Geoscience Deficiency in Application

Raser has presented no coherent geologic model or hard evidence (actual real measured data) that scientifically defines:

- Reservoir rock or location.
  - ➢A shifting story.
- Reservoir permeability or storage characteristics.
  - ➢No wells have been drilled and pump tested.
- A confining rock unit over the production or injection zone that could act to shield and isolate injected fluids.
  - ➢No test wells have been drilled to evaluate.
- Actual water chemistry to be produced and injected.
  - ➢No test wells have been drilled and sampled.
- A cross section of reservoir/injection targets based upon actual drilling or geophysical interpretation.

Damon Seawright, President
AmeriCulture, Inc.
Copy # 3
Exhibit 1

OCD Hearing History Summary

- Raser has presented no actual data to support interpretations and well design in the disposal permit.
- AmeriCulture has presented a geologic model with actual borehole, geochemical, and geophysical data that refutes several claims in the disposal permit.
  - Production from Horquilla Limestone will be poor water quality (>3,000 TDS).
  - Size of resource is very small.
  - Location of up flow zone is <u>not</u> on a northeast striking and hidden B & R fault.
- Raser has quoted geothermal experts or their reports and has failed to produce those experts for testimony or their reports for review and critic.
  - GeothermEx.
  - Lightning Dock Geothermal and their consultants.

Current State of Knowledge

- Natural heat loss is less that 10 MWt.
- Up flow zone is very small and is located in the horst block beneath Burgett Greenhouses and near the ring fracture zone of the Muir caldera of the Pyramid Mountains.
- Fluid chemistry of current geothermal production is the result of flow path and chemical equilibrium in rhyolite.
- Fracture ground preparation is facilitated by a major NW striking and long-lived first order structure in the crust.
- Stress associated with a late Pleistocene fault tip has locally reopened fractures of older bedrock ground preparation.

Problems

- Reservoir is not sustainable at 12,000 gpm production and injection over such a small resource.
  - ➢ Violates correlative geothermal rights of adjacent direct-use operators who have State Geothermal Leases.
  - ➢ Ground subsidence is likely.
  - ➢ Currently used shallow geothermal outflow plume will be destroyed.
  - ➢ Adjacent water rights holders will be impacted in both water quality and amount of fresh water in storage.
- The Raser project is geotechnically unsuitable for disposal permit with current state of exploration and resource characterization and proposed rates of production and injection.

Glitches in Draft Permit

- Intermediate and production casing strings should not be cemented back to surface.
  - Only need to cement to casing hanger inside larger casing string.
  - Geothermal wells require a large diameter surface casing string for pump equipment.
  - Geothermal wells are not oil and gas wells with high pressure – geothermal is hydrostatic.
- Add AmeriCulture 1 State to Table 3.
- No description of the required "nested monitor well."
  - The screen requirement does not describe a nested monitor well configuration.

Recommendations

- Permit test wells only.
- Deny disposal application as it is premature and not supported with tangible geologic information.
  - Where is the reservoir?
  - What are the confining rock units?
  - What is the reservoir fluid chemistry?
  - What is the reservoir storage and permeability?
  - What are the rock units best for casing points to insure long-term injection well integrity?
- Require submission of injection well (disposal) permit request and production well permit request after test drilling and reservoir information is compiled and a complete hydrogeologic analysis with real data is available.