2012 Geothermal Technologies Student Competition

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Geothermal Project Title: Geophysical Characterization of the Western Snake River Plain

Approach and Methodology

After an evaluation of the geology of the Snake River Plain, it has been determined that a promising area of investigation would be near the town of Homedale, Idaho. This area straddles the interface between volcanic rock as well as unconsolidated sediments, presumably separated by basin bounding faults that possibly host geothermal potential. Past experience exploring the geothermal fields at Neal Hot Springs to the north indicates that this area could also present an opportunity for geothermal energy production. The basic approach of this team is to integrate local geologic information with geophysical data gathered on-site. Initial geological surveys will be performed in order to determine ideal locations to target the geophysical surveys. The methods that will be used have been chosen to meet two basic criteria. The first criteria is their ability to locate faults as well as the flow of hot fluid. The second criteria has to do with logistical constraints including budget, time and manpower limitations. The methods to be used include self-potential, DC resistivity, gravity, magnetic and electromagnetic surveying. Self-potential and DC resistivity are ideal survey methods for mapping he flow of fluids in the subsurface. DC resistivity provides detailed images of the exact locations of fluids in the subsurface, while self-potential describes the direction of fluid flow. Gravity and magnetic survey methods are ideal for mapping the changes in geology associated with faulting. The dynamic differences in rock properties between the volcanic rocks and the unconsolidated sediments will be easily distinguished by both gravity and magnetic methods. Finally, electromagnetic methods are useful for providing broad imaging of both the fluids in the subsurface as well as the changes in geologic structures. By combining multiple methods, subsurface parameters controlling thermal fluid can be correlated, increasing confidence in the final geological interpretation. After all data are collected in the field, the data will be processed and inverted to provide the best subsurface images possible. Geological data taken initially will be used to help constrain the relevant geological parameters.