

Executive Summary

Horizontal Condensing Forced Air Unit

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 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

The Horizontal Condensing Forced Air Unit (HCFAU) represents new technology entering residential use in the Southern California Gas Co. service area. Factors and concerns that led to selecting this unit for the study include:

- Performance/safety may be dependent on flame characteristics
- Safety concerns related to flue gases
- Sophisticated heat exchanger/combustion system
- Recommendations from credible industry experts
- Information from background and industry research
- Technology entering southern California marketplace

3 - Test Results and Findings

The HCFAU demonstrated the capacity to satisfactorily operate with the range of gas properties and compositions currently supplied and anticipated to be supplied in the southern California service area. The HCFAU was tested over a



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

- As tested, the unit did not exhibit significant safety, performance or emissions sensitivities to the range of gas compositions used in this program.
- Heat exchanger temperatures were somewhat higher when the HCFAU operated with richer gas, but remained well below temperatures that would cause an operating concern.
- Ignition testing using the range of gases and differing manifold pressures were normal.

4 - HCFAU Specifications:

- **Description:** Gas-fired Category IV forced air furnace
- **Burner:** Induced combustion system with in-shot burners firing into a tube-type heat exchanger
- **Input rate:** 105,000 Btu/hr
- **Air temperature rise:** 50 - 80°F
- **Type of fuel:** Natural Gas
- **Required gas supply pressure:** 5.0 - 10.5" W.C.
- **Required gas manifold pressure:** 3.5" 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.