# Crump Geyser

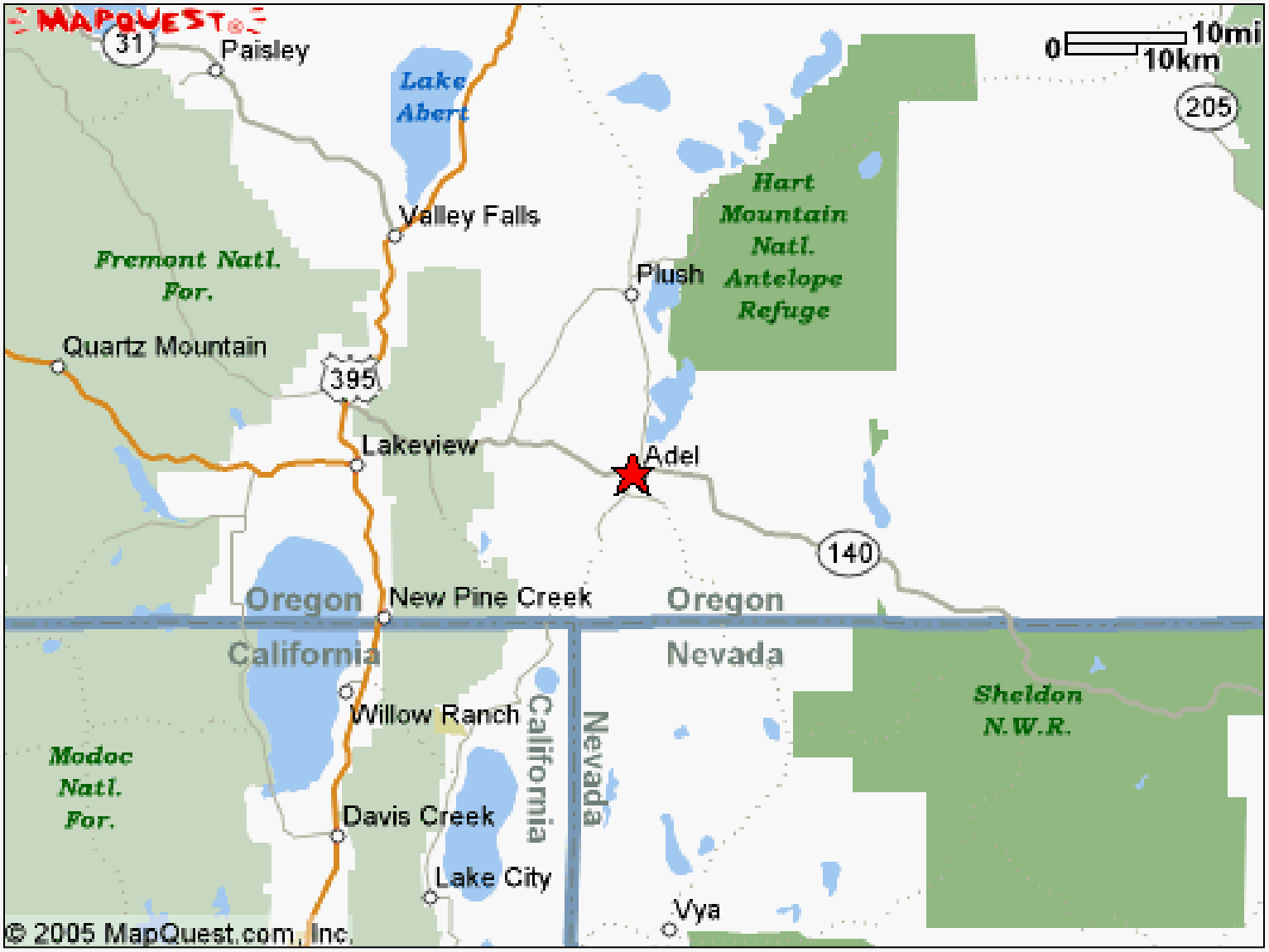
## Warner Valley, OR

DOE-Funded

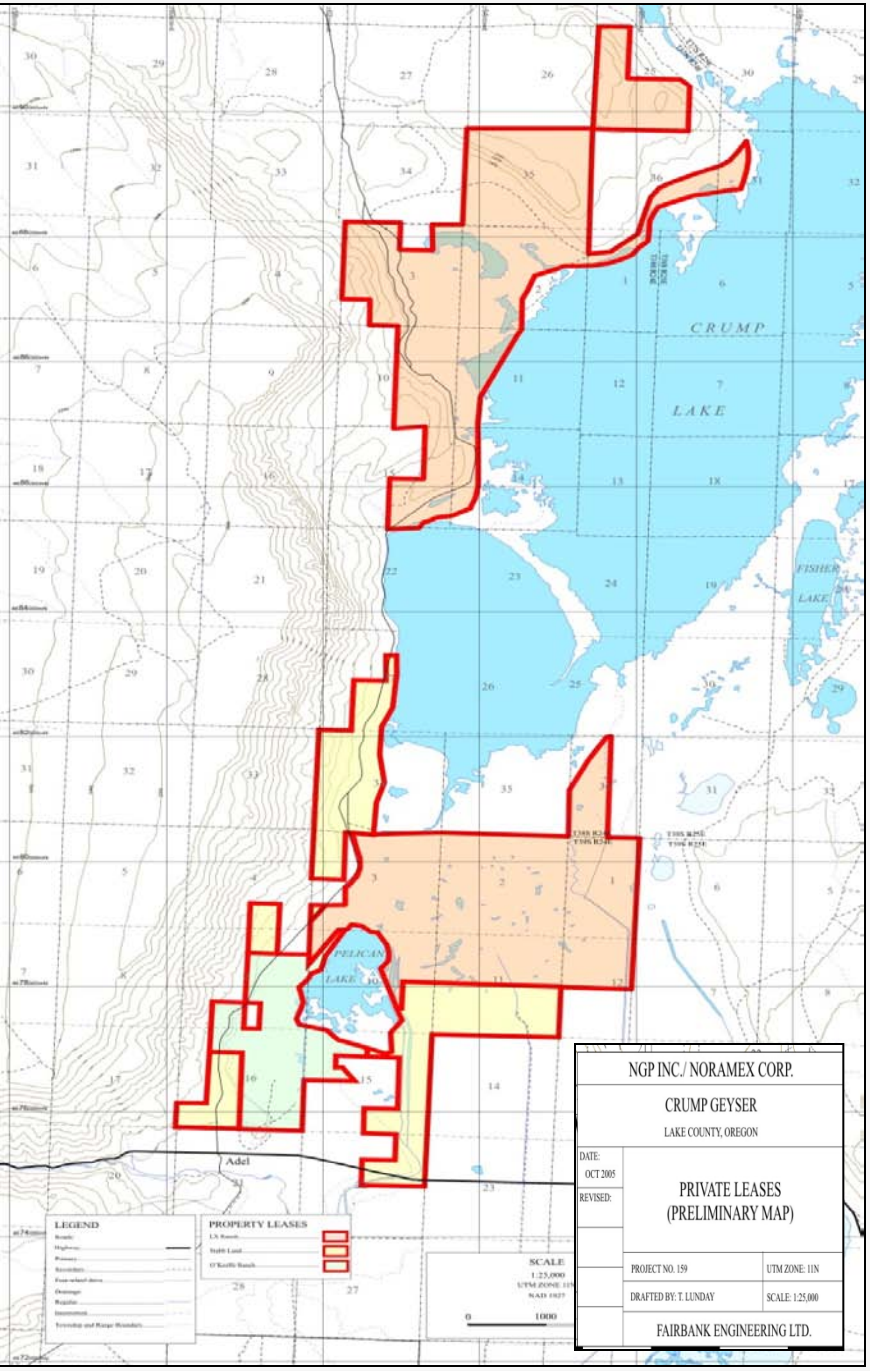
Innovative Exploration & Drilling Project

NGP
NEVADA GEOTHERMAL POWER

# CRUMP GEYSER LOCATION



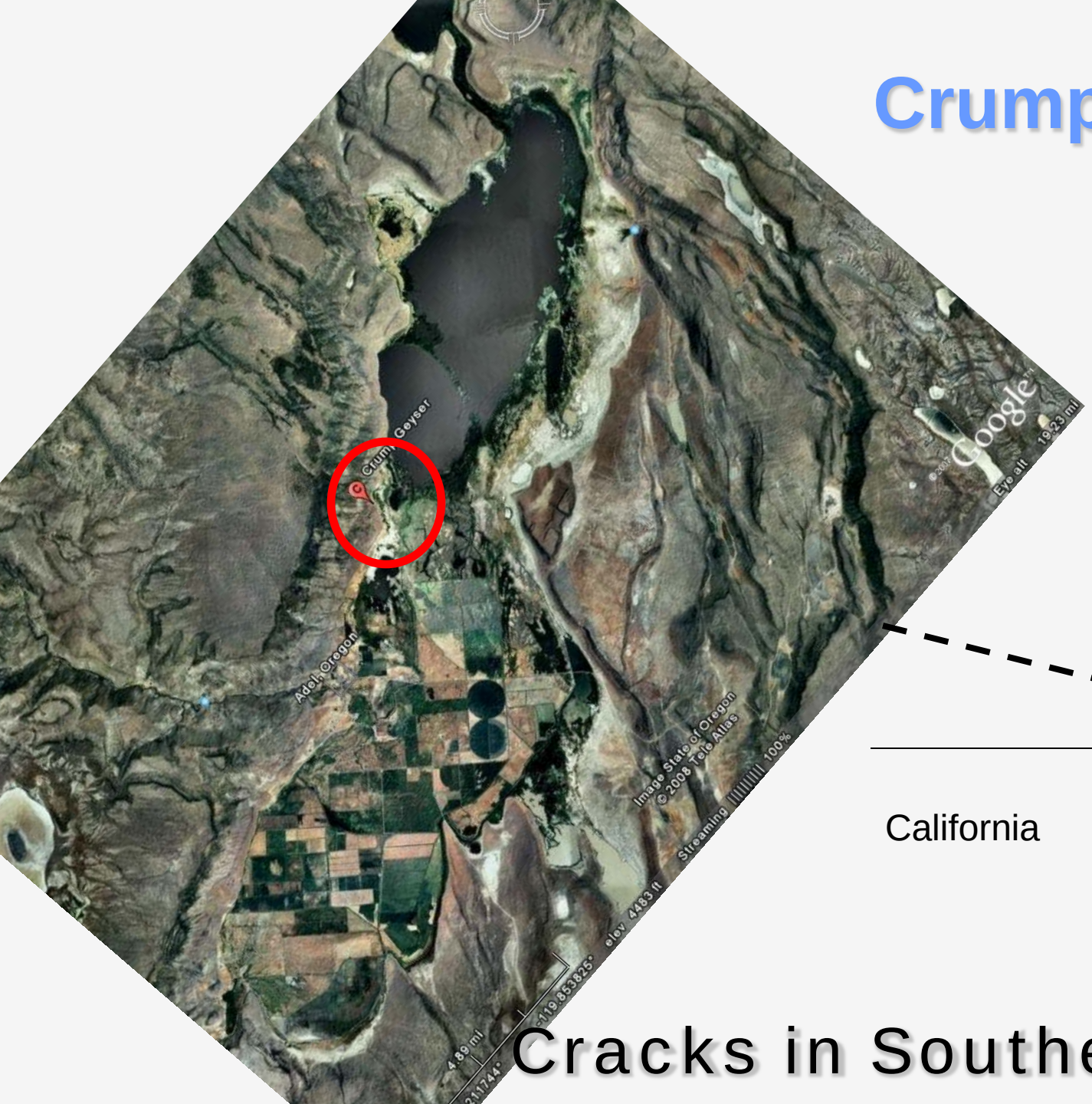

- Warner Valley
- Lake County
- 33 miles east of Lakeview on Hwy 140
- North of Adel

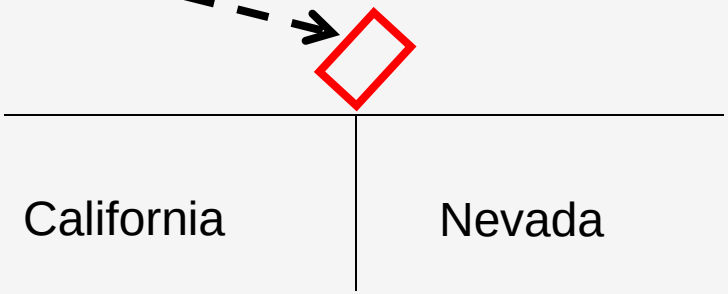



# CRUMP GEYSER

- 7200 acres, Warner Valley
- U.S. DOE, U.S. DOI, & BLM in 2003 ranked “Crump Geyser Known Geothermal Resource Area” as highly favorable for near-term development

# Crump Geyser



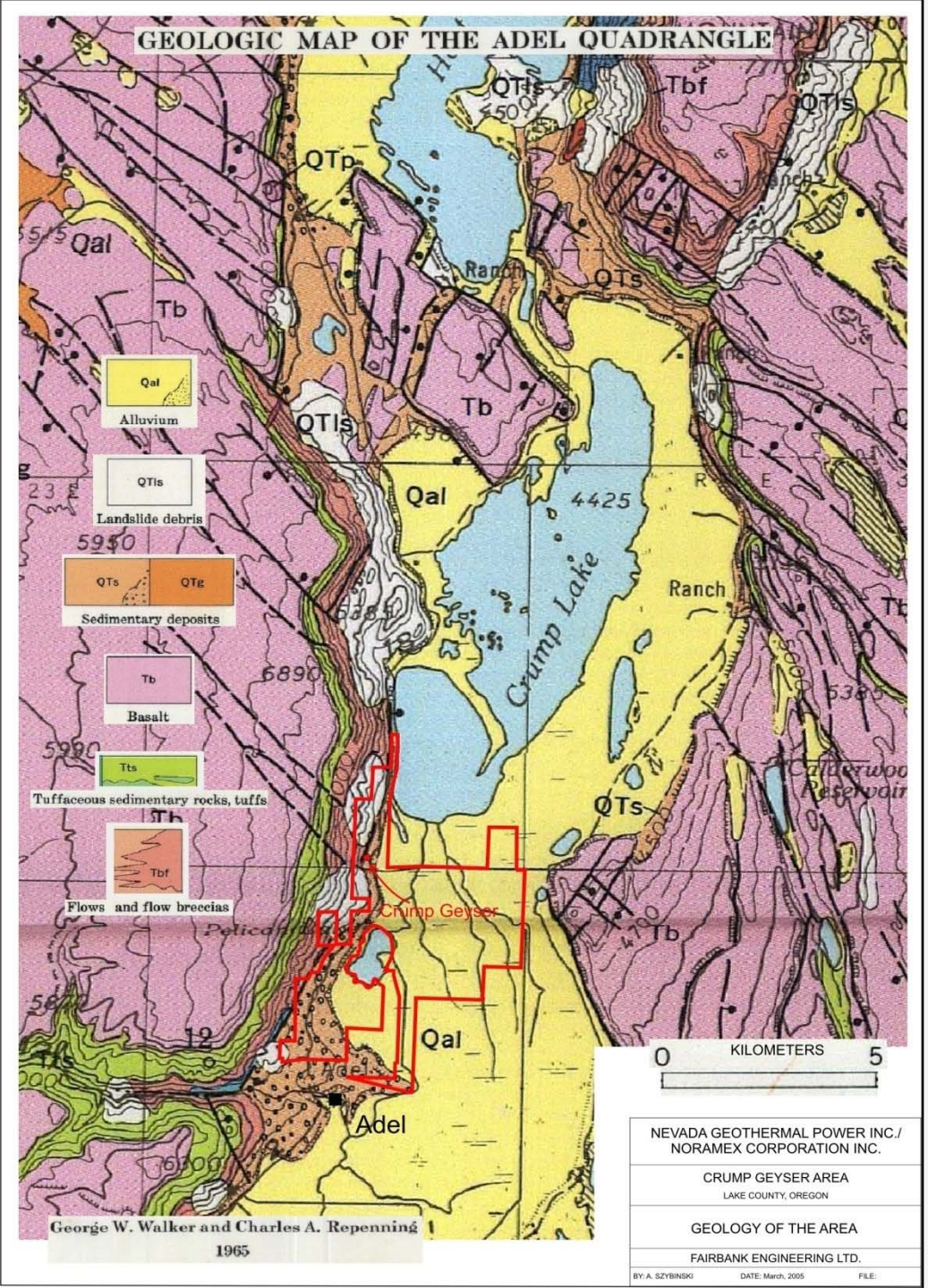




Cracks in Southern Oregon

# CRUMP GEYSER, GEOLOGY

- **Southern Oregon, Lakeview District and Crump property lie in the transitional zone between the Basin & Range and the High Lava Plains physiographic provinces.**

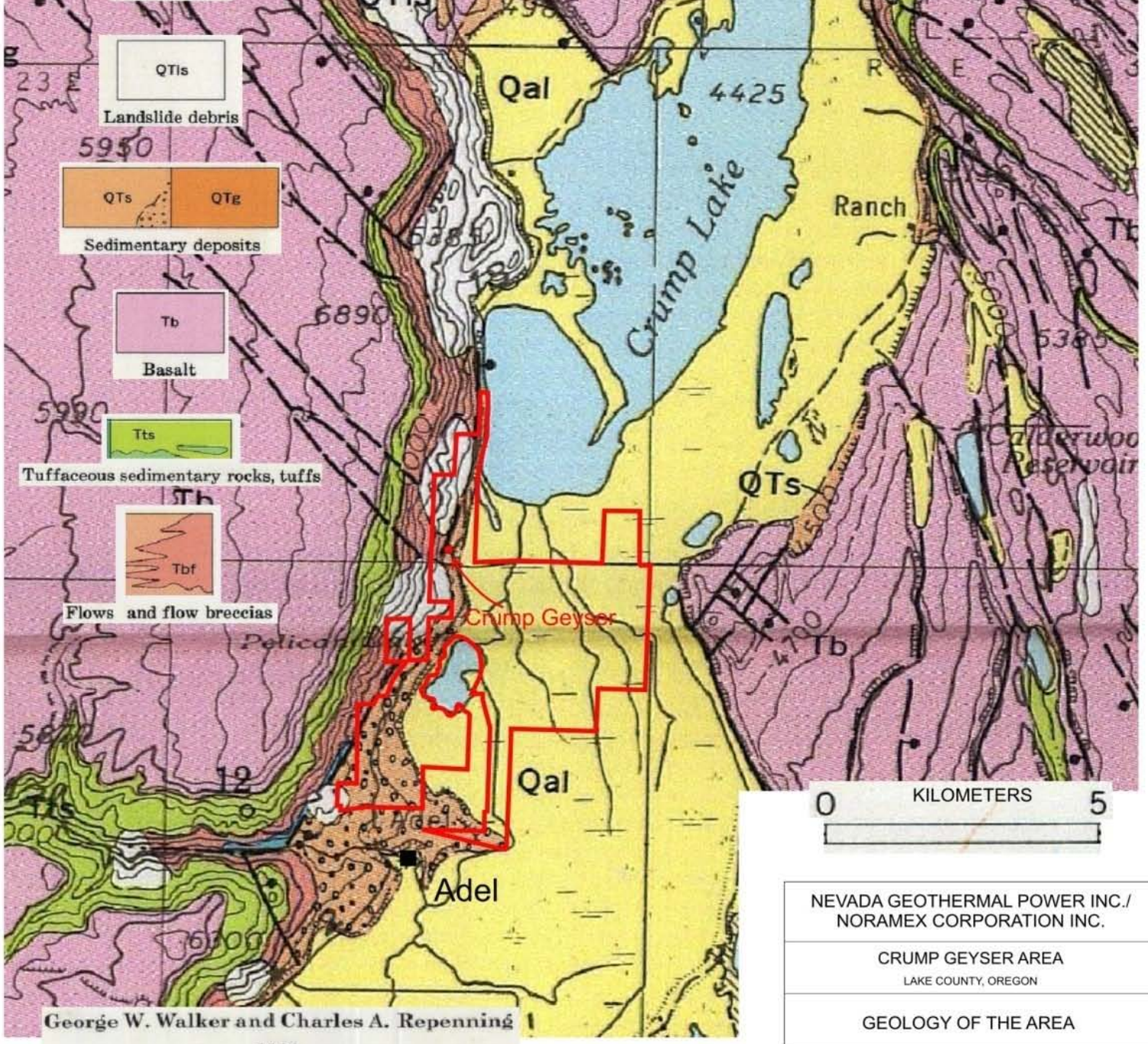
- **Rock units exposed in the property area are Tertiary volcanics; heavily faulted and characterized by narrow and elongated NW trending fault blocks.**



# Exploration To Date

- **Geologic and structural mapping:**
  - **Predominant range front fault.**
  - **Cross cutting NW faults.**
  - **Linear arrangements of sinter mounds/hot springs.**

- **Hot springs up to 78ºC (172ºF).**
- **Two shallow wells up to 120ºC (248ºF).**
- **Geothermometry indicates parent source up to 150ºC (302ºF).**
- **Gravity.**
- **Audio MT.**
- **Airborne magnetics.**
- **Schlumberger Resistivity.**




NEVADA GEOTHERMAL POWER INC./
NORAMEX CORPORATION INC.

CRUMP GEYSER AREA

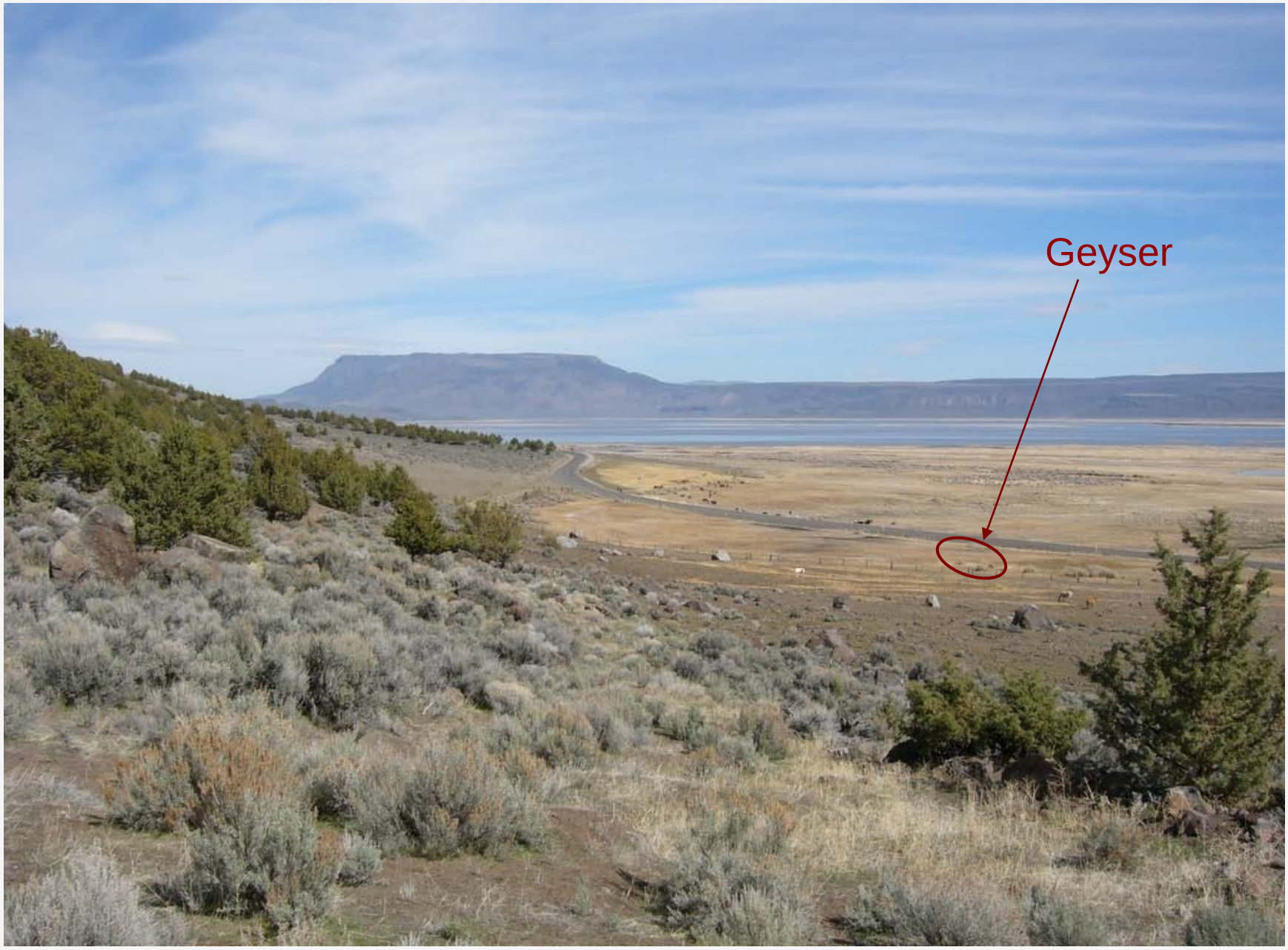
LAKE COUNTY, OREGON

GEOLOGY OF THE AREA

FAIRBANK ENGINEERING LTD.

BY: A. SZYBINSKI DATE: March, 2005 FILE:

# Crump Geyser Area



# HISTORIC CRUMP GEYSER

- Well drilled in 1959 by Nevada Thermal Power Company resulted in the Crump Geyser.
- 2 days after completion the well erupted sending a continuous column of steam and hot water 150 feet in the air.

# Crump Geyser Today

- 12 ¼ inch well recorded 260˚F, depth of 660 feet
- 1960's well plugged with rocks
- Steam is rolling from well and muffled rumbling can be heard continuously

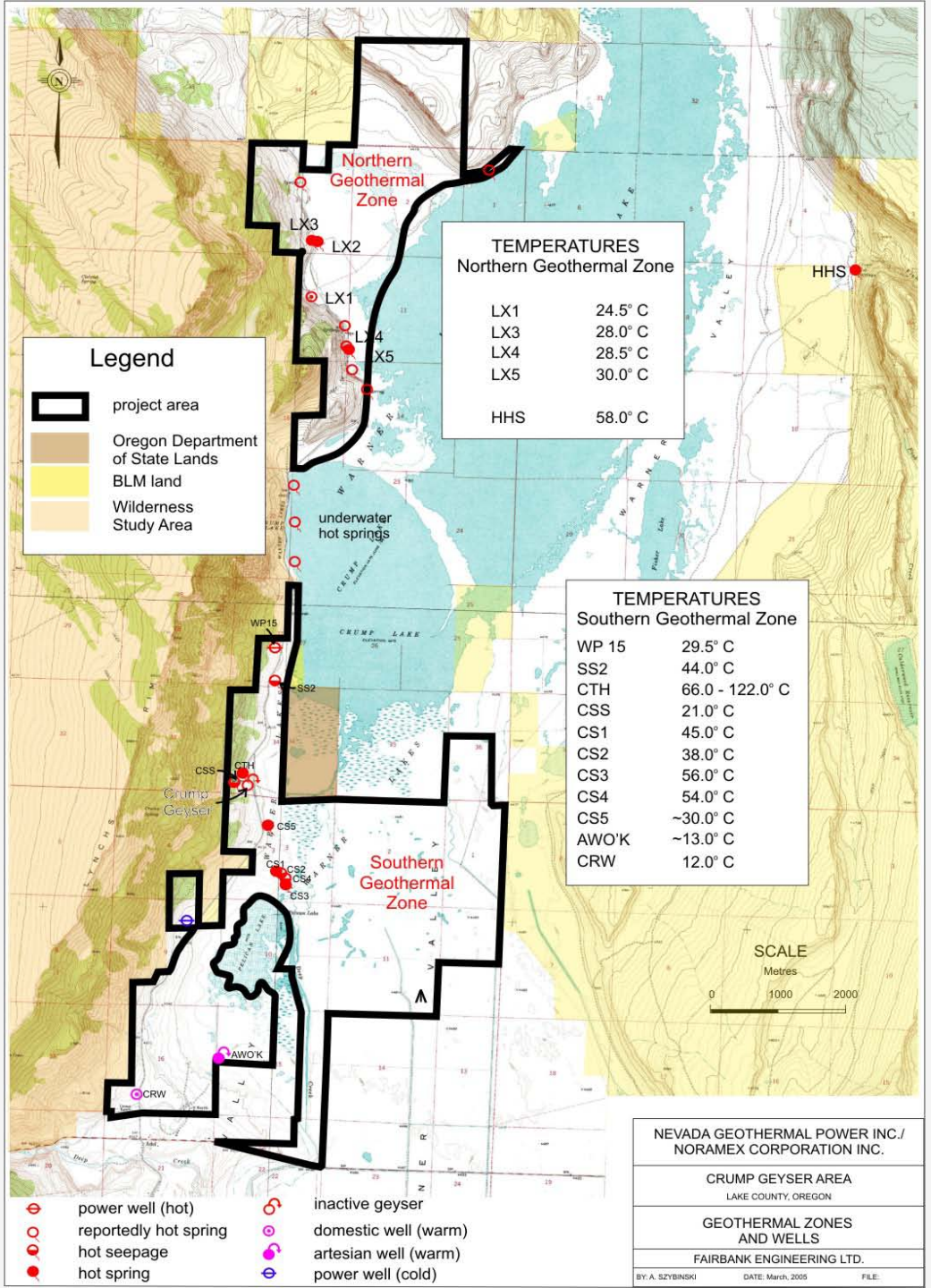
# Crump Geyser 6” Gradient Well

- Temperature measurements were recorded to a depth of 67 feet

- The temperature at the edge of casing is 150˚F
  - **at 19 feet 226˚F**
  - **at 67 feet 251˚F**

# Crump Geyser Springs

- Northern and Southern geothermal zones identified.
- Sampling of the springs indicated average temperatures of 82˚F in the NGZ and 107˚F in the SGZ.
- Geological and geochemical data in both sites suggest that the resource is sufficient for electricity production.



# Sinter Mounds

# Hot Springs

# DOE: Crump Geyser

## Validation of Innovative Exploration Technologies › New Combination of Technologies; Drilling

- Ultra-high precision gravity, magnetic, and shallow seismic geophysical exploration data to detail fracture patterns in a shallow buried basalt formation in the Crump Geyser area.

# DOE Innovative Exploration & Drilling – Phase I Exploration Geophysics

- **Work Completed:**

- **Airborne magnetic survey.**
  - **(March 2010, By Edcon-prj)**

# DOE Innovative Exploration & Drilling – Phase I
# Exploration Geophysics

- **Upcoming Work:**
- **Gas piston source shallow seismic reflection survey.**


- **ATV towed ground magnetic survey (USGS).**
- **Precision gravity survey (USGS).**
- **Integration with existing datasets.**
- **Interpretation / Modeling – Targeting TG holes.**

# DOE Innovative Exploration & Drilling – Phase II Drilling

- **Drill 8 shallow thermal gradient holes.**
  - **300 feet depth.**
  - **Sumpless drilling technique.**
  - **Start date in May 2010.**

- **Target and drill 2 intermediate-depth slim-holes.**
  - **~2000 feet depth.**
  - **Sumpless drilling technique.**
  - **Start date in Summer/Fall 2010.**

# DOE Innovative Exploration & Drilling – Phase III Testing

- **Flow & Injection Testing:**

- **Flowing Differential Self-potential Survey:**
  - **Measure distribution of natural electrical potential across a network of 200 electrodes surrounding the wells.**
- **Resistivity Tomography:**
  - **Apply a current to distal and each individual electrode, and measure the potential difference.**

- **Data Interpretation and Integration.**

# Subsequent Development Work

- **Complete DOE cost share program.**
- **Proceed with final targeting and drilling of 3 production test wells near the core resource area.**
- **Based on results of initial drilling, continue with development of full size production and injection wells, leading up to plant design and construction.**

# Questions?

- Nevada Geothermal Power:
  - http://www.nevadageothermal.com

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