

**STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT  
OIL CONSERVATION COMMISSION**

**APPLICATION OF LIGHTNING DOCK  
GEOTHERMAL HI-01, LLC FOR APPROVAL  
TO INJECT INTO A GEOTHERMAL AQUIFER  
THROUGH THREE PROPOSED GEOTHERMAL  
INJECTION WELLS AT THE SITE OF THE  
PROPOSED LIGHTNING DOCK GEOTHERMAL  
POWER PROJECT, HIDALGO COUNTY, NEW  
MEXICO**

**CASE NO. 15357**

**APPLICATION OF LIGHTNING DOCK  
GEOTHERMAL HI-01, LLC TO PLACE WELL  
NO. 63A-7 ON INJECTION-GEOTHERMAL  
RESOURCES AREA, HIDALGO COUNTY, NEW  
MEXICO**

**CASE NO. 15365  
Order No. R-14021-D**

**ORDER OF THE COMMISSION**

This matter came before the New Mexico Oil Conservation Commission ("Commission") on the applications of Lightning Dock Geothermal, HI-01, LLC ("LDG") to place four wells on injection under the Geothermal Resources Conservation Act, NMSA 1978, Sections 71-5-1 et seq. ("Act"). The Commission, having conducted a public hearing on September 10 and 11, 2015, and October 9, 10 and 11, 2015, and having considered the testimony, the record, and the arguments of the parties, and being otherwise fully advised, enters the following findings, conclusions and order in consolidated Cases 15357 and 15365.

**THE COMMISSION FINDS THAT:**

1. This is a proceeding under the Geothermal Resources Conservation Act to consider applications to inject fluids into a geothermal reservoir and to consider requests for hearing on these applications. The Commission has jurisdiction to conduct hearings and issue orders under the Act. NMSA 1978, Section 71-5-6(B) (1979).

**Procedural history.**

2. LDG seeks authorization to drill, and inject fluids into a geothermal reservoir through, the following geothermal wells: LDG 63A-7, LDG 15-8, LDG 76-7, and LDG 13-7. LDG filed the applications for LDG 15-8 and 76-7 with the Oil Conservation

Division of the Energy, Minerals and Natural Resources Department ("OCD") on or about June 9, 2015. LDG filed the application for LDG 13-7 on or about June 16, 2015, and LDG filed its application for LDG 63A-7 on July 1, 2015 (collectively, the "Applications").

3. An objection from AmeriCulture, Inc. ("AmeriCulture" or "AC") to the applications filed for wells LDG 15-8, LDG 76-7 and LDG 13-7 was sent to the OCD on June 20, 2015. An objection from AmeriCulture to the application filed for well LDG 63A-7 was received on July 15, 2015. Both objections requested that OCD deny the applications, or schedule a hearing on the applications pursuant to 19.14.110 and 19.14.112 NMAC.

4. The Act and the rules allow the OCD Division Director the discretion to have the Commission hear the matter. NMSA 1978, Section 71-5-6.B (1979); 19.14.125 NMAC. Order No. R-14021 was issued on July 17, 2015, scheduling Case 15357 (applications for wells 15-8, 76-7 and 13-7) for a hearing before the Commission on August 13, 2015. On July 28, 2015, the Commission consolidated Case No. 15357 and Case No. 15365 (application for well 63A-7) and scheduled the Cases for hearing before the Commission on September 10, 2015. Order R-14021-A.

5. The Commission issued a Procedural Order on August 5, 2015 to provide procedures for pre-hearing submittals and for the conduct of the hearing. Order R-14021-B. The Procedural Order required any party that intended to present technical testimony at the hearing to file a pre-hearing statement by September 3, 2015. The parties filing pre-hearing statements were LDG, AmeriCulture and OCD.

6. In Order R-14021 and Order R-14021-B, the Commission also directed AmeriCulture to file a more specific application for hearing that meets the requirements of 19.14.122.8(A) NMAC. AmeriCulture filed an Application for Hearing with the Commission on August 12, 2015.

7. AmeriCulture filed an Expedited Motion to Vacate Hearing on September 4, 2015. The Motion was opposed by LDG and OCD. The Commission Chairman held a pre-hearing conference on September 8, 2015, and heard arguments on the Motion to Vacate. The Chairman denied the Motion to Vacate.

8. Hidalgo Soil & Water Conservation District ("Hidalgo") filed a Notice of Intervention with the Commission on September 3, 2015. At the pre-hearing conference, LDG initially opposed the intervention but then withdrew their objection at the commencement of the hearing. The Commission granted Hidalgo's request to intervene.

9. Notice of the hearing was posted on the OCD's website, published in the Hidalgo County Herald and provided to persons on the Commission's distribution list.

10. The hearing was commenced on September 10, 2015. Testimony was presented on September 10 and 11, 2015. The hearing was continued by the Commission Chairman until October 9, 2015. 19.14.118 NMAC ("Continuance of Hearing without New Service"). Testimony was heard on October 9, 10 and 11, 2015. The Commission heard closing arguments from the parties and deliberated on October 11, 2015.

11. The parties participating in the hearing were LDG, AmeriCulture, OCD and Hidalgo. Each party was represented by counsel. Each witness presented by a party was subject to cross examination by the other parties and by the Commission and its counsel. On each day, the Commission provided opportunity for any public comments on the applications.

12. LDG presented David Janney, Monte Morrison, John Shomaker, Roger Bowers, Greg Miller and DL Sanders as witnesses. Several witnesses were recalled as rebuttal witnesses. LDG's witnesses testified on LDG's current and proposed operations, the applications for the proposed wells, the nature of geothermal system that LDG is producing and injecting into, and how the proposed wells will not cause waste, impact correlative rights or cause violations of groundwater standards. LDG requested that the Commission approve the well applications.

13. AmeriCulture presented Charles Jackson, Daniel Hand, James Witcher, and Damon Seawright as witnesses. AmeriCulture testified on its current and future planned uses of the shallow geothermal resource, on possible impacts to its resources from the current injection by LDG and on the possible impacts of the proposed injections by LDG. AmeriCulture opposed the proposed injection wells and requested that the Commission deny the applications.

14. Hidalgo presented Darr Shannon as a witness. Hidalgo testified as to their concerns about injections into the shallow alluvial aquifer and the potential impacts on other users of the alluvial aquifer in the Animas Valley. Hidalgo opposed injection into the shallow aquifer.

15. OCD did not present any witnesses. OCD requested that the well applications be approved with the conditions submitted to the Commission by OCD for drilling each geothermal well and placing each well on injection. (OCD Ex. 1-8)

16. Public testimony was received from Scott Richins and public comments were submitted by Tom McCants, the Geothermal Energy Association,

Legal Standards.

17. Under the Act, the Commission "has jurisdiction over all matters relating to the conservation of geothermal resources...[and all] things necessary or proper to enforce effectively the provisions of the Geothermal Resources Conservation Act or any other law of this state relating to the conservation of geothermal resources and the prevention of waste of potash as a result of geothermal operations." NMSA 1978, § 71-5-6 (A). The Commission has "concurrent jurisdiction and authority" with the OCD to perform the duties of the Commission under the Act. Section 71-5-6(B).

18. Under the Act, the Commission has the duty to prevent "waste" and to protect "correlative rights" as those terms are defined in the Act. Sections 71-5-3(C); 71-

5-5; and 71-5-7. The specific duties of the Commission related to the review of a proposed injection well include the authority to issue rules and orders:

F. to require wells to be drilled, operated and produced in such a manner as to prevent injury to neighboring leases or properties and to afford reasonable protection to human life and health and to the environment;

L. to permit and regulate the injection of fluids into geothermal reservoirs and low-temperature thermal reservoirs;

M. to regulate the disposition of geothermal resources or the residue thereof, and to direct the surface or subsurface disposal of such in a manner that will afford reasonable protection against contamination of all fresh waters and waters of present or probable future value for domestic, commercial, agricultural or stock purposes, and will afford reasonable protection to human life and health and to the environment. Section 71-5-8 (1977).

19. Rules promulgated under the Act provide specific requirements for applying for and approving injection wells. 19.14.52, 53, 55, 93 NMAC. The rules provide that, in addition to the requirements, specific forms must be submitted to the OCD for wells. These include form G-101 (Application for permit to drill, deepen or plug-back), G-102 (Well location and acreage dedication plat), G-104 (Certificate of compliance and authorization to produce geothermal resources) and G-112 (Application to place well on injection). Additional forms are required after a well is drilled and after it is producing or injecting.

20. Rule 19.14.93 provides specific requirements necessary for the OCD to approve placing a well on injection including the submittals necessary to accompany form G-112. The OCD must find that these requirements have been met and, in addition, determine:

“that the proposal is in the interest of conservation and will prevent waste and protect correlative rights, and 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.”

21. In 2012, the Act was amended to provide that a permit from the State Engineer is not required for the use of ground water over 250 degrees F as part of a geothermal resources development if the diverted ground water is reinjected in the same ground water source from which it was diverted. NMSA 1978, Section 71-5-2.1 (2012).

Authority to Hold Hearing.

22. LDG submitted “Objections” to the Commission prior to the hearing and argued that the Commission had the authority to reject an application for a hearing under Rule 19.15.112.8 NMAC (“Method of Initiating a Hearing”) especially if such application

is inadequate. Rule 112 does not provide a process, or a standard, for determining whether a hearing is required when an application for hearing is submitted (Compare Water Quality Control Commission rule 20.6.2.3108.K: "Requests for hearing shall be in writing and shall set forth the reasons why a hearing should be held. A public hearing shall be held if the secretary determines there is substantial public interest").

23. The Commission need not reach this issue because a hearing is required for other reasons in this case. LDG's applications request the authority to inject beginning at 150 feet below surface. In order to grant such authority, findings in a prior Commission order on LDG injection wells would need to be addressed and likely modified. Order R-13675-B. The Act requires that before an order, or a change to an order, can be issued, a public hearing must be held. NMSA 1978, Section 71-5-17(A) (1977).

Parties and Properties.

24. LDG operates a binary geothermal power facility in Hidalgo County that involves the use of geothermal resources that are produced through production wells and, after heat is exchanged, reinjected through injection wells. OCD and the Commission have approved a number of production and injection geothermal wells for use at the facility and placed conditions on those wells. (E.g., AC Exh. B, C, D)

25. LDG leases geothermal rights from the U.S. Bureau of Land Management under two leases. One lease covers 2500.96 acres and the other covers 640 acres. (Janney testimony 9/10).

26. LDG testified that current production is occurring at well LDG 45-7 which is open for production at an approximate interval of 1680 to 2900 feet below surface. The produced water is measured at approximately 312 degrees Fahrenheit.

27. LDG testified that the current injection is occurring primarily at well LDG 55-7 with marginal injection at wells LDG 53-7 and LDG 63-7. (The injection intervals range from 1050 feet to over 4000 feet below surface. (Janney testimony 9/10; Bowers testimony 10/9). LDG has two other potential injection wells which have been approved by the State, LDG 47-7 and LDG 17-7. (Bowers testimony 10/9).

28. LDG testified that it intends to increase production at the facility and therefore additional injection wells are needed. LDG testified that it plans to produce up to 5000 gpm of geothermal fluids and produce 10 megawatts of electricity and that it has a power purchase agreement to sell the electricity. (Morrison testimony 9/10). The need for further injection wells will increase if LDG converts injection well LDG 55-7 to a production well as planned. (Morrison testimony 9/10; Bowers testimony 9/10)

29. AmeriCulture operates a fish farm north of the LDG facility. AmeriCulture has a business lease from the New Mexico State Land Office covering 40 acres for the fisheries operation. (AC Exh. N). AmeriCulture also has a 10-acre geothermal lease from the State Land Office. (AC Exh. S). AmeriCulture also has the rights to use shallow

geothermal water under an adjacent 15-acre property through a Joint Operating Agreement with LDG which holds the federal geothermal lease. (AC Exh. O).

30. AmeriCulture has four wells. Two are on the 10-acre State Land Office geothermal lease: "State Well #1", which is a shallow geothermal well, and "State Well #2", which is cased deeper but is not currently used. AmeriCulture uses the hot water from State Well #1 and mixes it with cold water from a well located about 1.6 miles to the west to create the warm water used in the fishery. (Seawright testimony 10/8). AmeriCulture also has a well on the adjacent federal lease, the "Fed #1 well" or "well A-444", which can be used for domestic purposes. (Seawright testimony 10/8; see LDG Exh. 1 for well locations)

#### Wells and Applications.

31. LDG submitted the following applications to drill wells and place them on injection:

a. LDG proposed to locate well LDG 76-7 1896 feet from the South line and 1128 feet from the East line (Unit I) of Section 7 in Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. LDG proposes to drill well LDG 76-7 to a depth of 1500 feet with casing to 150 feet and an injection interval between 150 and 1500 feet below surface.

b. LDG proposed to locate well LDG 13-7 1537 feet from the North line and 504 feet from the West line (Unit E) of Section 7 in Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. LDG proposes to drill well LDG 13-7 to a depth of 1500 feet with casing to 500 feet and an injection interval between 500 and 1500 feet below surface.

c. LDG proposed to locate well LDG 15-8 2141 feet from the South line and 345 feet from the West line (Unit L) of Section 8 in Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. LDG proposes to drill well LDG 15-8 to a depth of 1500 feet with casing to 150 feet and an injection interval between 150 and 1500 feet below surface.

d. LDG proposed to locate LDG 63A-7 1934 feet from the North line and 1403 feet from the East line (Unit G) of Section 7 in Township 25 South, Range 19 West, NMPM, Hidalgo County, New Mexico. LDG proposes to drill well LDG 63A-7 to a depth of 1500 feet with casing to 150 feet and an injection interval between 150 and 1500 feet below surface.<sup>1</sup>

32. For each proposed well, LDG submitted forms G-101 (Application for permit to drill, deepen or plug-back), G-102 (Well location and acreage dedication plat), G-104 (Certificate of compliance and authorization to produce geothermal resources) and G-112 (Application to place well on injection). LDG submitted the supporting documents

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<sup>1</sup> LDG withdrew the application for well LDG 63A-7 during the hearing. See Finding 54.

and provided notice. (AC Exh. M; Janney testimony 9/10). For each well, OCD submitted two sets of conditions. One set of conditions covers the drilling of each geothermal well and the other covers placing each well on injection. (OCD Exh. 1 – 8). LDG did not object to the conditions requested by OCD for drilling and injection at each well. (Janney testimony 9/10).

33. The Commission finds that the applications met the rule requirements for their contents and for notice. 19.15.93.8.A and B NMAC. The Commission finds that the OCD conditions are necessary for proper oversight and administration of the injection wells.

Hearing issues.

34. The Commission and Division have previously approved geothermal production and injection wells to be utilized at the LDG facility on the assumption that LDG will “reinject all water produced for geothermal power plant operations into the same geothermal reservoir from which it was produced”. (OCC Order R-13675-B, Finding 10; AC Exh. C, D). The Commission concluded that this proposal was “in the interest of conservation and will prevent waste”. (Order R-13675-B, Finding 18).

35. AmeriCulture previously raised objections that the LDG geothermal wells would be in “direct hydrologic connection” with the AmeriCulture geothermal production well (State Well #1) which is located in the alluvial aquifer. (Order R-13675-B, Finding 7). The Commission found that LDG’s production and injection wells were located in the same geothermal zone and were “not directly connected to the alluvial aquifer at 400 feet below ground surface” where AmeriCulture’s State Well # 1 is located. (Order R-13675-B, Finding 15).

36. The current proceeding differs from the prior proceedings, and includes challenges to the Commission’s findings from the prior proceeding. LDG seeks approval of injection wells with much shallower injection intervals. Three proposed wells have injection intervals beginning at 150 feet below ground surface and one at 500 feet. The current permitted injection begins at 1050 feet below ground surface. These injection intervals will be in contact with the shallow alluvial aquifer. LDG contends that, in contrast to LDG’s prior testimony and the Commission’s prior finding, the deeper geothermal zones and the shallow geothermal zones are part of one geothermal system and that the proposed shallow injection will largely remain within that geothermal system.

37. AmeriCulture requests that the Commission deny the LDG well applications. Their arguments can be summarized into two categories. One challenges the Commission’s prior findings and claims that evidence shows that current permitted injection at LDG’s wells is connected to the shallow aquifer and is causing negative impacts at the shallow AmeriCulture wells, in particular the federal, or A-444, well. The second argument is that LDG’s proposed shallow injection will not remain within the geothermal system and will instead flow into the alluvial system and negatively impact the groundwater and the other wells in the shallow aquifer.

38. Hidalgo is also opposed to the injection of the geothermal water into the shallow aquifer because it believes the mixing of the water will be detrimental to water quality and the current uses of the shallow aquifer. According to Hidalgo, the shallow aquifer is used for irrigation, human consumption, livestock water and other domestic uses. (Shannon testimony 9/10).

Lightning Dock Geothermal System.

39. Experts from LDG and AmeriCulture both testified that the geothermal system extends vertically from deep within the bedrock to the shallow alluvial aquifer. A cartoon depiction of the system shows the geothermal waters originating in a deep, semi-confined reservoir and then moving upward through a hydrogeologic window consisting of fracture zones. The geothermal waters eventually meet and mix with the colder alluvial aquifer and the resultant outflow plume carries the geothermal waters toward the north within the valley. (AC Exh. V, slide #2). The heat and contaminant levels within the geothermal waters extend for a significant distance but eventually decline. (LDG Exh. 6). The hottest portion of the geothermal system, as shown by temperatures at 100 foot depth, is located in the northeast quarter of Section 7, T25S, R19W. (LDG Exh. 13).

Impact of current injection.

40. The current injection by LDG has had some impact on geothermal and monitor wells located within the shallow portion of the geothermal system. Water level measurements show mounding occurring at certain wells near the injection wells. (AC Exh. G, P; Shomaker testimony 9/10; Witcher testimony 10/8). LDG stated that fluoride levels had increased at one monitor well but did not produce data. (Janney testimony 9/10). AmeriCulture claimed that one of its wells, A-444, showed increases in fluoride and TDS and decreases in temperature since injection began, but no laboratory results were provided. (Witcher testimony 10/8).

41. LDG testified that the current system of deep production wells and deep injection wells are in equilibrium based on data for flow rates, temperatures, pumping rate and injection rates at production well LDG 45-7 and data for flow rate and casing head pressure at injection well LDG 55-7. These numbers have been fairly stable since late 2014. The equilibrium of the system is established when the pumping from the production well is in balance with the pressure response from the injection wells. The production well causes a sink and the injected water moves toward the sink. (LDG Exh. 3; Shomaker testimony 9/10).

42. LDG testified that while water levels in certain shallow wells did rise after injection began, those levels have been stable in recent months. The mounding is an expression of the upwelling from the depth of the geothermal system but does not indicate that more geothermal water is leaving the system. (Shomaker testimony 9/10). LDG also testified that given the location and depth of AmeriCulture well A-444, there are other potential causes for changes in temperature and water chemistry at that well.



43. The Commission finds that the evidence submitted at this hearing does not change the prior findings and conclusions of the Commission concerning the approved production and injection wells. The current injection of geothermal water by LDG at minimum depths of 1050 feet below ground surface will reinject the geothermal water back into the same geothermal reservoir from which it was produced. The evidence does show that the shallow geothermal system is connected to the deeper geothermal system and deep reinjection can produce some minor reactions at shallow wells. Therefore, it is necessary to continue the groundwater monitoring program to calculate any such effects.

Proposed injection.

44. LDG seeks approval for injection intervals much shallower than previously approved by the Commission and the OCD. The applications allow injection into the shallow alluvial aquifer which has not been previously permitted by the Commission. The injection intervals are proposed to extend to 1500 feet below the ground surface and LDG claims much of the injected water will flow by gravity to the lower portion of the injection interval. LDG did testify that a portion of the injected water will enter the shallow alluvial aquifer and injecting into that layer is necessary for LDG. (Bowers testimony 10/9).

45. LDG testified that its understanding of the geothermal system has "evolved" since the prior Commission hearing when it testified, and the Commission found, that the geothermal zone where the deeper production and injection was proposed was "not directly connected to the alluvial aquifer". (Order R-13675-B, Finding 15). LDG now sees a larger geothermal system which includes the shallow geothermal layers. (Shomaker testimony 9/10). As a result, LDG claims that injection into the shallow geothermal layers will have the same result as the current deep injection: the reinjected water will flow toward the deep production zone and therefore will not leave the geothermal system. (Shomaker testimony 9/10).

46. AmeriCulture testified that the proposed injection into the shallow aquifer would not result in the injected water being returned to the production zone; but rather the overwhelming majority of the water injected into the shallow aquifer would migrate out of the area following the natural alluvial flow. (Hand testimony 10/7; Witcher testimony 10/7). AmeriCulture and Hidalgo testified that the injection into the shallow aquifer will cause contamination of fresh waters of present or probable future value for domestic, commercial, agricultural or stock purposes. (Witcher testimony 10/7; Shannon testimony 9/10).

47. The naturally occurring geothermal water contains certain water quality constituents at levels that exceed State groundwater quality standards. 20.6.2.3103 NMAC. Samples from the current LDG production and injection wells show levels of fluoride and total dissolved solids (TDS) exceed State groundwater standards in the deep geothermal layers. (LDG Exh. 2). Samples from shallow monitor wells, obtained prior to injection by LDG, show exceedances of the TDS standard in every well, exceedances of the fluoride standard in all but one well and exceedances of the sulfate standard in several wells. (AC Exh. P, table 3). As the geothermal water leaves the geothermal system through the outflow

plume and mixes with alluvial water in the valley, the levels of constituents, particularly fluoride, do exceed groundwater standards in certain locations. (LDG Exh. 6, table 2; Miller testimony 9/11).

48. LDG testified that the injection into the alluvium will cause a change in the mixing patterns between the geothermal and fresh water. (Shomaker testimony 9/10). (Bowers 10/9 testimony). The injection into the shallow aquifer will have a response that includes increases in the levels of water quality constituents including fluoride at the shallow aquifer wells. (Janney testimony 9/10; Shomaker testimony 9/10; Miller testimony 9/11). LDG testified that while fluoride levels would increase, fluoride concentrations in valley wells already exceed groundwater quality standards due to out flow from the geothermal system. (Miller testimony 10/9).

49. The Commission finds that LDG has not demonstrated that the geothermal waters directly injected into the shallow alluvial aquifer will remain in the "same geothermal reservoir from which it was produced" and will not migrate into the outflow plume. Injection of large quantities of formerly deep geothermal water into the alluvial aquifer poses risks to other users of the shallow aquifer within the valley. The Commission therefore will limit the injection in the proposed wells to intervals that are below the shallow aquifer.

Correlative rights and waste.

50. AmeriCulture also claimed that LDG's proposal to inject into the shallow aquifer would impair the correlative rights of AmeriCulture to the geothermal resources in the shallow geothermal waters and would result in waste. AmeriCulture testified, not that the fish farm would be impaired, but that a proposal to establish a geothermal power plant using the shallow geothermal waters would be impacted. (Hand testimony 10/7; Seawright testimony 10/7). The water injected by LDG would be of a slightly lower temperature than the water produced at State Well#1, and, therefore, could lower the temperature at State Well #1 and reduce the power generation opportunity (AC Exh. R). AmeriCulture did obtain approvals from OCD and the Office of the State Engineer in 2002 to use water rights for power production and to reinject the water. (AC Exh. T). Since then, there has been no construction on the power plant and AmeriCulture does not have a power purchase agreement.

51. The Commission finds that the LDG development of geothermal resources, including the reinjection of spent geothermal waters as approved by this and other Orders, does not impair the correlative rights of other users of the Lightning Dock Geothermal System. The AmeriCulture power development proposal, while speculative, is not impaired by the injection approved under the terms of this Order.

52. The Act prohibits the "waste" of geothermal resources, NMSA 1978, Section 71-5-4 (1975), and the Commission has the duty to prevent waste. NMSA 1978, Section 71-5-7 (1977). The Commission finds that LDG's development of the geothermal resources within the Lightning Dock Geothermal System to operate a binary geothermal

power facility in Hidalgo County does not constitute waste. LDG's reinjection of spent geothermal waters back into the Lightning Dock Geothermal System as provided in this Order will prevent waste.

Future development.

53. To develop its geothermal power facility, LDG has submitted a series of production and injection well applications for review by the Commission and OCD. The Commission has, in this and in prior proceedings, examined the issues surrounding the LDG project and its use of geothermal waters for production and injection. The Commission has made certain findings and established conditions which should guide the OCD in reviewing and approving any future LDG geothermal well applications.

54. Fourth injection well. On the final day of the hearing, LDG withdrew its application for well 63A-7. LDG stated that it intends to reapply for a fourth injection well likely to be located south of current injection well 55-7.

Section 71-5-2.1.

55. LDG presented undisputed evidence that the ground water being produced for geothermal purposes at the LDG project exceeded 250 degrees F, and that all geothermal water that is produced is reinjected. Based on the evidence presented, the Commission finds that the diverted ground water is reinjected after it passes through the power plant, and, if reinjected into the wells approved by this Order and under the terms and conditions of this Order, the diverted ground water will be reinjected into the same ground water source from which it was diverted.

**THE COMMISSION CONCLUDES THAT:**

1. The Commission has jurisdiction, under the Geothermal Resources Conservation Act, over the parties and the subject matter of this case. Public notice of the hearing has been provided.
2. LDG has complied with the requirements, provided in the Rules, for an application to drill wells and for authority to inject fluids into a geothermal reservoir for wells LDG 13-7, LDG 15-8 and LDG 76-7. 19.15.93.8 NMAC.
3. Proposed injection wells LDG 13-7, LDG 15-8 and LDG 76-7 can be approved for injection subject to conditions that will prevent the migration of geothermal fluids out of the geothermal reservoir and will allow LDG to reinject all produced geothermal water into the same geothermal reservoir from which it was produced.
4. The proposal to inject geothermal fluids as approved in the Order is in the interest of conservation, will prevent waste and will protect correlative rights.
5. If developed in accordance with the terms and conditions of this Order, wells LDG 13-7, LDG 15-8 and LDG 76-7 will be 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, or surface resources.

**IT IS THEREFORE ORDERED THAT:**

1. The application of LDG to drill geothermal wells LDG 13-7, LDG 15-8 and LDG 76-7 at the locations designated in the applications is approved subject to the conditions in this Order.
2. The application of LDG to place geothermal wells LDG 13-7, LDG 15-8 and LDG 76-7 on injection is approved subject to the conditions in this Order.
3. The intermediate casing (or "surface casing" as shown on form G-112) for geothermal wells LDG 13-7, LDG 15-8 and LDG 76-7, for which LDG has proposed a depth of 500 feet for well LDG 13-7 and 150 feet for wells LDG 15-8 and 76-7, shall be set at a depth of at least 150 feet below the bottom of the shallow aquifer. The bottom of the shallow aquifer is generally indicated by the bottom of a silicified sediment layer (LDG Exh. 14C). LDG may increase the proposed total depths of the injection wells.
4. No injection shall occur above the intermediate casing depth. LDG shall provide documentation to OCD that the well has been drilled in compliance with condition 3 above prior to OCD approving form G-112 and allowing the well to be placed on injection.
5. The geothermal injection wells are subject to the Conditions of Approval in attached Exhibit A. The conditions include the collection of water quality samples and the submission of water quality data to OCD. All water quality data submitted to OCD shall be public and not held confidential.
6. The OCD is authorized to approve a fourth LDG geothermal injection well if such well is located within that portion of Section 7 (T25S, R19W), which is south of current geothermal well LDG 55-7 and the well complies with the terms and conditions imposed by this Order on the other LDG injection wells.
7. The OCD is authorized to review any applications related to geothermal wells within the geothermal resource area and to take action consistent with this Order, without the need to refer such actions to the Commission, except that the Commission reserves jurisdiction over any approvals of wells located within the northeast quarter of Section 7 (T25S, R19W), which is the hottest area of the geothermal resources (LDG Exh. 13).

DONE at Santa Fe, New Mexico on this 5th day of November, 2015.


STATE OF NEW MEXICO  
OIL CONSERVATION COMMISSION



ROBERT BALCH, Member



PATRICK PADILLA, Member



DAVID R. CATANACH, Chair

SEAL

**Exhibit A**  
**Conditions of Approval**

**Conditions of Approval with respect to Drilling a Geothermal Resources Well  
(Form G-101)**

**Class V Injection Well LDG 13-7**

To be located 1537 feet from the North line and 504 feet from the West line of Section 7 in Township 25 South, Range 19 West NMPM, Hidalgo County, New Mexico

This injection well shall be drilled and completed as described in the operator's application (Forms G-101, G-102, G-104, G-112, and associated attachments) dated June 16, 2015.

**Class V Injection Well LDG 15-8**

To be located 2141 feet from the South line and 345 feet from the West line of Section 8 in Township 25 South, Range 19 West NMPM, Hidalgo County, New Mexico

This injection well shall be drilled and completed as described in the operator's application (Forms G-101, G-102, G-104, G-112, and associated attachments) dated June 9, 2015.

**Class V Injection Well LDG 76-7**

To be located 1896 feet from the South line and 1128 feet from the East line (Unit I) of Section 7 in Township 25 South, Range 19 West NMPM, Hidalgo County, New Mexico

This injection well shall be drilled and completed as described in the operator's application (Forms G-101, G-102, G-104, G-112, and associated attachments) dated June 9, 2015.

**The following drilling conditions apply to all approved injection wells:**

1. The operator (Lightning Dock Geothermal HI-01, LLC) must obtain a well bond approved by the Oil Conservation Division (OCD) prior to any drilling activity.
2. Drilling pits must be constructed with liners capable of withstanding elevated temperatures associated with geothermal activity and otherwise meet all pertinent requirements of 19.15.17 NMAC. All wastes must be properly handled, managed, and disposed.
3. This well shall not be intentionally deviated except toward the vertical without prior approval from the OCD using a G-103 sundry notice with copies of that notice simultaneously provided to geothermal operators on offsetting tracts, if any. Deviations may result in the need for downhole directional surveying.

4. A successful mechanical integrity test (MIT) along with a cement bond log of the well is required before injection can occur. The MIT shall consist of a 30-minute pressure test at 600 psig on the 7" diameter surface casing. The pass/fail criteria for this test is no more than a 10% loss in pressure using an OCD approved recording device calibrated no more than 90 days prior to the MIT. A G-103 sundry notice must be provided to and approved by the OCD in advance of the MIT and the OCD must be given sufficient notice such that the test can be observed.

**Conditions of Approval with respect to placing the wells on Injection within a Geothermal Resources Area (Preliminary Form G-112)**

1. Before injection, the operator (Lightning Dock Geothermal HI-01, LLC) must be in compliance with all conditions associated with the drilling and completion of the well.
2. The operator must submit to the Oil Conservation Division (OCD) a final G-112 form along with required G-105, G-106, and G-107 forms, all containing complete information, within 60 days of well completion. Commercial injection into the well is not allowed until OCD has approved all such forms.
3. A successful mechanical integrity test (MIT) of the well is required before injection can occur. Specifics of this testing are contained in the Conditions of Approval associated with drilling of the well.
4. The operator shall install a groundwater monitoring well to be associated with this injection well. The monitoring well must be located within 100 feet of the injection well in the nominal downgradient direction hydrologically. The monitoring well must be constructed of at least 2" diameter threaded PVC well materials, incorporate a screened interval approximately 10 feet above and 20 feet below the initial static water table, and otherwise conform with applicable requirements of the Office of the State Engineer.
5. The top of pipe elevation of the groundwater monitoring well must be determined to an accuracy of at least 0.01 feet. The depth to groundwater within the monitoring well must be gauged to an equivalent accuracy on a weekly basis beginning at least one week before injection begins and continuing for two months thereafter. Depth to water determinations must be made at least once a month throughout the injection well's useful life. All acquired data must be retained by the operator and reported to the OCD on a regular basis.
6. Appropriate sampling and analysis of groundwater from the monitoring well must be undertaken in accordance with the OCD-approved water quality monitoring plan for this geothermal project. All acquired water quality data must be retained by the operator and reported to the OCD on a regular basis. The OCD retains the right to modify the monitoring plan based upon available information.

7. This approval does not relieve the operator from responsibility should its operations pose a threat to public health or the environment, nor does it relieve the operator of compliance with any other federal, state, or local requirements.