PROPOSAL for PRELIMINARY GEOLOGIC ANALYSIS OF THE GLASS MOUNTAIN HYDROTHERMAL SYSTEM, SISKIYOU COUNTY, CALIFORNIA

submitted to

Mitchel Stark, Senior Geoscientist and Project Manager
Calpine Corporation, 10350 Socrates Mine Road
Middletown, CA 95461
707-431-6101 mitchs@calpine.com

from

Jeff Hulen, Senior Geologist and Principal Investigator (PI)
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March 5, 2002

Dear Mitch:

It is our understanding that Calpine Corporation, now the sole leaseholder at the Glass Mountain (Medicine Lake) geothermal property, is planning an ambitious exploration and development drilling program to commence in the Fourmile Hill sector of the acreage in mid-2002. Calpine has asked the PI, Jeff Hulen, to complete a preliminary geologic analysis and resource synthesis of the Glass Mountain system, with emphasis on Fourmile Hill, in order to assist the company with its drilling program. The governing objective of this work is to provide fundamental new resource information that Calpine can employ to reduce the risks and costs of exploration, and to improve the odds for intersecting a commercially productive geothermal reservoir.

The work is organized into the following tasks:

1. Assemble and review published and proprietary literature on Medicine Lake volcano and the Fourmile Hill and Telephone Flat portions of the Glass Mountain hydrothermal system.

2. Geologically log in detail the core from recently deepened Fourmile Hill corehole 88-28, with support for this task from reconnaissance petrographic, X-ray diffraction, and fluid-inclusion analyses. Emphasis for this logging effort will be on lithology, volcanic stratigraphy, fracturing and vein mineralization, and hydrothermal alteration.

3. Critically compare hydrothermal alteration mineralogy and zoning in 88-28 with that intersected in Telephone Flat geothermal wells. Although the alteration (particularly propylitic alteration) may be superficially similar among these wells and the relatively impermeable 88-28, are there subtle differences that can be practically used to discriminate "productive" from the "nonproductive" mineral assemblages and textures? This task will involve the review of existing petrographic work and thin sections from Telephone Flat well 87-13; logging selected lengths of altered core from that well; then comparing and contrasting the alteration styles of 87-13 and 88-28.

4. Utilize existing temperature, fluid-composition, lithology, structural disruption, and hydrothermal alteration data (Calpine, CalEnergy, Unocal, Phillips, Occidental) to construct a series of cross sections and level maps through the entire Glass Mountain hydrothermal system. Selected parameters to be plotted in 3-D for full clarity and predictive capability. Temperature, for example, to be plotted at 500 m elevation increments to the deepest levels encountered, and to be plotted on at least 4 mutually intersecting cross-sections. Same for lithology and alteration.

5. Develop and prepare a reference set of rock, alteration, and vein-mineral types for use in logging future exploration and development boreholes at Glass Mountain, in particular the Fourmile Hill wells and coreholes to be drilled during summer

and fall of 2002. Travel to The Geysers or Santa Rosa, California, to conduct a one-day seminar on the reference set (and its geologic setting) for Calpine geoscientists and borehole-logging contractors.

The total estimated cost of this work is XX,XXX. A detailed budget is appended to this letter proposal. We appreciate the opportunity to work with Calpine to gain a better understanding of the important Glass Mountain resource.

Sincerely yours,

Jeffrey B. Hulen

att: detailed budget

Subject: glass mountain budget
Date: Mon, 04 Mar 2002 18:37:20 -0800
From: Jeff Hulen <jhulen@egi.utah.edu>
To: hmorris@egi.utah.edu, mitchs@calpine.com

Heather --

Attached is the information you need for the Glass Mountain project budget. At your request, I've separated X-ray diffraction and fluid-inclusion lab costs into expenditures for personnel and supplies. Calpine wishes to pay for thin sections directly, so I've deducted $2,250 from my most recent informal cost estimate for the job. Accordingly, the total EGI budget for the work should not exceed $32,000. I'll bring you an accompanying short proposal tomorrow morning, and if you and OSP are willing, we should get the proposal and budget to them in the next day or two. Calpine is anxious for us to get started.

When you have an exact budget number, would you do me a favor and forward the total cost figure to the Calpine Glass Mountain Project Manager, Mitch Stark, at the e-mail address noted above.

Thanks, Heather --

--Jeff

Glass Mtn Budget Info.doc	**Name:** Glass Mtn Budget Info.doc **Type:** Winword File (application/msword) **Encoding:** base64

Information for Glass Mountain project budget

Personnel

Jeff Hulen – 55 days

Joe Moore – 5 days

Sue Lutz – 5 days

Louise Spann – 5 days

Supplies and Services

For XRD and fluid-inclusion laboratories -- $500

Travel

One trip to The Geysers, California, to meet with Calpine geoscientists and borehole-logging contractors

Airfare, Salt Lake City to San Francisco and back –

Rental car – San Francisco to The Geysers and back, 3 days –

Lodging – 2 nights in Santa Rosa, California

Per Diem – 3 days