

Panel 1: National Perspectives on Key Technical Challenges



PHMSA Perspective

Kenneth Lee

Director of Engineering & Research, Office of Pipeline Safety

Pipeline Research and Development Forum

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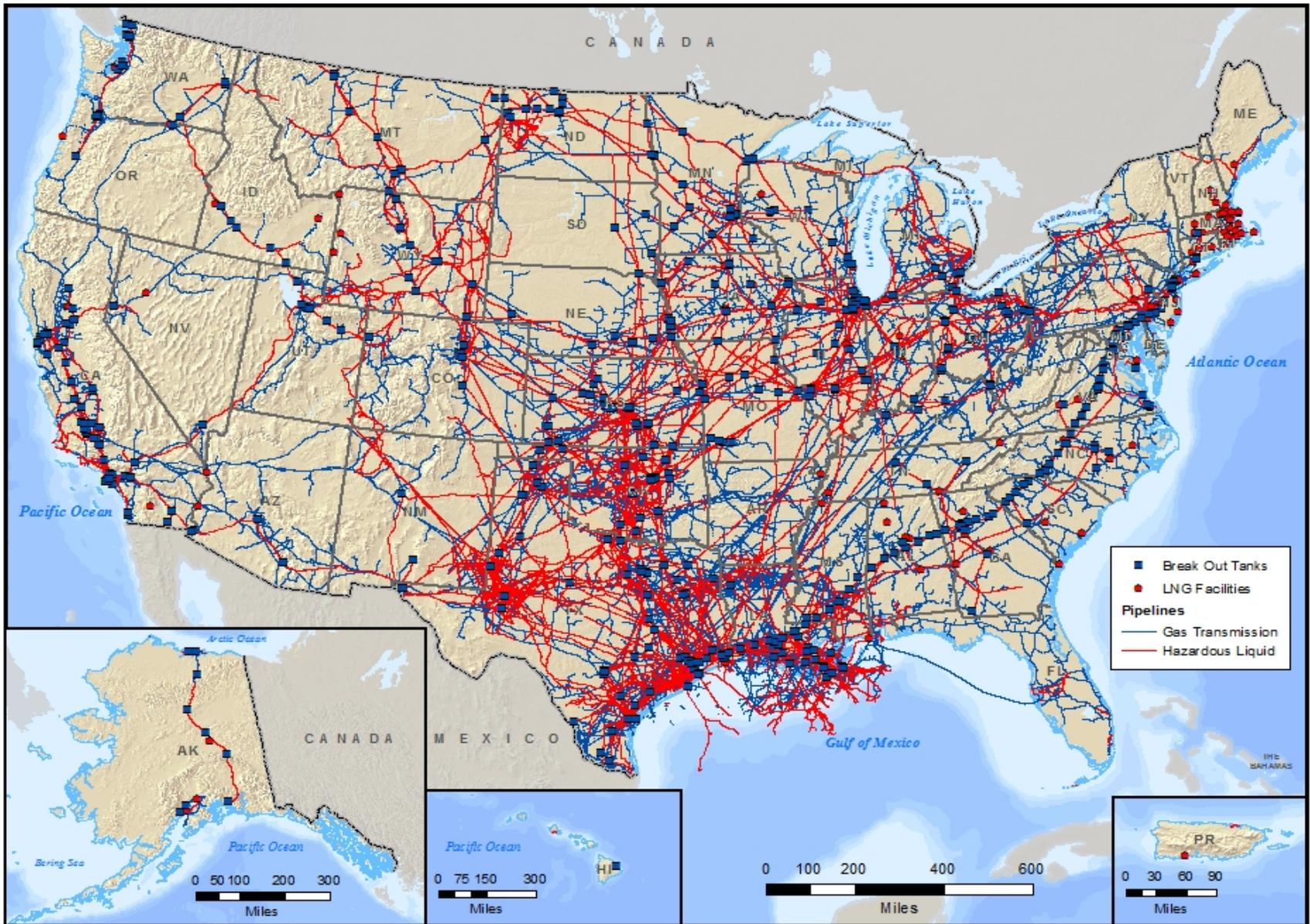
What PHMSA OPS Regulates

| System Type | Miles | % Miles | # Operators |
|---|------------------------|------------------|---|
| Hazardous Liquid | 199,334 7,677 Tanks | 7% | 456 |
| Gas Transmission | 301,810 | 11% | 1,020 |
| Gas Gathering | 17,663 | 1% | 367 |
| Gas Distribution (Mains & Services) | 2,168,599 | 81% | 1,373 |
| Total | 2,687,406 | 100% | Note: Some operators have multiple system types |
| Liquefied Natural Gas | 115 Plants | 205 Tanks | 83 |



Gas Transmission and Hazardous Liquid Pipelines in the United States

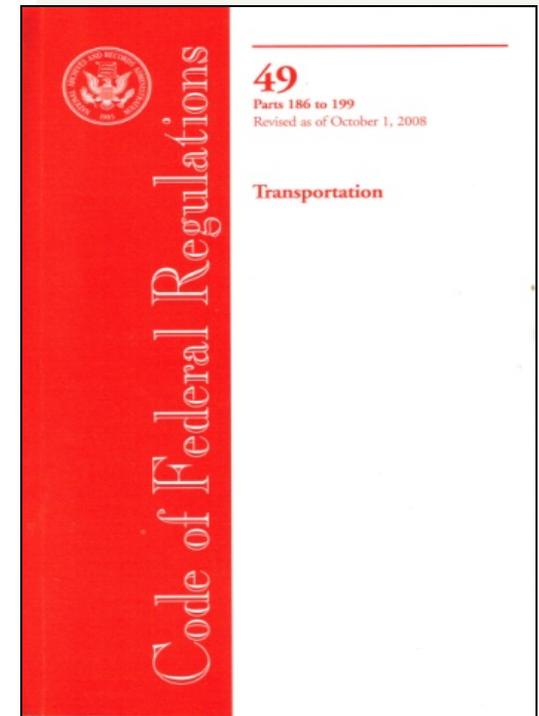
National Pipeline Mapping System



U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration
 Projection: Albers Equal Area Conic
 Map created December, 2014

Some of PHMSA's Roles and Responsibilities

- **Minimum safety standards: 49 CFR Parts 190-199, including:**
 - Part 192: Natural Gas Pipelines
 - Part 195: Hazardous Liquids Pipelines
 - Part 193: LNG Facilities
- **Inspections & Enforcement**
- **Safety Awareness & Outreach**
- **Research & Development**



Research Program Performance Since 2014 R&D Forum

- 2014 R&D Forum: Chicago, 230 attendees
- 17 topics were solicited by PHMSA
- Received 83 White Papers and 38 Proposals
- Awarded 20 projects: \$12.3M PHMSA + \$12.4M Resource Sharing
<https://primis.phmsa.dot.gov/matrix/>
- CAAP University Projects will be presented later
- **See Program Backgrounder at registration desk for more details**



Notable Anticipated Outputs/Impacts

- Finished some informative studies on risk tolerance & risk models
- Finished framework on Construction Quality Management Systems – API now utilizing results
- Improved our knowledge of LNG vapor dispersion/failure rates
- Several projects still ongoing supporting the proposed Integrity Verification Process, in regards to pressure testing and NDE methods to determine pipe strength and hardness (3-6 mo)
- Addressing standardized framework for assessing leak detection systems and work to quantify small non-hazardous leaks (1-3 mo)
- Anticipate commercialization of mechanical damage & crack sensors onto robotic inspection solutions (3-6 mo)
- Anticipate further development and commercialization of Inverse Wave Field Extrapolation sensors for crack detection (8-12 mo)



Threat/Damage Prevention

- October 19, 2016: Portland, OR
- Subcontractor excavation hit 1-inch dia. pipe
- 8 injuries, several buildings damaged



Leak Detection/Mitigation

- September 9, 2016: central Alabama
- ~6,000 barrels gasoline spill into retention pond
- Disrupted gasoline supply to Eastern US
- October: Pipeline hit by trackhoe, 1 fatality



Anomaly Detection/Characterization

- April 29, 2016: Westmoreland County, PA
 - 30” gas pipeline explosion, 1 injury
 - suspected cause: corrosion under tape coat
- October 17, 2016: Tekamah, NE
 - 8” ammonia pipeline release, 1 fatality



Underground Storage – Aliso Canyon, California: Oct 2015 – Feb 2016

- Largest natural gas release in U.S. history (5.4 bcf)
- Public health impacted, 5,000+ households relocated
- Federal Task Force on Underground Natural Gas Storage Safety

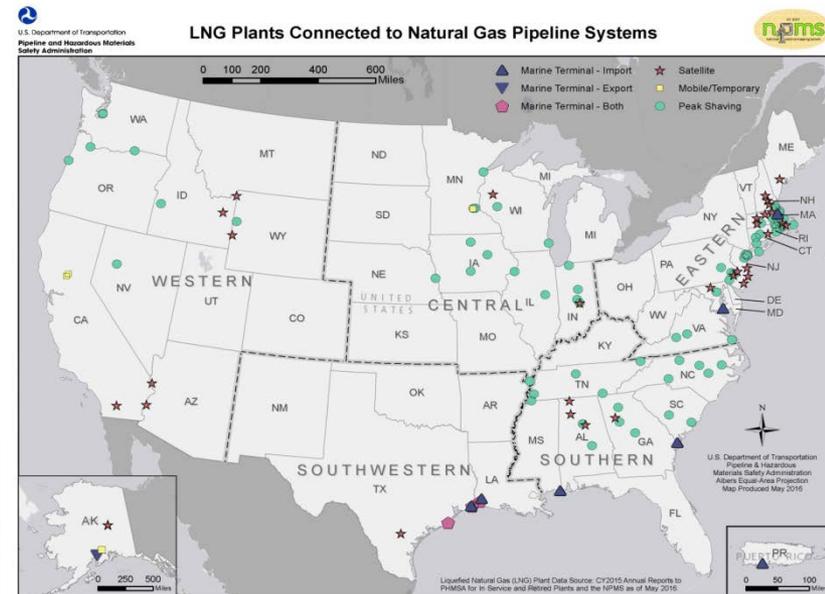


Aerial FLIR video of natural gas release
Environmental Defense Fund



Liquefied Natural Gas (LNG)

- Plymouth, WA Incident
March 2014 Incident:
Liquefaction start-up
explosion
- Fast growing industry
 - Marine export &
transportation fuel
 - Small scale facilities



Thank You!/R&D Program Contacts

Kenneth Lee

Director – Engineering & Research
Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202) 366-2694
Email kenneth.lee@dot.gov

Jim Merritt

Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(303) 638-4758
Email james.merritt@dot.gov

Robert Smith

Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(919) 238-4759
Email robert.w.smith@dot.gov

Joshua Arnold

Department of Transportation
Pipeline & Hazardous Materials Safety Administration
Office of Pipeline Safety
P(202) 366-6085
Email joshua.arnold@dot.gov

PHMSA RD&T Providing/Supporting:

