Advance Seismic Data Analysis Program: (The "Hot Pot Project")

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Validation of Innovative Exploration Technologies

Overview Slide:

- Timeline:
  - Start Date – January 29, 2010
  - Completion Date – August 31, 2011
- Percentage Completed:
  - <25%
- Budget:
  - Total Project Funding - $8,199,656.00
  - DOE Share - $4,214086.00
  - Awardee Share - $3,985,570.00
  - Planned FY10 Amount - $2,250,253.00
- Barriers:
  - Lack of available & reliable resource information
  - High exploration risks & high up-front costs

Project Objectives:

- To improve geothermal well target selection and reduce drilling risk through an innovative and advanced analytical method for interpreting seismic data to locate deep geothermal structures.

Relevance/Impact of Research

- Through analyzing the seismic data by the advanced method of the 2.5-D technique and a full waveform inversion the data can be pre-stacked into images of faults and fractures within the geothermal field at depth.
  - Using this method will result in costs saving compared to 3-D models.
  - Better drilling target selections that will reduce the risk of dry holes.
  - Reduce high up-front costs of geothermal power project development.

Scientific/Technical Approach:

- Apply new developments in seismic imaging
  - Follow methodology of Pullammanappallil and Louie (1997) to maximize reflection at depth
  - Next the use of a velocity model (2.5-D) to pre-stack depth migration
  - Using a waveform inversion computer program by means of a Beowulf cluster machine, the data will be stubbed until refined.
  - Finally the velocity model derived from the data will deliver images of faults and fractures within the geothermal field.
- Scientific Objectives
  - Pin point faults and fractures at depth to better select drilling targets

Scientific/Technical Approach: continued

- Milestones for FY10
  - Complete background and GIS analysis – April 2010
  - Complete seismic survey data collection permitting – May to June 2010
  - Complete seismic survey data collection – August 2010
  - Complete seismic survey data analysis – September 2010
  - Select slim hole and resource confirmation well targets – September 2010
  - Complete slim hole and resource confirmation well permitting process – October to December 2010
- Go/NoGo Decisions
  - At this stage of the Project all decisions will be a “GO”.

Accomplishments, Expected Outcomes and Progress:

- Accomplishments
  - Completed background and GIS analysis
  - Submitted NOI to BLM office for seismic survey permit
- Expected Outcome
  - Seismic survey permit granted by BLM
- Progress
  - Complete seismic survey at site
  - Complete seismic data analysis
  - Select slim hole and resource confirmation well targets
  - Submit slim hole and resource confirmation well drilling permits

Accomplishment, Expected Outcomes & Progress: continued

- Team Qualifications

  The Oski team is one of the finest geothermal development teams within the industry. Oski's team members have a total of over 100 years experience within the geothermal power industry. Members include business management, geologists, engineers, land acquisition, environmental & safety, and finance experts. The team has extensive geothermal resource development and well field/plant operations experience.

Project Management/Coordination:

- Summary of Project Plan
  - Obtained seismic survey permits
  - Complete seismic survey at site
  - Analyze survey data
  - Select slim hole and resource confirmation well targets
- Schedule
  - Obtain permit – June 2010
  - Seismic survey data collection – July 2010
  - Analyze survey data and select drilling target – September 2010
  - Permit slim hole and resource confirmation wells – October 2010.

Project Management/Coordination: continued

- Application of Resources and Leverage of Spending Plan
  - Oski team to permit and gather background data on Project
  - Vendor – Optim to complete seismic survey at site
  - Oski team and Optim to analyzed survey data
  - Oski team to select slim hole and resource confirmation well targets
- Spending Plan Total Funds (FY10)

April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
$30,838	$94,408	$52,442	$120,789	$170,296	$365,060	$630,060	$725,507	$22,889

Project Summary:

- Seismic survey data analysis using innovative techniques
  - 2.5-D model
  - Full Waveform inversion computer program
  - Clear images of at depth faults and fractures in geothermal fields
- Less Up-Front risk
  - Better well drilling target selection