

August 2, 2007

**OIL & GAS DOCKET NO. 03-0252152**

---

**THE APPLICATION OF COASTAL CAVERNS, INC. PURSUANT TO STATEWIDE RULE 95 FOR A PERMIT TO CREATE, OPERATE AND MAINTAIN AN UNDERGROUND HYDROCARBON STORAGE FACILITY, THE GCCI LEASE, SPINDLETOP FIELD, JEFFERSON COUNTY, TEXAS**

---

**HEARD BY:** Thomas H. Richter, P.E., Technical Examiner

**DATE OF HEARING:** July 25, 2007

**APPEARANCES:**

Tim George, lawyer  
Joe T. Ratigan  
Carl Brassow  
Robert W. James

**REPRESENTING:**

Coastal Caverns, Inc.

Jamie Nielson, attorney  
James Pitts  
Kathryn McCoy  
Phil Gamble, attorney

AGL Resources

Centana Interstate Pipeline

**EXAMINERS' REPORT AND RECOMMENDATION**  
**STATEMENT OF THE CASE**

Coastal Caverns seeks a permit to create, operate and maintain an underground liquid hydrocarbon storage facility on the GCCI lease which overlies the Spindletop salt dome in Jefferson County. The facility is filed pursuant to the requirements of Statewide Rule 95. The application was originally protested but the protests were cancelled prior to the hearing. After cooperative discussions between Coastal Caverns and adjoining storage property owners, some of the original proposed locations were adjusted slightly to the amended proposed locations, and the originally proposed well and cavern "CCI-5" was omitted. The examiner recommends approval.

**DISCUSSION OF THE EVIDENCE**

The 47-acre GCCI facility site is located in an industrial area about one-mile south of Beaumont, Texas, and has access to nearby pipelines and proximity to the Gulf Coast for waterborne shipments. The proposed locations for the 8 storage wells were selected to afford ample distance between the wells and caverns and the perimeter boundaries of the facility. The setback from the perimeter boundary of the facility of 150' or more affords a buffer area between the proposed caverns and neighboring property. Although there is no specific between-well spacing requirement under Texas law, the between-well distances at this proposed facility, which range from 402' to 569', exceed the regulatory standards applied in other jurisdictions. Additionally, the between-well distances provide P/D values (salt pillar ("P") compared with cavern diameter ("D")) significantly above accepted minimums. Using extrapolations from other existing caverns located at Spindletop,

only one of the proposed wells has the potential to encounter a plane of preferred dissolution in the salt, and if encountered in that well, a plane of preferred dissolution can be accommodated and taken into account during the solution mining process for the cavern.

Each proposed cavern is to have a capacity of 3 million barrels when fully leached in the salt from a cavern top at a depth of 2,200' to a cavern bottom at a depth of 3,100'.<sup>1</sup> The anticipated approximate cavern radius when fully leached will be approximately 75' (cylinder shape). Maximum injection rate for each cavern will be 216,000 barrels per day and is expected to average 96,000 barrels per day. Injection pressure will be a maximum of 1,350 psig and is expected to average 975 psig. Each well will be completed with several casing strings: 42" conductor; 36" surface; 30" intermediate No. 1; 24" intermediate No. 2; 20" production; 16" hanging string No. 1 and 9-5/8" hanging string No. 2.

The storage caverns will be created by solution mining. After a well is drilled and completed at total depth, fresh water will be injected under controlled conditions to dissolve the salt and create the cavern space. A blanket liquid (diesel) will be used to control and limit dissolution. Brine density will be monitored periodically as fluid is removed. Sonar caliper surveys will be performed at stages to monitor cavern development.

Structural contour mappings and cross sections depict Spindletop Salt Dome as a large salt dome with a broad flat top, approximately one-mile in diameter, and with steeply dipping flanks. The salt is overlain with at least 500' of anhydrite caprock. The proposed facility is located in the central portion of the salt dome, away from the perimeter boundaries of the salt. Testing of salt core samples from Spindletop Salt Dome establish that the salt rock comprising this dome and located at this proposed facility is strong and competent in comparison to other Gulf Coast salt domes tested and utilized for underground hydrocarbon storage. Salt rock to be encountered by the wells and caverns at the proposed facility is an impermeable salt formation that will confine stored liquids, prevent waste of the stored hydrocarbons, prevent uncontrolled escape of hydrocarbons, and protect usable-quality water from pollution by stored hydrocarbons. The usable-quality ground water is to be protected to a depth of 450'.

The facility will store all types of NGLs, LPGs, and other liquid hydrocarbons including for example propane, propylene, isobutane, normal butane, isobutylene, normal butylene, natural gasoline, naphtha, condensate, and Y-Grade.

Coastal will conduct an annual subsidence survey monitoring program of wells and benchmarks at the facility, with reports submitted annually to the Commission staff. Elevations will be taken of each of the 8 wellheads and 6 existing benchmark markers. Surface subsidence at other Gulf Coast facilities have been 1/2" to 3/4" annually. A generalized abandonment procedure plan was filed; however, at the time of abandonment, the wells and caverns will be abandoned in accordance with the Commission's requirements at that time.

---

<sup>1</sup> The mapping of this salt dome piercement shows contours extending to 4 - 5,000'; the salt ultimately connects to the LuAnn Salt at approximately 30,000'.

Coastal has previously obtained two permits for oil and gas waste disposal caverns at locations on the proposed storage facility. These permits will no longer be needed and are to be cancelled contemporaneously with the issuance of the permit for underground hydrocarbon storage. All wells were reviewed within 1/4 miles from the proposed facility and were found to be either properly plugged and abandoned or were completed properly.

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 June 28, July 5, 12 and 17, 2007.

### **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 June 28, July 5, 12 and 17, 2007.
2. Coastal Caverns seeks a permit to create, operate and maintain an underground liquid hydrocarbon storage facility on the GCCI lease which overlies the Spindletop salt dome in Jefferson County.
3. The proposed locations for the 8 storage wells were selected to afford ample distance between the wells and caverns and the perimeter boundaries of the facility.
4. Each proposed cavern is to have a capacity of 3 million barrels when fully leached in the salt from a cavern top at a depth of 2,200' to a cavern bottom at a depth of 3,100'.
  - a. The anticipated approximate cavern radius when fully leached will be approximately 75' (cylinder shape).
  - b. Maximum injection rate for each cavern will be 216,000 barrels per day and is expected to average 96,000 barrels per day.
  - c. Injection pressure will be a maximum of 1,350 psig and is expected to average 975 psig.
5. The storage caverns will be created by solution mining. A blanket liquid (diesel) will be used to control and limit dissolution. Sonar caliper surveys will be performed at stages to monitor cavern development.
6. Structural contour mappings and cross sections depict Spindletop Salt Dome as a large salt dome with a broad flat top, approximately one-mile in diameter, and with steeply dipping flanks.

- a. The salt is overlain with at least 500' of anhydrite caprock.
  - b. Salt rock to be encountered by the wells and caverns at the proposed facility is an impermeable salt formation that will confine stored liquids, prevent waste of the stored hydrocarbons, prevent uncontrolled escape of hydrocarbons, and protect usable-quality water from pollution by stored hydrocarbons.
7. The usable-quality ground water is to be protected to a depth of 450'. Each well will be completed with several casing strings: 42" conductor; 36" surface; 30" intermediate No. 1; 24" intermediate No. 2; 20" production; 16" hanging string No. 1' and 9-5/8" hanging string No. 2.
  8. The facility will store all types of NGLs, LPGs, and other liquid hydrocarbons including for example propane, propylene, isobutane, normal butane, isobutylene, normal butylene, natural gasoline, naphtha, condensate, and Y-Grade.
  9. Coastal will conduct an annual subsidence survey monitoring program of wells and benchmarks at the facility, with reports submitted annually to the Commission staff.
  10. A generalized abandonment procedure plan was filed; however, at the time abandonment, the wells and caverns will be abandoned in accordance with the Commission's requirements at that time.
  11. All wells were reviewed within 1/4 miles from the proposed facility and were found to be either properly plugged and abandoned or were completed properly.

#### **CONCLUSIONS OF LAW**

1. Proper legal notice was issued to all persons and entities entitled to receive notice.
2. The Commission has jurisdiction to authorize issuance of a permit pursuant to Statewide Rule 95 to create, operate, and maintain an underground hydrocarbon storage facility for storage of liquid or liquefied hydrocarbons in a salt formation.
3. The proposed underground hydrocarbon storage facility will be created, operated, and maintained so as to confine stored liquids within the storage wells and caverns, to prevent waste of the stored hydrocarbons, to prevent uncontrolled escape of hydrocarbons, and to protect usable-quality water from pollution.
4. The application should be granted pursuant to Statewide Rule 95.

#### **EXAMINER'S RECOMMENDATION**

Based on the above findings and conclusions, the examiner recommends that the application of Coastal Caverns, Inc. to create, operate, and maintain an underground hydrocarbon storage facility for storage of liquid or liquefied hydrocarbons in a salt formation be approved. It is recommended that the Commission's Technical Permitting Section issue the necessary permits pursuant to the conditions required by Statewide Rule 95.

Respectfully submitted,

Thomas H. Richter, P.E.  
Technical Hearings Examiner  
Office of General Counsel