Negotiating Sales Gas Specifications

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Definition of Interchangeability

• From the 1930s to 2000
  – Flame characteristics are satisfactory after substitution of one gas for another.

• 2004 Natural Gas Council
  – Ability to substitute one gas for another without materially changing safety, efficiency, performance or emissions.
The need for Interchangeability

• 1930s – Introduction of natural gas with locally produced town gas.
• 1940s – Peak shaving including propane-air systems.
• 1970s – Imported liquid natural gas.
• Today - More imported liquid natural gas and changes in domestic gas.
Interchangeability Methods

• Single Index Method
  – Wobbe Index (1926)

• Multiple Index Methods
  – AGA Bulletin #36 (1946)
  – Weaver (1951)

• Lifting, Flashback, Yellow Tipping
AGA Indices

- Lifting
  - 1.0 ideal, > 1.0 lift tendency
- Flashback
  - 1.0 ideal, > 1.0 flashback tendency
- Yellow Tipping
  - 1.0 ideal, < 1.0 tendency to soot
Weaver Indices

- Heat Rate
  - 1.0 ideal, > 1.0 higher heat delivered
- Lifting
  - 1.0 ideal, < 1.0 lift tendency
- Flashback
  - 0.0 ideal, > 0.0 flashback tendency
- Yellow Tipping
  - 0.0 ideal, > 0.0 tendency to soot
- Incomplete Combustion
  - 0.0 ideal, > 0.0 tendency to produce CO
Interchangeability Procedure

• Obtain pipeline gas flow and gas data.

• Calculate interchangeability indices for 100% Sales Gas and 100% pipeline gas.

• If not 100% interchangeable, calculate indices for blends to determine maximum allowable Sales Gas content.
Project Results (1 of 2)

• EBI **Blend** into Trans Québec & Maritimes
  – Spec: 80% CH4 min., 2% CO2 max.
  – Sales Gas: 83% CH4, 0.6% CO2
  – 100% Sales Gas **Blend** acceptable

• Winder **Blend** into City of Buford
  – Spec: 95.5% CH4 min., 1% CO2 max.
  – Spec: Wobbe 1270 to 1395
  – 49% Sales Gas **Blend** acceptable
• Point Loma Digester Gas
  – End of SDG&E pipeline, Rule 30 applies
  – Spec: 97.8% CH4 min., Wobbe 1279 to 1385
  – Lifting (≤ 1.06) Flashback (≤ 1.2) YT (≥ 0.8)
  – 100% Sales Gas acceptable Substitute
Selected Documents (1 of 2)

• 1927 Wobbe, A New Definition of Gas Quality
• 1946 AGA Bulletin #36, Gas Interchangeability
• 1951 Weaver, Formulas for gas interchangeability
• 1980 GRI, Prediction models for interchangeability
• 1982 GRI, Nonconventional gases and equipment
• 1984 Rossbach, What interchangeability means
• 1986 GRI, Trace constituents in landfill gas
Selected Documents (2 of 2)

- 2003 Halchuk, Specifications for interchangeability
- 2004 Messics, Do you really need pipeline quality?
- 2004 Pomerantz, Pipeline gas from LFG in Canada
- 2005 NGC Paper on Natural Gas Interchangeability
- 2006 Halchuk, AGA Bulletin #36 and Weaver indices
- 2008 Pomerantz, Converting LFG into pipeline gas
- 2010 Pomerantz, High Btu project operating lessons