

Executive Summary

Natural Gas Compressor Engine

1. Gas Quality and LNG Research Study Objectives

This research study was designed to assess how residential and small commercial/industrial end-use equipment responded to changes in gas quality and to determine if Southern California Gas Company (SCG) needs to modify its current Gas Quality Standards (Rule 30).

The major objectives of the study during this test were as follows:

- Evaluate a rich burn engine to determine any issues relating to equipment safety and performance such as over heating, knocking or changes in CO and HC emissions levels.
- Collect NO_x emissions data during testing.

2. Selection Criteria

A rich burn engine was selected because industry experts were concerned that this type of engine will have some operational, overheating or knocking problems when running on rich gases. The engine used for this test is an engine that was installed in the Ventura County area before the more stringent emissions requirements, Best Available Control Technology (BACT), were effective. The Ventura County Air Pollution Control District emissions requirements for this engine were:

NO_x: 25, CO: 4,500, ROG: 250 (all in ppm @ 15% O₂)

BACT for Ventura County Air Pollution Control District has the following emissions requirements:

NO_x: 0.15, CO: 0.6, ROG: 0.15 (all in g/BHP-hr) or
NO_x: ~9.5, CO: ~64, ROG: ~28 (all in ppm @ 15% O₂)

3. Test Results and Findings

The engine tests consisted of running the unit alternately on various Pipe Line Gases (PLG) and LNG and recording data pre/post catalyst, according to developed test protocols¹. Results obtained from the tests conducted revealed that:

- Engine did not have any knocking, over heating or operational problems.
- Average CO and NO_x were always below the requirements from Ventura Air Pollution Control District.
- With all gases, there were some emission spikes during the test but we were unable to conclude how they were generated.

4. Equipment Specifications

- Description: Rich-Burn Engine
- Type: Reciprocating
- Rating: 186 BHP @ 1400 rpm
- Bore: 6.25 in.
- Stroke: 6.50 in.
- Heat Rate Nominal : 8,500 Btu/BHP-hr
- Emissions Control Equipment: NSCR catalyst, air/fuel ratio controller
- Usage: Natural Gas Compressor
- Type of fuel: Natural Gas
- Required Gas Supply Pressure: 5 psig

¹ Testing protocols used in this program were derived from industry standards and regulatory test procedures. Note, however, that based on the needs of this program and the operating and design characteristics of equipment tested, adherence to the industry and regulatory testing standards was not literal. The reader is cautioned that no inference can nor should be drawn as regards certification of these devices to the industry or regulatory requirements as a result of this program.