

Drilling Prospectus: Camas USU-1 Geothermal Test Well
The Snake River Plain Geothermal Play Fairway Analysis Project

Submitted by John Shervais, Department of Geology
Utah State University, Logan UT, 84322-4505
john.shervais@usu.edu; 435-797-1274

The Snake River Plain Geothermal Play Fairway Analysis Project has three main goals: (1) to adapt the methodology of Play Fairway Analysis for geothermal exploration, creating a formal basis for its application to geothermal systems, (2) to assemble relevant data for the Snake River Plain volcanic province from publicly available and private sources, and (3) to build a geothermal play fairway model for the Snake River Plain that will allow us to identify the most promising plays. This model integrates diverse data sets within ArcGIS and serves as a point of departure for future exploration efforts.

We selected two related play types for further evaluation: (1) blind geothermal systems in the WSRP similar to that discovered in MH-2 by Project Hotspot, and (2) more traditional play-types in the Camas Prairie-Mount Bennett Hills area, which are associated with exposed surface fault systems and hot springs, but represent nonetheless a variation of the basalt-sill complex geothermal system developed in our conceptual model. New data acquisition included field investigations of structures and volcanics, magnetotelluric surveys, high-resolution gravity and magnetic surveys, active source seismic surveys, and water chemistry from springs and wells.

Our primary goal for FY2018 is to validate our methodology by drilling a slim hole in the Camas Prairie area designed to intersect permeability and heat in a hydrothermal system. Basement rocks in this area have elevated $^3\text{He}/^4\text{He}$ ratios, high thermal gradients, and moderately high reservoir temperatures from multi-component geothermometry. Our analysis of the local geology shows that the depth to basement is much shallower than under the western SRP and that we have the potential to intersect permeability at depths of less than 2000 feet. The validation drill hole at Camas Prairie will allow for extensive reservoir testing and analysis, which have been budgeted separately from drilling.

This project is funded by the U.S. Department of Energy award number DE-EE0006733, with a budget of \$442,106 for drilling by the U.S Geological Survey Research Drilling Program, \$435,894 to Utah State University and its subawardees (*U.S.G.S. Geothermal Program; Boise State University; Leidos*), and \$122,000 to Federally-funded Research and Development Centers: *Idaho National Laboratory (INL), Lawrence Berkeley National Laboratory (LBNL), and the National Renewable Energy Laboratory (NREL)*.

The drill plan is detailed in a letter from the U.S. Geological Survey Research Drilling Program (attached as page 2 of this prospectus) and schematically (page 3). Funds for plug-and-abandon are included in the USGS budget. Funds for geophysical logging and reservoir testing are included in the USU budget. We plan to drill late Summer-early Fall 2018, and complete operation by late Fall, including P&A.

Coordinates for the well site are: 43.29888889, -114.9091667, at approximately 300 South on Barron Road (600 West) near Fairfield, Idaho. Maps are shown on page 4.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY RESEARCH DRILLING PROGRAM

3595 E Patrick Lane
Suite 100-200
LAS VEGAS NEVADA 89120
702-823-1235 Telephone

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To: Dr. John Shervais
Department of Geology
Utah State University
4505 Old Main Hill
Logan Utah, 84322-4505
435-797-1274

Subject: Drilling Plan for Camas Prairie Geothermal Test Well

The USGS Research Drilling Program (RDP) proposes the following plan for drilling operations. RDP plans to use two types of rigs for this project. A multimethod top head TH60DH rig will be used to drill and install conductor and surface casings. It will also drill into the bedrock and ream all intervals cored. A CS1000 core rig will be used to collect N sized core in intervals of interest and those to be tested.

The current plan is to use mud rotary methods and drill a 15" hole to 40' and set then cement in 10" conductor casing. A 9" + hole will be drilled to bedrock again using mud rotary methods. Depending on depth to bedrock we may step down in bit size as we descend. Then 6 5/8" 0.25" wall surface casing will be set then cemented into place. A Haliburton collar, shoe and float will be used for cementing the surface casing with the last batch of cement being Thermalok type cement. Note RDP will always keep at least a 1" annular space for cementing the surface casing.

During the curing time for cement RDP will install the Torus style 2000psi Blow Out Preventer (BOP), diverter and diverter casing then TH60DH rig will continue to drill into bedrock until the permeable zones of interest are hit. If possible and until temperatures reach unsafe limits, air percussion methods will be used in the bedrock. Once temperatures begin to elevate RDP will have to switch back over to fluids and keep up-hole temperatures at safe levels. To control temperatures RDP will have around 10,000 gallons of fresh clean water. A constant supply of water and a batch of mud will be on hand should the well need to be killed. Barite will also be on site ready if additional head is required. A nearby irrigation well will be the water supply for our operations. RDP will also have 2 water trucks on hand to transport the water to the onsite containers for resupply.

Coring will be performed with the CS1000/P6L core rig using N size bits and rod. During coring a second BOP will be placed above the first BOP and used for the wireline operations. Promising fracture zones will be the targets of coring. Once coring has been completed, RDP will switch back to the larger TH60DH rig and ream the cored interval to approximately 6".

Downhole temperature and pressure testing will follow reaming of the hole and take approximately 4 full days.

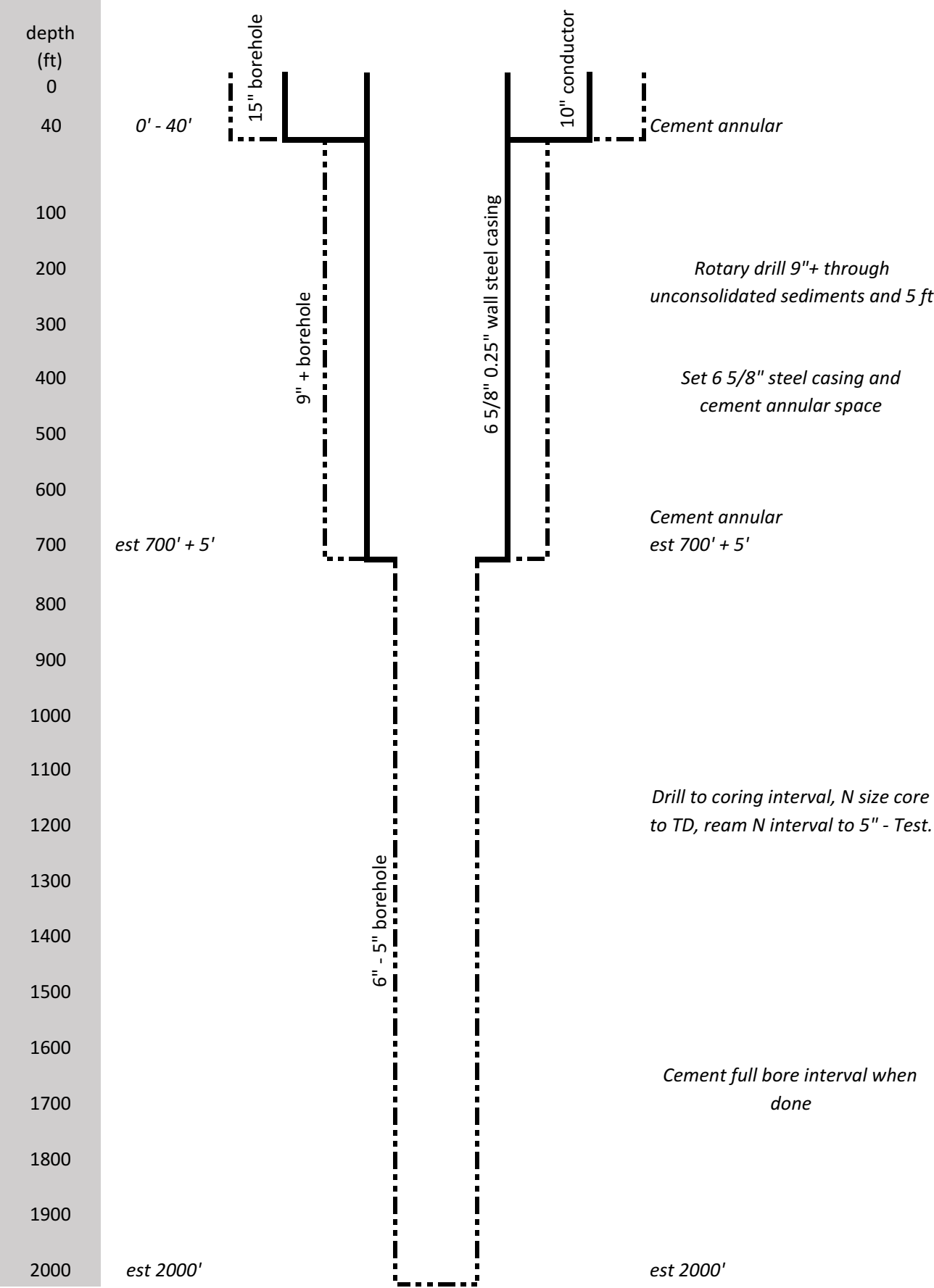
Abandonment of the test well is the last phase. Once all testing and measurements are completed RDP will properly abandon the borehole with cement using tremie pumping from the bottom up and all the way to surface. The well head will be cutdown and secured as required.

Sincerely,

Steven Crawford
Supervisory Geologist
Chief USGS Research Drilling Program
smcrawfo@usgs.gov

cc. Michael Weathers, Department of Energy

Camas Prarie Geothermal Test Well As-built



Drilling Prospectus: Camas USU-1 Geothermal Test Well

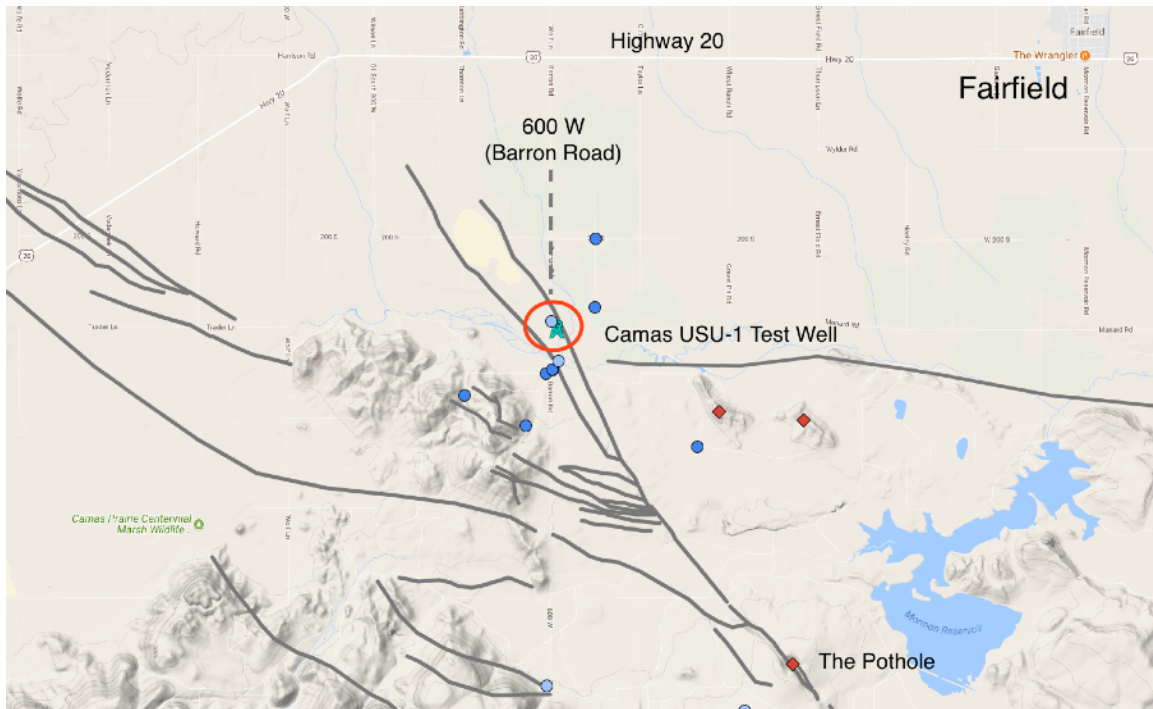


Figure 1. Camas USU-1 Test Well site, located on 600W (Barron Road), SW of Fairfield, Idaho. Faults: Grey lines; Springs and wells: Blue dots; volcanic vents: Red diamonds.



Figure 2. Detail map showing well location, Sun Valley Ranch, and inferred fault locations. Well will be at least 100 feet from Barron Road.