

Executive Summary

Legacy Floor Furnace

1 - Gas Quality and LNG 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 were as follows:

- Evaluate each selected unit to determine any issues relating to equipment safety and performance. Equipment safety includes changes in carbon monoxide (CO) levels, combustion stability and lifting, flashback, and yellow tipping.
- Compare measured and observed results against the major natural gas interchangeability indices, including Wobbe Number, lifting, flashback, yellow tipping and incomplete combustion.
- Collect NO_x emissions data during testing

2 - Selection Criteria

Floor furnaces are in extensive use throughout southern California. Yet, they are among the oldest gas-fired appliances found in this area. This unit was recommended for the study by a focus group of SCG instructors and field technicians. There was concern that many of these units are installed with long venting systems that could experience problems if supplied with gases of varying gas compositions. Factors and concerns that led to the selection of the Legacy Floor Furnace for this study include:

- Performance/safety may be dependent on flame characteristics
- Safety concerns related to flue gases
- Historical combustion system related safety concerns
- High density in southern California
- Recommendations from credible industry experts

5 - Test Results and Findings

There were no operational, ignition, flame stability or safety problems experienced with operation of this appliance. The Legacy Floor Furnace was

tested over a wide range of operating conditions and gas compositions according to developed test protocols¹. Test results and findings include:

- NO_x and CO emission concentrations remained consistent throughout the test period.
- A unit-specific test series was conducted to simulate residential installation and operating conditions in which the air inlet to the unit could be blocked. NO_x emissions remained stable and CO emissions were negligible through this test, which included using the Base study gas and both the highest and lowest Btu and Wobbe Number test gases.

4 - Legacy Floor Furnace Specifications

- **Description:** Floor furnace with a 3-module heat exchanger
- **Burner:** 2 atmospheric burners made of pressed steel and porcelain-coated
- **Maximum input rating:** ~32,000 Btu/hr
- **Minimum input rating:** ~22,400 Btu/hr
- **Type of Fuel:** Natural Gas
- **Required gas supply pressure:** 4.5 - 7.0" W.C.

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.