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February 4, 2011

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**Via Hand Delivery**

Ms. Dolores Howard, Docket Services  
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1701 North Congress Avenue, 12<sup>th</sup> Floor  
Austin, Texas 78701

OFFICE OF GEN. COUNSEL  
RAILROAD COMMISSION  
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2011 FEB -4 PM 4:52

FILED

Re: Docket No. 7B-0268629 - Commission Called Hearing to Consider Whether Operation of the Range Production Company Butler Unit, Well No. 1H (RRC No. 253732) and the Teal Unit, Well No. 1H (RRC No. 253779), Newark, East (Barnett Shale) Field, Hood County, Texas, are Causing or Contributing to Contamination of Certain Domestic Water Wells in Parker County, Texas  
**Range Production Company's Closing Statement**

Dear Ms. Howard:

By this letter, Range Production Company ("Range") files **Range Production Company's Closing Statement** in the above-captioned proceeding and serves the same on the attached service list.

Also included with this filing is a CD which contains the Closing Statement and Proposed Findings of Fact and Conclusions of Law in both MS Word 2003 and PDF formats.

Very truly yours,



David E. Jackson  
Attorney for Range Production Company

/cac

Attachments

cc Donna Chandler, Technical Examiner  
Gene Montes, Hearings Examiner  
Attached Service List

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DOCKET NO. 7B-0268629

COMMISSION CALLED HEARING TO § Before the  
 CONSIDER WHETHER OPERATION §  
 OF THE RANGE PRODUCTION §  
 COMPANY BUTLER UNIT, WELL NO. §  
 1H (RRC NO. 253732) AND THE TEAL §  
 UNIT, WELL NO. 1H (RRC NO. 253729), § RAILROAD COMMISSION OF TEXAS  
 NEWARK, EAST (BARNETT SHALE) §  
 FIELD, HOOD COUNTY, TEXAS, ARE §  
 CAUSING OR CONTRIBUTING TO §  
 CONTAMINATION OF CERTAIN §  
 DOMESTIC WATER WELLS IN §  
 PARKER COUNTY, TEXAS § Office of General Counsel

OFFICE OF GENERAL COUNSEL  
 RAILROAD COMMISSION  
 OF TEXAS

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**RANGE PRODUCTION COMPANY'S  
 CLOSING STATEMENT**

TO THE HONORABLE RAILROAD COMMISSION OF TEXAS:

COMES NOW Range Production Company (“Range”) and files this its written Closing Statement, and in support would show the Railroad Commission of Texas (the “Commission”) the following:

**I. INTRODUCTION**

**A. Background.** This Commission-called hearing was triggered by two events. The first was an August 2010 complaint, made to the Commission’s Abilene District office by homeowner Steve Lipsky, about the presence of natural gas in Mr. Lipsky’s domestic water well in Parker County.<sup>1</sup> The second event occurred on December 7, 2010, when the U. S. Environmental Protection Agency (“EPA”) issued an Emergency Administrative Order (the “EPA Order”) relating to two domestic drinking water wells.<sup>2</sup> *Ex. 5.* Based solely upon the EPA’s incomplete and fundamentally flawed investigation, the EPA Order concluded that

<sup>1</sup> This complaint was docketed by Field Operations as Docket No. 7B-9601 and was immediately investigated. The Commission’s investigation of that complaint remains open and ongoing and much of the evidence presented by Range at hearing was generated in response to the Commission’s investigation.

<sup>2</sup> In the EPA Order, the Lipsky well is referred to as “Domestic Well 1” and the nearby Hayley well is referred to as “Domestic Well 2.”

... contaminants are present in or are likely to enter an underground source of drinking water and may present an *imminent and substantial endangerment to the health of persons*, and EPA has determined that *appropriate State and local authorities have not taken sufficient action to address the endangerment* described herein and do not intend to take such action at this time ....

*EPA Order at p. 1* (emphasis added); *See also EPA Order at Findings of Fact 39, 40 and 41 and Conclusions of Law 47 and 48*. In addition to finding that the Commission had failed to fulfill its regulatory responsibilities, the EPA Order also unjustly implicates Range in the supposed “endangerment,” purporting to find that natural gas in the Lipsky well is “likely to be from the same source” as gas produced from Range’s Butler Unit Well 1H and Teal Unit Well 1H (the “Range Gas Wells”), that natural gas in the Lipsky well “is likely to be due from impacts of oil and gas development and production activities in the area,” and that Range “caused or contributed to the endangerment identified herein.” *EPA Order Findings of Fact 25 and 27 and Conclusion of Law 46*.

In direct response to both the Lipsky complaint and the EPA Order, on December 8, 2010—the day after the issuance of the EPA Order—the Commission issued its notice for this Commission-called hearing. The Commission’s notice of hearing states that at hearing

... the Commission will consider the extent and causation of, and responsibility for, any contamination that may have occurred, or which is likely to occur, in domestic water wells in the area of the Range Production Company Butler Unit, Well No. 1H (RRC No. 253732) and the Teal Unit, Well No. 1H (RRC No. 253779), and, more particularly, whether the operation of these wells has caused or contributed, or may cause or contribute, to any such contamination. The Commission may also consider whether there is any alternative cause or contributor to any contamination that may have occurred.

*Commission Notice of Hearing at 2*. The Commission’s Notice of Hearing “directs” Range to appear and present evidence. The Notice “encourages” the EPA to participate and present evidence in its possession, and the Notice lists both Mr. Steve Lipsky and Mr. Rick Hayley<sup>3</sup> on

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<sup>3</sup> Note that in the record, the name is sometimes spelled “Hailey” and sometimes spelled “Hayley.” Based on information in the tax appraisal records, this brief uses the spelling “Hayley.”

the Service List as persons who may be interested in the issues falling under the call of the hearing.

**B. The Hearing.** The Commission's hearing was held on January 19 and 20, 2011. Surprisingly, both the EPA and Mr. Lipsky elected not to participate in the hearing, although each was given every opportunity to appear and participate.<sup>4</sup> Nor did Mr. Hayley or any other area landowner participate. The Commission Staff entered an appearance through Staff counsel, David Cooney. Range also appeared and presented live testimony from highly qualified experts in all areas pertinent to the Lipsky complaint and the erroneous conclusions drawn by the EPA.

Each of Range's witnesses was cross examined by the Commission Staff's counsel, and each witness was also questioned by the Hearing Examiners. Range presented sworn deposition testimony (through video excerpts) from Mr. Lipsky and his "consultant," Alisa Rich. In addition, so that the Commission might have the benefit of all materials marshaled by Range in the course of its investigation, Range tendered into the record (i) the complete Commission file on the Lipsky Complaint (Docket 7B-9601, including both the Austin and Abilene files), (ii) the complete transcript of all depositions taken in this matter, including depositions of Mr. Lipsky, Ms. Rich and of long-time water well drillers Larry Peck and Leland Malone (*Exhs. 130-133*), (iii) test results gathered by Ms. Rich (*Exhs. 103-107*), (iv) test information obtained from the EPA (*Exhs. 108 and 109*), and (v) other information from public records relating to the history of the presence of natural gas in water wells in this area of the State (*Ex. 32*). On February 4, 2011, by late-filed Ex. 134, Range tendered the complete transcript of the January 25, 2011 deposition

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<sup>4</sup> Not only did the EPA and Mr. Lipsky fail to appear at the hearing, both resisted providing any sworn deposition testimony or relevant documents. Range was allowed to take Mr. Lipsky's deposition and sample his water well only after obtaining an order from the Examiners on a motion to compel. When Range obtained Commission subpoenas to obtain discoverable information from the EPA regarding the basis of its Order, the EPA refused to comply, and then removed the subpoena proceedings to Federal Court. Range was finally able to depose an EPA representative only after the EPA was ordered by a U.S. District Judge to provide a representative for deposition.

of EPA designee John Blevins, Director of EPA Region 6 Compliance Assurance and Enforcement Division, including all exhibits to that deposition. *Ex. 134.*<sup>5 6</sup>

The evidence in this record is overwhelming and conclusive. The Range Gas Wells and the Barnett Shale are *not* the source of gas in the Lipsky or Hayley water wells or in any other area water wells, and hydraulic fracturing and other oil and gas activities *have not* in any way contributed to the contamination of fresh water in this area. All of the evidence—historic, geologic, microseismic, engineering, gas fingerprinting, and water well sampling—establishes that the source of natural gas in the Lipsky well and in other area water wells is *not* the Barnett Shale but *is* the shallow gas-bearing Strawn formation. The migration of natural gas from the Strawn formation to fresh water aquifers is not the result of oil and gas activities, but has occurred over decades through a regional, natural geologic connection, exacerbated by increased pumping from the aquifer and by water wells drilled into the Strawn.

**C. Range's Request for Relief.** Based on the evidence, Range requests that the Commission's Final Order find that (1) Range and its Gas Wells are not the source of gas in the Lipsky or Hayley water wells or any of the other area water wells; (2) Hydraulic fracturing and other oil and gas activities have not contributed in any way to the contamination of fresh water in this area, are not likely to contribute to contamination of fresh water, and are not the source for the natural gas found in the Lipsky well and other area water wells; and (3) The source of natural gas in the Lipsky well and other area water wells is not the Barnett Shale or oil and gas activities, but occurs through a natural geologic connection with the shallow gas-bearing Strawn formation, that is exacerbated by water wells that have been drilled too deep and into the Strawn.

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<sup>5</sup> As of the date of filing of this brief, Mr. Blevins had not returned a signed version of his deposition. Therefore, Range will substitute the signed version at the appropriate time.

<sup>6</sup> On February 3, 2011, U. S. District Judge Lee Yeakel took under advisement Range's motion for additional depositions from two key EPA employees. Range will provide a status report when a ruling is issued, and will file copies of additional deposition transcripts in the event additional depositions are taken of EPA representatives.

Attached as Exhibit A are proposed Findings of Fact and Conclusions of Law for consideration by the Commission.

## II. FACTS ESTABLISHED AT THE HEARING

A. **The Long History of Natural Gas in Area Water Wells.** The Lipsky well is not the first water well in this area to encounter natural gas. Nor is the Lipsky well the most dramatic example of the occurrence of natural gas in water wells. In 2005, *four years prior to the drilling of the Range Gas Wells*, the nearby Hurst water well flared significant quantities of natural gas.<sup>7</sup> *See Exhs. 11 and 26, V. 1, p. 211/3-212/4, 212/13-213/7, 216/3-8, 219/16-21.* The natural gas encountered by the Hurst water well was so prolific that its pressure lifted water to the surface without a pump. *V. 1, p. 58/3-11, 211/3-25, 219/16-21.* When gas from the well was lit, a large flare was created. *See Exhs. 11 and 26.* The Hurst water well was completed at approximately the same correlative depth as the Lipsky water well, and is located only 885' away from the Lipsky well and approximately 1500' from the Hayley well. *See Ex. 29, V. 1, p. 215/20-216/8.*

Nor is the Hurst well the only example of natural gas being found in area water wells long prior to the drilling of the Range Gas Wells. Exhibit 29 is an aerial photograph showing the locations of other documented instances in the immediate area in which natural gas was encountered in shallow water wells, and Exhibit 31 is a timeline of these events. The Richard Lipscomb water well, located approximately 4500' west of the Lipsky well was abandoned in January 2007 after the hole collapsed and "there was so much gas in it they couldn't get it cased." *See Ex. 29, V. 1, p. 210/15-211/1.* The Morris Oujesky water well, located 1055'

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<sup>7</sup> Significantly, there was virtually no Barnett Shale activity in this area in 2005. *See Ex. 49 and V. 2, p. 19-20.*

northwest of the Lipsky well and 985' west of the Hayley well, flowed gas for 2 months after its completion in 2007.<sup>8</sup> *See Ex. 29, V. 1, p. 212/6-12.*

Approximately 7000' to the east of Lipsky and Hayley, natural gas components have been detected in the Lake Country Acres public water system wells since 1995.<sup>9</sup> In 2003, Lake Country Acres water well No. 4 flowed 122 Mcf/D of natural gas, and had to be plugged because it produced more gas than water. *See Exhs. 29 and 31, V. 1, p. 213.* Notably, the signage on the Lake Country Acres *water storage tanks* warns "**DANGER: FLAMMABLE GAS**" and "**DANGER: NO SMOKING, NO OPEN FLAMES, NO SPARKS,**" warnings not typically associated with water wells or water storage. *V. 2, p. 83/21-84/4 and Ex. 68 and Ex. 32, tab 25, p. 3.*

The natural occurrence of gas at shallow depths is further confirmed by the Commission's drilling and production records. These documents identify several shallow Strawn gas fields in the area, the most notable being the Center Mills (Strawn) Field which produced at depths of only 358' to 426', located just south of Lake Country Acres. *See Exhs. 29, 32 (tabs 1-6) and 49, and V. 1, p. 209.*

**B. Geology.** The geology of the area further demonstrates why it is not surprising that natural gas may naturally migrate to shallow fresh water aquifers. Exhibit 53 demonstrates the regional geology of the area. *See V. 2, p. 59/5-60/25, 61/7—64/16.* The fresh water-bearing aquifer is found in the shallow Cretaceous formation, which dips to the southeast at about 10' per mile. Underlying the Cretaceous is the gas-bearing Pennsylvanian-age Strawn formation which dips to the northwest at approximately 100' per mile. The intersection of the Cretaceous and the

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<sup>8</sup> Water well driller Leland Malone also refers to the "Guge well" that was drilled in the Silverado subdivision prior to 2000 and flared gas. *V. 2, p. 82/19-83/15.*

<sup>9</sup> Public records concerning occurrences of natural gas in the Lake Country Acres public water system wells, including documentation from the Texas Commission on Environmental Quality ("TCEQ"), are included in Exhibit 32, tabs 7-15, 17-22 and 25.

Strawn represents an “angular unconformity” in which approximately 150 million years of deposition have been lost to erosion, allowing the younger Cretaceous to abut the older Strawn directly and create a regional interconnection. Because the Strawn dips more steeply and in a different direction, multiple Strawn lenses have the opportunity to communicate with the Cretaceous, thus allowing Strawn natural gas and saline water to enter Cretaceous fresh water aquifers. *V. 2, p. 61/7-62/14.*

The “boundary” between the Strawn and the Cretaceous in this area occurs at about 400’ below the surface, but is somewhat irregular and sometimes difficult to identify. *V. 2, p. 63/17-64/6, Ex. 54.* As is vividly demonstrated on Exhibit 33 (also admitted as Exhibit 69), drilling a water well to the base of the Cretaceous may result in a gassy water well, and drilling a gas well to the top of the Strawn may result in a watery gas well. Exhibit 33 is a log cross section extending from the Hurst and Lipsky water wells on the west, to the Lake Country Acres water wells and Center Mills (Strawn) gas wells on the east, and shows that the Lake Country Acres water supply wells have been producing, and are now producing, from virtually the same interval as did the Center Mills (Strawn) gas wells. *V. 1, p. 247-248, and V. 2, p. 84/6-87/6.* The issue is further demonstrated by Exhibit 32A, which shows the depth of area water wells in relation to the depth of the Cretaceous. Those water wells drilled below the base of the Cretaceous, or near the base of the Cretaceous, have a much greater chance of encountering natural gas. *V. 1, p. 244/14-247/2, and V. 2, p. 86/10-87/6.*

**C. The Lipsky Well.** The Lipsky complaint was initiated on August 6, 2010, when Mr. Lipsky contacted the Commission’s Abilene District Office and complained of natural gas in his well. There is no dispute that the Lipsky well contains natural gas in the “headspace” of the

well.<sup>10</sup> Nor is there any dispute that the Lipsky well contains small amounts of dissolved methane and heavier hydrocarbons at levels that do not create health or safety issues. What is in dispute, however, is the source of the gas in the Lipsky water well, and the level of “endangerment” presented.

The Lipsky water well was drilled by Peck’s Well Service, and completed on April 11, 2005. The well was completed at the same correlative depth as the Hurst water well. Exhibit 32A shows that both the Hurst and Lipsky wells were completed within 25’ of the base of the Cretaceous. *V. 1, p. 246/10-247/2*. In 2005, the Lipsky well was used for a cabin built on the property, and which the Lipskys lived in for a time while a larger home was constructed. *V. 1, p. 223/1-6, Ex.132, p. 28/19-30/7*. Initial water usage was significantly less than when the Lipsky’s main residence on the property was completed in late 2009. *V. 1, p. 226/2-11*. The Commission’s August 20, 2010, Initial Report on Lipsky Complaint No. 7B-9601 describes the Lipsky water well as follows:

The water well produces at a sustained rate of 10 gallons/minute and will pump down within 15 minutes. Well water is pumped from the wellhead to a 5,000 gallon open top plastic tank inside a building approximately 10 feet east of the water well. Well water in the tank is circulated by two ozonator pumps to remove residual sulfur odor that has been present since the well was drilled. Water from the tank is pumped into a pressurized water system servicing the residence and property. The [Lipsky] property uses about 1500 gallons of water per day.

Following Mr. Lipsky’s complaint, the Commission inspected the well on August 6 and 10, and again on August 11 and 17, when water samples were collected for analysis.<sup>11</sup> An August 11, 2010 inspection report by the District Office notes that

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<sup>10</sup> The “headspace” of a water well is the annular space between the casing and the discharge pipe, located above the water level. *See Ex. 28*.

<sup>11</sup> According to the Commission’s September 22, 2010 Status Report on Complaint No. 7B-9601 (Ex. 2), benzene was detected at 0.00864 mg/L, and the threshold limit for a Class 1 injection well is 0.005 mg/L. No other constituents of concern were noted from the Commission’s August 17 sampling. [As to benzene, it should be noted that subsequent sampling by Range found a lower benzene level in the Lipsky well at 0.0042 mg/L. Analysis contracted by Mr. Lipsky on August 8, 2010, found a benzene level of only 0.0031 mg/L, and the EPA’s analysis of October 26, 2010, found a benzene level of only 0.00455 mg/L. *See EPA Order, Findings of Fact 18 and 28.*]

the casing on the water well has what appears to be natural gas present, [but] I detected no sign of hydrocarbons in the water. Mr. Lipsky stated that Wolf Eagle Envi. [sic] detected natural gas in the air inside the house. I didn't smell natural gas inside the house nor in the water from the well.

Although the Commission was told by Mr. Lipsky on August 11, 2011 that Wolf Eagle (Ms. Rich) "had detected natural gas in the air inside the house," no results from Ms. Rich's testing were even available on either that date or on August 13, 2010, when Ms. Rich reported (as reflected in Staff Exhibit 1) that "the concentration of gas in his [Lipsky] water was very concentrated and to stay away from the well." *Ex. 133, Rich Depo, p. 105/10-13.* Tellingly, as evidenced by Ms. Rich's engagement agreement with Mr. Lipsky dated August 9, 2010, before Ms. Rich even set foot on the Lipsky property, she was focused on demonstrating that natural gas development was causing an "adverse environmental impact." *Ex. 133, Rich Depo, Ex. 6.*<sup>12</sup>

On August 26, 2010, the Commission made a further inspection of the Lipsky well and collected "gas samples from the casinghead [headspace] of the Lipsky water well." Analysis of the August 26 headspace gas sample from the Lipsky well showed that it contained approximately 68% methane. *See Comparative Gas Analysis report of 9/24/2010 in Complaint 7B-9601.* Exhibits 27 and 28 are photos and a schematic of the Lipsky water well, and show the garden hose installation used to vent the headspace gas. *V. 1, p. 226/17-234/17.* Despite the presence of the vent, Mr. Lipsky routinely leaves the vent closed, allowing headspace gas to build up so that it can be ignited. *V. 1, p. 233/21-234/17.*

On August 26, 2010, Mr. Lipsky informed the Commission that he was discontinuing using his water well for home use and that the 5,000 gallon tank would be purged and filled with

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<sup>12</sup> In deposition testimony, Mr. Lipsky testified that Alisa Rich told him the house was uninhabitable in early August, 2010. *Ex. 132, p. 132/7-15.* Mr. Lipsky found Ms. Rich through posts on the website for the movie "Gasland." *Ex. 132, p. 86/5-25.*

water from another source. On September 13, 2010, Mr. Lipsky advised the Commission that he was moving his family out of the house.<sup>13</sup>

**D. The Hayley Well.** The Hayley well was drilled in 2002, and there is no record of any complaint ever being made to the Commission by Mr. Hayley. In fact, it is unclear what concerns have been expressed by Mr. Hayley about his water well. Mr. Hayley first appears in Commission records as attending the August 26, 2010 joint inspection of the Lipsky property by the Commission and the EPA, which was then followed by a joint inspection of Mr. Hayley's well. *See October 26, 2010 Commission Inspection Reports for the Lipsky and Hailey (sic) wells in the File No. 7B-9601.*

The Hayley well is also referred to in the EPA Order as Domestic Well 2. According to the EPA Order, in May 2010, the owner of the Hayley Well noticed that the water "had begun to effervesce." *Ex. 5, EPA Order, Finding of Fact 36.* But this statement is not supported by any of the evidence in this record.<sup>14</sup> The EPA Order also states that analysis of water from the Hayley well on August 26, 2010 showed a small amount of dissolved methane, and that analysis on October 26, 2010, showed small levels of dissolved methane, ethane and propane. *Ex. 5, EPA Order, Finding of Fact 37.* None of the levels reported by the EPA, however, were at levels that create health or safety concerns. *V. 2, p. 179/6-8, and Ex. 91, see also discussion of finding of Fact 28 at V. 2, p. 203/12-206/7.*

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<sup>13</sup> In protesting the his property tax appraisal in 2010, Mr. Lipsky claimed that the house was uninhabitable as a result of the gas in his water well. By doing so, the appraised value for Mr. Lipsky's house was lowered from over \$2 million to \$25,000, resulting in a property tax savings for 2010 of over \$40,000. Mr. Lipsky subsequently moved back into the house, where he and his family live today. *V. 1, p. 237/21-239/21, Ex. 132, p. 75/14-76/9.*

<sup>14</sup> In fact, the evidence presented by Range demonstrates that this "fizzy water" is caused by the water level being drawn down in the aquifer which causes the well pumps to cavitate (when air is pumped instead of water). The cavitation is not caused by high concentrations of methane in the water, as the EPA Order seems to infer, but by the drawdown of the aquifer. *V. 2, p. 94/11-97/4, and Ex. 72.* Moreover, the low dissolved methane concentrations documented from water wells sampled in this area are proof positive that methane is not the cause of "effervescing" water in the Lipsky or Hayley water wells. *V. 2, p. 94/20-21 Ex. 91, Attachment A.*

The location of the Hayley well is identified on Range's exhibits, and the sampling and testing performed by Range of all area water wells, including the Hayley well, are listed in Exhibits 82-84, 87-91, 94 and 97-99.

**E. Pumping and Development.** The Lipsky and Hayley properties are located in the Silverado on the Brazos subdivision in Parker County. The development of homes in Silverado on the Brazos has increased dramatically since 2005 when the Hurst and Lipsky wells were drilled, and similarly, water demands and pump rates have increased dramatically. *V. 2, p. 94/22-95/5, 96/10-15.* Currently, there are at least 28 wells used for domestic purposes in Silverado, including home use, landscaping and swimming pools, and all pump from the same low transmissive aquifer. *V. 2, p. 88/6-14.* The Lipsky well, like most wells in the area, has a water treatment systems to address water aesthetics, such as the sulphur smell. *V. 1, p. 236/8-24, V. 2, p. 169/4-21.*

The increased usage of well water in Silverado is demonstrated by homeowners like Mr. Lipsky and another named Mr. Stites. Prior to completion of Mr. Lipsky's current residence in late 2009 or early 2010, he had a only a "cabin" on his property. Mr. Lipsky's new residence has approximately 15,000 sq. ft. of living space, a swimming pool, and a 30-zone sprinkler system using thousands of gallons of water to water the landscaping. *V. 1, p. 225/7-15.* Mr. Stites pumped his well for 3 to 4 months at a constant rate in order to fill a 3-acre lake on his property. *V. 2, p. 87/22-88/5.*

Increased pumping from the aquifer associated with residential development in the area has caused water levels to significantly decline. *V. 2, p. 88/6-14.* Water levels in this aquifer can be pulled down by even minimal amounts of pumping. *V. 2, p. 75/21-24.* As a result of increased pumping, waters and gas from the Strawn can naturally mix with waters from the aquifer. *V. 2, p. 75/25-77/2 and Ex. 62.*

**F. The Range Gas Wells.** The Teal Unit Well 1H and Butler Unit Well 1H were drilled and completed in April and July 2009, and both began production in August 2009. *V. 1, p. 25/16-20.* Although the base of usable quality water was incorrectly identified by TCEQ “Water Board” letters, both the Teal and Butler wells have surface casing cemented below the base of the Cretaceous, thus protecting the base of usable water. *V. 1, p. 253/23-254/12.* The surface casing in the Teal well is set at 409’ (GL), and the surface casing of the Butler well is set at 394’ (GL). *Exhs. 36 and 41.* Cement was circulated to the surface on the surface casing of both wells. *V. 1, p. 254/8-12.* Pressure tests were successfully conducted on the surface casing prior to the casing plug being drilled out. *V. 1, p. 257/22-258/1, 264/8-16, Exhs. 38 and 43.* No problems or issues were encountered during the drilling or completion of either well. *V. 1, p. 26/1-8.* Each well was completed with a nine stage frac. *Exhs. 36 and 41, and V. 1, p. 254/21-23.* Mechanical integrity pressure tests have been run to confirm the integrity of the Teal and Butler wellbores, and that the wells are not leaking. *See Exhs. 38 and 43, and V. 1, p. 34/11-35/20, 36/21-37/14, 257/22-258/9 and 264/8-16.* Cement bond logs have also been run in each well to confirm the integrity of the cement seal behind pipe in the production casing. The cement bond logs show excellent quality cement in each well. *Exhs. 39, 40 and 44, and V. 1, p. 258/16-262/15, 264/23-265/3.* Of note is that on December 31, 2010, a special logging tool, called a radial cement bond log, was run on the Teal well to confirm that there was no channeling in the cement. This log not only confirms the integrity of the cement, but also confirms that cement integrity was not affected by the frac job performed on the well in 2009. *Ex. 40, V. 1, p. 259/19-262/15.*

The Teal well has never had any pressure on its bradenhead, but during the initial investigation of the Lipsky complaint, it was noted that the Butler well had a pressure of approximately 30 psig on its bradenhead. *V. 1, p. 26/21-25, 265/13-267/12.* The bradenhead is a port at the top of the wellhead that is used to monitor the pressure in the annular space between

the 7-inch surface casing and the 4-1/2-inch production casing, as well as deeper depths above the top of cement for the production casing. *V. 1, p. 29/11-31/14, Ex. 9.* The 7-inch surface casing in the Butler well was set at 394' and cemented to surface. The 4-1/2-inch production casing extends from the surface to the total depth (TD) of the well, and is cemented from a depth of 4580' to TD. Because the production casing is not cemented above 4580', the gauge on the bradenhead port provides a pressure for the annular space between the production casing and the cemented surface casing at 394', and then for the interval from the shoe of the surface casing at 394' to a depth of 4580'. *V. 1, p. 29/11-31/14, Ex. 9.* If there was a leak in the Butler wellbore, one would expect it to be reflected in the bradenhead pressure. Significantly, however, when Range ran a Commission-witnessed mechanical integrity pressure test on the Butler well on October 14, 2010, the Butler well production casing held 845 psig for 30 minutes with 540 psig on the tubing, while the bradenhead pressure remained constant during the test at only 28 psig. This proves there are no leaks in the Butler well—the casing held pressure during the test while at the same time there was no increased pressure behind the casing on the bradenhead. *Ex. 3 and V. 1, p. 36/21-37/23.*

Bradenhead pressure on the Butler well is being monitored by Range and the Commission, and has dissipated over time. *V. 1, p. 265/13-267/21.* At the time of hearing, the bradenhead pressure was approximately 5-10 psig, indicating that it is most likely the result of low pressure seepage from a shallow gas-bearing formation. *V. 1, p. 63/21-64/9, 265/13-267/21.*

**G. Range's Response to the Commission's Investigation of the Lipsky Complaint.** Range's response to the Commission's investigation of the Lipsky complaint is documented in the file for the Lipsky complaint, in the testimony of Range witnesses Mike Middlebrook, John McBeath and Keith Wheeler, in the file for Complaint 7B-9601 and specifically in Exhibits 2-4, 6-8, 10, 12-14 and 80-99. Range cooperated with the Commission's

investigation in every possible respect. In September and October 2010, Range sampled production gas from the Teal and Butler wells, and bradenhead gas from the Butler well. *Exhs.* 2-3. In October, Range ran a mechanical integrity pressure test on the Butler well, having to kill the well in order to do so. *V. 1, p. 34/22-36/20, V. 2, p. 23/5-16*. In response to the Commission's December 16, 2010 letter (Ex. 6), Range embarked on a comprehensive and unprecedented investigation of every avenue that might connect Range to the presence of natural gas in the Lipsky well. These requests included pressure testing the Teal well, running additional logging, taking additional bradenhead and production gas samples from both the Teal and Butler wells and conducting compositional and isotopic testing, sampling area water wells and conducting compositional and isotopic testing on headspace and solution gas samples, and conducting soil gas sampling. Range complied with every request made by the Commission, as reflected in Exhibits 4, 7, 10 and 12.

**H. The EPA Order and the EPA Deposition.** The EPA Order ignores almost all of the facts recited above. The EPA was aware of but did not investigate the history of natural gas in water wells in the area. *Ex.134, p. 58/7-21; p. 215/10; p. 216/5*. Although the EPA admits that the Strawn formation is a natural gas bearing formation that exists in the general vicinity of the Lipsky and Hayley water wells, the EPA does not know where the formation exists under the surface of the earth and, curiously, did no geologic investigation before issuing the EPA Order. *Ex.134, p. 99/16-25-p. 100/10; p. 104/14-21; p. 106/18-p. 107/2-9; p. 168/21-24*. Inexplicably, the EPA simply did not evaluate the geology below the Lipsky property. *Ex.134, p. 95/15-17*. Thus, despite admitting that it has a responsibility to consider alternative scenarios as to how gas may be occurring in the Lipsky water well (*Ex.134, p. 93/18-p. 94/4*), the EPA did nothing to determine whether the shallow gas-bearing Strawn formation at approximately 400' is a more

likely candidate for the source of gas in the Lipsky well than was the Barnett Shale at a depth of over one mile beneath the aquifer.

The EPA's justification for issuing the EPA Order implicating Range can be boiled down to three factors, two of which should be dismissed outright as coincidental and not causal: (i) Range's Butler and Teal wells were drilled and placed in operation prior to Lipsky *complaining* of natural gas in his water well; (ii) Range's Butler and Teal wells are geographically close to Lipsky's well (but only if one ignores 1 mile in depth to the Barnett Shale and known geologic barriers); and (iii) gas from the Lipsky well had thermogenic qualities similar to production gas from the Barnett formation. There simply is no technical, evidentiary, or logical support for either of the first two elements of EPA's justification.<sup>15</sup> The EPA arbitrarily chose a distance to include the Range wells without any basis to do so. (*Ex. 134, p. 284/13-p. 288/11*). And, the EPA chose to remain ignorant of other sources and composition of thermogenic natural gas in this area, such as the natural gas in the Strawn formation. *Ex. 134, p. 107/10-23*.

As to the third element, the EPA admits that its fingerprinting analysis only distinguishes between thermogenic and biogenic gas. *Ex. 134, p. 101/2-7*. Further, the EPA's comparison of the ratio of the heavier hydrocarbons only suggests that the gas samples could be similar, but is inconclusive without expert analysis. Thus, EPA's so-called gas fingerprinting analysis is akin to attempting to determine the color of individual peanut M&Ms by testing for peanuts. All peanut M&Ms have peanuts, so testing for peanuts does not determine if an individual M&M is green or blue. Similarly, all natural gas produced from the Fort Worth Basin is thermogenic—so, identification of a particular gas as thermogenic does not determine whether the source of the gas is the Strawn, the Bend, the Barnett Shale, or an individual reservoir within those different

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<sup>15</sup> The notion that a subsequent event is caused by a prior event is so flawed there is even a Latin phrase, *post hoc ergo propter hoc*, to describe the classic fallacy. Similarly, the distance between the wells is not tied to any scientific theory or analysis.

formations. At a minimum, the EPA should have considered the characteristics of the most likely source of natural gas in the Lipsky water well—the natural gas known to occur in the Strawn formation—and developed an analysis that at least had the potential to serve to distinguish among the various gas samples. But the EPA did not deem it even necessary to take the most fundamental step and test the Strawn formation gas for peanuts, i.e. whether the Strawn is thermogenic. *Ex. 134, p.107/2-7.*

The cover sheet for late-filed Exhibit 134 (the January 25, 2011 deposition of EPA representative John Blevins) lists the necessary investigations that the EPA did not undertake, as well as those inconclusive factors upon which the EPA relied. In summary, the EPA was aware that water wells in the area of the Lipsky water well experienced significant amounts of natural gas years before Range drilled the Butler and Teal, but decided it was not germane to EPA's investigation (*Ex. 134, p. 57/16-p. 61/12; p. 215/10-p. 216/5*); the EPA dismissed all alternative scenarios as to how gas may be occurring in the Lipsky water well based solely on data collected from the Range and Lipsky wells (*Ex. 134, p. 93/18-p. 96/2*); the EPA failed to evaluate the geology in the area and, specifically, below the Lipsky property (*Ex. 134, p. 95/15-17 and p. 100/9-10*); the EPA failed to consider that the Strawn formation is a natural gas bearing formation that exists beneath the Lipsky and Hailey properties (*Ex. 134, p. 106/18-p. 107/9*); the EPA failed to investigate whether Strawn formation gas is thermogenic or biogenic (*Ex. 134, p. 107/10-23 and p. 170/21-p. 171/10*); the EPA admits that its fingerprinting analysis merely distinguishes between thermogenic and biogenic gas (*Ex. 134, p. p. 100/21-p. 101/2-7*); the EPA admits its calculation of component gas ratios and purported correlations are different for the Butler bradenhead gas and distinguishable from the Range well's production gas and the Lipsky water well gas (*Ex. 134, p. 108/21-109/15*); the EPA admits that the nitrogen in natural gas samples is a factor to consider when identifying the source of natural gas in the Lipsky well that

EPA did not consider (*Ex. 134, p. 171/11-p. 173/19*); the EPA admits that Dennis Coleman of Isotech, advised EPA that it needed to “evaluate the potential for other sources that would be thermogenic and the geology or structures that would store or transmit the gas from origin to aquifer to be certain” before it made a determination (*Ex. 134, p. 264/23-p. 267/9*); the EPA admits that their in-house, most credentialed expert, Dr. Doug Beak of the EPA, an environmental chemist, advised EPA Region 6 personnel that he **could not** compare the gas fingerprinting and compositional data on which EPA relies in issuing the EPA Order, and that the “only way to compare the data would be to make assumptions to fill in data and gaps and [he did not] believe [EPA had] enough experience at this site or data to do this at this time” (*Ex. 134, p. 269/3-p. 275/2*); the EPA admits that EPA does not know whether hydraulic fracturing caused or contributed to any natural gas in the Lipsky or Hailey water wells (*Ex. 134, p. 200/10-p. 201/1*); the EPA admits that it does not understand how natural gas is migrating into the Lipsky or Hayley water wells and that it issued the EPA Order to force Range to gather necessary data to answer that question (*Ex. 134, p. 301/9-p. 302/4*); and the EPA confesses that Range *may not* have caused or contributed to the natural gas in the Lipsky water well, and contrary to paragraph 46 of the EPA Order, can say under oath only that Range *may* have caused or contributed to natural gas in the Lipsky water well (*Ex. 134, p. 225/17-p. 228/2*). The EPA deposition transcript (*Ex. 134*) amply demonstrates that the EPA’s investigation was fundamentally flawed and woefully incomplete.

### III. EXPERT TESTIMONY

In addition to testimony from petroleum engineer Mike Middlebrook, Range’s Vice-President of Operations, Range presented five expert witnesses—*Norm Warpinski, Ph.D.* who testified on rock mechanics and geophysics, including microseismic and hydraulic fracturing; *Mark McCaffrey, Ph.D.* who testified on geochemical gas fingerprinting; *John C. McBeath,*

*P.E.* who testified on petroleum engineering; *Charles W. Kreidler, Ph.D.* who testified on geology and hydrogeology; and *Keith Wheeler, P.G., C.P.G.* who testified on hydrology and groundwater investigations.

**A. Microseismic and Hydraulic Fracturing.** Dr. Norm Warpinski is an expert on microseismic and hydraulic fracturing, having spent more than 30 years working in this specialty. Dr. Warpinski testified about hydraulic fracturing in the Barnett Shale and about Parker County specifically. His testimony proves why the hydraulic fracturing of the Range Gas Wells can not be a contributing cause to the presence of natural gas in the Lipsky and Hailey water wells. Specifically, Dr. Warpinski testified that:

- “Hydraulic fracturing” is the injection of fluids under pressure into subsurface formations to create fractures that act as pathways for oil or gas to flow to the wellbore. *V. 1, p. 70/10-13.*
- The objective of hydraulic fracturing is to fracture only in the productive zone or reservoir from which oil and gas production is expected; fracturing out of the productive zone limits the effectiveness of the hydraulic fracture stimulation. *V. 1, p. 96/12-23.*
- The Barnett Shale is a good candidate for hydraulic fracturing because the carbonate formations above and below the Barnett restrict the growth of fractures out of the productive zone. *V. 1, p. 103/24-104/19.*
- Microseismic monitoring is a seismic technology used to monitor the effects of well stimulation using hydraulic fracturing to insure the effectiveness of the hydraulic fracture stimulation. *V. 1, p. 78/6-81/3 Ex. 17, p. 1.*
- Using microseismic monitoring, the locations of microseisms can be determined and mapped, resulting in the ability to map the geometry, dimensions, and growth of hydraulic fractures. *V. 1, p. 78/6-81/3 Ex. 17, p. 1.*
- The technology for microseismic monitoring has been validated through multi-site testing (or “M-Site Validation”). *V. 1, p. 89/7-93/10 and Ex. 17, p. 4.*
- Data plotted by Dr. Warpinski for over 2200 hydraulic fracture stimulations in the 18 Texas counties comprising the Barnett Shale show that frac heights are limited, and rarely extend outside the Barnett Shale. *V. 1, p. 105/4-110/25 Ex. 17, p. 6.* In fact, hydraulic fractures end thousands of feet below of the deepest water wells, and no hydraulic fracturing extends to any shallow aquifers. *V. 1, p. 108/9-109/12 and Ex. 17, p. 6.*

- The data shows that even when faults are encountered, hydraulic fracturing does not impact aquifers. *V. 1, p.109/20-112/25.*
- Data plotted by Dr. Warpinski for over 320 hydraulic fracture stimulations in Parker County show that frac height is even more limited in Parker County than the Barnett Shale as a whole and that faults are not extensive. *V. 1, p.112/3-113/3 and Ex. 17, p. 7.*
- In Parker County, the hydraulic fractures extend no higher than 4500' below surface, approximately 4000' below the base of usable water. *V. 1, p.113/24-114/10 and Ex. 17, p. 7.*

Hydraulic fracturing cannot be the source of contamination in water wells in the area of the Teal and Butler wells. In Dr. Warpinski's words, "*it is impossible.*" This conclusion is based upon all the data collected by Dr. Warpinski in the Barnett Shale and many other similar areas, as well as his experience with fracture mechanisms and how fractures grow in some layers of rock and are restricted in others. It is also based on Dr. Warpinski's knowledge of physics, volumetrics, and recognition that the amount of fluid that would be required to propagate a fracture extending from the Barnett Shale upward 4,000 feet into an aquifer would be "*outrageous*" compared to volumes actually used in hydraulic fracture stimulations. *V. 1, p.115/5-116/9, 120/23-122/16 and Ex. 17.*

**B. Geochemical Gas Fingerprinting.** Dr. Mark McCaffrey is an expert in geochemical gas fingerprinting and has been engaged in that discipline for more than 20 years. Dr. McCaffrey testified that the EPA's attempt to perform geochemical gas fingerprinting was fundamentally flawed and cannot be used to match gas from the Lipsky water well to either the Barnett Shale reservoir or to the Range Gas Wells or to accurately identify the source of the gas. Using the correct scientific methodology for geochemical gas fingerprinting, Dr. McCaffrey testified that the source of the gas in the Lipsky water well is the shallow Strawn formation immediately below the aquifer and not the Barnett Shale. More specifically, Dr. McCaffrey testified as follows:

- Geochemical gas fingerprinting uses one or more chemical characteristics of a gas sample to characterize one or more aspect of the origin of that sample. *V. 1, p. 130/7-10.*
- The scientifically accepted method for gas fingerprinting is to first identify the source candidates for the gas, and then identify what geochemical parameters can distinguish between those candidates. *V. 1, p. 132/14-133/3.* The proper geochemical parameters to be used differ from study to study. *V. 1, p. 133/4-22.*
- Compositional analysis and isotopic analysis are the two primary tools for use in gas fingerprinting. *V. 1, p. 133/23-134/5.* Compositional analysis examines the quantity of gas components in a sample, *i.e.*, how much of each component is present. *V. 1, p. 134/6-11.* Isotopic analysis examines distinct isotopic characteristics of a gas that are independent of quantity. *V. 1, p. 134/12-135/24.*
- The EPA used an incorrect methodology to perform geochemical gas fingerprinting. *V. 1, p. 136/21-24, 177/20-178/2.* The EPA's study is fundamentally flawed in two separate ways. First, the EPA made no effort to identify source candidates for the gas, other than the Range Gas Wells and the Barnett Shale. *V. 1, p. 137/1-6.* Secondly, the EPA did not determine whether the geochemical parameter it used—carbon isotopes—could distinguish between Barnett Shale gas and other source gases. *V. 1, p. 137/7-20.*
- A review of generally available open literature, supplemented by a commercially available data base, confirms that the Pennsylvanian age formations above the Barnett Shale, including the much shallower Strawn formation, are possible source candidates. *V. 1, p. 143/14-144/15, 159/7-162/5, Ex. 22, p. 5.*
- Carbon isotopic analysis cannot distinguish between Barnett Shale gas and gas from the shallower Pennsylvanian age formations. *V. 1, p. 137/16-20, 166/10-20, and Ex. 22, p. 6-7.* This is because the source rock for all gas produced from the Fort Worth Basin is the Barnett Shale, and the gas naturally migrated to more shallow reservoirs over geologic time. *V. 1, p. 183/5-22.*
- A determination that gas in the Lipsky well is thermogenic does not make the gas a match to the Barnett Shale. The same thermogenic carbon isotope signature is found in both the Barnett Shale and in the shallow Strawn formation located much closer to the aquifer. *V. 1, p. 157/20-158/7, 161/13-162/5, 162/6-169/14 Ex. 22, p. 6-7.*
- Using the EPA's carbon isotopic analysis, one would incorrectly conclude that gas from the Hurst water well, which flared in 2005, was a match to Range's wells and the Barnett Shale even though Range's wells were not drilled until 2009. *V. 1, p. 153/9-20, 163/20-164/1, 178/3-8 and Ex. 22, p. 12.*
- The correct geochemical parameters to use to fingerprint the gas found in the Lipsky well is compositional analysis using nitrogen and CO<sub>2</sub>, which can be used

to distinguish between gas from the Barnett Shale and gas from the Strawn. *V. 1, p. 138/22-139/15, 167/1-168/4, 178/9-17 and Ex. 22, p. 8-9.*

- In conducting his study, Dr. McCaffrey relied on data from open literature, a commercially available data base, and actual sampling results. Samples included 29 solution gas samples from 25 area water wells, 30 headspace samples from the same 25 water wells, tubing gas and injection gas samples from the Teal and Butler wells and bradenhead gas samples from the Teal and Butler wells. *V. 1, p. 150/25-152/8 and Ex. 22, p. 2.*
- Based on correctly applied geochemical gas fingerprinting, the gas from the Lipsky well is a match to the much shallower Pennsylvanian Strawn formation, and not to the Barnett Shale formation located a mile below the aquifer. *V. 1, p. 139/16-139/25, 142/11-142/22, 166/21-180/10, 185/10-186/1, Ex. 22, p. 8-12.*
- If Barnett Shale gas was migrating from either the Teal or Butler wells one would expect to see Barnett Shale gas in the bradenhead of one or both of the wells, since the formations through which the gas would have to migrate are open to the bradenhead. *V. 1, p. 146/11-147/20, 174/12-175/4, Ex. 22, p. 9-12.*
- No Barnett Shale gas is found in the bradenhead gas samples. *V. 1, p. 178/17-179/5.*
- The Teal bradenhead gas consists almost entirely of microbial (or biogenic) gas. *V. 1, p. 176/27-177/2, 196/12-197/8.*
- The Butler bradenhead gas is approximately 50% thermal gas from the a Pennsylvanian reservoir and 50% microbial (or biogenic) gas. *V. 1, p. 176/7-177/9, 178/17-179/5.* In contrast, the Barnett Shale gas contains no Pennsylvanian gas and no microbial gas. The differences between the Butler bradenhead gas and Barnett Shale gas confirms that Barnett Shale gas is not migrating to shallow aquifers. *V. 1, p. 147/23-148/20, 174/14-175/4, 176/7-177/9, 178/17-179/5, 196/12-197/8 and Ex. 22, p. 8-12.*
- Gas in most of the water well samples has an isotopic signature indicative of partial microbial degradation. This indicates that gas migration into the aquifer is not a single event, but is a result of seepage that has occurred over geologic time. *V. 1, p. 179/6-180/11, and Ex. 22, p. 3, 12.*
- There is no scientific support for the portion of Finding of Fact 25 of the EPA Order stating that gas from the Lipsky well is “likely to be from the same source” as gas from the Teal and Butler wells. *V. 1, p. 181/8-182/4.*
- There is no foundation whatsoever for the portion of Finding of Fact 27 of the EPA Order stating that the presence of gas in the Lipsky well is “likely to be due to impacts from gas development and production activities in the area.” *V. 1, p. 182/5-183/11.*

Dr. McCaffrey's thorough and painstaking analysis demonstrates how geochemical gas fingerprinting should properly be applied to these issues. It also amply demonstrates the woeful inadequacies of the EPA's attempt to use gas fingerprinting without proper expertise. On the question of the source of gas in the Lipsky well, Dr. McCaffrey's analysis provides the scientifically supported answer—the gas found in the Lipsky well is a match to the shallow Pennsylvanian-age Strawn formation, and not to the Barnett Shale formation located a mile below the aquifer.

**C. Petroleum Engineering.** John McBeath is an expert petroleum engineer who testified about the history of gas in water wells in this area of the State, and that those occurrences are unrelated to oil and gas development or to Range's wells. Mr. McBeath also testified about the mechanical integrity of Range's wells and that pressure tests and cement bond logs confirm that Range's wells can be ruled out as a possible source for the gas in the Lipsky well and other area wells. Among other things, Mr. McBeath testified that:

- Public records and interviews with water well drillers show that natural gas has been found in area water wells for many years, and long before the drilling of Range's wells in 2009. *V. 1, p. 240/9-242/2, and Exhs. 29, 31-32.*
- The most notable event was the Hurst well, located only 885 feet from the Lipsky well, that flared significant amounts of gas in 2005. *V. 1, p. 211/3-25, 217/13-218/1, Exhs. 11, 26.*
- Other nearby wells encountered significant quantities of natural gas in 2007. *V. 1, p. 210/15-211/1, 212/6-12.*
- The Lake Country Acres public water system has encountered natural gas components in its wells since 1995, and one of its water wells had to be plugged in 2003 because it made more gas than water. *V. 1, p. 212/9-213/25, and Exhs. 29, 31-32.*
- The Center Mills (Strawn) gas field is located to the southeast of the area in which the Lipsky well is located, and just south of Lake Country Acres. These gas wells produced from the Strawn at depths of only 358' to 426'. *See Exhs. 29, 32 (tabs 1-6) and 49, and V. 1, p. 209.*

- In many cases, area water wells are drilled to the same depth as shallow Strawn gas wells. Exhibit 33 is a log cross section showing that area water wells are drilled to the same depth as the Strawn and completed in virtually the same zones. *V. 1, p. 240/10-241/3, 247/19-248/19, Ex. 33.*
- The Lipsky and Hayley wells are completed within 25 feet of the base of the Cretaceous, and in close proximity to the Strawn. *V. 1, p. 244-247, Ex. 32A.* Some area water wells, like the Perdue well, are actually drilled into the Strawn. *V. 1, p. 245/24-246/10.*
- Development and water usage in the area have increased since the 2005 when the Hurst and Lipsky water wells were drilled. *V. 1, p. 225/16-226/11.* Increased drawdown of water levels can result in increases in the presence of natural gas in the water wells. *V. 1, p. 246/10-247/2.*
- The source of gas in the Lipsky well is a combination of natural migration of gas from the Strawn, and gas moving through conduits created by water wells that have been drilled into the Strawn. *V. 1, p. 247/5-14, V. 2, p. 27/3-12.*
- The surface casing in both the Teal and Butler wells is set below the base of the Cretaceous (and therefore below the base of usable quality water), is cemented back to surface, and was pressure tested when set. *V. 1, p. 254/3-12, 257/22-258/1, 264/8-16, Exhs. 38 and 43.*
- Based on pressure tests and cement bond logs, the Teal and Butler wells have excellent mechanical integrity, are not leaking, and can be ruled out as the source of gas in the Lipsky well and other area water wells. *V. 1, p. 262/20-263/4, 267/22-268/21, V. 2, p 14/6-10, V. 2, p 26/18-22, Exhs. 36-44.*
- The pressure on the bradenhead of the Butler well is so low, it is not significant, and could not be the source for gas in the Lipsky well or other area water wells. *V. 1, p. 265/13-267/12.*
- Gamma ray log interpretations confirm there is no faulting in the area of the Teal or Butler wells that could act as a conduit for migration of gas to the shallow aquifer. *V. 1, p. 269/19-272/19, Ex. 45.*
- Based upon the lack of faulting, as well as upon Dr. Warpinski's testimony and the laws of physics, hydraulic fracturing can be ruled out as a potential source for gas in area water wells. *V. 2, p. 14/18-15-5, 28/3-5.*
- Based upon the investigation of the Lipsky complaint, Finding of Fact 40 of the EPA Order (stating that "State and local authorities [including the Commission] have not taken sufficient action to address the endangerment" described) cannot be justified. *V. 2, p. 24/13-25/5, 26/6-10.*

Mr. McBeath's testimony proves that the occurrence of natural gas in shallow wells is not a new phenomenon, nor is it one that should be unexpected given the proximity of the shallow gas-bearing Strawn formation to the depths at which water wells have been completed. Mr. McBeath's testimony also proves that the mechanical integrity of the Teal and Butler wells is irrefutable. The integrity of these wells has been tested and double tested—they can be ruled out as the source for the gas in area water wells.

**D. Geology and Hydrogeology.** Dr. Charles W. Kreitler is an expert in geology and hydrogeology with 35 years of experience in groundwater investigations. *V. 2, p. 54/19-57/17 and Ex. 52.* Dr. Kreitler testified that the gas found in the Lipsky well occurs as a result of a widespread naturally occurring geologic contact between the shallow Strawn gas-bearing formation and the shallow Cretaceous fresh water-bearing formation which lies on top of the Strawn. Specifically, Dr. Kreitler testified that

- It is well known that there is natural gas in the Strawn. *V. 2, p. 61/7-16 and 78/17-23.*
- There is an angular unconformity between the Cretaceous (which dips toward the southeast) and the Strawn (which dips to the northwest). *V. 2, p. 59/18-60/25, 65/9-66/9, Ex. 53-55.* This angular unconformity creates a “plumbing system” connecting the Strawn to the Cretaceous. *V. 2, p. 61/21-62/14.*
- 3-D seismic shows there are no faults anywhere near the wellbore path of the Teal and Butler wells. *V. 2, p. 68/5-7, Ex. 56.*
- From a geological perspective, given the nature and thickness of the formations located between the Barnett Shale at a depth of over 5,000’ and the Cretaceous at a depth of approximately 400’, leakage from the Barnett Shale to the Cretaceous is simply not a reasonable concern. *V. 2, p. 68/8-21, Ex. 57.*
- Most of the area water wells draw their water from the Twin Mountains aquifer, which is part of the Cretaceous formation. *V. 2, p. 743-17.* The Twin Mountains is not a highly productive aquifer. *V. 2, p. 75/9-16 and 21-22.*
- The Twin Mountains is a relatively low transmissive unit, and increased pumping associated with residential development in the area has caused water levels to significantly decline. *V. 2, p. 88/6-14.* Water levels in the Twin Mountains can be pulled down by even minimal amounts of pumping. *V. 2, p. 75/21-24.*

- As a result of pumping in the Twin Mountains, and the presence of the angular unconformity, waters and gas from the Strawn can naturally mix with waters from the Twin Mountains. *V. 2, p. 75/25-77/2 and Ex. 62.*
- There is documented evidence of natural gas in the Strawn long before Range's drilling operations. *V. 2, p. 79-80.* There are multiple examples of natural gas found in the Twin Mountains aquifer before the Teal and Butler wells were drilled. *V. 2, p. 82/12-84/4. Ex. 66-68.*
- Several area water wells penetrate down into the Pennsylvanian (Strawn) section and have been found to contain methane. *V. 2, p. 84/6-87/6, Ex. 69.* Mr. Lipsky's well is drilled to about the same depth as the Hurst well that flared gas in 2005. *V. 2, p. 86/13-87/6, Ex. 69.*
- An aerial map showing the content of methane in area water wells does not show a plume coming from a single source; rather, it is a random distribution. This indicates leakage coming out of the Strawn and not contamination from a single source. *V. 2, p. 90/14-91/12, Ex. 70.*
- The water well with the highest methane concentration in the Silverado subdivision (the Perdue well at 2.8 mg/l) is also the deepest water well in the area reviewed, extending almost 100' into the Strawn. *V. 2, p. 90/5-13, Ex. 70.*
- The U.S. Department of the Interior advises that dissolved methane concentrations of less than 10 mg/l require no action other than periodic monitoring. *V. 2, p. 94, Ex. 71.* The highest concentration of methane in any of the wells sampled in the area of the Lipsky well was 2.8 mg/l. *V. 2, p. 94/1-9, Ex. 70.*
- The U.S. Department of the Interior also advises that methane will not accumulate in the wellbore if the well is properly vented to the air. *V. 2, p. 93/7-25, Ex. 71.*
- The "fizzy water" claimed by Mr. Lipsky is not caused by high concentrations of methane in the water, but by cavitation resulting from the drawdown of the aquifer. *V. 2, p. 94/11-97/4, and Ex. 72.*
- The low dissolved methane concentrations documented from water wells sampled in this area demonstrate that methane is not the cause of "fizzy water." *V. 2, p. 94/20-21, Ex. 91, Attachment A.*
- The concentrations of total dissolved solids (TDS) and chlorides are higher in this area than would be expected in the Twin Mountains, indicating discharge coming into the Twin Mountains from the Strawn. *V. 2, p. 97/6-101/14, and Exhs. 73-74.*

Dr. Kreitler's testimony demonstrates that, as one would expect, understanding the geology of this area is fundamental to any analysis of issues related to the occurrence of natural

gas in water wells. As a corollary, his testimony demonstrates that the EPA's failure to understand the geology of the area prior to issuing its Order is yet another fatal flaw in its investigation. Dr. Kreitler's geologic testimony proves that the methane found in the Lipsky water well and other area water wells is a naturally occurring process resulting from the percolating flow of gas out of the Strawn, and is not related to Barnett Shale oil and gas development. *V. 2, p. 103/8-14.*

**E. Hydrology and Groundwater Investigations.** Keith Wheeler is an expert hydrogeologist with 23 years of experience in subsurface groundwater investigations. *V. 2, p. 144/17-146/21, Ex. 79.* Mr. Wheeler worked with Range and its consultants to design and then oversee the comprehensive groundwater investigation sampling project undertaken by Range in response to the Railroad Commission's investigation of the Lipsky complaint. *V. 2, p. 147/11-19.* Based on the extensive sampling of water wells in the area, Mr. Wheeler testified that there is absolutely no public health or safety issue related to the Lipsky well or any of the other water wells in the area. *V. 2, p. 179/6-8, Ex. 91.* More particularly, Mr. Wheeler testified that:

- The water well sampling had three components: (1) ambient air sampling; (2) groundwater collection; and (3) headspace gas collection. *V. 2, p. 151/13-19.*
- The ambient air readings were tested for ethane, methane, and propane and compared to the Lower Explosive Limit (LEL). *V. 2, p. 159/4-161/1, Ex. 87.*
- None of the readings taken on any of the ambient air readings created any concern for explosion, including around the Lipsky and Hayley wells. *V. 2, p. 162/3-164/21.* The ambient air readings were insignificant in terms of creating any sort of fire or explosion danger. *V. 2, p. 164/21.*
- A total of 26 water well samples were taken by Range and each was tested for over 135 analytes or constituents of concern. *V. 2, p. 167/6-169/3, Ex. 90.*
- The analytes evaluated fall into four groups: (i) volatile organic compounds, (ii) RCRA metals, (iii) dissolved gases, and (iv) general water chemistry parameters. *V. 2, p. 171/23-172/19, Ex. 91.*
- The Protective Concentration Levels (PCLs) for the Texas Risk Reduction Program (TRRP) were used as the evaluation standard for those analytes with

published PCLs. *V. 2, p. 170/20-171/19, Ex. 91.* TRRP is a very conservative standard used by the TCEQ to evaluate human health concerns. *V. 2, p. 171/11-19.*

- Secondary maximum containment levels (MCLs), which are not human health standards, were used to evaluate aesthetic issues (i.e., chlorides, sulfates and total dissolved solids) related to general groundwater chemistry. *V. 2, p. 177/7-178/1, Ex. 91.*
- The water well sampling results show that there are no exceedances of human health PCLs for any of the wells sampled. *V. 2, p. 179/1-13, Ex. 91.* The water from all wells sampled, including water from the Lipsky and Hayley wells, is safe to drink. *V. 2, p. 179/6-8, Ex. 91.*
- 21 of the 26 wells sampled, including the Lipsky and Hayley wells, have small amounts of dissolved gases. *Ex. 91, Attachment A.* The maximum levels detected for dissolved gases were butane (0.027 mg/L), ethane (0.6 mg/L), isobutene (0.011 mg/L), methane (3.9 mg/L)<sup>16</sup> and propane (0.15 mg/L).<sup>17</sup> *Ex. 91, Attachment A.* There are no TRRP PCLs (human health standards) for these dissolved gases. *V. 2, p. 203/15-204/3, Exhs. 90-91.*<sup>18</sup>
- The levels detected for dissolved gases in the Lipsky well were butane (0.027 mg/L), ethane (0.6 mg/L), isobutene (0.011 mg/L), methane (2.3 mg/L) and propane (0.15 mg/L). *Ex. 91, Attachment A.* These levels do not make the Lipsky water unsafe to drink. *V. 2, p. 179/6-8, Ex. 91.*
- The levels detected for dissolved gases in the Hayley well were butane (ND), ethane (0.0081 mg/L), isobutene (ND), methane (0.12 mg/L) and propane (ND). *Ex. 91, Attachment A.* These levels do not make the Hayley water unsafe to drink. *V. 2, p. 179/6-8, Ex. 91.*
- As to headspace gas samples, the results show that there were no exceedances of the LEL in 23 of 25 wells, but that two wells (Lipsky and Perdue) had an exceedance of the LEL for methane. *V. 2, p. 182/6-19, Ex. 94.* However, these conditions can be eliminated if these two wells are properly vented. *V. 2, p. 183/1-185/2, 189/17-21.*
- During the sampling of the Lipsky well, it was discovered that the vent on the Lipsky well was closed. *V. 2, p. 183/1-20.* The Perdue well does not have a vent,

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<sup>16</sup> Methane at 3.9 mg/L was in the Foster well, located significantly north of the Silverado subdivision. *See Ex. 82.* The highest methane content in the area of the Lipsky well was the Perdue well at 2.8 mg/L.

<sup>17</sup> In comparison, the levels detected for dissolved gases in the Lake Country Acres Public Water Supply Well No. 3 on March 22, 2001 were butane (0.307 mg/L), isobutane (0.316 mg/L) and propane (0.723 mg/L). *Ex. \_\_, Tab 13, p. 2.* In this public water supply well, propane concentration is 4.8 times higher than Lipsky, butane concentration is 11.4 times higher than Lipsky and the isobutane concentration is 28.7 times higher than Lipsky. Note: Methane and ethane concentrations were not measured by Lake Country Acres.

<sup>18</sup> Nor is there any explosivity issue since all concentrations are orders of magnitude below the LELs listed in Exhibit 87, and therefore insignificant. *V. 2, p. 162/3-164/21, Ex. 87.*

but Range has made arrangements, at Range's expense, to put a vent on this well as soon as possible. *V. 2, p. 183/21-185/2.*

- The soil gas survey was conducted to (1) identify whether there was an accumulation of gas in the shallow soils that might present a safety concern, and (2) determine the source of gas if there were elevated concentrations of gas. *V. 2, p. 155/19-156/10.*
- The soil gas readings did not come anywhere close to creating any sort of safety risk. *V. 2, p. 186/23-187/6.* The highest reading of methane was less than .2% of the LEL. *V. 2, p. 187/1-4.* An aerial map of the soil gas results show that they are randomly distributed and there is no plume that would indicate the gas is emanating from the Butler and Teal wells. *V. 2, p. 187/18-188/23, Ex. 97.*
- There is no evidence that the Teal or Butler wells are the source for groundwater contamination in this area. *V. 2, p. 189/22-190/3.* The most likely source of gas in area water wells is the Strawn formation. *V. 2, p. 192/23-193/2.*

In conclusion, Mr. Wheeler testified that (1) based on the results of the groundwater sampling and analysis, the groundwater is safe to drink, (2) there were no exceedances of human health risk-based standards, (3) there are no unsafe concentrations of natural gases found in the ambient air or in the shallow soils, (4) unsafe concentrations of gas in the headspace of water wells should be vented, and (5) there is no evidence that Range's wells had contributed to groundwater contamination. *V. 2, p. 189-190, Ex. 98.*

#### **IV. CONCLUSION AND PRAYER**

In order to reach scientifically valid conclusions, one must employ scientifically valid methods. You can not determine the color of an individual peanut M&M by testing for peanuts. Or, to use one of Dr. McCaffrey's analogies, a test for the presence of wings will determine whether the animal you are testing is a bird or a pig, but will not determine if the animal you are testing is a bird or a bat. To reach scientifically valid conclusions, one must employ scientifically valid methods.

The record in this proceeding is abundantly clear on the topic of who has used scientifically valid methods and who has not. Rather than design and implement a scientifically

valid test to determine the source of natural gas in the Lipsky water well, the EPA used incomplete and inconclusive data in an attempt to reach its and Alisa Rich's pre-ordained conclusion that Range and its Gas Wells were to blame and that the Commission had not fulfilled its regulatory responsibilities. The EPA's admissions of its own shortcomings in this regard speak volumes. *See Ex. 134 and Section II. H above.* In contrast, the record is equally clear that Range has made every effort to ensure that scientifically valid methods were employed by qualified experts to examine the issues that were the subject of the hearing notice, and that the results and conclusions were fully disclosed to the Commission.

For all of the reasons stated above, and based on the overwhelming evidence in this record, Range respectfully requests that the Commission's Final Order find that the following:

(1) that Range and its Gas Wells are not the source of gas in the Lipsky or Hayley water wells or any of the other area water wells;

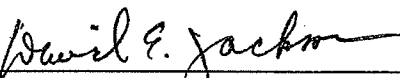
(2) that hydraulic fracturing and other oil and gas activities have not contributed in any way to the contamination of fresh water in this area, are not likely to contribute to contamination of fresh water, and are not the source for the natural gas found in the Lipsky well and other area water wells; and

(3) that the source of natural gas in the Lipsky well and other area water wells is not the Barnett Shale or oil and gas activities, but occurs through a natural geologic connection with the shallow gas-bearing Strawn formation, that is exacerbated by water wells that have been drilled too deep and into the Strawn.

Respectfully submitted,

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**CERTIFICATE OF SERVICE**

I hereby certify that a true and complete copy of the forgoing **Range Production Company's Closing Statement**, in Docket No. 7B-0268629, was served by e-mail, when address provided, and by regular mail on this the 4th day of February, 2011, to the following parties:

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