REVISED STATEMENT OF INTENT TO PRESENT EVIDENCE

(Public Hearing, pursuant to Discharge Application by Los Lobos Geothermal, LLC for application GT-001 Lightning Dock Geothermal No. 1)

(1) Person filing statement: Damon E. Seawright, President, AmeriCulture, Inc., on behalf of AmeriCulture, Inc.

(2) I oppose the proposed discharge plan, in the form currently submitted.

(3) Witnesses (In submitting this list of witnesses, it is assumed that an OCD representative will testify. Witness proficient in WQCC statutes TBD if necessary)

James C. Witcher
Geologist
Las Cruces, New Mexico

(4) Estimated presentation time for James C. Witcher: 40 minutes.

(5) Exhibits to be offered as evidence at the hearing:

a) PowerPoint presentation.

b) Copy of published peer review paper on the geology of the Lightning Dock area, "Evidence for Large-Scale Laramide Tectonic Inversion and a Mid-Tertiary Caldera Ring Fracture Zone at the Lightning Dock Geothermal System, New Mexico, James C. Witcher, 2008, New Mexico Geological Society Guidebook, 59th Field Conference, Geology of the Gila Region, p. 177-187.

c) Any other materials required to support testimony.

SUMMARY

Background

Burgett Geothermal and AmeriCulture utilize a shallow geothermal reservoir within the outflow plume of the Lightning Dock geothermal system. Excessive production of the overall geothermal resource and poorly cited injection wells will result in deleterious impact on water quality and rapid thermal depletion of the resource that both businesses depend upon. In addition, the State's water interest and existing water rights of the current geothermal users and neighbors will be impaired.

The proposed production and injection well locations and designs are not based upon prudent geoscience and reservoir engineering practice. The Paleozoic presumptive reservoir target is untested in terms of reservoir hydraulic properties or fluid chemistry. Deep exploration for geothermal resources in the area is in a very immature stage and very poorly characterized. Only three wells deeper than 2,000 ft have been drilled and only two have intersected the presumptive Paleozoic carbonate reservoir. In each case,

no fluid chemistry is available and no pump tests to determine reservoir hydraulic properties have been done on pre-Tertiary reservoir host targets.

Known Geothermal Characteristics of the Resource

1) Current productive thermal wells produce from mid-Tertiary silicic volcanic rocks and highly-silicified Gila Conglomerate in the outflow plume.

2) The geothermal system outflow plume and primary upflow zone occur in a Neogene intra-graben horst block (Hot Wells Horst) that is buried beneath upper Miocene to Pliocene alluvial fan deposits shed from the Pyramid Mountains to the east.

3) Pervasive silicification of the older alluvial fan deposits demarcates the hottest outflow plume between horst block faults on the west and east.

4) Total natural heat loss for the system is less the 10 MW thermal and ranges from 6 to 9 MW thermal. Given the small volume of the volcanic reservoir and surface inefficiency in conversion of heat to electricity, sustainable power production is probably less than 2 to 3 MW.

5) The upflow zone or hydrogeologic window is very small and may be only ten's of acres in planar extent. Neogene analogies of the present day system are found in WNW trending structure zones on the western base of the Pyramid Mountians. All the older hydrothermal systems vertical feeder veins cover areas less the 20 acres. Table Top Mountain south of Lightning Dock may represent the erosional resistant silicified remnant of an older Miocene geothermal system outflow plume similar to Lightning Dock at the southern end of the Hot Wells horst block.

6) The Lightning Dock geothermal system is located at the intersection of a major WNW basement structure zone with a mid-Tertiary cauldron (eroded caldera complex), the intra-basin buried horst block, and an incipient late Pleistocene fault. The WNW basement structure is the largest first order structure in the area. The buried horst block is probably an element of the extensional transfer zone between the lower (north) and upper (south) Animas grabens.

7) Fluid chemistry is sodium sulfate composition and has less than 1,200 ppm total dissolved solid (TDS). No hydrogen sulfide is present. Measured temperatures range from less than 200° F to 306° F. The maximum measured temperatures in volcanic rocks in the Steam Reserve 55-7 well are in agreement with maximum quartz geothermometer temperatures.

8) Fluid chemistry and isotopic analysis indicate the geothermal fluids are meteoric water and have not circulated through Paleozoic carbonate rocks. Isotopic evidence points to a flow path and deep reservoir storage in silicic volcanic rocks and intrusives and Precambrian granite.

9) Higher temperatures observed in well 52-07 in volcanic rocks probably represent leakage at depth across the western boundary fault of the Hot Wells horst. Production in this zone is unproven.

Discharge Plan Deficiencies

1) The proposed drilling program is generic and does not account for the structural and hydrogeologic differences between the production well and injection well site location domains. In fact, the plan is a cut and paste presentation with well designs and drilling operations from various locations outside New Mexico and purposes. For some Lightning Dock locations, the surface casing shoe design is well below depths with higher temperatures that would require minimal BOPE such as an annular BOPE and rotating head according to Federal Geothermal Resource Operations Orders.

2) No valid evidence of reservoir fluid production chemistry is documented. The presumptive reservoir target is Paleozoic carbonate rock, yet it has never been sampled for chemistry.

3) It is impossible to site and space production and injection wells without knowledge of the hydraulic properties of the intended production and injection zones. These data are absent from the plan.

4) No geologic or hydrogeologic cross section is presented that validates the well designs. Also, no evidence is provided to detail confining cap rocks or aquitards that would protect shallow potable ground water and the existing geothermal production wells from contamination by injected fluids.

5) Well completion drawings do not concur with information in the drilling plan or with the APD's. For instance, the drilling plan states that the 9 5/8-inch casing string will be hung inside the 13 3/8-inch casing and cemented back to the hanger. The drilling plan states that all casing strings will be brought back to the surface and cemented to the surface.

6) AmeriCulture's fish are grown in a mixture of cold ground water and geothermal water. Therefore, injected chemicals should be limited to those approved for potable water. The anti-scaling chemicals listed in the application do not meet this description. There is no geotechnical information that gives prudence to injecting chemicals safely.

Comment on the Austin Report

There are several highly questionable interpretations in the Richard Austin report "The Effects of Shallow Geothermal Fluid Utilization on Fresh Water of the Lightning Dock KGRA, Animas Valley, New Mexico."

1) The outflow plume is not documented to have had major changes in size or intensity from shallow geothermal production. Mr. Austin compared a 1956 1-meter temperature study with a 1981 2-meter temperature study. Obviously, the temperatures between the two studies are different. The later study is deeper and should have higher temperatures. Also, the later study covered a greater area.

2) The concept that thermal fluids are unconfined is incorrect. By definition, a regional bedrock geothermal system is separated from shallow cold water along the flow path and the drive for discharge is the head difference between recharge and discharge zones. Discharge occurs at Lightning Dock because of a hydrogeologic window across confining aquitards.

Recommendations

Since the injection and production wells are located in separate geologic domains, overproduction of the reservoir has much potential to create a significant pressure gradient between the shallow geothermal reservoir and cold ground water aquifer and induce mixing. Injection south and southeast will force cold geothermal and ground water to flow in and mix in the current geothermal production area. Planned production and injection will "quench" the shallow outflow plume reservoir with cold injection at greater depth and induce cold ground water inflow from the reservoir margins. Thermal break through of cold water into the planned production wells in the deep reservoir will occur also from over production and poorly cited injection wells

Because of the deep geothermal exploration immaturity of the area, none of the submitted APD's should be permitted as production and injection wells. Simultaneous permitting of several injection and production wells is inherently flawed with regard to well location, spacing, construction, and operational practice. All sites are truly exploratory test holes and any permitting should reflect this fact. Only until the test wells are drilled, thoroughly characterized for hydrogeology, and tested can Class V injection well permitting proceed under the WQCC procedures.

Injected chemicals should be limited to those approved for potable water as the water quality of current geothermal use is suitable for irrigation and intensive aquaculture and is currently used in that fashion.