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

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 13686
ORDER NO. R-12649

AMENDED APPLICATION OF DKD, LLC FOR AN ORDER REVOKING THE INJECTION AUTHORITY FOR THE GANDY CORPORATION STATE T WELL NUMBER 2, LEA COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This case came on for hearing at 8:15 a.m. on April 27, 2006, at Santa Fe, New Mexico, before Examiner William V. Jones.

NOW, on this 24th day of October, 2006, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner,

FINDS THAT:

(1) Due public notice has been given, and the Division has jurisdiction of this case and its subject matter.

(2) The applicant, DKD, LLC ("DKD"), requests that the Division immediately and permanently revoke the authority of Gandy Corporation ("Gandy") to utilize its State "T" Well No. 2 for the injection of produced water for disposal purposes. In addition DKD requests the Division require Gandy to reduce pressures in the injection formation, to plug and abandon the State "T" Well No. 2, and to repair or plug any wells determined to have been damaged by Gandy's operations.

(3) In its application, DKD states that Gandy has failed to obey many of the Division's ordering paragraphs within its current permit to inject. In part DKD states that;

(a) Gandy has failed to conduct injection operations to ensure injected fluids remain in the authorized injection intervals within the State "T" Well No. 2 and in surrounding wells;

(b) Gandy's injection well has caused waste of hydrocarbon reserves and may cause further waste if allowed to continue injection; and

(c) Gandy's injection well has a reasonable likelihood of causing contamination of fresh water.

(4) Gandy currently operates the State "T" Well No. 2 (API No. 30-025-03735), which is an injection well located 4290 feet from the South line and 500 feet from the West line (Lot 12) of irregular Section 6, Township 16 South, Range 36 East, NMPM, Lea County, New Mexico.

(a) The State "T" Well No. 2 was drilled in 1957, with 13-3/8 inch casing set at 378 feet and circulated with cement, intermediate 8-5/8 inch casing set at 4749 feet and cemented within 625 feet of surface, and 5-1/2 inch casing set at 10,679 feet and cemented with 300 sacks of cement, top of cement approximately 9762 feet. The well was completed from 10,538 feet to 10,647 feet in what was then called the Townsend-Wolfcamp Oil Pool; but afterwards considered to be upper Pennsylvanian. The well was inactive by 1976 and remained inactive with open perforations until being considered for saltwater disposal in 2002.

(b) An application to inject into the State "T" Well No. 2 was submitted by a predecessor to Gandy, Pronghorn Management Corporation ("Pronghorn"), and first evaluated by the Division for saltwater injection into the lower San Andres and upper Glorieta formations from 6000 to 6200 feet. Administrative permit SWD-836 was issued on April 30, 2002. This permit was contingent upon first plugging back the well to 6500 feet, squeezing cement from the existing cement top to the surface, and supplying a cement bond log to the Hobbs district office of the Division. As an operator within ¾ mile of this well, DKD challenged this permit. The Division found deficiencies in required notice and the permit was rescinded in Division Order R-11855 issued in Case No. 12905 on October 28, 2002.

(c) Under Commission Order No. R-11855-B issued May 15, 2003 the Oil Conservation Commission considered the issues presented and re-instated administrative Order SWD-836 with an injection interval from 6000 to 6400 feet. The Commission found that SWD-836 appeared to address all requirements of Rules 701 through 708 and therefore did not impose additional requirements.

(d) Division records indicate that operation of the well was transferred from Pronghorn to Gandy (OGRID 8426) and a sundry "notice-of-intent" was filed with the Division to plug back the well, cement squeeze, run a cement bond log, and perforate from 6200 to 6400 feet.

(e) During August of 2003, the well was plugged back from the original perforations with permanent plugs set at 10,288 feet and 7722 feet, holes in the casing at 7650 feet and 4800 feet were squeezed with cement, the casing was perforated at 4320 feet and 500 sacks of cement was circulated into the 8-5/8 and 5-1/2 inch annulus. The well was then perforated from 4810 feet to 6880 feet, plastic coated tubing installed, and injection begun. Since these depths were not permitted for injection, the Division Director issued an Emergency Order shutting the well in on May 3, 2004.

(f) Gandy subsequently applied to the Division on May 11, 2004 to utilize this well for saltwater disposal through a perforated interval from 4810 to 6880 feet. DKD, as an offsetting operator of record within the NW/4 of Section 6, Township 16 South, Range 36 East, NMPM, filed a letter of objection to the application and the application to inject was set to hearing.

(g) Division Order No R-12171 issued in Case No. 13293 on July 9, 2004, gave Gandy permission to utilize this well to dispose of produced water into the San Andres and Glorieta formations from depths of 4810 feet to 6880 feet. This order contains requirements such as limiting the maximum surface injection pressure to 962 psi and retained jurisdiction for further orders as necessary for the prevention of waste, the protection of correlative rights, and the protection of fresh water.

(h) During July of 2004, an injection survey run on this well showed 23 percent of the injected fluid entering the San Andres between 4810 and 4850 feet and a small amount leaving the wellbore at 5300 feet. The majority of injected fluid was leaving the wellbore between 6210 feet and 6360 feet.

(i) During 2005, this well began pressuring up and Gandy conducted a step-rate test to establish a higher surface injection pressure limit. On December 19, 2005, the Division issued Order IPI-264 authorizing Gandy to increase the maximum surface injection pressure on the State "T" Well No. 2 from 962 psi to 1930 psi.

(5) DKD and Gandy presented testimony and exhibits at the hearing. No other parties entered an appearance in this case or supplied letters of support or opposition.

(6) As the applicant, DKD presented two witnesses who testified as follows.

(a) The State "T" Well No. 2 reached "fill-up" or finally experienced pressure in August of 2004 after injecting approximately 560,000 barrels of water. Using reservoir parameters obtained from the injection survey and the electric log on the Watson "6" Well No. 1, it is apparent that the effective porosity is very low

and therefore injection waters are confined to the smaller, more permeable intervals.

(b) The San Andres is a commonly known corrosive interval. Most of the surrounding wells were drilled for the Townsend-Permo Upper Penn ("Wolfcamp") oil production and were not cemented to cover the San Andres or the Glorieta formations. The original permit application for the State "T" Well No. 2 had estimated cement tops that were too optimistic and the actual tops are much lower.

(c) The latest injection pressure increase awarded by the Division to Gandy has affected the surrounding operators: DKD and Energen Resources Corporation ("Energen").

(d) Waters injected by Gandy's well are not being confined in the injection interval within surrounding wells. Because of corroded casing and poor cement coverage within surrounding wells and high injection pressures in Gandy's well, injection waters are being seen at the surface from wells within the ½ mile area of review.

(e) Two wells to the south and one well to the east of the State "T" Well No. 2 have seen direct and immediate communication of waters from the State "T" Well No. 2. One of these wells is the Snyder "A" Well No. 1 operated by DKD and the others are the Snyder "B" Well No. 2 and the Snyder "A" Com Well No. 1 operated by Energen Resources Corporation.

(f) DKD is concerned about the difficulty, safety, and cost of plugging the Snyder "A" Well No. 1 with constant water pressure on the surface and rods, pump, and tubing installed.

(g) In October of 2004, DKD began monitoring and recording the surface casing pressures from at least two wells in this area. DKD also compared these pressures with injection pressures on Gandy's injection well and noticed a correlation. When pressures were higher on Gandy's well they were also higher on DKD's Snyder "A" Well No. 1 and when Gandy's well was shut-in and back-flowed, the pressure dropped off on DKD's well. The chart presented by DKD shows the surface pressure on Gandy's well as consistently 400 or more psi higher than the surface pressure on the Snyder "A" Well No. 1.

(h) Gandy's injection into the State "T" Well No. 2 has already affected wells further than ½ mile away and is threatening the remaining active wells in the Townsend-Townsend-Permo Upper Penn Oil Pool.

(i) DKD is also concerned with the effect of injection by Gandy's well on its own saltwater injection well located 1700 feet to the southeast. DKD

is concerned that high-pressure saltwater injection into the San Andres and Glorieta by Gandy will eventually corrode the casing and someday cause the casing to collapse.

(7) In its defense, Gandy presented two witnesses who testified as follows.

(a) This San Andres reservoir does have adequate porosity and thickness and is adequate for use for water injection.

(b) The San Andres has not had fluids removed from the reservoir and therefore "fill-up" calculations as used in waterflooding are not valid. Pressure will build while injecting into this type of reservoir until equilibrium is reached. It is normal for wells such as Gandy's to eventually need higher maximum allowable surface pressure limits. After the Division allowed a higher maximum pressure, more horsepower was added to the injection pump.

(c) Some of the pressure increases or spikes for the State "T" Well No. 2 are due to near wellbore effects. This is a commercial injection operation equipped with a filter system. Some trucks have unfortunately dumped damaging materials into this well and overloaded the filtration system. To remedy the situation, the well was back-flowed by approximately 3000 barrels and was cleaned out and re-perforated. Despite these efforts, the well has less injection capacity than before.

(d) The State "T" Well No. 2 has not caused waste of oil and gas resources or affected correlative rights. It is true that it appears that offset wells could have seen pressure resulting from injection water into the State "T" Well No. 2. However, casing corrosion and leaks in the San Andres have happened in this area for years prior to this well being allowed to inject and the Wolfcamp oil interval has long been depleted and wells have been inactive for years.

(e) The two Energen wells have now been plugged and abandoned and are no longer an issue. The only other well in the ½ mile area of review is DKD's Snyder "A" Well No. I. This well is depleted in the Wolfcamp and has been inactive for some time and should be plugged and abandoned.

(f) No fresh waters are in danger from operation of this well.

(8) The following are details for the three affected wells and for the Watson "6" Well No. 1.

(a) The Snyder "A" Well No. 1 (API No. 30-025-03727) operated by DKD is located 2319 feet from the South line and 330 feet from the West line (Lot 17) of irregular Section 6, Township 16 South, Range 36 East, NMPM, Lea County, New Mexico. It is located 1978 feet from the State "T" Well No. 2.

(i) The Snyder "A" Well No. 1 was drilled in 1957, with 13-3/8 inch casing set at 370 feet and cemented with 275 sacks of cement, intermediate 8-5/8 inch casing set at 4715 feet and circulated with cement, and a 5-1/2 inch liner set from 4536 feet to 10,719 feet and cemented with 300 sacks of cement. The well was completed from 10,652 feet to 10,692 feet in the Wolfcamp and, in 1960, additional perforations were added from 10,571 feet to 10,649 feet.

(ii) In December of 2002, Energen had trouble blowing the gas [see DKD's exhibits] off of the well while attempting to set a plug above the perforations. Apparently Energen never set the plug as intended.

(iii) In August of 2004, DKD blew the gas off the well and after the well died, ran rods and pump to 10,541 feet, installed a pumping unit and attempted to pump the well. That attempt was abandoned after it became apparent the water could not be pumped off and the gas did not come back. It appeared this well had, a casing leak up hole.

(iv) In December of 2005, DKD filed a sundry form C-103, which indicated it intended to plug and abandon.

(b) The Snyder "B" Well No. 2 (API No. 30-025-03729) operated by Energen Resources Corporation ("Energen") is located 3656 feet from the North line and 2310 feet from the East line (Lot 10) of irregular Section 6, Township 16 South, Range 36 East, NMPM, Lea County, New Mexico. It is located 2380 feet from the State "T" Well No. 2.

(i) The Snyder "B" Well No. 2 was drilled in 1958, with 13-3/8 inch casing set at 363 feet and cemented with 275 sacks of cement (circulated), intermediate 8-5/8 inch casing set at 4724 feet and circulated with cement, and a 5-1/2 inch liner set from 4551 feet to 10,703 feet and cemented with 300 sacks of cement. The well was completed from 10,624 feet to 10,651 feet in the Wolfcamp oil.

(ii) October of 2002 was the end of consistent production from this well and the last reported production was June of 2003. In September of 2005, during operations in preparation for plugging, Energen discovered the casing to be partially collapsed at 6365 feet. Energen set a casing plug at 10,600 feet over the existing perforations and within minutes experienced a strong water flow at the surface. In November of 2005, Energen needed 14.5 pounds per gallon mud weight to kill the well and was then able to complete its plug and abandonment.

(c) The Snyder "A" Com Well No. 1 (API No. 30-025-34073) operated by Energen Resources Corporation ("Energen") is located 990 feet from the South line and 874 feet from the West line (Lot 18) of irregular Section 6, Township 16 South, Range 36 East, NMPM, Lea County, New Mexico. It is located 3321 feet from the State "T" Well No. 2.

(i) The Snyder "A" Com Well No. 1 was drilled in 1998, with 13-3/8 inch casing set at 398 feet and cemented with 440 sacks of cement (circulated), intermediate 8-5/8 inch casing set at 4762 feet and circulated with cement, and 5-1/2 inch set at 11,745 feet and cemented with 650 sacks of cement (top of cement by cement bond log at 8832 feet). The well was completed in the Strawn in the NE Shoe Bar-Strawn Pool as a marginal producer.

(ii) In May of 2005, the well had a casing leak and flowed water out of the tubing and casing with 630 psi shut in tubing pressure. The well's casing collapsed at 8786 feet and was ultimately plugged and abandoned in December of 2005.

(d) The Watson "6" Well No. t (API No. 30-025-34197) is located 2857 feet from the South line and 1417 feet from the West line (Lot 14) of irregular Section 6, Township 16 South, Range 36 East, NMPM, Lea County, New Mexico.

(i) The well was drilled in 1997 by Chesapeake Operating Inc. as a Strawn oil test. The Strawn was dry and was isolated with a permanent plug and the well was recompleted in February of 1998 into the Cisco, Townsend, and Penn Lime members of the Upper Pennsylvanian within the Townsend-Permo Upper Penn Pool. By January of 1999, these perforations were declared un-economic and were shut-in.

(ii) DKD became operator of the well and on April 26, 2002, the well was permitted by administrative order SWD-834 as an upper Pennsylvanian formation (Cisco, Townsend, and Penn Lime) injection well within the existing open perforations located from 10,340 feet to 11,062 feet. The well began injection in June of 2002 without the need for an injection pump and has always injected on a vacuum into the permitted interval through 2-7/8 inch plastic coated tubing. The annulus remains full of water treated with corrosion inhibitor and the well passes all mechanical integrity tests.

(iii) This well was cemented with 1720 sacks of cement, with a cement diverter stage tool at 8150 feet. The first (lower) stage of cement circulated and the second (upper) stage covered the Glorieta and San Andres formations with cement.

(9) There are 10 wells located within ½ mile of Gandy's State "T" Well No. 2 injection well. Eight of these wells have now been adequately plugged and abandoned. DKD's Watson 6 Well No. 1 is one of the more recent wells drilled in this immediate area and the only well in this area cemented across the San Andres.

(10) The last producing well within the ½ mile area of review is DKD's Snyder "A" Well No. 1.

(a) The presented evidence shows waters from Gandy's well are likely moving horizontally through the San Andres injection formation and entering the wellbore of DKD's Snyder "A" Well No. 1. After entering the wellbore, the waters are likely moving down into the partially restricted Townsend-Permo Upper Penn perforations and, especially with the recently increased pressure from Gandy's well, are reaching the surface and causing pressure on the well head.

(b) The last reported oil production from this well was in 1997 and from the Townsend-Permo Upper Penn Pool. This interval was depleted years ago and is currently receiving active, but low pressure injection of waters from DKD's Watson "6" Well No. 1. DKD's map plat shown at the hearing shows a history of casing leaks in this well from 1970 through 1997 but does not specify how the leaks were repaired - although the early leaks must have been repaired. Those casing leaks were not shown in the Division's well file. On December 15, 2005, DKD filed a sundry notice with the Division of its intent to submit a plug and abandonment procedure for this well. This well has been inactive for a long period of time without being temporarily or permanently plugged, has poor cement coverage, corroded casing, and pressure at the surface. This well is providing a method of communication of any waters entering above, with the Townsend-Permo Upper Penn oil reservoir and with the surface.

(c) To safely plug or repair DKD's Snyder "A" Well No. 1, Gandy's well should be shut-in to allow dissipation of pressures in the San Andres. Alternately, DKD must use high-density mud to plug or repair this well just as Energen was required to use on the Snyder "B" Well No. 2 in late 2005.

(11) The Division records indicate the Upper Penn intervals completed in most of these wells were and are commonly called the "Wolfcamp". The perforated intervals appear to be correlative and the latest pool name is the Townsend-Permo Upper Penn Pool (59847). Earlier, it was called the Townsend-Wolfcamp Pool.

(12) It was shortsighted that the wells in this area drilled in the late 1950s were not cemented to cover all up-hole corrosive intervals. It is also unfortunate that operators of Wolfcamp wells in this area did not obey Division Rule 201 and set a protective plug above the Wolfcamp perforations within a year of inactivity.

(13) This hearing brings up the question of whether waste of oil and gas occurs through saltwater disposal into largely depleted oil reservoirs. Many saltwater disposal wells are permitted into depleted oil reservoirs, but commonly only into known waterflood candidates such as the San Andres. It is known that primary recovery of oil from reservoirs under drive mechanisms other than natural water-drive is only a small percentage of the original oil in place. So the majority of oil is still present in these reservoirs after all attempts to flow or pump the wells are exhausted. These reservoirs may again be productive under the right product prices or operating costs or after using existing or future secondary or tertiary recovery technologies. In any case, until proven otherwise, they must be assumed to be a resource of the state and should be protected. It is sometimes the practice of the Division to get an opinion from a reservoir engineer prior to allowing injection into older oil reservoirs.

(14) At this hearing there were conflicting engineering opinions as to the value of remaining Wolfcamp oil in this reservoir and conflicting opinions as to whether this oil is being affected adversely by injection into the State "T" Well No. 2. There were no reservoir engineering studies presented at the hearing as to the volume of primary or secondary reserves, which currently exist for this Townsend-Permo Upper Penn Pool. Product prices are dramatically higher now than when most wells became inactive and when the Watson "6" Well No. 1 was tested in the Wolfcamp prior to its conversion to injection. There was less than adequate evidence of waste presented at the hearing and even less evidence proving this is not occurring. The long production history indicates this oil reservoir is largely depleted and likely low on pressure and below the bubble point with free gas present in the reservoir.

(15) DKD is the owner of a well which has produced from the Wolfcamp and believes Gandy's injection operations have cut-short its latest production test. The Watson "6" Well No 1 was the first water disposal well in this area of the reservoir and began injection in 2002. In late 2002, Energen had difficulty blowing down the gas in the offsetting Snyder "A" Well No 1. DKD took over the well and spent a reported $180,000 attempting to pump test this well. DKD was not able to get high volumes of water pumped off and therefore unable to determine if oil and gas could be recovered in this well.

(16) DKD maintains there are active Wolfcamp wells beyond ½ mile from the State "T" Well No. 2 which may be affected and showed evidence that Energen's Snyder "A" Com Well No. 1, located 3321 feet from the State "T" Well No. 2, did experience a water flow from a casing leak although there was no evidence that high mud weights were required to plug the well. It is apparent that the lower San Andres injection interval has thin, high permeability layers that are capable of being a conduit for injection water over long distances.

(17) After reviewing the facts in this case the examiner finds that Gandy's injection well is equipped and cemented properly to isolate injected fluids vertically at the injection well site.

(18) DKD's Watson "6" Well No. 1 is also cemented adequately and not in immediate danger from Gandy's injection operations.

(19) All wells in this area are cemented with two casing strings and usually have two sheaths of cement protecting the existing fresh ground water. Unless there is a surface leak from water pressures experienced in un-cemented surrounding wells or a surface leak during workover operations, Gandy's operations are not a danger to fresh water.

(20) Division Rule 703 requires injection operations to be confined to the injection interval. Because of poorly cemented surrounding wells and high injection pressures, Gandy has failed to conduct injection operations to ensure injected fluids remain in the authorized injection intervals within surrounding wells.

(21) It was shown that this injection into the San Andres has hastened the abandonment of Wolfcamp wells, which could possibly have been repaired and used to test the concept of secondary recovery of this Wolfcamp oil. The examiner therefore concludes that this injection has caused waste and impaired correlative rights.

(22) The following should be done in order to prevent further movement of fluids vertically from the existing San Andres injection interval and to prevent waste and protect correlative rights.

(a) The existing injection permit for the State "T" Well No. 2 issued by Division Order No R-12171 in Case No. 13293 should be revoked 30 days after the date of this order.

(b) Any new injection permit for this well should be approved through an examiner hearing and only after notice is provided to all affected parties [as defined in Rule 701.B.2] within 1 mile of this well. In addition, the applicant should show evidence that all surrounding wells within 1/2 mile and drilled to deeper horizons are either plugged and abandoned or cemented across the proposed injection interval. Any new permit to inject into this well should limit the maximum surface injection pressure to an equivalent gradient of 0.2 psi per foot over the top perforation. Relief from this pressure requirement should be granted only after notice and hearing and after all offset wells, located within 1 mile, are shown to have cement across the injection interval.

(c) It is very important that the Snyder "A" Well No. 1 be repaired and returned to production or abandoned after the pressure has dissipated in the lower San Andres formation. If this well remains out of compliance with Division Rule 201, the Division should pursue enforcement action *as* soon as is practical.

IT IS THEREFORE ORDERED THAT:

(1) The permit to inject which was granted in Division Order No R-12171 issued in Case No. 13293 is hereby revoked 30 days after the date of this order. Gandy Corporation ("Gandy") is thereafter ordered to cease injection into its State 'T' Well No. 2 (API No. 30-025-03735) located 4,290 feet from the South line and 500 feet from the West line (Lot 12) of irregular Section *6*, Township 16 South, Range 36 East, NMPM, Lea County, New Mexico.

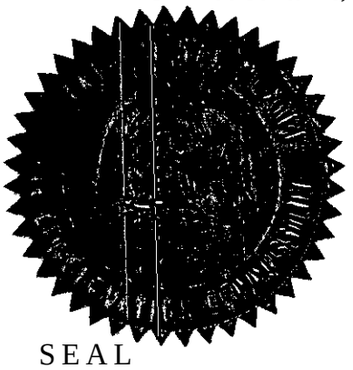
(2) If the injection well is not shut-in as ordered above, Gandy shall be subject to enforcement action including fines of 1,000 dollars per day beginning 30 days from the date of this order.

(3) The operator of the State 'T' Well No. 2 may apply for a new permit to inject at an examiner hearing and after notice is provided to all affected parties [as defined in Rule 701.B.2] within 1 mile of this well. In addition, the applicant shall show evidence that all surrounding wells located within 1/2 mile and drilled to deeper horizons are either plugged and abandoned or cemented across the proposed injection interval.

(4) Any new permit to inject into this well shall have a maximum surface injection pressure equivalent to a gradient of 0.2 psi per foot over the top perforation. Relief from this pressure requirement shall be granted *only* after notice and hearing and after all offset wells, located within 1 mile, are shown to have cement across the injection interval.

(5) Jurisdiction is hereby retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.



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STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MARK E. FESMIRE, P.E.
Director