

# Department of Energy

## Port Graham Woody Biomass

### Feasibility Study

October 25, 2006

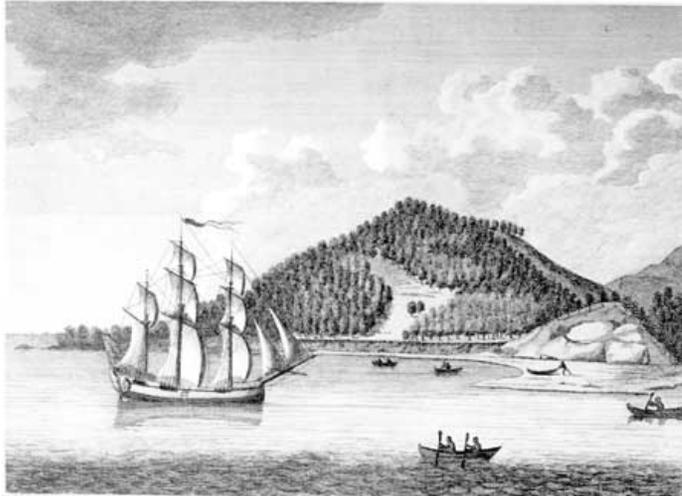


- Pat Norman, Chief
- Olga Fomin, Second Chief
- Fran Norman, Tribal Administrator
- Violet Yeaton, Environmental Specialist
- Charlie Sink, Technical Representative

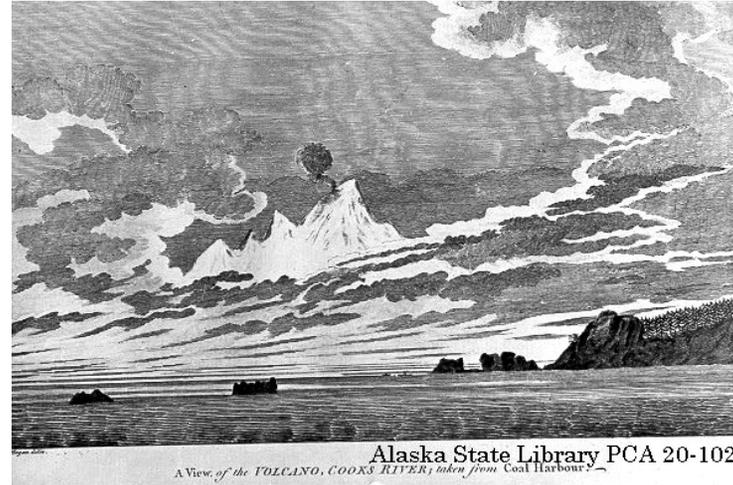
# Port Graham Feasibility Study

- Port Graham Village Council is the contractor
- University of South Dakota's Energy & Environmental Research Center is the sub-contractor, with project managers Darrin Schmidt and Kerryanne Leroux
- Charlie Sink, Chugachmiut Director of Enterprise and Trust Resources is the Technical Representative with help from Chugachmiut's forester Tom Hines

# Port Graham, Alaska



*Coal Harbor, near Port Graham, 1786*



Alaska State Library PCA 20-102  
*A View of the VOLCANO, COOKS RIVER, taken from Coal Harbour.*

*View of Volcano taken from Coal Harbor*

- Port Graham lies on the lower tip of the Kenai Peninsula of Alaska.
- Nearby, Nanwalek was the site of the first Russian fort built on the North American continent (1781).
- Today there are approximately 200 residents



# PORT GRAHAM (PGM)

**COOK INLET**

**PGM CTAF 122.9**

**ELEVATION 93  
N59 20.90/W151 49.89**

**Photo Date June 1996  
Data Date August 1998**

**RWY 12 appch restricted by hill  
RWY 30 appch restricted by trees  
Runway has scattered sharp edge rocks to 3-in**

**1975 X 45**

**30**

**12**

**PORT GRAHAM**

**ENGLISH BAY (KEB)**

# Port Graham, Alaska

- Port Graham Village is administered by an IRA federally recognized Tribe formed during the Alaska Native Claims Settlement Act (ANCSA) December 18, 1971.



# ANCSA

- ANCSA established recognition of approximately 225 Tribes in the State of Alaska comprising 12 geographic and ethnic regions.
- Each Tribe generally coincided with a geographic community that existed during creation of the act.

# ANCSA

- Congress, in seeking to create something different for Alaska, separated the federal recognized tribes from their land base and instead created for-profit Native corporations to hold and manage Indian lands.

# ANCSA

- Tribes in the Tribal communities were given a small land base.
- Community occupants were given title to their townsite lots. If they were Tribal, they received “Restricted” trust lots.
- Eligible Tribal members who showed use and occupancy were given trust Native allotments.

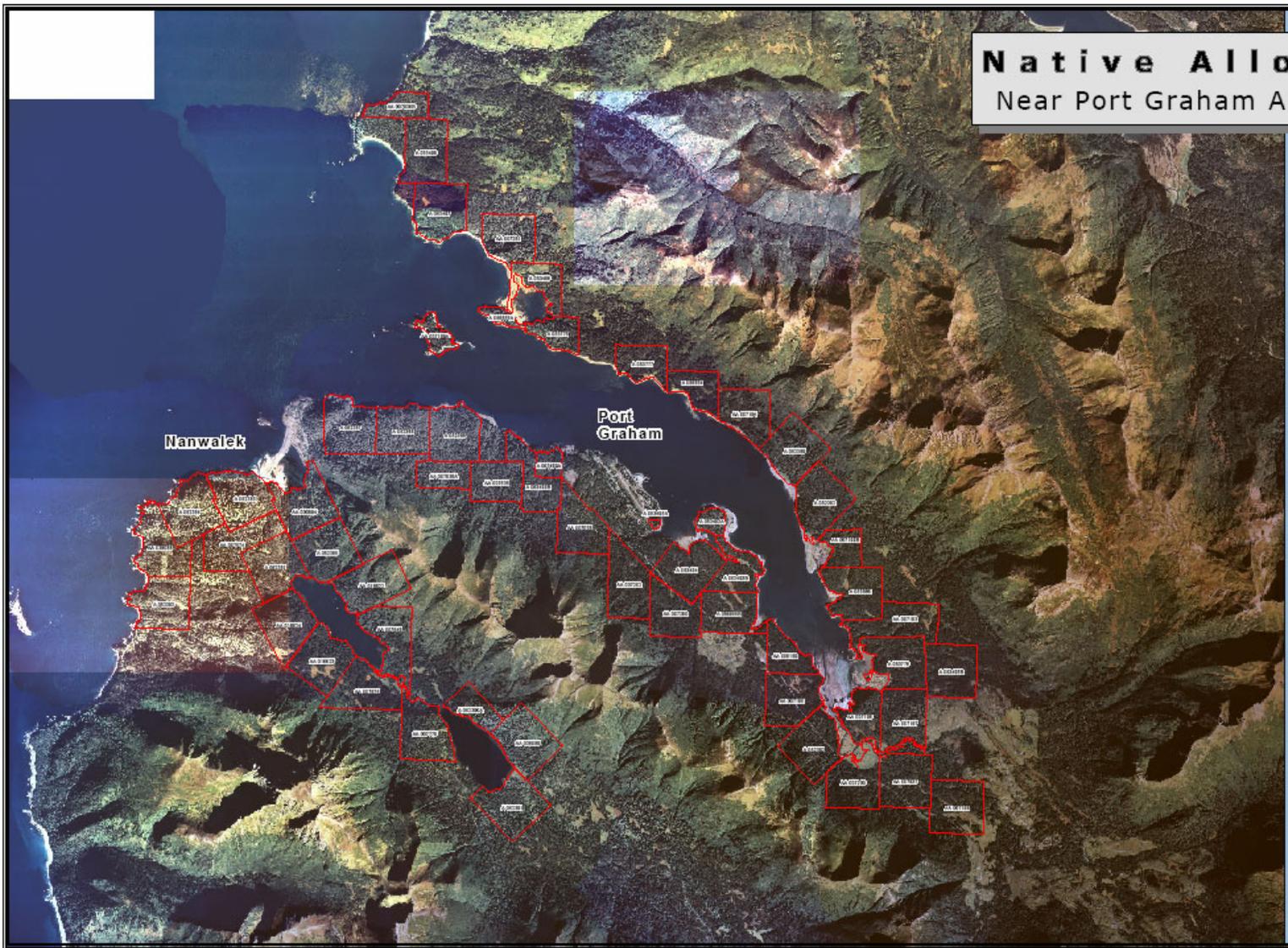


# ANCSA

- Surrounding these communities, the Native village corporations selected lands for which they received surface title.
- Adjacent to these lands, each of 12 Regional corporations selected land and received subsurface rights to those lands and those of the village corporations.

# Native Allotments

Near Port Graham And Nanwalek



Allotments



# Port Graham Biomass Study Objectives

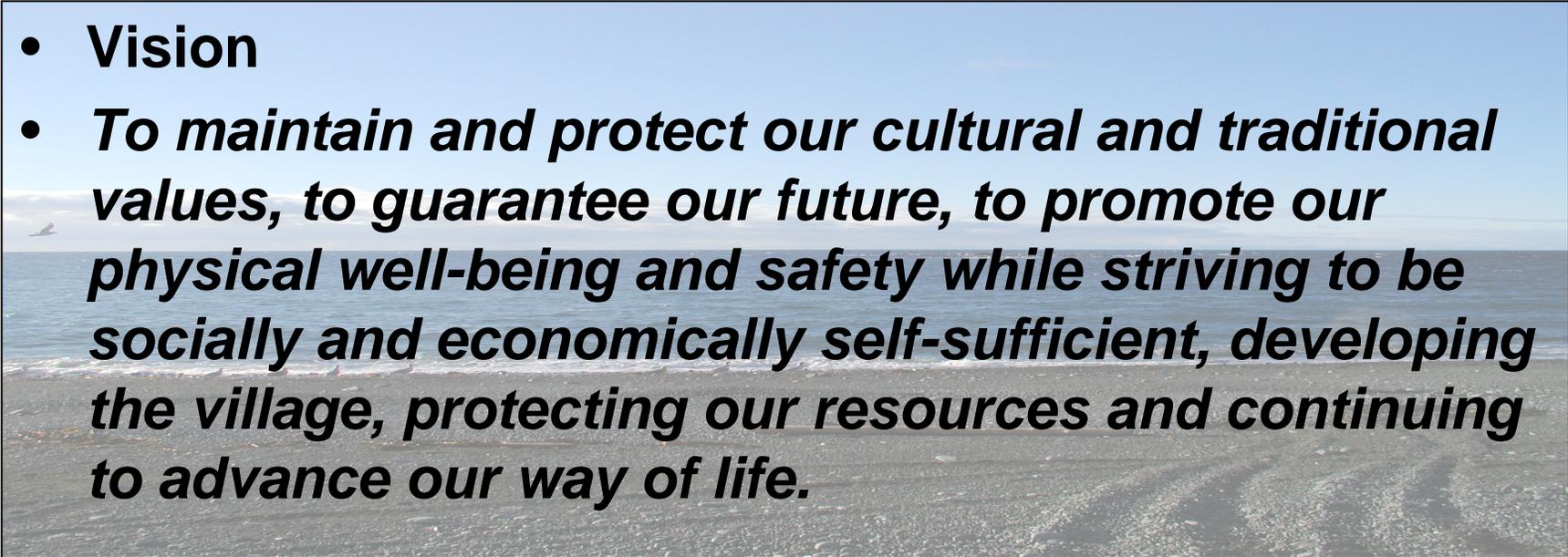
- “By practicing our traditional lifestyle we continue to celebrate our rich cultural heritage, including the prudent use of our human and natural resources.”

- ~ *Port Graham Strategic Plan, 2001*

- Reduction in living costs
- Secure growth
- Economic Development
- Utilization of lands
- Help prevent sale of Native allotments
- Better Tribal integration in management of Native lands
- Energy alternatives

# Port Graham Interest in Biomass

- Secure growth
  - Prevent loss of residents
  - Provide for future residents

- 
- **Vision**
  - ***To maintain and protect our cultural and traditional values, to guarantee our future, to promote our physical well-being and safety while striving to be socially and economically self-sufficient, developing the village, protecting our resources and continuing to advance our way of life.***

# Port Graham Interest in Biomass



- Economic Development
  - Port Graham Cannery
  - Port Graham Hatchery
  - Port Graham Village Corporation timberlands
  - Native allotment timberlands
  - Private enterprise

# Port Graham Interest in Biomass



- Reduction in living costs
  - Electricity is single-phase 220 volts from Bradley Lake Hydro-electric project
  - Heating is done by oil fired furnaces
  - Diesel fuel is barged into the community, currently around \$4.00/ gal number 2 grade

# Port Graham Interest in Biomass



- Utilization of Lands
  - Port Graham Tribal members are concerned about their cultural traditions and traditional use of their lands
  - They would also like to seek ways to better utilize their lands without endangering their way of life

# Port Graham Interest in Biomass

- Help prevent sale of Native allotments
  - Allotments are generally under utilized
  - Owners and new gift deeded owners have, at times, monetary needs
  - Tribe desires to maintain their cultural association with the land and the owners



# Port Graham Interest in Biomass

- Better Tribal integration in management of Native lands—a Tribal IRMP
  - Corporate and Native allotment landowners and managers
  - Currently, Native owned lands are contiguous
  - Desire by the Tribe to maintain their culture and Native identity



# Port Graham Interest in Biomass

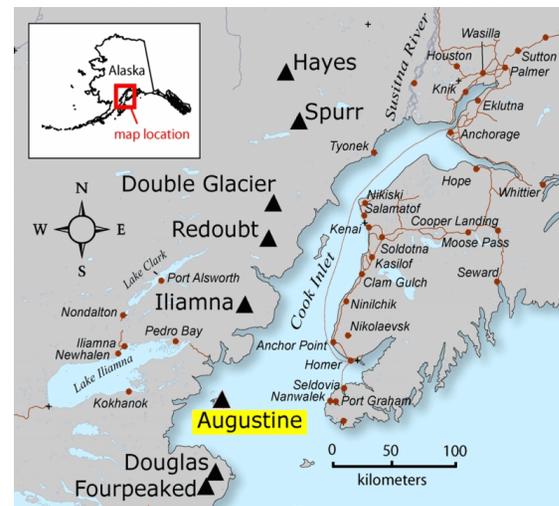


*Augustine Volcano*  
*Photo by Richard Waitt, U.S. Geological Survey, 1988*



*Steam and ash billow from Augustine Volcano*  
*January 17, 2006*

- Energy Alternatives
  - Coal
  - Hydro
  - Wind
  - Tidal
  - Geothermal



# Port Graham Timber Quality and Availability



- 200,000 tons woody biomass available
- 4,000 tons per year at 50-year interval
- 40,000 acre forest resource accessible by old timber harvest road network
- Land is either Native allotment or Port Graham Native Corporation owned

# Port Graham Energy Requirements--Residential

- Forced air or hot water for heat
- Diesel is primary energy source
- Wood stoves were traditionally used and are used when diesel prices are high
- Approximately 70 homes with an average 1,000 square feet per home



# Port Graham Energy Requirements—Village Buildings

- Tribal Council Building
- Chugachmiut Clinic
- Native Corporation Office
- Public Safety Building,  
and
- School
- Approximately 20,000  
square feet
- Diesel boilers with water  
base board heat



# Port Graham Energy Requirements—Industrial

- Port Graham Village Corporation Cannery
  - 20,000-25,000 gallon diesel annually
  - About \$1 million per year to operate
  - Not in operation last year due to markets and not operated as a cannery but as a hatchery
- Hatchery
  - Hot water boiler used Jan-Feb for rise in ambient temperature for thermal mark on smolt



# Port Graham Energy Requirements—Electrical Usage



- Estimated 2,000 MWh annual and 250 kW peak demand electrical use
- Four existing diesel generators for Port Graham and Nanwalek electricity back-up installed to operate 3-phase electricity to cannery operation
- Homer Electric Association has installed one of the generators

# Potential Technologies and Options--Combustion

- Applications
  - Village building and home heating
  - Generation of steam/hot water for industrial processing
  - Logs, chips, or pellets as feed



# Potential Technologies and Options--Combustion



- Small-scale combustion, i.e., outdoor furnaces
  - 50% efficient
  - Can be automated using pellets as feed
- Large-scale combustion
  - 75% efficient
  - Automation available with chips or pellets

# Potential Technologies and Options--Gasification

- Applications
  - Village building and home heating
  - Village electricity production
  - Cogeneration of electricity and steam/hot water for heat or industrial processing
  - Overall electrical production efficiency is 13-17% on a higher heating value basis



# Potential technologies and Options- -Biodiesel

- Biodiesel
  - Cannery can be modified to create fish oil biodiesel
  - Can use either form fresh fish or carcasses and other wastes
  - No processing facilities in Alaska, must build facility or ship oil out to be returned as biodiesel



*Port Graham, 1940s. (Left to right: unknown, Phillip Anahonak, Murphey Meganack, Marvin Norman, Johnny Malchoff). Photograph by John Poling. Copyright Chugach Heritage Foundation*

# Estimated Potential Economics— Total Biomass Potential

- \$300,000 annual savings to provide heating for village buildings and homes plus electricity for the village and energy for cannery operation
- 5,000 tons wood annually, requiring 200 acres without clear-cutting



# Estimated Potential Economics-- Combustion

- Combustion of wood chips for heating of village buildings and homes
  - Multiple small systems (outdoor furnaces)
    - \$100,000 annual savings (up to \$1,000 per home)
    - 800 tons/yr wood, requiring 30 acres w/o clear cutting
  - One large system
    - \$110,000 annual savings (up to \$1,000 per home)
    - 500 tons/yr wood, requiring 20 acres w/o clear cutting

# Estimated Potential Economics-- Gasification

- Gasification of wood chips for electricity and/ or steam production
  - Village electricity
    - \$120,000 annual savings over HEA provided electricity (up to \$2,000 per home)
    - 4,000 tons/yr wood, requiring 160 acres w/o clear cutting
  - Cannery processing
    - \$60,000 annual savings over diesel
    - 600 tons/yr wood, requiring 25 acres w/o clear cutting

# Estimated Potential Economics- Fish Oil Biodiesel



- \$2-\$3 per gallon potential based on current studies
- Cost of production needs to be  $\leq 90\%$  cost of diesel to be economical
- 50,000 gallons required annually for village heating

# Feasibility Ideas to Explore in Study

- We would like to think its feasible
- Biomass is there—but is the cooperation among landowners
- Which technology is appropriate
- What is the potential for growth
- Does the community and tribe really want biomass
- What about including the 3-village corps

# Questions

