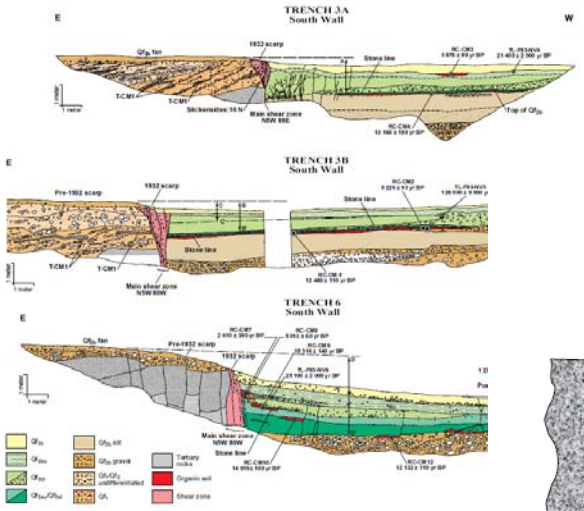

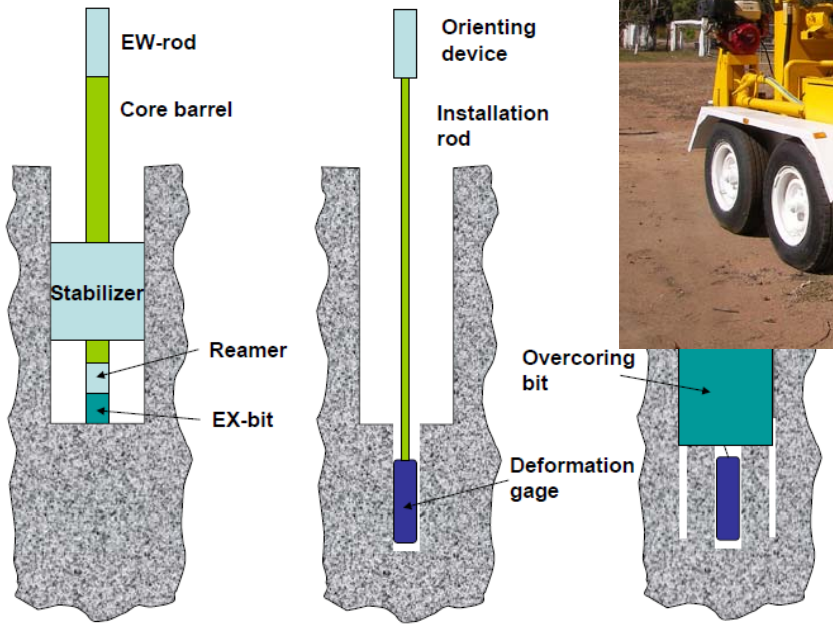

Away from the Range Front - Intra-Basin Geothermal Exploration

May 18, 2010

PI: Glenn Melosh
Presenter: Max Wilmarth
Organization: GeoGlobal Energy

Scientific/Technical Approach

- Target open fractures at depth from detailed surface structural and mechanical data and evidence for shallow thermal upflow.
- Extend the range front fault targeting method with early detail
  - Increase the number of complementary structural/mechanical data sets
  - Quantify fracture permeability mechanics early
- Apply existing technology from outside the geothermal industry
  - Geotechnical Industry – push core drilling and fault trenching
  - Mining Industry – stress over-coring
  - Research – Lidar and stress/fracture pattern permeability models
- Milestones
  - Establish full project team
  - Target deep wells
  - Drill first deep well
  - Drill second deep well

Accomplishments, Expected Outcomes and Progress

1. No accomplishments so far

2. Expected outcomes: Technical success, uncertain drilling result
    1. Application of known techniques in a new way
    2. Uncertain extension of near surface data to depth

3. Progress
    1. NEPA/NOI process started
    2. Lidar bid and contracted
    3. Pre-existing data acquired

Project Management - Schedule

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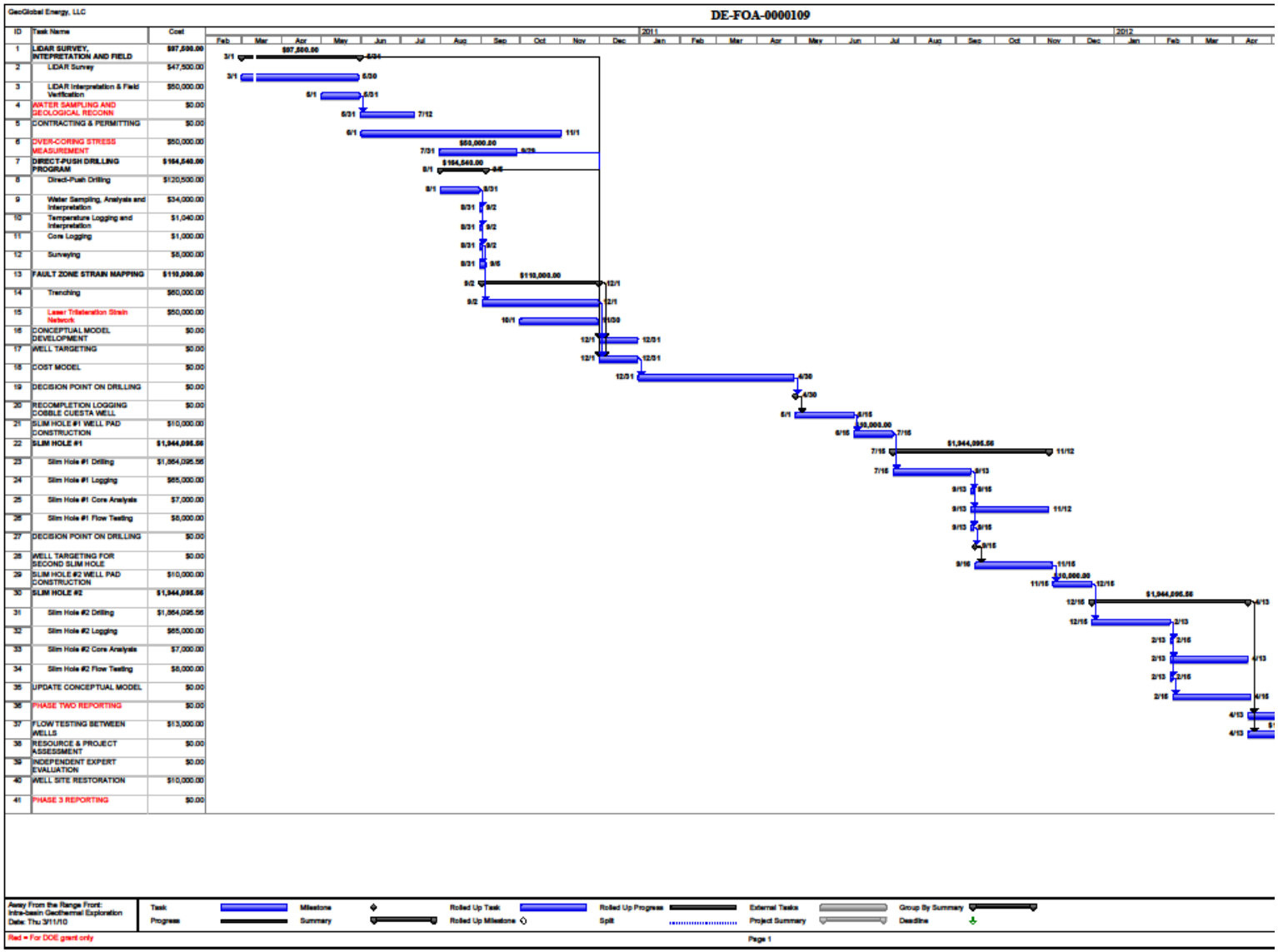

ID	Task Name	Cost
1	LIDAR SURVEY, INTEPRETATION AND FIELD	$97,500.00
2	LIDAR Survey	$47,500.00
3	LIDAR Interpretation & Field Verification	$50,000.00
4	WATER SAMPLING AND GEOLOGICAL RECONN	$0.00
5	CONTRACTING & PERMITTING	$0.00
6	OVER-CORING STRESS MEASUREMENT	$50,000.00
7	DIRECT-PUSH DRILLING PROGRAM	$164,540.00
8	Direct-Push Drilling	$120,500.00
9	Water Sampling, Analysis and Interpretation	$34,000.00
10	Temperature Logging and Interpretation	$1,040.00
11	Core Logging	$1,000.00
12	Surveying	$8,000.00
13	FAULT ZONE STRAIN MAPPING	$110,000.00
14	Trenching	$60,000.00
15	Laser Trilateration Strain Network	$50,000.00
16	CONCEPTUAL MODEL DEVELOPMENT	$0.00
17	WELL TARGETING	$0.00
18	COST MODEL	$0.00
19	DECISION POINT ON DRILLING	$0.00
20	RECOMPLETION LOGGING COBBLE CUESTA WELL	$0.00
21	SLIM HOLE #1 WELL PAD CONSTRUCTION	$10,000.00
22	SLIM HOLE #1	$1,944,095.56
23	Slim Hole #1 Drilling	$1,864,095.56
24	Slim Hole #1 Logging	$65,000.00
25	Slim Hole #1 Core Analysis	$7,000.00
26	Slim Hole #1 Flow Testing	$8,000.00
27	DECISION POINT ON DRILLING	$0.00
28	WELL TARGETING FOR SECOND SLIM HOLE	$0.00
29	SLIM HOLE #2 WELL PAD CONSTRUCTION	$10,000.00
30	SLIM HOLE #2	$1,944,095.56
31	Slim Hole #2 Drilling	$1,864,095.56
32	Slim Hole #2 Logging	$65,000.00
33	Slim Hole #2 Core Analysis	$7,000.00
34	Slim Hole #2 Flow Testing	$8,000.00
35	UPDATE CONCEPTUAL MODEL	$0.00
36	PHASE TWO REPORTING	$0.00
37	FLOW TESTING BETWEEN WELLS	$13,000.00
38	RESOURCE & PROJECT ASSESSMENT	$0.00
39	INDEPENDENT EXPERT EVALUATION	$0.00
40	WELL SITE RESTORATION	$10,000.00
41	PHASE 3 REPORTING	$0.00

Project Management - Budget

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Summary of Budget Categories: Phase 1, 2 and 3					
CATEGORY	**Budget Period 1 Costs**	**Budget Period 2 Costs**	**Budget Period 3 Costs**	**Total Costs**	**Project Costs %**
a. Personnel	$667,200	$580,800	$1,072,200	**$2,320,200**	**31.50%**
b. Fringe Benefits	$166,800	$145,200	$268,050	**$580,050**	**7.90%**
c. Travel	$20,250	$22,250	$9,250	**$51,750**	**0.70%**
d. Equipment	$0	$65,000	$0	**$65,000**	**0.90%**
e. Supplies	$1,040	$124,500	$2,500	**$128,040**	**1.70%**
f. Contractual	$378,500	$3,650,191	$15,500	**$4,044,191**	**54.90%**
g. Construction	$0	$0	$0	**$0**	**0.00%**
h. Other Direct Costs	$66,100	$100,000	$6,600	**$172,700**	**2.30%**
i. Indirect Charges	$0	$0	$0	**$0**	**0.00%**
Total DOE-approved Project Costs	**$1,299,890**	**$4,687,941**	**$1,374,100**	**$7,361,931**	**100.00%**

Project Management – Implementation

- Establish team
  - Project Coordinator – starts May 30
  - Graduate student selection in progress
  - GGE team engaged in Chile through May 30
- Finalize documents
  - Government (BLM, DOE, State)
  - University (UCSB, UNR)
  - Contractors (NA)
- Start technical projects
  - Lidar project poised to start

Future Directions

- 2010 Sub-projects
  - Survey designs and locations
  - Contractor bids and specifications
  - Lidar, Push core drilling, water sampling, over-coring, trenching, laser tri-lateration baseline
  - Conceptual model and targeting
- Deep Drilling Decisions
  - Areal extent of target zones
  - Expected reservoir temperature and depth
  - Expected IRR projection from cost model
  - Likelihood of drilling success
- Solar-Geothermal Hybrid to increase project size

- Deep permeability is a rare event
- Observations have revealed:
  - Success at the Range Front at fault irregularities
  - Relative fault-stress orientations can affect permeability
  - Lithology and contrasts can affect permeability
- Challenges
  - Explore away from the range front
  - Geomechanical/structural information is sparse relative to fracture complexity
  - Stress and propping may both be necessary to keep fractures open

Summary - Highlights

- Escalate mechanical and structural methods to build on the results of studies in existing well-fields
  - Traditional: TGH and fault maps from the range front
  - This Project: shallow wells and geomechanics before drilling
- Push-core may optimize shallow drilling
  - Much lower cost than TGH
  - Lower environmental impact
  - Measure 30 m gradient rather than 2 m temperature
  - Fluid sampling opportunity
- Over-coring stress measurement may reveal local stress
  - Fault pattern studies suggest permeability at fault irregularities
  - A developed technique in a new application