EG&G Idaho

GL07187

INTEROFFICE CORRESPONDENCE

date March 17, 1980

to K. W. Jones

from S. Petty/J. A. Martinez

subject LOCATION OF PRODUCTION AND INJECTION WELLS FOR BECHTEL ALCOHOL FUELS STUDY - SP-5-80/JAM-1-80

OBJECTIVES:

In order to complete the economic analysis for a proposed 75.6 million liter per year alcohol fuels plant Bechtel National, Inc., asked EG&G Idaho, Inc., for assistance in locating production and injection wells at the Raft River KGRA. In a meeting on February 20, 1980, it was determined that 13 production wells and 5 injection wells would yield realistic cost estimates for the supply and injection system.

INTRODUCTION:

Originally, Bechtel had estimated that the drilling of 10 production and 3 injection wells would ensure the supply and injection requirements of 378.5 lps at 137.8°C. for the proposed alcohol fuels plant. This allowed for one uneconomic well out of the 10 drilled. Discussion of the success ratio for drilled wells at the present Raft River facility resulted in a decision to locate 13 production wells and 5 injection wells. Six additional injection well sites were chosen to allow for expansion of the injection field.

One hundred sixty acres of land in R.26E T.15S section 25 are readily available and were suggested for use as a plant site and well locations by Bechtel. From geologic mapping, geophysics and subsurface geology it seems probable that no structures with the potential for geothermal production pass through this area. It was decided that the production wells should be located first and then the plant and injection field sited to minimize piping distances.

Production well sites were chosen on the basis of surface geophysics, surface geology, heat flow data, geochemistry, borehole geophysics and stratigraphy. Because production in the Raft River KGRA is largely from vertical and steeply dipping fractures geophysical evidence of fracturing from seismics and surface expression of fractures were sought as a clue to the existence of fractures at depth. Wells were located to intersect these fractures at depths where high temperatures could be expected. Lineations from aerial photography, geochemistry, electrical, magnetic and gravity data were used to confirm evidence of fractures. Heat flow

data from five core holes and 22 auger holes, were used to locate areas of high geothermal gradient.

Four areas of interest were designated Zones 1-4. Wells in each zone were located on structures believed to increase the potential for geothermal production. High priority wells are those with the greatest potential for economic geothermal production. Low priority well locations were given to indicate the potential for dirlling further wells in each zone should the number of uneconomic wells be higher than expected.

The wells in Zone 1 (see figure 1) were located in an area of high geothermal gradient as evidenced by hot water seeps and high temperatures in auger holes H30 and H10. The area is controlled by the Narrows Structure which trends northeast. This zone of fracturing has been described both as a sheer zone and a graben. No definitive statement is possible on the true nature of this structure without further geophysical work. Reversals in the temperature gradient in three heat flow wells in this area suggest that hot water is moving upward from depth along dipping fractures which trend roughly northeast - southwest. Well sites in Zone 1 were located east of the Jim Sage Mountains in order to tap these fractures at greater depths where temperatures would be higher.

The wells in Zone 2 are located along a mapped fracture for which there is supportive evidence in the seismic reflection survey. No heat flow wells exist in this area so the presence of geothermal fluids can only be assumed. The drilling of heat flow holes is suggested prior to drilling of this feature.

The existence of an east-west fault in Kelsaw Canyon and an east-west trending anomaly in the self-potential survey running through RRGE-3 suggest the possibility of an east-west fault extending into the Raft River Valley. The well sites in Zone 3 were chosen to intersect this fault.

High heat flow in H09, mapped northeast trending fractures, the hot BLM well and geophysical and geologic evidence for north-west trending fractures were the reasons for locating production wells in Zone 4.

The plant location was chosen after siting the 13 production wells. The maximum distance for transmission of geothermal fluids was arbitrarily chosen as 1 km. Using insulated 10" pipe this would give a temperature drop between the furthest wells and the plant of approximately 1°C assuming that a quarter of the total production would come from each production zone. The plant site was then located in an area of relatively low geologic hazard on private land not presently cultivated.

The injection field was chosen to avoid fractures and so prevent upward movement of the injected fluid. The wells are located as close as possible to the suggested plant location between two areas of production wells. It is expected that pressurizing the middle zone of permeable sediments would lessen upward movement of geothermal fluids and reduce losses of heat from the reservoir. Extra well locations were given to indicate the direction of the injection field.

RECOMMENDATIONS:

It is strongly recommended that any feasibility study for use of the geothermal resource in the Raft River Valley include the cost of exploratory holes to increase the probability of successful drilling of production wells. Despite the fact that a resource is undeniably located in Raft River the successful placement of production wells necessitates adequate exploration.

sh

Attachment: Figure 1. Location Map of Proposed Well Locations.

cc: C. A. Allen C. A.
D. M. Callan
E. G. Dibello
M. R. Dolenc
D. Goldman
J. H. Ramsthaler
R. R. Stiger
Central File
Letter File

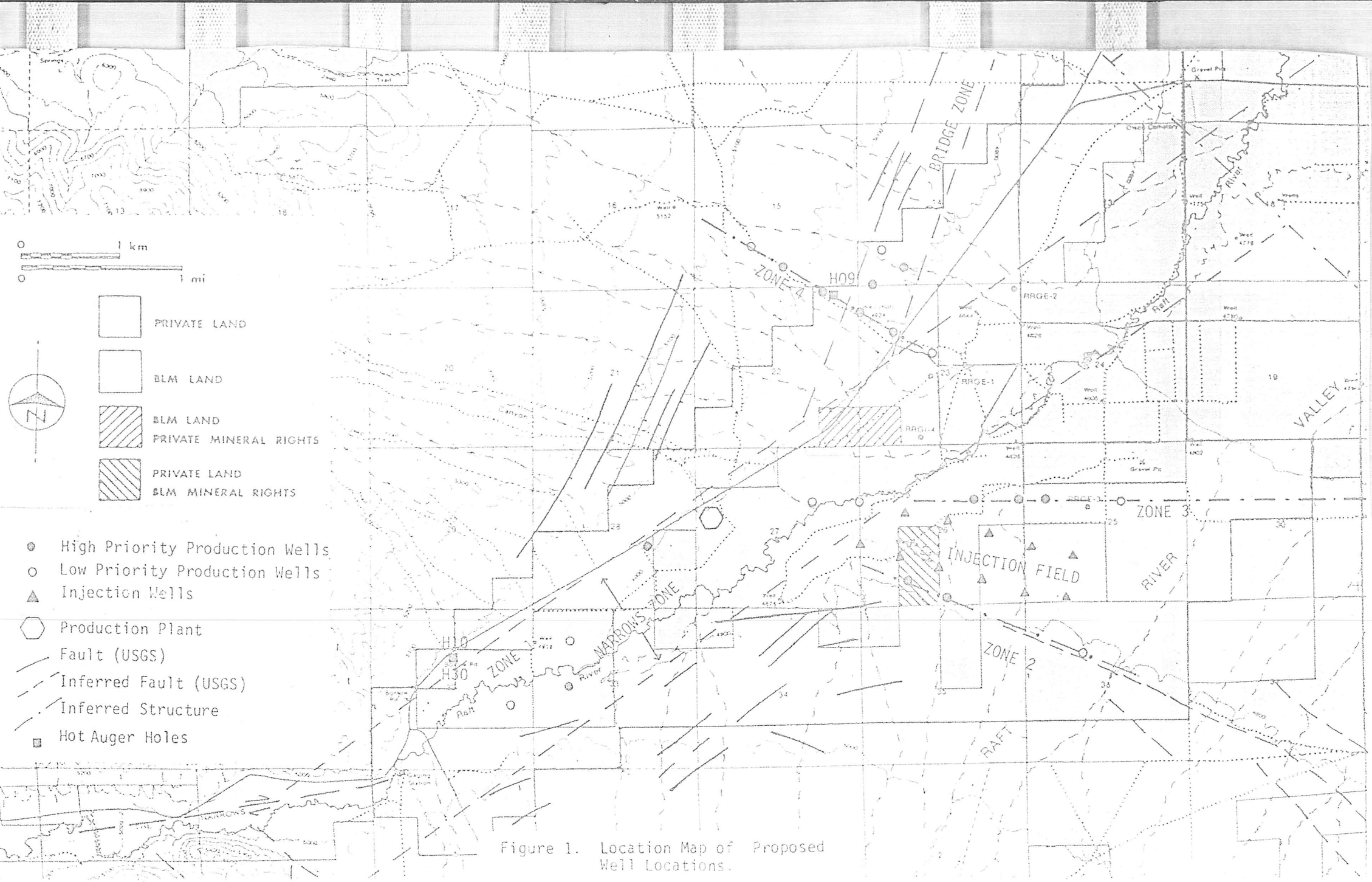

Figure 1. Location Map of Proposed Well Locations.