BEFORE THE NEW MEXICO OIL CONSERVATION COMMISSION



**APPLICATION OF LOS LOBOS RENEWABLE POWER, LLC TO PLACE GEOTHERMAL WELLS LDG-55-7 AND LDG 53-7 ON INJECTION IN SECTION 7, TOWNSHIP 25 SOUTH, RANGE 19 WEST, NMPM, HIDALGO COUNTY, NEW MEXICO**

**Case No. 14948**

## CLOSING STATEMENT

Los Lobos Renewable Power, LLC, respectfully asks the Oil Conservation Commission to approve Los Lobos' pending form G-112s. The G-112 forms request permission to use existing geothermal wells, LDG 55-7 and LDG 53-7, as injection wells in connection with Los Lobos' geothermal power plant project in Section 7, Township 25 South, Range 19 West, Hidalgo County, New Mexico.

## Applicable Law

Section 19.14.93.8(A) NMAC requires, for any proposed injection well, a complete G-112 application packet. This packet includes a plat, information about wells and geothermal lease owners within a one-mile radius, a log of the proposed injection well, and a diagrammatic sketch of the proposed injection well. Section 19.14.93.8(B) NMAC requires that the G-112 form be sent to all other geothermal lease owners within a one-half mile radius of the proposed injection well.

Section 19.14.93.8(C) identifies the criteria for approving geothermal injection wells. It is as follows:

1. That the above requirements (19.14.93.8(B) and (C) NMAC) have been complied with,

2. That the proposal is in the interest of conservation and will prevent waste,
3. That the proposal will protect correlative rights, and
4. That the well is cased, cemented, and equipped in such a manner that there will be no danger to any natural resource, including:
    - geothermal resources,
    - useable underground water supplies, and
    - surface resources.

***1. Complete Application / Notice***

***A. Evidence Presented.*** Los Lobos' witness, geologist David Janney, testified that 19.14.93.8(A) and (B) NMAC were complied with and there was no evidence presented to the contrary. There is no dispute that Los Lobos' pending G-112 packets are complete. There is no dispute that Los Lobos' sent the G-112 forms as required.

***2. Conservation / Waste***

***A. Evidence Presented.*** Regarding conservation and waste, Los Lobos' witness, Site Manager Chuck Smiley, testified that during the temporary testing program, any evaporative or other water losses incurred in testing or future plant operations would be within the volume of water rights leased by Los Lobos, wherein Los Lobos would use the leased water to replace any lost or evaporated water. (Under a water rights lease, the owners of the water rights voluntarily refrain from farming a portion of their customarily irrigated land so that the water can be used instead by the water rights lessee. This temporary use of water rights must be approved by the

State Engineer's Office and is technically outside of the scope of this proceeding.) Mr. Smiley further testified that Los Lobos planned to use binary technology in its power plant.

Los Lobos' geothermal consultant, Ted De Rocher, explained how the geothermal resource is used in a binary power plant. Mr. De Rocher testified that there are binary power plants all over the world, that the technology is well vetted, that heat is withdrawn from the produced geothermal fluid and then all fluid is re-injected, and that the re-injected fluid reheats naturally so it can be used again and again. Mr. De Rocher further testified, based on his considerable experience with geothermal power plants in many different locations, that the business model requires sustainability (i.e., re-injected fluid must reheat before it can be re-produced). These testimonies evidence that Los Lobos' proposal is in the interest of conservation and will prevent waste. All geothermal fluid produced for geothermal power plant operations will be re-injected into the same geothermal reservoir from which it was produced after use, thus conserving the geothermal reservoir and preventing waste.

AmeriCulture attempted to argue that Los Lobos will be producing from one reservoir and injecting into a different reservoir, which (if true) could affect consideration of conservation and waste. However, Los Lobos presented geothermal fluid analytical results that indicate consistent concentrations of analytes from the geothermal fluid flow intervals in the production well, LDG 45-7, and the proposed injection wells, LDG 53-7 and LDG 55-7. The analyte concentrations are substantially the same as those in the shallow alluvial wells within the geothermal fluid up-flow area. In fact, the isotope data presented by AmeriCulture's expert also evidences that the geothermal water is all substantially the same. In other words, the water chemistry does not evidence geothermal water originating from different reservoirs or sources.

Los Lobos presented evidence that water levels had come nearly into equilibrium, in the sense that drawdowns had nearly ceased to change, at the end of the closed-loop pumping test in early 2012. This supports the conclusion that the water pumped and the water re-injected were in hydraulic communication.

***B. Precedent.*** AmeriCulture's president, Damon Seawright, testified that instead of using its less-hot geothermal well (Federal Well #1) and reserving the hotter portion of the geothermal reservoir for uses that require higher temperatures, AmeriCulture produces hot geothermal water from State Well #1 at approximately 230° F, and then cools this water to approximately 80-85° F before running the warm water through its fish tanks, and thereafter surface-disposes the waste water. Assuming this current use of the Lightning Dock geothermal reservoir is in the interest of conservation and prevents waste, all the more so is Los Lobos' proposal to use binary technology to generate electricity that meets the New Mexico Legislature's renewable portfolio mandate and then to reuse all produced geothermal fluid again and again.

***3. Correlative Rights***

***A. Evidence Presented.*** Evidence presented at the hearing establishes that the proposed injection wells are likely to cause change in the natural geothermal reservoir. However, all wells—including Protestant AmeriCulture, Inc.'s wells—cause change. Los Lobos' witnesses, Mr. De Rocher and Dr. John Shomaker, both testified that even with a change, the geothermal reservoir is likely to reach equilibrium within approximately 30 days. In fact, Dr. Shomaker testified that after 10 days of testing in 2012, monitoring wells showed that the reservoir was starting to reach equilibrium. Mr. De Rocher further testified that in his experience with utility-

scale geothermal projects all over the world, there are mitigation options to alleviate adverse effects (if any) on other users of a geothermal reservoir.

It is important to remember that under the principle of correlative rights, no single lease holder has right to exclusive use of a geothermal reservoir. Unlike Texas, New Mexico does not follow the law of capture. The geothermal statutes and regulations do not grant any special status to prior appropriators. To the contrary, all owners/leaseholders have a mutual correlative right to proportionately develop the geothermal resource.

Los Lobos presented evidence that the federal lease of the Lightning Dock geothermal mineral was awarded in 1979 for over 2,500 acres. AmeriCulture's state geothermal lease is for 10 acres. AmeriCulture also shares 15 acres of geothermal mineral with Los Lobos pursuant to a Joint Facility Operating Agreement. AmeriCulture's Federal Well #1 is situated on the 15 shared acres. The Joint Facility Operating Agreement, signed in 1995, is significant because it establishes in writing how two users of one geothermal resource agreed to share that resource. Los Lobos' predecessor Lightning Dock Geothermal, Inc. ("LDG"), was allocated "Power Use" of the reservoir, and limited itself under its federal lease to the portion of the reservoir below 1000'. AmeriCulture was allocated "Non-Power Use" of the reservoir and it was allowed to use that portion of the federal leased mineral that is above 1000'. The Joint Facility Operating Agreement is also significant because it acknowledges that Power Use of the geothermal reservoir could possibly affect AmeriCulture's heat source, and it provides a remedy that AmeriCulture agreed to: "If LDG's drilling activities result in a depletion of AmeriCulture's heat source for non-power purposes, then upon the commencement of geothermal production by LDG, LDG shall provide AmeriCulture with effluent heat in an amount equivalent to that by which AmeriCulture's resource is depleted." Page 6 ¶B(3). Protestant AmeriCulture bought its

property and built its business knowing that the federal portion of the Lightning Dock geothermal reservoir had already been leased for the express purpose of electricity generation and that it had a contractual remedy for maintaining its business if the natural geothermal heat was affected by the generation of electricity. It is hard to conceive of anything more that Los Lobos could do to protect correlative rights, except to deny its own correlative rights and voluntarily forego any use of the shared resource (which would not protect Los Lobos' correlative rights).

As expressly codified in the Geothermal Resources Conservation Act,[1] each geothermal owner/leaseholder's right to develop is proportionate: the amount of recoverable geothermal resources under the owner/leaseholder's property as compared to the total recoverable geothermal resources in the reservoir. AmeriCulture's expert, Mr. Witcher, expressed one opinion about the total recoverable geothermal resources in the reservoir, and he correctly acknowledged that there are other opinions based on different assumptions regarding the total recoverable geothermal resources in the reservoir. At this point in time, there is no conclusive evidence of the exact amount of total recoverable geothermal resources in the reservoir. There is conclusive evidence, however, that the amount of mineral acreage leased by Los Lobos (more than 2500 acres) far exceeds the leased and shared mineral acreage held by AmeriCulture (10+15 acres), and that the recoverable geothermal resources are not confined to AmeriCulture's property (the 10+15 acres). AmeriCulture's correlative rights, therefore, are not in danger.

[1] §71-5-3(C) NMSA: " 'correlative rights' means the opportunity afforded, insofar as is practicable to do so, to the owner of each property in a geothermal reservoir to produce his just and equitable share of the geothermal resources within such reservoir, being an amount, so far as can be practicably determined and so far as can be practicably obtained without waste, substantially in the proportion that the recoverable geothermal resources under such property bear to the total recoverable geothermal resources in the reservoir and, for such purpose, to use his just and equitable share of the natural heat or energy in the reservoir."

***4. Wells Cased / Cemented / Equipped so No Danger to any Natural Resource***

***A. Evidence Presented.*** Los Lobos' geologist, David Janney, testified that he had studied the logs and records of the proposed injection wells and that they were cased, cemented and equipped so that that there will be no danger to any natural resource, including geothermal resources, useable underground water supplies, and surface resources. He further testified that OCD has already accepted the logs for these wells. Further, Los Lobos shared well logs and other technical data with AmeriCulture's expert, Mr. Witcher. Having had an opportunity to review this data, AmeriCulture presented no evidence that the proposed injection wells were improperly cased, cemented or equipped. Instead, AmeriCulture's arguments are that the wells should not exist at all, or should exist in different locations.

Los Lobos presented evidence that the geothermal fluid production zones in LDG 53-7 and LDG 55-7 are the same. The producing geothermal fluid flow interval in LDG 53-7 ranges from approximately 2,400 to 3,000 feet bgs and is comprised of the lower portion of the Tertiary volcaniclastic 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 2,200 feet bgs and is also comprised of the lower portion of the Tertiary volcaniclastic 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.

## Collateral Arguments

Having established that the criteria for injection wells have been met, Los Lobos asks the Commission to approve it pending G-112 applications. Los Lobos believes that the Commission does not need to decide or rule on the following arguments because they are outside the regulatory criteria. However, because these arguments were raised at hearing, Los Lobos is addressing these issues.

AmeriCulture raises complaints. AmeriCulture believes it was affected by a Los Lobos well test in 2010. However, Mr. Seawright testified that this situation was never brought to Los Lobos' attention. AmeriCulture also described the unfortunate reality that, in 2012, Los Lobos' Rhodamine tracer dye was drawn to a Rosette geothermal well that unbeknownst to Los Lobos, AmeriCulture was temporarily utilizing. Los Lobos acknowledges these complaints. However, Los Lobos also agrees with OCD that these situations are outside the scope of this proceeding.

AmeriCulture's protest in this proceeding cited two grounds for its opposition. First, that State Well No. 1 is in direct hydraulic connection with the production interval in well LDG-55-7. Second, that there was a possibility of migration of disposed geothermal power plant "fluids" to one or more of AmeriCulture's production wells. Over the past four months, however, AmeriCulture's grounds for opposition have morphed.

AmeriCulture dusted off an argument it raised in August 2012 when Los Lobos proposed to use well 55-7 as the production well and well 45-7 as the injection well (i.e., the reverse of the pending applications). AmeriCulture's argument in August was that well 45-7 taps a different "reservoir" than well 55-7. Los Lobos' reply, "What's the harm?" Based on an uncharacteristic water chemistry sample, AmeriCulture argued in August that the naturally occurring high flouride in well 55-7 would cause exceedance of flouride in the injection area of well 45-7. OCD disagreed after looking at numerous water chemistry samples and ascertaining characteristic

water chemistry and, as Mr. Janney testified, approved the G-112 allowing injection into well 45-7. AmeriCulture now again raises the "different reservoir" argument. Los Lobos disagrees that there are different reservoirs. But what if AmeriCulture is right? If so, the most likely effect is that there will be a net addition of native geothermal water in the deep geothermal reservoir that feeds up into the shallow area tapped by AmeriCulture's geothermal production well, AmeriCulture State Well #1. This would mean more source water for AmeriCulture. AmeriCulture postulates a second effect: that reservoir cooling may, in theory, be a possible result. This would mean that AmeriCulture would require less blending with cold water to reach the approximately 80-85° F temperature water used in its fish farm. If the uncharacteristic water sample were accurate (for the sake of argument), then a third effect would be a lowering of the flouride concentration in the geothermal fluid. It is hard to understand the harm.

AmeriCulture also raises the argument that AmeriCulture Federal Well #1 is a relevant, usable, geothermal, "domestic" well. This is the well that is on the other side of the alleged " 'shallow and impermeable' boundary" from the injection wells. AmeriCulture conjectures that the injected waters may, in theory, infiltrate Federal Well #1 and thereby alter its chemistry adding even more flouride to the possible detriment of AmeriCulture's fish. Los Lobos disagrees that there is any threat of infiltration—an issue already argued by AmeriCulture and ruled on at the 2008/2009 hearing—but if so, the chemistry of Federal Well #1 would likely reflect the chemistry of AmeriCulture State Well #1, i.e., the geothermal well that AmeriCulture uses now. It is hard to understand the harm, particularly when AmeriCulture does not currently use Federal Well #1 and testified that they have not used the well since 2009 or 2002 (the date was not clear from testimony).

AmeriCulture's evidence that Federal Well #1 is a "domestic" well is strained. AmeriCulture's President testified that Federal Well #1 had been used for domestic purposes at some point in the past (until 2009, or before 2002), but that testimony was not supported by any evidence of use such as State Engineer monthly meter readings, monthly geothermal production reports (G-108 forms) required by 19.14.59.8 NMAC, or proof that the well is actually plumbed to any tap. Moreover, the State Engineer "Change of Ownership" form tendered by AmeriCulture as Exhibit 15 indicates that the conveyed well is located in Section 12 (see line 5). Furthermore, the use of the water with high concentrations of fluoride for domestic purposes presents substantial health hazards to those consuming the water and hopefully the water is not used for this purpose. AmeriCulture's greenhouses are located in Section 7, as is the well identified as Federal Well #1 (see, e.g., the "Pre-Decisional Draft Environmental Assessment" from June 2002, and compare Figures 2-2 and 2-3). It is AmeriCulture's cold freshwater domestic water well that is located in Section 12, 1.5 miles away from the greenhouses.

In the course of this protest proceeding, AmeriCulture also alleged that "copious quantities of cooling tower chemicals" might migrate into its production well. This issue was already argued by AmeriCulture and ruled on at the 2008/2009 hearing. The argument appears to have finally been abandoned at the March 2013 hearing. For the record, Los Lobos' Discharge Permit dated July 1, 2009 expressly addresses monitoring and mitigation measures for cooling tower chemicals and Los Lobos presented evidence that it no longer plans to build a water-cooled cooling tower.

Los Lobos believes that AmeriCulture's continued opposition to this project is rooted in the idea that the thermal properties of the Lightning Dock geothermal reservoir are limited such that only three to five megawatts of electricity can be generated sustainably. This idea is based

on one well test using AmeriCulture's State Well #1. Mr. Jim Witcher's report of the test describes a test that did not unfold as designed: technical equipment did not work correctly due to the heat of the fluid; non-technical equipment (such as a float on a string) did work, but not with any calibrated, scientific, verifiable accuracy and not via data collection by actual water technicians; and the neighboring rose farm unexpectedly pumped its wells at the same time as the test. Mr. Witcher's resulting report, therefore, is filled with caveats, "may's", assumptions that admittedly are not absolutely met, and inconclusive, preliminary statements. Mr. Witcher did make a conclusive iron-clad statement in the report at page 23 interpreting the delayed drawdown at AmeriCulture's Federal Well No. 1 thus: "There is no doubt that a 'shallow and impermeable' boundary occurs between the AmeriCulture Federal Well and the AmeriCulture production well." Mr. Wichter, however, recanted this assertion at the hearing. As Dr. John Shomaker testified, and Mr. Witcher acknowledged, the delayed drawdown at AmeriCulture's Federal Well No. 1 is not evidence for such a boundary condition, and in fact would be consistent with the expected aquifer properties. It should be noted that AmeriCulture's State Well #1 is completed in the shallow aquifer and not in the deeper, higher temperature aquifers, wherein Los Lobos' wells are completed.

Despite the lack of certainty in Mr. Witcher's "Preliminary Analysis" of the Lightning Dock geothermal reservoir, AmeriCulture clings to conclusion at page 12 that "With sustainable development, electrical power output for the area may conservatively be limited to less than 5 MWe (megawatts electric)." If there are only a few megawatts producible, AmeriCulture seems to want those megawatts all for itself. As testified to by AmeriCulture's other witness, Damon Seawright, AmeriCulture President, AmeriCulture would like to build its own personal-use power plant to provide free power its fish farming operations. This seems to be the motivating

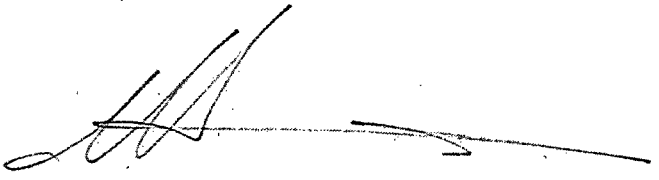
factor for AmeriCulture's ongoing opposition to Los Lobos' project. It is not, however, a reason for the Commission to deny the pending G-112 applications.

## Conclusion

Los Lobos' pending G-112 applications comply with Section 19.14.93.8(A) NMAC. There has been no conclusive evidence to the contrary. AmeriCulture has not shown any real risk of future injury. Having fully heard this matter, the Commission should grant the pending G-112 applications and allow Los Lobos to proceed with its geothermal power plant project.

Respectfully Submitted,

MICHELLE HENRIE, LLC



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## CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing Closing Statement was e-mailed to the following on April 11th, 2013:

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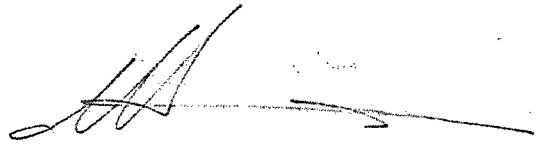
Dated this 11th day of April, 2013.



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