

**BEFORE THE CORPORATION COMMISSION
OF THE STATE OF OKLAHOMA**

APPLICANT: HALLCO PETROLEUM, INC.)
)
RELIEF SOUGHT: UNITIZATION ENHANCED)
RECOVERY UNIT - DESCRIBED)
AS THE CONKLIN UNIT)
)
LEGAL DESCRIPTION: S/2 OF SECTION 9, TOWNSHIP)
27 NORTH, RANGE 5 EAST,)
KAY COUNTY, OKLAHOMA)

CAUSE CD NO.
201202483

FILED
JAN 15 2016

COURT CLERK'S OFFICE - OKC
CORPORATION COMMISSION
OF OKLAHOMA

APPLICANT: CHAPARRAL ENERGY, L.L.C.)
)
RELIEF SOUGHT: UNITIZED MANAGEMENT,)
OPERATION AND FURTHER)
DEVELOPMENT OF THE)
BURBANK KAY COUNTY)
ENHANCED RECOVERY UNIT,)
INCLUDING TERTIARY)
RECOVERY OPERATIONS)
)
LEGAL DESCRIPTION: W/2 OF SECTION 3, ALL OF)
SECTION 4, ALL OF SECTION 9,)
THE W/2 OF SECTION 10, THE)
W/2 OF SECTION 15, ALL OF)
SECTION 16, THE N/2 NE/4 OF)
SECTION 21, AND THE W/2 OF)
SECTION 22, ALL IN TOWNSHIP)
27 NORTH, RANGE 5 EAST,)
KAY COUNTY, OKLAHOMA)

CAUSE CD NO.
201203768

APPLICANT:	CHAPARRAL ENERGY, L.L.C.)	
)	
RELIEF SOUGHT:	CLARIFY, CONSTRUE AND/OR)	CAUSE CD NO.
	PARTIALLY VACATE ORDER)	201204362
	NO. 27937)	
)	
LEGAL DESCRIPTION:	SW/4 AND SW/4 NW/4 OF)	
	SECTION 3, AND E/2 AND E/2)	
	NW/4 OF SECTION 4, AND N/2)	
	OF SECTION 9, AND N/2 SW/4)	
	OF SECTION 10, ALL IN)	
	TOWNSHIP 27 NORTH, RANGE)	
	5 EAST, KAY COUNTY,)	
	OKLAHOMA)	

REPORT OF THE OIL AND GAS APPELLATE REFEREE

These Causes came on for hearing before **David D. Leavitt**, Administrative Law Judge ("ALJ") for the Corporation Commission of the State of Oklahoma, on the 3rd day of July, 2012; the 7th, 13th and 22nd days of August, 2012; the 8th and the 15th days of March, 2013; the 19th day of April, 2013; the 12th, 13th, 14th, 19th, 26th and 27th days of June, 2013; the 4th day of September, 2013, the 23rd, 24th, 25th, 30th and 31st days of October, 2013; the 22nd and 25th days of November, 2013 ; the 16th day of December, 2013; the 22nd, 23rd and 28th days of January, 2014; the 26th, 27th and 28th days of February, 2014; the 12th, 13th, 14th and 15th days of March, 2014; the 9th, 10th, 11th and 30th days of April, 2014; the 1st and 2nd days of May, 2014; the 11th, 12th, 13th, 25th and 27th days of June, 2014; the 1st day of July, 2014; and the 13th, 14th and 21st days of August, 2014, at 8:30 a.m. in the Commission's Courtroom, Jim Thorpe Building, Oklahoma City, Oklahoma, pursuant to notice given as required by law and the rules of the Commission for the purpose of taking testimony and reporting to the Commission. Closing arguments were heard by the ALJ on the 10th day of September, 2014. Prior to and during the hearing on the merits, several motions were filed related to discovery and other prehearing matters and the causes were consolidated. On or about October 14, 2014, the parties submitted their Findings of Fact and the ALJ then closed the record and took the matter under advisement to prepare the following report.

APPEARANCES: **Dale E. Cottingham**, attorney, appeared on behalf of applicant, Hallco Petroleum, Inc. ("Hallco") and for Steven L. Clubb, Trustee of the Isaac Clubb Living Trust ("Clubb"); **Richard A. Grimes**, attorney, appeared on behalf of Gary Davis Oil Company ("Davis"); **Gregory L. Mahaffey**, attorney, appeared on behalf of applicant, Chaparral Energy, L.L.C. ("Chaparral"); **Russell James Walker**, attorney, appeared on behalf of John B. Kirkpatrick, LLC; **David E. Pepper**, attorney, appeared on behalf of Devon Energy Production Company, L.P. ("Devon"); **Robert D. Gray**, attorney, appeared on behalf of John Kirkpatrick and Larry Nielsen; **Keith Thomas**, Assistant General Counsel, appeared on behalf of the Oil and Gas Conservation Division of the Commission; and **James L. Myles**, Deputy General Counsel for Deliberations, filed notice of appearance.

The ALJ filed his Report of the Administrative Law Judge on the 19th day of June, 2015, to which Exceptions were timely filed and proper notice given of the setting of the Exceptions.

The Appellate argument concerning the Oral Exceptions was referred to **Patricia D. MacGuigan**, Oil and Gas Appellate Referee ("Referee"), on the 18th day of September, 2015. After considering the arguments of counsel and the record contained within these Causes, the Referee finds as follows:

STATEMENT OF THE CASE

CHAPARRAL AND HALLCO TAKE EXCEPTION to the recommendation of the ALJ to deny their filed applications.

Cause CD 201202483 is the application of Hallco for the Conklin unitization enhanced recovery unit covering the S/2 of Section 9, T27N, R5E, Kay County, Oklahoma. The ALJ recommended denial because Hallco could not provide substantial evidence to the Commission that the proposed water flood would substantially increase the ultimate recovery of oil.

Cause CD 201203768 is the application of Chaparral for unitized management, operation and further development of the Burbank Kay County enhanced recovery unit, including tertiary recovery operations. The ALJ recommended denial because Chaparral did not provide substantial evidence to the Commission that the tract allocation or participation factors were fair, equitable or reasonable with respect to the distribution of hydrocarbons produced by the CO₂ flood of the Burbank common source of supply; that it is premature to determine whether the proposed CO₂ flood will be economically viable; that its proposed unit will likely create economic waste and cause harm to the surrounding environment.

Cause CD 201204362 is the application of Chaparral to clarify, construe and/or partially vacate Order No. 27937. The ALJ recommended that it be clarified to state that Order No. 27937 is not an unitization order, that it did not establish a secondary recovery unit under 52 O.S. Section 287.1; and that Order No. 27937 remain in force and not be vacated.

These three consolidated causes comprise a complex matter between the protestants, Hallco, Davis, Devon and Clubb, and the applicant, Chaparral. The crux of the dispute between the parties centers around opposing engineering and geologic proposals for secondary recovery operations and possibly tertiary recovery operations affecting the Burbank sand underlying portions of Kay County. Hallco proposes to unitize the 320 acre Conklin lease and conduct a water flood operation. Chaparral proposes to implement a combined water flood and CO₂ enhanced oil recovery ("EOR") operation on a 3,000 acre unit called the Kay County Burbank Unit that encompasses the Conklin lease. The interests of Clubb and Davis were initially linked to those of Hallco in opposition to Chaparral's CO₂ EOR operation, but Davis' protest was settled when Chaparral purchased Davis' mineral interests during the time of the hearing on the merits. Hallco's main complaint is that its interests will be diluted or it will receive no compensation when Chaparral implements the CO₂ EOR plan. Resolution of the dispute partially depends upon clarification of an old Commission order (Order No. 27937) that remains in effect.

Order No. 27937 was issued on December 22, 1953 authorizing Gulf Oil Corporation ("Gulf") and Phillips Petroleum Company ("Phillips") to operate a water flood in the Burbank sand underlying the SW/4 SW/4 NW/4 of Section 3, the E/2 E/2 NW/4 of Section 4, the N/2 of Section 9, and the N/2 SW/4 of Section 10, all in T27N, R5E, Kay County, Oklahoma. The area affected by the order encompassed some or all of the land and mineral interests related to this present cause.

On April 9, 2012, Hallco filed its application in CD 201202483 to unitize the geological interval known as the Conklin Unit located in the NE/4 SW/4 of Section 9, T27N, R5E, Kay County, Oklahoma for the purpose of conducting unitized management, operation and further development. Hallco also filed a plan of unitization that named Hallco as the unit operator. Hallco alleged that the proposed unitized method of operation which essentially consists of a water flood is feasible, would prevent waste, and would most likely result in increased recovery of substantially more oil and gas from the Conklin Unit than would otherwise be recovered. Chaparral protested the cause on May 1, 2012, alleging that the proposed plan would not prevent waste.

On June 12, 2012, Chaparral filed its own application in CD 201203768 seeking to create the 3,000 acre Burbank Kay County unit for the purpose of

unitized management, operation and further development of the oil and gas within the Burbank common source of supply located in the W/2 of Section 3, all of Section 4, all of Section 9, the W/2 of Section 10, the W/2 of Section 15, all of Section 16, the N/2 NE/4 of Section 21 and the W/2 of Section 22, all in T27N, R5E, Kay County, Oklahoma. Chaparral filed a plan of unitization with its application naming Chaparral as the unit operator and stating that the unit would be developed by CO₂ flooding whereby both the injection and producing wells would be situated to optimize the flood pattern. Chaparral alleged that its plan would protect the respective rights and obligations of the owners entitled to share in production and that the unitized management, operation and further development of the area affected by the plan is necessary for water flooding operations, CO₂ injection and other forms of joint effort calculated to substantially increase the ultimate recovery of oil and gas than would otherwise be recovered.

On June 27, 2012, Hallco protested the cause alleging that the proposed plan would not prevent waste, would not be economical, and would pollute the ground water. Hallco alleged that its 320 acre area was never water flooded and proposed that it be allowed to water flood the area independently of Chaparral. Hallco also contended that the tertiary recovery project using CO₂ that was proposed by Chaparral was not supported by substantial engineering evidence, and that it would be years in the future before it could be done. Because of this uncertainty, Hallco alleged that it would not be fair to include its 320 acre tract with the rest of the 3,000 acre area to be developed by Chaparral.

On July 30, 2012, Chaparral moved to consolidate CD 201202483 and CD 201203768 alleging that these causes concerned the same land in the S/2 of Section 9, T27N, R5E, Kay County, Oklahoma and that both involved enhanced recovery proposals where each party held competing ideas on how the S/2 of Section 9 and adjacent lands should be developed. The ALJ recommended that the Motion to Consolidate be granted on August 22, 2013 and the Referee affirmed the recommendations of the ALJ on November 13, 2012. The Commission issued Order No. 605382 consolidating CD 201202483 and CD 201203768 on December 13, 2012.

On July 31, 2012, Hallco moved to dismiss Chaparral's application in CD 201203768 claiming that the application was a collateral attack on Order No. 27937. Hallco contended that this order was essentially a unitization order rather than a water flood order and that the order was not for a field-wide unitization. Chaparral disagreed with Hallco's position that the order created a unitization, alleging that the order was a "cooperative water flood order" and that the order had been inactive for many years. Chaparral contended that the order was inactive in that many of the leases related to the mineral interests in

question had been released and new leases taken, and that there were no circumstances whereby the order had served as a basis for holding leases by production in the areas covered by the order. Chaparral noted that operators do not release leases in an active unitization where revenues must be paid out, implying that the unitization was inactive. The testimony indicated that Phillips had been the original operator of the Burbank Field and that the internal records of Phillips indicated that the order described a cooperative water flood process.

On August 22, 2013, the ALJ recommended that the Motion to Dismiss be denied and that Chaparral should file a separate application to clarify their cooperative water flood application so that it is clear that it was not a unitization under the Unitization Act which would pertain to an unitization plan and allocation formulas and all the things that are required by the unitization statute. The Referee affirmed the recommendations of the ALJ on November 13, 2012 and the Commission issued Order No. 605383 on December 13, 2012 denying the Motion to Dismiss and directing Chaparral to file a separate application to clarify and amend, if necessary, Order No. 27937 to eliminate any confusion about the impact of the order on any secondary recovery operation proposed by Chaparral.

On September 6, 2012. Chaparral filed its application in CD 201204362 to clarify, construe. and/or partially vacate Order No. 27937, alleging that the order did not establish a secondary recovery unit pursuant to 52 O.S. Section 287.1. Chaparral requested that the Commission partially vacate the order except for the injection authority granted under the order for the injection wells active in the SW/4 SW/4 NW/4 of Section 3, the E/2 NW/4 of Section 4, the N/2 of Section 9, and the N/2 SW/4 of Section 10, all in T27N, R5E, Kay County, Oklahoma. Chaparral filed the application to determine if the order established a secondary (water flood) recovery unit or, in the alternative, to partially vacate the order. Chaparral's filing appeared to be a response to the ALJ's recommendations in the hearing on the Motion to Dismiss held on August 22, 2013. Hallco, Davis and Clubb protested the cause.

On November 1, 2012, Chaparral amended its application in CD 201204362 to reflect the decision of the Commission in Order No. 605383 that was issued on December 13, 2012. The amended application requested that the Commission enter an order clarifying and construing Order No. 27937 to determine that the order did not establish a secondary (water flood) recovery unit under 52 O.S. Section 287.1 et seq, or in the alternative, to partially vacate Order No. 27937, except for the injection authority under the order for the Bar W-02; the Bar W-06; the Clubb W-02 and the Clubb W-05 wells, which wells continue to be active injection wells operated by Chaparral.

On February 11, 2013, Chaparral filed a Motion to Consolidate CD 201204362 with CD 201202483 and CD. 201203768, alleging that the causes involved the same parties of record, the same formations and the same lands. Clubb joined with Hallco in objecting to the consolidation, claiming that the issues are separate and not interrelated. On February 22, 2013, the ALJ denied the Motion to Consolidate, finding that CD 201204362 should be heard and determined prior to hearing CD 201202483 and CD 201203768. The Referee affirmed the recommendations of the ALJ on March 14, 2013.

On March 8, 2013, Hallco filed a Motion to Continue CD 201202483 and CD 201203768. The ALJ recommended that the motion be granted in part and denied in part. The Referee affirmed the recommendation of the ALJ on March 15, 2013 while also determining that CD 201204362 does not have to be tried separately before CD 201202483 and CD. 201203768. On March 20, 2013, Hallco filed a Motion for Oral Argument before the Commission En Banc to argue that Order No. 605383 requires CD 201204362 be tried separately and before CD 201202483 and CD 201203768. The Commission denied Hallco's motion.

On April 9, 2013, the Commission issued Order No. 610098 consolidating CD 201204362 with CD 201202483 and CD 201203768. The Commission held that the central issue in CD 201204362 is the impact of Order No. 27937 on any secondary recovery operation proposed by Chaparral, and that this issue can and should be resolved together with CD 201203768 and CD 201202483. On April 11, 2013, Hallco filed its Motion to Clarify Order No. 610098 in this present cause.

On April 19, 2013, the hearing was held on Hallco's Motion. The ALJ noted that Order No. 610098 directed that CD 201204362, CD 201203768 and CD 201202483 should be heard together and consolidated for judicial economy and efficient administration and that issue of the impact of Order No. 27937 on any secondary recovery operation proposed by Chaparral can be resolved together with CD 201203768 and CD 201202483. The ALJ recommended that the testimony, evidence and arguments related to CD 201204362 be presented first during the consolidated hearing in his report dated June 13 , 2013.

On June 12, 2013, the hearing on the merits for the consolidated causes began. During the pendency of the hearings, several motions were filed by each party and objections were made as to the admissibility of various items of evidence. On July 1, 2014, the ALJ requested that the parties submit briefs on the issue of whether it would be an impermissible taking under Oklahoma law and the U.S. Constitution for the Commission to order the non-consenting parties to be part of a unit if the evidence shows that they will not be able to

recover any economic value from their participation in the unit given the penalties imposed by the rules and the statutes.

On or around August 14, 2014, the parties submitted their briefs on the topic. At the end of closing arguments on September 10, 2014, the ALJ requested that the parties submit Findings of Fact to aid him in his recommendation. On or about October 14, 2014, the parties submitted their Findings of Facts and the ALJ then closed the cause and took the matter under advisement.

HALLCO TAKES THE POSITION:

1) The Report of the ALJ is contrary to the law and contrary to the evidence. While the majority of the ALJ Report was well-reasoned, with respect to Hallco's application in Cause CD No. 201202483, the ALJ Report is arbitrary, unreasonable and discriminatory in that it fails to effect the ends of prevention of waste and the protection of correlative rights required by the applicable laws of the State of Oklahoma, but more specifically the rules of the Commission.

2) The ALJ erred in paragraph 498 of the ALJ Report where the ALJ wrongly concludes that a very large amount of water has already infiltrated the reservoir by way of natural and artificial water flooding, and further concludes in error that subsequent efforts by Hallco to water flood will not increase the ultimate recovery factor of oil which currently exists. This conclusion is based on the erroneous findings in prior paragraphs, such as the "natural waterdrive and artificial water flooding has impacted the S/2 of Section 9." The ALJ erred in making those Recommendations and Conclusions for the following reasons:

A) In contrast to the ALJ's conclusion, substantial evidence was presented to the Commission that Hallco's application should be granted, which evidence demonstrated that the proposed water flood would prevent waste, would promote the economic and efficient development of the area, and that its allocation factors were fair, equitable, or reasonable with respect to the distribution of hydrocarbons.

B) Mr. Michael Glenn Davis, a consulting petroleum engineer employed by Davis Engineering on behalf of Hallco, was retained as an expert petroleum engineer by the ALJ without objection, and he provided ample testimony that water flooding is an operation that has been determined to historically work and be very successful in the Burbank formation. He testified that the S/2 of Section 9 is currently not water flooded and that he is not aware of an OCC Order authorizing water flooding in the S/2 of Section 9.

C) Chaparral's Exhibit 26, the Conklin Unit Phase I Tract Allocation Data, demonstrates that the Burbank formation is productive in the tracts

located adjacent to the S/2 of Section 9. Hallco's experts demonstrated that the commerciality criteria used to demonstrate water flood successes is based on water flooding in the same formation. The map attached to Exhibit 26 shows that the S/2 of Section 9 is currently not water flooded. However, adjacent tracts producing in the Burbank sand have demonstrated that water flooding of the S/2 of Section 9, which has never experienced a water flood, would be successful.

D) Chaparral failed to provide the Commission with substantial evidence that a natural waterdrive provided energy to the Burbank sand. Evidence in the form of academic papers demonstrated that the energy in the North Burbank pool was supplied almost entirely by dissolved gas in the oil, not a natural waterdrive, and that the rapid decline of production was a result not of water encroachment, but antiquated production methods of pulling on wells in the 1920's in an effort to increase production. The effect of pulling on wells is to create water coning, which will show an increase in water production that is not actually tied to the remaining oil in place. Chaparral did not present any evidence of any historical recognition of a natural waterdrive. In fact, the first instance in which the natural waterdrive was theorized can be found in the 1960s when discussed in the Hunter Paper, which was after the beginning of injection in both the NBU and project water floods approved for Gulf, Phillips, and the others by the Commission.

E) Exhibit 31-4, the Hunter Progress Report on the North Burbank Unit Water Flood, stated that the unit's energy comes from dissolved gas, and was not specific as to the location in the Burbank Unit where a waterdrive could have occurred. Chaparral's expert, Mr. Flinchum, agreed that the Hunter Paper referenced that high water production was the result of coning wells in the early years of well production (water coning), during the 1920's. In fact, the data from the Burbank demonstrates that the reservoir pressures dropped to an extremely low level, below 100 pounds. This in and of itself is sufficient evidence to find that there is no effective natural waterdrive.

F) Exhibit 156, Data from Plugging Forms, further demonstrates that there was no water encroachment over many decades which is reflective of the absence of waterdrive reservoir. This exhibit demonstrates that there was no relationship between date of abandonment and placement on the structure. Further, production from the S/2 of Section 9 demonstrates that reserves exist there under which have not been affected by a natural waterdrive. Chaparral's expert failed to demonstrate to the Commission that a natural waterdrive presently exists in the S/2 of Section 9.

G) Mr. Davis testified that the data from the natural waterdrive does not appear to be evident, as the pressures in the reservoir got down to 67

pounds, which is not possible in a waterdrive reservoir. While Chaparral's expert Mr. Flinchum contended that the high water production was all the evidence he needed to conclude that a natural waterdrive existed, he admits that reservoir pressure was 1,350 pounds prior to any drilling, and that wells in the field dropped below 100 pounds reservoir pressure after primary production.

H) While the ALJ repeatedly noted that there was no barrier between the S/2 of Section 9 and the surrounding acreage, suggesting that water flooding impacted the S/2 of Section 9, there was no evidence that Hallco's leases showed any response to the injection into the offset leases.

I) Assuming arguendo that artificial water flooding has impacted the S/2 of Section 9, the ALJ's findings and conclusion discriminate and significantly prejudice Hallco. The Conklin lease went off production in the early 1950's, was not water flooded, and stayed off production until 1983 when Hallco started production. During this more than 30 year period, Hallco did not benefit from the water flood operations. If all the available oil under the Conklin lease was stolen by virtue of off-set water flood operations, the Commission authorized an impermissible taking of Hallco's property. Moreover, assuming arguendo that a partial waterdrive throughout the field exists, there was no testimony or evidence presented that would suggest that Hallco's proposed water flood would not result in the increased recovery of oil that currently exists. In fact, Chaparral's 1012 demonstrate that when they increased water injection, their oil production increased. Just as it was not too late for Chaparral to benefit, it is not too late for Hallco to increase its production from the proposed water flood.

J) In fact, every single well producing in the Burbank Field, which is 23,000 acres in size, is being produced under a man-made water flood operation. The Commission approved these operations. Every other owner and operator has been granted the ability to water flood their properties in Kay County by the Commission. To refuse Hallco's application is discriminatory.

K) Hallco's expert testified that the proposed unitization is feasible, would recover substantially more hydrocarbons than the existing production, and that the cost to recover the hydrocarbons are very low and are vastly outweighed by the additional revenue generated. Testimony from Hallco's experts disclosed that water flooding the Burbank in the S/2 of Section 9 could be accomplished at a cost of less than \$100,000, and the incremental barrels of oil recovered by the water flood would be at least 270,000, possibly all the way up to 500,000. This would lead to an undiscounted profit of \$22.3 million, and a discounted profit of \$7.8 million. Such evidence and testimony supported Hallco's proposal that hydrocarbons were present in the Burbank

that could be recovered by water flood. Mr. Davis noted that adjacent tracts producing from the Burbank are being successfully water flooded. Further, as noted by the ALJ, the testimony demonstrated that to the extent tertiary reserves exist under the S/2 of Section 9, they will remain there after water flooding. (See Report at paragraph 448.) Moreover, the very reason that the protesting party Chaparral sought to vacate the prior order of the Commission was because it has been water flooding its properties successfully.

L) The denial of Hallco's application is a violation of Hallco's equal protection rights under the Oklahoma and Federal Constitutions. The same equal protection component found in the Fourteenth Amendment of the United States Constitution is present in the due Process clause of the Oklahoma Constitution. See *Presley v. Board of County Commr's of Oklahoma County*, 981 P.2d 309 (Okl. 1999). The protections afforded by the Fourteenth Amendment and state Constitution is primarily the freedom from arbitrary discrimination by the State. See *Lafalier v. Lead-Impacted Communities Relocation Assistance Trust*, 237 P.3d 181 (Okl. 2010). The U.S. Supreme Court has specifically prohibited "class-of-one" discriminatory actions by a state based on the purpose of the Equal Protection clause being "to secure ever person within the State's jurisdiction against intentional and arbitrary discrimination, whether occasioned by the express terms of a statute or by its improper execution through duly constituted agents." See *Village of Willowbrook v. Olech*, 528 U.S. 562, 564-65 (2000) (citing *Sioux City Bridge Co. v. Dakota County*, 200 U.S. 44 1(1923)). If a party can demonstrate that it has "been intentionally treated differently from others similarly situated and that there is no rational basis for the difference in treatment," a "class-of-one" equal protection violation has occurred. See *Cordi-Allen v. Conlon*, 494 P.3d 245 (Okl. 2007, citing *Willowbrook*, supra.

M) In the present cause, Hallco has demonstrated that there is no rational basis for the Commission to preclude a water flood in the Burbank formation underlying the S/2 of Section 9. The surrounding leaseholders have been permitted by the Commission to water flood adjacent tracts in the Burbank from the 1953 Order forward. Offset operators have benefited from increasing oil production from injecting water, Hallco should be treated no differently. To uphold the denial of Hallco's application for the same treatment in the face of otherwise clear evidence that water flooding the S/2 of Section 9 would be technically, economically, and environmentally feasible, would be a violation of Hallco's equal protection under the Commission's Rules and Oklahoma law. Further, the royalty owners in the S/2 of Section 9 should be protected by allowing Hallco's water flood to recover their share of water flood reserves. Hallco's water flood proposal is a proven recovery method in this field.

6) The ALJ erred in erroneously concluding that Hallco did not take into account position on the structure, porosity, permeability, prior productivity or any other factors listed in the Unitization Statute when it suggested a Tract Participation Formula ("TPF") for its proposed secondary recovery water flood operation, for the following reasons:

A) 52 O.S. Section 287.4 (b) provides guidance to the Commission upon how to allocate production from a water flood unit to all of the mineral owners. According to the statute:

The division of interest or formula for the apportionment and allocation of the unit production, among and to the several separately owned tracts within the unit area such as will reasonably permit persons otherwise entitled to share in or benefit by the production from such separately owned tracts to produce or receive, in lieu thereof, their fair, equitable and reasonable share of the unit production or other benefits thereof.

As set forth above, any tract allocation formula, tract allocation schedule or TPF must, first and foremost, be fair, equitable and reasonable, and permit the mineral owners to receive their fair and equitable share of production.

B) Thus, such a tract allocation formula, tract allocation schedule or TPF must be based or predicated upon parameters that in themselves can be measured and of such a nature as to permit a knowledgeable person in the oil and gas industry to be able to determine if they are reasonable. These parameters forming the basis for the allocation must also be related to the quantum of the mineral owner's interest in the minerals that comprise his interest at the date of unitization and the tract in which his interest resides so that a mineral owner, and the Commission, have a reasonable basis to determine if an owner's share in the production from a unit is equitable. The statute addresses these issues as follows:

A separately owned tract's fair, equitable and reasonable share of the unit production shall be measured by the value of each such tract for oil and gas purposes and its contributing value to the unit in relation to like values of other tracts in the unit, taking into account acreage, the quantity of oil and gas recoverable therefrom, location on structure, its probable productivity of oil and gas in the absence of unit operations, the burden of operation to which the

tract will or is likely to be subjected, or so many of said factors, or such other pertinent engineering, geological, or operating factors, as may be reasonably susceptible of determination. The unit production as that term is used in this act shall mean and include all oil and gas produced from a unit area from and after the effective date of the order of the Commission creating the unit regardless of the well or tract within the unit area from which the same is produced.

In light of the statute, a tract owner's allocated share in production must be based upon measurable and determinable factors that can be used to assess the value of a tract. Such factors include acreage, the quantity of oil and gas recoverable from the tract, location on structure, and probable productivity of oil and gas, or other pertinent engineering, geological, or operating data.

C) Mr. Michael Glenn Davis, a consulting petroleum engineer employed by Davis Engineering on behalf of Hallco, testified that the application of the Hallco Phase 2 formula was reasonable based on his opinion that the amount of remaining oil in each of the individual 40 acre tracts comprising the 320 acre unit were +/- 5% of each other. In other words, the tracts were very close in acreage size and the amount of remaining oil. Mr. Davis reached these opinions after deducting the ultimate recovery of the producing wells in each of the 40 acre tracts after calculating the thickness and reviewing the porosity of modern logs in the Hallco tracts, which existed for almost every 40 acre tract in the 320 acre unit. See Exhibit 53, a drawing from the hearing illustrating Mr. Davis's calculation of original oil in place and then remaining oil in place. Therefore, it was in error to conclude that Mr. Davis did not sufficiently consider other factors listed in the Unitization Statute when he testified regarding the proposed TPF. In fact, Mr. Davis testified to the same factors that the ALJ determined Chaparral should have used in presenting substantial evidence of the remaining oil that existed in any track.

D) Hallco provided substantial evidence to the Commission that the tract allocation or participation factors under its plan were fair, equitable or reasonable with respect to the distribution of hydrocarbons produced by the proposed water flood of the Conklin Unit. Ninety-nine percent of the owners have agreed to Hallco's water flood proposal. The total cost of performing the water flood will be \$100,000, which based on today's dollars would only be 2,000 barrels of incremental production.

7) When presented with an application and a plan of unitization, the Commission is obliged to determine if such a plan will prevent waste, protect the correlative rights of all of the interest owners, and is supported by

substantial evidence. A standard for the Commission's review of such a proposed plan is shown in 52 O.S. Section 287. 1, which states:

The Legislature finds and determines that it is desirable and necessary, under the circumstances and for the purposes hereinafter set out, to authorize and provide for unitized management, operation and further development of the oil and gas properties to which this act is applicable, to the end that a greater ultimate recovery of oil and gas may be had therefrom, waste prevented, and the correlative rights of the owners in a fuller and more beneficial enjoyment of the oil and gas rights, protected.

Here, Hallco presented substantial evidence that additional hydrocarbons can be recovered and waste prevented by establishing the Conklin Enhanced Recovery unit to include a water flood secondary recovery operation in the S/2 of Section 9, T27N, R5E, Kay County, Oklahoma. Hallco's experts presented data establishing that the Burbank sand underlies the entirety of the S/2 of Section 9, and that although Order No. 27937 authorizes water flooding on a leasehold basis on leases surrounding the S/2 of Section 9, no order exists which authorizes water flooding in the S/2 of Section 9.

8) For all the reasons stated above, Hallco respectfully requests that the Report of the ALJ be reversed as to the assignments of error.

CHAPARRAL TAKES THE POSITION:

1) The ALJ's ruling denying Chaparral's application for unitization in Cause CD No. 201203768 is contrary to the law, to the evidence, and such ruling fails to prevent waste and protect correlative rights. Further, the ALJ's ruling results in waste of some portion of approximately 60 MMBO. The primary mandate of the Legislature and the Oklahoma Supreme Court for the Commission is to prevent waste. See *In The Matter of the Application of Champlin Refining Company*, 296 P2d 176, (Ok!. 1956). The Burbank sand underlying the Burbank Field comprises approximately 23,000 acres; 3,000 of which are situated in Kay County, and 20,000 of which are situated in Osage County. It is one of the largest oil fields in the country and has original oil in place of approximately 824 MMBO (see Chaparral Exhibit 72), but certainly no less than 671 MMBO (see ALJ Report Paragraphs 97, 103, 145, 335 and 336; and Exhibits 31-7 and 73). It is undisputed that the entire field, since the 1920's, has produced approximately 360 MMBO, which is approximately 39% of the original oil-in-place. Approximately one-half of the production came from primary, and approximately one-half from secondary. Chaparral

estimates that 2,570 acres of productive area on the Kay County side of the Burbank Field had 102 MMBO oil-in-place of which 40 MMBO have been produced through the combination of primary and secondary (water flooding and gas injection) production, thus leaving over 60 MMBO in the ground underlying the Kay County Burbank Unit. (See Exhibits 50, 71 and 72.) Mr. Delon Flinchum, the only engineer who had experience with CO₂ flooding, testified that Chaparral, conservatively, expects to recover 9.3% of the OOIP from its Kay County CO₂ flood (see ALJ Report Paragraph 323 and Exhibit 74). Thus, Chaparral expects to recover an additional 9.5 MMBO out of the Kay County Burbank sand from its CO₂ flood. Hallco's consultant engineer, Mike Davis, an expert witness who testifies daily at the Commission, but who has never been involved in designing, implementing or installing a CO₂ flood, testified that there was about 64.4 MMBO of original oil-in-place (see ALJ Report Paragraph 434) At an expected minimum recovery factor of 9.3% (Ryder-Scott estimated greater than 11%, see Exhibit 75), 6 MMBO is wasted and left in the ground forever, even under Hallco's volumetrics. As noted on Exhibit 74, the average CO₂ flood oil recovery factor is 10.6%. Therefore, Chaparral's 9.3% is a conservative estimate. Whether there is 6 MMBO or 9.5 MMBO of additional recoverable oil from CO₂ flooding that will be left in the ground if unitization is denied, this is the very type of waste that the Commission is mandated to prohibit.

2) The ALJ erred in finding that Chaparral's CO₂ Flood would be uneconomic. Chaparral offered both an un-escalated and an escalated set of economics. On an un-escalated basis, the unitization will result in a profit over expenses in the amount of \$253,950,000. (See Exhibit 99A). On an escalated basis, Chaparral's CO₂ flood will result in a total profit over expenses of \$403,437,000. (See Exhibit 101A). On an escalated basis, an additional royalty will be generated to Oklahoma royalty owners in the amount of \$194,402,000 and gross production taxes will be generated to the State in the amount of \$70,546,000.

Chaparral is not a novice at projecting the economics and success of a CO₂ enhanced oil recovery project. Chaparral is the third largest, active operator of EOR oil projects in the country. Of the 105 active projects in the country, Chaparral operates eight, more than Chevron, Exxon-Mobil and other major oil and gas operators. (See Exhibit 60).

Even Hallco's expert, Mike Davis, stated that the North Burbank Field is a reasonably good enhanced oil recovery project, because it had a relatively successful water flood with a recovery ratio of 70% of the volume of primary production of oil on secondary recovery from water flooding. (See ALJ Report Paragraph 95). This factor was also emphasized by Mr. Flinchum as being a primary factor in the success of Chaparral's CO₂ project: a successful water

flood had occurred in the North Burbank Unit, indicating that a successful CO₂ flood will occur.

Chaparral has already implemented the infrastructure for the Kay County Burbank Unit. It has built a 68.3 mile pipeline to a Coffeyville, Kansas, fertilizer plant to guarantee about 44 MMCF of CO₂ delivery daily. Chaparral has borne the cost to plug or remediate numerous old wells. Chaparral's Phase I project in North Burbank Unit has resulted in a 600 BOPD increase in production as of June 2014, with the increase of daily production accelerating as of June 2014. The CO₂ flood of the Kay County North Burbank Unit will be economic.

3) The ALJ erred in finding that the implementation of Chaparral's CO₂ flood is premature. The ALJ opined that Chaparral's proposal is premature and that Chaparral had not provided the Commission with evidence that it has possession of sufficient volumes of CO₂ to perform the entirety of its project in Kay County. Chaparral provided substantial evidence that its CO₂ project is successfully being implemented in the Osage County portion of the Burbank sand. In June 2014, prior to closing the evidence, Chaparral had seen a substantial increase in production from its Phase I project in the North Burbank Unit. Phase I is immediately east of Kay County and contiguous to the Kay County proposed unit. See Exhibit 123. Chaparral was in the process of completing its Phase II project in the North Burbank Unit and was beginning to start Phase III as of June 2014. Chaparral has constructed a CO₂ recycling facility which allows reuse of CO₂ produced with the increased oil production.

As noted by Shawn Nix, Petroleum Engineer, the Phase I production has experienced a substantial increase beginning in March of 2014. Daily production from Phase I was averaging approximately 300 barrels per day prior to January 2014. As of June 1, 2014, production had increased to approximately 850 barrels per day. (See Exhibits 147 and 148). This is the "hockey stick effect" usually seen on successful CO₂ projects within 6 to 12 months after first CO₂ injection, as testified to by Mr. Flinchum (see Exhibits 64 - 69). When fully implemented on the Osage County side of the Burbank Field, Mr. Flinchum expects daily production to increase from its current rate of around 1,000 barrels per day to as much as 12,000 barrels per day. (See Exhibit 43). Hallco's expert opined that one to two years of Phase I production, after seeing the initial response on the Osage County North Burbank Unit, would be sufficient to determine the success of the proposed Kay County CO₂ Project. Chaparral has been injecting CO₂ into Phase I over two years, since June 2013, and subsequent to the initial response in January 2014, has seen a production increase response for 1.5 years. If there is any doubt in the Commission's mind on the economic viability of the Kay County Unitization, then this Commission should remand the case for the taking of additional

evidence on the economic success of the North Burbank Unit Phase I. As noted by Mr. Flinchum, "performance of the CO₂ EOR in Osage County is the best indicator of what a CO₂ flood will do in Kay County." (See ALJ Report Paragraph 325). Obviously, the Osage County CO₂ has resulted in substantial increase in oil production and is successful. Therefore, the ALJ should have granted the Kay County Unitization application.

4) The ALJ erred in failing to find Chaparral's TPF to be fair, equitable and reasonable and as permitting the mineral owners to receive their fair and equitable share of production. Chaparral was the only party to submit a proposed TPF. Exhibit 77 contains a two phase formula. Phase I is based upon current production (45%), remaining reserves (45%), and surface area (10%). Phase II involves factors for cumulative production (40%), net reservoir volume (30%), gross reservoir volume (20%), and surface area (10%). Mr. Flinchum testified that he had experience in approximately 28 water flood units, 13 of which were either Red Fork, Burbank or Bartlesville (see ALJ Report Paragraph 28.) He also has experience in, and has reviewed a number of, CO₂ unitization orders, all of which were modified water flood unitization orders. He further testified that he had studied this particular Burbank reservoir for four to five years and had experience with the Burbank Reservoir since his first employment as an engineer with Texaco in 1971. He testified that he had looked at other formulas in plans of unitization and found 40 to 42 that included a TPF, many using the same parameters utilized by him for his Kay County TPF. Mr. Flinchum's formula takes into account position on the structure, porosity, permeability and prior productivity of each of the individual tracts. The ALJ concluded that the size of the Kay County reservoir and acre feet could be off as much as 40% to 50% based on the criticism made by Hallco's experts of Chaparral's isopach. Hallco did not introduce an alternate isopach map. The amount of reservoir acre feet has no bearing on the Phase I TPF and does not affect 50% of the Phase II TPF. However, it was the unrefuted testimony of Mr. Flinchum and Mr. Hall that they had re-evaluated the isopach map and taken into consideration the thinner wells, as opined by Hallco, and such sand thickness changes will make less than a 1% difference in the redistribution of production under the formula proposed on Exhibit 52. In fact, Mr. Flinchum opined that redoing the formula to reduce the acre feet would likely result in a lower tract participation for the Hallco acreage in the S/2 of Section 9. However, Mr. Flinchum concluded that any change in the actual Phase 2 TPF, as depicted on Exhibit 52 is de minimis.

Should Chaparral's formula need some adjustment, such is not a basis for denying the unitization. As noted by the ALJ from the holding of the *Denver Producing and Ref. Co. v. State*, 184 P.2d 961, 964 (Okl. 1947):

In striking a balance between conservation of natural resources and protection of correlative rights, the latter is secondary and must yield to the reasonable exercise of the former.

The formula goes to protection of correlative rights. Unitization goes to prevention of waste. If the ALJ and the Commission believe that there needs to be some adjustment or modification of the formula, either to delete certain acreage from the unit or to adjust the gross and net reservoir volume numbers calculated by Chaparral for the TPF, then the matter should be remanded for additional testimony; however, the unitization should not be denied. Hallco did not offer any alternative to Exhibit 77, the Tract Participation factors or Exhibit 52, the application of the TPF to the Kay County Burbank sand reservoir data. Hallco's only criticism was the numbers being used for surface acres, reservoir volume and cumulative production. Hallco did not participate in any negotiations for the TPF; Hallco wants unitization denied and its criticism of the formula was almost an afterthought. Professor Meyers in Meyers, *The Law of Pooling and Unitization, Voluntary - Compulsory* stated:

The formula is the heart of the unitization agreement. It is usually the most difficult problem to solve, but unitization is impossible until it is agreed upon by the operator. The formula determines the portion of the unitized substance each participant is to receive, and is usually arrived at only after long and laborious negotiation. The idea is that each operator's share of production from the unit shall be in exact proportion to the contribution which he makes to the unit.

Chaparral submitted the only TPF. Chaparral's TPF is fair, reasonable, gives credit to tracts expected to contribute the most oil to the CO₂ flood and complies with the statutory mandate of determining "...the value of each tract for oil and gas purposes and its contributing value to the unit in relation to like values of other tracts in the unit."

5) The ALJ erred in finding that Chaparral's unitization poses a significant risk to human health and the environment. The ALJ has focused in on a single situation of purging on a Davis lease well that was improperly plugged by Davis or its predecessor to opine that Chaparral's operation will constitute a significant risk to the environment. It was the testimony and evidence of Chaparral that they had no significant instances of purging or pollution in North Burbank Unit, the Osage County portion of the Burbank Field. It was undisputed that the Osage Tribe was satisfied with Chaparral's operations. It was the testimony of Mr. Tim Baker that Chaparral has timely responded to the

Commission's request for any remediation, plugging and cleanup in Kay County and Chaparral has conducted itself as a prudent operator. Chaparral offered substantial evidence that the Davis wells purged because same had been improperly plugged, and that Davis should have plugged such wells over ten years ago after Davis failed to complete an OCC approved recompletion and the wells ceased to produce. Chaparral, had it been in control of the Davis lease, would have properly plugged the wells to prevent any purging or surface pollution.

There was no substantial evidence offered to show that Chaparral's CO₂ flooding of the Kay County side of the Burbank Field is going to jeopardize the Kaw Reservoir. The plugged wells underlying the Kaw Reservoir and penetrating the Burbank sand, as shown on Exhibits 129 and 130, are plugged wells under the Kaw Reservoir three or more miles southwest of the down dip limit of the Kay County Burbank Unit. There is a series of dry holes which have been drilled between those wells and the Kay County Burbank Unit, indicating that the Burbank Unit is in a separate, stratigraphic reservoir. Even if the Burbank sand penetrated and plugged out wells underlying the Kaw Reservoir are not stratigraphically separated from the Kay County Burbank Unit, it was the undisputed testimony of Mr. Flinchum that any pressure build up in the Burbank Unit will dissipate at the rate of about 800 psi per mile. Even with a buildup to miscibility pressure of 1700 psi, about 350 psi over initial virgin pressure of about 1350 psi, which is also the pressure it takes to lift a column of fluid to the surface at this depth, once you are half a mile away from the boundary of the Kay County Burbank Unit, the pressure will dissipate below 1,300 pounds. A mile away from the Kay County unit will result in pressures of 900 pounds or less. Therefore, there is absolutely no risk of bringing deleterious substances to the surface underneath the Kaw Reservoir, which would require pressure exceeding 1300 psi.

Regarding the Beaver Creek area that underlies the northern portion of the proposed Kay County unit, Chaparral's evidence and testimony showed that they already plugged or remediated many of these wells, that pressuring up on North Burbank Unit has not caused any plugging incidents near Beaver Creek, that Chaparral has numerous field personnel on location in Kay County, and that they will effectively and adequately plug any improperly plugged wells and will monitor any issues requiring remedial action.

While the ALJ and the Commission should be concerned about serious threats to the environment or to human health, the incidents involving the Davis lease would not have happened had Chaparral been in control of that lease. Such isolated incident should not be used as a "Chicken Little" conclusion that all of Chaparral's operations in Kay County will jeopardize human health and the environment.

6) The ALJ erred in finding that Chaparral's plan of unitization was going to confiscate the Hallco interest. The ALJ erroneously concluded that Hallco would be receiving no production once the plan of unitization was implemented. Such is not the case. Mr. Nix and Mr. Flinchum testified that Chaparral planned to keep the producers in the Kay County Burbank sand on production as long as possible before implementing the Kay County Phase I. It will take some period of time to inject water into the Kay County side of the unit to bring reservoir pressure up to miscible pressure such that the CO₂ can be injected. During such pressure build up, Chaparral is capable of handling the increased water production and will continue to pay out oil revenues based on the Phase I TPF regardless of whether the wells on the Hallco lease are shut in or are actually producing. Once the Plan of Unitization is approved, Hallco will receive revenue from all production within the approximate 3,000 acre unit, based upon the formula set forth in Exhibits 77 and 52.

If the Commission believes that the statutorily authorized 300% non-consent penalty is not "fair and reasonable" then the Commission has the authority to modify same. However, Chaparral, owner of over 75% of the working interest, should not be precluded from pursuing recovery of an additional 9.5 MMBO because the owner of 10% interest, Hallco, does not want to pay its share of the costs.

The Supreme Court in *Palmer Oil Corp. v. Phillips Petroleum Co.*, 231 P.2d 997 (Okl. 1951) noted:

The purpose of the [Unitization] Act is to so adapt the exercise of such rights that the value of the reservoir may be realized to the fully degree possible by those entitled thereto and according to the respective shares therein. This can be done only through and intelligent control of the drilling operations.

As further noted by the Court in the *Palmer* case, supra, challenges to the unitization statute as being an unconstitutional taking have been decided adversely to Hallco's contentions. Hallco's share of Phase I, CO₂ flood oil, per Exhibit 52 is 14.803625% or 91,053 BO of Phase I oil. Hallco's share of Phase II CQ2 flood oil, per Exhibit 52 is 13.309572% or 1,264,409 BO of expected recovery. The evidence clearly demonstrates that Hallco will recover substantially more oil from the proposed CO₂ flood than they ever would recover from primary production.

7) The ALJ erred in failing to consider the Yeats Study as reliable evidence of historical data about the Burbank Field. The ALJ assigned no probative

value to documents in the Yeats Report because he believed such document failed to meet the Daubert standard. However the ALJ misconstrued Daubert. The Oklahoma Supreme Court adopted Daubert in the case of *Christian v. Gray*, 65 P.3d 591 (Okl. 2003) where the Court stated:

Daubert provided a list of factors for the trial judge to consider when determining the admissibility of evidence. They include: 1. Can the theory or technique be, or has it been, tested; 2. Has the theory or technique been subjected to peer review and publication; 3. Is there a "known or potential rate of error and the existence and maintenance of standards controlling the technique's operation;" and 4. Is there widespread acceptance of the theory or technique within the relevant scientific community. Daubert, 509 U.S. at 593 - 594.9 The inquiry is a flexible one, and focuses on the evidentiary relevance and reliability underlying the proposed submission, and not on the conclusions they generate. Id. 509 U.S. at 595. The evidence must also "assist the trier of fact to understand the evidence or to determine a fact in issue." This requirement "goes primarily to relevance." Daubert, 509 U.S. at 591. Rule 702 thus "requires a valid scientific connection to the pertinent inquiry as a precondition to admissibility." Daubert, 509 U.S. at 592.

As noted by the Court, the trial judge, as gate keeper, is to review scientific method and theory but Daubert does not concern evidence that is factual in nature. Mr. Flinchum was only relying upon certain factual information contained in the Yeats Report, particularly cumulative production between 1923 and 1938 which is a time period which the state records and public records are lacking. He testified that the Yeats early years, Burbank Field Production Record was a document kept in the ordinary course of business by Phillips Petroleum Company and found in their files when Chaparral acquired Calumet, the successor to Phillips Petroleum Company as operator and owner of the North Burbank Unit. The only other significant piece of data relied upon by Mr. Flinchum was a water encroachment map also found in the ordinary course of business records of Phillips Petroleum Company, Exhibit 51. However, Mr. Flinchum independently testified to production data of water and oil at the date of abandonment and plugging of the wells depicted on that map and the down dip portions of Section 9 as factual foundation for Exhibit 51. Even if this data was deemed to be hearsay, and inadmissible under the business records exception, an expert is entitled to rely on hearsay to formulate

his expert opinions. Mr. Flinchum adopted the water flood front interpretation as his own. Thus, the preliminary questions to be addressed by Daubert of the qualification of the person to be a witness and the admissibility of opinion evidence, does not come into play, insofar as the data from the Yeats Study relied upon by Mr. Flinchum.

The OCC has wide latitude in determining what is substantial evidence. In *Union Texas Petroleum, a division of Allied Chemical Corporation v. Corporation Commission of State of Oklahoma*, 651, P.2d 652 (Okl. 1981) the Supreme Court stated concerning substantial evidence that:

The Commission has a wide discretion in the performance of its statutory duties, and this court may not substitute its judgment upon disputed factual determinations for that of the Commission but is restricted to a determination of substantial evidentiary support for the order issued under authority of the statutes. *In Re: Application of Continental Oil Company*, 376 P.2d 330 (Okl. 1962). Searching a record for substantial evidence supporting the order appealed does not entail a comparison of the parties' evidence to determine that which is most convincing but only that the evidence supportive of the order be considered to determine whether it implies a quality of proof inducing a conviction that the evidence furnished a substantial basis of facts from which the issue could be reasonably resolved. *Chenoweth v. Pan American Petroleum Corporation*, 382 P.2d 743 (Okl. 1963). Substantial evidence has been additionally outlined as something more than a scintilla; possessing something of substance and of relevant consequences carrying with it a fitness to induce conviction, but remains such that reasonable men may fairly differ on the point of establishing the case. A determination of substantial evidentiary support does not require weighing the evidence but only a measurement of the supportive points to determine whether the criterion of substantiality is present. *Central Oklahoma Freight Lines v. Corporation Commission*, 484 P.2d 877, 879 (Okl. 1971).

Therefore, the ALJ erred in assigning no probative value and weight to the factual documents introduced from the Yeats Report, especially since the

expert witnesses who testified, Mr. Flinchum and Mr. Hall, relied upon other independent and substantial data to support their opinions.

8) The ALJ erred in not admitting Exhibit 38, a Rhoads #6 well log. As noted by Mr. Flinchum, Exhibit 38 is the type of data that he, as an expert petroleum engineer, could reasonably rely upon. The exhibit corroborates that the porosities on the Rhoads #6 well compare favorably to the high porosity in the Conklin #9-7 well in the southeast and the Conklin #9-2 well in the north which have modern day porosity logs showing between 20% and 30% porosity and which wells have permeability of 400 to 500 MD. While Chaparral also relied upon other data to substantiate its opinion that the porosity (22%) and permeability (188 MD) in the Kay County portion of the Burbank sand are better than in the Osage County portion (16.8% porosity and 50 MD), Exhibit 38 is a significant piece of corroborative evidence.

9) Chaparral concludes that the Kay County portion of the Burbank Field is not separated by faults or any other permeability barrier from the North Burbank Unit, the Osage County side of the Burbank Field; the entire field is in pressure communication and is a single, common reservoir. Chaparral is currently expending millions of dollars to implement water curtains around its Osage County Phases I, II and III CO₂ projects, in part to minimize the pressure impact on Kay County. Because this is one common reservoir and because Chaparral is actively involved in CO₂ flooding 90% of the reservoir that is situated in Osage County, common sense dictates unitizing the Kay County portion of the Burbank Field and placing the operational control of the entire reservoir in the hands of one operator, Chaparral. It is undisputed that there is a substantial amount of oil under the Kay County portion of the Burbank Field that is unrecovered. Such oil can only be recovered through CO₂ flooding. While it was disputed what percentage will be recovered through CO₂ flooding, it is undisputed that the average recovery factor is 10.6% and that Chaparral's conservative 9.3% recovery factor results in a minimum of 6 MM and more likely over 9.5 MM barrels of additional oil that could be produced. Whether 6 MMBO or 9.5 MMBO is produced by a CO₂ flood, substantial additional royalty revenues and gross production tax revenues will be enjoyed.

Chaparral requests that the ALJ Report be reversed insofar as it denies unitization of the Kay County Burbank sand. Alternatively, Chaparral requests that its application be remanded for the taking of additional evidence, to the extent that this Commission believes that additional evidence is required to support the economic viability of the project, the participation formula or the lack of endangerment to the environment and human health.

THE ALJ FOUND:

- 1) **Cause CD 201204362 - Clarify and/or Vacate Order No. 27937.** Chaparral filed its application in CD 201204362 to clarify, construe, and/or partially vacate Order No. 27937, alleging that the order did not establish a secondary recovery unit pursuant to 52 O.S. Section 287.1. Chaparral requested that the Commission partially vacate the order except for the injection authority granted under the order for the injection wells active in the SW/4 and SW/4 NW/4 of Section 3, the E/2 NW/4 of Section 4, the N/2 of Section 9, and the N/2 SW/4 of Section 10, all in T27N, R5E, Kay County, Oklahoma. Chaparral filed the application to determine if the order established a secondary (water flood) recovery unit or, in the alternative, to partially vacate the order.
- 2) Chaparral's witnesses testified that Order No. 27937 granted Gulf and Phillips the authority to water flood on a leasehold basis the Burbank sand underlying the SW/4 and SW/4 NW/4 of Section 3, the E/2 and E/2 NW/4 of Section 4, the N/2 of Section 9, and the N/2 SW/4 of Section 10, all in T27N, R5E, Kay County, Oklahoma. The 1953 order remains a valid order of the Commission issued after enactment of the Modern Unitization Act.
- 3) Chaparral's landman reviewed the division order list for the leases that Chaparral operates in Section 9 and determined that Chaparral does not share in revenues or expenses with any of the owners in the area covered by Order No. 27937. He contended that if a unitization was currently in effect, then these costs and revenues would be shared. He also admitted that he found no statement or direct evidence that Order No. 27937 had been abandoned. He said that he found no evidence of notice to royalty owners, overriding royalty owners, working interest owners, and surface owners concerning a unitization. He testified that Order No. 27937 authorizes water flooding on a leasehold basis.
- 4) Chaparral's engineer said that the project is operated as a co-op water flood and not a unitization because: there is no plan of unitization; there are no documents identifying the unit operator; there are no documents mentioning financing or economic relationships between parties; there are no documents explaining how equipment is to be taken over and compensated on the project area; there is no evidence of when the unit was to be started and dissolved; Chaparral, in Tracts 12 and 13 in the N/2 of Section 9, has not been sharing production or costs with anyone; and Gary Davis, the operator of the Munroe lease, has not been sharing production and costs with Chaparral.
- 5) The ALJ finds that no documents for unitization were ever filed in the application for Commission Order No. 27937 and that no Plan of Unitization was filed, nor was a formula created for allocation and apportionment of unit

production in the making of the order. The Order No. 27937 contained no reference to the statutory unitization authority in place at the time of the making of the order. (52 O.S. Section 286.1 et seq.) (now repealed). The ALJ also found no significant evidence that the order was ever abandoned.

6) The ALJ finds that Order No. 27937 doesn't mention or authorize a unitization but granted Gulf and Phillips the authority to operate a joint water flood project, and that Gulf and Phillips continued to operate their leases separately and to sell production separately instead of operating as a single unitized management area. There was never a vote between the lessees as to which entity would solely operate the area and the order contained no reference to the apportionment of expenses for a joint operation and no notice was given to any royalty owners, as is required under the pre-1953 Unitization statute. There was no time set for a plan of unitization to go into effect and the order didn't set a date for the order to become ineffective as is the case for a unitization.

7) The ALJ thus clarifies that Order No. 27937 authorized a leasehold water flood in the Burbank sand underlying the SW/4 and SW/4 NW/4 of Section 3, the E12 and E/2 NW/4 of Section 4, the N/2 of Section 9, and the N/2 SW/4 of Section 10, all in T27N, R5E, Kay County, Oklahoma. The order remains a valid order of the Commission issued after enactment of the Modern Unitization Act.

8) Chaparral also requested that the Commission partially vacate Order No. 27937 except for the injection authority granted under the order for its active injection wells. When presenting a request to partially vacate Order No. 27937, Chaparral must provide substantial evidence that there has been a change in conditions with respect to the Burbank sand water flood sufficient to justify terminating the water flood upon which the order is based, but retaining the right to inject into its active injection wells covered by the order.

9) OCC-OAC 165:10-5-2 is titled Oil and Gas Conservation, Underground Injection Control, Approval of Enhanced Recovery Injection Wells or Disposal Wells. The rule states that: "The subsurface injection or disposal of any substance for any purpose is prohibited except upon approval of the Commission pursuant to 165:10-5-5 or 165:10-5-12 and 165:10-5-13. This authorization may be conditioned upon the applicant taking corrective action to protect treatable water as specified by the Commission.

10) OCC-OAC 165:10-5-3 is titled Oil and Gas Conservation, Underground Injection Control, Authorization for Existing Enhanced Recovery Injection Wells and Existing Disposal Wells. The rule states that: "Each enhanced recovery injection well authorized under order of the Commission on the effective date of

this Section is an existing enhanced recovery injection well. Injection is prohibited in any existing enhanced recovery injection well unless the operator has included that well on a completed Form 1070 submitted to the Commission within one year following the effective date of this Section. Form 1070 (Inventory of Authorized Existing Enhanced Recovery Injection Wells) shall include each well name, location, authorizing Commission order No. (including all orders authorizing exceptions), date of order, maximum authorized injection rate, and maximum authorized injection pressure."

11) OCC-OAC 165:10-5-5 is titled Oil and Gas Conservation, Underground Injection Control, Application for Approval of Enhanced Recovery Injection and Disposal Operations. It requires that: "[E]ach application for the approval of a newly drilled or newly converted injection well, disposal well, or commercial disposal well shall be filed with the UIC Department on Form 1015 and shall be verified by a duly authorized representative of the operator."

12) Chaparral's witnesses testified that their intent in filing the application was to terminate the order except as to its injection authority. Chaparral's witnesses further testified that Commission rules require an operator to either have a current order approved on a Form 1015 authorizing the injection or disposal of fluids, or had to have in place an order the allowing the disposal well or injection well.

13) OCC-OAC 165:10-15-1(f) is titled Oil and Gas Conservation, Oil Well Production and Allowables, Classification of Oil Pools and Projects. Enhanced Oil Recovery Projects. The rule states that: "The Commission may, upon application, notice, and hearing, authorize the pressure maintenance of a pool or the production of oil by the injection of fluid, fluids, gas, gases, or other material into a common source of supply or a portion thereof, whether unitized or not, where substantial quantities of additional oil may be recovered which could not be recovered under ordinary primary depletion methods. When so authorized, the project will be classified as an Enhanced Oil Recovery Project with one of the following classifications: (A) Pressure Maintenance Project; (B) Gas Repressuring Project; (C) Water flood Project; (D) Other Enhanced Recovery Projects."

14) Here Chaparral's application seeks to maintain the injection well component of the order while stripping the order of its purpose as a 'water flood project.' OCC-OAC 165:10-15-1(f) does not permit the Commission to authorize injection wells outside the scope of this rule. Pressure maintenance fluids must be injected for a specific purpose, which in the case of the order, was for a water flood. Since the injection exists in conjunction with the water flood, it would be improper for the Commission to modify its order by vacating the underlying purpose for which it was entered.

15) The ALJ finds that there is no compelling or substantial change of condition that would mandate vacating the order and a possibility that doing so would have an adverse impact upon some of the parties. He notes that vacating the order may cause waste in that it will be time consuming and expensive for Chaparral and other operators to reapply for authority to inject saltwater into the injection wells encompassed and grandfathered in by the order. Such injection wells would likely be required to conform to the current Commission rules related to wellbore construction and would most likely have to be modified.

16) After taking into consideration all of the facts, circumstances, evidence and testimony presented in Cause CD No. 201204362, it is the recommendation of the ALJ that Chaparral's application to Clarify and/or Vacate Order No. 29737 be clarified to state that the order is not a unitization order and did not establish a secondary recovery unit under 52 O.S. Section 287.1 and that the order remain in force and not be vacated. The order should not be vacated because it authorizes injection of fluid for a "water flood project." Fluid must only be injected for specific purposes under Commission rules. Chaparral seeks to retain the right to inject, but do away with the water flood purpose of the order. Chaparral did not provide substantial evidence to the Commission that its request to partially vacate Order No. 27937 was permitted under the rules, or that the result would not prevent waste.

17) **Cause CD No. 201203768 - Unitized Management, Operation and Further Development of the Burbank Kay County Enhanced Recovery unit, including Tertiary Recovery Operations.** Chaparral filed its application in CD 201203768 seeking to create the 3,000 acre Burbank Kay County unit for the purpose of unitized management, operation and further development of the oil and gas within the Burbank common source of supply located in the W/2 of Section 3, all of Section 4, all of Section 9, the W/2 of Section 10, the W/2 of Section 15, all of Section 16, the N/2 NE/4 of Section 21, and the W/2 of Section 22, all in T27N, R5E, Kay County, Oklahoma.

18) Chaparral filed a plan of unitization with its application naming Chaparral as the unit operator and stating that the unit would be developed by CO₂ flooding whereby both the injection and producing wells would be situated to optimize the flood pattern. Chaparral alleged that its plan would protect the respective rights and obligations of the owners entitled to share in production and that the unitized management, operation and further development of the area affected by the plan is necessary for water flooding operations, CO₂ injection and other forms of joint effort calculated to substantially increase the ultimate recovery of oil and gas than would otherwise be recovered.

19) When presented with any application or plan that has the potential to pollute the groundwater, the Commission has a responsibility to protect human health and the environment. For this purpose the Commission has jurisdiction under 17 O.S. Section 52 (A)(i) over the handling and disposition of produced water and other deleterious substances associated with oil and gas extraction and transportation activities. The Commission is also obligated to prevent pollution and protect human health and the environment under various statutes and rules including 52 O.S. Section 139 and OCC-OAC 165:10-7-2. The Commission has promulgated rules for the location, installation and operation of injection wells that are intended to protect human health and the environment.

See 17 O.S. Section 52(A)(i) which states that the Commission shall have jurisdiction over: "the handling, transportation, storage and disposition of saltwater, mineral brines, waste oil and other deleterious substances produced from or obtained or used in connection with the drilling, development, producing and operating of oil and gas wells."

See 52 O.S. Section 139 which states that: "The Corporation Commission is vested with exclusive jurisdiction, power and authority, and it shall be its duty, to make and enforce such rules and orders governing and regulating the handling, storage and disposition of saltwater, mineral brines, waste oil and other deleterious substances produced from or obtained or used in connection with the drilling, development, producing, and operating of oil and gas wells and brine wells within this state as are reasonable and necessary for the purpose of preventing the pollution of the surface and subsurface waters in the state, and to otherwise carry out the purpose of this act."

See OCC-OAC 165: 10-7-2(c)(8)(9) and (10) which states that the Commission has jurisdiction over: "(8) The handling, transportation, storage and disposition of saltwater, drilling fluids, mineral brines, waste oil and other deleterious substances produced from or obtained or used in connection with the drilling, development, production, and operation of oil and gas wells at any facility or activity specifically subject to Commission jurisdiction or other oil and gas extraction facilities and activities. (9) Spills of deleterious substances associated with facilities and activities specified in O.A.C. 165:10-7-4(c)(8) or otherwise associated with oil and gas extraction and transportation activities. (10) Groundwater protection for activities subject to the jurisdictional areas of environmental responsibility of the Commission." The applicants are also obligated to prevent pollution.

See OCC-OAC 165:10-7-5(a) which states that: "Prohibition of pollution - pollution is prohibited. All operators, contractors, drillers, service companies,

pit operators, transporters, pipeline companies, or other persons shall at all times conduct their operations in a manner that will not cause pollution."

20) Here Chaparral's witnesses told the Commission that the company's CO₂ EOR plan is feasible and controllable and will not pollute the groundwater. Chaparral's engineers assured the Commission that controls, including a water curtain, were in place in Osage County to pressurize the Burbank through Phase I of the pilot study without negatively affecting the leaseholds across the Kay County line. Before this present hearing was over, however, Chaparral's assurances came to naught when an uncontrolled pressure wave from the Phase I pilot program in Osage County caused two wells on the Davis lease in Kay County to purge salt water.

21) An employee of Davis testified that they began to have pressure increases in the fall of 2013 that worsened until in March, 2014 when two wells on the lease began to purge fluids and where the fluids purged up the backside of the casing, not just through the cemented sections of the wellbore. The employee testified that whether the well was properly plugged or not, the well would have purged because the purging was coming outside of the casing. Chaparral's increase in pressure from its CO₂ operations caused the Davis wells to purge and the purging ceased after Chaparral quit in injecting water into nearby injection wells.

22) The manager of pollution abatement for the Commission testified that Chaparral agreed to attempt to plug the purging wells on the Davis lease and to shut in injection wells in order to reduce pressure on the Davis leases. He also testified that Kaw Reservoir is a public drinking supply several miles away from the purging wells in the proposed Kay County Burbank Unit and that he would be very concerned if there were Burbank wells in or under the reservoir that are improperly plugged or not plugged. He also testified that he is very concerned about unplugged or improperly plugged wells on Beaver Creek, a direct tributary to Kaw Reservoir, that are within the boundary of Chaparral's proposed CO₂ flood in Kay County and therefore would be subject to the higher pressures proposed by Chaparral to achieve a miscible CO₂ flood.

23) Hallco's experts provided testimony and evidence to indicate that the proposed CO₂ flood would pose a risk to human health and the environment due to the presence of improperly or unplugged wells, and the Burbank formations intersection with the fresh water Kaw Reservoir, which provide drinking water to Ponca City. Exhibit 131 showed the Kaw Reservoir near the proposed CO₂ flood unit. Hallco's experts testified there are a number of improperly or unplugged Burbank wells under the Kaw Reservoir and these wells are connected to the Burbank formation and Chaparral's proposed CO₂ flood. Chaparral has no proposed plan or method to plug these wells under

Kaw Reservoir in the event of purging such as actually occurred on the Davis lease. Hallco's experts testified that there are 10 to 11 Beaver Creek wells within the proposed unit which are in close proximity to Beaver Creek, a direct tributary to the Kaw Reservoir, a public drinking water supply. These wells are either unplugged or have been improperly plugged, and will be subject to the same pressures that Chaparral is instituting to achieve higher pressures in Osage County. There is substantial danger that CO₂ or hydrocarbons will purge from these wells, like they did on the Davis lease. "In striking a balance between conservation of natural resources and protection of correlative rights, the latter is secondary and must yield to a reasonable exercise of the former." *Denver Producing & Ref Co. v. State*, 184 P.2d 961, 964 (Okl. 1947).

24) Chaparral contended that all problems resulting from this CO₂ project can be addressed by a single operator. The Chaparral position fails to recognize that the problem is not who the project operator but project and plan proposed by Chaparral. The evidence shows that the Burbank has too many leak points when you inject at a pressure of 400 pounds above original reservoir pressure. Chaparral's position that it is the one operator to resolve these problems is unsupported by the prior orders of this Commission authorizing Gulf, Phillips and others to operate water floods. The Commission has already determined that a number of operators can operate within this same common source of supply.

25) Davis operated wells that were affected by Chaparral's CO₂ operations, and Chaparral's experts admitted that it was imprudent not to notify Davis of the potential harm to their wellbores by the CO₂ injection. Specifically, Chaparral's CO₂, which is being injected at greater or equal 400 psi above the original pressure of the reservoir, caused a CO₂ purging event in two of Davis' wellbores. Chaparral has admitted that they have not investigated whether all potentially affected wells have been properly plugged or have failed cement such that they can avoid an additional purging event. Chaparral's witnesses further stated that investigating these wells is not planned by the company. Hallco's experts testified that Chaparral has not instituted the water curtain and production wells necessary to keep the pressurization of the North Burbank Unit contained and away from potentially affected wells or the Kaw Reservoir. Chaparral testified that they are unaware how many wells might be affected. The ALJ noted that the purging that occurred on the Davis lease was purging outside of the casing so that whether a well is properly plugged or not, there is a substantial danger of purging in any event.

26) The ALJ finds that Chaparral's application and unitization plan poses a significant risk to human health and the environment. The plan in concept and in its initial implementation caused pollution and the pollution would

certainly increase when the Kay County Burbank Unit attains a higher pressure of around 1,680 psi under the current plan.

27) The Commission is also obliged to determine if Chaparral's application and plan will prevent waste, protect the correlative rights of all of the interest owners, and is supported by substantial evidence. A standard for the Commission's review of such a proposed plan is shown in 52 O.S. Section 287.1, which states: The Legislature finds and determines that it is desirable and necessary, under the circumstances and for the purposes hereinafter set out, to authorize and provide for unitized management, operation and further development of the oil and gas properties to which this act is applicable, to the end that a greater ultimate recovery of oil and gas may be had therefrom, waste prevented, and the correlative rights of the owners in a fuller and more beneficial enjoyment of the oil and gas rights, protected."

28) Here, Chaparral contended that additional hydrocarbons can be recovered and waste prevented by creating the Burbank Kay County Enhanced Recovery unit to establish a CO₂ flood tertiary recovery operation in an area part of which was previously water flooded beginning in 1953. Chaparral's engineer and geologist testified that, to a lesser or greater degree, they relied upon the Yeats Report to prepare their exhibits and formulate their theories and opinions. The Yeats Report is not really a report at all but a collection of documents attributed to a man named Yeats or Yates who died long ago and who no-one living today has met and who might have been an engineer or a scholar or an employee of Phillips, and who couldn't have been the maker of the maps in the report because he allegedly had no hands.

29) The ALJ notes that the what was referred to by Chaparral's engineer as the Yeats Study is actually only the appendix supposedly attached to the Yeats Study. The original or complete Yeats Study or Report that presumably contained the text of the report and the appendix of the report was never found or reviewed by Chaparral or Hallco. Chaparral's technical witnesses thus only reviewed the appendix.

30) Both Mr. Grimes and Mr. Cottingham objected to the acceptance of the Yeats Report as substantial or significant evidence. Mr. Cottingham said that the report was found on the floor of Calumet's field office in Shidler, Oklahoma and, as a result, had not been delivered to Chaparral; the report was only half complete; because the report was not delivered and because it was incomplete, and it can be inferred that this is not something upon which Chaparral relied. He argued that the evidence is not reliable because there is no way to check its reliability; that the evidence is not verifiable because no one questioned Yeats or knows who Yeats was or knows his relationship to the company; and that the evidence is not scientific knowledge because there is no proven scientific

method shown for how the numbers in the report or the map were derived to prove are valid. They also argued that the Yeats Study failed to demonstrate scientific validity and merit under the Daubert standard for evaluating the admissibility of scientific and technical evidence. See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

31) In the *Daubert* case, the U.S. Supreme Court held that the trial judge must be a "gatekeeper" to the admission of expert and scientific testimony. Prior to the admission of any expert testimony, its reliability from a scientific perspective must be inquired into by the judge. The crux of this inquiry has become known as the Daubert standard. Any hearing into the admissibility of such testimony must consider several elements or tests: whether the theory or technique can be or has been tested; whether it has been subject to peer review and publication; whether, in respect to a particular technique, there is a high known or potential rate of error and whether there are standards controlling the technique's operation; and whether the theory or technique enjoys "general acceptance" within a "relevant scientific community."

32) Here the entire original Yeats Study can't be tested because it can't be found and no one can affirm whether documents in the appendix were tested because the text that would answer that question also can't be found. The original Yeats Report and the appendix haven't been published in a peer-reviewed journal and most likely the appendix documents would not be accepted for publication by a peer reviewed publication without the background text. There is no way to assess the error rates or do a statistical analysis on the information in the appendices without knowing how the documents were generated and without the original data used to create the maps and tables. Although an assessment of the acceptance of the information in the appendix is related to the selection of a particular scientific community, it is highly unlikely that any group of objective scientists or engineers would accept documents from an unknown source.

33) For all of the above, the ALJ finds that the Yeats Report fails the Daubert standard on all accounts and thus he assigns no probative weight to the documents in the Yeats Report. He also finds that wherever the Yeats Report is used as a foundation for other reports, charts, calculations and opinions, their credibility is diminished. Here it appears to the ALJ that the information in the Yeats Report was used in part by Chaparral's geologist to form his maps and to assess his oil/water contact lines on his maps, so this work product is diminished in probative value. The ALJ also notes that Chaparral's engineer testified that he considered the data tables from the Yeats Report to be significant evidence for the unitization case and for the water flood order case.

34) Chaparral's expert testified that their plan of unitization for the Burbank Unit was prepared under the assumption that there are 102 MM barrels of OOIP in the Burbank under the formation sought, and that they can obtain a recovery factor of 9.3%, for an ultimate recovery of roughly 9.5 MMBO. Chaparral's testimony further represented that the industry standard for calculating CO₂ recovery is to apply a recovery factor to the OOIP, regardless of the efficiency of primary and secondary recovery.

35) Chaparral's experts admitted that the volumetric calculations they used relied upon the accuracy of the underlying geological information of the Burbank formation based in part upon the Yeats Report. Hallco's expert said that Chaparral's geology was not reliable because: (1) the underlying maps contained documented or documentable errors of commission; (2) the underlying maps contained documentable errors of omission; (3) the underlying maps contained a misapplication of a technique resulting in overstated amounts of potential reservoir; and (4) Chaparral's geologist didn't objectively and correctly interpret the geologic data when he prepared his maps.

36) Chaparral's geologist testified that the net acre feet of Burbank sand in Kay County is 96,955 feet. Hallco's experts looked at the same data and found around 81,637 net acre feet of Burbank sand in Kay County. The thickness attributed to the Burbank reservoir by Chaparral was not supported by the data because the well logs demonstrated that the actual thickness of the Burbank sand is approximately half of the thickness that Chaparral placed on its maps.

37) Chaparral's geologist also used a method of calculating the thickness of the Burbank known as a summing calculation. Hallco's experts demonstrated that this is an inappropriate method of calculation for the formation because the sands within the Burbank formation down cut into each other. This down cutting prevents the formations from being additive, so the result should be calculated without summing the overlapping sands. The Plunkett paper that was admitted into evidence demonstrated that there is no support for the summing technique. With respect to increasing the thickness, Hallco's experts said that this method is not reliable because the total sand volumes end up being higher than any actual sand volumes present in the available logs. Chaparral's method of calculating thickness appeared to overstate the thickness of the Burbank by 40 to 50%, which would directly affect the accuracy of any of the volumetric calculations based upon these geological results.

38) Hallco's experts examined Chaparral's Structure Map shown in Exhibit 36 and noted that there are no values on the map, which is unusual for

any project, let alone one with fixed costs in the hundreds of millions of dollars. The data that Exhibit 36 is derived from is not annotated next to the individual wells on the map. Hallco's experts showed that the thickness of the Burbank sand can be found from industry sources and Commission records, but Chaparral's geologist didn't appear to use this data in his interpretations of the net sand and the structure.

39) Chaparral plotted the oil/water contact line on Exhibit 36, but Hallco's experts contended that contact line of the map incorrectly represented the possible thickness of the Burbank formation. Chaparral showed contour lines as high as minus 1,850 feet, but the most thick part of the Burbank formation in Kay County above the oil/water contact is 50 feet. Chaparral's numbers do not correspond to this direct geologic relationship. Chaparral's volumetric calculations, to the extent they are based on Chaparral's maps, are incorrect, and cannot be relied upon to support a CO₂ flood of the Burbank formation.

40) Based on the testimony of Hallco's experts, it is likely that the reservoir is actually 50% of the size indicated by Chaparral. On Exhibit 35, in the NE/4 SW/4 of Section 3, Chaparral indicated that the Jesse Kelly well shows Burbank sand of approximately 118 feet. Hallco's experts found 66 feet of thickness from the log data. Chaparral's map appears to show approximately 60 feet too much sand because the thickest Burbank sand that can be found in Osage County by Hallco's experts was around 87 feet. In the NE/4 NW/4 of Section 10, Chaparral's experts found that gross Burbank sand was up to 115 feet and net sand was up to 100 feet. However, Chaparral's expert admitted that he found no direct evidence to credit this area with over 53 feet of sand. Upon inquiry, Chaparral's expert stated that he had a need to find as much sand as possible and adopt a liberal interpretation for that purpose. The evidence provided by Hallco demonstrated that Chaparral's geologic interpretations that were used in its volumetric calculation were approximately 50% too high.

41) Using the average porosity value of 22%, Chaparral's experts said that there were 102 MM barrels of OOIP in Kay County. Hallco's experts, after reviewing Chaparral's underlying data and the exhibits, concluded that there was 64.4 MM barrels of OOIP and an average porosity of 16.95% in the Kay County Burbank formation. Hallco's experts contended that Exhibit 140, a summary of core data from numerous wells with a summary of both permeability and porosity, supported Hallco's projected porosity value. The experts noted that a paper from a Phillips geologist named Melville sands shown in Exhibit 31-10 demonstrated that the greatest range of production will be in areas of the largest average percentage of pore space. They also noted that the Oklahoma Geologic Survey also evaluated porosity on the Clubb, Pappan and Barnum Leases and calculated a porosity of 17%. Based upon

81,000 acre feet and a porosity of 16.9%, the OOIP value drops to 64.4 MM barrels and the CO₂ EOR project becomes uneconomical.

42) Chaparral procured the services of Ryder Scott to prepare a report on the potential production from Chaparral's CO₂ flood. Chaparral provided Ryder Scott all the data it used, without independent verification. Ryder Scott's modeling depended upon Chaparral reaching higher pressure in the Burbank formation. Ryder Scott's incremental CO₂ reserves assumed that each producing well would produce around 5 BOPD per well before CO₂ reserves would commence, which is a number provided by Chaparral.

43) Ryder Scott was not provided with information regarding the fracture system in the Burbank, or the horizontal or vertical permeability in the Burbank. Ryder Scott was never informed of the fractured shale on top of the Burbank. Hallco's experts contended that Ryder Scott's stimulation for vertical permeability was off by 1,000% and that the incorrect permeability data would greatly affect the results found in the Ryder Scott report. Ryder Scott's representative could not confirm the accuracy of the two-minute production tests run by Chaparral, which Ryder Scott relied upon in making their report.

44) In regard to Ryder Scott's assignment of reserves to the Phase 1 area, Ryder Scott based its assignment on three well tests out of a total of 1,600 well tests. These well tests were taken by a two-minute test that Chaparral admitted is subject to substantial inaccuracy because of oil slugging. The evidence showed that an increase in CO₂ reserves results in a corresponding and equal decrease in overall reserves assigned to the Burbank in Osage County as reported in Chaparral's 10K filing with the SEC. Ryder Scott never provided an economic justification to demonstrate that the incremental CO₂ reserves would be profitable.

45) Ryder Scott's evaluation as to economics of the proposed unit did not take into account the past money spent on the project by Chaparral, only the money that would be spent in the future. This is despite the fact that Chaparral planned to charge as fixed costs to members of the unit previously incurred expenses related to the CO₂ pipeline to be used in the proposed unit. Ryder Scott's expert said that it is too early to tell whether the CO₂ flood project will be successful.

46) Exhibit 97 shows Chaparral's proposed fixed costs in the unit. The total cost of the CO₂ project is \$487,909,000. Hallco's share would be \$57,496,920. During the first three years of the project, Hallco's fixed costs would be \$4,078,000, when it is not even receiving any revenue because all producers will be shut in according to Chaparral's own plan. Because of these fixed costs and Chaparral's non-consent penalties which preclude a party from joining the

CO₂ flood after it has begun, the economics of Chaparral's proposal would be tantamount to a confiscation of Hallco's mineral interests if Mr. Hall chose not to be an active participant in the unit.

47) The two relevant takings amendments to the United States Constitution state as follows: "No person shall...be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation." U.S. Const. amend. V. "No State shall...deprive any person of life, liberty, or property, without due process of law...." U.S. Const. amend. XIV, Section 1.

The respective provisions of the Oklahoma Constitution nearly mirror their federal counterparts, but the Oklahoma Constitution goes even further to protect the private property rights of its citizens. These provisions state: "No person shall be deprived of life, liberty, or property, without due process of law." Okla. Const. art. II, Section 7. "No private property shall be taken or damaged for private use, with or without compensation, unless by consent of the owner, except for private ways of necessity, or for drains and ditches across lands of others for agricultural, mining, or sanitary purposes, in such manner as may be prescribed by law." Okla. Const. art. II, Section 23. "Private property shall not be taken or damaged for public use without just compensation. Just compensation shall mean the value of the property taken, and in addition, any injury to any part of the property not taken. Okla. Const. art. II, Section 24. The Commission cannot enter an order approving a field-wide unitization knowing that the end result will be a person's loss of vested mineral interests without receiving a reciprocal benefit, because an unconstitutional taking will be the result.

48) The Oklahoma Supreme Court has recognized that government action, even when it is a lawful exercise of police power, may not comply the constitutional protections against takings without just compensation. See *Mattoon v. City of Norman*, 617 P.2d 1347, 1349, ¶7, (Okl. 1980) ("We have never held that a finding that the exercise of police power is valid absolutely precludes compensation for property taken or damaged by such exercise."); *City of Sand Springs v. Colliver*, 434 P.2d 186, 191, ¶23, (Okl. 1967) ("[T]he claim that particular action is taken under the police power cannot justify disregard of constitutional inhibitions.") overruled on other grounds in *O'Rourke v. City of Tulsa*, 457 P.2d 782 (Okl. 1969) Thus, "[t]he test is not the propriety of the exercise, but is a question of impairment...." *Mattoon v. City of Norman*, supra, at 1349, ¶10. The Court held that government "goes too far" when it "substantially interferes with use or enjoyment of the property." *In re Initiative Petition No. 382*, 142 P.3d at 406, (Okl. 2006) (citing *Stewart v. Rood*, 796 P.2d 321, (Okl. 1990) overruled on other grounds in *Dulaney v. Okla. State Dept. of Health*, 868 P.2d 676 (Okl. 1993); *Mattoon v. City of Norman*, supra;

Suntide Inn Operating Corp. v. Okla. State Highway Comm'n, 571 P.2d 1207, (Okla. 1977); *Henthorn v. Oklahoma City*, 453 P.2d 1013, (Okla. 1969).

49) In the forced pooling context, the Oklahoma Court of Civil Appeals rejected arguments asserted by a force-pooled, non-participating mineral interest owner that pooling should occur on a wellbore-by-wellbore basis within a drilling and spacing unit, rather than on a unit-wide basis, so that a mineral interest owner could have multiple participation elections. See *Amoco Production Company v. Corporation Commission*, 751 P.2d 203, 205 (Ok.Civ.App. 1986). The Court of Civil Appeals observed that "[a]n election not to participate transfers" to the operator "by operation of law the right to drill the spacing unit." *Id.* at 206. "[O]nce the spacing unit is pooled and the time for elections has past [sic]," that right "becomes vested beyond the Corporation Commission's reach to modify." *Id.* An order of the Commission permitting new participation elections for each subsequent wellbore would "strip a prudent operator of the property rights he has purchased," *Id.*, and "deprive the original risk capital investors of rights earned by taking the risk of the initial well," *Id.* at 207.

50) Although forced pooling necessarily results in an adjustment of property rights between the operator and non-participating mineral interest owners, this adjustment is not an unconstitutional taking because it is "in furtherance of conservation of natural resources," in "recognition of correlative rights," and is ultimately "for the benefit of both and for the protection of the public generally." See *Anderson v. Corp. Comm'n*, 327 P.2d 699, 703, (Okla. 1957). In other words, whether or not a mineral interest owner elects to participate, Section 87.1 ensures a fair share of production commensurate with investment and risk; i.e., an average reciprocity of advantage. In the *Amoco* case, the Court ultimately found that pooling by the wellbore would disrupt this balance by disappointing the distinct, investment-backed expectations an operator normally secures after the election period has passed and the pooling order is in place, thereby resulting in an unconstitutional and "arbitrary forfeiture" of vested property rights. See *Amoco Production Company v. Corporation Commission*, *supra* at 203, 205; see also *Franco-American Charolaise, Ltd. v. Okla. Water. Res. Bd.*, 855 P.2d 568, 582, (Okla. 1990) (finding a violation of Article II, Section 24 of the Oklahoma Constitution to the extent statute failed to preserve vested riparian rights).

51) The concept of required reciprocity for a taking is no less active in cases specifically concerning fieldwide unitization under 52 O.S. Section 287.1. In *Jones Oil Company v. Corporation Commission*, 382 P.2d 751, 755 (Okla. 1963) the Oklahoma Supreme Court upheld the Commission's approval of a unitization application after the record was found to contain clear evidence "that by water flooding under this Unitization Plan the Protestants will recover

far more oil than they would from primary recovery." See *N Am. Royalties, Inc. v. Corp. Comm'n*, 683 P.2d 539, 541-42, ¶10, (Ok.Civ.App. 1984) (Finding no taking where evidence in the record supported Commission's conclusion that "compensation to be paid to those working interest owners who did not wish to participate in the drilling of the unit well" was measured by "fair market value of [their] interest[s].")

52) The U.S. Supreme Court held that a regulatory taking cannot deprive a party of all economic benefit of owning its property. The Supreme Court analyzed regulatory takings in *Lucas v. South Carolina Coastal Council*, 505 U.S. 1003 (1992) and acknowledged that a regulatory taking occurs when regulatory action denies a claimant "all economically beneficial or productive use" of its property. See 505 U.S. 1003, 1015 (1992). In such a case, an unconstitutional taking has occurred per Se, and "there is no need to examine the policy behind the regulation, unless the regulation merely prevents use of the property in a manner that creates a nuisance under state law." See *R.T.G., Inc. v. State of Ohio*, 780 N.E.2d 998, 1000 (Ohio 2002).

53) All of Hallco's leasehold interests in the S/2 of Section 9 are entirely encompassed by Chaparral's proposed CO₂ flood unitization area. From Hallco's perspective, the property interest subject to regulation would be Hallco's leasehold interests in the Burbank sand. Chaparral has admitted that any party who does not join in the CO₂ flood at the outset will be absolutely precluded from joining later by the proposed economics of the project. Based on both federal and Oklahoma takings law, such an arrangement would be an unconstitutional taking without just compensation of Hallco's mineral interests in the S/2 of Section 9.

54) As admitted by Chaparral's witnesses, a 300% non-consent penalty precludes non-consenting parties from ever coming back into the project based on Chaparral's proposed economics. This is tantamount to a confiscation of Hallco's mineral interests in the S/2 of Section 9. It is prohibited for a unit operator to include as fixed costs in an amount over and above the price of CO₂ in order to increase the profits of an affiliate company. It is not allowed for a unit operator to charge a profit on affiliate services. It is inappropriate for a 300% non-consent penalty to be imposed on an enhanced recovery unit that has no chance of becoming profitable until numerous years in the future, if at all.

55) Chaparral has also admitted that its CO₂ supplies are limited, and that it cannot flood the entire Burbank Field at one time. As such, Chaparral intends to flood the Burbank beneath Osage and Kay Counties in a 90/10% proportion, respectively. This is going to cause the Kay County CO₂ flood project to take even longer than the initially projected 40 years for the entire project. The

evidence shows that to the extent tertiary reserves exist under the S/2 of Section 9, they will remain there. Further, Chaparral projects 16 phases, as demonstrated in Exhibit 75, in its CO₂ flood in Osage County that will take 40 years to produce.

56) In the North Burbank Unit, Chaparral's CO₂ monthly costs will be approximately \$3,146,000 for the Osage County CO₂ flood. In order to pay the costs of the CO₂ itself, not taking into account anything else, the unit will have to produce an additional or incremental 32,684 BO/month. Chaparral has already started its CO₂ flood in the Osage, but it is not know if it can be profitable at this time. Exhibit 154 demonstrated that the tank batteries accepting this new production did not show an increase from prior to the institution of CO₂ injection. In fact, many of these wells are not reaching or maintaining minimum miscible pressure.

57) Referring to Exhibit 144. a study of a Salt Creek EOR project sponsored by the State of Wyoming, the CO₂ flood in this project only recovered 1.3% of OOIP, and is declining. Despite this evidence, Hallco's experts applied an optimistic 5.5% production value for the Burbank Field and multiplied by the 64.4 MM OOIP and determined that the ultimate recovery from the Burbank formation will not recoup the fixed costs of the project.

58) The protestants in this Cause are working interest owners and a mineral owner, and their experts disagree with Chaparral that the application and proposed CO₂ flood unitization would prevent waste and recover hydrocarbons that would not be recovered if the CO₂ flood was not performed. The protestants also dispute that they would receive production or revenue from the CO₂ flood of the Burbank that they would not receive if Chaparral's CO₂ flood isn't implemented. The protestants further argue that Chaparral's tract allocation formula, tract allocation schedule and TPF's are not fair and fail to protect their correlative rights, that they do not address the amount of oil each tract is bringing to the CO₂ flood, and that even Chaparral, admits that its Tract 37 has no production in the Burbank according to its own maps. In Cause CD No. 201206622, in the Report of the ALJ, the ALJ recommended denial of a water flood application based on the insufficiency of the tract participation formula.

59) 52 O.S. Section 287.4(b) provides guidance to the Commission upon how to allocate production from a water flood unit to all of the mineral owners. According to the statute: "The division of interest or formula for the apportionment and allocation of the unit production, among and to the several separately owned tracts within the unit area such as will reasonably permit persons otherwise entitled to share in or benefit by the production from such separately owned tracts to produce or receive, in lieu thereof, their fair,

equitable and reasonable share of the unit production or other benefits thereof."

As set forth above, any tract allocation formula, tract allocation schedule or TPF must, first and foremost, be fair, equitable and reasonable, and permit the mineral owners to receive their fair and equitable share of production.

60) Thus, such a tract allocation formula, tract allocation schedule or TPF must be based or predicated upon parameters that in themselves can be measured and of such a nature as to permit a knowledgeable person in the oil and gas industry to be able to determine if they are reasonable. These parameters forming the basis for the allocation must also be related to the quantum of the mineral owner's interest in the minerals that comprise his interest and the tract in which his interest resides so that a mineral owner, and the Commission, have a reasonable basis to determine if an owner's share in the production from a unit is equitable. The statute addresses these issues as follows: "A separately owned tract's fair, equitable and reasonable share of the unit production shall be measured by the value of each such tract for oil and gas purposes and its contributing value to the unit in relation to like values of other tracts in the unit, taking into account acreage, the quantity of oil and gas recoverable therefrom, location on structure, its probable productivity of oil and gas in the absence of unit operations, the burden of operation to which the tract will or is likely to be subjected, or so many of said factors, or such other pertinent engineering, geological, or operating factors, as may be reasonably susceptible of determination. unit production as that term is used in this act shall mean and include all oil and gas produced from a unit area from and after the effective date of the order of the Commission creating the unit regardless of the well or Tract within the unit area from which the same is produced." 52 O.S. Section 287.4(b).

What is important is that the formula allocates to each tract its fair, equitable and reasonable share of unit production. See *Jones Oil Company v. Corporation Commission*, 382 P.2d 751 (Okl. 1963). A separately-owned tract's share of the unit production must be measured by the value it contributes to the total value of the unit for oil and gas purposes. Each tract must be measured by the same set of values as must the unit as a whole. In the construction of statutes, the word "shall" is usually given its common meaning of "must" and interpreted as implying a command or mandate depending upon the construction of the statute as a whole and the intention of the Legislature. See *Eason Oil Company v. Corporation Commission*, 535 P.2d 283 (Okl. 1975) (citing *Oklahoma Alcoholic Beverage Control Board v. Moss*, 509 P.2d 666 (Okl. 1973)).

61) In light of the statute and corresponding case law, a tract owner's allocated share in production must be based upon measurable and determinable factors that can be used to assess the value of a tract. Such factors include acreage, the quantity of oil and gas recoverable from the tract, location on structure, and probable productivity of oil and gas, or other pertinent engineering, geological, or operating data. The most theoretically accurate formula is one that gives the greatest weight to recoverable remaining saturated hydrocarbon pore volume utilizing more concrete factors in the formula. See Bryan J. Standley and Scott B. Cline, *Participation Formula in Water flood Units: What are the Statutory and Judicial Guidelines?*, 66 Okla.B.J. 3373, October 28, 1995.

62) Chaparral's proposed tract formula suggests that there are a number of tracts in the proposed unit which are not underlain by productive Burbank formation. The tract formula doesn't reward existing oil in place underlying the proposed surface area, but purports to reward prior production from these tracts. Hallco's experts identified at least 11 ten-acre tracts that have been condemned by drilling or clearly outside Chaparral's gross sand map.

63) Chaparral has not provided significant evidence and testimony that their proposed unitization plan can adequately contain and control the subsurface pressure generated in the CO₂ flood and the release of CO₂ to the environment. Natural fractures are present in the Burbank, and it is clear from both Hallco's experts and the Hagen Study admitted as Exhibit 31-1 that the joint pattern of the fracture system of the Burbank is noticeable on the surface and that there is a fractured shale on top of the formation. Chaparral reviewed 7,000 feet of core sample, but did not provide the Commission with an analysis of these cores regarding the presence of fractures. This is despite the overwhelming number of techniques available to operators to confirm whether fracturing will have an effect on a proposed enhanced recovery operation. Hallco's expert testified that it is important to perform a fracture analysis due to the fact that a CO₂ flood will affect both production of hydrocarbons, and because of the potential inference with other wells, formations, and fresh water sources in the area.

64) Chaparral offered formulas to the Commission relating to the fracture gradient of the rock without preexisting fractures, but did not take into account the evidence that the Burbank and the shale on top of the Burbank both contain preexisting fractures which will be expanded by lower pressures injection of fluid. Chaparral's rock matrix formulas are therefore irrelevant to the actual geology of the formation. Because of the preexisting fractures and the high vertical permeability of this formation, Hallco's experts testified that the CO₂ injected by Chaparral will traverse the formation, and potentially even reach the surface through other wellbores. Despite Chaparral's denial of this

possibility and Chaparral's statement that they can control CO₂ injection project, this reality was demonstrated to the Commission by video evidence of Chaparral's Phase 1 CO₂ project unintentionally purging CO₂ and saltwater and toxic H₂S and oil from abandoned wellbores on the Davis lease.

65) With respect to CO₂ costs and utilization, Chaparral's experts testified that there was an escalation in the price of CO₂ in the contract between Chaparral and its affiliate CO₂ company. The initial price of CO₂ is listed at \$.10 per MCF, but the price will raise to \$1.90 due to Chaparral's affiliate charging costs related to its pipeline, costs to comply with DOT regulations, costs to pay back capital investments, and a reasonable rate of return on its investment, which Chaparral has testified is 15 to 16% profit. The proposed plan of unitization allows Chaparral to charge pre-unitization expenses and the right to advance bill nonoperators, and gives 30 days' notice for a non-operator prior to being deemed non-consent, with a 300% penalty.

66) The Oklahoma Supreme Court, in *Young v. West Edmond Hunton Lime Unit*, 275 P.2d 304 (Okla. 1954) determined that the operator of a unit established pursuant to 52 O.S. Section 287.1 et. seq. is in the nature of a trustee or fiduciary, and therefore is required to a high degree of fidelity with respect to the benefit of the various persons involved in the production from the area. Chaparral's plan to charge a profit on pipeline costs, CO₂ costs, and charges for use of an affiliate to the members of its proposed unit does not appear to be consistent with its duties as a fiduciary. The Commission is prohibited by law from establishing a proposed CO₂ flood unit based on a plan of unitization where only the operator has a reasonable chance of profiting.

67) "Pursuant to the provisions of 52 O.S. Section 287.3(d), one of the conditions precedent to the Commission's issuance of an order of unitization is a finding that such unitization...is for the common good and will result in the general advantage of the owners of the oil and gas rights within the common source of supply or portion thereof directly affected thereby. An expert's opinion must be more than ipse dixit." *Christian v. Gray*, 65 P.3d 591, 606 (Okla. 2003). "[An] opinion is of no greater value than the reasons given in support. If no rational basis for the opinion appears, or if the facts from which the opinion is derived do not justify it, the opinion is of no probative force, and it does not constitute evidence sufficient to...sustain a finding[.]" See *Downs v. Longfellow Corp.*, 351 P.2d 999, 1004, (Okla. 1960. See also *Haymaker v. Oklahoma Corp. Comm.*, 731 P.2d 1008, 1013, (Ok.Civ.App. 1986). Chaparral's witnesses failed to provide substantial evidence supporting their opinions as to the propriety of instituting a CO₂ flood in the Burbank sand. Hallco's witnesses provided substantial evidence to the Commission that Chaparral's experts and evidence cannot be relied upon to demonstrate that the proposed Burbank

Enhanced Recovery unit would prevent waste, protect correlative rights, and increase the recovery of oil and gas from the Burbank formation.

68) Although the ALJ finds that there is a tremendous potential for recovery of oil by an EOR project in the proposed Kay County Burbank Unit, the evidence presented doesn't support Chaparral's current proposal. Chaparral's proposal is premature and Chaparral has not provided evidence to the Commission that it is in possession of enough CO₂ to perform the entirety of its project in Kay County.

69) Hallco's expert said that Chaparral's ongoing pilot project in Osage County could be used as a basis of a project in Kay County if the CO₂ flood was conducted for long enough time period to produce quantifiable results for extrapolating on a long term basis. He opined that this time period would be one to two years from the time of seeing the initial response. This is because it takes this long to gather data on speed of the reservoir response, the magnitude of the response, and how long the response hangs in there for a period of time. In the interest of the prevention of waste, the ALJ recommends that Chaparral reapply to conduct an CO₂ EOR project after it has obtained sufficient evidence from the operation of its CO₂ EOR in Osage County to present a plan of unitization that could be approved by the Commission.

70) After taking into consideration all of the facts, circumstances, evidence and testimony presented in Cause CD No. 201202482 it is the recommendation of the ALJ that Chaparral's application for Unitization be denied. The application should be denied because Chaparral did not provide substantial evidence to the Commission that the CO₂ flood would prevent waste, protect correlative rights of adjacent owners, or fairly allocate hydrocarbons produced in the Burbank common source of supply.

71) **Cause CD No. 201202483 - Unitization Enhanced Recovery unit - Described as the Conklin Unit.** Hallco filed its application in CD 201202483 to unitize the geological interval known as the Conklin Unit located in the NE/4 SW/4 of Section 9, T27N, R5E, Kay County, Oklahoma for the purpose of conducting unitized management, operation and further development. Hallco also filed a plan of unitization that named Hallco as the unit operator and proposed that the 320 acre unit be developed by water flood.

72) Mr. Hall, the owner and sole stockholder of Hallco, decided to water flood the Conklin Unit to protect his interest in the S/2 of Section 9. Hall believed that the Burbank sand in the S/2 of Section 9 contains a substantially greater concentration of oil than the same formation in the N/2 of Section 9 and all of the other adjacent sections. Hallco has owned the leasehold interest in the S/2 of Section 9 since 1983 and never proposed a secondary water flood project

prior to its meeting with Chaparral in December 2011 to review Chaparral's proposed Kay County CO₂ project. Hallco has never operated a secondary recovery water flood project.

73) Mr. Hall alleged that his proposed water flood project will be economic and feasible. He testified about the set-up of the wells on the Conklin Unit and explained that each well has a tank battery of two tanks and a free water knockout located near the Conklin #9-1 well. Fluids are piped from the tank surface location to the tank battery. The tank battery is connected through a skim tank that is connected to the Conklin #9-3 disposal well. The wells are connected at the tank battery. He said that he doesn't need extensive surface facilities to conduct a water flood because the piping and other infrastructure is in place and no down hole configurations.

74) He said that he didn't take into account position on the structure, porosity, permeability, prior productivity or these other factors listed in the unitization statute when he determined his tract participation formula. He also didn't take into account a decline in production as reservoir energy and oil declines when preparing the tract participation formula because he did not think it would decline very much.

75) He testified that 99% of the working interest owners and 64% of the royalty interest owners that own within the S/2 of Section 9 have approved Hallco's Unitization Plan. He said that Hallco's unitization met the statutory requirements for approval of a unitization.

76) Hallco's expert engineer also testified that the proposed Hallco water flood is both technically and economically feasible. He said that that tract allocation formula for the water flood is reasonable and equitable in that it recognizes the contribution of oil from various tracts to the unit. He stated that unitized management is feasible and that substantially more oil and gas from the area would be recovered than if the plan was not implemented. He said that the size and shape of the proposed unit is reasonable to insure successful and efficient operation of the proposed unit, and that no material adverse consequences will be suffered by the offset operators by the proposed water flood. He said that Hallco's plan will prevent waste because the cost of the water flood is about \$100,000 and the recovery will range from 270,000 barrels up to 500,000 BO, resulting in an undiscounted profit of \$22.3 million, or a discounted profit of \$7.8 million.

77) Chaparral has standing to protest Hallco's proposed secondary recovery water flood project in the S/2 of Section 9 since Chaparral owns substantial interest within the Burbank sandstone common source of supply encompassing the S/2 of Section 9 and owns approximately ten net acres of

leasehold in the S/2 of Section 9. Chaparral protested Hallco's application because it contended that the unitization of the S/2 of Section 9 was unnecessary and would not prevent waste.

78) Chaparral's expert testified that the S/2 of Section 9 has already experienced the effect of a natural waterdrive as indicated by the high water production in previously producing wells. He opined that water flooding took place on the S/2 of Section 9 because many of the wells in that section have been re-injecting their produced water. He also said that the produced water came from a limited waterdrive from the west that is not an aquifer drive and that the limited waterdrive maintained partial pressure in the Burbank and caused the aquifer to expand. He said that the limited waterdrive swept water into the reservoir from the west while allowing the pressure to fall. He also said that the wells surrounding Section 9 showed high water production in previously producing wells and that high water production supports his opinion that a natural waterdrive is occurring in Section 9.

79) Because of this natural waterdrive, he opined that Hallco's application to water flood the S/2 of Section 9 is unnecessary because the hydrocarbons underlying the tracts have been naturally water flooded and unitization of the section for water flooding would not yield any significant increase in production compared to present operations.

80) He said that the exhibit contains the Conklin #9-3 well log that was part of Exhibit 32 along with other logs from the S/2 of Section 9, including the Conklin #9-A well. He said that the exhibit shows that the Burbank sand under the S/2 of Section 9 is the same as that under Section 10. He doesn't believe that there is any faulting present or any evidence of permeability barriers or other geologic separations and opined that the Burbank sand is one common accumulation.

81) He testified that he saw no geologic break that would exist between the S/2 of Section 9 and Section 16 or Section 15. He opined that this is all one common source of supply. He testified that he saw no evidence of faults, permeability barriers, or other geologic separations. He opined that it is the same common accumulation zone of the Burbank that is under the Conklin Tract, the S/2 of Section 9, and that underlies substantially all of the 3,300 acres that is in the proposed Chaparral unit.

82) Based upon his study, he opined that the S/2 of Section 9 has been previously water flooded. He said that it has both a water encroachment recovery mechanism and a very active bottom waterdrive. He said that this in conjunction with saltwater disposal operations that were conducted by man, together have been a very efficient water flooding mechanism of the S/2 of

Section 9. He said this area has been extensively water flooded in the past by both man and Mother Nature.

83) Based on his experience as a reservoir engineer, he opined that it would be economic waste to try to water flood the S/2 of Section 9 since it has already been efficiently and effectively water flooded by both man and nature. He opined that a competent engineering firm would not have put together a floodplain like Hallco has put together, because it's a "recipe for disaster." He said that Hallco's proposed plan has an uncontained line drive with no back up, which is usually the cause for water floods to fail. He opined that the S/2 of Section 9 would have less waste, and more recovery of hydrocarbons if a different type of recovery project was implemented. He said that a CO₂ EOR project would be the best way to go. He affirmed Chaparral's request that the Hallco plan of unitization be denied.

84) He said that Burbank sand that's on the east side of Kay County is the same as the Burbank on the W/2. Mr. Flinchum affirmed that it was the same and opined that this area is all one continuous common source of supply. He said that water flooding started in about 1950 and continued to be expanded until 1964. He said that millions of barrels of water were injected into the Burbank sand during these water flood operations.

85) Hallco's expert opined that there is no evidence that the S/2 of Section 9 has ever been water flooded partially because the pressures are extremely low at 100 to 200 lbs, which are not indicative of a waterdrive. He admitted, however, that there has been close to 3 BBW injected in the North Burbank and noted that the Hunter papers made mention of the possibility of a natural waterdrive or partial waterdrive in the reservoir.

The ALJ noted that the Hunter paper stated: that part of Kay County was subject to a natural waterdrive reservoir and that portion recovered more oil; most of the reservoir produced from the dissolved gas in the oil; and there is a gas cap drive for the Kay County and Osage County parts of the Burbank Reservoir. He said that the Hunter paper on the Burbank water flood discussed Phillips' deal with the Osage Indians to make an 18,000 acre unit in 1949 where Phillips injected a billion and a half barrels of water into the Burbank over 20 years. He said that it was possible that some of the 3 BBW that been injected in the North Burbank Unit went westward into Kay County. He recalled that Phillips injected around 28 MMBW into the Robert Sands lease and an unknown amount of water into the Clubb lease.

86) He testified that the coning of water is an important factor to take into consideration when assessing the water saturation levels. He said that the evidence of coning was that some leases went off of production in a short

period of time and that these leases were producing water when they were abandoned, and other leases continued to produce at lower depths. He also said that some leases had higher initial production than offsetting leases. He noted Chaparral's position that all of these offset units have been injecting water into the S/2 of Section 9, water flooding the section up to the point where the 5 MM barrel recovery threshold has been attained. He opined that the water flood in the offset units didn't produce the 5 MM barrels as claimed by Chaparral. He said that the secondary recovery operations that started in 1953 took place after the S/2 of Section 9 had been abandoned. He admitted, however, that he did not see any records from the 1920s that indicated that these wells pulled very hard.

87) He opined that solution gas provides the drive mechanism for the reservoir. He testified that Exhibit 26 clearly shows that the drive mechanism is a solution gas drive, not a waterdrive, which suggests no natural waterdrive present in the S/2 of Section 9. He stated that the data showing that the reservoir pressure dropped to 67 pounds is totally inconsistent with a waterdrive. He opined that the Oklahoma Geological Survey agrees with this finding, and that Order No. 27937 shows that water flooding began in the area in 1953, but not in the S/2 of Section 9, with good results for Gulf and Phillips. He noted that the largest of the leases water flooded under Order 27937 was 320 acres, and the smallest was 40 acres. He testified that water flooding continues to be successful on the lands surrounding the S/2 of Section 9, and that the S/2 of Section 9, hasn't experienced water flooding. He noted that the decline curves in Exhibit 26 further support that water flooding has been successful in the areas surrounding the S/2 of Section 9.

88) Hallco's expert agreed with Chaparral that the S/2 of Section 9 is surrounded by highly permeable, highly porous Burbank sand across all directions and that this is characteristic for the whole North Burbank Unit. He said that didn't see any permeability barriers between the S/2 of Section 9 and the N/2 of Section 9. He testified that the SW/4 of Section 10 was in the Phillips/Gulf co-op water flood and that those wells had high initial production numbers. He didn't know if that area has similar permeability or porosity factors to the Conklin #9-7 well.

89) He testified that the Conklin lease is seeing an oil cut from 7.4 to 8.9% which is equivalent to about 1 BO for 10 BW. He said that the surrounding leases show oil cuts ranging from 0.85% oil cut, which is about 1 BO for 110 BW, to an average of 0.48%, which is about 1 BO to 200 BW. He alleged that the oil cut data is evidence that there is more oil under the Conklin lease than under any of the surrounding leases. He opined that this shows that Hallco's unitization is desirable for the S/2 of Section 9 as a water flood will sweep oil,

maintain reservoir pressure, and produce more oil compared to primary production.

90) Hallco's expert opined that a high water/oil ratio is indicative of an area being water flooded but the S/2 of Section 9 has not been water flooded because the water and oil production reports submitted to the Commission during 2009, 2010, and 2001 do not indicate that a water flood occurred. The oil cut data was taken from Commission records filed by Hallco's pumper who estimated the water production because the wells on the lease had no water meters. The estimated water production was not confirmed by analysis of a sample of the fluid produced from the wells. He said that additional data that might support the data in the pumper's reports was not used in this evaluation because the data were not available on the Commission website and he did not physically check the files. Since then, he admitted that he has done no additional research to supplement or expand upon his prior analysis.

91) Mr. Hall testified that he didn't how much water is produced for each barrel of oil from his wells. He relied on his pumper and he believed his pumper makes estimations on the amount because there is no meter on the leasehold. The pumper estimated the yearly water production rate, and that estimate was entered into the Commission annual reports on oil and water production for each well.

92) Hallco's expert admitted that he did not know whether the Hallco pumper estimated the produced water that was reported on the 1012A forms or what the pumper looked at to determine the produced water estimate or if the pumper measured the water going back down into the Arbuckle using a meter, production test or pump test. He admitted that Hallco's pumper didn't report produced water on any gauge reports on the skim tank before the water was re-injected. He opined that the pumper reported a number he believed was a valid and reasonable estimate. He doesn't know if the number was just reused from year to year or know anything about the reliability of the data other than it was believed to be accurate enough for filing at the Commission.

93) Hallco's expert agreed with Chaparral that there is no geological evidence of any fault, separation, or permeability barrier within the Burbank reservoir and admitted that the areas surrounding the S/2 of Section 9 have been water flooded. He admitted that he didn't ask Hallco for their internal records on oil/water production for years 1981 through 2013 because he thought that Hallco didn't monitored water production in their office beyond what was reported on the Commission 1012A forms as estimated by the pumper. He said that he wanted the most recent data for his study. He noted that Hallco reported "NR" or "none reported" for produced water in 2001, 91,000 BW of water in 2009 and 91,000 BW in 2010.

94) He testified that he did not know how much water was produced for the wells in the S/2 of Section 9. He didn't ask Hallco to run a production test to determine the wells actual production of oil and water because that was already done by the pumper on the data reported to the Commission. He testified that he did not do a bucket test. When asked by Chaparral why he didn't recommend that any actual production data be taken or whether Hallco had such information, he testified that there was a current 1012 Form filed with the Commission that should suffice. He said that Mr. Hall responded that "we just put in the water, it goes into the tank, then it goes into the well."

95) During the hearing, the ALJ suggested that Hallco take samples from its producing well in the S/2 of Section 9 and determine the oil/water ratio because the analysis of fluid from the well could support Hallco's position that the wells were not water flooded. Chaparral filed a Motion to Compel Hallco to allow Chaparral to enter the leasehold and take the samples. Hallco argued that it would be unlawful to allow Chaparral to come onto the property and the process of taking the samples would interrupt production and could damage the well. The ALJ denied Chaparral's Motion and the samples weren't taken. The oil cut data was taken from Commission records filed by Hallco's pumper who estimated the water production because the wells on the lease had no water meters. The estimated water production was not confirmed by analysis of a sample of the fluid produced from the wells.

96) The ALJ finds that Chaparral has been ready, willing and able to test each of Hallco's individual wells at Chaparral's cost to determine a true oil/water ratio in order to ascertain whether such wells have been effectively water flooded. Despite Chaparral's willingness, Hallco has declined to have its wells tested for oil/water content.

97) When presented with an application and a plan of unitization, the Commission is obliged to determine if such a plan will prevent waste, protect the correlative rights of all of the interest owners, and is supported by substantial evidence. A standard for the Commission's review of such a proposed plan is shown in 52 O.S. Sec. 287.3 which states: "after notice and a hearing and based upon substantial evidence the Corporation Commission can authorize the unitization and unitized operation of a common source of supply or portion of such a formation. Findings of such a Commission order include: Unitized management, operation and further development of a common source of supply of oil and gas or portion is reasonably necessary in order to effectively carry on pressure maintenance or re-pressuring operations, cycling operations, water flooding operations, or any combination or any other non-primary production form of joint effort calculated to substantially increase the ultimate recovery of oil and gas from the common source of supply; One or more of the

unitized methods of operation as applied to such common source of supply or portion are feasible, will prevent waste and will with reasonable probability result in the increased recovery of substantially more oil and gas from the common source of supply than would otherwise be recovered; The estimated additional cost, if any, of conducting such operations will not exceed the value of the additional oil and gas so recovered."

98) The crux of the dispute between the parties centered upon whether the S/2 of Section 9 contained more oil than the surrounding sections that can only be produced by a unitized water flood. After reviewing all of the testimony and evidence, the ALJ finds that Hallco failed to present substantial evidence that unitized management will prevent waste and will with reasonable probability result in the increased recovery of substantially more oil and gas from the common source of supply than would otherwise be recovered. The ALJ notes the below findings.

99) The ALJ finds that there is no faulting or permeability separation which would separate the S/2 of Section 9 from the rest of the Burbank sandstone existing in the surrounding acreage. He also finds that acres currently leased by Hallco in the S/2 of Section 9 are connected to and are in communication with the larger Burbank Field in the surrounding acreage, which encompasses approximately 3,000 acres in Kay County and approximately 22,000 additional acres in Osage County.

100) The ALJ finds that the primary recovery factor of the Burbank Field is approximately 26%. Since the Kay County portion of the Burbank Field has cumulative production of approximately 40% recovery of the original recoverable oil in place, Hallco's acreage has been at least partially water flooded by natural and artificial means.

101) The ALJ finds that Hallco did not take into account position on the structure, porosity, permeability, prior productivity or any other factors listed in the Unitization Statute when it suggested a TPF for its proposed secondary recovery water flood operation.

102) The ALJ finds that Hallco's annually reported volumes of saltwater production are unreliable since Hallco does not perform and has not performed monthly gauge reports for produced water, has no meter on the skimmer tank or the well, and has not performed a production test for all fluids in over ten years. Hallco's reported number for saltwater production is the exact same number for several years even though the related reported numbers for oil production vary each year because Mr. Hall "relies on his pumper's estimate" and the pumper's estimate of the amount of water produced that was recorded

on Commission forms is the exact same number for sequential years, indicating that the pumper 'penciled in' the data.

103) The ALJ finds that due to the combination of a natural waterdrive and artificial water flooding over the last eight decades, multiple wells in the S/2 of Section 9 were making less than a 5% oil cut when they were plugged. Inversely stated, the wells were making more than 95% water, which high water cut is indicative of a reservoir that has been water flooded.

104) The ALJ finds that the Burbank sandstone formation Hallco has proposed to water flood has already been successfully and substantially water flooded by a combination of a natural bottom waterdrive below the reservoir and an artificial "co-op" secondary recovery water flood performed over the last six decades by multiple operators in the surrounding acreage.

105) The ALJ finds that due to the very large amount of water that has already infiltrated the reservoir by way of natural and artificial water flooding, any subsequent efforts by Hallco to water flood, while they may increase the current rate at which oil is produced, will not increase the ultimate recovery factor of oil which currently exists.

106) For all of the above reasons, Hallco's application should be denied because Hallco could not provide substantial evidence to the Commission that the proposed water flood would substantially increase the ultimate recovery of oil.

POSITIONS OF THE PARTIES

HALLCO

1) **Dale E. Cottingham**, attorney, appearing on behalf of Hallco, notes that this case is a consolidated case. The Hallco application is for a water flood of S/2 of Section 9 and the Chaparral application is for a CO₂ flood, which is larger area that overlaps Hallco's application.

2) Hallco notes that water flooding has gone on since the 1950s in the Burbank field and that Chaparral operates a water flood in the N/2 of Section 9.

3) Hallco notes that water flooding is a low-pressure tertiary operation. Conversely, the Chaparral application to CO₂ flood will increase the pressure to

1,687 psi, which is above the Burbank reservoir native pressure of roughly 1,300 psi. Hallco further notes the evidence shows the pressure increase to 1,687 psi is dangerous.

4) Hallco argues that the evidence shows Joe Hall, Chaparral's engineer, did not formulate his volumetric calculation on fact or scientific data but on the basis of need. Hallco argues that the "summing" technique used by Mr. Hall has been proven scientifically inappropriate for a field like the Burbank, and the technique resulted in an overestimation of total Burbank sand by up to 50%.

5) Hallco argues that the Yeats appendix and Exhibit 38 are not reliable because the data or creator cannot be validated and the information was not published by peer-reviewed journals. Hallco further argues that the Yeats appendix and Exhibit 38 do not meet the Daubert requirements.

6) Hallco directs the court's attention to the record of Chaparral's petroleum engineer Shawn Nix, who stated that he would not invest in the CO₂ flood if the reservoir is half the size. Hallco notes if the reservoir is half the size, at \$97.71 per barrel of oil ("BO"), there would be an \$88 million loss, so the CO₂ flood would create economic waste. Hallco further notes that the project's economics are so poor that it would cost 32,000 BO/month, at \$94 per BO, to pay for the CO₂.

7) Hallco argues that Chaparral's projected recovery factor of 9.3% is an unrealistic account because the only similar CO₂ flood project in the United States is the Salt Creek in Wyoming project that the State of Wyoming concludes has a recovery factor of 1.3%. Salt Creek is analogous because it is a relatively shallow reservoir and the minimum miscible pressure, just like in the Burbank, is significantly above the native reservoir pressure.

8) Hallco cites *Young v. W. Edmond Hunton Lime Unit*, 275 P.2d 304 (Okl. 1954), and asserts that Chaparral, as unit operator, has a fiduciary duty to not profit off of other working interest owners. Hallco notes that the evidence is clear that Chaparral is profiting from the unitization; specifically, Chaparral will charge an incremental cost for CO₂, and will have a pipeline cost and a 16% midstream rate of return, and will use their own affiliates, charging them not at cost, but at commercial rates. .

9) Hallco argues that Chaparral's tract participation formula is incorrect because 30% of the Phase II basis includes the excluded Yeats appendix. Hallco further argues the tract allocation formula is incorrect because 10% of the tract allocation formula includes surface area that is outside of the gross sand map.

10) Hallco believes there will be no reciprocity if they non-consent to the CO₂ flood and it will result in a confiscation of their interest because the economics and the other project issues are so great.

11) Hallco notes that there are an unknown number of improperly plugged wells, dating back to the 1920s. Hallco argues these wells could lead to detrimental environmental factors that the Commission is obligated to protect against because the wells are in Beaver Creek and under Kaw Reservoir. Hallco further notes that Chaparral has had to remedy many incidents, including spending \$1.5 million to mill down through the pipe in order to plug a well, in the proposed CO₂ flood unitization area.

12) This is a highly-fractured reservoir and minimum pressure is going to open these native fractures.

13) Hallco argues that the ALJ erred in denying Hallco's request to water flood the S/2 of Section 9 because the record does not support the finding of a natural waterdrive. Hallco contends the decrease in reservoir pressure to less than 100 pounds when the original pressure in the reservoir was 1,300 pounds concludes that there is not an active waterdrive. Hallco notes in the N/2 of Section 9, increased production occurred from 2010 through 2014 as a result of water flooding. Hallco expects to recover by water flooding in the S/2 of Section 9, 270,000 BO, up to 500,000 BO.

14) Hallco argues that the ALJ made reversible error and that denial of their water flood denies them of equal protection because all adjoining properties have been granted the right to water flood. Hallco request that the decision of the ALJ be reversed.

CHAPARRAL

1) **Gregory L. Mahaffey**, attorney, appearing on behalf of Chaparral stated that to his knowledge this is a case of first impression with the Corporation Commission because he could not find evidence of a CO₂ flood being applied for from scratch, so to speak.

2) Chaparral notes only 80 acres of mineral interest owners out of this 3,200 acres opposed the CO₂ flood unitization, over 75% of working interest owners are in favor of the project, and over 50% of royalty owners have ratified the unitization. Hallco has 320 acres, slightly under 10% of the proposed unit.

- 3) Chaparral dismisses Hallco's assertion that a 9.3% recovery factor is too high and the CO₂ project would be uneconomical because out of 120 CO₂ projects around the country only two have been uneconomical and the overall average recovery is 10.6%.
- 4) Chaparral notes that it is undisputed that there is one pressure connected sand for the Burbank through Kay County and Osage County and there is not a fault line that creates segmentation.
- 5) Chaparral argues that the decision of the ALJ should be reversed because the increase in production that has occurred as a result of a CO₂ flood in Osage County would also occur in Kay County because of the homogenous nature of the reservoir.
- 6) Chaparral argues that it will be very expensive and difficult to control the reservoir pressure when they control 90% of the reservoir located in Osage County but do not have control of the 10% located in Kay County because pressure will dissipate into the Kay County part of the reservoir. Chaparral further argues it would make sense to have the same operator for Kay County and Osage County.
- 7) Chaparral contends that the Davis well purging was an issue that was known or should have been known by the former operator and Chaparral resolved the issue before acquiring the lease. Moreover, Gary Davis stated that if Chaparral had been in charge, the purging issue would have been anticipated and properly plugged.
- 8) Chaparral argues that any well purging or mud-plugged well issue will be handled properly so any environmental issue is a Chicken Little argument.
- 9) Chaparral argues that if the ALJ decision factored in Chaparral's maps or tract allocation formula, which go to correlative rights, then the case should be remanded and reopened for additional data because the denial of the CO₂ flood will result in substantial waste.
- 10) Chaparral argues that the ALJ error in ruling will result in waste of some amount of oil, which at the most conservative estimate would equate to 60 million BO.
- 11) Chaparral dismisses Hallco's claim that Salt Creek's recovery factor is only 1.3% because Mr. Flinchum, Chaparral's chief petroleum engineer, stated that number could be just to-date, not the ultimate recovery factor since the Salt Creek field has not been fully developed.
- 12) Chaparral argues that the ALJ made reversible error in finding that the CO₂ flood would be uneconomic when Mr. Nix indicated that even at \$50

per barrel the project should be economic. Chaparral noted if oil prices do not escalate, expected recovery would be \$250 million and if escalated prices were used, the total would be \$403 million.

13) Chaparral asserts Hallco, who owns only 9.7% of the proposed unitized interest, should not be able to block Chaparral from reaping the benefit of unitization. Chaparral notes they would not implement Phase II or Phase III, in Osage County, if they did not believe positive economics were possible, so the Kay County project should also be economic.

14) Chaparral argues that the ALJ was incorrect in finding that the implementation of Chaparral's CO₂ flood was premature because a substantial increase in production has occurred in the North Burbank Unit, which is the same reservoir. If there is any doubt, then the Commission should remand for additional evidence.

15) Chaparral argues that the ALJ erred in rejecting the tract performance participation formula because the Commission has approved similar formulas and the formula was based to properly allocate current production and remaining reserves. Chaparral further argues that if the formula needs to be altered, the Commission should remand or make a decision based on the evidence. Although Hallco has less than 10% of the acreage, 320 acres out of 3,280 acres is 14%-over 14% of production during Phase I.

16) Chaparral alleges Hallco did not participate in the operators' meeting to calculate an alternative formula because Hallco intended to file their water flood preemptively to either stop the CO₂ flood or for other reasons.

17) Chaparral argues that the ALJ erred by denying the CO₂ flood for environmental concerns because the miscibility pressure dissipates below virgin well pressure before it reaches the Kaw Reservoir and data indicates a pinch-out occurs between the unit and Kaw Reservoir. Chaparral notes as the North Burbank Unit has been pressured, the Beaver Creek area in the north part of Kay County has not had any issues.

18) Chaparral claims that they will not confiscate Hallco's interest if Hallco does not participate because they will still recover, on primary production, their estimated fair share value.

19) Chaparral argues that the ALJ erred in assigning no probative value and weight to the Yeats appendices because experts can rely on hearsay to formulate their own opinion.

20) Chaparral contends that the ALJ ruled correctly in denying Hallco's water flood because publications support a minimal waterdrive and that Hallco was not willing to test their wells for actual water cut.

21) Chaparral submits that the ALJ water flood denial be confirmed and requests that the decision of the ALJ be reversed in regards to the CO₂ flood.

RESPONSE OF HALLCO

1) Hallco dismisses Chaparral's claim that the Osage County field and the Kay County field are the same because the Osage Nation, and the federal government regulate the former, while the Corporation Commission regulates the later. Furthermore, the economic viability and environmental impact of the Osage County field are not addressed in the record.

2) Hallco notes that other working interest owners went non-consent, so how Chaparral presented the interest of parties was incorrect, because other non-consent parties did not approve the CO₂ flood.

3) Hallco contrasts the proposed CO₂ flood to the other CO₂ floods across the United States by noting that the majority of CO₂ floods are below virgin pressure, so the Chaparral data does not analogize.

4) Hallco dismisses Chaparral's claim that the CO₂ flood would be economic at \$50 BO because the claim is not supported by recorded evidence or testimony.

5) Hallco dismisses Chaparral's Salt Creek 15% recovery factor because it came from a company trade publication, which attempts to promote the company and the publication came prior to the State of Wyoming report that calculated a 1.3% recovery factor.

6) Hallco reasserts that Chaparral has a fiduciary duty, as unit operator, and cannot make profit off of other working-interest owners, which Chaparral did not refute. The evidence is clear and Chaparral did not refute this at all. The evidence is clear that Chaparral is making money, just as ALJ Leavitt found, both in terms of the rate of return on pipeline and in returns of the CO₂ that they purchase and then resell at a profit, and the fact that they are charging an increase, more than just their cost, for their affiliate services. Again, Chaparral's statement in regard to that, "Well, we're not making money off other people." That's not what the evidence shows. Chaparral is making

money. Chaparral's plan is to make money off their other working-interest owners.

7) Hallco argues that there was not an increase in production as a result of CO₂ production because the record shows that the production increased back to historic levels because wells that were taken offline were put back online.

8) Hallco contends it is unnecessary to remand for new evidence because the CO₂ flood pressure issues are not going to change, and the parties have waited long enough.

9) Hallco asserts that Chaparral did not refute how the large miscalculations in geology changed the tract participation factor but Chaparral claimed the tract participation factor experienced less than 1% change, which is not supported by evidence.

10) Hallco stresses the environmental issue is not just one or a couple isolated incidents, but several have been reported and plugging will not solve the environmental issue because the purging occurs outside the well. Furthermore, Chaparral will not search for purging wells and they cannot search for some because wells are in Beaver Creek and Kaw Reservoir.

11) Hallco readdressed how the ALJ ruled correctly on the Yeats appendices and that Chaparral did not address any specifics in regards to the Daubert requirements.

12) Hallco asserts they are entitled, like operators adjacent to their land, to conduct a water flood of the S/2 of Section 9.

RESPONSE OF CHAPARRAL

1) Chaparral dismisses Hallco's assertion that Chaparral has jettisoned the volumetric projections. Chaparral agrees there is a dispute amongst experts on total recoverable oil but Chaparral notes that it is not disputed that there is a substantial quantity of economic and recoverable oil that will be wasted.

2) Chaparral asserts that the proposed CO₂ unitization will have a higher recovery factor than the average CO₂ recovery factor of 9.3%. Moreover, if Hallco's conservative estimates are used then 7.7 MMBO will be recovered from Chaparral's proposed unitization.

- 3) Chaparral argues that the proposed CO₂ development is not premature and that it will still be economic at the current price of oil because they would not pursue uneconomic development.
- 4) Chaparral dismisses Hallco's claim that Salt Creek shows how the proposed CO₂ development would not be economic because Hallco used a recovery factor that is before full development, and the Salt Creek operators believe the recovery factor will be closer to 15%.
- 5) Chaparral reasserts that Hallco has rights and the Commission should be able to frame a plan that gives Hallco an opportunity to participate or protects their rights but does not result in a minimum waste of 7.7 MMBO.
- 6) Chaparral believes the Kaw Reservoir environmental issue is a Chicken Little argument because no concrete evidence was provided to show the Kay County field is in communication with the wells underneath Kaw Reservoir. Chaparral notes that there appears to be a pinch-out which separates the Kay County field and the Kaw Reservoir.
- 7) Chaparral notes that even if communication is present between the Kay County field and the wells underneath Kaw Reservoir that Mr. Flinchum's undisputed testimony states a column of fluid is unable to reach the surface in the Kaw Reservoir because the pressure dissipates to below 1,300 pounds before reaching the Kaw Reservoir.
- 8) Chaparral dismisses Hallco's argument that Chaparral's unitization is an attempt to profit off of the other working interest partners in the unitization because Chaparral does not have other working interest partners. Chaparral notes that there is no probation against operators using affiliated companies in pooled operations so long as market rate pricing is applied.
- 9) Chaparral citing *Palmer Oil Corp. vs. Phillips Petroleum Co.*, 231 P.2d 997 (Okla. 1951), reasserts that having one operator is the most efficient method to control drilling operations in a unitization.
- 10) Chaparral contends that the ALJ's decision, denying Hallco's water flood, correctly concluded that the evidence supports the S/2 of Section 9 has already been naturally water flooded and a natural waterdrive is present, and water flooding by Hallco would not yield any significant increase.
- 11) Chaparral argues that Hallco's inappropriate allocation formula should not be the reason to reject their unitization by water flood, but Hallco's formula is arbitrary because it was not built with common methods that include structure and thickness.

12) Chaparral closes by reemphasizing there is a substantial amount of oil that is going to be wasted, and the potential environmental concerns are a Chicken Little argument.

13) Chaparral asks that the ALJ be reversed insofar as denying the unitization by CO₂, and affirmed as to denial of the unitization by water flood.

CONCLUSIONS

The Referee finds the Report of the Administrative Law Judge should be affirmed.

1) The Referee would incorporate by reference completely the Findings of Facts and Conclusions of Law of the ALJ beginning on page 101 through page 124 of the Report of the ALJ filed on June 19, 2015. The ALJ has written a well-reasoned and explicit report setting out all the pertinent facts in this case and citing the appropriate law to support his decision.

Cause CD 201204362-Clarify and/or vacate Order No. 27937.

2) The ALJ stated that the Order No. 27937 did not mention or authorize a unitization but granted Gulf Oil Corporation ("Gulf") and Phillips Petroleum Company ("Phillips") the authority to operate a joint water flood project and that Gulf and Phillips continued to operate their leases separately and to sell production separately instead of operating as a single unitized management area. The ALJ found that the order remains a valid order of the Commission issued after enactment of the modern unitization act. Chaparral is requesting the Commission to partially vacate Order No. 27937 except for the injection authority granted under the order for its active injection wells. The Referee agrees with the ALJ that a valid order may only be modified or vacated upon a showing by Chaparral that there has been a change of conditions or change in knowledge of conditions. The ALJ found:

408. The ALJ finds that there is no compelling or substantial change of condition that would mandate vacating the order and a possibility that doing so would have an adverse impact upon some of the parties. He notes that vacating the order may cause waste in that it will be time consuming and expensive for Chaparral and other operators to reapply for authority to inject saltwater into the injection wells encompassed and grandfathered in by the order. Such

injection wells would likely be required to conform to the current Commission rules related to wellbore construction and would most likely have to be modified.

409. After taking into consideration all of the facts, circumstances, evidence and testimony presented in Cause CD No. 201204362, it is the recommendation of the ALJ that Chaparral's application to Clarify and/or Vacate Order No. 29737 be clarified to state that the order is not a unitization order and did not establish a secondary recovery unit under 52 O.S. Section 287.1 and that the order remain in force and not be vacated. The order should not be vacated because it authorizes injection of fluid for a "water flood project." Fluid must only be injected for specific purposes under Commission Rules. Chaparral seeks to retain the right to inject, but do away with the water flood purpose of the Order. Chaparral did not provide substantial evidence to the Commission that its request to partially vacate Order No. 27937 was permitted under the rules, or that the result would not prevent waste.

3) The Referee agrees with the Conclusions of the ALJ and would cite the case of *Mustang Production Company v. Corporation Commission*, 771 P.2d 201, 203 (Okl. 1989) where the Supreme Court held:

"The standard to be applied by the Corporation Commission when hearing an application to modify or vacate a prior, valid order is well known in Oklahoma. A prior, valid order may only be modified or vacated upon a showing by an applicant that there has been a change of conditions or change in knowledge of conditions. *Phillips Petroleum Company v. Corporation Commission*, Okl., 461 P.2d 597, 599 (1969). The applicant must make the showing by substantial evidence. *Phillips, supra*; *Anderson Pritchard Oil Corp. v. Corporation Commission*, 205 Okl. 672, 241 P.2d 363 (1951); Okla. Const. Art. IX, § 20. Without this showing, any attempt to vacate or modify a prior, valid order constitutes a prohibitive collateral attack on that earlier order. *Application of Bennett*, Okl., 353 P.2d 114, 120 (1960).

See also Harris, *Modification of Corporation Commission Orders Pertaining to a Common Source of Supply*, 11 OKLA.L.Rev. 125 (1958).

Cause CD 2012-3768-Unitized Management, Operation and Further Development of the Burbank Kay County Enhanced Recovery Unit, Including Tertiary Recovery Operations.

4) The ALJ found that Chaparral's unitization plan posed a significant risk to human health and the environment. The ALJ found the plan caused pollution and the pollution would certainly increase when the Kay County Burbank Unit obtained an MMP of around 1680 psi under the current plan. The increase in pressure is above the Kay County Burbank reservoir's native pressure of roughly 1,300 psi. Apparently an uncontrolled pressure wave from Chaparral's Phase I pilot program in Osage County caused two wells on the Garry Davis lease in Kay County to purge salt water which purged up the back side of the casing, not through the cemented sections of the wellbore. Whether the well is properly plugged or not would not be an issue, as the well would have purged, because the purging was coming outside of the casing. Chaparral's increase in pressure from its CO₂ operations caused the Garry Davis wells to purge and the purging ceased after Chaparral quit injecting water into nearby injection wells. The Kaw Reservoir is a public drinking supply several miles away from the purging wells in the proposed Kay County Burbank Unit, and the Burbank wells in or under the Kaw Reservoir that are improperly plugged or not plugged would be subject to the higher pressure proposed by Chaparral to achieve its CO₂ flood. There are also apparently unplugged or improperly plugged wells on Beaver Creek, a direct tributary to Kaw Reservoir that is within the boundaries of Chaparral's proposed CO₂ flood in Kay County.

5) The ALJ denied Chaparral's application in Cause CD 201202483 stating that "Chaparral did not provide substantial evidence to the Commission that the CO₂ flood would prevent waste, protect correlative rights of adjacent owners, or fairly allocate hydrocarbons produced in the Burbank common source of supply." See page 117 of the ALJ Report, 465.

6) Chaparral's engineer and geologist apparently relied on the Yeats Report to prepare their exhibits and formulate their theories and opinions. The Yeats Report that Chaparral's engineer relied on was actually only an appendix supposedly attached to the Yeats study. The original Yeats study, a collection of documents, was never found or reviewed by Chaparral or Hallco. Hallco argued that the Yeats study failed to demonstrate scientific validity under the Daubert standard for evaluating the admissibility of scientific and technical evidence. See *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993). The ALJ found that the Yeats Report failed the Daubert standard and because the Yeats Report was used in part by Chaparral's geologist to form his

maps and to assess his oil/water contact lines on his maps, his testimony was diminished in probative value.

7) Chaparral's testimony was that the unitization for the Burbank Unit was prepared assuming that there were 102 MMB of OOIP in the Burbank under the formation sought and that they could obtain a recovery factor of 9.3% for an ultimate recovery of approximately 9.5 MMBO. Hallco's evidence was that the volumetric calculations Chaparral used, which relied upon the accuracy of the underlying geological information of the Burbank formation, was based in part upon the Yeats Report, and therefore Chaparral's geologic data was inaccurate.

8) It was also demonstrated by Hallco's experts that Chaparral's "summing" calculations were an inappropriate method of calculation for the formation because the sands within the Burbank formation downcut into each other. The downcutting prevents the formations from being able to be added, so the result should be calculated without summing the overlapping sands. A Plunkett paper was admitted into evidence which demonstrated that there was no support for the "summing" technique. Chaparral's method of calculating thickness appeared to overstate the thickness of the Burbank by 40 to 50% which would affect the accuracy of any volumetric calculations based upon these geological results. The evidence apparently provided by Hallco demonstrated that Chaparral's geological interpretations that were used in its volumetric calculation were approximately 50% of the size indicated by Chaparral. The ALJ found in his Report on page 109, paragraph 434 the following:

434. Using the average porosity value of 22 percent, Chaparral's experts said that there were 102 million barrels of OOIP in Kay County. Hallco's experts, after reviewing Chaparral's underlying data and the exhibits, concluded that there was 64.4 million barrels of OOIP and an average porosity of 16.95 percent in the Kay County Burbank formation. Hallco's experts contended that Exhibit 140, a summary of core data from numerous wells with a summary of both permeability and porosity, supported Hallco's projected porosity value. The experts noted that a paper from a Phillips geologist named Melville Sands shown in Exhibit 31-10 demonstrated that the greatest range of production will be in areas of the largest average percentage of pore space. They also noted that the Oklahoma Geologic Survey also evaluated porosity on the Clubb, Pappan and Barnum Leases and calculated a porosity of 17 percent. Based upon 81,000 acre feet

and a porosity of 16.9 percent, the OOIP value drops to 64.4 million barrels and the CO₂ EOR project becomes uneconomical.

9) The evidence reflects that Chaparral hired Ryder Scott to prepare a report of the potential production from Chaparral's CO₂ flood. Chaparral apparently provided Ryder Scott the data for his evaluation. Hallco's experts testified that Ryder Scott's simulation for vertical permeability was off by 1,000 percent and would greatly affect the results found in the Ryder Scott Report. Ryder Scott's evaluation as to economics of the proposed unit also did not take into account the past money spent on the project by Chaparral, only the money that would be spent in the future. However, Chaparral planned to charge as fixed costs to participants in the unit, previously incurred expenses relating to a CO₂ pipeline to be used in the proposed unit. Exhibit 97 reflects Chaparral's proposed fixed costs in the unit with the total cost of the CO₂ project being \$487,909,000. Hallco's total share of the cost would be \$57,496,920 with the first three years of the project being \$4,078,000 even when it is not even receiving any revenue, because all producers will be shut-in according to Chaparral's plan. The ALJ found on page 110 of his Report, 439, that "[b]ecause of these fixed costs and Chaparral's non-consent penalties which preclude a party from joining the CO₂ flood after it has begun, the economics of Chaparral's proposal would be tantamount to a confiscation of Hallco's mineral interests if Mr. Hall...chose not to be an active participant in the unit." The ALJ found on page 111 of his Report, 440, that:

The Commission cannot enter an order approving a field-wide unitization knowing that the end result will be a person's loss of vested mineral interests without receiving a reciprocal benefit, because an unconstitutional taking will be the result.

The ALJ cites many cases concerning the subject of unconstitutional takings without just compensation.

10) Evidence was also presented by Hallco's experts that even applying an optimistic 5.5% production value for the Burbank Field and multiplied by the 64.4 MM OOIP, it was determined that the ultimate recovery from the Burbank formation will not recoup the fixed costs of the project.

11) The ALJ also found that Chaparral's proposed tract participation formula was not fair and did not address the amount of oil each tract is bringing to the CO₂ flood. The ALJ found that Chaparral's proposed tract formula had a number of tracts in the proposed unit which were not underlain by productive Burbank formation and did not reward existing oil-in-place

underlying the proposed surface area but purported to reward prior production from these tracts.

12) The ALJ also found that Chaparral's plan to charge a profit on pipeline cost, CO₂ costs and charges for use of an affiliate to the members of its proposed unit does not appear to be consistent with its duties as a trustee or fiduciary. The ALJ found that the Commission would be prohibited by law from establishing a proposed CO₂ flood unit upon a plan of unitization where only the operator has a reasonable chance of making money and profiting. See *Young v. West Edmond Hunton Lime Unit*, 275 P.2d 304 (Okl. 1954).

13) The Referee agrees with the ALJ's determination on page 117 of his Report, 463, that "Chaparral did not provide substantial evidence to the Commission that the CO₂ flood would prevent waste, protect correlative rights of the adjacent owners, or fairly allocate hydrocarbons produced in the Burbank common source of supply." The Supreme Court in *Central Okl. Freight Lines, Inc. v. Corp. Com'n*, 484 P.2d 877, 879 (Okl. 1971) stated:

The term "substantial evidence" means something more than a scintilla of evidence and means evidence that possesses something of substance and of relevant consequence such as carries with it fitness to induce conviction, and is such evidence that reasonable men may fairly differ as to whether it establishes a case. The determination of whether there is substantial evidence in support of the Commission's order does not require that the evidence be weighed, but only that the evidence in support of the order be examined to see whether it meets the above test. *Yellow Transit Co. v. State*, 198 Okl. 229, 178 P.2d 83; *Application of Choctaw Exp. Co.*, 208 Okl. 107, 253 P.2d 822.

The Supreme Court in *Cameron v. Corporation Commission*, 414 P.2d 266 (Okl. 1966) states:

And in *Chenoweth v. Pan American Petroleum Corporation*, Okl., 382 P.2d 743, we said:

"The determination whether there is 'substantial evidence' to support an order made by Corporation Commission does not require that the evidence be weighed, but only that the evidence tending to support the order be considered to determine whether it implies a quality of

proof which induces the conviction that the order was proper or furnishes a substantial basis of facts from which the issue tendered could be reasonably resolved."

Both sides produced technical expert evidence to inform the ALJ regarding the warranting of the creation of unitized management operation and further development of the Burbank Kay County Enhanced Recovery Unit by CO₂ flooding. The ALJ chose to accept the evidence presented by Hallco that the CO₂ flood should be denied, because Chaparral did not provide substantial evidence and the CO₂ flood would not prevent waste, protect correlative rights of adjacent owners or fairly allocate the hydrocarbons produced in the Burbank common source of supply. Considering the record and the evidence presented the Referee agrees with the ALJ's Findings. Although there is conflicting evidence, the evidence cannot be weighed upon review and in the present case there was substantial evidence to support the findings and conclusions of the ALJ. The Referee would therefore affirm the ALJ's determination.

Cause CD 201202483-Unitization Enhanced Recovery Unit-Described As The Conklin Unit.

14) Hallco filed its application to unitize the geological interval known as the Conklin Unit located in the NE/4 SW/4 of Section 9. Hallco filed a Plan of Unitization that named Hallco as the unit operator and proposed the 320 acre unit be developed by water flood. Hallco believes that the Burbank sand in the S/2 of Section 9 contains a substantially greater concentration of oil than the same formation in the N/2 of Section 9 and all of the other adjacent sections. Hallco has owned its leasehold interest in the S/2 of Section 9 since 1983 and has never proposed a secondary water flood operation prior to Chaparral's proposed Kay County CO₂ project.

15) Hallco's engineer testified that Hallco's plan would prevent waste with the cost of the water flood being \$100,000 and the recovery ranging from 270,000 BO up to 500,000 BO, resulting in an undiscounted profit of \$22.3 million or a discounted profit of \$7.8 million.

16) Chaparral's expert, however, testified that the S/2 of Section 9 had already experienced the effect of a natural waterdrive as indicated by the high water production in previously producing wells. Many of the wells in the S/2 of Section 9 have been reinjecting their produced water. Chaparral's expert also testified that the limited waterdrive swept water into the reservoir from the west while allowing the pressure to fall and that the wells surrounding Section 9

showed high water production in previously producing wells. High water production supports his opinion that a natural waterdrive is occurring in Section 9. Chaparral's expert testified that it would be unnecessary to water flood the S/2 of Section 9 because the hydrocarbons underlying the tracts have been naturally water flooded and unitization of the section for water flooding would not yield any significant increase in production compared to present production.

17) Chaparral's expert also testified that there was no geological break that would exist between the S/2 of Section 9 and Section 16 or Section 15. This was all one common source of supply and was the same accumulation of the Burbank zone in the S/2 of Section 9, the Conklin Unit, which underlies all of the 3,300 acres that is in the proposed Chaparral unit. Hallco's expert stated that there had been close to 3 billion barrels of water injected in the North Burbank and that the Hunter papers had made mention of a natural waterdrive or partial waterdrive in the reservoir. Hallco's expert stated that the S/2 of Section 9 is surrounded by highly permeable, highly porous Burbank Sand across all directions and this is characteristic for the whole North Burbank, with no permeability barriers between the S/2 of Section 9 and the N/2 of Section 9. The Hallco expert also testified that Hallco's unitization was desirable for the S/2 of Section 9 as the water flood would sweep oil, maintain reservoir pressure, and produce more oil compared to primary production. He also testified that the S/2 of Section 9 had not been water flooded because the water and oil production reports submitted to the Commission during 2009, 2010 and 2011 did not indicate that a water flood occurred. However, the oil cut data was taken from Commission records filed by Hallco's pumper who estimated the water production, because the wells on the lease had no water meters. The estimated water production was therefore not confirmed by an analysis of a sample of the fluid produced from the wells. However, Hallco's expert did admit that he did not know whether the Hallco pumper estimated the produced water that was reported on the 1012A forms.

18) Hallco's expert agreed with Chaparral that there is no geological evidence of any fault, separation or permeability barrier within the Burbank reservoir and admitted that the area surrounding the S/2 of Section 9 has been water flooded.

19) Because of the evidence presented by both Hallco and Chaparral the ALJ found that there was no faulting or permeability separation which would separate the S/2 of Section 9 from the rest of the Burbank sandstone existing in the surrounding acreage. The ALJ also found that the primary recovery factor of the Burbank Field was approximately 26% and therefore since the Kay County portion of the Burbank Field has cumulative production of approximately 40% recovery of the original recoverable oil-in-place, Hallco's

acreage has been at least partially water flooded by natural and artificial means.

20) The ALJ also found that Hallco's annual reported volumes of salt water production were unreliable since Hallco did not perform monthly gauge reports for produced water and has no water meters at the wells on the lease and has not produced a production test for all fluids in over ten years. Also, Hallco reported salt water production was the exact same number for several years even though the related reported numbers for oil production vary each year. The pumper's estimate of the amount of water produced that was recorded on Commission forms is the exact same number for sequential years. The ALJ found that due to the combination of natural waterdrive and artificial water flooding, wells were making more than 95% water with a 5% oil cut when they were plugged. This is indicative of a reservoir that has been water flooded. Therefore, the ALJ found that due to the very large amount of water that was already in the reservoir by way of natural and artificial water flooding any subsequent water flooding by Hallco might increase the current rate at which oil is produced but would not increase the ultimate recovery factor of oil which currently exists.

21) The ALJ therefore found that Hallco had not provided substantial evidence to the Commission that the proposed water flood would substantially increase the ultimate recovery of oil. The ALJ found the expert of Chaparral to be more rational than Hallco's expert. The Referee believes the ALJ followed the procedure required as set forth in *Haymaker v. Oklahoma Corp. Com'n*, 731 P. 2d 1008 (Ok1.Civ.App. 1986) wherein the Court stated:

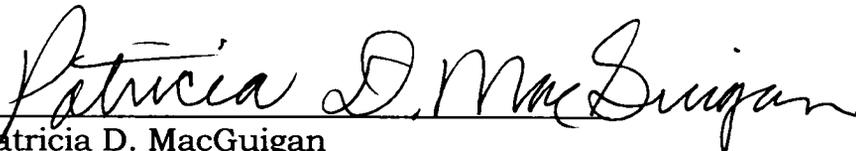
Proper appraisal of the expert testimony requires observance of the following benchmark principle approved in *Downs v. Longfellow Corp.*, 351 P.2d 999, (Ok1. 1960):

"The reasons given in support of the opinions [of an expert witness] rather than the abstract opinions are of importance, and the opinion is of no greater value than the reasons given in its support. If no rational basis for the opinion appears, or if the facts from which the opinion was derived do not justify it, the opinion is of no probative force, and it does not constitute evidence sufficient to...sustain a finding or verdict. "

The ALJ obviously chose to accept the evidence presented by Chaparral and placed greater weight upon the expert opinions espoused by Chaparral, which rested upon a rational basis giving the Chaparral expert opinion probative force and constituting evidence sufficient to sustain the ALJ's Report.

22) The Referee, for the above stated reasons, believes the ALJ has reached the proper decision and should be affirmed and Hallco's application should be denied because Hallco could not provide substantial evidence to the Commission that the proposed water flood would substantially increase the ultimate recovery of oil.

RESPECTFULLY SUBMITTED THIS 15th day of January, 2016.


Patricia D. MacGuigan
OIL & GAS APPELLATE REFEREE

PM:ac

xc: Commissioner Anthony
Commissioner Murphy
Commissioner Hiett
James L. Myles
ALJ David D. Leavitt
Dale E. Cottingham
Richard A. Grimes
Gregory L. Mahaffey
Russell James Walker
David E. Pepper
Robert D. Gray
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Michael L. Decker, OAP Director
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