Texas Commission on Environmental Quality (TCEQ)
Texas Emissions Reduction Plan (TERP)

New Technology Implementation Grant (NTIG) Program

Ranger Compressor Station

Final Implementation Report for:

New Technology Implementation Grant (NTIG) Program

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Submitted by:

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Introduction/Background

Colt Gathering (North Texas) LP (Colt) requested a grant from the TCEQ to repower two of four in-service compressors located at the Ranger Compressor Station in Eastland County, TX. All four engines were White Superior 8G models. Colt intended to replace two of the engines with modern Waukesha 7042GU engines. The site is typically running two of the four units while the other two units remain in standby. All four units are the same and were rotated for consistent runtime. Colt will treat the repowered units as primary units and is committed to at least 80% runtime on the two repowered units.

The project was intended to reduce the emissions of Colt's Ranger Compressor Station by upgrading higher-emission older engines with modern high-efficiency engines that significantly reduced the emissions of the station on a go-forward basis. The reductions in emissions contributed positively to the State of Texas's efforts to reduce emissions from the oil and gas industry while also promoting the ongoing production of oil and gas in a more efficient and clean manner.

Project Objectives/Technical Approach

The project consisted of installing more efficient combustion engines in addition to a new 3-way catalyst implementation on both units. The project's anticipated emissions reduction met the net reduction and NOx reduction requirements of the Request for Grant Applications (RFGA) for Midstream Oil and Gas Stationary Compressor Re-power. With both engines completed, Colt anticipates a total reduction of approximately 60 tons per year (TPY) of emissions, including approximately an 83% reduction of nitrogen oxides (NOx), 60% reduction of carbon monoxide (CO), 39% reduction of volatile organic carbons (VOC), and 71% reduction of formaldehydes (CH_2O), a hazardous air pollutant.

Task Overview

1. Engine Core Selection and Disassembly
    - Description: Mechanics selected two engine blocks from Colt's inventory, disassembled them, and removed all components. Reusable parts were cleaned, and others were discarded.
    - Timeline: 2–4 days for disassembly.

2. Engine Block Machining
    - Description: Bare engine blocks were shipped to a machine shop for precision machining. One block was found to have a hairline crack, requiring a replacement block to be sent, causing a delay.
    - Timeline: 4–6 weeks per block (plus over 1 month delay due to cracked block).

3. Engine Rebuild and Assembly
    - Description: Once blocks were returned, mechanics reassembled engines using cleaned reused parts and new parts from an overhaul kit. This included two new crankshafts for the engines – one of the blocks had an existing crank shaft, but

it failed inspection as a core.
    - Timeline: 3 weeks per engine.

4. Engine Testing and Painting
    - Description: Completed engines were tested in a run bay with temporary utilities (coolant, oil, electrical) to ensure functionality. After testing, engines were painted.
    - Timeline: 3 days per engine

5. Engine Removal Preparation
    - Description: Existing engines were prepared for removal one at a time to maintain operational capacity. Mechanics and contractors disconnected old engines and inspected/repaired compressor components. Cranes were brought in to remove the old engines.
    - Timeline: 1 week per engine

6. Skid Modification and Cleaning
    - Description: Compression skids were reused but modified to fit the new Waukesha engines, including pedestal adjustments and structural reinforcements. This is a critical step to ensure alignment. Skids were also cleaned and prepped.
    - Timeline: 2 weeks per engine

7. Engine Installation (Swing-In)
    - Description: Cranes were used to place the new engines onto the modified skids. Engines were aligned properly with the existing equipment.
    - Timeline: 2 days per engine

8. Utility Piping and Custom Connections
    - Description: Utility lines (coolant, oil, etc.) were rerouted to match the new engine layout. Custom components were fabricated to connect the engine to the fan shaft and new exhaust system.
    - Special Note: Required skilled welders and fabricators – the skid was not originally designed for this engine

9. Electrical and Communications Hookup
    - Description: The Colt Instrumentation and Electrical ("I&E") team, assisted by contractors, installed new conduit, wiring, and end devices from control panels to engines and compressors.
    - Timeline: Final stage of engine installation.

Total Installation Duration: The full process of removing, modifying, and installing each engine took approximately one month per engine.

Discussion/Observations

The project is set to meet all objectives set forth by Colt and approved by TCEQ as a part of the grant award. The project utilized Colt's inhouse technical teams and existing infrastructure/equipment to maximize the cost efficiency of the project while still meeting the significant emission reduction goals. Several challenges were encountered during the project, with most of them surrounding changing engine manufacturers on existing skids in the field. This project was the equivalent of putting a Ford engine in a Chevrolet car but involved a much larger application. Other unforeseen issues arose that drove up costs including the cracked block, the inability to get core-quality crank shafts out of the existing 7042 blocks, and extended efforts to fabricate the connecting piping between the skids and the new engines. The complexity of changing engines required careful and technically challenging custom work on each skid to connect all utilities and specialized equipment. For example, the new engines required external oil coolers – these were not a part of the old engines. This was not discovered until the old engines were removed. Colt's mechanical team was able to locate oil coolers from other inventory skids and modify them to work in this application. Other technical achievements included a more robust electrical control system being integrated on to these skids – several functionalities of the old engines, like governors, were mechanically controlled. The new engines have more complex engine management systems and electrically controlled components (such as the governor) that all had to be integrated into the skid.

There were several lessons learned during this process, with the majority of those being very specific to the individual engine models and compressor frames. However, there were some overall lessons learned on the first skid that the Colt team was able to apply to the second skid and save some time and resources. Most importantly, the project is almost certain to reduce the emissions to levels forecasted under the grant award and provide an equally reliable operational configuration going forward.

Summary/Conclusions

The status quo alternative to this TERP grant project would have been to swing the existing engines with like-kind engines which would have had no effect on the emissions from the facility. The approach taken under the TERP grant program was a significantly more expensive approach (nearly double the cost). However, given the grant's partial reimbursement to Colt, the project is a slightly more economical project than the status quo alternative. Given the significant operational upgrade (modern engine), improved reliability, and significantly improved emissions, the project is considered to be a great success from Colt's perspective. Although it was a very challenging project for the Colt team, tremendous teamwork building and sense of accomplishment was recognized by our employees.

Acknowledgments

Colt Midstream would like to thank the TCEQ personnel who have worked with Colt on this project – it is because of the TERP program that Colt was able to make this dramatic improvement in emissions and operational performance at the Ranger Compressor Station.

Appendix A: Pictures

Compressor 3 at the Ranger Compressor Station with new engine rails being installed

Alignment of engine pedestals going on at the Ranger Compressor Station

Completion of the new engine support rails on Ranger #3 compressor skids

One of Colt's technicians working on the alignment of one of the engines to the base plate in Colt's overhaul shop

A view of one of the 7042 engines being lowered into the building at the Ranger Compressor Station

Crane is seen preparing to lift a new engine into place at the Ranger Compressor Station