Dept. of Environmental Conservation

Presentation to Alaska Climate Impact Assessment Commission
January 24, 2007

What Knowledge Can DEC Offer

- Comparison of mutual duties Commission / DEC
- How climate change already impacts pollution, health and environmental management done by DEC.
- Likely role DEC would serve if greenhouse gases become regulated.
- Knowledge from other state’s Task Forces accessible to the Commission

Alaska's Environmental Policy AS 46.03.010

- a) "It is the policy of the state to **conserve, improve, and protect its natural resources and environment** and control water, land, and air pollution, in order **to enhance the health, safety, and welfare of the people of the state and their overall economic and social well being".**

- b) "…to improve and coordinate…plans, functions, powers and programs…to develop and manage the basic resources of water, land, and air to the end that the state may full its responsibility as trustee of the environment for the present and future generations."

Statutory Duties of DEC

excerpts from AS 44.46.020

- “primary responsibility for coordination and development of policies, programs, and planning related to the environment of the state and of the various regions of the state;”
- “primary responsibility for the adoption and enforcement of regulations setting standards for the prevention and abatement of all water, land, subsurface land, and air pollution, and other sources or potential sources of pollution of the environment;”
- “**promote and develop programs for the protection and control of the environment of the state**;”
- “adopting regulations for “the regulation of sanitation and sanitary practices in the interest of public health.”

Duties of the Commission that Interface with DEC duties

- Excerpts from HCR 30:
- (1) **assess the current and potential effects** of climate warming trends on the **citizens, natural resources, public health, and economy** of the state, in particular the adverse effects on …**community …infrastructures**;

- (2) **estimate costs to the state** and its citizens of adverse effects associated with climate charge;

- (4) **examine alternative measures to prevent and mitigate** the effects of flooding and erosion;

Duties of the Commission that Interface with DEC duties

- (5) develop **policies to guide infrastructure investments** in Alaska villages, cities, and boroughs that are most affected by flooding and erosion;

- (7) **investigate** and assess issues involving permafrost and **damage caused by permafrost**;

- (8) recommend **policies to decrease the negative effects of climate change**;

- (9) **identify and coordinate efforts of mutual concern with federal, state, and local agencies**;

DEC Program Based Impact Assessments

- Safe Food
- Preventing / Responding to Spills
- Investments for Water & Sanitation Facilities
- Clean Rivers, Streams and Lakes
- Clean Air

Safe Foods

Kristin Ryan, Director, Environmental Health

Locally Produced
Seafoods
Meats
Vegetables

Vibrio parahaemolyticus (*Vp*)

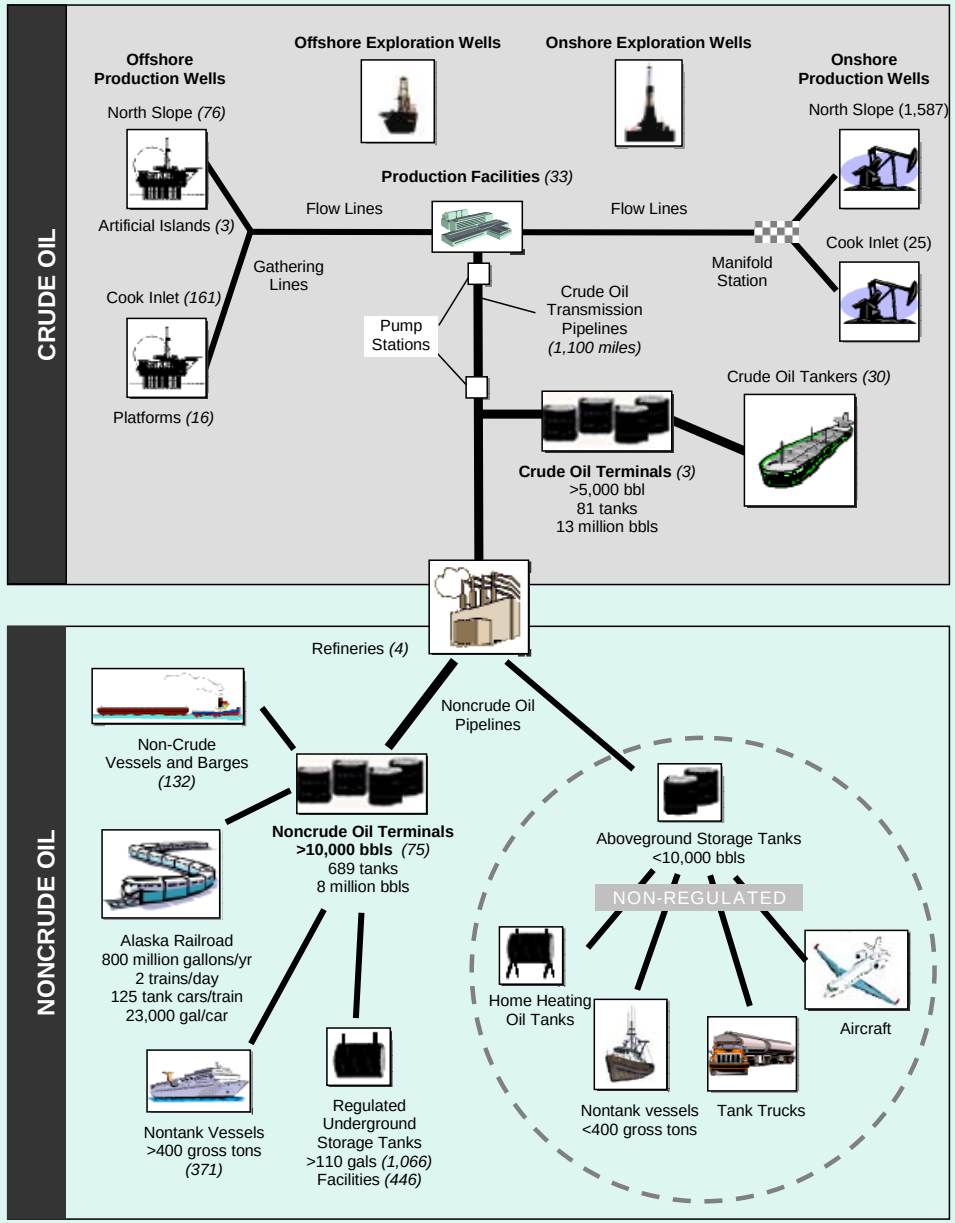
- *Vp* is a bacterium found in estuarine and marine waters and sediment.
- Grows excessively at or above 62° F water temperature.
- First recorded gastrointestinal illness outbreak from *Vp* in Alaska oysters occurred in July 2004.
- Two farms implicated in Prince William Sound.
- Farms were unable to sell oysters and were required to implement three year control plan.
- Entire industry was impact by media attention.

Increased Risk of Oil Spills

Larry Dietrick, Director, Spill Prevention & Response

Alaska's Oil Production, Transportation and Storage Network

The facilities designated as "non-regulated" are not required to have a state-approved oil discharge prevention and contingency plan. () indicates number of facilities.



Regulated Facilities

Oil terminals, exploration and production facilities are required to have a state approved oil discharge prevention and contingency plan. This includes:

- Onshore and offshore oil wells
- Noncrude bulk fuel storage greater than 10,000 barrels or 420,000 gallons
- Crude bulk fuel storage greater than 5,000 barrels or 210,000 gallons
- 15 oil pipelines

Kotzebue

Orca Oil - Cordova

Kaktovik

Red Dog

Northstar

Valdez Marine Terminal

Rural Bulk Fuel Farms

- Most of the bulk fuel farms serving rural communities along the coast and rivers are below the state threshold volumes for oil spill contingency plans
- Most of these same facilities, however, are required to have an EPA Spill Prevention, Containment and Countermeasure Plan

City tank farm – Holy Cross.

Shageluk – City tank farm.

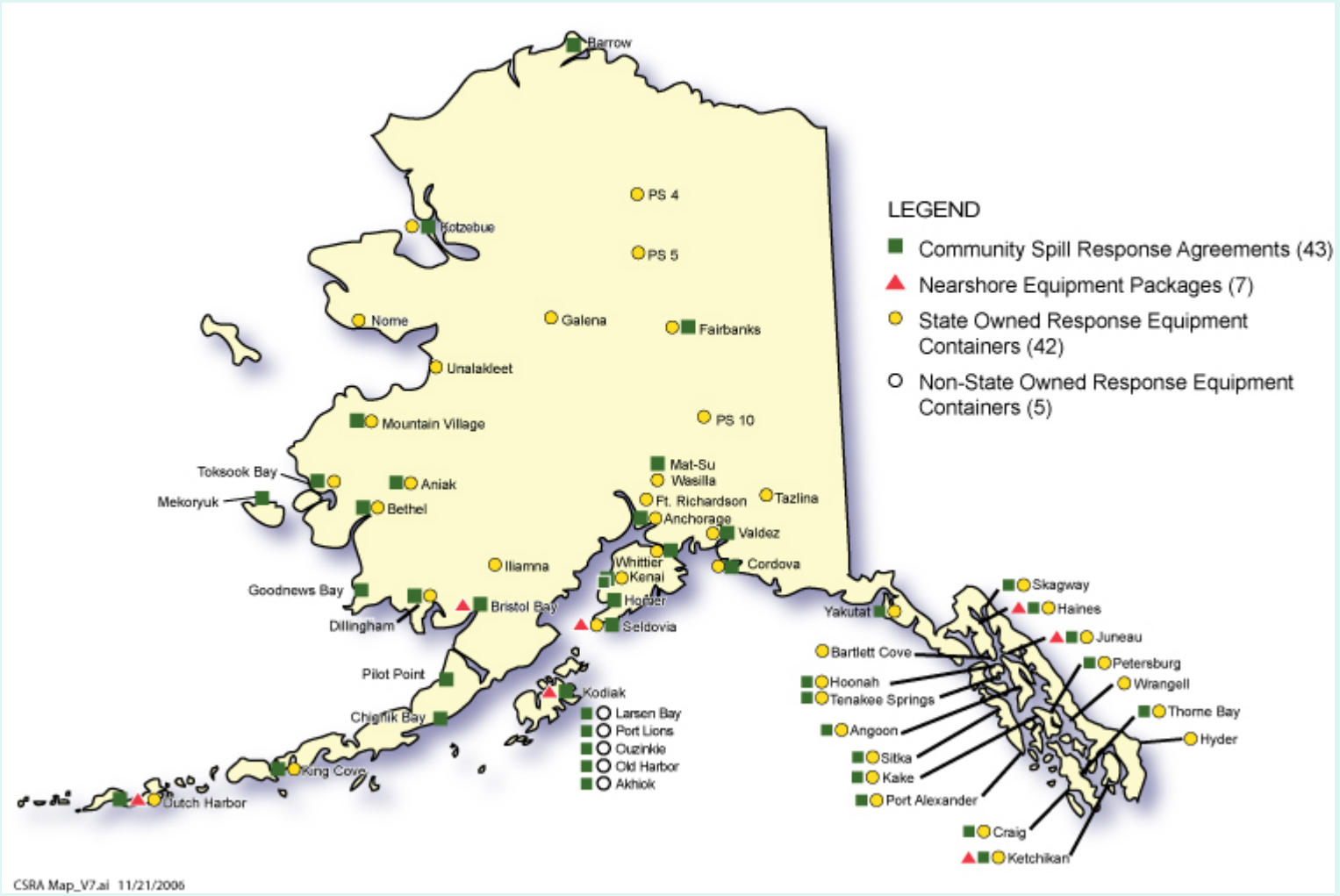
Spill Response

- All spills are required to be reported to DEC and EPA or the USCG
- Spill response is carried out using the Unified Command
- DEC maintains 43 formal response agreements with local communities
- 38 of these agreements are with coastal communities

Grayling - set up to pump.

Community Spill Response Agreements, Response Equipment Containers, and Nearshore Equipment Packages in Alaska

(as of November 2006)



Reconfiguring the barges – St. Mary’s

Facility Siting

- Oil wells, terminals and pipelines are sited and permitted through the existing land management and coastal zone regulatory framework
- A very high percentage of these facilities are in environmentally sensitive areas
- Spill avoidance is best affected through proper facility siting
- Alaska has a historical backlog of facilities sited in close proximity to water bodies

Saint George

Saint George

Kivalina -- 2002


Kivalina Measurements
As of 10/20/06
Connex
50 feet
School
150 feet

Kivalina -- Fall 2003

Diomede

Diomede

Diomede
Bering Sea Storm, 2004

Sanitation Infrastructure and Climate Change: Impacts to Public Health & Capital Investment

Bill Griffith, P.E.
Facility Programs Manager
Alaska Department of Environmental Conservation, Division of Water

Alaska Climate Impact Assessment Commission
January 24, 2007

For More Information:

- Arctic Climate Impact Assessment (ACIA) (www.acia.uaf.edu)

  4 Year Comprehensive Assessment (2000 – 2004)

  International Team

  18 Countries, more than 300 scientists and other experts

- Climate Change and Human Health: Infrastructure Impacts to Small Remote Communities in the North

  (*International Journal of Circumpolar Health, 64:5 2005*

  John Warren, James Berner, Tine Curtis; included as reference document)

Selected ACIA Key Findings:

1. Arctic climate is now warming rapidly and much larger changes are projected

- Widespread melting of glaciers and sea ice, and a shortening of the snow season
- Increasing precipitation, shorter and warmer winters, and substantial decreases in snow cover and ice cover

Selected ACIA Key Findings:

2. Many coastal communities and facilities face increasing exposure to storms

- Thawing permafrost weakens coastal lands
- Risk of flooding in coastal wetlands is projected to increase
- Communities in coastal zones are already threatened or being forced to relocate, while others face increasing risks and costs

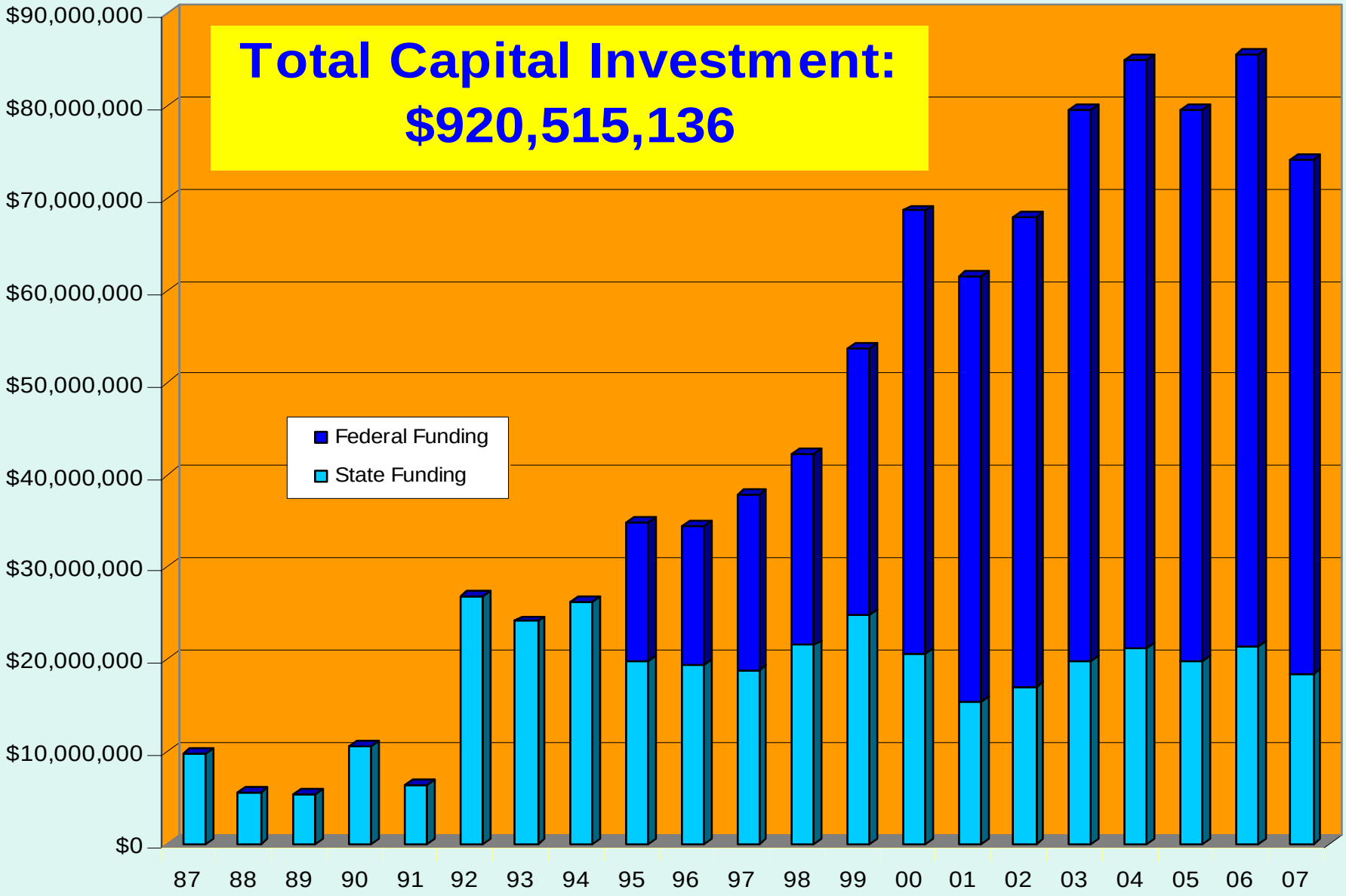
Selected ACIA Key Findings:

3. Thawing ground will disrupt transportation, buildings, and other infrastructure

- Many existing buildings and roads are likely to be destabilized, requiring substantial rebuilding, maintenance, and investment
- Future development will require new design elements that will add to construction and maintenance costs

Village Safe Water Funding

for Rural Alaska Sanitation Projects 1987-2007:



Climate Change Impact Mechanisms and Sanitation Infrastructure

- Increased Severity and Frequency of Coastal or River Flooding
- Melting Permafrost
- Rising Sea Levels
- Drought and Heavy Storms
- Accelerated Coastal and Riverbank Erosion

Communities In the North

- **Isolated by Rough Terrain and Great Distances**
- **Harsh Environment**
- **Limited Economic Conditions**

Sanitation Facilities in Rural Alaska

- Individual and Community Haul
- Piped Distribution and Collection
- Highly dependent on sanitation roads and boardwalks
- High Construction and Maintenance Costs

Potential Climate Change Impacts:
Water Source

- Reduced supply
  - Drought
  - Short intense storms (water lost to runoff)
  - Damage to intake or impoundment structure
- Contamination
  - Rising sea level (saline wedge entering coastal river intake)
  - Storm surge (seawater entering ponds, lakes, rivers used as a source)
  - Northward migration of animals with disease
  - Saline intrusion into coastal groundwater

Snow Catchment Reservoir

Potential Climate Change Impacts:
Water Treatment

- Increase contaminant levels or new contaminants entering source:
  - Turbidity, pathogens, organics overwhelming treatment process
  - Saline intrusion
- Algae blooms in the source: Reducing treatment capacity and enhancing the production of dangerous byproducts

Potential Climate Change Impacts: Hauled Water & Sewer

- River bank erosion intercepting trail/road/boardwalk
- Flooding (storm surge or river) damaging boardwalk or road structure
- Melting permafrost (loss of foundation support) damaging boardwalk/road

Storm Surge Board Walk Damage

Potential Climate Change Impacts:
Piped Water and Sewer

Structural damage

- Ice impact damage during flooding (storm surge or river)
- Flood damage (storm surge or river)
- Melting permafrost (loss of foundation support)
- Grade changes in gravity mains
- River bank erosion

Potential Climate Change Impacts:
Wastewater Treatment and Disposal

- Lagoons
  - Floodwater can spread waste
  - Erosion can intercept the lagoon
  - Melting permafrost can breech the dike

- Septic Tank/Drainfields, Outfalls
  - River bank or shoreline erosion can intercept septic tank, outfall or drainfield
  - Heavy precipitation can cause groundwater level to rise and flood system

Waste Spread by Flooding

Potential Climate Change Impacts:
Solid Waste Collection and Disposal

- Collection system
  - Destruction/loss of access
- Disposal system
  - Erosion intercepting facility spreading waste.
  - Flood water enter facility spreading waste
  - Permafrost or waste melting and releasing contaminants

Monitoring: A Key to Developing our Response to Climate Change

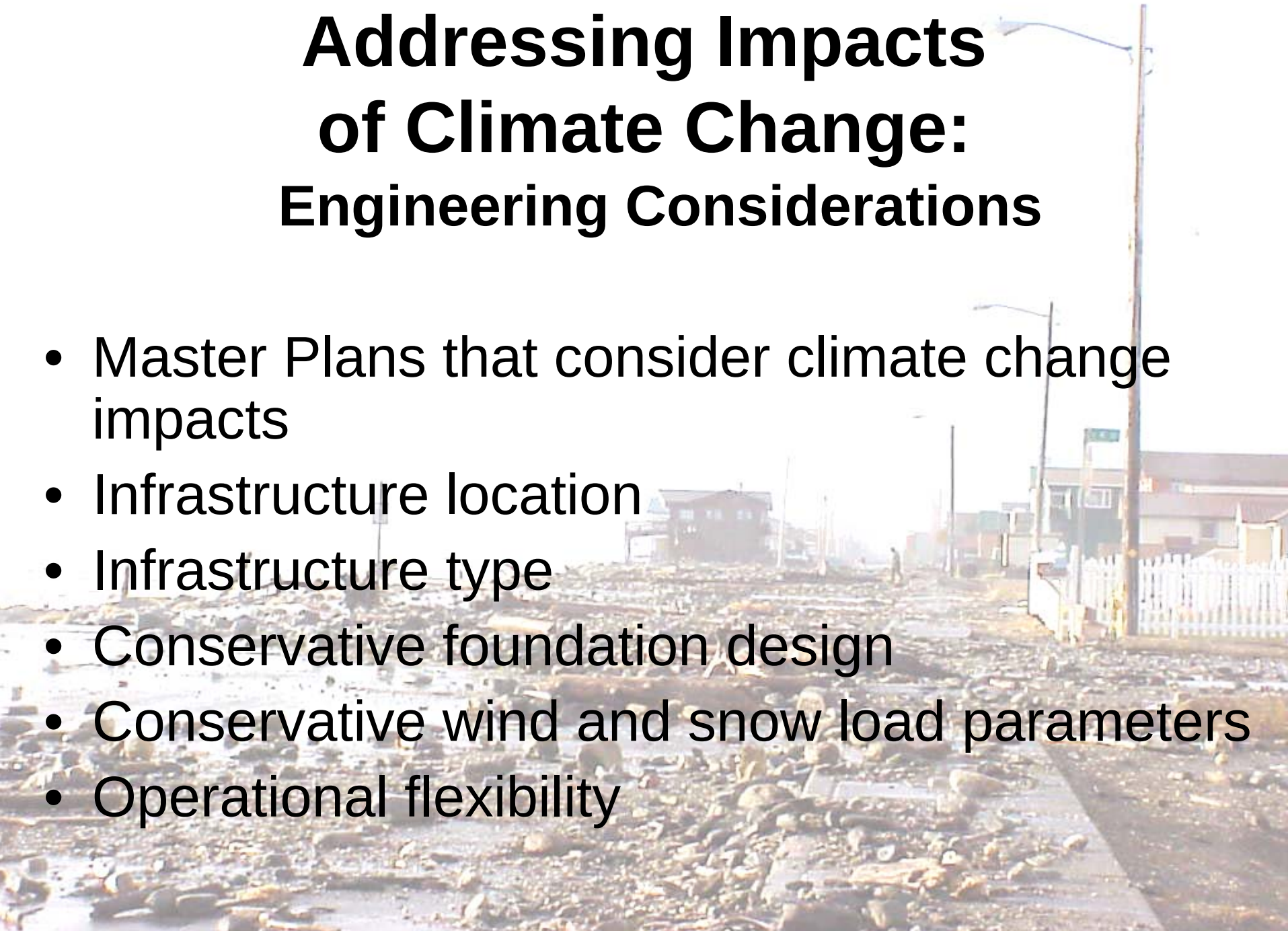
- Increased operational costs for water or wastewater systems
- Increased repair costs for sanitation infrastructure, boardwalks, and roads
- Structural failures due to increased snow or wind loads

Monitoring: A Key to Developing our Response to Climate Change

- Increase in regulatory noncompliance events for sanitation systems
- Pollution of waterways caused by human waste or solid waste
- Increased incidence of waterborne diseases

Addressing Impacts of Climate Change:
Engineering Considerations

- Master Plans that consider climate change impacts
- Infrastructure location
- Infrastructure type
- Conservative foundation design
- Conservative wind and snow load parameters
- Operational flexibility



Addressing Impacts of Climate Change:

Government Considerations

- Financial Support for Increased Operational Costs
- Financial Support for Infrastructure Repairs and Replacement

Water Quality
Risks to Clean Rivers, Streams, Lakes

- Warmer streams and lakes may impact habitat for salmon, trout and aquatic ecosystem - already evident in Kenai, Anchorage and Mat-Su streams;

- Thawing permafrost may impact water quality: turbidity, sedimentation, nutrients and other contaminants;

- Timing of freeze-up and break-up may change the biology and physical structures (habitat) of rivers and lakes; and

- Increased melting and disappearance of glaciers will alter volume flows, may effect biology of fresh and marine waters.

Mitigations to Protect Surface Waters

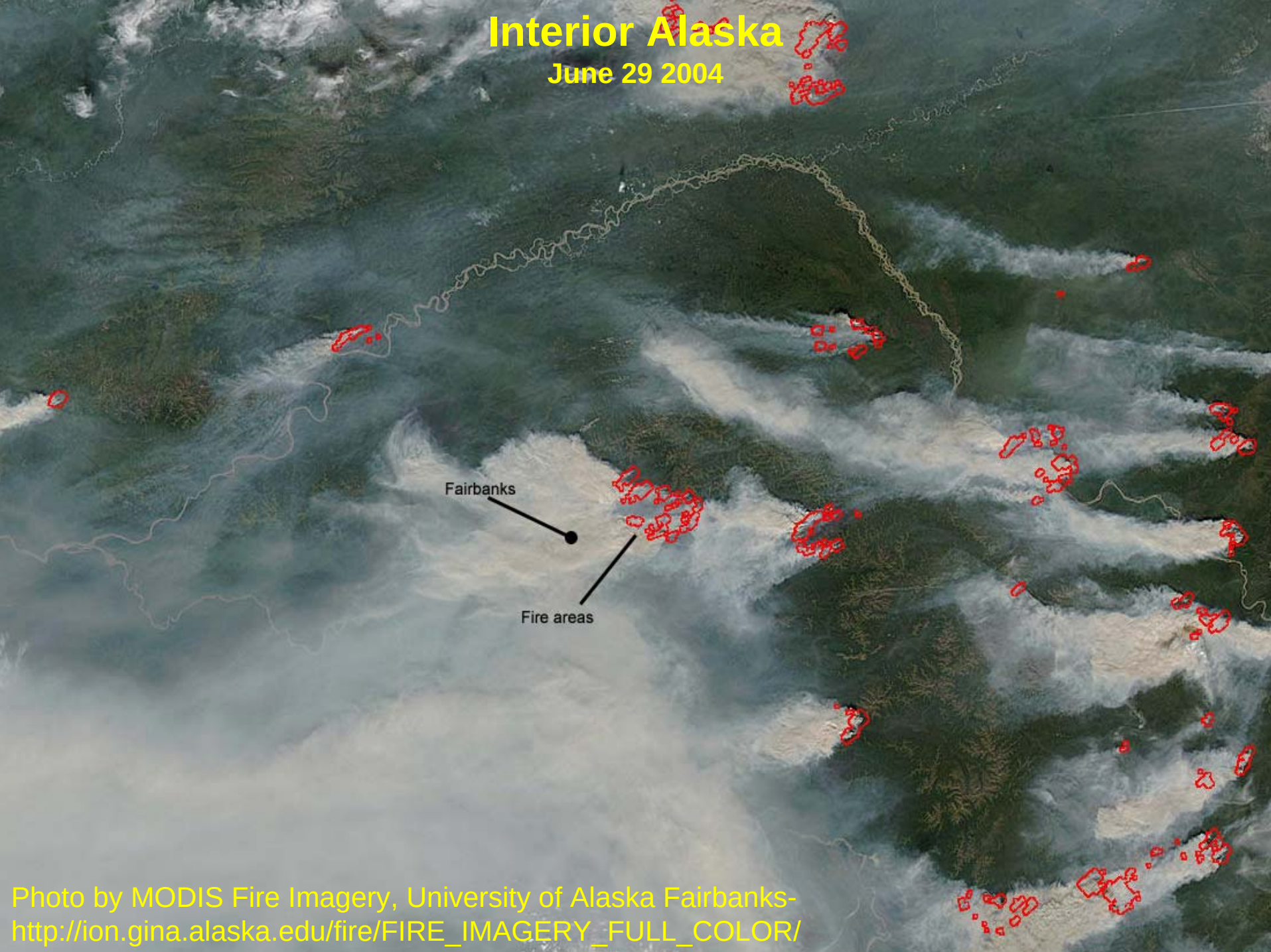
- Greater protection of streamside vegetation;
- Tighter management of: water withdrawals, alterations of streambeds or banks in developing areas;
- Careful decisions on dams and reservoirs;
- Better practices and structures to prevent stream bank erosion with ATVs and other vehicles.

Risks to Clean Air

Inversions not as strong

New Pollutants

Fire Smoke

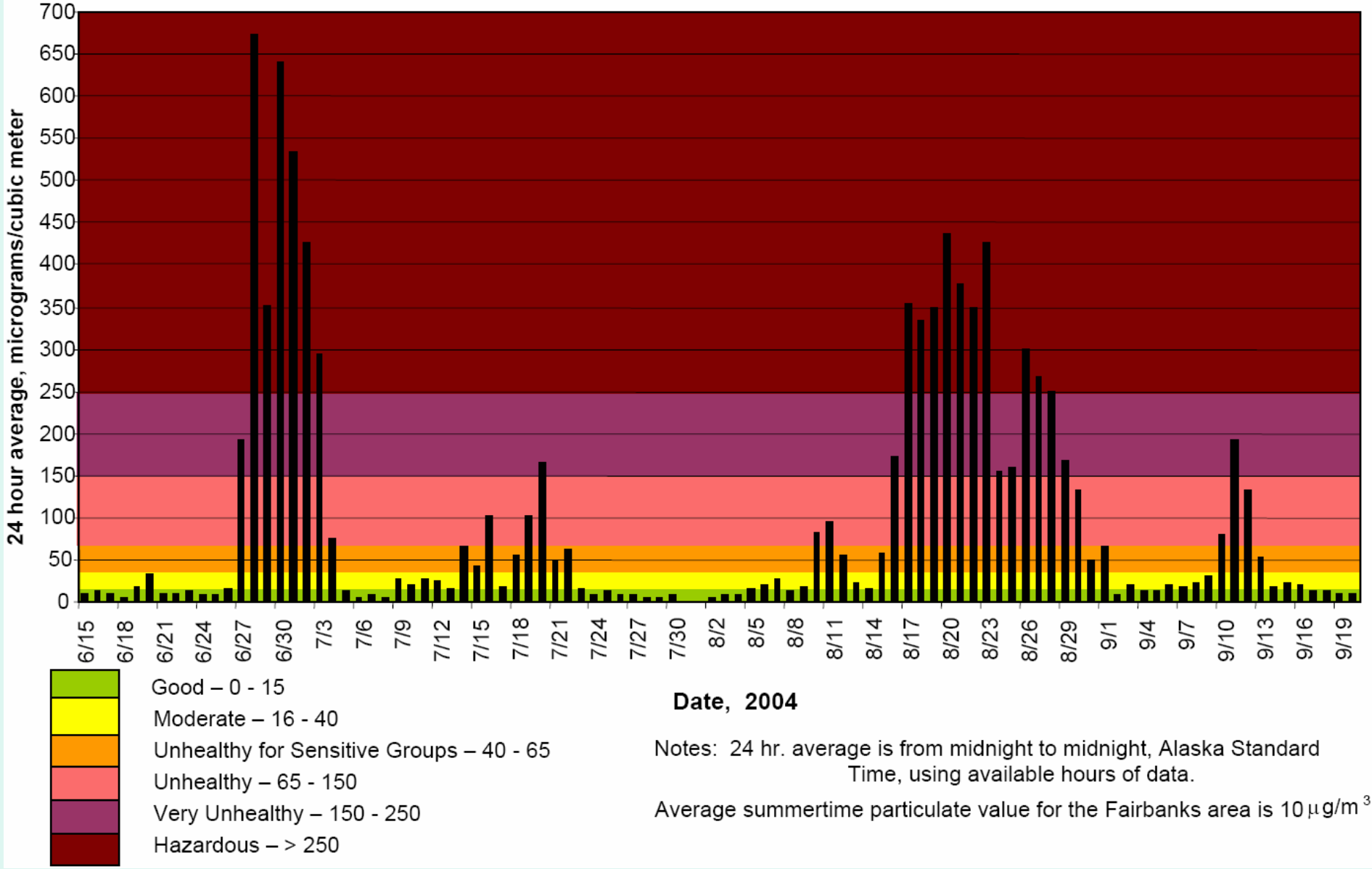

Interior Alaska
June 29 2004
Fairbanks
Fire areas
Photo by MODIS Fire Imagery, University of Alaska Fairbanks-
http://ion.gina.alaska.edu/fire/FIRE_IMAGERY_FULL_COLOR/

South Fairbanks
June 28, 2004. Air quality particulate level at approximately 900 ug/m^3

Photos by Dr. James Conner, FNSB

South Fairbanks
July 6, 2004. Air quality particulate level at approximately 10 ug/m^3

2.5 Micron Airborne Particulate Matter - 24 hour Daily Average Values
Downtown Fairbanks, Alaska: June 15 - September 20, 2004



Notes: 24 hr. average is from midnight to midnight, Alaska Standard Time, using available hours of data.

Average summertime particulate value for the Fairbanks area is 10 $\mu g/m^3$

Overall Summary: What a Warmer Alaska means for DEC

- Different diseases in foods: seafood, animals and produce;
- More frequent oil spills in rural coastal and river communities due to storms and flooding - investment and response challenge;
- Relocation, modification with re-investment for existing water and sanitation systems; changes in design for new systems;
- Changing strategies / practices for preserving fish habitat through water quality / riparian land management;
- Fire smoke pollution must be actively managed for health protection; integrated with fire fighting agencies;
- Others impacts that are currently less obvious.

How Will Climate Change Laws Shift the Duties at DEC / State?

HCR30 duty(8) recommend policies to decrease negative effects of climate change;

State's Policy, AS 46.03.010: "conserve, improve and protect its natural resources and environment… in order to enhance health, safety and welfare…"

DEC's duty under law, AS 44.46.020(3): promote and develop programs for the protection and control of the environment of the state"

It's a DEC duty not only to react / mitigate, but to act to prevent and to control damage to the environment caused by greenhouse gases

Greenhouse Gases as Regulated Pollutants

- DEC's Assumptions about changes in law:
  - GHG reduction targets will be mandated by U.S. law and tier down to state by state targets;
  - Free market principles will be used to achieve flexibility for lowest cost solutions – worked for acid rain;
  - Carbon dioxide and other GHGs will be a commodity traded and regulated by markets and governments;
  - Free market principles will create new economic opportunities as well the expected carbon (fuel) user costs;
  - Many accounting and regulatory rules will get defined with a drive toward uniform rules nationally and internationally;
  - Low hanging fruit in fuel efficiency and energy conservation will make reductions comparatively easy for the first decade;
  - Existing federal and state air pollution control / permitting framework will be the primary implementing tool

Reducing GHG Emissions in Alaska is broader than DEC

- DEC can lead the regulatory functions of reducing emissions.

- Life style changes, energy use, community and economic challenges are best stimulated or managed by other state agencies: DCCED, DNR, Revenue, RCA, AOGCC.

- Economic opportunities for Alaska in sequestering / storing carbon: forestry, enhanced oil recovery – production
  (see reference documents on HB 196 (2003), oil industry carbon sequestering projects)

Has DEC Prepared for GHG Laws?

- State law does not currently regulate greenhouse gases;
- DEC has tracked action in other states;
- Participated with western states in building market and agency fundamentals: Inventory emissions of greenhouse gases, exploring a common “Registry” format for bookkeeping and validation of reductions;
- Alaska’s Inventory of existing and projected emissions – April ’07.
- DOE estimated Alaska’s 2001 emission at 42 million metric tons; comparable to Connecticut and ~50% of that emitted by Washington state. North slope industry is 14 of the 42.

Task Forces / Commissions in Other States

- Alaska's Commission is Impact Focused;
- Many other states or Neighboring states have Actions underway to reduce Green House gas Emissions;
- Arizona and New Mexico are good examples for Alaska (see reference documents);
- Energy conservation, Energy efficiency, Offsetting new increases, Future year reduction targets