

Executive Summary

Residential Gas Range Broiler

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).

This comparison test was conducted to evaluate how the broiler would react to LNG compared to PLG. The major objectives of the study were as follows:

- Evaluate the broiler 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

A residential freestanding range was chosen because industry experts were concerned about them generating more indoor air pollution when operating on richer gases. Ranges are not directly vented outside the house and the unit selected has an upper oven/broiler and lower oven underneath the cook-top, which makes the combustion and ignition systems very complex.

The ignition system for the unit selected works as follows: When the broiler is turned “on” the top oven comes “on” for 10 minutes (bottom burner), then, the broiler comes “on” (upper burner) and when the flame on the broiler is proved, the oven turns “off” (bottom burner).

3. Test Results and Findings

The residential gas range broiler was tested under two types of gas compositions (LNG and PLG) according to developed test protocols¹. Results obtained from all tests conducted revealed that:

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.

- There were no ignition, flame stability, flame lifting, flashback, yellow tipping or safety problems with the different gases or during transitioning.
- CO and HC emissions increased while running on LNG but remained well within the limits of safety.

4. Equipment Specifications

- **Description:** residential gas range broiler with atmospheric burners
- **Burner/Input rate (Btu/hr):**
 - Right front and left rear Top Burner - 9,200
 - Left front top burner -16,000
 - Right rear top burner - 5,000
 - Upper oven bake - 10,000
 - Upper oven broil - 10,000
 - Lower oven - 16,000
- **Type of fuel:** Natural Gas
- **Required gas supply pressure:** 5.0 in. w.c.