Remote Access Drilling and Geophysical Program
Terror Lake Hydro Project
Kodiak Island

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The Challenges of Dams in Cold Climates
Design, Construction, Permitting and Environmental Issues
Fall 2017 Workshops and Field Tours
Project Overview

- Access Road
- East Dam
- West Dam
- Upstream Tunnel Portal
- Downstream Tunnel Portal
- Terror Lake Dam
Watershed
Subsurface Site Characterization Program
Start with the End in Mind
What Will Affect…
Construction, Design, or Operations?

- Depth to Rock
- Rock Quality
- Discontinuity Characteristics
- Groundwater Conditions
- Extent of Rock Units
- Location of Major Fractures, Faults, Shears
Regional and Project Geology

**So what??**

- Recent Study
- Known Conditions
- We can focus on refining the known
Field Exploration Program

- Diversion Dams and Spillways
  - 7 Borings
  - 8 Geophysical Survey Lines (ERI)
  - Engineering Geologic Mapping

- Tunnel portals
  - 3 Borings
  - 6 Geophysical Survey Lines (ERI, MASW, Seismic Refraction)
  - Engineering Geologic Mapping

- 23 Total Field Days
  - 14 total field days for geophysical crew
  - 4 full days lost to weather, several partial days
EAST DAM SITE
LOOKING UPSTREAM
EAST DAM SITE
LOOKING EAST

DE-1

DE-2

DE-SW-1
SOIL AND ROCK CORE DRILLING
EAST DAM
Kodiak Formation Outcrop
Approximate route of proposed Diversion Pipe.
Approximate route of proposed Diversion Pipe.
WEST DAM DRAINAGE
UPSTREAM PORTAL AT WEST DAM SITE
HORIZONTAL ROCK CORING
ROCK CORE
KODIAK FORMATION
WEST DAM SITE
AND UPSTREAM PORTAL
UPSTREAM PORTAL AT WEST DAM SITE
Tunnel Profile

- 0.93 degree slope
- 1,073 ft
- 6,700 ft

Terror Lake

West Dam
KODIAK BATHOLITH with inclusion of Kodiak Formation
Approximate Tunnel alignment.
TERROR LAKE
Looking north (downstream)
Downstream Portal
Plan and Section

Plan View - Downstream Tunnel Portal

Profile - Downstream Tunnel Portal

Note: 15% grading in rock and 9% in soil for excavations.
ERI, MASW and Seismic Refraction Surveys
Integrated Reporting
TAKE AWAYS

- Planning and Scheduling is Critical
- Communications are Vital
- Multiple Methods Yield Better Interpretations of Ground Conditions
- Knowing Your Ground Conditions Yield:
  - Better Designs
  - Fewer Construction Issues and Claims
  - Reduced Cost
  - Reduced Stress
Moving Forward

- September 2017 - Pre-Bid Meeting
- Early 2018 – Construction Contractor Selected
- Summer 2018 – Construction Begins
- 2020 - Water Diverted Through System