



Ulupalakua, Maui

Glass Buttes, Oregon



Innovative Exploration Technologies Maui Hawaii & Glass Buttes, Oregon

Project Officer: Ava Coy

Total Project Funding: Maui-\$4.9M, GB- \$4.4M

April 23rd, 2013

Kyle Snyder
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Ormat Nevada Inc.

- **Timeline**

- Project start date **10/29/2009**
- Project end date **Q3 2013**
- Well sites permitting: **Q1/2011-Current**
- Percent complete **~50%**

- **Budget**

- Total project budget: \$10.4M
- DOE share: \$4.9M
- Awardee share: \$5.5M
- Spent through Q1, 2012: \$473K (Exploit Phase-I budget)

- **Barriers**

- 'Blind' system
- Permitting
- Culturally sensitive location

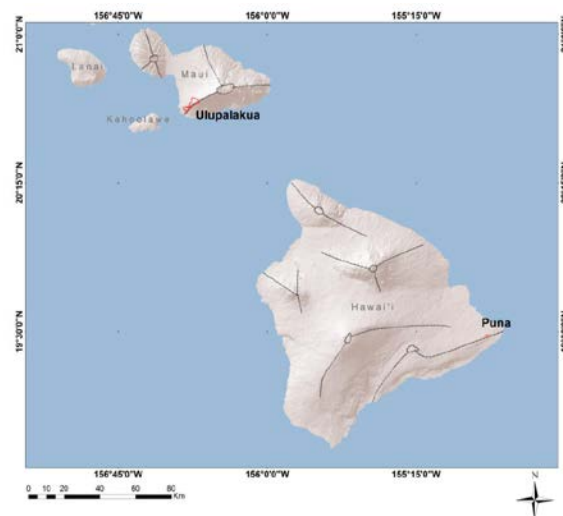
- **Partners**

- Lawrence Berkeley National Lab

- Our research:
 - Provides a benchmark for exploration of other 'blind', dormant volcanic systems
 - Validates gravimetry and aeromagnetism for geothermal exploration in young, basaltic volcanic environments (including challenges)
 - Demonstrates success and challenges of CO₂ and isotope analysis in young, hot-spot volcanic systems for geothermal exploration
 - May ultimately result in baseload energy generation for Maui



Haleakala SW Rift Zone



Study Areas

Maui Ulupalakua Land



- April, 2011 - Initiated biological & cultural surveys of the project area and started on air quality, hydrology, noise, and traffic impact assessments.
- February, 2012 - Published draft EISPN to allow for 30 day public comment period to commence.
 - Received extensive comments regarding proposed project.
- April, 2012 - Ormat decided to include site specific drill target analysis in EIS to save time down the road.
- (1 EIS vs. 2 EIS)
- May, 2012 - Maui County adopts geothermal regulations.
- Delays have also resulted from preparation of Cultural Inventory Assessment (CIA) for inclusion into EIS.

- Hope to have draft EIS ready by September-October, 2013.
- Final EIS to be filed with DLNR by end of 2013.
- Document will then go out for 45 day public comment period.
- Final EIS accepted by DLNR in March, 2014.
- File for State lands lease.
- Apply for Mining lease under “reserved” lands.
- Obtain Geothermal Resource Permit (GRP) from Maui County.
- Obtain Exploration drilling permits from the State.

- Lack of knowledge about geothermal operations.
 - Lots of misinformation floating around.
- Lack of clarity regarding permitting process.
 - Not a clear distinction between exploration and utilization.
 - A new process for regulators.
- Lack of regulatory stability.
 - Specific counties enacting regulations.
 - Legislature constantly changing regulations.

Maui Summary

| | FY2010 | FY2011 | FY2011-2013 |
|------------------|--|---|---|
| Target/Milestone | Archive historical geochemistry | Acquire fill-in geochemistry, new aqueous and gas geochemistry (including isotopic data from wells and springs) | Complete EIS, |
| Results | Completed 7/10 | Completed | Final EIS accepted by DLNR in March, 2014 |
| Target/Milestone | Archive and re-process historical geophysics | Re-process old Puna gravity/magnetics using new methods being developed at Ulupalakua | |
| Results | Completed 8/10 | Completed | |
| Target/Milestone | Make CO2 flux measurements along geophysically-defined targets | Make CO2 flux measurements along geophysically-defined targets | |
| Results | 50% completed in 2010 | Completed | |

- Timeline
 - Start Date: March, 2010
 - Projected End Date: May, 2012
 - Completed: Phase-I: ~95%
- Budget
 - Total project budget: \$8,7M
 - DOE cost share: \$4,4M
 - Awardee cost share: \$4,3M
 - Spent through Dec 31, 2011: \$637K (Exploit Phase-I budget)
- Barriers
 - Biological and Tribe consultation issues have slowed permitting.
 - Long BLM permitting process has delayed drilling
- Partners
 - Ormat Nevada Inc
 - Oregon State University
 - Oregon Department of Geology and Mineral Industries
 - US Department of Energy

Objectives

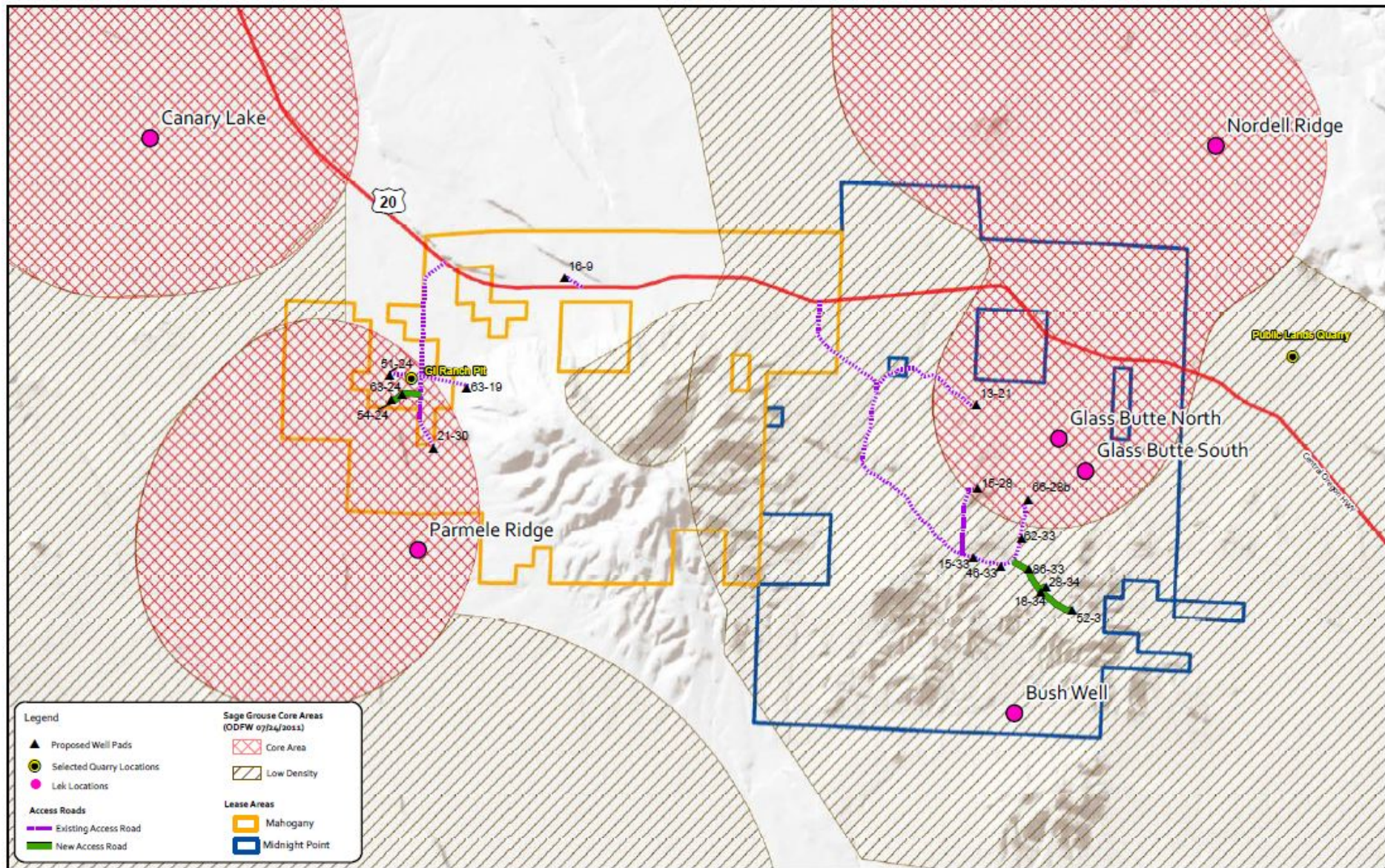
- Combine high resolution geophysical and geochemical techniques to reduce exploration risk
- Study 2 separate prospective areas with a single set of exploration data
 - Midnight Point
 - Mahogany
- Combine all exploration data in a comprehensive 3D model
- Drill 2 slim wells and one full size production well

Glass Buttes

Accomplishments, Results and Progress

- Major milestones (June 2011 to May 2012).
 - Detailed geologic map completed,
 - All data compiled into 3D geologic model
 - Preliminary fault model created
 - Preliminary slim well targets created
- Major milestones (May 2012 to April 2013).
 - On-Going BLM EA

Glass Buttes Project



- Notice of Intent submitted to BLM in September, 2010.
- Tribal consultation was initiated by BLM in April, 2011.
- 1st draft of EA was submitted to BLM in September, 2011.
- Met w/ BLM State Director, ODFW, and DOE in Portland to discuss Sage Grouse and tribal issues w/ project in June, 2012.
- Multiple (6-7) revision cycles have taken place over the course of the project.
- Sage Grouse and tribal issues have added to delays on the project.

- Having two BLM offices working on project has also added to delays on the project.
- Document is near completion, BLM plans to release for 30 day public comment period in April, 2013.
- Decision Record is expected in June, 2013.
- Will most likely have multiple restrictions due to Sage Grouse including; areas of no surface occupancy, drilling blackout periods, noise restrictions, and off-site mitigation requirements.

| | FY2011 | FY2012 | FY2013 |
|------------------|--------------------------------------|---|------------------|
| Target/Milestone | Complete 3D model and Phase I report | Finalize geologic map, 3D model, and Phase I report | |
| Results | ~80% completed | Completed Q2 2012 | |
| Target/Milestone | Finalized BLM EA | Finalized BLM EA | Finalized BLM EA |
| Results | On-Going | On-Going | On-Going |