Executive Summary
Half Size Gravity Vented Wall Furnace

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).

Two main tests were conducted to evaluate how the appliance will react to the different test gases when (a) tuned to the rated input while using Base Gas (low heating value and low Wobbe Number) and (b) tuned to the rated input using Gas 8 (medium heating value and medium Wobbe Number). The major objectives of the study during these two tests 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, flame lifting, flame stability, flashback and yellow tipping. Equipment performance includes ignition, combustion and output stability.
- Collect NO_X emissions data during testing.

2. Selection Criteria

The Half Size Direct Vented Wall Furnace consists of a sealed steel combustion system that draws outdoor air into the combustion chamber and discharges the products of combustion through coaxial tubes mounted on the rear end of the furnace. Factors and concerns that led to selecting this unit for the study include:

- Unique air intake and vent design.
- Long life expectancy due to the mild winters in Southern California.
- Potential for heat exchangers to crack due to overfiring.

3. Test Results and Findings

The half size wall furnace was tested over a wide range of operating conditions and gas compositions according to developed test protocols[1]. Results obtained from all tests conducted revealed that:

- There were no operational, ignition, flame stability, flame lifting, flashback, yellow tipping or safety problems with the different gases or during transitioning.
- None of the temperatures monitored experienced critical changes.
- The flame temperature and NO_X emissions followed the same pattern as the equivalence ratio throughout each test.
- There were no significant changes after tuning the appliance with Gas 8 (Medium heating content and Wobbe Number).
- CO emissions were negligible throughout all tests.

4. Equipment Specifications

- **Description:** Half Sized Direct Vented Wall Furnace with a steel heat exchanger
- **Burner:** Cast Iron atmospheric burner firing vertically into the heat exchanger
- **Input rate:** 14,000 Btu/hr
- **Type of fuel:** Natural Gas
- **Required gas supply pressure:** 4.5 – 10.5 in. 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.