6. PROCESS DESCRIPTION AND PROCESS FLOW DIAGRAM

The 200 MMscfd Longhorn Gas Plant will consist of inlet separation facilities, an amine treating unit, glycol unit, cryogenic processing skid, and supporting equipment. The supporting or auxiliary equipment consists of a hot oil heater, refrigeration system, regeneration heater, residue compression, regenerative thermal oxidizer, flare, storage tanks, and truck loading and unloading facilities for consumable chemicals. A process flow diagram is included at the end of this section.

6.1. INLET AND SEPARATION

Gas will flow into the plant from either of two delivery points through high pressure pipelines equipped with onsite pipeline pig receivers (EPN 7-MSS, EPN 8-MSS). Gas from the pig receivers flows into the inlet slug catcher for liquid removal. The gas is then measured and goes through the Plant Inlet Separator for removal of any additional water, solids or liquids. Gas then flows to the Plant Inlet Filter/Separator for filtering of smaller particles of water and solids. Condensate from all inlet separation equipment is pumped back into a pipeline for delivery and handling at an existing facility located offsite.

6.2. GAS TREATING

After inlet separation and filtration, the inlet gas flows into the Amine Contactor, where the gas is contacted with an aqueous solution of UCARSOL AP-814 amine to remove CO_2. CO_2 exits with the amine from the bottom of the contactor and is heated and regenerated using closed hot oil system in the Amine Regenerator. Hot oil is circulated and supplied by the Heating Medium Heater (EPN 4). The CO_2 released from the regeneration process is routed to the onsite Regenerative Thermal Oxidizer (RTO, EPN 5), where the vent gas is combusted and burned. When the RTO is down for maintenance, the vent gas is routed to a flare (EPN 15). Treated gas (less CO_2) exits the Amine Contactor and is routed to the Treated Gas Coolers where it is cooled with ambient air. Any condensed water drops out in the Treated Gas Scrubber. Water that drops out is recycled back to the amine process for reuse.

6.3. GAS DEHYDRATOR

Gas from the Treated Gas Scrubber then goes to the TEG Contactor where water removal is accomplished by contacting with Triethylene Glycol (TEG). The TEG is then regenerated in a 2.0 MMBtu/hr direct fired reboiler (EPN 1). Flash vapors from this unit go through an exchanger to remove condensables and then are routed back to the reboiler burner as fuel. Water removed from the TEG in the reboiler is cooled and any residual vapors are routed to the RTO (EPN 5) for combustion. During RTO maintenance the residual vapors are vented to the flare (EPN 15). Dehydrated gas leaves the contactor and is exchanged with incoming glycol in a side mounted exchanger and then routed to the Mole Sieve Inlet Separator to recover any glycol carryover. Any recovered glycol/water is recycled back to the TEG system for reuse.

Gas exits the Mole Sieve Inlet Separator and flows into the Inlet Filter / Separator where it is again filtered prior to entering the Mole Sieve Dehydrator Beds. The gas flows into two (2) of the three (3) Mole Sieve Dehydrators for removal of any traces of water prior to the cryogenic process. Each dehydrator contains molecular sieve dehydration beads that absorb trace amounts of water from the gas stream. Two vessels will be used to dehydrate inlet gas while the third vessel is being regenerated. Dehydrated high pressure gas is used for regeneration. The regeneration gas is compressed by a Sundyne Compressor. The compressed gas flows to the Regeneration Gas Heater (EPN 3). The heater duty is not a 24 hour, continuous duty operation but only needed a few hours per day per bed. The hot gas flows from the heater to the dehydrator vessel being regenerated. The

water is removed from the molecular sieve by evaporation. The hot gas and vaporized water flow to the Regeneration Gas Cooler, where the gas is cooled and the water is condensed. The cool regeneration gas stream flows to the Regeneration Gas Scrubber where condensed water is level controlled to the closed drain system flash tank and then to the plant waste water tank. The cooled gas recycles to the inlet of the plant upstream of the Dehydration Inlet Filter/Separator. Dehydrated gas from the mole sieve beds flows into the Mole Sieve Dust Filters to remove any mole sieve particles prior to entry into the cryogenic process.

6.4. CRYOGENIC PROCESS

Gas flow into the Cryogenic Process is split to (2) plate fin type exchangers. Normally 60% will go to the Inlet Gas Exchanger, while the remainder flows to the Gas/Product Exchanger, then the Demethanizer reboiler, and then to the Demethanizer Side Reboiler or Heater. The exchangers are combined into one plate fin exchanger. Gas vapor and liquid from the exchangers are combined and enter the Demethanizer Tower. The inlet gas is further cooled by heat exchange with propane refrigerant in the Inlet Gas Chiller. There are (3) 1500 horsepower (hp) electric driven screw compressors that supply the process with refrigerant propane for cooling of the gas. Any heavier components collected in the refrigeration compressor scrubbers or system goes to the closed drain system flash tank. Refrigerant propane is loaded by truck into the Refrigerant Accumulator. Vapor and liquids from the chiller then flow to the Cold Separator. The Cold Separator is used to separate vapor and liquid hydrocarbons that have condensed as a result of chilling in the exchangers. Most of the vapor exiting the Cold Separator flows into the Expander side of the Expander/Booster Compressor where the temperature and pressure are reduced and enter the Demethanizer Tower. A portion of the Cold Separator liquids combines with a portion of the Cold Separator overhead vapors and flows to the Demethanizer Feed Subcooler where it is cooled with cold residue gas. The pressure is reduced and the stream feeds the top of the Demethanizer Tower. The remainder of the Cold Separator Liquid is level controlled to reduce the pressure and enters the Demethanizer Tower.

The Demethanizer Tower is a packed tower with a bottoms reboiler and a side reboiler (also known as a side heater). Liquids leaving the bottom of the tower flow to the Product Surge Tank. The product is then pumped by the Product Booster Pumps which are tandem seal centrifugal pumps, through the Gas/Product Exchanger where the product is heated by exchange with the inlet gas and then to the Product Pipeline Pumps which are tandem seal multistage centrifugal pumps. Overhead gas vapors (residue) from the Demethanizer Tower flows to the Demethanizer Feed Subcooler, then to the Inlet Gas Exchanger where the temperature is increased by heat exchange with the inlet gas. The residue leaving this exchanger is compressed by the Booster Compressor side of the Expander/Booster Compressor. Boosted residue is cooled in the Booster Compressor After-cooler and then flows to the residue compressors. Residue compressors comprise (3)5,000 hp electric motor-driven reciprocating compressors which take the residue gas from plant residue pressure to pipeline sales pressure. Any compressor liquids accumulated from scrubbers is routed to the closed drain system flash tank. After cooling with fin fan units the residue gas is delivered by pipeline to the sales point offsite.

6.5. CLOSED DRAIN SYSTEM

The closed drain system is designed with a flash tank that will operate at 40 psig and will route all flash vapors to a vapor recovery unit (VRU). Two VRUs will be installed at the site so that when one is down or undergoing maintenance, the other unit will compensate. Liquids from the flash tank go to the low pressure condensate tanks (EPNs 17, 18). Water is separated out from the condensate and is drained to the waste water tank (EPN 16). Condensate is loaded out via trucks (FUG-2). Flash, working, and breathing vapors from the low pressure condensate tanks are controlled by the vapor recovery units (VRU) and delivered to the plant fuel system.

6.6. OPEN DRAIN SYSTEM

The facility is equipped with an open (atmospheric) drain system to collect rain water and skid drain liquids to the open drain sump (EPN 21). The water collected in the sump flows to the waste water tank (EPN 16). Water in the waste water tank is loaded onto trucks for offsite handling.

6.7. FLARE SYSTEM

Two 40 CFR §60.18 compliant flares (EPNs 6 and 15) will be located on the facility site. Flare-1 (EPN 6) is air assisted. Flare-2 (EPN 15) is unassisted. Both flares are designed for smokeless operation. All pressure safety valves (PSV) containing heavier than air hydrocarbons, refrigeration system PSV's and compressor blowdowns and residue compressor blowdown vapors are routed to the EPN 6 flare. Emissions resulting from the amine unit and TEG dehydrator during RTO downtime will be routed to the EPN 15 flare.