
Saltville Storage Expansion Project

Project Summary

The Saltville gas storage facility was developed through a partnership between NUI-Virginia Gas Company (VGC) and Duke Energy Gas Transmission (DEGT). The job involved a 5-year plan for expansion of Saltville gas storage facilities to an ultimate working gas capacity of 6 billion cubic feet (bcf). Parsons Brinckerhoff Energy Storage Services (PB ESS), a subsidiary of Parsons Brinckerhoff (PB), provided re-entry and conversion well design and drilling services as well as surface facilities designs.

(LONG-FORM PROJECT DESCRIPTION FOLLOWS)

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Saltville, Virginia

Owner

Virginia Gas Pipeline Company

Background

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Parsons Brinckerhoff Role

PB Energy Storage Services (PB ESS), a subsidiary of Parsons Brinckerhoff (PB), provided re-entry and conversion well design and drilling services as well as engineering services for the compressor station expansion.

Project Elements

- Project management
- Design engineering
- Well workovers
- Cost estimating
- Procurement
- Construction management
- Operations training

Project Description

Because the project was critical to the needs of the client in supplying natural gas to eastern United States at a predetermined tariff, PB undertook fast track design and procurement methods and provided technical support during construction, all within the client's fixed budget and schedule. PB performed detailed design, engineering and procurement support for civil, structural, mechanical, process, electrical, and Distributed Control System (DCS) systems.

The initial working gas capacity was expanded from 1.0 Bscf in 2002 to 6.0 Bscf in 2007. The facilities were designed to inject a maximum of 260 million standard cubic feet per day (mmscfd) of natural gas. The corresponding withdrawal rate is a maximum of 550 mmscfd.

The facilities were designed to inject and withdraw natural gas at a wide range of flow rates. New facilities included a 10,500 hp, electrically driven compressor station expansion and an automated DCS control system.



The mechanical designs included free water knockout vessels to separate water carried out of the wells during natural gas during delivery. The gas heater was sized with a 16 million British thermal units per hour (MMBtu/hr) heat load for the first phase flow. Due to the steep and narrow site access roads, 2 x 50% heaters were installed, allowing for easier movement onto the site. Two smaller heaters also allow for greater flexibility in operations than a single unit because a greater turndown ratio is needed for the variable gas flow rate.



The electrical design included a 138 KV transmission line and a substation, transformers and switchgear. The large electric motor drivers required considering variable frequency drives (VFDs) and "soft start" techniques to gradually ramp the electric loads during start-up.

Challenges on the civil structural designs included siting the surface facilities in a mountainous area where balanced cut and fill to reduce construction

cost was implemented. Structural foundations were designed to incorporate three dimensional torsion and vibration loads.

This work was done in conjunction with other subsurface work to expand the facility's storage, injection and delivery capacity. The Saltville Storage project is an excellent example of PB's technical skill in planning, organizing and executing a challenging project within the client's budget and schedule constraints.

Teaming

PB is serving as prime consultant.

Staffing

Tommy Smith served as project manager and S. (Raghu) Raghuraman served as principal-in-charge.

Schedule

Our services began in March 2002 and were completed in July 2004.

Project Number: 50492

Creation Date: 11/10

Approved By: Tim Moran/Tim Reichwein