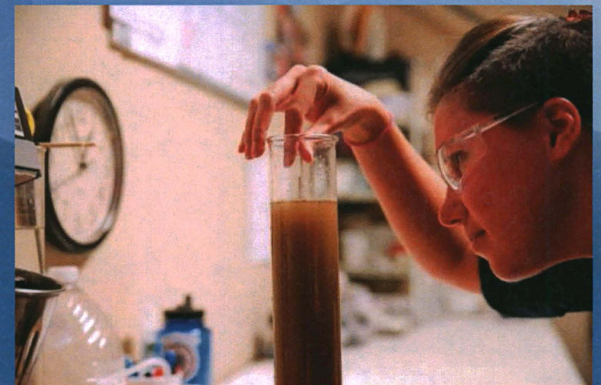


**01-25-16  
PRESENTATION:  
ALASKA LNG  
PROJECT BY  
STEVE BUTT,  
PROJECT MANAGER**

<TARGET><BILL></BILL><SUBJECT>01-25-16 PRESENTATION  
ALASKA LNG PROJECT BY STEVE BUTT, PROJECT  
MANAGER</SUBJECT><COMM>HRES29</COMM></TARGET>

# Alaska LNG

Fueling Alaska's Future <sup>TM</sup>

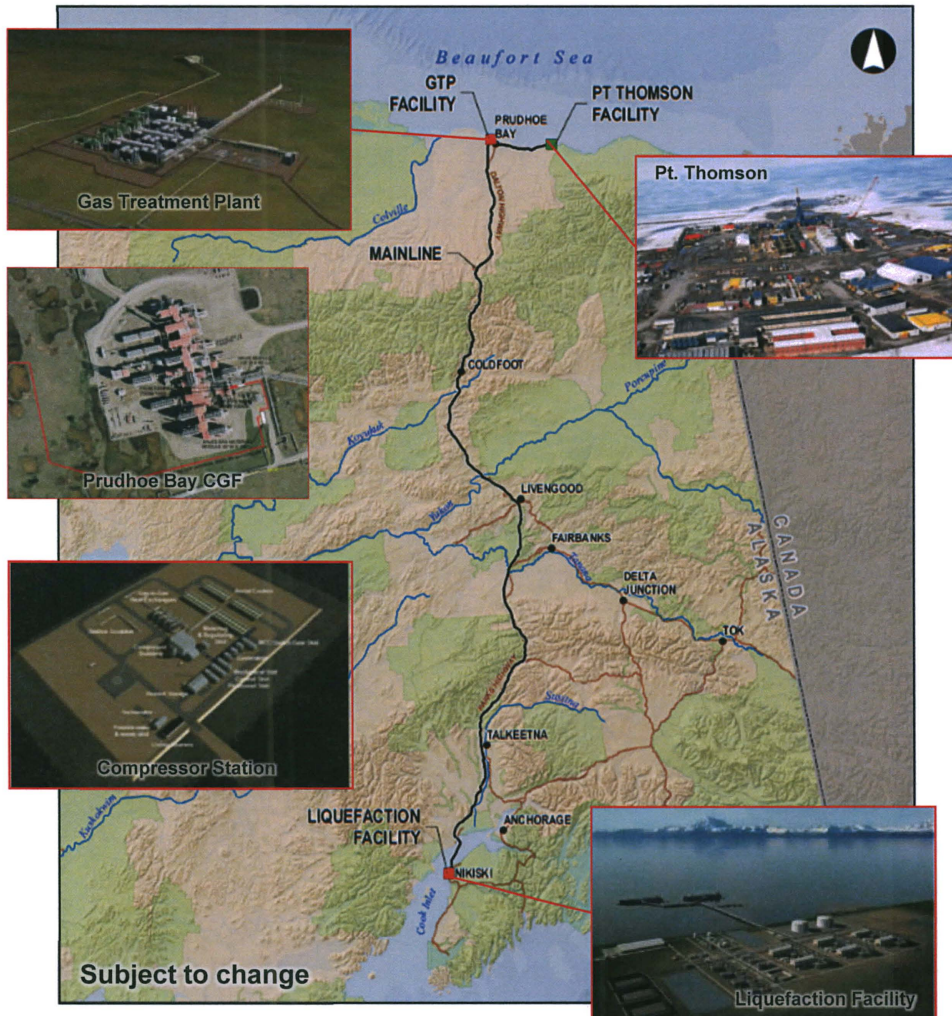


25 January 2016

**Project Update**  
Presented by Steve Butt

# Alaska LNG – Project Overview

*An integrated liquefied natural gas export project providing access to gas for Alaskans*



## North Slope

**Point Thomson:** Deliver natural gas to GTP

**Prudhoe Bay:** Deliver natural gas to GTP, receive CO<sub>2</sub> / impurities for further handling

**Gas Treatment Plant (GTP):** Clean, dehydrate, chill and compress 3.5 BCFD of natural gas and deliver to pipeline

## North Slope, Interior & Southcentral

**Gas Pipeline:** Transport 3.3 BCFD of natural gas over 800 miles to Nikiski, with at least five interconnection points for in-state gas

## Southcentral

**Liquefaction Facility:** Create, store, and load up to 20 million tons of LNG per year (15-20 LNG cargoes per month)

*(SHRINK BY 600)*

*12% CO<sub>2</sub> : NO OTHER RESEVOIR HAS THAT MUCH.*

## Safety, Health and Environment Report:

- ✦ Completed all work in 2015 incident free – continue building culture of caring

## Executive Summary:

- ✦ Spend: \$370M on pre-FEED through December 2015
- ✦ Initial design scope ~85% complete, updated to reflect optimization work
- ✦ Finalizing project design/execution basis for cost and schedule estimates
- ✦ Key 2015 milestones – FERC RR (Draft 1), export authorizations, AOGCC rulings

#480M  
TOTAL  
PRE-FEED

## 2016 Priorities - Optimize Pre-FEED, progress EIS

- ✦ Evaluate 48" pipeline option – targeting April 2016 decision
- ✦ Additional G&G and field work to support Resource Report Draft 2
- ✦ Contract strategy development and market engagement to ensure project is globally competitive while maximizing opportunities for qualified Alaskans
- ✦ Provide owners with information for FEED decision

## Key Messages:

- ✦ Alaska LNG is an integrated LNG project – *plants plus pipeline*
- ✦ Focus on lowest cost of supply to compete in a global market
- ✦ Alignment, risk and cost reduction (ARC) remain key to success

PT. THOMPSON 4% CO<sub>2</sub> > 10.5%  
 PRUDHOE BAY 12% CO<sub>2</sub> CO<sub>2</sub>  
 BLEND



## Project Design Basis

- ✦ Completed base case Pre-FEED design
- ✦ Integrated hydraulic / compositional model of system
- ✦ Continuing to evaluate design efficiencies

## Project Specification Development

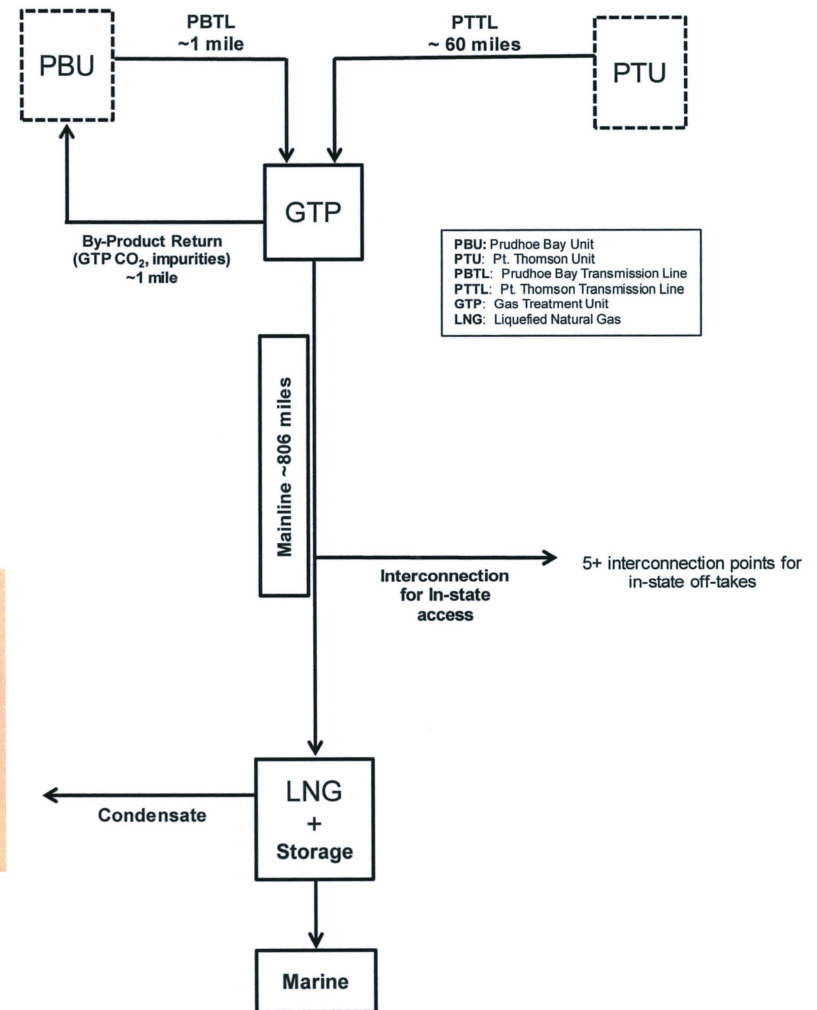
- ✦ Developing 'fit-for-purpose' project specifications including common specifications for GTP, Pipeline and LNG Plant

## Reliability, Availability & Maintainability (RAM)

- ✦ Completed base case project-wide RAM modelling and analysis

## Optimization – Focus on Cost Reduction

1. Evaluating technical and economic feasibility of optimization opportunities
2. Improved integrated system efficiency – align planned maintenance, sparing of key equipment, etc.



# LNG Plant and Marine Terminal Update Alaska LNG™

Completed Pre-FEED design, initiated optimization studies

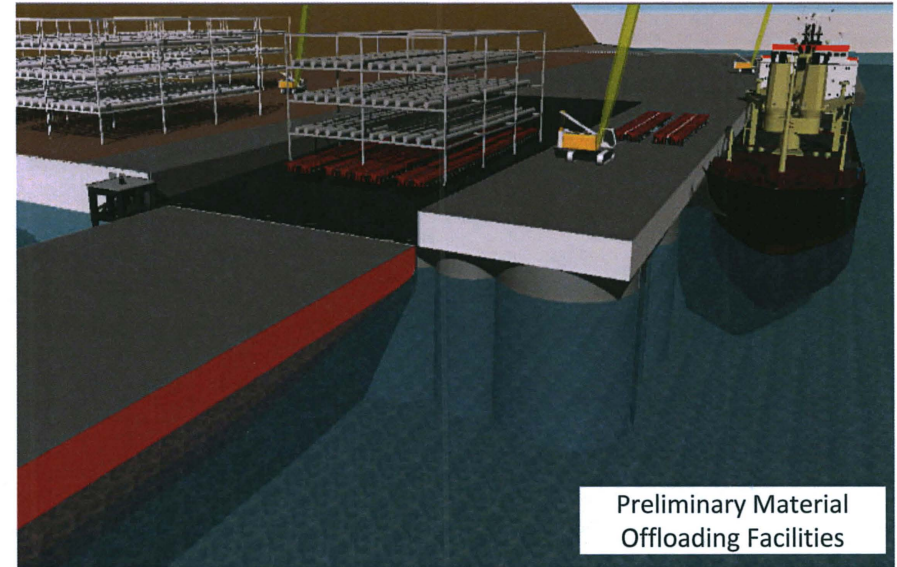
Advancing technical evaluations - drivers / containment

Continuing to improve marine terminal design / operations

- \* Completed navigation simulation work – incorporate findings
- \* Finished jetty trestle construction study

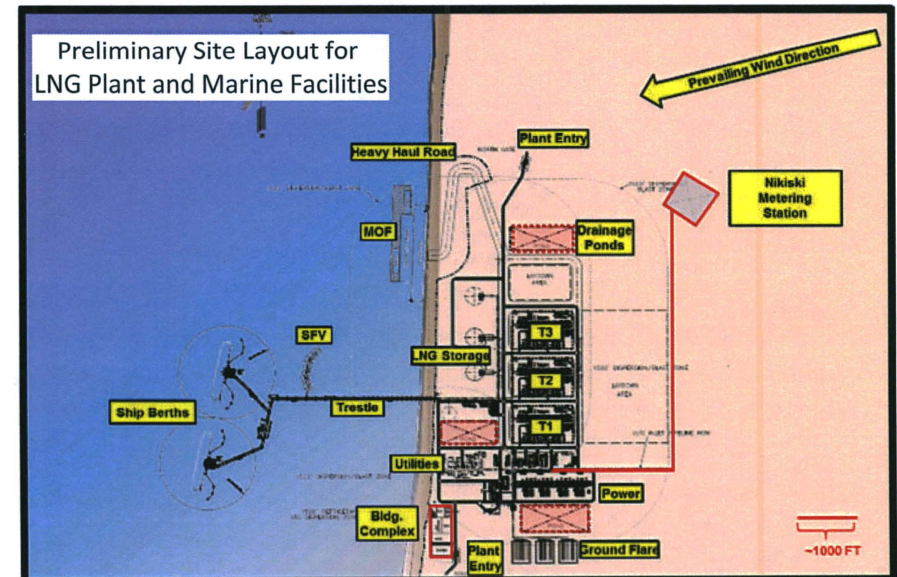
Successful 2015 G&G Program

- \* Drilled 61 on- / 25 off-shore boreholes / 20 monitoring wells
- \* ~240,000 feet of seismic (all depths)
- \* Completed ~60 square km of seafloor mapping / bathymetry



## Optimization Studies – Focus on Cost Reduction

1. Technical qualification of new gas turbine drivers - reduced kit
2. Use of current limiters to eliminate electrical equipment
3. Modularization improvements – revise layout, increase density
4. Evaluate alternative tank technology - reduce cost, schedule
5. Potentially reduce total LNG storage capacity
6. Reduce material offloading facility size
7. Evaluating alternative ice management options



# Marine Video

Alaska LNG™

**Initial design scope 91% complete through end of 2015**

**Pipeline materials design and testing in progress**

- \* Evaluating weld processes / procedures
- \* Evaluating alternative coating designs / applications
- \* Full scale testing of 42" pipe completed
- \* 48" test pipe ordered and expected arrival in 2Q16

**Continued engagement with federal pipeline regulator (PHMSA) to confirm design basis / align on special permits**

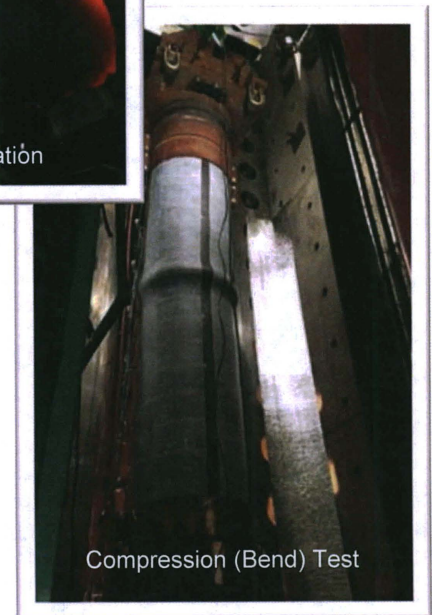
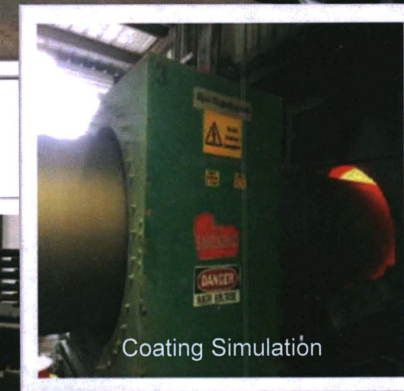
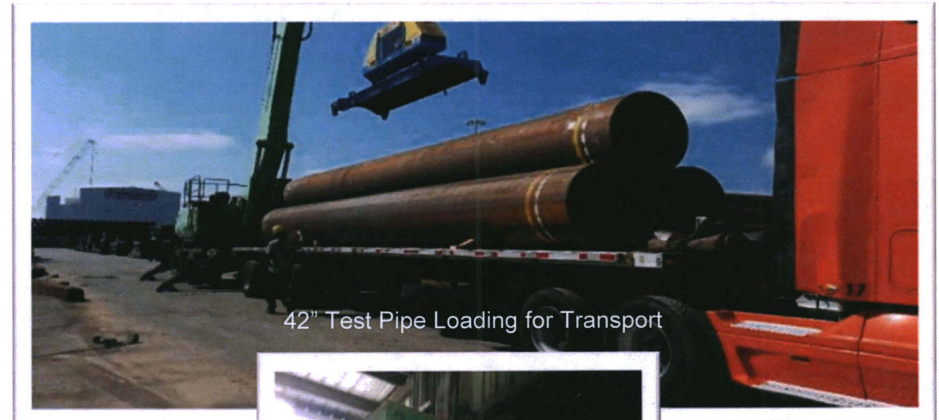
**Evaluating cost / schedule impacts of 48" pipeline**

- \* All 48" engineering deliverables underway
- \* Cost estimate in final stages of development
- \* Offshore installation feasibility studies underway
- \* Decision for 42" vs. 48" pipeline expected in April 2016

### Optimization Studies – Focus on Cost Reduction

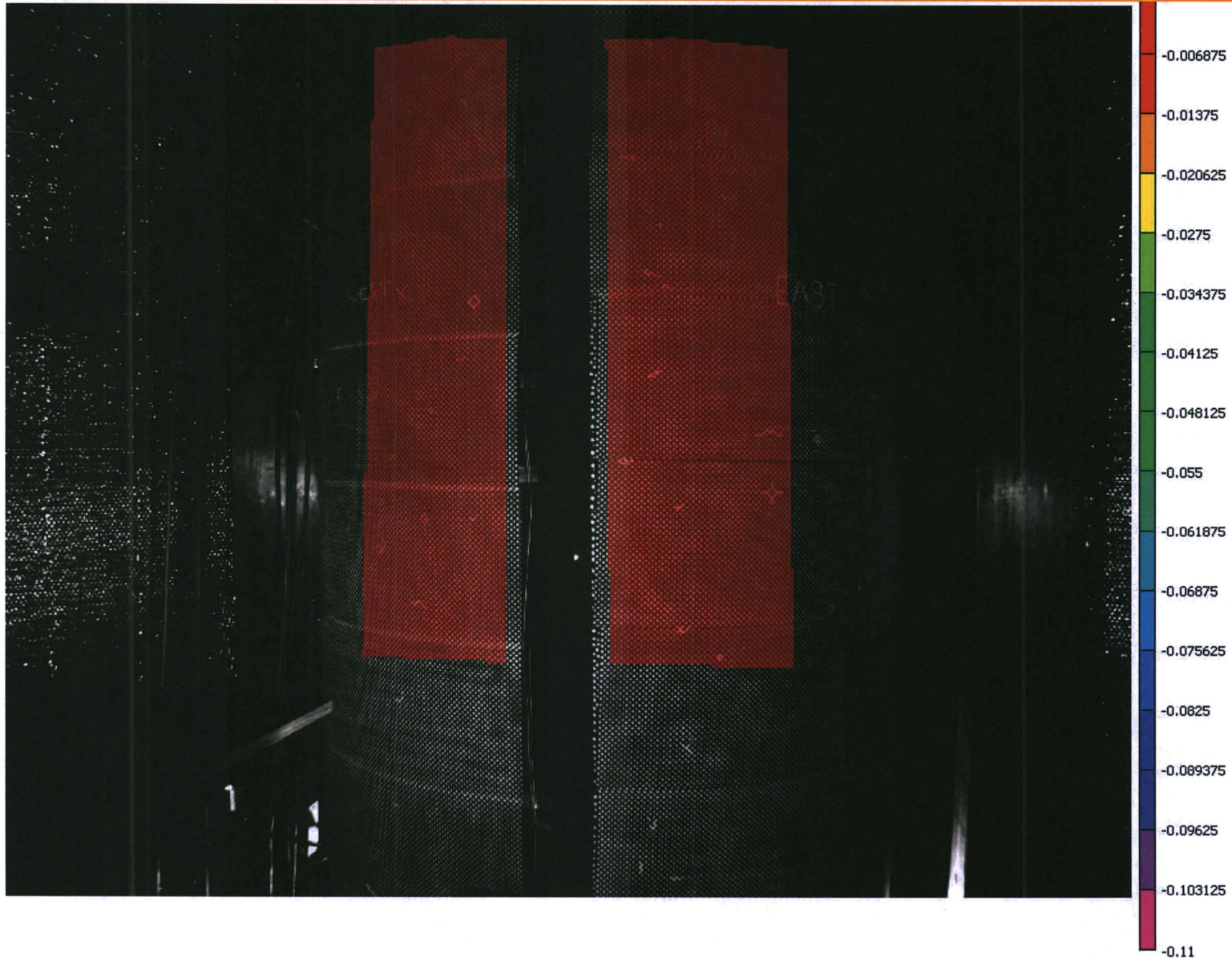
1. Construction – fine-tune pipeline route, reduce gravel
2. Camps – capture logistics and procurement opportunities
3. Pipeline design – safely increase valve / crack arrestor spacing and evaluate heater station requirements
4. ASAP Project – cooperation on routing and data sharing

*5 PIPE TYPES THROUGHOUT  
800 MILES.*



# Full Scale Pipe Test (compressive)

Alaska LNG™



# Gas Treatment Plant Update

Completed initial design scope, initiated optimization work

Finished design and execution plan to support cost estimate

Continued integration / optimization work with PBU

Refined site / camp layout

Completed field program in support of execution planning

- ✦ Confirmed winter dredging / assessing maintenance requirements
- ✦ Gravel sourcing and water reservoir location

CO<sub>2</sub>

450 MCF DAILY  
STRIPPED

CAN OF  
4 GRAMS = COKE

4 TRILLION OVER THE LIFE

## Optimization Studies – Focus on Cost Reduction

1. Reduce total module weight / layout optimization
2. Electrical design - meet required load with min equipment
3. Machinery selection –highest reliability / lowest cost
4. Review plan utilities for optimization opportunities
5. Streamline project execution plan to identify lowest cost



# Labor Update

## Finished Alaska LNG Labor Study

- ✦ Sharing results with key stakeholders / Alaska Dept. of Labor
- ✦ Incorporating key finding into Alaska LNG labor strategy

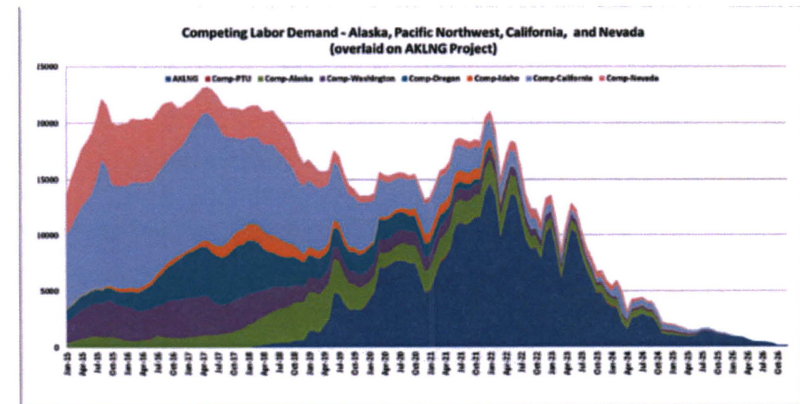
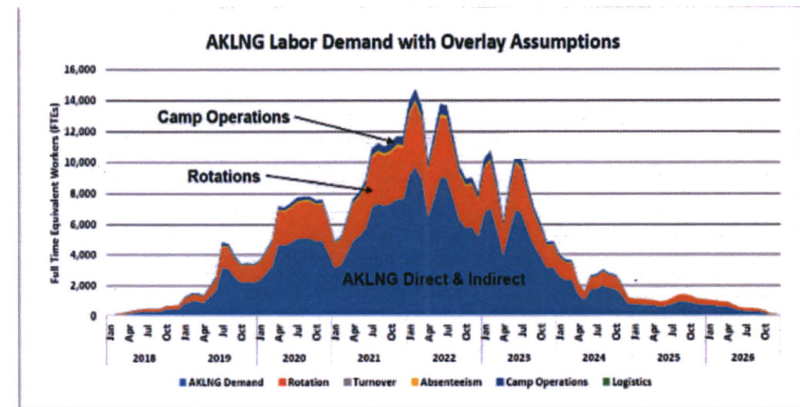
## Key Findings / Recommendations

- ✦ Project labor demand exceeds current Alaska capacity
- ✦ Competing global projects will challenge labor acquisition
- ✦ Maximize use of Alaskans / focus on workforce development
- ✦ Project Labor Agreements can minimize contingency and risk impacts to EPC bidding

**Strong coordination with AK Dept. of Labor & Workforce Development, Alaska Native corporations, training providers**

## Optimization – Focus on Cost Reduction

1. Evaluate potential impacts of 48" pipe
2. Finalize labor sourcing strategy
3. Develop structure and plan for Project Labor Agreements
4. Develop skills training roadmap and timing



## Study focus on construction-related craft labor

Pipefitters, welders, ironworkers, carpenters, scaffolds, sheet metal workers, boilermakers, equipment operators, truck drivers, instrument technicians, insulators, electricians, laborers, etc.

# Logistics Update

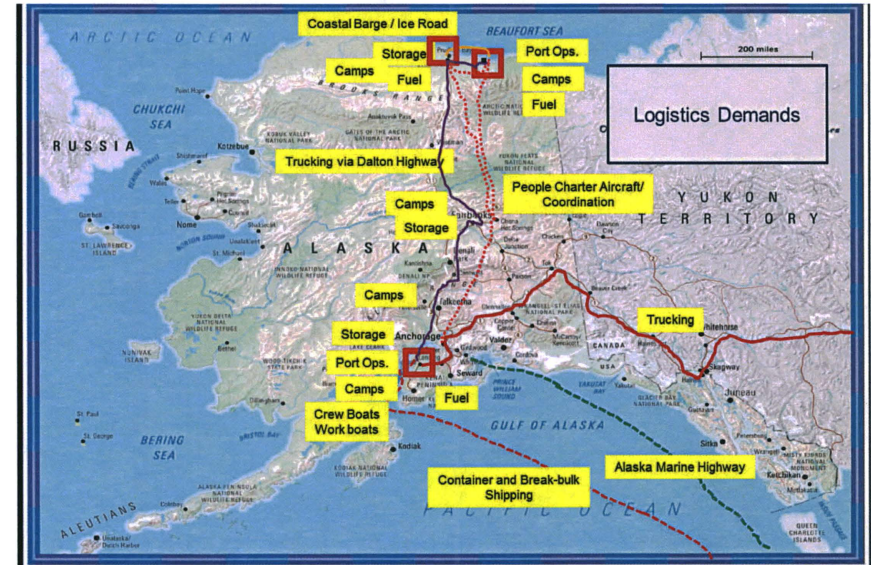
## Completed Alaska LNG Logistics Study for Pre-FEED

- ✦ Sharing results with key stakeholders / AK Dept of Labor
- ✦ Incorporating key findings into Alaska LNG execution plans

## Key findings / recommendations for managing

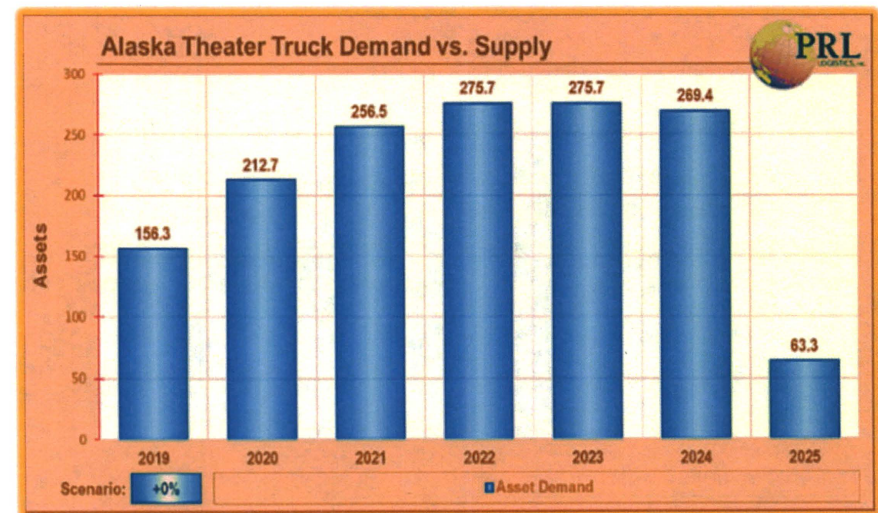
- ✦ Trucking equipment and driver capacity
- ✦ Logistics standards, training and certification requirements
- ✦ Alaska Railroad utilization
- ✦ Coastal barges and tugs
- ✦ Aviation capacity

**Strong coordination with AK Dept. of Transportation and local industry to develop Alaska logistics capabilities for trucking, rail, marine transport, airfreight, facilities**



## Optimization – Focus on Cost Reduction

1. Optimize project-wide logistics routes, transport alternatives
2. Evaluate identified opportunities for most efficient methods to move materials and equipment
3. Identify logistics infrastructure synergies across project
4. Incorporate into project execution, contracting strategies



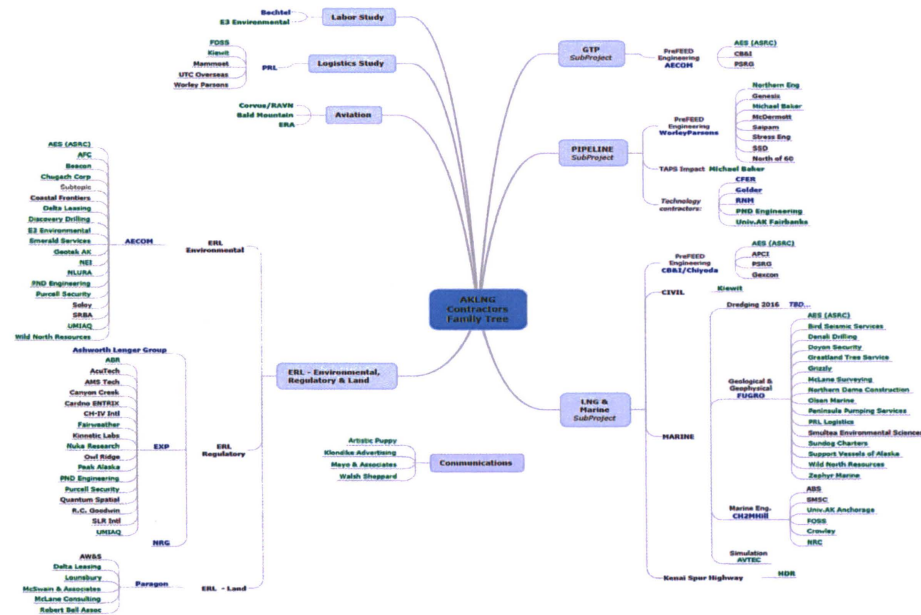
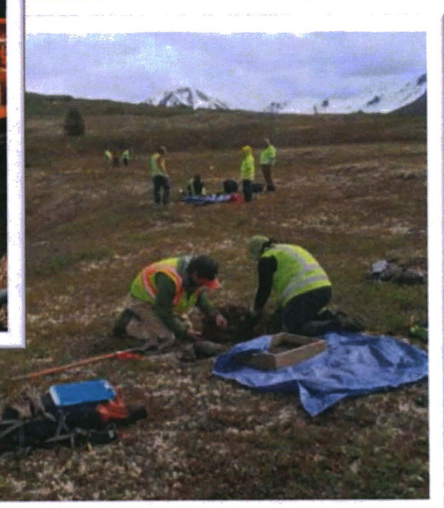
# Contracting Approach

## Combine 'Global LNG' and 'Local Alaska' skills / experience

- \* Expertise of Alaska businesses leveraged via global prime contractors
- \* Alaskans know State regulations, requirements and processes
- \* Ensure commitment to communities where we work

## Near Term Contracting Goals

- \* Complete "market engagement" with qualified FEED/EPC bidders
- \* Continue public business information sessions
- \* Request FEED bids from qualified prime contractors
- \* Networking forums for global / Alaska contractors (2Q-3Q)
- \* Complete Alaska "focus group" sessions on execution plans



# Summer Field Season / Regulatory Work **Alaska LNG™**

## Successful 2015 Field Season - 250,000+ hours in field

- \* Supported pipeline routing and siting of project facilities
- \* Captured key lessons learned – continue to build on success

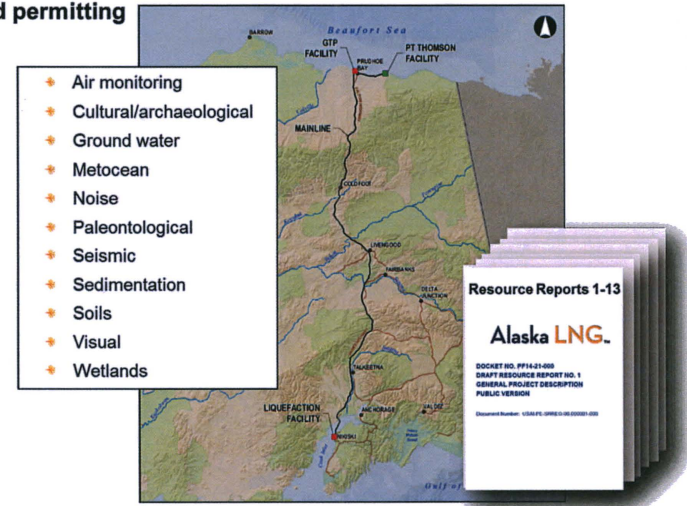
## Progressing 2016 field planning – last season before filing

- \* “Wrap up” outstanding field work, fewer hours / focused effort

## Federal Environmental Regulatory Agency (FERC) filing

- \* Nearing completion of second draft Resource Reports
- \* Capturing stakeholder input ahead of 1Q/2Q submission

Continued data collection throughout Alaska to support engineering, FERC filing, and permitting



### Pre-Filing

#### Draft Resource Reports

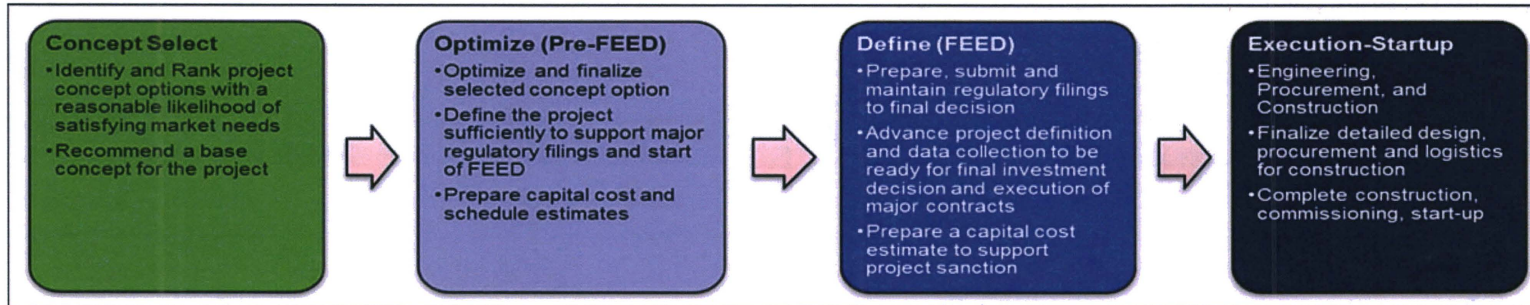
1. Project Description
2. Water Use & Quality
3. Vegetation & Wildlife
4. Cultural Resources
5. Socioeconomics
6. Geological Resources
7. Soils
8. Land Use, Recreation & Aesthetics
9. Air & Noise Quality
10. Alternatives
11. Reliability & Safety
12. PCB Contamination
13. LNG Information

### Filing – planned October 2016

#### Natural Gas Act Section 3 Application

- Exhibit A -- Articles of incorporation and bylaws
- Exhibit B -- Statement of corporate and financial relationships
- Exhibit C -- State authorization
- Exhibit D -- Agreement between the applicant and border facilities
- Exhibit E -- Safety and reliability statement
- Exhibit E-1 -- Earthquake hazards and engineering
- Exhibit F -- “Final” Resource Reports**
- Exhibit G -- Location of facilities
- Exhibit H -- Statement regarding additional federal authorizations





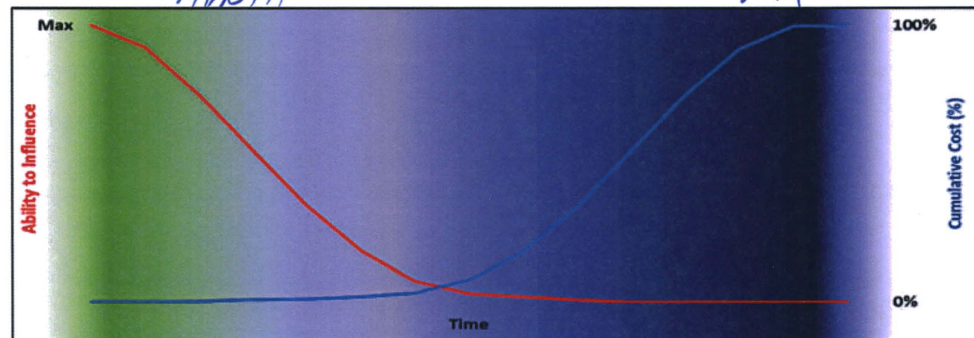
30M  
YEAR

30M  
MONTH

**Project Influence Curve**

\$ 30M  
WK

\$ 30M  
DAILY



## Forward Plans

- \* Select pipeline size, identify offtakes and complete integrated hydraulic model
- \* Complete pre-FEED deliverables
- \* Continue cost optimization work to improve project competitiveness - lowest 'cost of supply' wins
- \* Progress FERC Resource Report Draft 2 and EIS application