
Helium from the Bureau of Land Management System

PAST HISTORY — FUTURE PLANS

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THE HELIUM PRIVATIZATION ACT OF 1996

The US Congress House and Senate passed The Helium Privatization Act of 1996 (Public Law 104-273) and it was signed by President Clinton on October 9, 1996. Known as “The Act of 1996” this law directed the US Bureau of Land Management’s (BLM) to cease pure helium production and marketing and for the BLM to offer for sale the approximately 29+ Billion Cubic Feet (BCF) of crude helium (CHE) in the Federal Reserve subject to review by the The National Academy of Sciences (NAS). The Federal CHE Reserve is stored in the Cliffside Field located near Amarillo, TX. In 2000, the NAS Committee published its report entitled “The Impact of Selling the Federal Helium Reserve.” The NAS Report concluded that the BLM could sell all but 600MMCF of CHE in the Federal Reserve without adverse impact to the helium market.

In 1998, all CHE refiners together with BLM-Amarillo personnel agreed to study the BLM Pipeline and Storage System (BLM System) to determine if an upgrade of the BLM System would be required for the BLM to sell the Federal CHE to third parties for refining to high-purity gaseous and liquid helium. The 1998 study, performed by Arthur W. Francis, a helium expert and consultant, concluded that CHE compression and a helium enrichment unit (HEU) would be needed to upgrade the then current BLM System to enable the CHE sales from the Federal Helium Reserve. The compression was required to maintain pressure in the entire pipeline that runs for approximately 400 miles from the Cliffside Field near Amarillo, TX to Bushton, Kansas. The upgrade added 3 compressors, the third unit to insure reliability. The HEU is required in order to maintain CHE purity (helium, nitrogen and only traces of hydrocarbons) via pipeline to the refining plants on the BLM System and provides for the recovery of hydrocarbons for resale by the BLM. Low pipeline pressure reduces the pipeline capability to deliver enough volume to refining plants while increased hydrocarbons delivered along with the CHE can cause the refining plants to shutdown due to freeze up because of their very low operating temperatures.

CHANGES TO THE BLM SYSTEM

After completion of the Francis study, the owners of all helium-refining plants on the BLM System together with BLM personnel, under the leadership of Tim Spisak, who was the Amarillo Field Manager at the time, negotiated and signed agreements between BLM and Cliffside Refiners, L.P. (CRLP). CRLP, a Delaware limited partnership, was formed in July 2000 to supply investment and project management expertise for the installation of both the CHE compression and the HEU. BLM personnel, who had always managed the withdrawal of native natural gas and CHE from the Cliffside Field, would operate the new compressors and HEU. BLM personnel also had the responsibility of managing the Cliffside Field, which at the signing of The Act of 1996 contained the Federal CHE Reserve with a total

value of \$1,328,657,029 (value resulting from CHE acquisition costs plus US Treasury interest charges on the debt to the Treasury through Fiscal 1994). The original Cliffside Field contained approximately 300BCF of native gas, whose composition was about 75 percent hydrocarbons with 1.8 percent helium. When the HEU is operating, hydrocarbons and helium in the native gas are extracted by HEU and sold by the BLM along with the CHE in order to reduce the BLM’s debt to the US Treasury. Over the next 15 years, revenues from CHE and hydrocarbon sales are projected to return all taxpayer monies originally provided to BLM by the US Treasury for the purchase of CHE in accordance with The Helium Conservation Act of 1960 (Public Law 86-777).

The BLM System upgrade had its groundbreaking ceremony on May 30, 2002 and the project was ready to operate by the time of the dedication ceremony on April 26, 2004. (See “New Crude Helium Enrichment Unit Dedicated,” *Cryogas International*, June 2004.) At the dedication ceremony, BLM Deputy Director Jim Hughes presented to the CRLP, a partnership of all refiners on the BLM System, the Four Cs Award to recognize their collaborative efforts in making CHE deliverable to buyers. The BLM Deputy Director stated in his award presentation “The Four Cs Award recognizes those within the BLM and outside our agency whose performance exemplifies Secretary Norton’s Four Cs philosophy of consultation, cooperation, and communication all in the service of conservation.”

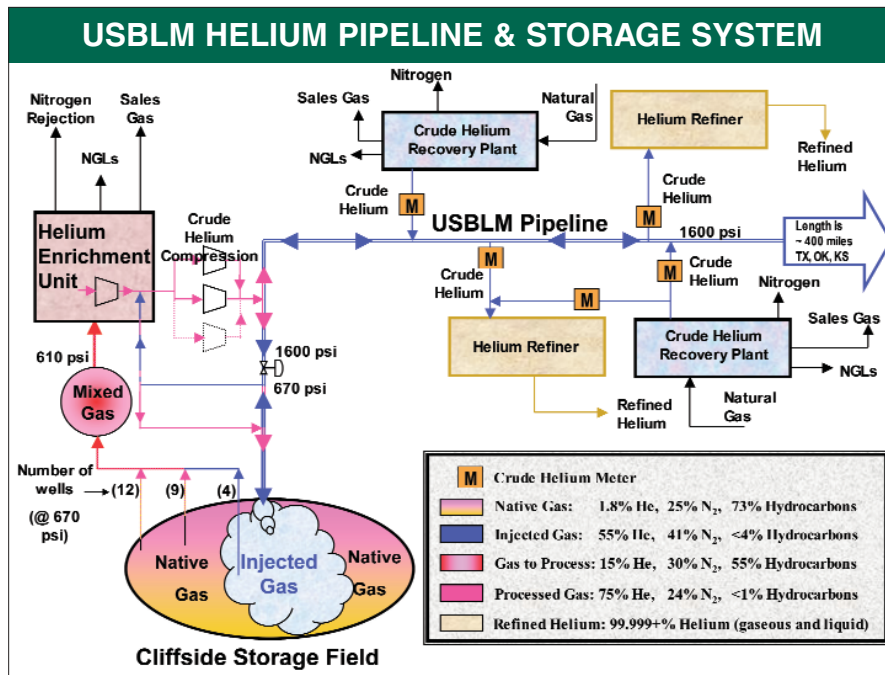
THE UPGRADED BLM SYSTEM

Figure 1, “USBLM HELIUM PIPELINE & STORAGE SYSTEM,” describes the upgraded BLM System. The BLM System CHE pipeline runs from just west of Amarillo, TX at the Cliffside Field, north through the Texas and Oklahoma panhandles into the southwest corner of Kansas and then northeast and east into central KS ending near Bushton, KS. BLM personnel operate, maintain and repair the pipeline and meters of the System to insure CHE quality and reliability. The pipeline operates at pressures up to 1600-psi and serves 9 CHE recovery plants (four others are shutdown due to lack of processing gas supply) and six refining locations. The HEU and CHE compression are located adjacent to the Cliffside Field, which has a current pressure of about 670 psi. The Cliffside Field currently contains less than 200BCF of native gas plus the Federal and private stored CHE that is in the center of the reservoir. The Conservation helium injected into the Cliffside Field had a minimum helium content of 50 percent, with the remainder being nitrogen plus a trace of hydrocarbons. Newer CHE recovery plants, installed after the Conservation plants, are required to produce CHE containing a minimum of 65 percent helium. BLM personnel manage the 25 wells in the Cliffside Field to insure field integrity. As the Cliffside Field depletes, CRLP will provide the investment for booster compression in order to enable the BLM to deplete the field such that only the 600MMCF of CHE would

remain, as authorized under in The Act of 1996. The legend in the lower right corner of the schematic indicates approximated analyses of gases in the BLM System. The schematic also shows the three types of plants connected with meters to the BLM System 1) a stand-alone CHE Recovery Plant, 2) a stand-alone Helium Refinery, and 3) a Helium Refinery located adjacent to a CHE Recovery Plant.

THE HISTORY OF HELIUM

Helium was found in 1904 in Dexter, KS in a natural gas deposit in a concentration greater than 15,000 ppm. The first recovery and purification plant in the United States was located at Fort Worth, TX and produced 49MMCF of helium at 94% purity from April 1921 through the end of 1928. The Fort Worth plant was replaced in 1929 by a new plant located near Amarillo, TX. During the 1930s the Amarillo



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plant was upgraded to be able to produce 99.5 percent purity gaseous helium. The majority of the helium produced was used to support the US Navy rigid airship program. During World War II, some helium was used in the Manhattan Project.

After WW II, the US Congress enacted Helium Conservation via The Act of 1960. Under the provisions of this Act, the United States Government contracted with the operators of five private CHE recovery plants to purchase up to 4BCF/year of CHE for 25 years (until 1985) and store it in the Cliffside Field. In 1973,

Congress refused to continue to fund these CHE purchases and the contracts were terminated.

In the early 1960s, private industry began to install CHE refining plants along the BLM pipeline to produce high-purity gaseous and liquid helium. In addition, private firms entered into contracts with the

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BLM to store their CHE in the Cliffside Field creating what became known as the BLM System, a System of helium operation unique to the United States. In 1986, a 1.2BCF/year liquid plant was installed in Wyoming and has recently been expanded. In 1995, a 150MMCF/year liquid plant was built in Utah. The US is the world leader in supply of helium and prior to the 1990s, supplied nearly 100 percent of world demand.

In Europe, the USSR has a recovery/purification plant in Orenburg, Russia. At Orenburg, some helium is stored for later refining in an underground brine field near the natural gas fields from which the helium is then recovered. In 1980, the government of Poland built a plant with a capacity of about 150MMCF/year and sold liquid helium to a third party for resale within Europe. Large 600MMCF/year liquid helium plants have been installed in Algeria (1995 and 2006) and Qatar (2005) and additional plants are now being proposed in Algeria, Qatar, Russia and Australia. The plants are required to support market growth and depletion of US sources. Since 1996, the worldwide market has grown at a rate of over 4 percent per year.

US DEMAND FOR HELIUM

The United States Federal agencies and private industries currently consume almost 60 percent of total worldwide helium demand or over 3BCF per year. The presently installed total refining capacity on the BLM System exceeds the current US demand. The BLM System is and has been very beneficial to US industry, particularly its high-tech companies, because its existence has provided assurance and reliability of supply and has helped keep the cost of helium reasonable. The BLM System helps refiners reduce losses and gives refiners the ability to use the System, if needed, as a backup for peak and emergency supply, thus giving US and worldwide customers a reliable supply of helium. Refiners not attached to the BLM System must ship all helium produced daily or vent the helium to the atmosphere because storage of large quantities of high-purity gaseous or liquid helium is not practical due to storage cost.

The BLM System is forecasted to operate for at least the next 15 years and possibly longer if additional CHE production can be connected to the System to recover and store CHE that is not needed for immediate refining. Without the foresight of the US Congress and their passing of The 1960 Act, US industry might have had to rely on foreign sourced supplies of helium with the possibility of more frequent supply interruptions, plus the potential of foreign price cartels and geopolitical supply situations similar to what we experience with the supply oil today.

Benjamin Reinoehl and Willard Moyer are principals of RMW Solutions, LLC a consulting firm to industry and research related to the uses and handling of industrial gases, equipment design and development, financial analysis for projects, market planning for industrial gases and sourcing evaluations for all industrial gases and the recovery of helium. Contact ben@rmwsolutions.net. □

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