



Mr. Damon E. Seawright
AmeriCulture
25 Tilapia Trail
Animas, New Mexico 88020

August 23, 2012

**RE: Response to letter from Americulture to Mr. David Brooks of NMOCD dated August 9, 2012:
Discharge Permit (GTHT-001), Hidalgo County, New Mexico**

Dear Mr. Seawright:

On behalf of Los Lobos Renewable Power, LLC (Los Lobos), AMEC Environment and Infrastructure, Inc. has prepared this response to the concerns you expressed in the above referenced letter. Mr. Carl Chavez of the NMOCD requested that Los Lobos respond directly to you and provide a copy to NMOCD. Los Lobos is extremely sensitive to everyone's concerns regarding potential effects to water quality or quantity as the result of the exploration, development, and production of the Lightning Dock Geothermal resource. Los Lobos is happy to address your concerns.

Your letter stated that: (1). *"the aquifer associated with well 45-7 and the aquifer associated with well 55-7 are different aquifers"*.

Response: The geothermal aquifer associated with LDG 45-7 and LDG 55-7 is the same. The producing geothermal fluid flow interval in LDG 45-7 ranges from approximately 2,200 to 2,600 feet below ground surface and is comprised of the lower portion of the Tertiary volcanoclastic rocks and the upper portion of the Horquilla Formation. The producing geothermal fluid flow interval in LDG 55-7 ranges from approximately 1,200 to 1,800 feet below ground surface and is comprised of the lower portion of the Tertiary volcanoclastic rocks and the upper portion of the Horquilla Formation. Regardless of the depths below surface, these geothermal fluid flow intervals occur in the same geological formations. It appears that the stratigraphic section in LDG 45-7 has been down-dropped by faulting relative to the section in LDG 55-7.

Los Lobos has shown that there is at least 300 feet of very low permeability formations above the first geothermal fluid flow interval including: the bottom 200 feet of alluvium and the upper 100 feet of Tertiary volcanoclastic rocks. Los Lobos has conducted three spinner log surveys in LDG 45-7. Each survey indicates no measurable permeability in the uppermost 100 feet of the Tertiary volcanoclastic rocks. Further evidence of permeability distribution comes from the drilling records and temperature surveys. As previously described to NMOCD in the daily drilling reports, LDG 45-7 was drilled to 1,703 feet with full returns using a 12.25-inch bit. Since the overpressure of the drilling fluid exceeded 100 pounds per square inch from 1,500 feet on, we may reasonably conclude that there is little or no permeability in at least the lower-most couple hundred feet of the alluvium.

(2). Your letter also stated that: *"Injection of water from well 55-7 into well 45-7 would almost certainly result in an exceedance of background for fluoride"... You also cited potential differences in chloride, sulfate, and TDS concentrations.*

Response: The geothermal fluid *in situ* exists as a single-phase liquid and only divides into vapor and liquid fractions upon production and pressure reduction (flashing). The process of flashing causes some chemicals to concentrate in different proportions in the vapor and liquid fractions, neither of which then accurately reflects the composition of the original liquid. Other chemicals, notably carbon dioxide, react in the flashing process to alter the chemical composition and elevate the pH of the remaining liquid. Only reconstructed samples collected by ASTM methods represent the chemistry of the liquid and vapor phases of the produced geothermal fluid before the unavoidable alterations associated with sampling and are therefore more representative of actual fluid chemistry than would be sample of just the liquid fraction of the geothermal fluid.

You cite a single sample collected from LDG 45-7 in January 2011 as an indication of water quality from this portion of the geothermal fluid flow interval. In fact there are two additional samples collected from LDG 45-7 in December 2011 and January of 2012 that have fluoride concentrations of 10 and 11.1 parts per million (ppm), respectively. In addition, other wells with temperatures above 70° C in the greenhouse area have fluoride and total dissolved solids (TDS) concentrations that range from 11 to 13 ppm and from 982 to 1628 ppm, respectively. Additionally, a number of the shallow and relatively cold wells in the Animas Valley with temperatures below 70° C have TDS concentrations in this range although fluoride concentrations may be somewhat lower. The January 2011 sample from LDG 45-7 is inconsistent with later LDG 45-7 samples collected according to the ASTM E 947 – 83 (Standard Specification for Sampling Single-Phase Geothermal Liquid or Steam for Purposes of Chemical Analysis) and ASTM E 1675 – 95a (Standard Practice for Sampling Two-Phase Geothermal Fluid for Purposes of Chemical Analysis). The later samples are, therefore, representative of the water quality in LDG 45-7 and these samples have water quality consistent with the LDG 55-7 and other wells above 70° C in the greenhouse area.

In summary, the aquifer or geothermal fluid flow intervals in LDG 45-7 and LDG 55-7 are the same in relation to either formation or lithology and water chemistry. Multiple samples collected from LDG 45-7 using accepted ASTM methods indicate that this geothermal fluid has chemical concentrations consistent with background water quality concentrations indicated by LDG 55-7 and other wells in the greenhouse area.

Thank you for your concern about these matters. Please contact me at 505.821.1801 if you have further questions.

Respectfully,



David W. Janney, PG
Agent for Los Lobos Renewable Power, LLC

Cc: David Brooks, NMOCD
Carl Chavez, NMOCD
Randy Dade, NMOCD
Nick Goodman – Cyrq Energy/Los Lobos Renewable Power/Lightning Dock Geothermal
Michelle Henrie – Attorney for Los Lobos Renewable Power, LLC