

Hydraulic Fracturing

A Panel Discussion

Michael Covert, P.G. (Terracon)

“Kumar” Ramurthy (Halliburton)

Gail Wurtzler, Esq. (Davis, Graham & Stubbs, LLP)

Outline

- Introduction- Opportunities (Mike)
- Challenges: Technical issues associated with hydraulic fracturing/well completions (Kumar)
- Challenges: Recent litigation/legal issues (Gail)
- Questions and discussion (All)

Opportunities

- Hydraulic Fracturing techniques combined with horizontal well drilling have sparked a “modern day gold rush” starting with tight shale gas in many parts of the country (Barnett Shale, TX, Marcellus, in PA, OH, Bakken in MT)
- With recent success in exploiting natural gas (lower prices) shift has been more to liquids
 - Eagleford play (South Texas)
 - Much more activity with conventional reservoirs (Miss Lime play in N. OK and S. KS, Conglomerates)



United States Shale Gas Plays

Shale Gas Plays
 Basins

Stacked Appalachian Plays

Marcellus
 Utica
 Devonian (OH shale)

November 2008
 Miles
 0 150 300 600



Point of Clarification

- Significant **public** concern over “hydraulic fracturing”, primarily related to groundwater contamination
- Critics of “hydraulic fracturing” insist that “fracing” has contaminated surface water and groundwater
- Oil & Gas industry and many researchers **insist:**
 - “Not a single documented case of surface or groundwater contamination due to hydraulic fracturing”

Who's right??



Developing an Oilfield:
Devon Energy, Lake Navajo, New Mexico



Remediation Opportunities

Three Major Components



Upstream

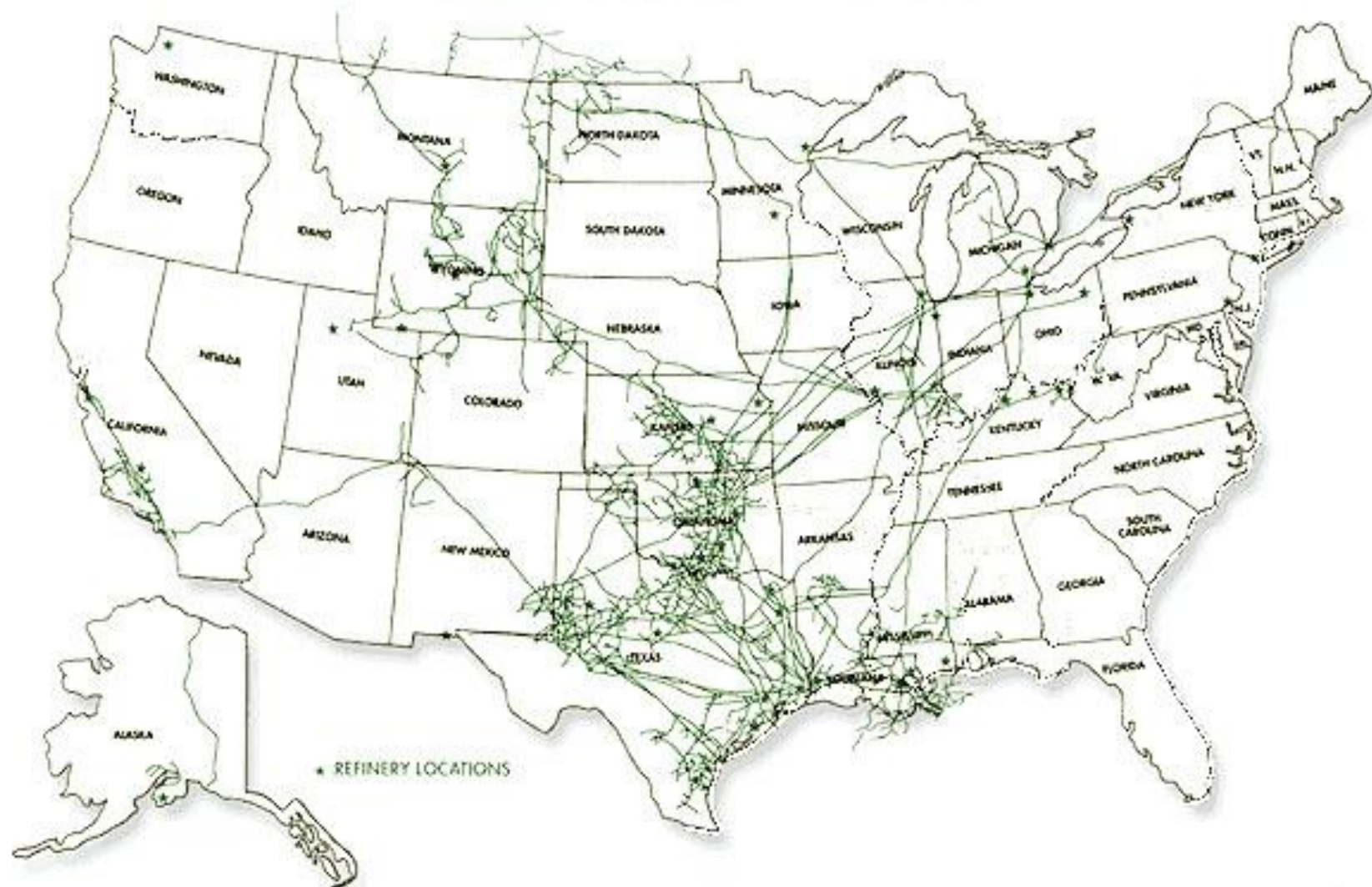


Midstream

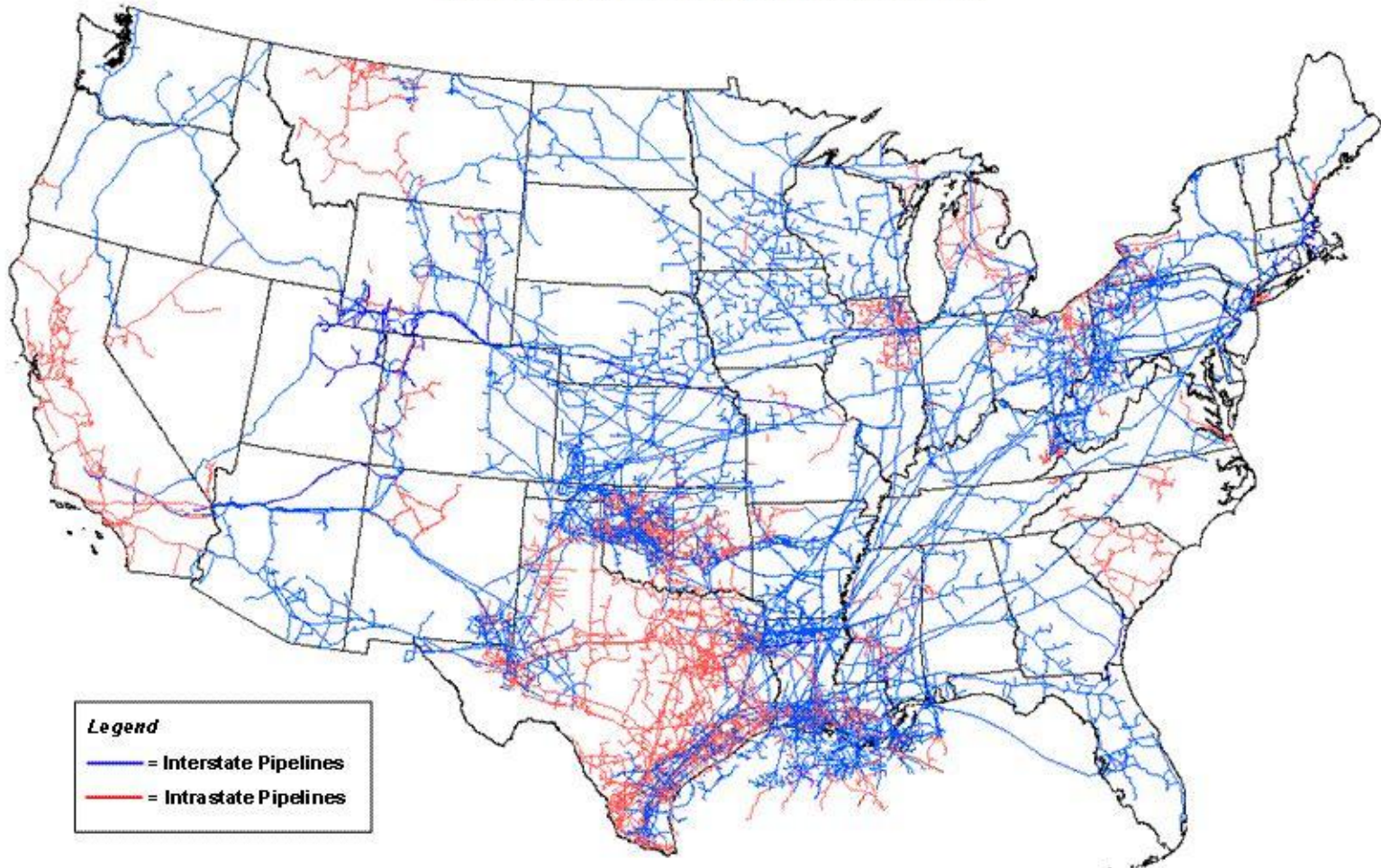


Downstream

MAJOR CRUDE OIL PIPELINES



U.S. Natural Gas Pipeline Network



Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System

Opportunities

- Due Diligence for Acquisition & Divestiture
- NEPA / Natural Resources / Wetlands Surveys
- SPCC and SWPPP Plans (Injection/Disposal Facilities)
- Site Investigation & Remediation (Baseline Sampling)
- Air Emission Inventories (GHG compliance)
- Regulatory Compliance & Permitting (Title V)
- Environmental Assessments / Environmental Impact Studies (Pipelines)

Opportunities

- Geotechnical/design for roads and pads (upstream) – variable depending on geography
- Geotechnical for compressor stations, booster stations, etc.
- Geotechnical and CMT for pipeline (midstream) construction/crossings (highways, roads, rivers)
- Geotechnical and CMT for processing/refining facilities (downstream)
- Geotechnical and CMT to “new” service company operations
- Additional services related to service companies (e.g. frac sand mining)