

Alaska Department of Transportation & Public Facilities



Winter Maintenance Challenges in Alaska

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Alaska – Land of Extremes

Largest State: larger than the next four largest states combined

Heaviest Annual Snowfall: 974.5 inches at Thompson Pass near Valdez

Tallest Mountain in North America: Denali at 20,320 feet

Most Glaciers in the Nation: 29,000+ square miles or 5% of the State

Shoreline: 33,904 miles

Temperature Extremes: 100F in Fort Yukon and -80F in Prospect Creek

Permafrost: 80% of State underlaid by ice-rich permafrost

Barrow: Northern most town in US. Three months without the sun and 82 days without the sun setting



Alaska Department of Transportation and Public Facilities

- Over 15,000 Miles of Public Roadway
- Over 5,600 Miles of State owned road
- 845 Bridges
- 247 Rural Airports
- 28 Harbors
- 720 Buildings (DOT owned or managed)
- Alaska Marine Hwy System
 - 33 ports of call
 - 11 vessels
 - 3,500 miles



Maintenance and Operations

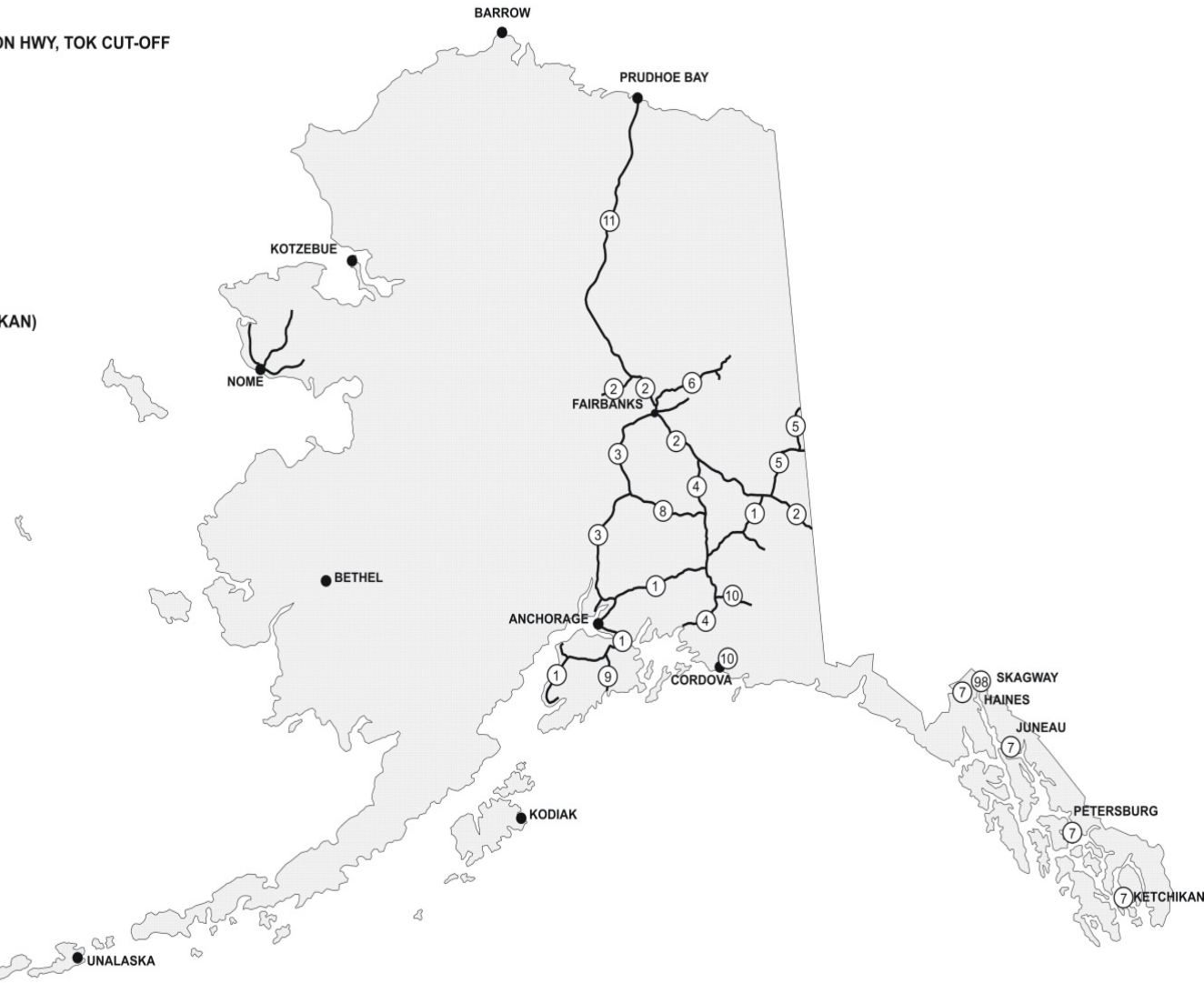
- Nearly 1000 M&O/SEF Employees Statewide
- 79 Maintenance Stations
- 3944 Pieces of Equipment
- \$170M M&O Operating Budget
- \$34M SEF Operating Budget
- \$55M Snow and Ice Control
- 18,000 Tons of Salt Annually
- \$50M FHWA PM Program
- \$5-10M FAA Surface Maintenance
- \$3-20M Deferred Maintenance

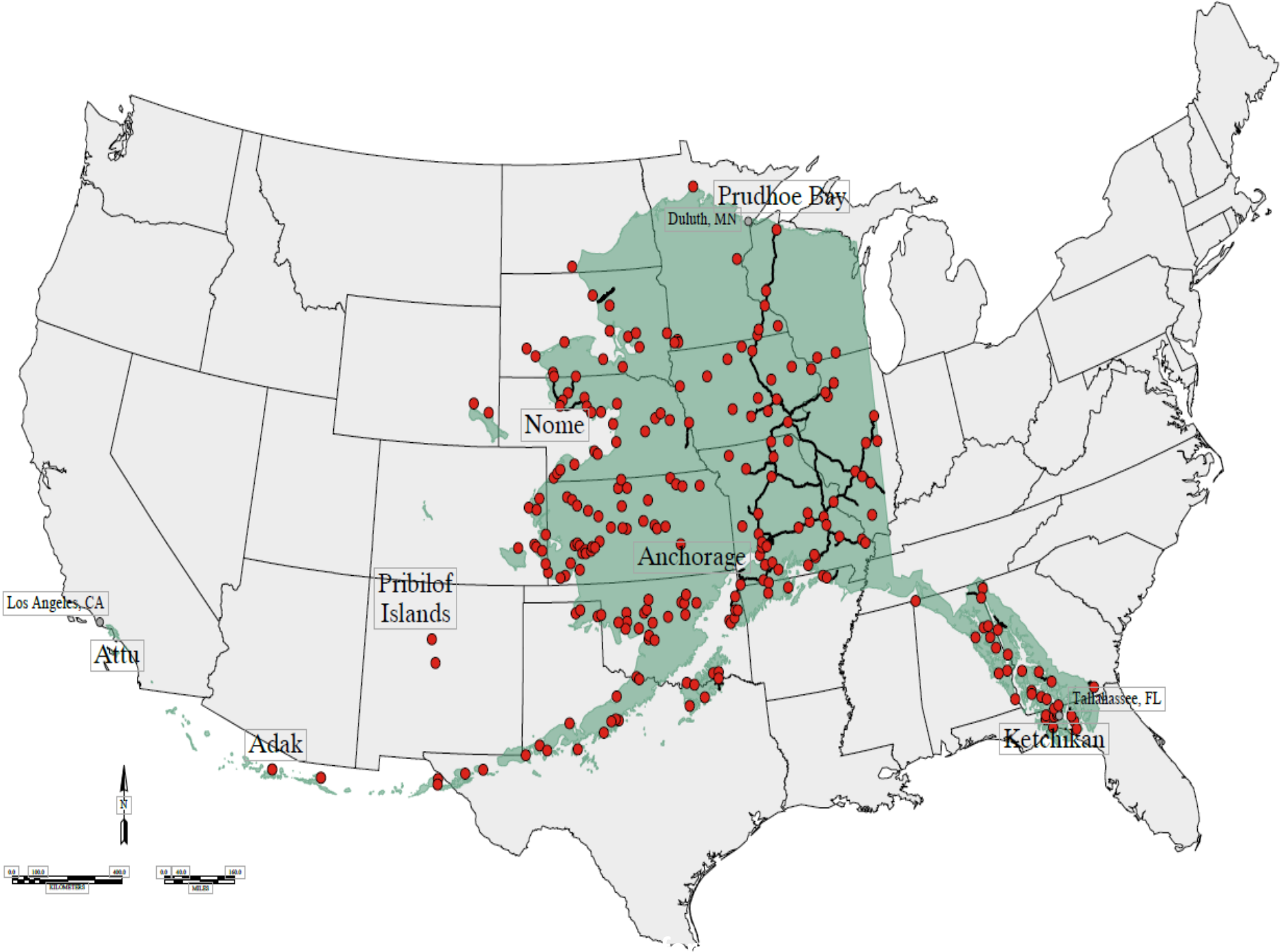


Alaska Highway System

ALASKA ROUTE NUMBERS

- ① STERLING HWY, SEWARD HWY, GLENN HWY, RICHARDSON HWY, TOK CUT-OFF
- ② ALASKA HWY, STEESE HWY, ELLIOTT HWY
- ③ GEORGE PARKS HWY
- ④ RICHARDSON HWY
- ⑤ TAYLOR HWY
- ⑥ STEESE HWY
- ⑦ HAINES HWY
GLACIER HWY, EGAN DRIVE (JUNEAU)
NORDIC DRIVE, MITKOFF HWY (PETERSBURG)
SOUTH TONGASS HWY, NORTH TONGASS HWY (KETCHIKAN)
- ⑧ DENALI HWY
- ⑨ SEWARD HWY, SEWARD TO STERLING HWY
- ⑩ COPPER RIVER HWY, EDGERTON HWY
- ⑪ JAMES DALTON HWY
- ⑨⑧ KLONDIKE HWY







Fred Meyer

-820

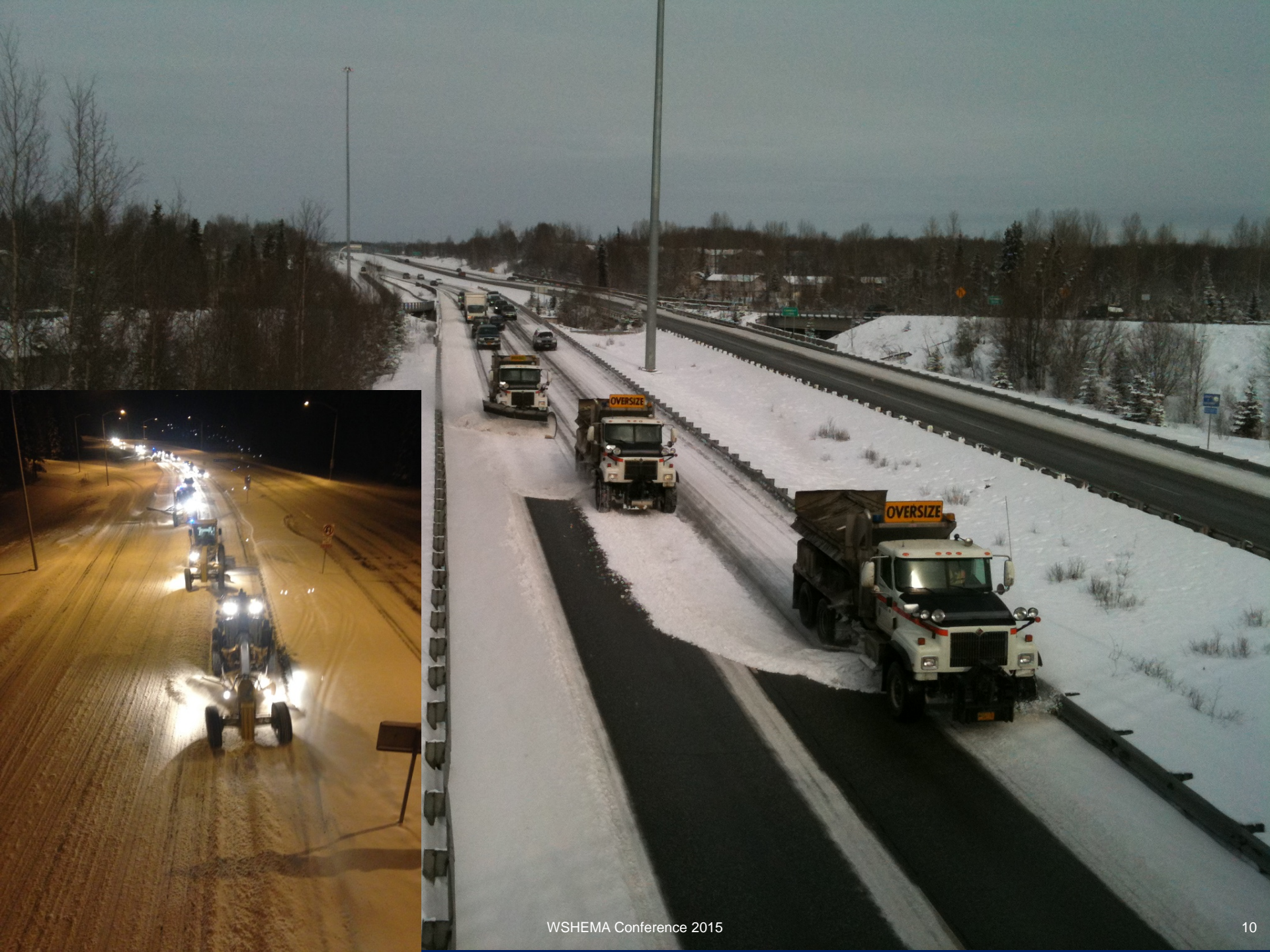
UNUSUAL PREMIUM DEST.

2.42 2.62 3.39



Urban Life





Rural (Bush) Life



Rural (Bush) Life



Normal Rural Mail Delivery









Winter Maintenance Challenges

- **Extreme Temperatures:** -80F to +100F
- **Extreme Snowfall:** 1.5' to 80'
- **Extreme Geography:** Maritime to Arctic
- **Extreme Cost:**
 - Bulk Salt - \$145/ton
 - Bagged Salt - \$400/ton
 - Organic Additive - \$2.40+/gal
 - Mag Chloride - \$3.00+/gal
 - Diesel - \$9-\$10/gal in Villages
 - Equip Shipping – up to \$60,000 ea
- **Changing Climate**
- **Declining Budget**



Winter Maintenance Challenges

- **Fly it in and fly in out**
- **Fly in the fuel**
- **Spare parts**
- **Fly it back, or stranded asset**



Maintenance Challenges







Changing Weather Patterns

Temperatures Increases

- Permafrost Thawing Affecting Infrastructure Support
- Increasing Risk of Landslides
- Diminishing Sea Ice and Increasing Coastal Erosion
- Increase in Freeze-Thaw Cycles

Precipitation Changes

- Increases in Storm Frequencies and Intensities
 - Combined Effect on Glacial Run-Off and Ice Break-Up
 - Stream migration and debris effects
- Possible Contributing Effect on Permafrost Thawing



Permafrost Problems



Longitudinal Shoulder Cracking



Thaw Settlement



Ice-Rich Permafrost Thawing



Ice-Rich Permafrost Thawing



The Blob



Recurring Ice Storms



Winter Maintenance Technologies

- 64 RWIS Installations
- Expanding Highway Anti-icing Program
 - 11 New Enhanced Salt Brine Units
- Airport De-icing
 - Urea and E36
- Six Tow Plows
- Smart Snowplows
- Automated Bridge De-icing System (E36)
- Telematics
- Mobile Weather Detection System
- Alaska Specific MDSS



2/2/2011
SALT BRINE APPLICATION KENAI URBAN



Winter Maintenance Technologies



- Need for ice breaking technology
 - Raiko Icebreaker
 - Ultramech Arctic Shark
 - Alaska Made

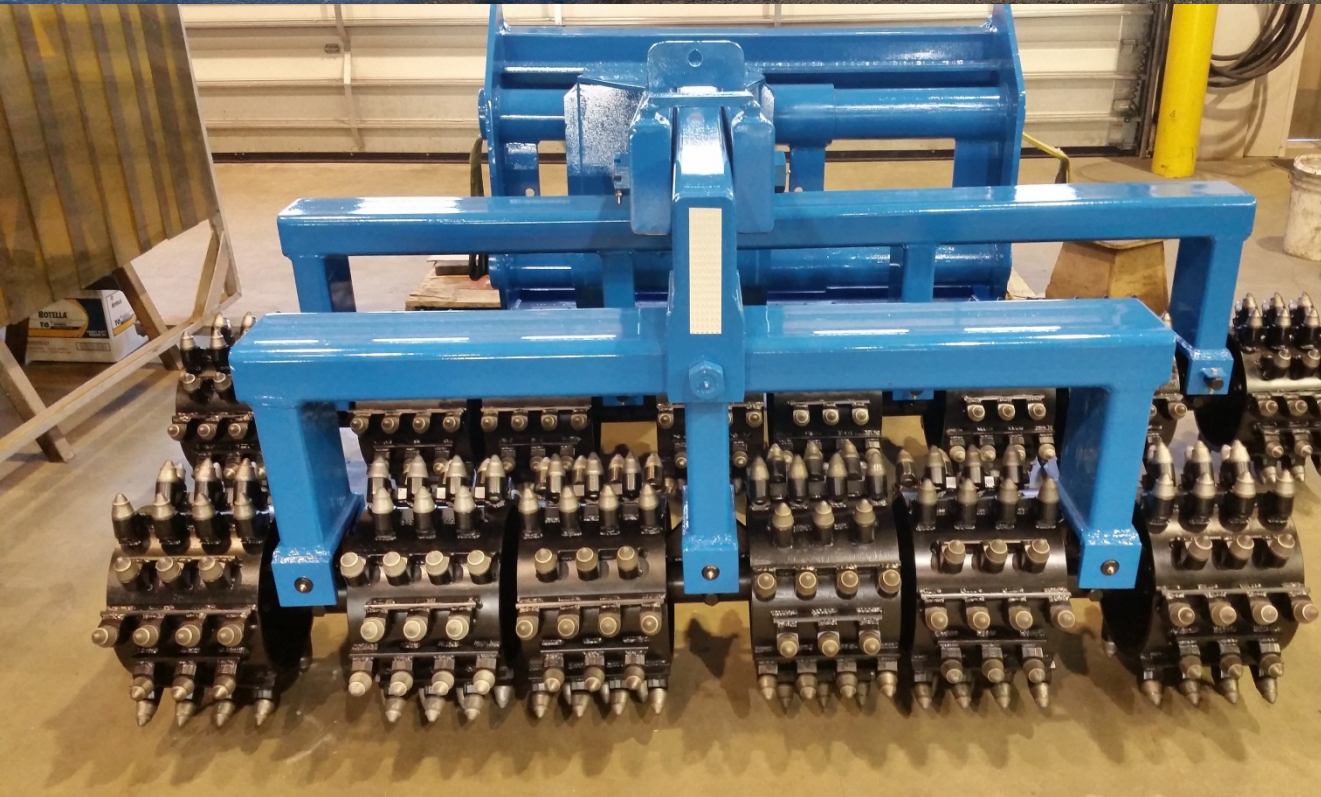


Ice Breaking Technology











VAT001

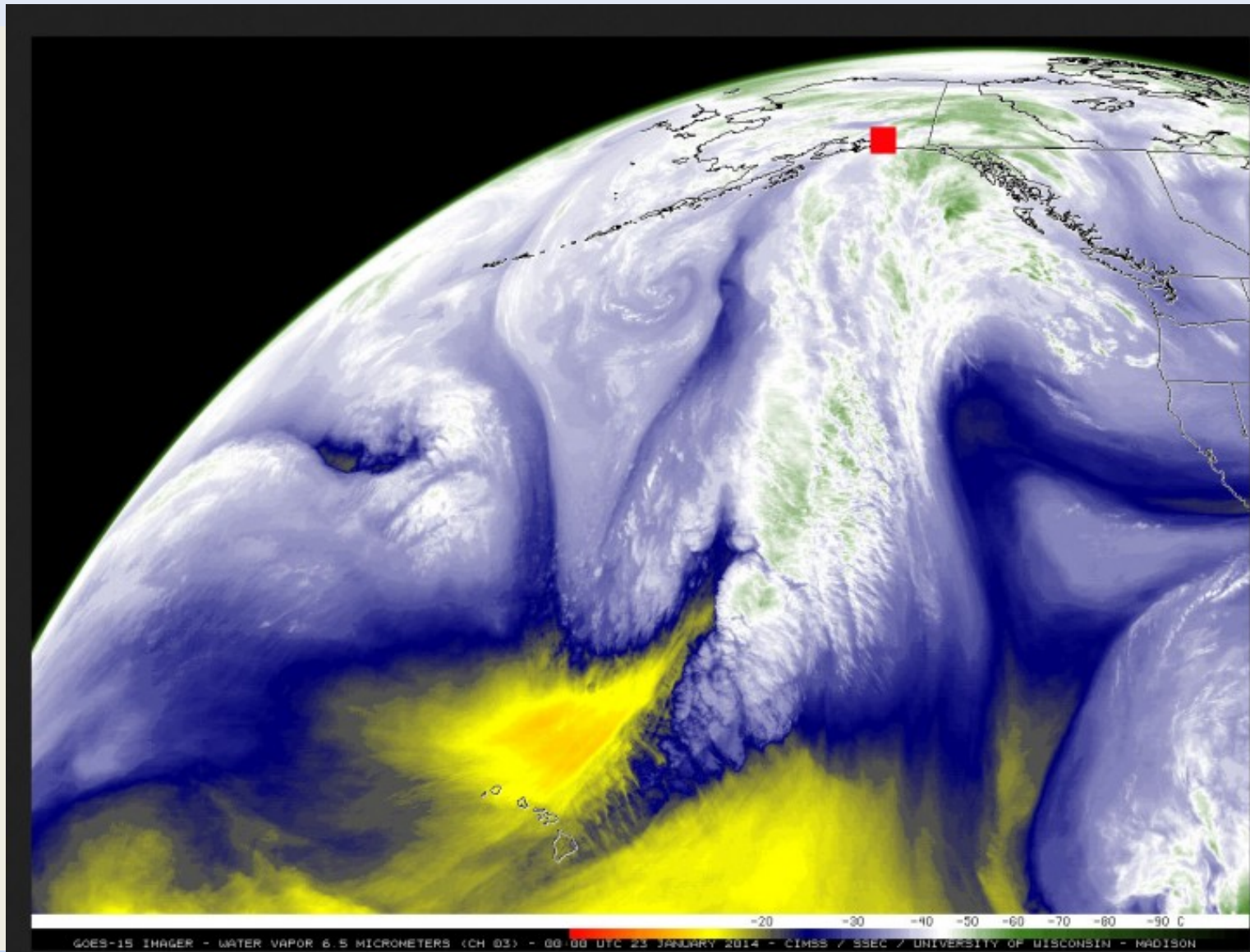
ConocoPhillips

2500 HD

LEPD

LEPD

2014 Pineapple Express





The Winter that Wasn't

- While the Central and Eastern US experienced the most severe winter in the past decade or two, Alaska experienced a relatively mild winter that was especially notable for the unusually warm January
- Ridge of high pressure off the Pacific Coast pushed warm air and rainstorms to Alaska instead of California (where they belong!)
- January 2014 was the warmest winter in Alaska's history with temperatures as much as 40°F above normal
- The all-time warmest January temperature ever observed in Alaska was tied on January 27 when the temperature peaked at 62°F at Port Alsworth / Lake Clark. Nome, Denali Park Headquarters, Palmer, Homer, Alyseka, Seward, Talkeetna, and Kotzebue all set January records



Valdez, AK, USA

Ammunition Island

Thompson Pass Station

4

Snowslide Avalanche Location

Snowslide Avalanche Path

© 2013 Google

Image © 2014 DigitalGlobe
Image Landsat

Google earth



Setting the Stage

- 18 day long weather system / avalanche problems
- At Thompson Pass 80" of snowfall Jan 1st – 23rd (250" Nov 11 to end of Jan)
- At 4000' an estimated 5' accumulated between 1/14th – 17th over cold, dry, low density 1/13th snow
- The huge avalanche was conditioned by three consecutive days of record high or record high minimum temperatures and then triggered by days of record anomalous rainfall
- Between Jan 21 and 25, 6 to 12 inches of rain fell



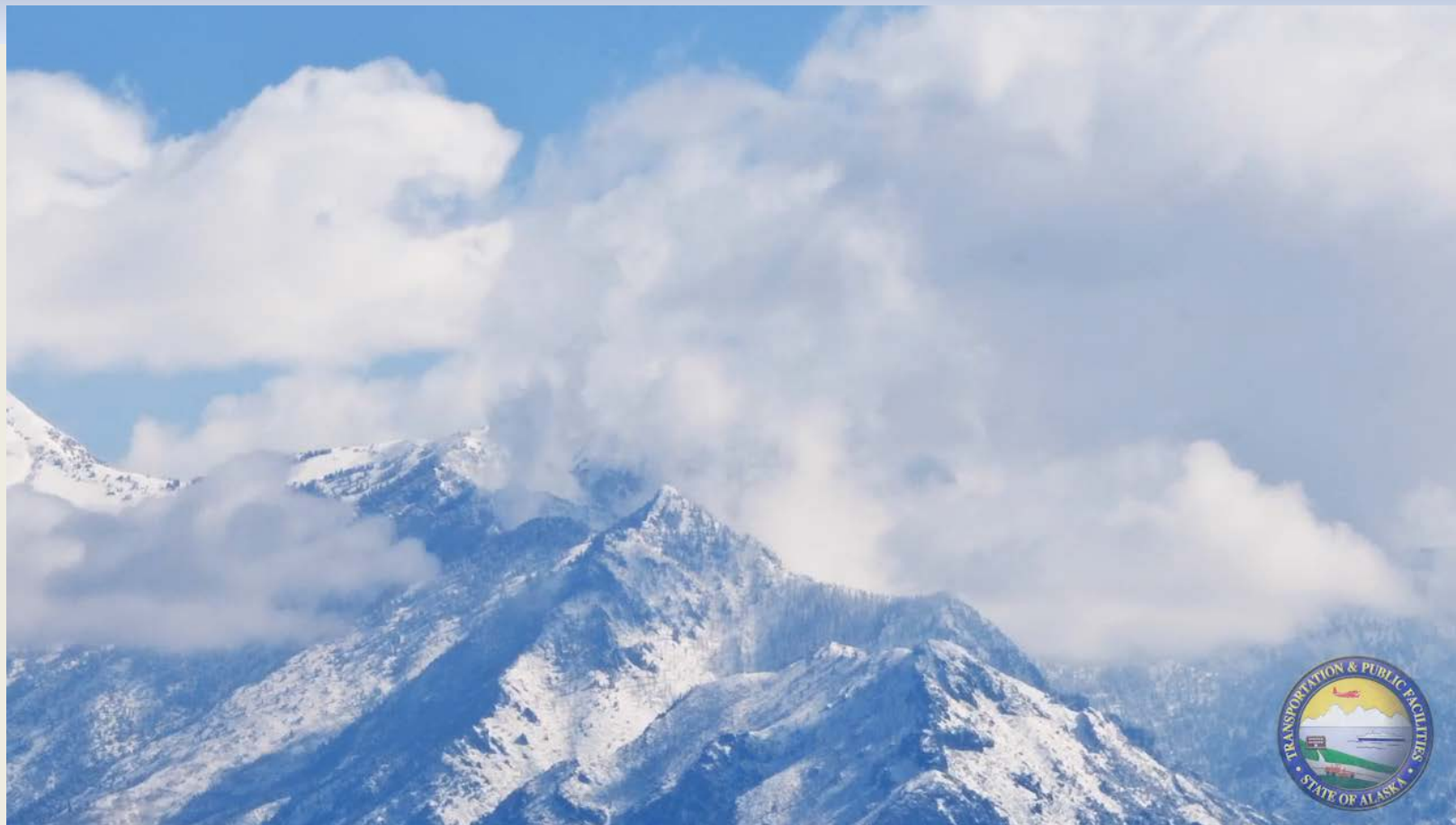




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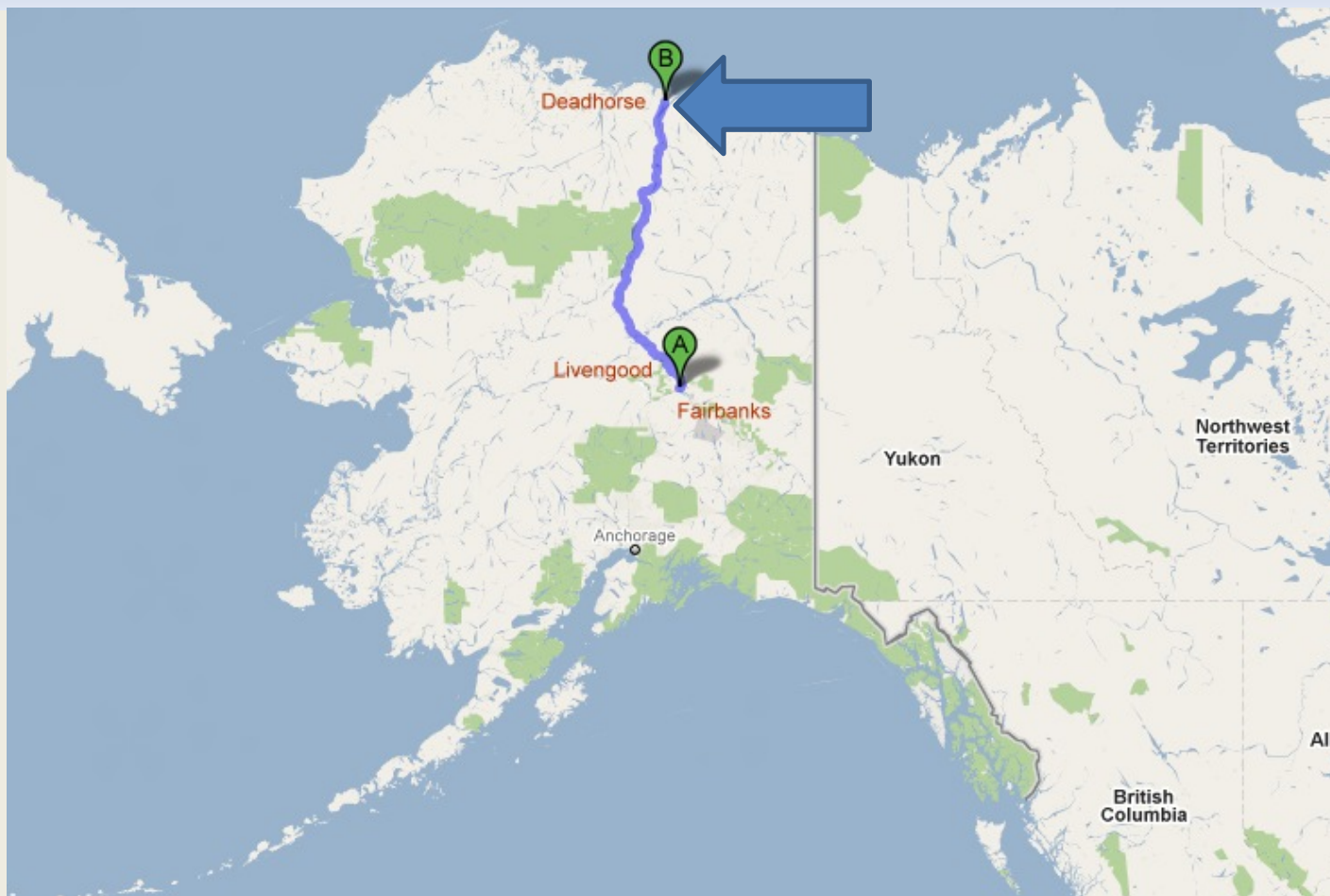


Video Summary





2015 Dalton Highway Flood









The Flood – Cause and Effect

Hydrology

- Heavy rain events in the Brooks Range - Fall 2014
- Sag River frozen all the way to the bottom
- Water pushed to surface, expanded beyond typical flood plain
- “A perfect sequence of snowfall, temperatures and winds lined up to create a massive sheet of ice that expanded for miles”

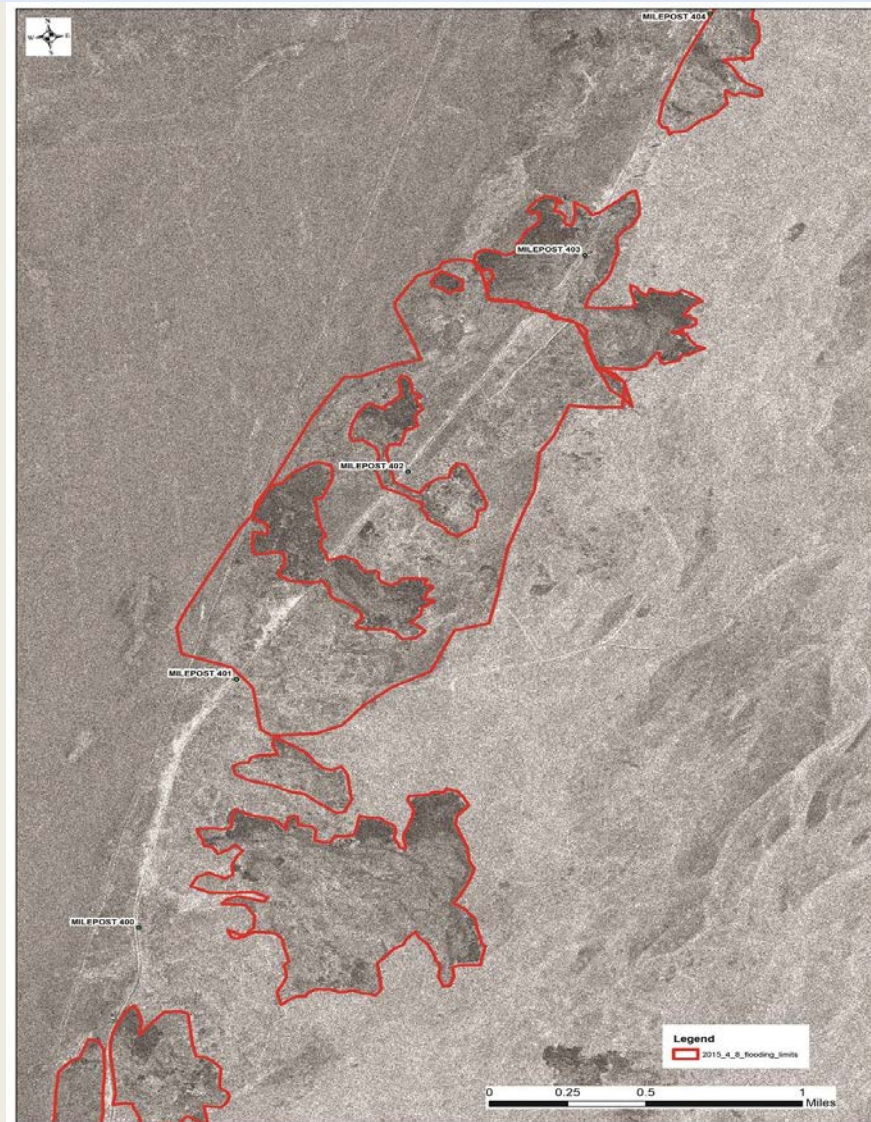








Synthetic Aperture Radar (SAR) Images





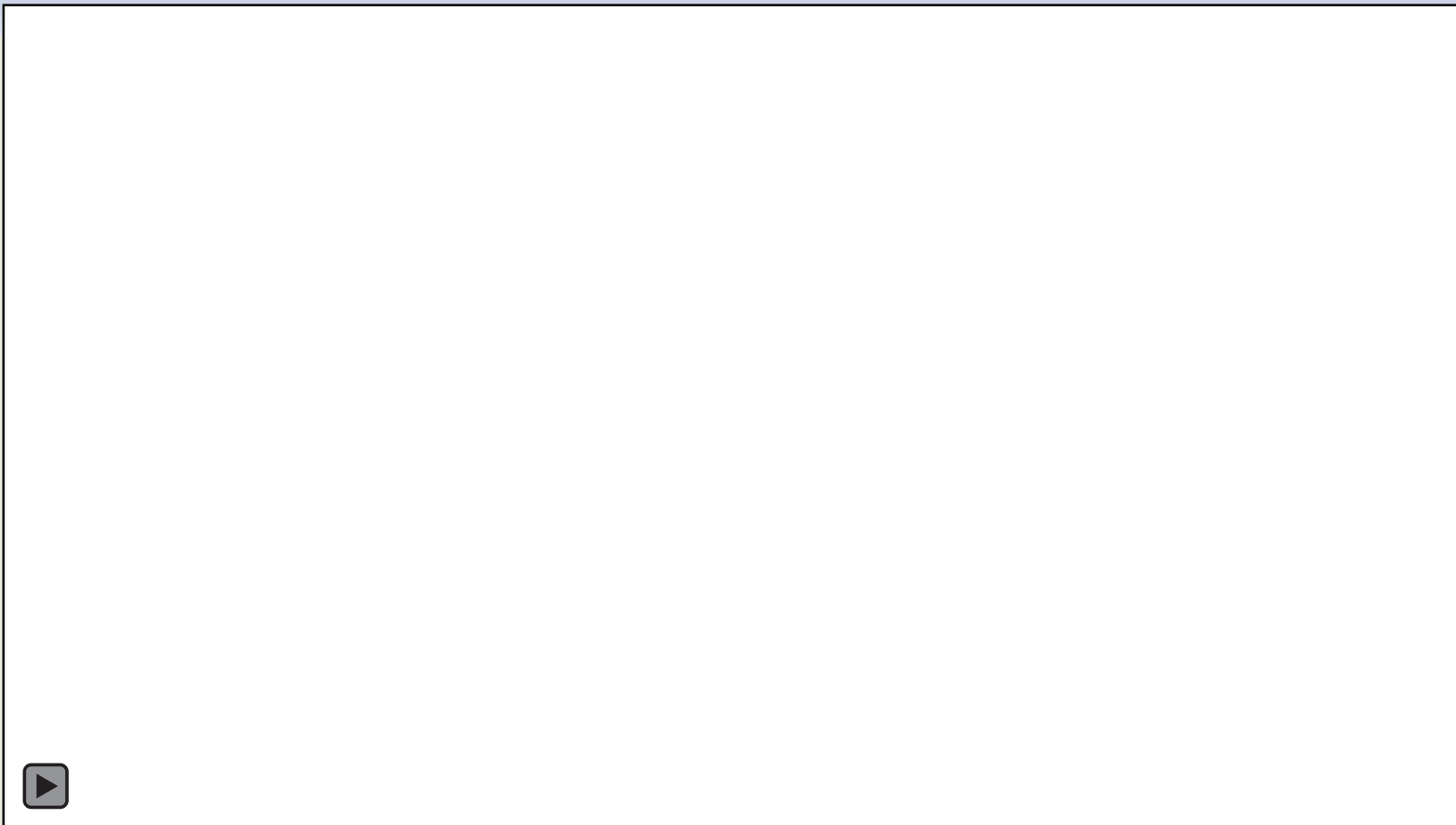


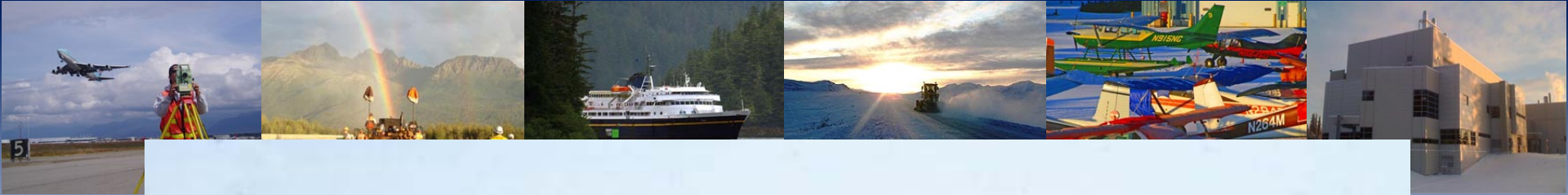






Flood Video









Dalton Disaster

- Unified Incident Command

- ADOTPF – IC
- ConocoPhillips
- BP
- ExxonMobil
- Alyeska
- North Slope Borough





Fuel/Supply Haul Across Tundra





UNLEADED	DIESEL
9.25	9.24





































Repair work begins

May 28, 2015



Rolling....
June 5, 2015



Welcome to Alaska

