

Akutan Geothermal Development Project DE-EE0000329

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PROJECT DESCRIPTION

Drill and flow test a 1,500 foot exploratory confirmation well to determine the viability of development of the geothermal resource located in the Hot Springs Bay Valley (HSBV) area of Akutan Island, Alaska.



Approximate location of proposed well AK-3 with view to south of saddle leading into Akutan Harbor (October 2014)

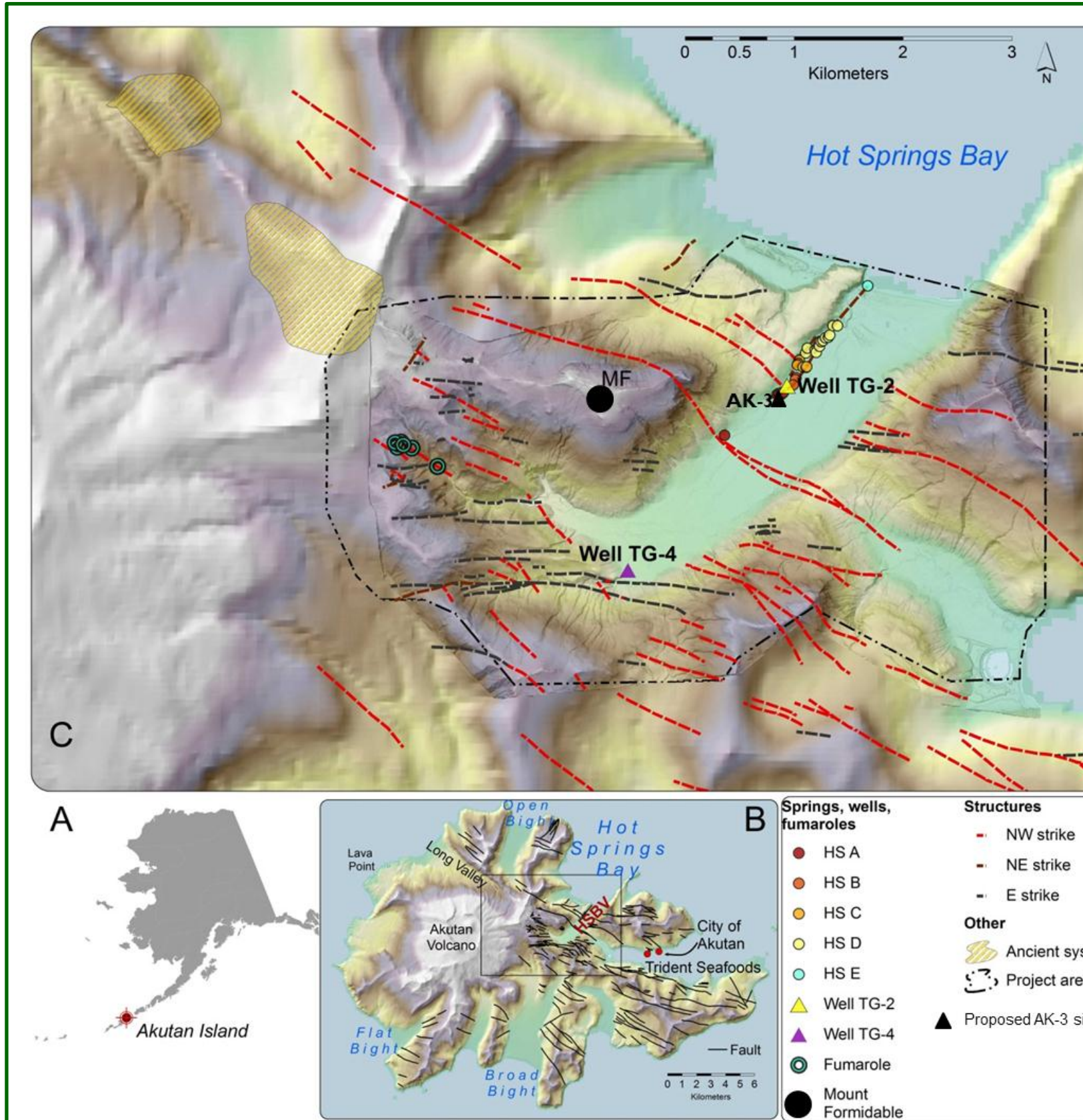
PROJECT GOALS

- ✓ Identify a drilling target and well site within the hot springs area of HSBV.
- Construct drilling site improvements and establish a base camp.
- Drill and test a resource confirmation well at the approved target location.
- Assess the probability of producing commercial quality geothermal resources from production wells.
- Prepare a bankable feasibility study to support development investment/financing.

The desired outcome of the project is the identification of a geothermal resource capable of generating electricity for the City of Akutan.

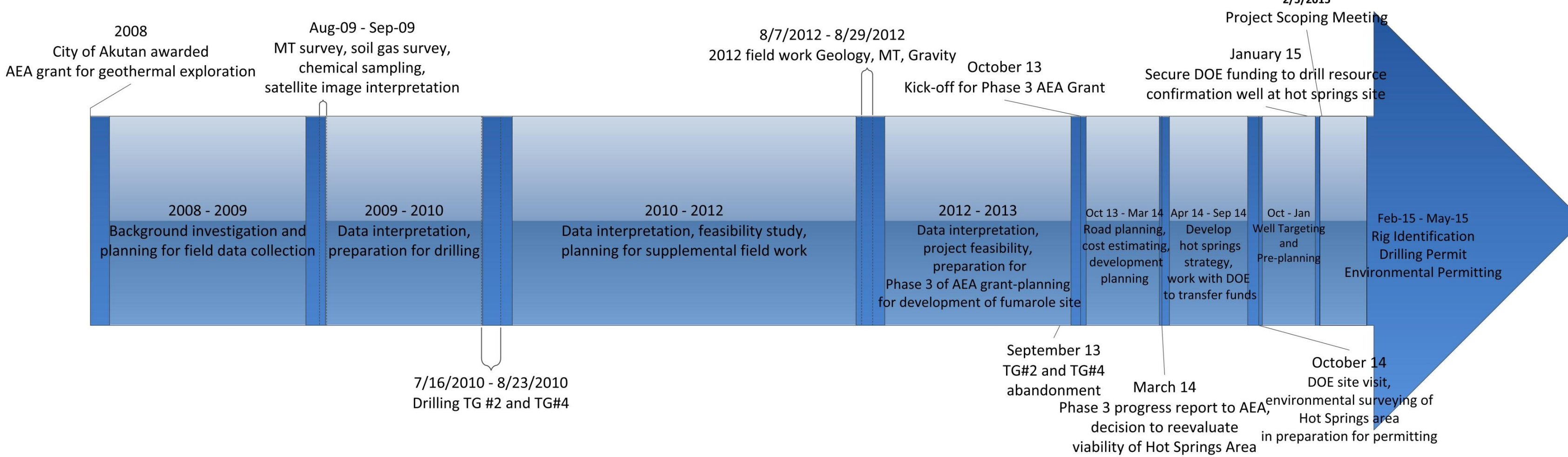
HOT SPRINGS BAY VALLEY GEOTHERMAL AREA

The Hot Springs Bay Valley (HSBV) geothermal resource area, located adjacent to Mt. Akutan volcano on Akutan Island, Alaska, is one of the most researched prospects for geothermal power production in the State of Alaska. The prospect area has been extensively studied, including geophysical surveys, geological mapping, geochemical studies, and the drilling of two thermal gradient wells. The planned drilling location is located in an area generally referred to as the Hot Springs site. It is a moderate enthalpy resource located in HSBV. Based on the analysis completed by the project team, the City of Akutan intends to pursue commercial-scale development of the Hot Springs site. A higher enthalpy resource is thought to exist, close to the fumarole area above Hot Springs Valley, but it is not economically feasible to pursue deep drilling in that location at this time. The intent of drilling AK-3 is to verify that HSBV resource would be capable of producing 5 MW_g.



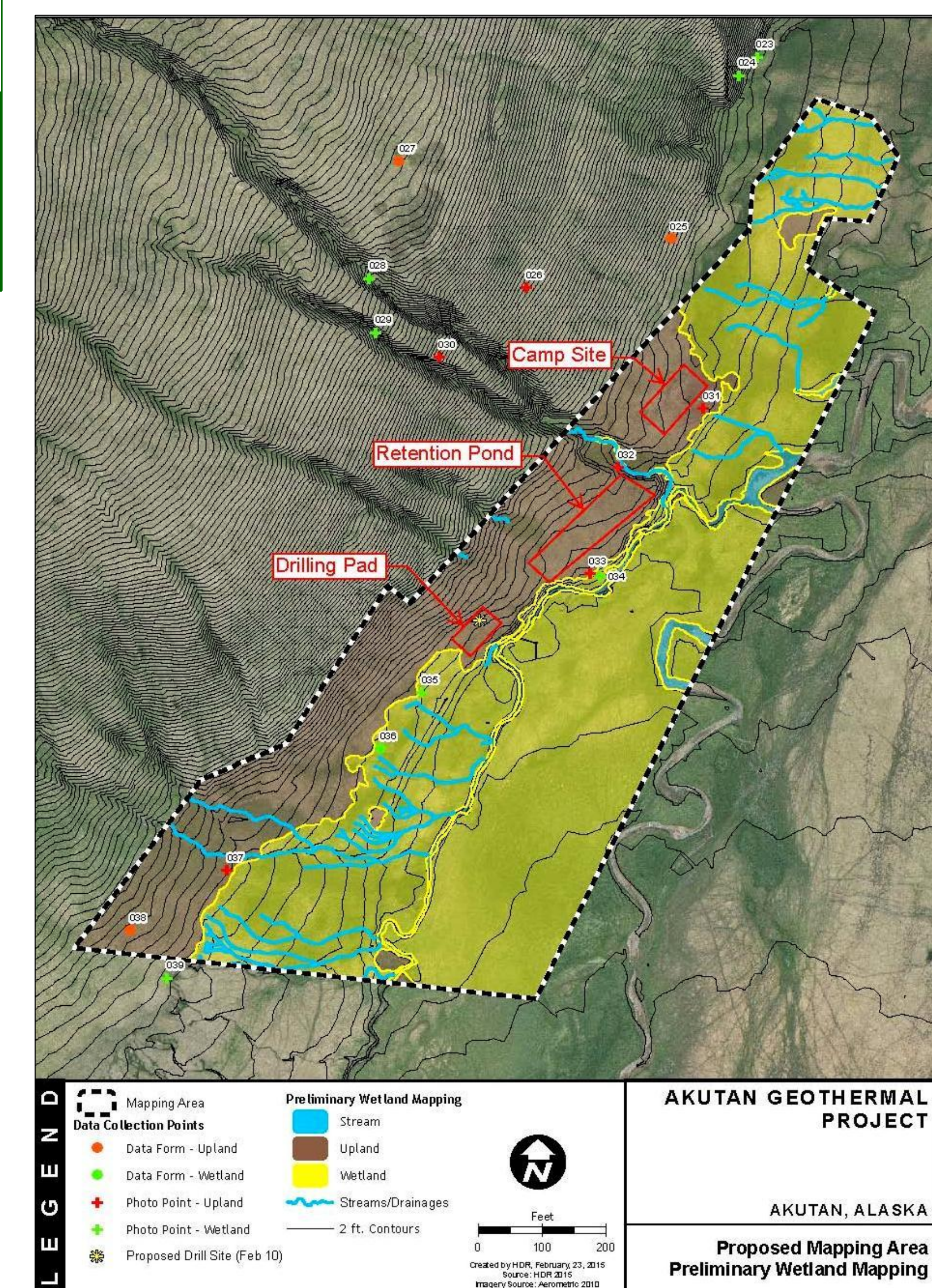
Akutan location map showing (A) Akutan Island, AK, and (B) structural grain and black rectangle denoting inset of Hot Springs Bay Valley geothermal project area shown in (C) with 2010 TG well locations and proposed well AK-3 location (Figure 1 from *Exploration of the Hot Springs Bay Valley (HSBV) Geothermal Resource Area, Akutan, Alaska* by Stelling et al., submitted to Geothermics, 2014).

PROJECT TIMELINE



Next Steps:

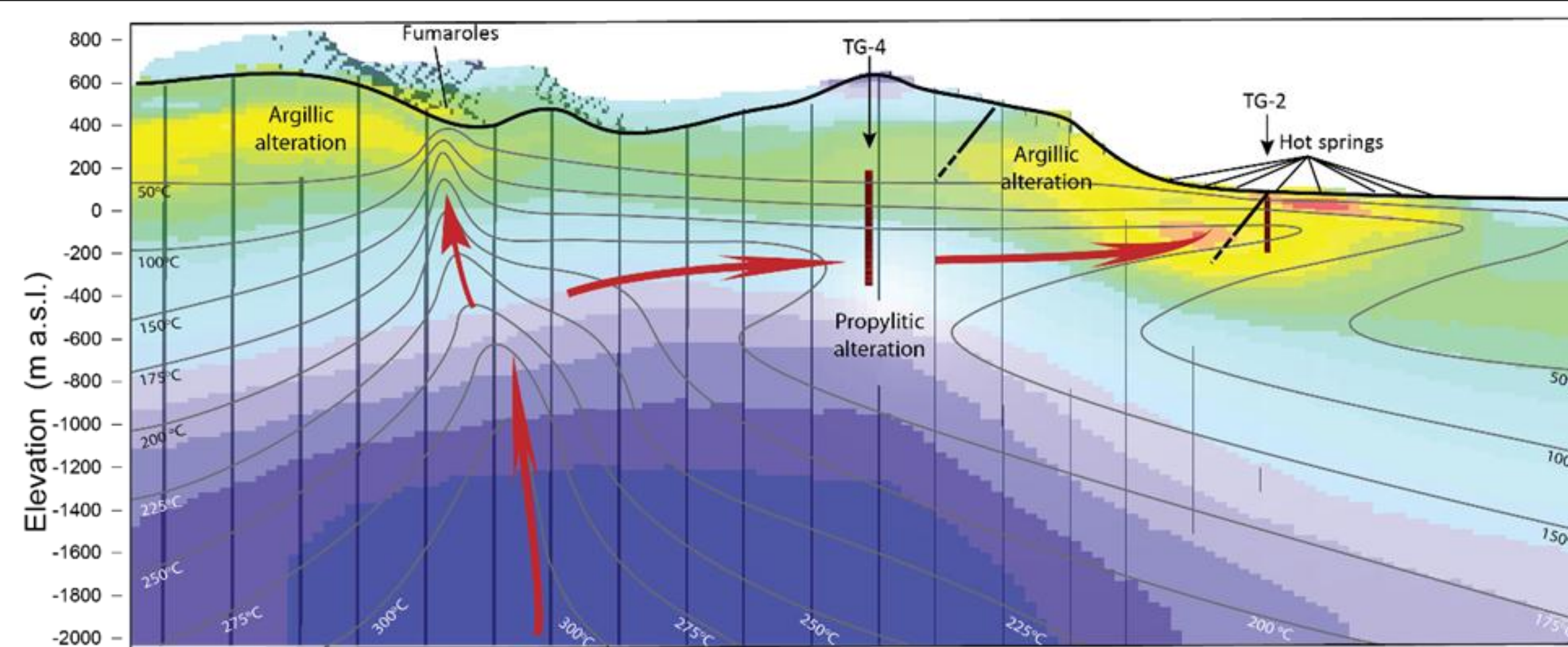
- Receive environmental and drilling permits and approvals from state and federal processes
- Receive DOE Go decision
- Proceed with planning and preparations for drilling and testing



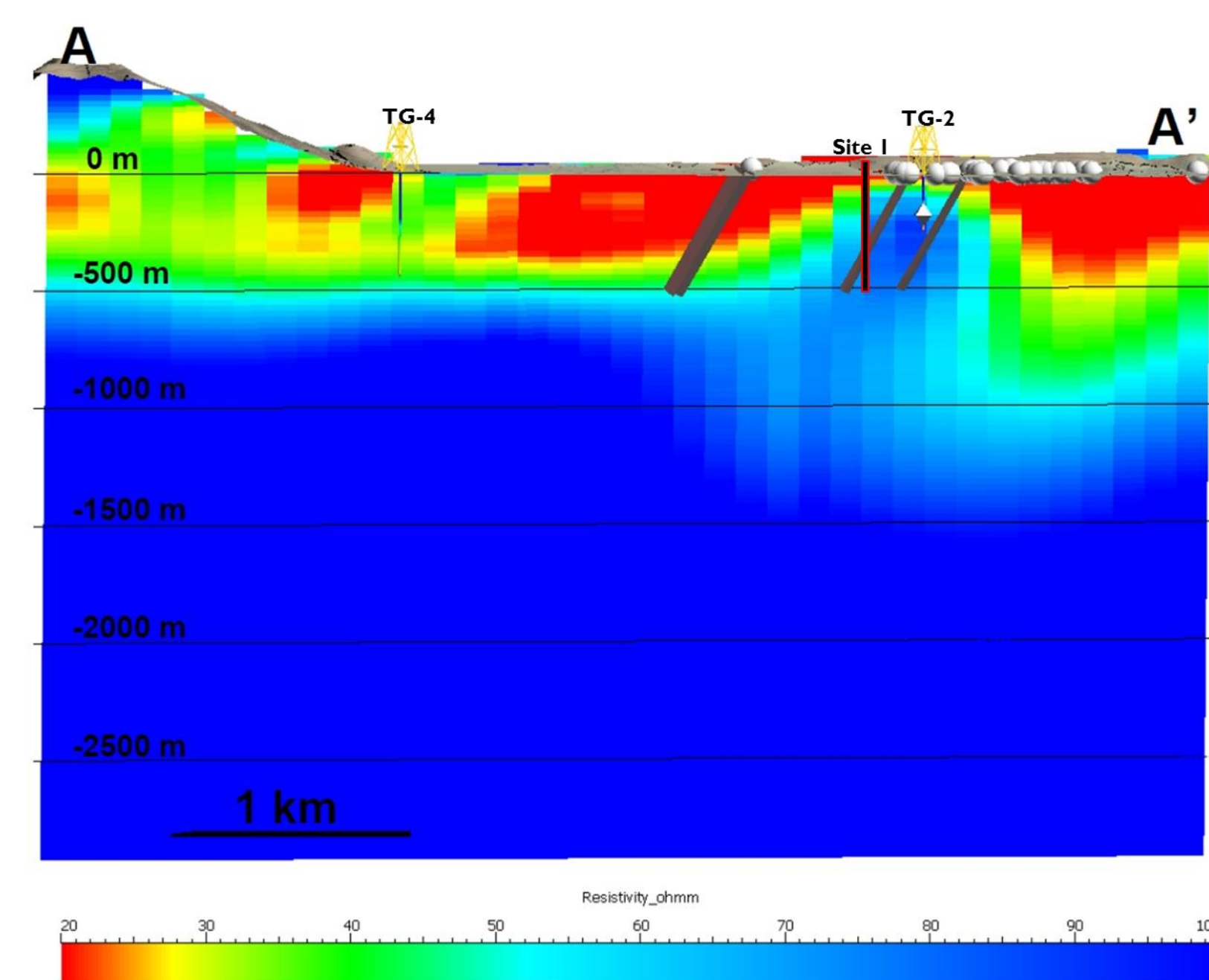
Planned area for drilling AK-3, showing location of wetland area identified by October 2014 mapping. Drilling operation will avoid disturbance of wetland. (map courtesy Mead & Hunt)

DRILLING TARGET AND SITE SELECTION

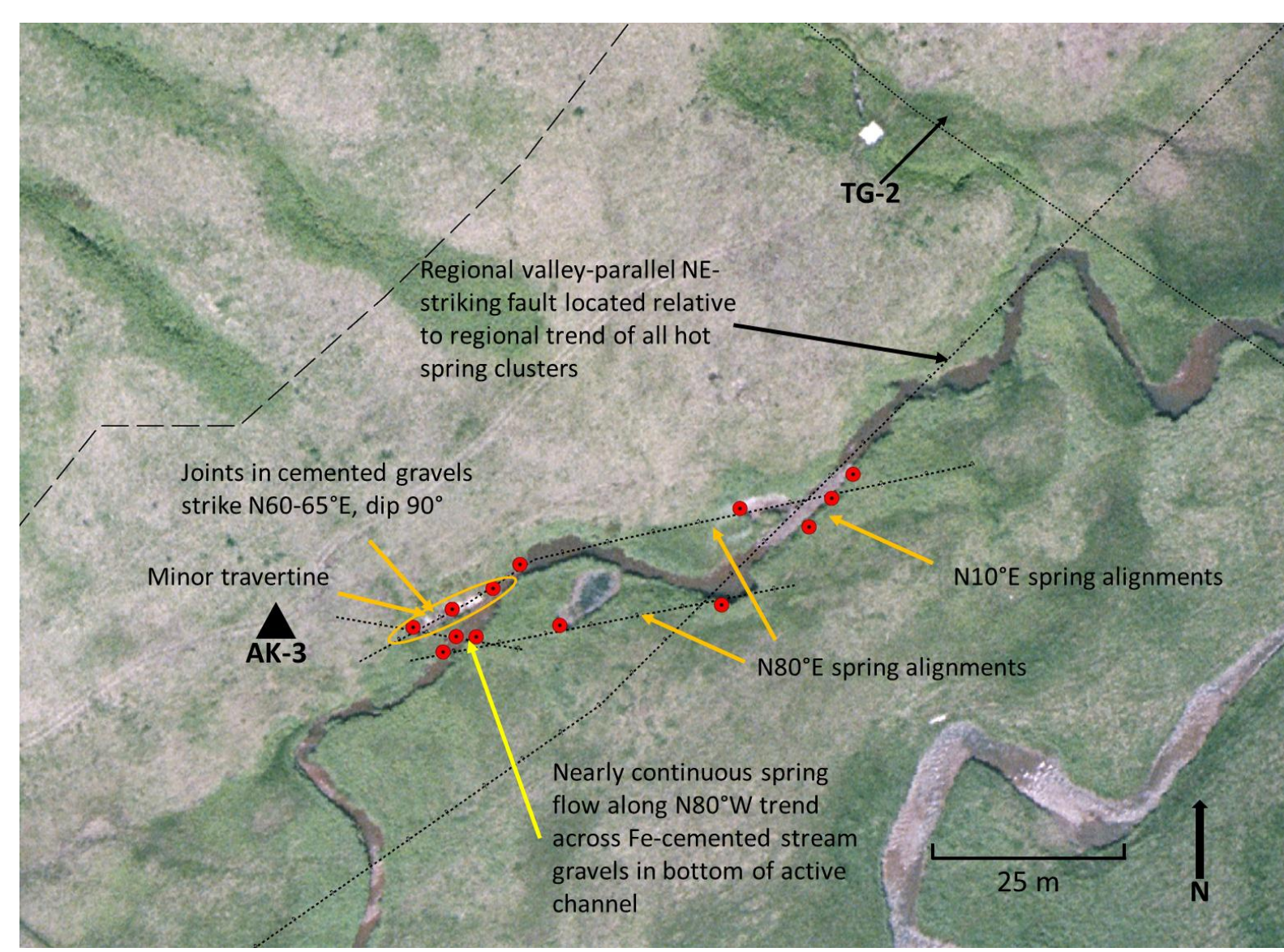
The drilling site was chosen based on the proximity to TG-2 and the known conditions there, logistical ease, intersection with the northwest-striking faults that seem to concentrate the fluids in the hot spring area, thickness and character of the low resistivity cap in the area, and the northwest-striking density change that implies favorable geologic structure. During the process of site selection, many possible locations were considered and eliminated based on logistical considerations, technical constraints, or scientific unknowns that would increase the risk of not achieving the goals of the project. The drill hole from the AK-3 site will target the southwest-dipping faults directly adjacent to a NE-striking (valley parallel) fault, both of which are associated with upflow, as evidenced by the hot spring manifestation.



Cross sectional view (approximately west-east) of conceptual model of Hot Springs Bay Valley geothermal area, showing locations of thermal gradient holes drilled in HSBV in 2010. Proposed well AK-3 is located close to TG-2 in the hot spring area.



Cross sectional view parallel to HSBV of a slice of the resistivity model created from 2010 and 2012 MT data and mapped faults projected at 60° dip to the southwest. Site 1 is the proposed AK-3 well, shown intersecting one of the fault projections.

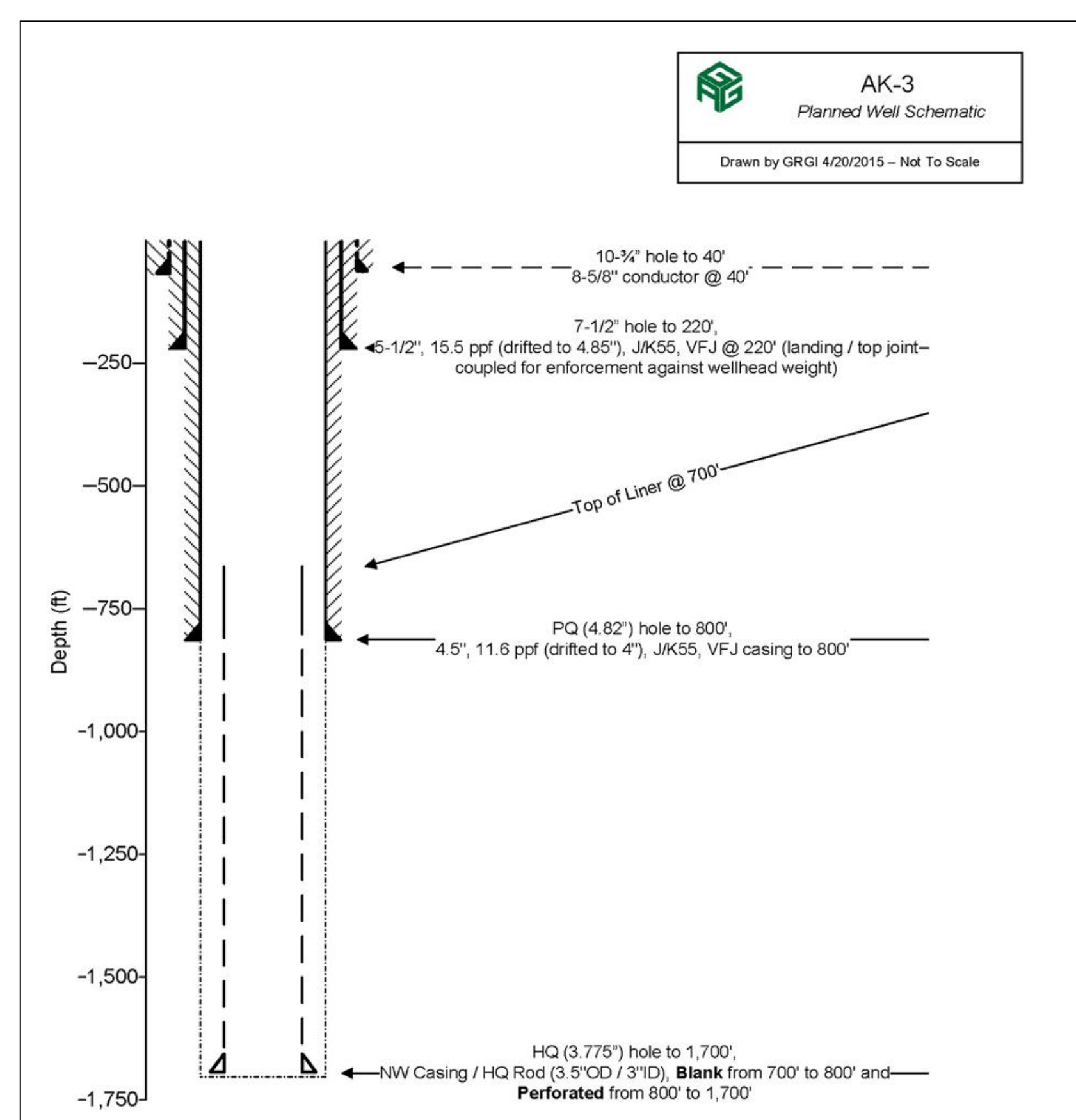


Surface manifestations at the Hot Spring area show a pattern that may be reflective of structural features. The proposed AK-3 site is shown (figure prepared by N. Hinz from 2012 field work).

EXPLORATION HISTORY BRIEF

The current exploration of the HSBV geothermal resource began in 2009 with geologic reconnaissance, geochemical sampling and a magnetotelluric (MT) survey of the project area. These data were used to create an initial conceptual model for the HSBV system that described upflow located beneath the fumarole field west and above the HSBV, and a shallow tabular outflow that comes to surface at the hot springs area in the lower valley. This conceptual model was used to inform site selection for the second stage, which included drilling two thermal gradient wells. Hot Springs well TG-2 was drilled to 833' in 2010. It flowed unassisted, and temperatures favorable for electricity generation were measured in the flowing and static well. The maximum measured temperature was 181°C. In 2012, new structural and alteration mapping was conducted, as were an extended magnetotelluric (MT) study and a gravity survey, and all elements were collected into a 3D conceptual model. No additional chemical sampling was done by the City team, but a USGS group sampled the hot springs in 2012 and a publication of their findings was released early in 2014 (Bergfeld et al., 2014). All of the chemical data shows that the hot springs area hosts neutral-chloride brine.

The 2014 well targeting involved further examination of the existing geophysical, chemical, and geological data from 2009-2012 field seasons.



Proposed well design for AK-3.

ACKNOWLEDGMENTS

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