Technology Development and Field Trials of EGS Drilling Systems

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High Temperature Tools and Sensors,
Down-hole Pumps and Drilling

Overview

- Project Overview
  - Timeline
    - Project start date FY 2010, Project end date FY 2012
      - Currently 2% complete
  - Budget
    - ARRA project funded by DOE Geothermal
    - Funds received $588,600
    - Total 3 year budget $1,889,000 (plus some industry cost share)
  - Barriers
    - None Identified
  - Partners
    - TBD

Evaluation/Application of Mature Drilling Technologies from other Disciplines to Geothermal Industry

- Faster drilling rates
- Short term realization of cost savings in geothermal drilling
- Improved Bit Life (Flat time reduction)
- Formation Drillability
  - PDC bits drill ductile and brittle formations
  - Potential for transition to multilateral completions using technology used in O&G applications
- Hard rock drilling alternative to existing technology
- Safety
  - R&D100 Award for PDC bits attributed to use of lighter weight BHA

Project objective

- Development of drilling systems based upon rock penetration technologies not commonly employed in the geothermal industry.

"Modification, improvements and field-testing of demonstrated technologies for high-temperature geothermal drilling applications."

Scientific/Technical Approach

- Approach
  - Review available technologies (i.e. percussion hammers, PDC bits, hybrid bits, mud hammers, and turbo drills)
  - Select Two Candidate Options
  - Field test (Secure industry partner with wells)
  - Evaluate results (Determine failure mechanisms)
  - Manufacture and Implement Modifications
  - Field Test / Evaluate Results
  - Realize Benefits
- Milestones

Year 1: Complete Initial Field Trials

Year 2: Implement Design Changes from Initial Field Trials

Year 3: Complete and analyze results of follow-on Field Trials

Accomplishments, Expected Outcomes and Progress

- Utilize commercially available technologies in geothermal
- Leverage SNL drilling technology testing and evaluation experience to geothermal
  - Experimental drill rig
  - Drilling laboratory
  - Concurrent rapid drilling projects

Project Management/Coordination

- Schedule
  - Schedule based on previously discussed milestones
  - Currently 2% complete, (review of current technologies)
- Application of resources
  - Sandia Geothermal Department
  - Leverage programs funded by non-DOE sponsors
- Coordination with industry
  - Industrial partner needed; contacts initiated

Future Directions

- Deployment strategy/ future research.
  - Publish/advertise results (GRC, etc)
  - Link advanced drilling system designs to geothermal needs
  - Results may warrant additional “needs”
    - For example - materials development
  - Encourage deployment if successful

Summary

- Planned work publicly advertised
- Initial contacts with industry made
- Remaining tasks:
  - Secure industry partner for wells of opportunity now and two years out
  - Select industry partners for drill method technologies
  - Complete Phase 1 testing
  - Analyze results, engineer improvements
  - Complete Phase 2 testing
  - Publish results/realize benefits in geothermal drilling