DCP Midstream
Lea County, New Mexico

Linam Acid Gas Injection Well #2

DCP Midstream (DCP) contacted Geolex, Inc. ® (Geolex) to permit, provide geologic and regulatory oversight for drilling and completion of a second acid gas injection (AGI) well adjacent to their Linam Gas Plant (the Plant) in Lea County, New Mexico. The Linam AGI #2 well is used to dispose of treated acid gas (TAG) from the Linam Gas Processing Plant in conjunction with the Linam AGI #1. The Linam AGI #2 well was drilled to act as a redundant AGI well so that natural gas processing operations can continue during times when either of the wells may be placed out of service and/or under repair. In addition, Linam AGI #2 provides operational flexibility to operate both wells at once splitting flow rate and reducing surface pressure. The Plant collects and processes approximately 135 million standard cubic feet per day (MMSCFD) of field gas from the adjacent Permian Basin. The field gas is treated to remove 4.85 MMSCFD (3% total) of acid gases, of which H_2S comprises 0.89 MMSCFD (18% acid gas) and CO_2 accounts for 4 MMSCFD (82% acid gases). DCP needs to safely inject up to 7 MMSCFD of TAG for 30 years, and geologic studies conducted for the selection of this location, and performance of Linam AGI #1, demonstrate that the injection zone is readily capable of accepting and containing the proposed acid gas injection volumes.

Phase I - AGI Feasibility Study:

The close proximity of Linam AGI #2 and #1, approximately 450' apart, ensures that the injection zone for Linam AGI #2 is nearly identical to that of Linam AGI #1. Geologic studies and analyses of the reservoir characteristics conducted at this location, based on data from Linam AGI #1, confirmed that the injection zone is an excellent closed-system reservoir that should easily accommodate and contain the future volumetric needs (7.0 MMSCFD of TAG for 30 years) for disposal of acid gas and CO_2 by injection of the Plant. Major elements in this feasibility study included: 1) the characterization of all wells completed in hydrocarbon-producing zones that surround and are present on the Plant site, 2) the past and current uses of the injection zone, 3) the stratigraphic and structural setting of the targeted injection zone relative to any nearby active or plugged wells, and other wells penetrating the intervals, 4) Identification and characterization of all plugged wells in the vicinity of the injection well, 5) Sources of injection fluid and compatibility with the formation fluid of the injection zone, and 6) location and identification of any fresh water bearing zones in the area; the depth and quality of the available groundwater in the vicinity, including a determination that there are no structures which could possibly act as conduits between the disposal zone and any known sources of drinking water.

Phase II – Permitting:

In 2012, Geolex submitted a C-108 application to the New Mexico Oil and Gas Conservation Division (NMOCD) for authority to inject, as required by the state of New Mexico. The permit process for the C-108 includes work produced from the feasibility study and notifications to all operators, oil, gas and mineral lessees, and surface owners within the area. Prior to the approval of the Linam AGI #2 C-108 application, a New Mexico Oil Conservation Commission (NMOCC) public hearing took place where Alberto A. Gutiérrez, RG provided testimony as an expert petroleum geologist and hydrogeologist. The NMOCC approved the application under Order R-

Major Project Elements:

Phase I:
AGI Feasibility Study

Phase II:
Permitting and Expert Witness Testimony

Phase III:
Well Design, Drilling and Completion Supervision

Commissioning, Training, and Start-up Oversight

Phase IV:
Ongoing Maintenance, Support, and Compliance for existing AGI wells

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12546-K, allowing DCP to inject TAG into the desired formation at pressures not to exceed 2,644 psig. In conjunction with the C-108 application a comprehensive H_2S Contingency Plan (Rule 11), which encompasses the gas plant, the pipeline, the compressor facility, and the well head, was prepared by Geolex and approved by the NMOCD prior to commencement of injection operations.

Phase III - Well Design, Drilling and Completion Supervision:

Geolex was responsible for geologic and regulatory oversight associated with all drilling and completion activities. Due to the corrosive environment in which the Zia AGI #1 is required to operate, special consideration was given to the metals used in its construction. Corrosion resistant alloys were thoroughly evaluated and included in the well design of all potentially impacted components, which include the wellhead, valves, packer, casing and tubing. Geolex was responsible for geologic and regulatory oversight associated with all drilling and completion activities. Collaboration with the drilling engineers in interpreting geophysical logs and analyzing sidewall cores resulted in the selection of the correct perforation zones, which was confirmed through reservoir testing. Geolex supervised, instructed, and trained plant operators in start-up and in how to minimize technical problems in order to safely inject TAG.

Phase IV - Ongoing Maintenance, Support, and Compliance:

DCP began injecting into the Linam AGI #2 in October 2015. Geolex's ongoing activities include annual mechanical integrity tests, notifying DCP of any upcoming deadlines, and currently overseeing monitoring and maintenance of Linam AGI #2. Due to seasonal fluctuations, the annular pressure is constantly monitored by gas control operations at the plant so that any pressure anomalies can be addressed immediately if the need arises. Tubing injection pressure and volume are monitored and archived for input into reservoir modeling software. Any changes in injection pressures at the subsurface safety valve (SSSV) control panel are constantly monitored, and regular function rests for the SSSV are scheduled every 6 months to verify proper functioning of the sliding sleeve within the SSSV. Current state guidelines mandate a mechanical integrity test (MIT) of the annular space every year. By having the annular pressures monitored constantly by gas control, regular MIT tests can be conducted in a routine manner.

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