PREPARATION OF FORMER LPG CAVERN FOR HIGH PURTIY ETHYLENE STORAGE

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GENERAL

The object of this project was to convert an existing cavern, which had been enlarged to over two million barrels of usable storage, to satisfactory high purity ethylene storage. The cavern had been previously used for storage of butane and then for propane.

Requirements included testing the casing without damage to the cement bond, testing the shoe of the casing at .8 psi/ft. of overburden, testing the hanging tubing for leaks, and purging the approximately 200 ft. diameter roof of contaminates which would prevent withdrawal of specification material from the storage.

The specifications require 99.8 volume percent ethylene minimum. Some of the component specifications which are most likely to be influenced by the cavern are .1 volume percent methane maximum, .2 volume percent ethane maximum, propylene and heavier 100 ppm volume maximum, CO - 5 ppm volume maximum, CO_2 - 32 ppm maximum and oxygen 5 ppm by weight maximum.

With the combination of testing casing and cavern, plus purification of the cavern, we decided to test with nitrogen. We used sufficient gas to provide a nitrogen brine interface below the shoe of the casing with nitrogen pressure at the shoe at, or slightly above, .8 psi/ft. of overburden. In this case, a pressure of 1978 psi was required at the shoe. By using nitrogen, the casing was tested at over working pressure up to the top, with little or no risk to the cement bond between the casing and the formation, or next outer casing. The nitrogen was retained in the well after testing and was later supplemented with additional nitrogen for removal of impurities.

Two million bbls. of ethylene storage are provided by the well. The drying facilities are capable of 90M#/hr. Drying and regeneration are accomplished at slightly below well-head pressure with motivation of ethylene through the regeneration heater, molecular sieve dryer, cooler and separator, provided by a product pressure drop through a control valve. Heat for regeneration is provided indirectly by a hot oil system. Pneumatically operated fail safe shut off valves have been provided for the product and brine connections in close proximity to the well head. A fast response temperature system is being provided for the drying system and well piping to actuate the shut off valves in case of temperature increase. A manual vent system is provided. Various pressure and flow conditions also actuate the shut off valves.