below the top of the permitted injection zone to ground surface. Financial assurance to ensure adequate funds for closure is provided.

These practices and procedures, coupled with the favorable geologic setting, will prevent possible leakage from the well into unauthorized zones and ensure that there will be no impact on groundwater from injection well operations.