New England Pipeline Safety Seminar October 22, 2014

Chris Christopoulos, Jr.

Lebanon Fire Department

Portable Pipeline

- Sometimes called a Virtual Pipeline, is method for supplying natural gas to areas not serviced by a traditional pipeline.

LNG Portable Pipeline

Supply

Transport

Storage

Vaporization

CNG Portable Pipeline

Supply

Compression

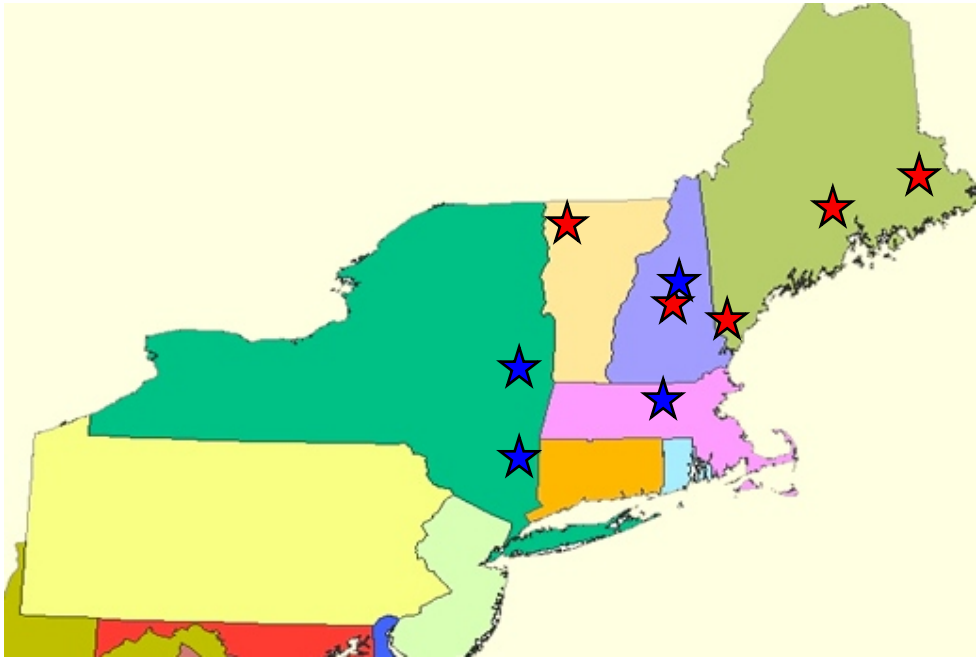
Transport

Storage

Decompression

Northeast Bulk CNG Compressor Stations

- Baileyville, Maine (active)
- Bangor, ME (active)
- Eliot, Maine (active)
- Milton, Vermont (active)
- Pembroke, NH (active)
- Concord, NH (not active)
- Worcester, MA (not active)
- Manheim, NY (not active)
- Albany, NY (not active)



OSMOMP/GLOBALP Compressor Station - Bangor, ME

Clean Energy Compressor Station – Pembroke, NH

Transportation?

LNG

- MC 338 Cryogenic Cargo Tank
- 16,300 Gallon liquid capacity

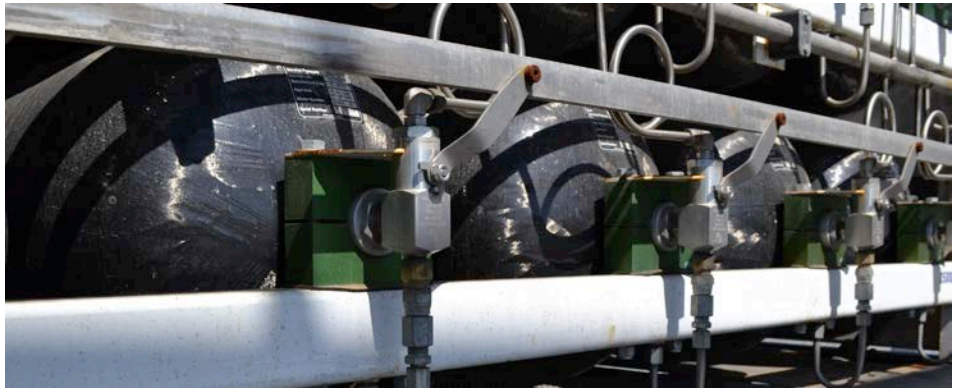
CNG - Type I Tube Trailer

- High Pressure Steel Cylinders
- Normal Operating Pressure 2,400 to 3,200 psi
- Capacity 179,221 Standard cubic feet (8 tube configuration)

CNG – Type III Cylinder Trailer

CNG – Type III Cylinder Trailer

- Aluminum Cylinder wound with Carbon Fiber
- POD's contain 30 Cylinders
- 5 POD's per trailer = 150 cylinders
- Total Capacity 440,700 standard cubic feet
- Cylinders 14" diameter x 9' long
- Normal Operating Pressure 3600 psi @ 59° F



CNG – TITAN™ Module

TITAN™ Module Mounted on Flatbed with side panels

CNG – TITAN™ Module

TITAN™ Module Mounted on Flatbed without side panels

CNG – Type IV Cylinder Module

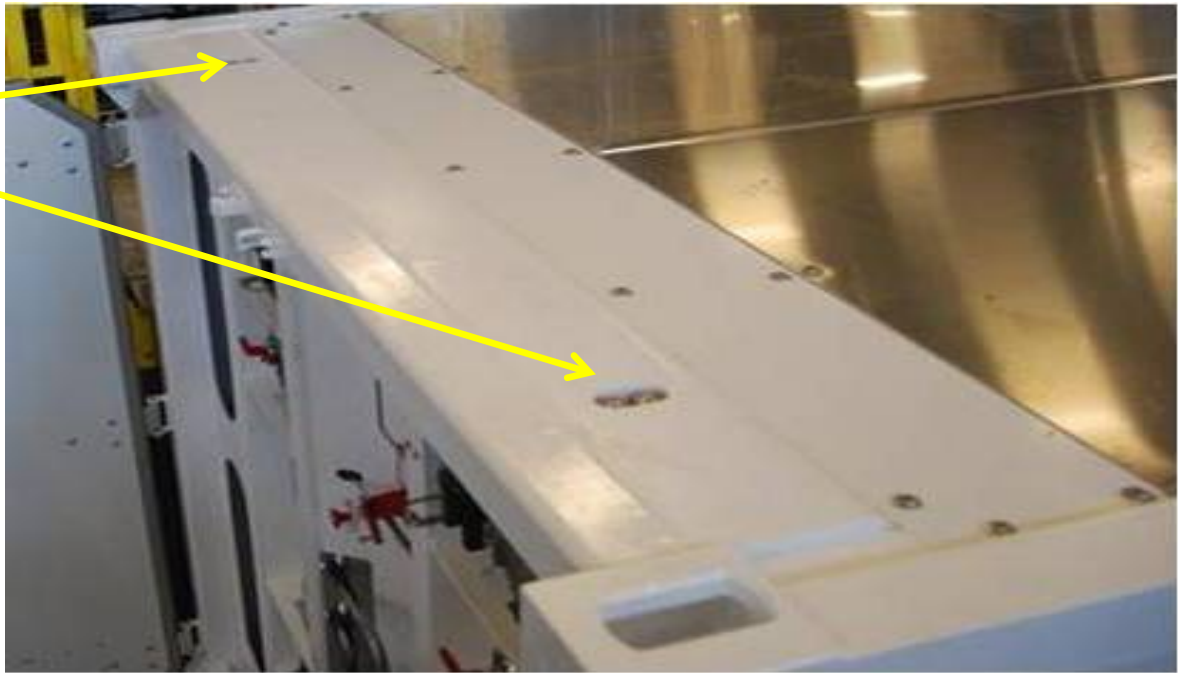
- Hexagon Lincoln TITAN™ Module

  - 4 cylinders – 42.5” in diameter x 38.5’ long
  - Normal Operating Pressure – 3,600 psi @ 59° F
  - DOT Special Permit – Maximum Working Pressure of 3,625 psi
  - Module Capacity 355,440 standard cubic feet
  - Weight of unit and trailer = 48,000 pounds
  - Hydro testing every 5 years
  - Service Life of 15 years (extendable to 30 years)
  - Must always maintain minimum of 100 psi
  - Equipped with an “Emergency Thermal Venting System”
  - Pressure Relief Valve
  - Burst Disks
  - 100 in United States – 70 in New England

Emergency Thermal Venting System

- Once activated venting cannot be stopped
- 45 – 60 minutes for a full module

¾” Vent Ports

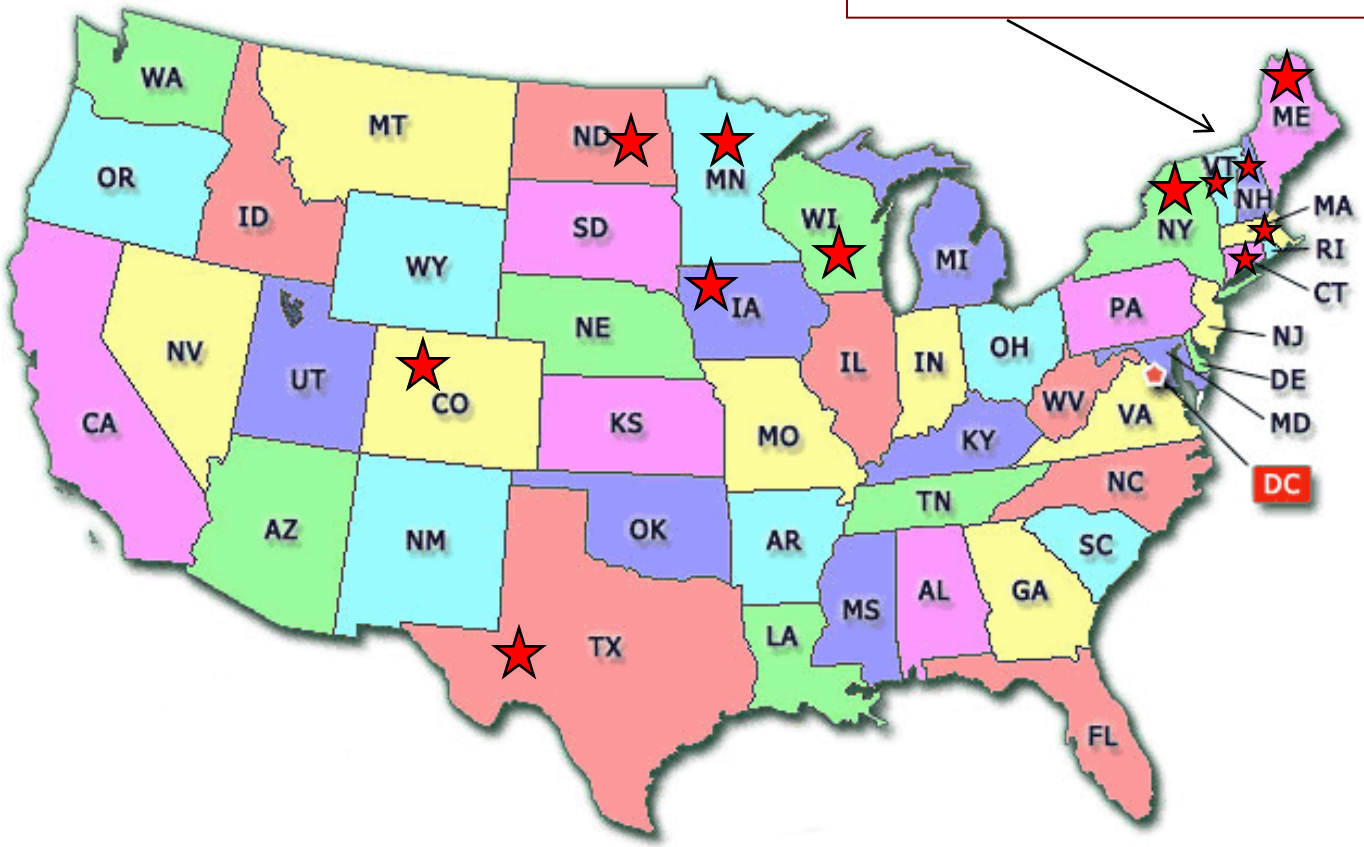


LNG Storage

Kleen Laundry, Lebanon, NH

Bulk CNG End User Sites

30 End User Sites in Northeast



CNG End User Sites

Dartmouth Hitchcock Medical Center, Lebanon, NH

CNG End User Sites

Pike Asphalt Plant, West Lebanon, NH

CNG End User Sites

Plymouth State University, Plymouth, NH

CNG End User Sites

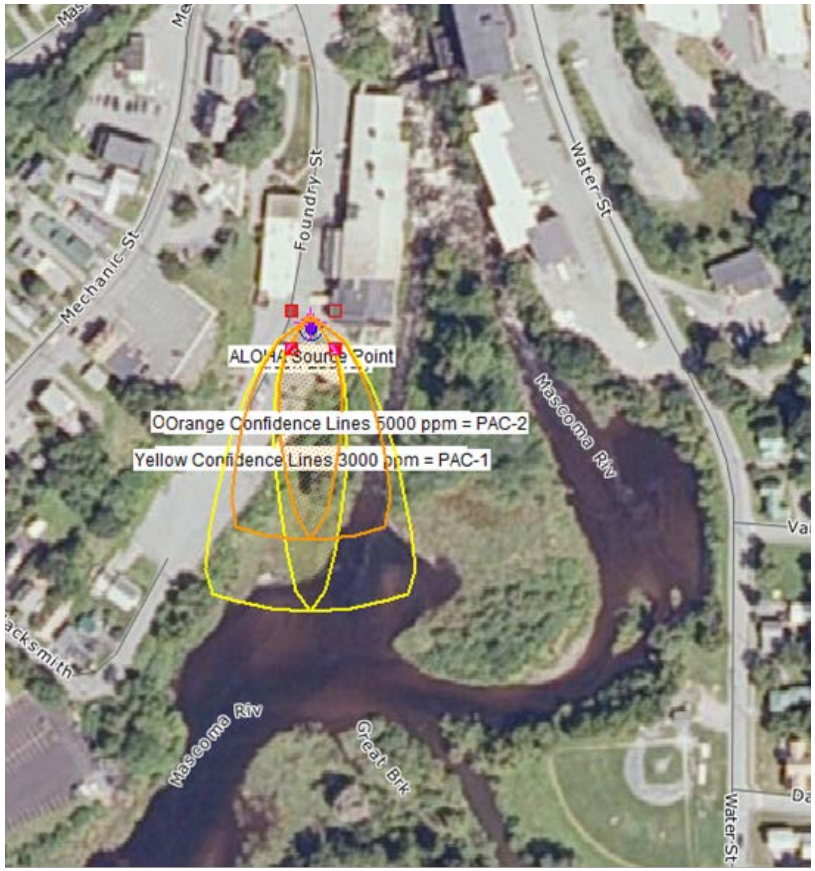
Drilling Sites

CNG End User Sites

Frac Sites Operations

Challenges

- LNG
  - 16,300 gallons liquid
  - 600:1 Expansion Ratio
  - Product is un-odorized in transport
  - Large potential impact area
  - Un-odorized in transport
  - 1 delivery every 6 days



Risk Management

- Lebanon – Kleen Laundry – LNG Facility
  - Restricted delivery to hours of 6-8am & 4-6pm
  - Required notification of offloading operations
  - Onsite flame and gas detection tied to municipal fire alarm
  - Pre-notification Reverse 911 lists

CNG Challenges

- No specific fire codes
- CNG - DHMC
  - Potential for a large impact area
  - Venting Titan™ - 45-60 minutes
  - Transportation accidents

CNG Risk Management

- NFPA 1, Performance Based Design
- NFPA 55, Chapter 7, Emergency Planning
- CNG - DHMC
  - Delivery restrictions
    - 7-9AM
    - 4-6PM
  - Pre-determined evacuation routes
  - Onsite flame and gas detection tied to municipal fire alarm
  - Required onsite emergency plan

CNG – TITAN™ Incidents

- March 25, 2013 – Milton, VT
- October 25, 2013 – Milton, VT
- December 22, 2013 – North Hampton, NH

Kansas Fire (Titan V) – July 22, 2013

Fire damage – Emergency Thermal Venting System Activated

Titan™ - February 2014 – Rollover - Mexico

Titan™ Rollover – May 15, 2014 – Rt. 101, Raymond, NH

Titan™ Rollover – May 15, 2014 – Rt. 101, Raymond, NH

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Chris Christopoulos, Jr.

Lebanon Fire Department

(603) 448-8810

chris.christopoulos@lebcity.com

www.portable-pipelines.com

www.energyemergencies.com