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MEMORANDUM

To:	Ken MacLeod kmacleod@geopower.ca	***Date:***	August 10, 2006
cc:	Andrew Ryder aryder@geopower.ca		Rupi Khanuja rupi@geopower.ca
From:	Roger Henneberger / Eduardo Granados		
Subject:	South Meager Project – Possible New Field Activities		

Introduction

This memo is intended to summarize new field activities that could be undertaken at the South Meager project site to expand the current knowledge of the geothermal resource. These possible activities were discussed in the meeting held yesterday (August 9) at our office.

As discussed in earlier communications, well-testing work programmed for the South Meager project has been delayed while wells MC-6 and MC-8 continue to equilibrate thermally after injection. During this period of delay, there are several low to moderate-cost operations that might be carried out, and which might prove useful to the future development of the project. The proposed activities are aimed mainly at investigating reservoir permeability at several of the coreholes drilled in the southern part of the project area.

Deep drilling and well testing conducted during 2004-2006 has focused on investigating reservoir characteristics in the northern part of the project area, through wells drilled from the high-elevation site (wells MC-6, MC-7 and MC-8). Though these wells encountered high temperatures as expected, and well testing to evaluate reservoir productivity is not yet complete, initial indications are that reservoir permeability in the northern sector is not as extensive as had been hoped, and may not be adequate to consistently yield high-productivity wells drilled from high-elevation sites. Therefore, it will be prudent, as well as complementary to the ongoing evaluation of the deep wells, to investigate reservoir permeability in more southerly zones that can be reached from lower-elevation drilling sites. Better characterization of permeability within the southern reservoir zone will serve to better define the range of options for project development, which could include (for example), exploitation of shallower, lower-temperature zones through wells produced by self-flow or by pumping.

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Possible Activities

The activities that could be considered are listed below, in approximate order of decreasing priority (based on their expected value, cost and difficulty):

- Hole M19 – Clean-out, temperature log and injection test
- Hole M18 – Clean-out and injection test
- Hole M7 – Drill replacement hole and injection test
- Hole M6- Drill replacement hole and injection test

The feasibility of any of these operations will depend on being able to obtain a coring rig at reasonable cost. Comments on each of the suggested operations follow.

Hole M19

Corehole M19 encountered high temperatures (up to 224°C) at elevations between +200 and +500 m, based on measurements made with maximum registering thermometers (MRTs). The well became blocked by an apparently minor obstruction, and a complete, stabilized temperature profile was never measured. The well also showed evidence during drilling of high permeability, but an injection test was not carried out (though a detailed plan for such a test was prepared).

It is likely that the obstruction could be removed quickly with a coring rig, which would allow an injection test to be conducted, and, after the well has heated up, a stabilized temperature profile to be measured. This would provide important information about reservoir conditions a short distance to the south of MC-6 and MC-8.

Hole M18

This hole encountered temperatures greater than 200°C at elevations of 350-500 m. It was left with a plug and sections of drill rods in the wellbore, but it may be possible to clean out the hole sufficiently to conduct an injection test.

If a coring rig is mobilized to clean out M19, it may be worthwhile to clean out M18 as well, and conduct an injection test following the same program used for M19. This will provide information about reservoir conditions in the central part of the outflow zone that extends southward to the site of hole M7. The present condition of M18 should be investigated carefully (through examination of available drilling records) before programming such an operation, to ensure that there is a reasonable likelihood of successfully cleaning out and testing the hole.

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Hole M7 (Replacement)

M7 was the hottest of the early (pre-2001) corehole, reaching more than 190°C at less than 500 m depth. Its temperature profile suggests that it was drilled into the top of a permeable reservoir zone that represents a southward outflow from the hotter reservoir to the north. However, no quantitative data relating to reservoir permeability are available from M7.

A corehole drilled at the same location, to a depth of 500-600 m, would intersect the same high-temperature zone, and allow reservoir permeability to be evaluated by injection testing (following approximately the same program established for hole M19). There is a chance that such a hole could be induced to flow (by air or nitrogen lifting); however, even if it doesn't, wellbore modeling could be used to assess the potential flow characteristics of a full-diameter well drilled at this site.

Hole M6 (Replacement)

Hole M6 had the second-steepest temperature gradient (after M7) among the early coreholes, and reached a temperature of about 140°C at 400 m depth. A new corehole at the same location would permit evaluation of reservoir permeability as described above for the M7 site. An alternative approach (which could be considered for the longer term, at this site and other southern sites) would be to use a water-well rotary rig to drill a somewhat larger-diameter well that could be pump-tested if adequate permeability was encountered. This would allow direct assessment of the feasibility of obtaining pumped production from moderate temperature (120-150°C) reservoir zones, which could serve as the basis for a binary-cycle generation project.

Recommendations

If Western Geopower is interested in pursuing any of the activities described above, the first step would be to investigate the availability of an adequate coring rig for the clean-out and/or drilling operations. If a rig is available on relatively short notice, then it may be possible to program some activities for the current field season; otherwise, the work would need to be postponed until 2007. Concurrently, the time required to permit new coreholes should be investigated, in case any new drilling is to be programmed.

Once a rig is determined to be available, a logistical plan for both temperature logging and injection testing should be developed, verifying that the time available within the field season is adequate to carry out the required logging and testing to completion. GeothermEx will be pleased to assist WGP in the analysis of options for water supply, instrumentation etc. for any work that is likely to be undertaken.