Executive Summary
Ultra-Low NOx Steam Boiler

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

The Ultra Low NO_X Steam Boiler was selected because some customers within the Southern California Gas Company service territory are purchasing equipment capable of meeting more stringent emission levels than required by regulatory agencies. In order for manufacturers to meet the more stringent emission levels, more sophisticated/complex burners and controls are used that could be more sensitive to natural gases with differing calorific values.

5 – Test Results and Findings

The Ultra Low NOx Boiler demonstrated an ability to satisfactorily operate over a range of gas compositions and maintained its low emission characteristics. The HCFAU was tested over a wide range of operating conditions and gas compositions according to developed test protocols[1]. Test results and findings include:

[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

- There were no operational, ignition, flame stability, or safety problems during testing of each gas or during transitions between gases
- CO emissions did not exceed 100 ppm (corrected to 3% O_2) for all tests conducted.
- NO_X emissions increased slightly with the richer gases.

4 – Characteristics of the Ultra Low NOx Boiler used in this study:

- **Description:** 15 HP Ultra Low NO_X Steam Boiler
- **Burner:** Surface premix power burner (operating on blue flame mode)
- **Maximum Heat Input Rating:** 645,000 Btu/hr
- **Type of Fuel:** Natural Gas
- **Supply Pressure:** 7 – 14" w.c.

regards certification of these devices to the industry or regulatory requirements as a result of this program.