Comments on E G & G Draft.

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CONCLUSIONS AND RECOMMENDATIONS

The promising evidence of hydrothermal resources underlying or in close proximity to Williams AFB, combined with the favorable life-cycle costs and energy savings associated with the geothermal development scenarios presented in this report suggest that the project should continue to be pursued through the drilling phase, subject to the discussion and expectations set forth below.

The factor giving rise to optimism concerning the existence of a usable geothermal resource at the base is, of course, the high temperatures in the GKI wells. In the course of trying to determine the extent of the geothermal reservoir, however, the initial fluid flow from the wells eventually dropped off, and attempts at stimulation failed. The GKI exploration experience, therefore, is inconclusive with respect to the existence of a geothermal reservoir at depth. The geologic controls on the area of high temperature at depth are not well-known, and a new production drill hole would have to gain access to an area of substantial fracture or fault-controlled permeability to produce the required fluid volume.

~~Serious~~ C consideration has been given to geophysical exploration tools, particularly the employment of a reflection seismic survey, that might help delineate these major structural ~~fractures~~ features and related fracture permeability. An expenditure of $100,000 for 10 to 15 line miles of seismic data would be required. There is ~~serious~~ some doubt about the probability of obtaining ~~usable~~ definitive data from the seismic survey, in view of some past unsuccessful attempts by industry to obtain data from the same stratigraphic section. In view of the limited selection of sites available on base and the ~~low probability~~ uncertainty of success with the seismic approach, further geophysical exploration is not recommended.

In the absence of additional geophysical information and exploration, well location WP-1, being the closest on-base location to the GKI wells, would be most likely to intersect a similar geologic setting. Location

WP-2, while preferable from an engineering and economic sense, would be a somewhat higher risk effort. A resource discovered at either location would provide the basis for an energy project with positive life-cycle cost benefits.

In selecting the production drilling site on base, two options exist, depending on the funding levels available. Site WP-2 might initially be selected on the basis of more favorable engineering and cost advantages. If a favorable resource is proven at that site, the injection well could then be located at WR-1. If no resource or an inadequate resource is encountered in the drilling of WP-2, that site might then be considered the injection well, obviating the need for WR-1, and the production well then sited at WP-1. If the drilling of WP-2 was unsuccessful, the net cost of taking an initial chance on that site would be about $1.25 million, since drilling WR-1 was estimated at $758,000. Considering WP-2 as the injection site should pose no problems with WP-1 as the production well, due to the one and one-half mile separation. Even though WP-2 would be a 10,000-ft well similar to WP-1, appropriate casing and cementing as WP-2 is drilled would preserve the option of using that well for fluid disposal at an intermediate level (~ 5,000 ft). Given adequate financial support, we believe this option possesses the greatest project flexibility and increases the prospects for developing a geothermal resource on the base.

If, on the other hand, the commitments to the projects are sufficient for only a single exploration effort, that effort should be made at site WP-1, for the reasons discussed above.

Given the favorable life-cycle cost advantages inherent in the geothermal energy supply systems discussed earlier, firm decisions on system selection could be made at the conclusion of the resource exploration program when the quality of the resource is determined. When the geothermal reservoir is confirmed and if temperatures exceed 350°F, principal consideration should be given to the development of an electrical supply system for the

Two successful production wells are required even if adequate flow is developed from one well. This will insure a standby well to be used if well stimulation or servicing, or repair and replacement of wellhead or surface loop materials is required due to corrosion or precipitation.

entire base. If the temperatures encountered are less than 350°F, the preferred alternative would be a more limited district cooling system for the principal load areas, perhaps including a corollary heating loop. Either development alternative would be cost effective at both WP well sites.

There are no known environmental or regulatory deterrents that would impede pursuance of the project.