

Preliminary assessment of the impact of geo-fluid properties on power cycle design

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The initial scope for this project had three aims. The first of these aims has been revised and work on it is now complete, while work on the second and third aims is in progress.

The first aim was to assemble the available data of water composition and quality from AGEG members. It became clear during our initial work that Geodynamics is the only AGEG member with a sufficiently advanced drilling program to enable sampling and analysis of geo-fluids. The data were obtained from water samples collected from Habanero #1 in 2003. These are reported in the Geodynamics 2004 Environmental Impact Statement (EIS) and Statement of Environmental Objectives (SEO) for the diagnostics phase of their Habanero #1 & #2 wells. More recent sampling and analysis from the Habanero #3 well occurred during March 2008 and the results of these tests have been provided by Geodynamics as a contribution to the present project.

The second aim of this project is to identify a worst-case scenario for non-condensable gases, pH and fouling potential and to undertake a preliminary design of components needed to treat them. This work is ongoing. The assumed worst-case scenario will be based on the limited data available from Geodynamics. The preliminary design of the power-cycle components required to treat these water quality issues will address all major power-cycle types, including both flash cycles and simple binary cycles. This will be based on our previous reports of basic designs for these power cycles. Those basic designs will be modified to assess the impact of the geo-fluid quality.

The third aim is to identify opportunities for cost-savings and research through such means as materials selection, cathodic protection and coatings. We have commenced a literature review to identify these, and other, types of mitigation strategies. While this work is ongoing, we have already identified some interesting literature relating to coatings that reduce fouling of heat exchangers in geothermal systems.

It should be noted that the delay in beginning the project was due to the late confirmation of funding. Nevertheless, work is now progressing well and is scheduled to be completed by mid-2009. We have also added some additional resources to the project: a Masters of Engineering student, Mr Donny Bhuana, has commenced on this project as part of his Masters studies. Mr Bhuana will focus on defining the appropriate range of water quality to investigate and complete the literature to identify opportunities for cost-savings and further research. He will also assist the 0.2 FTE Research Officer, funded under the original proposal, in completing the power-cycle designs to treat the water quality issues. This strategy will allow us to increase the project scope and remain within the existing budget and overall timeframe.