2012 Geothermal Technologies Student Competition

Team Mentor: Michael McCurry
College or University: Idaho State University
Academic Department: Geosciences
Team Mentor Email: mccumich@isu.edu
Mailing Address: Department of Geosciences, 921 South 8th Ave., Pocatello, ID 83209
Mentor Phone Number: 208-282-3235

Team Leader: Michael Ginsbach
Name of Team: Idaho State University
Team Leader Mailing Address: Department of Geosciences, 921 South 8th Ave., Pocatello, ID 83209-8072
Team Leader Email: ginsmich@isu.edu
Team Leader Phone Number: 208-282-3235

Geothermal Project Title
Development of an integrated, testable conceptual model of blind geothermal resources in the eastern Snake River Plain: application to the Newdale geothermal prospect.

Approach and Methodology
Statement of the Problem The Eastern Snake River Plain (ESRP) region in Idaho is well-known for having vast geothermal potential (e.g., MIT, 2007; Neely and Galinato, 2007) despite having few surficial manifestations of that potential. Paucity of surface thermal manifestations is likely a result of masking of high heat flow by groundwater flow in the ESRP aquifer system (Blackwell, 1989) - i.e. it is largely a blind geothermal resource (MIT, 2007). Applications of geophysical methods for identifying deeper heat sources and potential reservoirs is also greatly complicated by the regional geology (e.g., capping basalt layers) and complex subsurface structures (e.g., Kuntz et al., 1992). We propose that a key element for effective exploration of this region will be development of a robust, testable geologic and hydrogeologic conceptual model of the subsurface, particularly in regions of the plain where active basin and range fault systems merge into the plain. We propose a multistep approach to develop a testable geologic and hydrogeologic conceptual model for the Newdale geothermal prospect located within the Heise caldera region near Rexburg, Idaho. On the southeastern edge of the HVF, near the town of Newdale, ID is the Newdale Geothermal Prospect. This prospect is in an area of high heat flow which is spatially isolated from suspected areas of highest heat flow (the axial region) of the SRP (GeothermEx, 2010). The data from this study can be collated with seismic, volcanologic, and geophysical data to reconstruct the volcanologic and structural history of the area which could then be used to build a conceptual model of heat production and shallow heat flow in the Heise area.

Structural analysis of the Newdale prospect will provide an excellent basis for determination of the extent and nature of what is thought to be a blind geothermal system in the area. Use of the methods of Autenrieth et al. (2011) and McCurry et al. (2011) of an analogous area in the Blackfoot Volcanic Field (BVF) located adjacent to the ESRP could be ideal for analysis. Specifically, using a combination of geophysical data and field mapping to develop a 3-dimensional visualization of the Newdale subsurface system could provide information on thermal fluid flow and structural controls on reservoir geometry. In collaboration with colleagues at the Idaho National Laboratory and the Center for Advanced Energy Studies (CAES), we hope

to use the CAVE facility at CAES to explore the geometry of our 3-D conceptual model much more thoroughly. Additionally, inclusion of geophysical data could provide information on lithologies at depth, which would provide information on groundwater flow as well, along with possible permeability, porosity, and conductive properties of the rocks underlying the surface of the Newdale prospect. Other, similar systems like the BVF have been categorized in this respect, and the combination of regional geology and structures has allowed conceptual models of groundwater and heat flow to be developed. The role of the faculty mentors for the duration of this project will be to provide assistance establishing collaborations with industry, government, and academic colleagues; as well as acting in an advisory capacity during execution of the proposed work plan, testing of the developed model, and report preparation.