

# Natural Gas Interchangeability

*Integrating supply diversity and end-use predictability*

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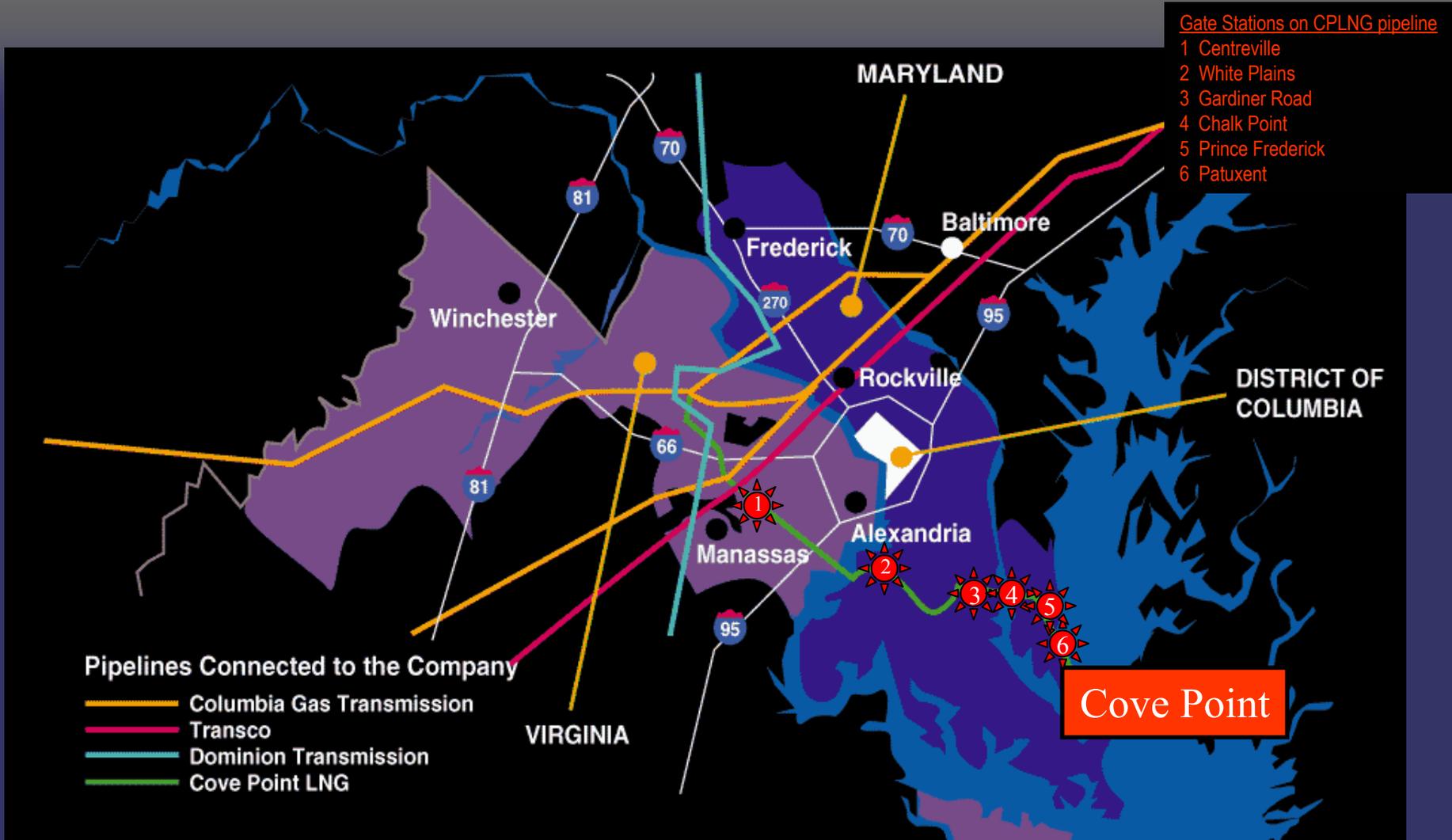
# Washington Gas Light Company (WGL)



- Natural gas local distribution company serving Washington D.C. and the surrounding metropolitan region in Maryland and Virginia
- 970,000 customers; 90% residential
- 1.7 Bcf peak day requirement; 100 MDth per day base load
- 20+ gate stations connect WGL with four upstream interstate natural gas pipelines



# Washington Gas System Profile

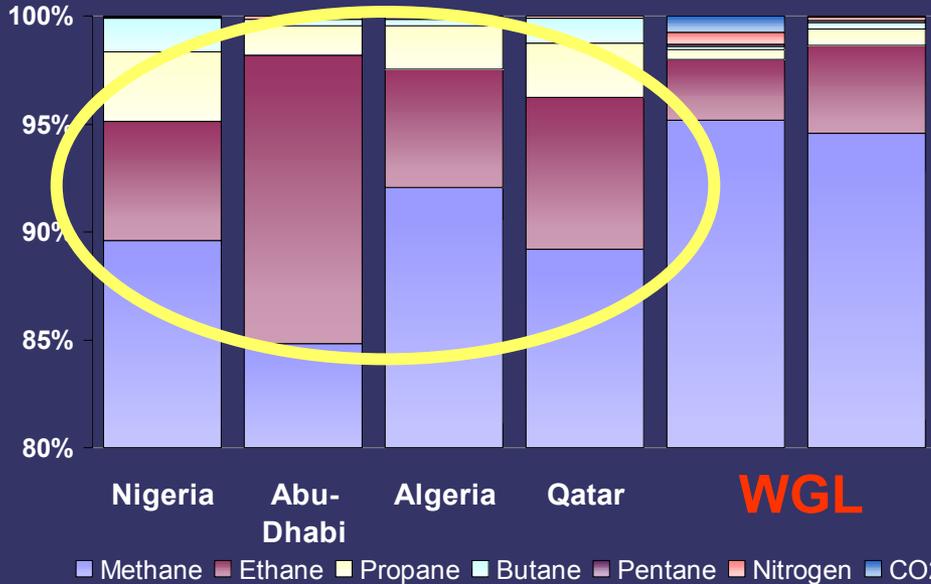
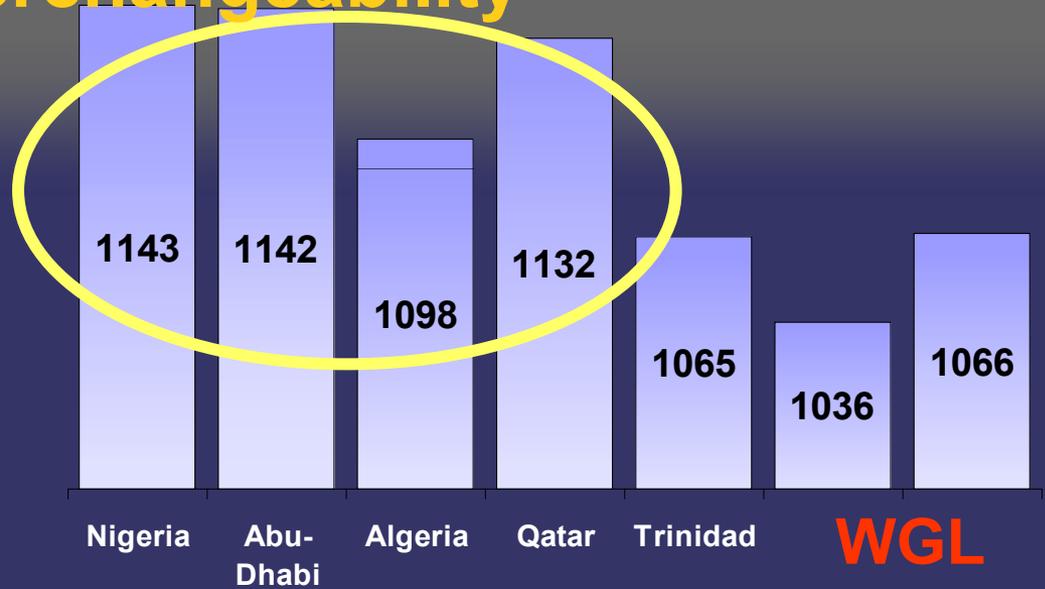


WGL has 6 Direct-Connect Gate Stations on the Cove Point LNG pipeline - the Transco, DTI & TCO Gate Stations are downstream of Cove Point



# Btu ~~↔~~ Interchangeability

Expected high Btu of LNG relative to WGL history of traditional supply



More heavy hydrocarbons can produce undesirable combustion characteristics

- Carbon monoxide production
- Reduced appliance life
- Environmental compliance implications



# Maintaining end-use predictability and supply diversity

## *WGL Interchangeability Approach*

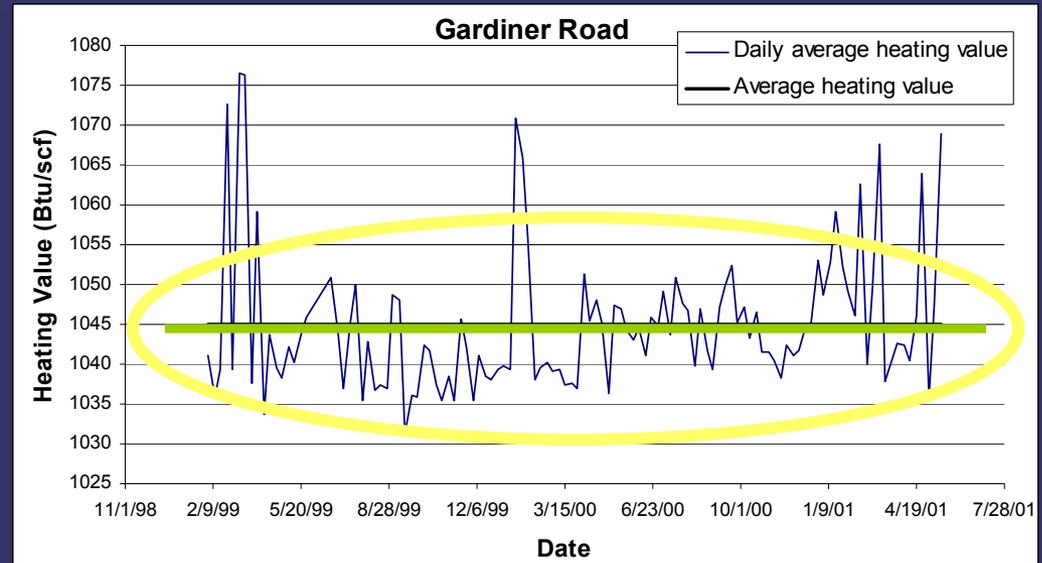
1. Identify historical natural gas quality range
2. Determine the appliance characteristics of the affected area
3. Select representative appliances for testing
4. Establish baseline appliance performance criteria
5. Lab test actual consumer appliances from impacted area and new appliances
6. Identify supply characteristics and dilution combinations that produce results comparable to the baseline
7. Translate supply source's molecular components and dilution combinations into quality criteria



# WGL Interchangeability Approach

## 1. Identify Historical Range

- Variation can serve as a benchmark for tolerances
- Evaluate length of time of sustained extreme conditions
- Evaluate impact of other resources on-system and downstream



2. Determine the appliance characteristics of the affected area
3. Select representative appliances for testing



# WGL Interchangeability Approach

**4. Establish baseline appliance performance criteria**

**5. Lab test actual consumer appliances from impacted area and new appliances**

- Rates of CO production
- Yellow-tipping characteristics
- Sooting potential
- Lifting tendencies

**6. Identify supply and dilution combinations that produce results comparable to the baseline**

**7. Translate supply source's molecular components and dilution combinations into quality criteria**



# Lessons Learned

**Local, historical natural gas characteristics** are the starting point for developing interchangeability indices because every market developed differently

**Heating value** is not the sole factor for determining interchangeability; the ratio of heavier hydrocarbons to methane must be considered

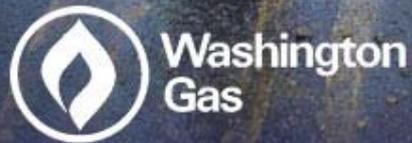
**Current pipeline tariff** gas quality ranges/limits do not necessarily reflect the actual historical gas quality at the appropriate level of detail

**Burner-tip solution** is not viable and would limit future access to alternative supplies

**No broad assumptions** can be made about the ability of design certified appliances to operate with a wide variety of gases absent field testing

**Interchangeability indices** can provide flexibility for alternative supplies while facilitating greater predictability in appliance response to variations in gas supply





**Thank you**

Prepared under the direction of **Adrian P. Chapman**

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