OIL AND GAS DOCKET NO. 03-0258152

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THE APPLICATION OF AIR LIQUIDE LARGE INDUSTRIES US LP FOR AUTHORITY PURSUANT TO STATEWIDE RULE 97 FOR A PERMIT TO CREATE, OPERATE AND MAINTAIN AN UNDERGROUND HYDROCARBON STORAGE FACILITY, AIR LIQUIDE STORAGE FACILITY LEASE, SPINDLETOP FIELD, JEFFERSON COUNTY, TEXAS

Heard by: Richard D. Atkins, P.E. - Technical Examiner

Hearing Date: September 17, 2008

APPEARANCES:	**REPRESENTING:**
Tim George Joe Ratigan Ronald Strybos Dan Heintz	Air Liquide Large Industries US LP
Jamie Nielson	Golden Triangle Storage, Inc.

EXAMINERS' REPORT AND RECOMMENDATION

STATEMENT OF THE CASE

Air Liquide Large Industries US LP ("ALLI") seeks a permit to create, operate and maintain an underground natural gas storage facility in the Spindletop Salt Dome on its Air Liquide Storage Facility Lease in Jefferson County. The application is filed pursuant to Statewide Rule 97.

The application was unprotested and the examiner recommends approval.

DISCUSSION OF THE EVIDENCE

The proposed gas storage facility is located atop the Spindletop Salt Dome in northeast Jefferson County. The Air Liquide Storage Facility Lease consists of approximately 25 acres located 3.5 miles southeast of the City of Beaumont.

The Spindletop Salt Dome is already the site of existing and permitted hydrocarbon storage facilities operated by PB Energy Storage Services, Centana Intrastate Pipeline, LP,

Golden Triangle Storage, Inc. (permitted, but not constructed) and Coastal Caverns, Inc. (permitted, but not constructed). In addition, there are one active and three plugged brine source wells located on the dome.

The Spindletop Salt Dome is typical of other strong and competent Gulf Coast domal salts, and has been utilized successfully for underground hydrocarbon storage for decades. Geological maps and cross sections depict the Spindletop Salt Dome as a large salt dome approximately one mile in diameter with a broad flat top and steeply dipping flanks. The caprock overlying the salt is composed of anhydrite, gypsum, and limestone. The shallowest occurrence of the caprock is at a depth of approximately 700 to 800 feet. Under the ALLI lease, the top of the caprock is expected to occur at a depth of 1,400 feet and the top of the salt is expected to occur at a depth of 1,800 feet.

The ALLI facility is located on the eastern portion of the dome and nearby the other storage facilities. The location of the proposed wells and caverns within the facility were selected to afford ample distance between the existing and/or permitted caverns and sufficient distances from adjacent properties to insure that the caverns stay on the ALLI lease.

ALLI plans to create two storage caverns on its lease in the Spindletop Salt Dome. To create the caverns, two wells will be drilled to a total depth of approximately 5,400 feet and will be completed with several casing strings: 42" conductor pipe driven to 150 feet; 36" surface casing set at 600 feet and cemented to surface; 26" intermediate casing set at 1,450 feet and cemented to surface; 20" intermediate casing set at 2,100 feet and cemented to surface; 16" production casing set at 3,500 feet and cemented to surface; 13 3/8" hanging string No. 1 and 8 5/8" hanging string No. 2.

Each of the caverns will be created by brine mining. During this process, fresh water is injected under controlled conditions to dissolve the salt and create the cavern space, and brine fluid is removed for disposal. A nitrogen blanket will be used to prevent washing of the cavern above the desired depths. The nitrogen blanket to brine interface depth will be continuously calculated and interface logs will be run to verify the nitrogen blanket depth. The boundaries of the cavern will be determined by periodical sonar caliper surveys during the development. When fully leached, each cavern will have a capacity of 10 million barrels. The top of each cavern will be at a depth of approximately 3,700 feet and the bottom of each cavern will be at a depth of approximately 5,400 feet. Each cavern will be approximately 250 feet in diameter and will be more than 500 feet from the edge of the salt dome.

Salt cores have been taken from existing cavern wells on the dome. This data is available from wells located northwest of the ALLI lease. However, a salt core testing program will be performed on samples taken from each well drilled on the ALLI lease. Tests will be performed on cores taken from the top, middle and bottom of the cavern. These tests will determine strength and deformation characteristics of the salt and will be used in the design of the caverns to insure cavern stability. A geo-mechanical study will

also be performed to assess the salt web which will separate the proposed caverns from other caverns on the dome.

After completion of the wells in storage service, this facility will participate in a cooperative subsidence monitoring program to be conducted by storage operators at the Spindletop Salt Dome. ALLI will conduct annual subsidence monitoring of each wellhead and approximately twelve surface benchmarks at the facility that are spaced at intervals of 500 feet.

The Texas Commission on Environmental Quality recommends that usable quality water be protected to a depth of 400 feet at this site. Through a search of public records, ALLI has identified 179 oil and gas related wells which have penetrated the caprock within 1,370 feet (¼ mile + 50 feet buffer) of each of the proposed storage wells. The majority of these wells have been plugged and abandoned and available plugging reports were submitted.

The facility is in the public interest as its use will increase the stability of a supply of hydrogen gas to local low sulfur gasoline refineries by supporting a hydrogen gas pipeline. The facility will be capable of rapid withdrawal of hydrogen to the refineries as needed. Each cavern will be capable of an instantaneous peak withdrawal of 130 MMCFGPD or a sustained average of about 60 MMCFGPD.

Notice of application and hearing were provided to each person and entity entitled to notice. Notice of the hearing was published in the *Beaumont Enterprise*, a newspaper of general circulation in Jefferson County, on August 12, 18, 25 and September 1, 2008. In addition, on May 12, 2008, ALLI mailed a copy of the Notice of Hearing to those persons entitled to receive notice of the application.

ALLI has complied with the requirements set forth in Statewide Rule 97 for approval of the requested permit and the ALLI facility, wells, and caverns will be subject to the rules and safety standards adopted by the Commission pursuant to Statewide Rule 97.

FINDINGS OF FACT

1. Notice of application and hearing were provided to each person and entity entitled to notice. Notice of the hearing was published in the *Beaumont Enterprise*, a newspaper of general circulation in Jefferson County, on August 12, 18, 25 and September 1, 2008. In addition, on May 12, 2008, ALLI mailed a copy of the Notice of Hearing to those persons entitled to receive notice of the application.

2. ALLI seeks permits to create, operate and maintain an underground

hydrocarbon storage facility in the Spindletop Salt Dome located in northeast Jefferson County. The Air Liquide Storage Facility Lease consists of approximately 25 acres located 3.5 miles southeast of the City of Beaumont.

3. The Spindletop Salt Dome is typical of other strong and competent Gulf Coast domal salts and has been utilized successfully for underground hydrocarbon storage for decades. Geological maps and cross sections depict the Spindletop Salt Dome as a large salt dome approximately one mile in diameter with a broad flat top and steeply dipping flanks.

4. The Spindletop Salt Dome is already the site of existing and permitted hydrocarbon storage facilities. The ALLI facility is located on the eastern portion of the dome and nearby the other storage facilities.

5. The location of the proposed wells and caverns within the facility were selected to afford ample distance between the existing and/or permitted caverns and sufficient distances from adjacent properties to insure that the caverns stay on the ALLI lease.

6. The facility will consist of two caverns, that when fully leached, will each have a capacity of 10 million barrels.

7. The top of the salt is estimated to occur at approximately 1,800 feet in the area of the proposed caverns. The top of each cavern will be at a depth of approximately 3,700 feet and the bottom of each cavern will be at a depth of approximately 5,400 feet. Each cavern will be approximately 250 feet in diameter and will be more than 500 feet from the edge of the salt dome.

8. A nitrogen blanket will be used to prevent washing of the cavern above the desired depths. The boundaries of the cavern will be determined by periodical sonar caliper surveys during the development.

9. Usable quality ground water occurs to a depth of 400 feet and will be protected in each well. Through a search of public records, 179 oil and gas related wells have been identified which have penetrated the caprock within 1,370 feet (¼ mile + 50 feet buffer) of each of the proposed storage wells.

10. ALLI will conduct an annual subsidence survey monitoring program of wells and benchmarks at the facility.

11. Each cavern will be capable of an instantaneous peak withdrawal of 130 MMCFGPD or a sustained average of about 60 MMCFGPD.

12. The facility is in the public interest as its use will increase the stability of a supply of hydrogen gas to local low sulfur gasoline refineries by supporting

a hydrogen gas pipeline.

13. ALLI has complied with the requirements set forth in Statewide Rule 97 for approval of the requested permit.

CONCLUSIONS OF LAW

1. Proper notice was timely given to all parties entitled to notice pursuant to applicable statutes and rules.

2. All things have occurred and have been accomplished to give the Commission jurisdiction in this case.

3. The use of the proposed gas storage caverns will not endanger oil, gas, or geothermal resources or cause the pollution of surface water or fresh water strata unproductive of oil, gas, or geothermal resources.

4. The facility is in the public interest as its use will increase the stability of the natural gas market.

5. The applicant has complied with the requirements for approval set forth in Statewide Rule 97.

EXAMINER'S RECOMMENDATION

Based on the above findings of fact and conclusions of law, the examiner recommends that the application of Air Liquide Large Industries US LP to create, operate and maintain a facility to store natural gas and then retrieve it from solution-mined caverns, be approved pursuant to Statewide Rule 97. Technical Permitting is directed to issue the appropriate permit with the usual conditions, restrictions and limitations as required by the Commission. Air Liquide Large Industries US LP shall comply with all applicable rules and safety standards adopted by the Commission pursuant to Statewide Rule 97.

Respectfully submitted

Richard D. Atkins, P.E.
Technical Hearings Examiner