



Newberry
Geothermal

Davenport Newberry Innovative Exploration

Oregon Geothermal Working Group
Portland, Oregon
March 23, 2010

History of Newberry Exploration

- The Cascade Range has long been identified as a promising geothermal resource
- Since the 1970's, efforts to commercially realize the geothermal potential of this area have been frustrated due to the unusual characteristics of the terrain
 - Throughout much of the volcanic range, the water table is located significantly below the topographic surface. This deeper water table results in the downward percolation of meteoric water, seeping through the porous volcanic rock, effectively masking underlying geothermal resources
- In 1990, the National Volcanic Monument Act was signed into law excluding geothermal development within the Newberry Monument, while providing for geothermal exploration and development outside Monument.
- Deep drilling on a small area of the upper northwestern flank of Newberry Volcano encountered high temperatures

Project Objectives

- Develop innovative exploration strategy that will
 - lead to the commercial development of geothermal energy on Newberry Volcano
 - provide a combination of exploration tools that can be applied throughout the Cascade Range and elsewhere to locate and develop “blind” geothermal resources
- The combination of exploration techniques, both innovative and conventional, are intended to locate “blind” (no surface indications) young hot pluton-associated geothermal systems

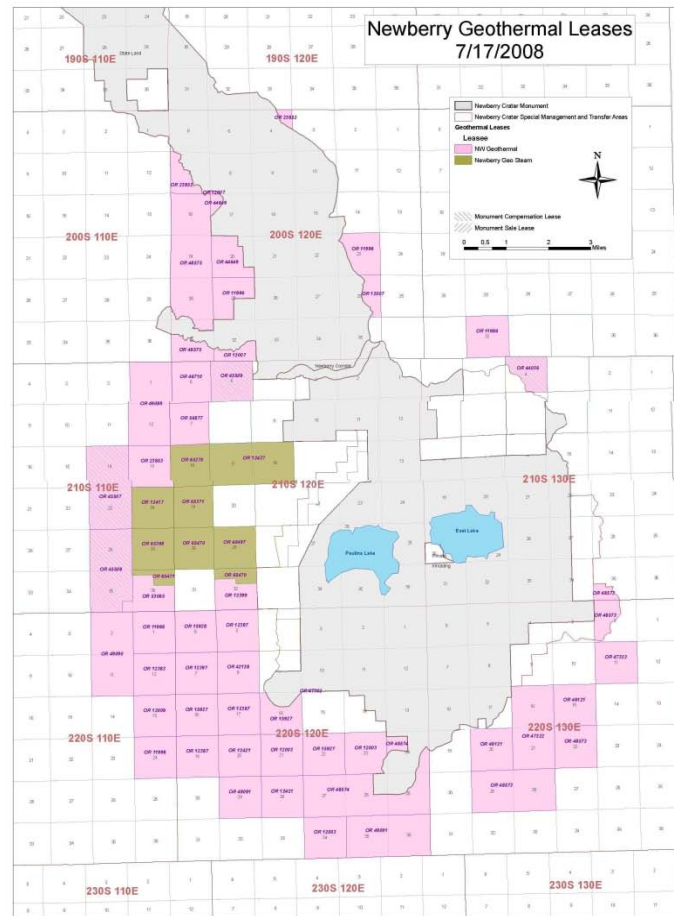
Grant Process

- American Reinvestment and Recovery Act
 - Grant FOA Number DE-FOA-0000109 for Validation of Innovative Exploration Technology
- Davenport awarded \$5M for Newberry
 - Al Waibel, Principal Investigator
 - Doug Perry, Davenport President
 - Todd Jaffe, Davenport Project Manager
- In association with
 - Southern Methodist University
 - APEX/HiPoint Reservoir Imaging
 - Zonge Engineering and Research
- Awarded a Conditional Grant January 31, 2010
- Expect to execute final Cooperative Agreement in early April 2010 followed by project initiation

Project Location



Project Location



Preparation

- Public Outreach
 - Public interaction through various media outlets
 - Numerous meetings with government officials
 - Permitting and planning meetings
- Permitting: Environmental Assessment has been prepared and posted to BLM website
 - <http://www.blm.gov/or/districts/prineville/plans/index.php>

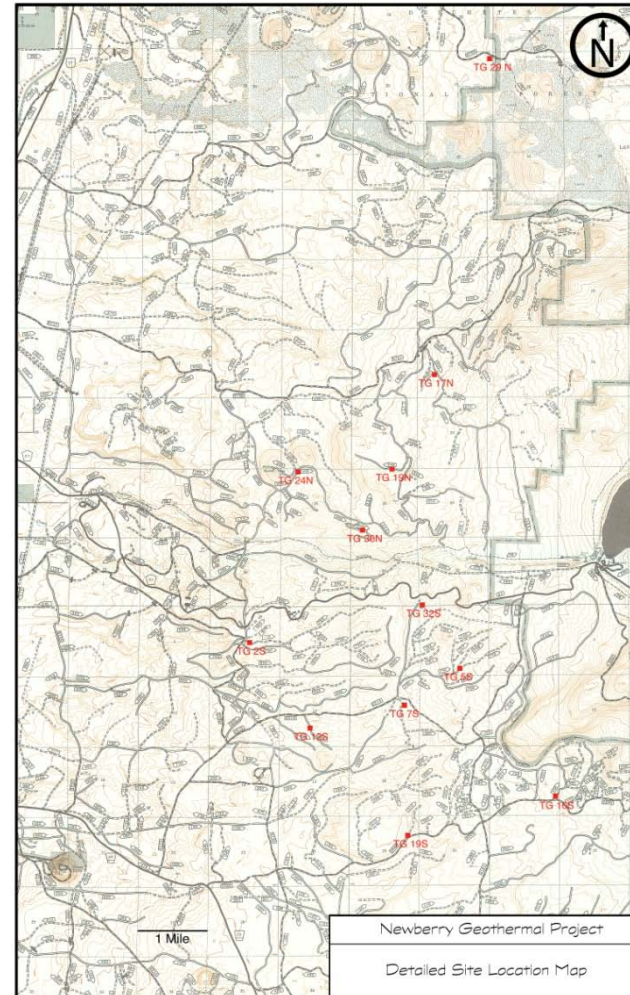
MT & Gravity Surveys

- Beginning soon, perform close spaced magneto-telluric (“MT”) and gravity surveys to characterize the complete shape of pluton(s) on the western, southern and eastern flanks of Newberry volcano



Temperature Gradient Wells

- Drill 10 to 12 temperature Gradient wells (up to 3,500 Feet deep) during 2010 and 2011 to measure underground temperatures and construct a 3-D temperature model



Temperature Gradient Wells (cont.)

- Set an array of geophones in wells in an attempt to locate faults, as well as to locate movement of fluids using an innovative seismic 3-D measuring process that has never been used for exploration for commercial geothermal systems
- Extract core samples from wells to (a) look for evidence of CO₂ degassing using special flux measurement Equipment, (b) perform geochemical analysis including X-Ray diffraction and stable isotope analysis and (c) perform a analysis of subsurface formations



Verification of Innovation Exploration Project

- Following analysis of exploration results and the success in identifying promising exploration targets, make decision concerning drilling deep slimhole/exploration well
- Permit and drill slimhole/exploration well as soon as 2013