Rules Done Right: How Arkansas Brought Its Oil and Gas Law into a Horizontal World

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I. INTRODUCTION

The oil and gas industry in the United States is over 150 years old.[1] The Mansfield Gas Field in Sebastian and Scott Counties, Arkansas was discovered in 1902,[2] while the El Dorado, Arkansas oil boom started with the blowout of the Busey-Mitchell Armstrong No. 1 Well on January 10, 1921.[3] These early discoveries were seminal events, to be sure. They led to a century of conventional oil and gas production in Arkansas, which by the year 2000 had largely devolved to a few depleted but still-producing reservoirs.[4]

That all changed with the Shale Boom at the beginning of the twenty-first century.[5] We began to foresee exploitation of vast reserves of hydrocarbons in unconventional rock formations

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1. *See* DANIEL YERGIN, THE PRIZE: THE EPIC QUEST FOR OIL, MONEY & POWER 10-15 (paperback ed. 2008). "Colonel" Edwin Drake drilled his first oil well near Titusville, Pennsylvania in 1859. *Id.* at 11.

2. Ahne v. Reinhart & Donovan Co., 240 Ark. 691, 693, 401 S.W.2d 565, 567 (1966).

3. A.R. Buckalew & R.B. Buckalew, *The Discovery of Oil in South Arkansas, 1920–1924*, 33 ARK. HIST. Q. 195, 203-04 (1974).

4. For example, the Arkansas Oil and Gas Commission (AOGC) issued an average of 1068 well permits per year from 1981 to 1985, but the average from 1996 to 2000 declined to only 223 per year. *See* ARK. OIL & GAS COMM'N, ANNUAL REPORT OF PRODUCTION: 2013, at 7, *available at* http://www.aogc2.state.ar.us/OnlineData/reports/Annual_Report_of_Production_2013.pdf (showing the number of drilling permits issued from 1972 to 2012).

5. *See generally* LEONARDO MAUGERI, BELFER CTR. FOR SCI. & INT'L AFFAIRS, HARVARD KENNEDY SCH., THE SHALE OIL BOOM: A U.S. PHENOMENON (2013), *available at* http://belfercenter.ksg.harvard.edu/files/The%20US%20Shale%20Oil%20Boom%20Web.pdf (providing an in-depth study of the shale oil boom in the United States and suggesting that the large scale of such resources could make the United States the world's largest producer of oil within a few years).

such as shales.[6] Newly perfected horizontal drilling techniques, in combination with multiple-stage hydraulic fracturing, proved a true game-changer, transforming our domestic oil and gas outlook from bleak to bright.[7] This article explores how one state—Arkansas—successfully transitioned its regulation of oil and gas to accommodate changes in the industry, while preserving fidelity to the rationale for such regulation in the first place.[8] This article is, in part, a history written by a personal observer and sometimes participant in the process.[9] On another level, it may serve as an example for other states engaged in a similar transition.

Part II starts at the beginning, which, for the study of oil and gas law, is the common law "rule of capture."[10] After all, the implosion of the oil industry—triggered by the kind of destructive competition which is a natural consequence of the rule of capture—led to government regulation. Part III then traces the history of Act 105 of 1939, Arkansas's Oil and Gas Conservation Act (the "Conservation Act"), which began Arkansas's modern regulation of oil and gas production. Part IV discusses how subsequent legislation amended the Conservation Act to facilitate the regulatory changes to come. Finally, Part V explains how the AOGC has used its authority under the amended Conservation Act to promulgate regulations such as General Rule B-43 to control the horizontal well development of the Fayetteville Shale play in central Arkansas. All of this was accomplished while holding true to the underlying purposes of

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6. *See* NAT'L ENERGY TECH. LAB., MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 8-9 (2009), *available at* http://energy.gov/fe/downloads/modern-shale-gas-development-united-states-primer.

7. *Id.* at 9.

8. *See generally* Phillip E. Norvell, *Prelude to the Future of Shale Gas Development: Well Spacing and Integration for the Fayetteville Shale in Arkansas*, 49 WASHBURN L.J. 457 (2010) (providing an excellent, objective, and less-personal view on the same subject).

9. The author, who has practiced oil and gas law for approximately forty years, regularly appears before the AOGC. He was a primary draftsman of Act 964 of 2003, discussed in Part III and attached as Appendix A. He also participated in the AOGC's drafting of the rules regulating the Fayetteville Shale Play.

10. *See* YERGIN, *supra* note 1, at 16 ("[M]ost important in shaping the legal context of American oil production, and the very structure of the industry from the earliest days, was the 'rule of capture,' a doctrine based on English common law."); *see also* Thomas A. Daily & W. Christopher Barrier, *Well, Now, Ain't That Just Fugacious: A Basic Primer on Arkansas Oil and Gas Law*, 29 U. ARK. LITTLE ROCK L. REV. 211, 240 (2007) ("Oil and gas . . . are *fugacious* minerals. Like the fox, they are here today, gone tomorrow.").

the Conservation Act as originally written—to prevent waste and protect the correlative rights of all owners.

II. BEFORE REGULATION: CAPTURE OR BE CAPTURED FROM

Oil and gas are fugacious minerals.[11] Thus, their ownership is governed by the ancient common law rule of capture.[12] The rule of capture has long been a part of Arkansas law. In the 1912 case of *Osborn v. Arkansas Territorial Oil & Gas Co.*,[13] the Arkansas Supreme Court, quoting an earlier United States Supreme Court decision, stated:

> Petroleum, gas, and oil are substances of a peculiar character. . . . They belong to the owner of land, and are part of it so long as they are part of it or in it or subject to his control; but, when they escape and go into other land or come under another's control, the title of the former owner is gone. If an adjoining owner drills his own land and taps a deposit of oil or gas extending under his neighbor's field, so that it comes into his well, it becomes his property.[14]

More simply stated, every well owner has a legal right to keep everything his well can produce as long as it does not physically cross over onto a neighboring tract. But as a corollary, the neighbor also has a legal right to drill his own wells and capture oil and gas.[15]

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11. *See* WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY OF THE ENGLISH LANGUAGE UNABRIDGED 918 (Philip Babcock Gove ed., 1966) (defining "fugacious" as "of an unsubstantial nature," "not fixed in a certain place," or "wandering").

12. *See generally* Dylan O. Drummond et al., *The Rule of Capture in Texas—Still so Misunderstood After All These Years*, 37 TEX. TECH L. REV. 1 (2004) (providing an interesting history of the ancient origins of the rule); Bruce M. Kramer & Owen L. Anderson, *The Rule of Capture—An Oil and Gas Perspective*, 35 ENVTL. L. 899 (2005) (offering a thorough discussion of the application of the rule to oil and gas production).

13. 103 Ark. 175, 146 S.W. 122 (1912).

14. *Id.* at 180, 146 S.W. at 124 (omission in original) (quoting Brown v. Spilman, 155 U.S. 665, 669-70 (1895)) (internal quotation marks omitted). The *Osborn* decision misquoted the Court, but not in any material way.

15. This is called the "offset drilling" rule. *See* Daniel F. Sullivan, Annotation, *Implied Duty of Oil and Gas Lessee to Protect Against Drainage*, 18 A.L.R. 4TH 14 (1982).

The trouble is that the rule of capture, left to run amuck in this fashion, leads to a pretty dreadful end. Competition among drillers for limited oil and gas reserves inevitably led to an intolerable situation, as the above 1903 photograph of Spindletop's Boiler Avenue near Beaumont, Texas famously showed.[16] Not only were far more wells drilled than were needed to produce the recoverable oil,[17] excessively rapid production actually damaged the underground reservoir, reducing the ultimate recovery and causing large amounts of oil to be lost forever.[18] Of even greater concern to the industry was the resultant glut of oil, which led to a freefall in its price.[19] However, the industry was powerless to save itself.

16. *See* WALTER RUNDELL, JR., EARLY TEXAS OIL: A PHOTOGRAPHIC HISTORY, 1866–1936, at 43 (1977).

17. *See* YERGIN, *supra* note 1, at 70 ("Within months [of the first discovery of oil], there were 214 wells jammed in on the hill, owned by at least a hundred different companies . . . .").

18. *See* J. Scott Parker, *A Changing Landscape: Environmental Conditions and Consequences of the 1920s Union County Oil Booms*, 60 ARK. HIST. Q. 31, 42 (2001) ("At the end of the twentieth century, an estimated 70 percent of the *total* oil in the Smackover field remained underground and could not be recovered because of the loss of gas pressure.").

19. YERGIN, *supra* note 1, at 70 ("By midsummer of 1901, oil went for as little as three cents a barrel. By comparison, a cup of water cost five cents . . . .").

III. WHAT THIS PICTURE NEEDS: SOME GOVERNMENT INTERVENTION

In his history of oil's role in the world's economic development, author Daniel Yergin wrote:

> But who would control production? Was it to be done voluntarily or under the government's aegis? By the Federal government or by the states? Even within individual companies there were sharp debates. A major split developed within Jersey Standard, with Teagle in favor of voluntary control, while Farish, the head of the Humble subsidiary, concluded that the government had to be involved. "The industry is powerless to help itself," Farish wrote to Teagle in 1927. "We must have government help, permission to do things we cannot do today, and perhaps government prohibition of those things (such as waste of gas) that we are doing today." When Teagle suggested that "practical men" from the industry should develop a program of voluntary self-regulation, Farish replied sharply, "There is no one in the industry today who has sense enough or knows enough about it to work out this plan." He added, "I have come to the conclusion that there are more individual fools in the petroleum industry than in any other business."[20]

Texas and Oklahoma both attempted to place controls on oil production with limited success.[21] Oklahoma's law, enacted in 1915, empowered the Oklahoma Commerce Commission "to regulate oil production to match the market's demand, a power that was very explicitly denied to the Texas Railroad Commission."[22] Thus, most of Texas's efforts were declared invalid by federal courts.[23]

During this time, the world also sunk into the Great Depression, and in 1933, Franklin Roosevelt became President of the United States.[24] Roosevelt's New Deal addressed oil price and production controls.[25] The National Industrial Recovery Act, passed in 1933, gave the President the power to promulgate a Code of Fair Competition for the petroleum

20. *Id.* at 206 (quoting various authority).
21. *See id.* at 232-33.
22. *Id.* at 232; *see also* 1915 Okla. Sess. Laws 28 (relevant legislation).
23. YERGIN, *supra* note 1, at 232.
24. *Id.* at 235.
25. *See id.* at 237-38.

industry.[26] Roosevelt did just that, but in 1935, the United States Supreme Court declared his executive orders to be the result of an unconstitutional delegation of legislative authority.[27] Later that year, the Court held most of the remaining portions of the Act unconstitutional for the same reason, but also because the legislation purported to regulate interstate commerce while in reality regulating intrastate commerce.[28] Thus, regulation of oil and gas production became the province of the individual states.

On February 16, 1935, six states endorsed "an interstate compact to conserve oil and gas," and Congress gave its required consent to this action six months later.[29] A delegate appointed by the Governor represented Arkansas at the original 1935 formation of the compact and recommended that the state join, which it officially did through Act 86 of 1941.[30] One of the first projects of the compact was the drafting of a model conservation act for member states.[31]

This model legislation, and the conservation acts of the several states which patterned their own acts on the model, approached regulation of the oil and gas industry more expansively than mere price or production controls. Such laws modified the rule of capture by authorizing a state conservation agency to create drilling units, each originally intended to contain a single well, thus limiting the number of wells drilled to the number of wells needed.[32] Under the model legislation, all owners within such a unit were required to share the costs and production from the unit well, which obviated the need for a rule permitting offset drilling.[33] Conservation agencies were also empowered to control the location and spacing of unit wells to

26. National Industrial Recovery Act, ch. 90, § 3, 48 Stat. 195, 196 (1933).

27. Pan. Ref. Co. v. Ryan, 293 U.S. 388, 433 (1935).

28. *See* A.L.A. Schechter Poultry Corp. v. United States, 295 U.S. 495, 550-51 (1935).

29. H.R.J. Res. 407, 74th Cong. (1935) (identifying Colorado, Illinois, Kansas, New Mexico, Oklahoma, and Texas as ratifying states).

30. Act 86, 1941 Ark. Acts 179 (codified as amended at ARK. CODE ANN. §§ 15-72-901 to -904 (Repl. 2009)).

31. *See* Barth P. Jiggs Walker, *Discussion: A Model Oil and Gas Conservation Law*, 26 TUL. L. REV. 267, 267-68 (1952).

32. *Id.* at 281-83.

33. *See id.* at 283-85.

minimize uncompensated drainage between units.[34] Legislators expressly intended such laws to prevent waste and protect the correlative rights of the owners within a common pool of oil and/or gas.[35]

The correlative right of an owner to share a unit well is the statutory substitute for the right of offset drilling enjoyed by owners under common law. An owner's absolute right at common law to drill his own well—to capture back—contributed to the problem and, if preserved, would have undermined the statutory intent of preventing unnecessary wells. However, it would be unconscionable, and likely an unconstitutional taking, to deny him that right without giving him a new correlative right to own a fair share of the unit well.

State regulation must prevent two broad types of waste. Clearly, physical waste of oil and gas has occurred, but what about economic waste? An excessive number of wells results in excessive costs.[36] Producing oil or gas far in excess of market demand depresses prices and may be characterized as economic waste.[37] In this case, the waste is measured by the difference between the depressed sale price and the true value of the commodity.

Arkansas's own Conservation Act was passed as Act 105 of 1939.[38] As enacted, it resembled the original Interstate Oil and Gas Compact Model Act. The Conservation Act created a state administrative agency, the AOGC, with authority to regulate all aspects of oil and gas production.[39]

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34. Act 105, §§ 11(L)–(M), 14(C), 1939 Ark. Acts 219, 227, 231 (codified as amended at ARK. CODE ANN. §§ 15-71-110(d)(12)–(13), 15-72-302(c) (Repl. 2009)).

35. *See, e.g.*, ARK. CODE ANN. § 15-72-101 (Repl. 2009) ("In recognition of past, present, and imminent evils occurring in the production and use of oil and gas as a result of waste in the production and use thereof in the absence of coequal or correlative rights of owners . . . in a common source of supply . . . this law is enacted for the protection of public and private interests against such evils . . . .").

36. *See* Walker, *supra* note 31, at 273-79 (discussing the concept of waste in the context of the aforementioned model legislation).

37. *Id.* at 278-79.

38. Act 105, 1939 Ark. Acts 219 (codified as amended at ARK. CODE ANN. §§ 15-72-101 to -407 (Repl. 2009 & Supp. 2013)).

39. *See* ARK. CODE ANN. § 15-71-101 (Repl. 2009) (legislative creation); ARK. CODE ANN. § 15-71-110 (Repl. 2009) (legislative charge). The lone exception to the AOGC's authority to regulate is contained within section 14(B) of the Conservation Act, which exempted pools that prior to the effective date of the Act—February 20, 1939—had been developed to such an extent that it would have been impracticable to use a drilling unit at

The Conservation Act's preamble sets forth its objectives: "AN ACT to Prevent Waste, Foster, Encourage and Provide Conservation of Crude Oil and Natural Gas, and Products Thereof, and Protect the Vested, Co-Equal or Correlative Rights of Owners of Crude Oil or Natural Gas."[40] The drafters reiterated these objectives in section 1 of the Conservation Act:

> DECLARATION OF POLICY: In recognition of past, present, and imminent evils occurring in the production and use of oil and gas, as a result of waste in the production and use thereof in the absence of co-equal or correlative rights of owners of crude oil or natural gas in a common source of supply to produce and use the same, this law is enacted for the protection of public and private interests against such evils by prohibiting waste and compelling ratable production.[41]

"Waste" was defined to include "physical waste" and, indeed, the Conservation Act listed various types of physical waste the legislation sought to prevent.[42] This section of the Conservation Act failed to address economic waste. However, the Conservation Act granted the AOGC the authority "[t]o limit and prorate the production of oil or gas or both"[43] and made clear that the Conservation Act was to prevent the drilling of unnecessary wells.[44] So at least in those respects, the Conservation Act targeted economic waste as well.

Over the last seventy-five years, the Conservation Act has seen numerous amendments. One of those was accomplished in Act 964 of 2003.[45] Act 964 is of particular importance to the present discussion because it radically changed section 14's

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that stage. *See* Act 105, § 14(B), 1939 Ark. Acts 219, 230-31 (codified as amended at ARK. CODE ANN. § 15-72-302(b)(1) (Repl. 2009)).

40. Act 105, 1939 Ark. Acts 219, 219.

41. § 1, 1939 Ark. Acts at 219 (codified as amended at ARK. CODE ANN. § 15-72-101 (Repl. 2009)).

42. § 9(I), 1939 Ark. Acts at 223-24 (codified as amended at ARK. CODE ANN. § 15-72-102(15) (Repl. 2009)).

43. § 11(J), 1939 Ark. Acts at 227 (codified as amended at ARK. CODE ANN. § 15-71-110(d)(10) (Repl. 2009)).

44. § 14(B), 1939 Ark. Acts at 230-31 (codified as amended at ARK. CODE ANN. § 15-72-302(b)(1) (Repl. 2009)) ("For the prevention of waste and to avoid the augmenting and accumulation of risks arising from the drilling of an excessive number of wells, the Commission shall, after a hearing establish a drilling unit or units for each pool . . . .").

45. Act 964, 2003 Ark. Acts 3089 (amending ARK. CODE ANN. § 15-72-302).

definition of a drilling unit,[46] giving statutory legitimacy to that which has followed.

The Conservation Act initially defined a drilling unit as "the maximum area which may be efficiently and economically drained by one well."[47] This kind of statutory language inserts a geological element into the unit formation process. Certainly, the determination of drainage area, if done correctly, requires a thorough understanding of the geology and reservoir characteristics of the productive formation. Even then, a geologic interpretation once thought correct is often proven erroneous by subsequent drilling and newer data.

Such geology-based unit creation has never actually been done in north Arkansas. This area is home to the Arkoma Basin, once a prolific source of high-quality dry natural gas but no liquid hydrocarbons.[48] Its geology is locally complex, so drilling units were typically formed long before there was sufficient geological and engineering information available to properly make the required determination of unit size and placement. To further complicate the issue, multiple separate reservoirs at different depths underlie significant portions of the Arkoma Basin.[49] These reservoirs exhibit different porosities, permeabilities, and physical boundaries, requiring different unit configurations at different depths if the former statutory requirement had truly been observed.

Instead, the AOGC formed simple square units to cover all depths beneath the surface, which arguably failed to comply with the statute as it read at that time.[50] Nevertheless, those

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46. *See* § 1, 2003 Ark. Acts at 3090 (codified at ARK. CODE ANN. § 15-72-302(b)(2)(A) (Repl. 2009)).

47. Act 105, § 14(B), 1939 Ark. Acts 219, 231, *amended by* Act 964, § 1, 2003 Ark. Acts 3089, 3090; *see also* Appendix A, *infra* (redlined to show the effect of the 2003 amendment).

48. *See Natural Gas*, ARK. GEOLOGICAL SURV., http://www.geology.ar.gov/energy/natural_gas.htm (last visited Jan. 8, 2015) (describing the geology of the area).

49. *See id.*

50. *See, e.g.*, Gatti v. State *ex rel.* Dep't of Conservation, No. 2013 CA 0289, 2014 WL 3517548, at *1-2 (La. Ct. App. Jan. 15, 2014) (reversing summary dismissal of a challenge by mineral owners to the formation of 640-acre governmental section units with multiple wells permitted for production of natural gas from the Haynesville Shale Formation alleged to violate a "one well" provision in Louisiana's Conservation Act), *rev'd on other grounds*, Gatti v. State *ex rel.* Office of Conservation, 146 So. 3d 541 (La. 2014). This decision of the Louisiana Court of Appeals was later reversed by the Louisiana Supreme Court on procedural grounds, so the issue in Louisiana never reached adjudication on the merits. *See Gatti*, 146 So. 3d at 542.

square units facilitated the commingling of multiple pay-zones within depleted wellbores, thus extending the life of those wells and preventing the waste of gas caused by premature well plugging.

The units mostly coincided with Arkansas's approximately 640-acre governmental sections.[51] They underlie the surface so that the boundary of each coincides with the boundary of the next.[52] The AOGC has long displayed a strong aversion to leaving open acreage between units, often referred to as "windows."

The 2003 amendment legitimized these governmental section units. Because of the amendment, unit size and shape are no longer related to geology. Today, units are officially 640-acre governmental sections, and drainage area is immaterial.[53] Exceptions are permitted, but only upon "request[] by an owner, as defined in [section] 15-72-102."[54] This provision defines "owner" as a "person who has the right to drill . . . and to produce."[55]

Just as significant, the 2003 amendment expressly empowered the AOGC to authorize multiple-unit wells[56] and regulate their locations within units.[57] The previous statutory reference to "a single well" suggested that such authority may not have existed, though the AOGC was permitting some increased-density wells, particularly in highly faulted areas or reservoirs lacking permeability. Since the AOGC is now empowered to permit and control the locations of multiple-unit wells, it can regulate unit drainage as the geological and engineering understanding of a unit develops, rather than guessing how much a single well might drain on the front end.

Another important portion of the Conservation Act enabled the integration of non-consenting owners.[58] This section merely

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51. *See* 178-00-001 ARK. CODE R. B-43(f) (LexisNexis 2014).

52. *See* 178-00-001 ARK. CODE R. B-43(i)–(j).

53. *See* ARK. CODE ANN. § 15-72-302(b)(2)(A) (Repl. 2009).

54. ARK. CODE ANN. § 15-72-302(b)(2)(A).

55. ARK. CODE ANN. § 15-72-102(9) (Repl. 2009). This definition encompasses working interest owners.

56. These multiple-unit wells are sometimes called "increased-density wells."

57. Act 964, § 1, 2003 Ark. Acts 3089, 3090 (codified at ARK. CODE ANN. § 15-72-302(b)(2)(B) (Repl. 2009)).

58. Act 105, § 15, 1939 Ark. Acts 219, 232-34. This process is called "forced pooling" in many jurisdictions where it is permitted by statute.

provided that an operator, through integration, could recover the costs attributable to a non-consenting party's interest from production before the non-consenting party had a right to participate in the unit's well.[59] That limitation no longer exists because a 1963 amendment substantially rewrote the Conservation Act's integration sections.[60]

To summarize, since February 20, 1939, Arkansas oil and gas production has been regulated by the AOGC, operating under a law that became effective on that date. The process has been helped along by amending legislation, particularly those adopted in 1963 and 2003.[61] This is very important, because as our knowledge of how to extract oil and gas changed, something really big happened.

IV. WELCOME TO THE FAYETTEVILLE SHALE PLAY

In 1939, or for that matter even in 1989, Arkansas oil and gas professionals assumed that all recoverable oil and gas was trapped in porous, permeable reservoirs, usually composed of sandstone or limestone. If one drilled a well vertically into a propitious spot in one of those reservoirs, oil and/or gas would flow into your well and, figuratively, into your wallet. For a long time, that plan worked pretty well, but alas, we inevitably began running out of undrilled, propitious spots.

Fortunately, not all was lost. The oil and gas industry eventually learned a new and wonderful word—"unconventional." This word means shale, or some other extremely dense rock rich in hydrocarbons.[62] The critical characteristics of an unconventional reservoir are high organic content, conducive to the formation of oil and/or gas, but very low permeability.[63] Scientists long theorized that immense reserves of oil and gas were locked within unconventional rocks, but the industry lacked the ability to produce those reserves with conventional vertical well technology, making exploitation

59. § 15(A), 1939 Ark. Acts at 233.

60. *See* Act 536, 1963 Ark. Acts 1648 (codified as amended at ARK. CODE ANN. §§ 15-72-303 to -304 (Repl. 2009)).

61. *See* Act 964, 2003 Ark. Acts 3089; Act 536, 1963 Ark. Acts 1648.

62. *See* NAT'L ENERGY TECH. LAB., *supra* note 6, at 15. For example, the author has been told that the Eagleford "Shale" in south Texas is actually not a true shale, but rather a dense, organically rich limestone.

63. *See id.*

commercially impractical.[64] Science then came to the rescue. Around the start of the twenty-first century, the drilling industry perfected two processes—horizontal drilling and multiple-stage hydraulic fracturing, or fracking.[65] The recovery of oil and gas from unconventional rock formations using those techniques has created a genuine boom in domestic exploration and production.[66]

A recent morning headline read, "Despite Turmoil, Oil Prices Falling: Crude Ample on U.S. Output."[67] The author observed that ongoing conflicts in four of the word's prolific production areas—Iraq, Libya, Ukraine, and Gaza—along with a growing United States economy, were reasons why one might expect crude oil and gasoline prices to soar, yet the opposite had occurred.[68] The author then explained, "[w]hat's changed is the shale fracking boom."[69] In other words, greatly increased domestic output has made the United States economy nearly immune to such external forces.[70] The same article concluded with a summary from Adam Sieminski, the head of the Energy Information Administration: "It's a very positive story for consumers."[71]

Arkansas was not left out of this new game. A band of acreage which lies in an east-west line roughly north of Little Rock is underlain by a rock named the Fayetteville Shale.[72] Like the rest of north Arkansas's productive reservoirs, the Fayetteville Shale contains only natural gas without liquid

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64. *See id.* at 13.

65. *Id.* ("[T]he science of shale gas extraction has matured into a sophisticated process that utilizes horizontal drilling and sequenced, multi-stage hydraulic fracturing technologies.").

66. *See id.* (discussing the Barnett Shale and the Bakken Shale plays).

67. *Despite Turmoil, Oil Prices Falling: Crude Ample on U.S. Output*, ARK. DEMOCRAT GAZETTE, Aug. 14, 2014, at 1A.

68. *Id.*

69. *Id.*

70. *See id.*

71. *Id.* (internal quotation marks omitted). The Energy Information Administration is the statistical arm of the Department of Energy. *Id.*

72. NAT'L ENERGY TECH. LAB., *supra* note 6, at 19. The Fayetteville Shale is thus named because it outcrops at the surface near Fayetteville, Arkansas. Curiously, Southwestern Energy Corporation discovered the Fayetteville Shale's productive potential and is presently its leading producer. *See Fayetteville Shale*, OIL & GAS J., http://www.ogj.com/unconventional-resources/fayetteville-shale.html (last visited Jan. 8, 2015).

hydrocarbons.[73] Current natural gas prices are lower than oil prices per equivalent heating value, so the Fayetteville Shale is somewhat less attractive than similar formations from which oil may be recovered.[74] Nevertheless, it has proved profitable for the companies which have learned to extract natural gas efficiently.[75]

According to an earnings report for the second quarter of 2014, Southwestern Energy Company—the largest gas producer from the Fayetteville Shale—sold 243 billion cubic feet of natural gas recovered from the Fayetteville Shale during the first half of that year.[76] In the same period, the company's average realized gas price was $3.98 per thousand cubic feet.[77] That calculates to gross revenue of nearly a billion dollars, earned in only six months. If royalties are a mere one-eighth[78] of gross revenue, royalty owners of these Arkansas wells were paid more than $120 million on this production. Meanwhile, Southwestern Energy reported that it paid taxes[79] which averaged $0.11 per thousand cubic feet during the six-month period.[80] Assuming that Arkansas received a proportionate share of those taxes, the state treasury's half-year share from this one company exceeded $25 million—not bad for a little gas play in the Ozark Mountains. The AOGC's modern unconventional production rules contributed mightily to this success. In turn, the AOGC was enabled by the good ole Conservation Act, as amended by Act 964 of 2003. Here is how it all happened.

73. *See* NAT'L ENERGY TECH. LAB., *supra* note 6, at 19.

74. *Home Heating Oil Is Now Cheap, but Natural Gas Is Even Cheaper*, MARKET WATCH (Dec. 30, 2014, 8:35 AM), http://www.marketwatch.com/story/cheap-oil-who-cares-homeowners-prefer-natural-gas-2014-12-18.

75. *See* NAT'L ENERGY TECH. LAB., *supra* note 6, at 19 (describing how horizontal drilling and hydraulic fracturing techniques developed in the Barnett Shale play in Texas were employed to make the Fayetteville Shale play economical).

76. Press Release, Sw. Energy, Southwestern Energy Announces Second Quarter 2014 Financial and Operating Results (July 31, 2014), *available at* http://www.swn.com/investors/Press_Releases/2014/2Q_2014EarningsRelease.pdf.

77. *Id.*

78. Often, this number is actually somewhat higher. *See* Phillip E. Norvell, *Pitfalls in Developing Lands Burdened by Non-Participating Royalty: Calculating the Royalty Share and Coexisting with the Duty Owed to the Non-Participating Royalty Owner by the Executive Interest*, 48 ARK. L. REV. 933, 937 (1995).

79. Severance and gross production taxes, not income taxes, comprise the lion's share of this figure. *See* Press Release, Sw. Energy, *supra* note 76.

80. *See id.*

V. ARKANSAS'S REGULATORY SCHEME

A. General Rule B-43

The Conservation Act created the AOGC.[81] Thus, similar to virtually every other producing jurisdiction, Arkansas's hands-on regulation is done by this administrative agency under the authority granted by the Conservation Act, as well as more recent legislation.[82] Today, the AOGC regulates most aspects of the oil and gas exploration and production processes. This article concentrates on the aspect of its regulation which relates to the unconventional production from the Fayetteville Shale play.

Prior to the advent of the Fayetteville Shale play, unit configurations, well set-back requirements, and other requirements pertaining to drilling and production in Arkansas were governed by "field rules."[83] Field rules are simply a collection of AOGC orders which created drilling units in response to specific discoveries of oil and/or gas. Shortly after making a discovery of a previously unknown reservoir, an operator had to apply to the AOGC for the establishment of a field.[84] Each order issued in response to such an application created a new field.[85] Subsequent orders occasionally supplemented or amended those field rules. Such orders specified the lands to be included within the field, the size and pattern of the field's units, well-location provisions within the units, and other regulations applicable to wells within the field.

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81. Act 105, § 2, 1939 Ark. Acts 219, 219 (codified as amended at ARK. CODE ANN. § 15-71-101 (Repl. 2009)).

82. Administrative agencies are creatures of statute and cannot regulate beyond their specific statutory authority. *See* Dobson v. Ark. Oil & Gas Comm'n, 218 Ark. 160, 164-65, 235 S.W.2d 33, 36 (1950) (holding an AOGC order combining several producing units into a single, field-wide unit for a secondary recovery operation exceeded its statutory authority under the Conservation Act). The Arkansas General Assembly remedied this problem through Act 134 of 1951, which supplied the missing authority. *See* Act 134, 1951 Ark. Acts 286.

83. *See* 178-00-001 ARK. CODE R. A-3(f) (LexisNexis 2014) (providing the process by which field rules are established).

84. 178-00-001 ARK. CODE R. A-3(f). General Rule B-38 requires an application be submitted for the establishment of field rules no later than the earlier of six months following the initial completion of a new discovery well or after the drilling of three wells into the new reservoir. 178-00-001 ARK. CODE R. B-38(a) (LexisNexis 2014).

85. 178-00-001 ARK. CODE R. B-38 (LexisNexis 2014).

FIGURE 1: STANDARD TOWNSHIP AND RANGE TO DEMONSTRATE FIELD RULE EXTENSIONS

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Often, field rules provide for the field to consist of the units containing the discovery well(s) and "extensions thereto." This so-called "automatic extension" provision causes the field to expand, Scrabble-board style, as future development occurs. It works like this. Assume that the initial order provides for 640-acre governmental section units, the first of which, Section 15 of a standard township and range, contains the discovery well. As is shown in Figure 1, Section 15 is directly offset by Sections 10, 14, 22, and 16, with four corner offsets consisting of Sections 9, 11, 21, and 23. Each of these offsetting sections is a potential extension and thus is eligible to become part of the field if and when a well is completed in that offset. For example, assume that the next well is drilled in Section 11, a corner offsetting extension to Section 15. Completion of this well will then create a new group of eligible extensions—Sections 1, 2, 3, 12, and 13, which are offsets to Section 11. Of course, Sections 10, 14, and 15 are also offsets to Section 11, but Section 15 was already within the field and Sections 10 and 14 were already extensions. In the same fashion, as additional wells are completed, the field grows, as does the list of eligible extensions.

Sooner or later, development in the area becomes dense, and fields may grow so close together that some governmental sections become potential extensions to more than one field. Because the AOGC issued each set of field rules in response to its own individual application pertaining just to the field then at issue, field rules that pertained to different wells lacked complete uniformity.[86] Thus, in some cases, an operator may have been motivated to select one adjoining field over another because of some perceived advantage of one set of field rules. Of even more concern was the absence of certainty as to what rules would govern the next discovery until field rules were established for the new discovery.

This whole field rule business is long on tradition but short on good regulatory sense. It is certainly not mandated by statute. Rather, it operates in its current form because it was that way before, and no one bothered to change it. Fortunately, the AOGC found a better way for the Fayetteville Shale play. The AOGC anticipated the potential of new resource development and chose to depart from the field rule model in favor of General Rule B-43, which regulates nearly every aspect of unconventional resource development.[87]

General Rule B-43 was first adopted on October 16, 2006, shortly after the first commercial discoveries within the Fayetteville Shale area. It remains somewhat of a work in progress, having already been amended three times since its enactment.[88] It differs from the field rules of the past in that it provides a single source for the consistent regulation of an entire play instead of the piecemeal, well-by-well approach. This article now examines General Rule B-43, section-by-section.

86. If one needs to better understand the substance of the field rules of a particular well or prospective well, the field rules summary page of the AOGC website is the place to go. *See Field Rule Summaries*, ARK. OIL & GAS COMM'N, http://www.aogc2.state.ar.us/field_rule_summaries.htm (last visited Jan. 8, 2015). However, this page should only be used as a gateway to the actual field rule orders, which are also available on the website, since the "summaries" are prepared by non-lawyer staff members and may be incomplete or misleading.

87. *See* 178-00-001 ARK. CODE R. B-43 (LexisNexis 2014). All AOGC rules, including General Rule B-43, are available online at the AOGC's website. *See* ARK. OIL & GAS COMM'N, http://www.aogc.state.ar.us (last visited Jan. 8, 2015).

88. 178-00-001 ARK. CODE R. B-43 (LexisNexis 2014). The most recent amendment to General Rule B-43 became effective on August 1, 2014.

General Rule B-43 begins by defining "unconventional" and "conventional" sources of supply.[89] Unconventional sources include the Fayetteville Shale, the Moorefield Shale, the Chattanooga Shale, and "their stratigraphic shale equivalents."[90] Conventional sources are defined as everything else.[91]

General Rule B-43 then defines "section (c) lands"[92] and "section (d) lands."[93] Section (c) lands are "all occurrences of either conventional or unconventional sources of supply" in certain enumerated counties.[94] These counties include every county in Arkansas in which one of the three shale formations addressed by section (a) was thought to exist in the subsurface.[95] Section (d) lands cover four additional counties where the rule only applies to unconventional sources of supply.[96]

Section (e) abolished any fields within the section (c) lands which had been established for Fayetteville Shale production prior to the effective date of General Rule B-43 and deleted any mention of Fayetteville Shale from any field rules within section (d) lands where that formation had been added to previously existing field rules.[97] This makes sense—it is illogical to create a general rule to cover all production within the section (c) lands and unconventional production within the section (d) lands while leaving fragmented remnants of field rules within the same areas.

Section (f) establishes drilling units to be uniformly comprised of single governmental sections, each covering approximately 640 acres.[98] These units apply to all oil and gas production within the section (c) counties and to unconventional production within the section (d) counties.[99] Of course, sizing

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89. 178-00-001 ARK. CODE R. B-43(a)–(b).
90. 178-00-001 ARK. CODE R. B-43(a).
91. 178-00-001 ARK. CODE R. B-43(b).
92. 178-00-001 ARK. CODE R. B-43(c).
93. 178-00-001 ARK. CODE R. B-43(d) (LexisNexis 2014).
94. 178-00-001 ARK. CODE R. B-43(c).
95. 178-00-001 ARK. CODE R. B-43(c). This section appears, in hindsight, to be overly optimistic. Only about half of the listed counties actually contained commercial shale wells as of the time of this article's publication.
96. 178-00-001 ARK. CODE R. B-43(d). In these counties—Crawford, Franklin, Johnson, and Pope—considerable conventional production, covered by existing field rules, had already occurred.
97. 178-00-001 ARK. CODE R. B-43(e).
98. 178-00-001 ARK. CODE R. B-43(f) (LexisNexis 2014).
99. 178-00-001 ARK. CODE R. B-43(f).

units in this manner is in perfect harmony with the amended Conservation Act.[100] Section (f) also differentiates between an "exploratory drilling unit" and an "established drilling unit."[101] This distinction was made following changes by the amended Conservation Act to permit the establishment and integration of exploratory, or "wildcat," units prior to production.[102] Section (f) defines an established drilling unit as a unit which either contains a completed well or is contiguous to a unit containing a completed well.[103] Exploratory drilling units include all remaining units which are not yet established drilling units.[104]

Section (f) distinguishes between exploratory and established drilling because of Act 881 of 1985.[105] Act 881, which amended the Conservation Act, permitted the formation and integration of exploratory drilling units and contained a requirement that an integration application for such a unit be supported by owners possessing a minimum of 50% of the right to drill and produce from the proposed exploratory unit.[106] Thus, General Rule B-43 bifurcates its treatment of the integration process into sections (g) and (h), with the former pertaining to the integration of exploratory units and the latter pertaining to established units.[107]

As far as the integration itself is concerned, sections (g) and (h) are almost identical. The single difference is that section (g) contains the statutorily required 50% support as a prerequisite to filing an integration application in an exploratory unit, while

100. *See* ARK. CODE ANN. § 15-72-302(b)(2)(A) (Repl. 2009) ("'[D]rilling unit' means a single governmental section or the equivalent . . . .").

101. *See* 178-00-001 ARK. CODE R. B-43(f) (LexisNexis 2014) (internal quotation marks omitted).

102. Act 881, § 1, 1985 Ark. Acts 1833, 1834-35 (codified as amended at ARK. CODE ANN. § 15-72-302(e) (Repl. 2009)).

103. 178-00-001 ARK. CODE R. B-43(f) (LexisNexis 2014).

104. 178-00-001 ARK. CODE R. B-43(f). Arkansas Code Annotated section 15-72-302(e) does not define the term "exploratory drilling unit," presumably leaving that determination to the AOGC. Historically, the AOGC has considered any unit not containing a well, or any unit contiguous to one containing a well, to be exploratory. This makes sense because units containing completed wells were required to be covered by field rules shortly after completion, and the field rules regularly applied to extensions of the producing units within the field as discussed in connection with Figure 1, *supra*.

105. Act 881, 1985 Ark. Acts 1833.

106. § 1, 1985 Ark. Acts at 1834-35 (codified as amended at ARK. CODE ANN. § 15-72-302(e) (Repl. 2009)).

107. *See* 178-00-001 ARK. CODE R. B-43(g)–(h) (LexisNexis 2014).

section (h) permits any person or persons owning the right to drill and produce to file an application, without making any minimum acreage requirement.[108]

Sections (g) and (h) contain an identical subsection (1). Both subsections require an applicant for integration to state in its application that it has sent written notice of the application to all working interest owners of record within the drilling unit, along with a well proposal and an "Authorization for Expenditure."[109] The remaining subsections of sections (g) and (h) set out the process for the AOGC to determine who will be named unit operator in the event the owners fail to agree.[110] These provisions of sections (g) and (h) differ slightly, but both essentially provide for the same process. In either case, a party having the backing of the majority of the ownership within the unit is entitled to be named its operator.[111] The two sections differ slightly because, in the case of the exploratory unit, there is already a 50% support requirement for filing the application, so an applicant who meets that requirement will only lack a majority in the event of a tie.[112] Should that occur, the AOGC would determine operatorship after consideration of the evidence and "the factors it deems relevant."[113]

In the case of an established unit, there is no minimum support requirement to file an application, so there is no assurance that any party will be supported by a majority of the working interest ownership. Therefore, section (h) provides that the person with the support of a plurality of working interest owners, but less than a majority thereof, receives a presumption in favor of being named operator, subject to rebuttal after the AOGC considers the evidence and "the factors the Commission deems relevant."[114] Sections (g) and (h) also contain identical provisions requiring the person chosen as operator to commence

108. *Compare* 178-00-001 ARK. CODE R. B-43(g), *with* 178-00-001 ARK. CODE R. B-43(h).

109. 178-00-001 ARK. CODE R. B-43(g)(1), (h)(1). An Authorization for Expenditure is a detailed estimate of anticipated drilling and completion costs for the proposed well.

110. *See* 178-00-001 ARK. CODE R. B-43(g)(2)–(5), (h)(2)–(6).

111. 178-00-001 ARK. CODE R. B-43(g)(3), (h)(3).

112. 178-00-001 ARK. CODE R. B-43(g)(4) (LexisNexis 2014).

113. 178-00-001 ARK. CODE R. B-43(g)(4).

114. 178-00-001 ARK. CODE R. B-43(h)(4).

operations within twelve months of the date of the order or risk replacement.[115]

The integration process extends beyond General Rule B-43, of course, because it is utilized for both conventional and unconventional drilling throughout the state. The total process is governed by a combination of two statutes,[116] other AOGC Rules,[117] and the provisions of individual integration orders issued by the AOGC to the extent that a particular problem is not expressly addressed by General Rule B-43.

In every such case, the integration order will require each non-consenting owner to make an election.[118] Unleased mineral owners get three options:

(1) Lease to the unit operator on terms determined to be fair and reasonable by the AOGC;

(2) Participate in the costs of drilling, equipping, and producing the well; or

(3) Receive a one-eighth royalty on their proportionate interest in the well until and unless the other seven-eighths of the well's revenue equals a sum which is determined as follows: Drilling and equipping costs times X% plus operating costs times 100% ("X" is usually 400% or 500%, as determined by the AOGC, to compensate the operator for taking the financial risk of drilling the well).[119]

Under the final option, after this sum is recovered, each non-consenting owner becomes a participant in the well, proportionately entitled to share in future revenue and proportionately liable for future costs.[120] This option is called "going non-consent."

If an unleased mineral owner fails to affirmatively elect from the above options, he will be deemed to have selected the

115. 178-00-001 ARK. CODE R. B-43(g)(5), (h)(6).

116. ARK. CODE ANN. §§ 15-72-303 to -304 (Repl. 2009).

117. *See, e.g.*, 178-00-001 ARK. CODE R. A-1 to A-3 (LexisNexis 2014) (setting forth the procedural requirements for hearings in general and additional requirements for certain hearings).

118. *See* ARK. CODE ANN. § 15-72-304 (Repl. 2009).

119. *See* ARK. CODE ANN. § 15-72-304(b), (d).

120. *See* ARK. CODE ANN. § 15-72-304(d).

first option—the lease.[121] If a non-consenting working interest owner fails to affirmatively elect one of the three options, he will be deemed to have gone non-consent.[122]

The AOGC's integration order will require parties to conduct operations pursuant to a Joint Operating Agreement (JOA) approved by the AOGC. The AOGC's approved JOA is similar to the American Association of Petroleum Landmen (AAPL) Form 610-1982 Agreement, but it has been substantially amended to include many of the provisions of the AAPL's 1989 JOA form.[123] Integrated and unleased mineral owners who either affirmatively elect to lease or are deemed to have leased by default are bound by the form oil and gas lease approved by the AOGC.[124] Likewise, non-consenting owners are bound by the provisions of this standard JOA, and they are treated as though they elected to be carried non-consent pursuant to its provisions.[125]

Sections (i) and (j) of General Rule B-43 govern well spacing and well density within section (c) and section (d) lands.[126] Such regulation was enabled by the 2003 amendment to the Conservation Act, which gave the AOGC "continuing authority to: (i) Designate the number of wells that may be drilled and produced within a drilling unit; and (ii) Regulate the spacing among multiple wells drilled and produced within a

121. *See* ARK. CODE ANN. § 15-72-304(d) (Repl. 2009). The lease is generally on the same terms, including bonus, as the most favorable terms contracted for by any owner within the unit who leased in an arms-length transaction.

122. This discussion of integration alternatives assumes that, at the time of the hearing on the integration application, there is no well capable of commercial production within the unit, and thus the integration is authorized under Arkansas Code Annotated section 15-72-304(b). If there is such a completed well within the unit, Arkansas Code Annotated section 15-72-304(c) applies. In this case, any option to execute an oil and gas lease is merely voluntary on the part of the integrated unleased mineral owner and the default rule, should the owner fail to elect, is to be deemed non-consent. Additionally, it has recently become the practice of the AOGC to award the applicant only 100% recovery of costs from non-consenting interests as to wells completed prior to the hearing, allowing the recovery of the additional risk-factor penalty only on subsequently drilled wells.

123. *See* ARK. OIL & GAS COMM'N, MODEL FORM OPERATING AGREEMENT (n.d.), *available at* http://aogc2.state.ar.us/PDF/JOA%20Archive/JOA%2010-28-08.pdf.

124. *See* ARK. OIL & GAS COMM'N, OIL AND GAS LEASE (n.d.), *available at* http://aogc2.state.ar.us/PDF/JOA%20Archive/AOGC%20Lease.pdf.

125. *See* ARK. OIL & GAS COMM'N, *supra* note 123, at 5-6 (pertaining to operations conducted by less than all parties).

126. 178-00-001 ARK. CODE R. B-43(i)–(j) (LexisNexis 2014).

drilling unit."[127] In the case of unconventional sources of supply, wells are required to be at least 560 feet from unit boundaries.[128] Unconventional wells are also required, in most instances, to be located at least 560 feet away, at all points along their completed horizontal intervals, from all other wells completed within the same common source of supply.[129] Finally, section (i) contains a limitation of sixteen "wells" per unit for each unconventional common source of supply.[130] This provision has caused some problems of late because of the way that the AOGC interprets "wells," but the discussion of this matter[131] must logically wait until after our discussion of cross-unit wells.

Section (j) permits only one conventional well per unit, per conventional common source of supply and requires each conventional well to be at least 1120 feet from all unit boundaries unless a location exception is granted to permit a closer encroachment.[132] Exceptions to both the density and encroachment provisions of section (j) may be granted by the AOGC after a hearing.[133]

Sections (k), (*l*), (m), and (n) are mostly housekeeping provisions. Section (k) adopts the casing requirements set forth by the General Rules[134] for wells drilled under General Rule B-43.[135] Section (*l*) provides that conventional wells drilled on section (c) and section (d) lands are subject to AOGC General Rule D-16's provisions relating to annual well testing.[136] Unconventional wells are generally exempt from these testing requirements.[137] Testing is required in order to calculate

127. Act 964, § 1, 2003 Ark. Acts 3089, 3090 (codified at ARK. CODE ANN. § 15-72-302(b)(2)(B) (Repl. 2009)).

128. 178-00-001 ARK. CODE R. B-43(i)(1) (LexisNexis 2014). This provision is mostly obviated, however, by the ability of producers to drill shared cross-unit wells. Cross-unit wells will be discussed in connection with section (o). *See* Part V.B., *infra*.

129. 178-00-001 ARK. CODE R. B-43(i)(2) (LexisNexis 2014). The limitation upon spacing offsets between wells may be waived by approval of 100% of parties with the right to drill in any of the affected wells. 178-00-001 ARK. CODE R. B-43(i)(2).

130. 178-00-001 ARK. CODE R. B-43(i)(4).

131. *See* Part V.C., *infra* (discussing the "sixteen well" problem).

132. 178-00-001 ARK. CODE R. B-43(j) (LexisNexis 2014).

133. *See* 178-00-001 ARK. CODE R. B-43(j)(4).

134. 178-00-001 ARK. CODE R. B-15 (LexisNexis 2014).

135. 178-00-001 ARK. CODE R. B-43(k) (LexisNexis 2014).

136. 178-00-001 ARK. CODE R. B-43(*l*).

137. 178-00-001 ARK. CODE R. B-43(*l*).

production allowables for wells whose production is restricted by the AOGC.[138] For the most part, unconventional wells are entitled to produce without any allowable restriction.[139] Section (m) permits commingling of unconventional and conventional zones within a wellbore if approved pursuant to General Rule D-18, though that would then subject the commingled flow to a restricted production allowable if the previously separated conventional well was subject to such restriction prior to commingling.[140] Section (n) requires all wells within the B-43 area to file monthly production reports pursuant to General Rule D-8.[141]

In section (p), the AOGC retains jurisdiction to combine multiple governmental sections into a single larger unit if requested to do so by a majority of the working interest owners.[142] An important example of this is the Ozark Highlands Unit—a large unit within the General Rule B-43 area containing lands owned mostly by the federal government in the Ozark National Forest, along with some scattered private tracts.

In section (q), the AOGC reserves authority to form units which omit lands owned by a governmental agency which has refused to lease its interest.[143] The AOGC lacks the constitutional power to regulate the United States or the State of Arkansas. Thus, if the state or federal government owns lands which it will not lease, those interests cannot be integrated by the AOGC and would potentially be open interests within units. The AOGC solves this problem by "spacing out" the uncooperative government's interest. This process has been applied recently to remove the bed of Greers Ferry Lake—owned in fee by the federal government—from units containing

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138. *See* 178-00-001 ARK. CODE R. D-16 (LexisNexis 2014).

139. *See* 178-00-001 ARK. CODE R. B-43(*l*) (LexisNexis 2014). It is possible, however, that the AOGC would approve a location exception for an unconventional well to be located closer than 560 feet from a unit boundary and, as a condition thereof, restrict its production allowable. In that case, the General Rule D-16 testing and reporting requirements would apply to that well. Such cases are rare.

140. *See* 178-00-001 ARK. CODE R. B-43(m).

141. 178-00-001 ARK. CODE R. B-43(n).

142. 178-00-001 ARK. CODE R. B-43(p).

143. 178-00-001 ARK. CODE R. B-43(q).

portions of the lake which the government has refused to even discuss leasing.[144]

B. Shared Cross-Unit Wells: Thinking Outside the Box

Arkansas Code Annotated section 15-72-302(c) requires all wells to be drilled at locations in conformity with AOGC rules and authorizes the AOGC to make an exception to the rules if such exception "is likely to prevent waste or protect correlative rights of owners within the unit, or both."[145] The provision then states that the AOGC shall take action to offset any advantage that the person securing the exception may have over other producers as a result thereof.[146] In other words, while there is no express right of offset drilling under the law, if the AOGC permits one unit's well to encroach upon an adjoining unit, the AOGC must act to prevent any unfair drainage from one unit to another. For decades, the AOGC handled the problem by penalizing the production allowable of any well which encroached upon a neighboring unit, theoretically reducing or eliminating offset drainage.[147] Often, the AOGC also permitted the neighboring unit's operator to drill an approximately equidistant offsetting well.

Because of the nearly nonexistent native permeability of the Fayetteville Shale, virtually all wells within the General Rule B-43 area are horizontal wells. The "location" of a horizontal well, for spacing purposes, is defined by General Rule B-3 as every point along the well's completed interval.[148] Section (i) requires unconventional well locations, as thus defined, to be at least 560 feet apart[149] and at least 560 feet from all unit

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144. *See* ARK. OIL & GAS COMM'N, ORDER NO. 270-2013-12: OMISSION OF CERTAIN LANDS FROM A DRILLING UNIT 1-2 (2014), *available at* http://www.aogc2.state.ar.us/Hearing%20Orders/2014/January/270-2013-12.pdf.

145. ARK. CODE ANN. § 15-72-302(c)(1) (Repl. 2009).

146. ARK. CODE ANN. § 15-72-302(c)(2).

147. *See* 178-00-001 ARK. CODE R. B-40 (LexisNexis 2014).

148. 178-00-001 ARK. CODE R. B-3(a) (LexisNexis 2014). This definition encompasses the line connecting the heel perforation with the toe perforation, as well as every point in between.

149. 178-00-001 ARK. CODE R. B-43(i)(2) (LexisNexis 2014). Wells which do not cross or encroach upon unit boundaries are allowed to be 448 feet apart, but, as discussed below, only a small percentage of wells drilled today neither cross nor encroach upon unit boundaries. *See* 178-00-001 ARK. CODE R. B-43(i)(3) (providing the 448-foot spacing exception).

boundaries.[150] This spacing restriction would prohibit many of the horizontal wells of today, some of which are almost two miles in length. Moreover, a 560-foot offset from all unit boundaries, observed on both sides of the common unit line, requires wells separated by that line to be, at a minimum, 1120 feet apart—a distance likely to leave considerable gas stranded along the unit boundary. This unrecoverable gas would thus be wasted, a violation of a principal purpose of the Conservation Act.[151] Of course, the AOGC could grant location exceptions for penalized equidistant encroaching wells to be drilled on either side of the unit line, but some of those would likely be unnecessary wells. What is really needed is a well drilled right on the unit line.

Fortunately, General Rule B-43(o) satisfies the statutory requirement in a better way by permitting the drilling and production of cross-unit wells, which are then shared by the units affected by them.[152] Cross-unit wells are very good things. They are located where they can maximize total recovery from the reservoir while fully protecting the correlative rights of the owners in all affected units. We should be proud that they were invented in Arkansas and that much of the economic success of the Fayetteville Shale play can be attributed, at least in part, to their widespread use.

Here is how the cross-unit well works. Notwithstanding the aforementioned 560-foot unit boundary setback, a well which encroaches upon, or even crosses, a unit boundary may be permitted as a shared cross-unit well.[153] In order to determine the sharing formula between the participating units, we draw an elongated, circle-like figure[154] exactly 560 feet from the horizontal wellbore, as defined by General Rule B-43.[155] The resultant figure somewhat resembles a Band-Aid, so the picture has been called a "Band-Aid Map." Next, engineers calculate the entire acreage within the Band-Aid as well as the acreage of

150. 178-00-001 ARK. CODE R. B-43(i)(1).

151. *See* Act 105, § 1, 1939 Ark. Acts 219, 219 ("[T]his law is enacted for the protection of public and private interests against such evils by prohibiting waste and compelling ratable production.").

152. 178-00-001 ARK. CODE R. B-43(o) (LexisNexis 2014).

153. 178-00-001 ARK. CODE R. B-43(o).

154. This figure is technically called an ellipse.

155. *See* 178-00-001 ARK. CODE R. B-43(o)(2)(E) (LexisNexis 2014).

each affected unit within the Band-Aid.[156] Finally, simple division of each unit's acreage within the Band-Aid by the Band-Aid's total acreage yields that unit's share of the costs and production of the cross-unit well.[157] Figure 2, which is an actual Band-Aid Map on file with the AOGC, illustrates this concept. The well depicted in Figure 2 is drilled from a surface location in the extreme southwest corner of Section 25 to a final bottom-hole location just barely inside the southeast quarter of Section 23. The well's heel perforation is located in the southeast corner of Section 26 (there are no actual perforations in Section 25). The horizontal wellbore then traverses a line which is barely inside Sections 23 and 26, almost touching the boundary between Sections 25 and 26 and between Sections 23 and 24. This well could not be drilled in conformance with General Rule B-43(i), but it is authorized as a cross-unit well by General Rule B-43(o). The well's total perforated interval length[158] is 4388.63 feet. Figure 2 shows the well's Band-Aid, along with its 560-foot radius. The Band-Aid's calculated area is 138.41 acres, which is the sum of the total acreage within each of the four units which contribute to the Band-Aid, allowing us to make our simple divisions and calculate the percentage allocation of the well among the four units.[159]

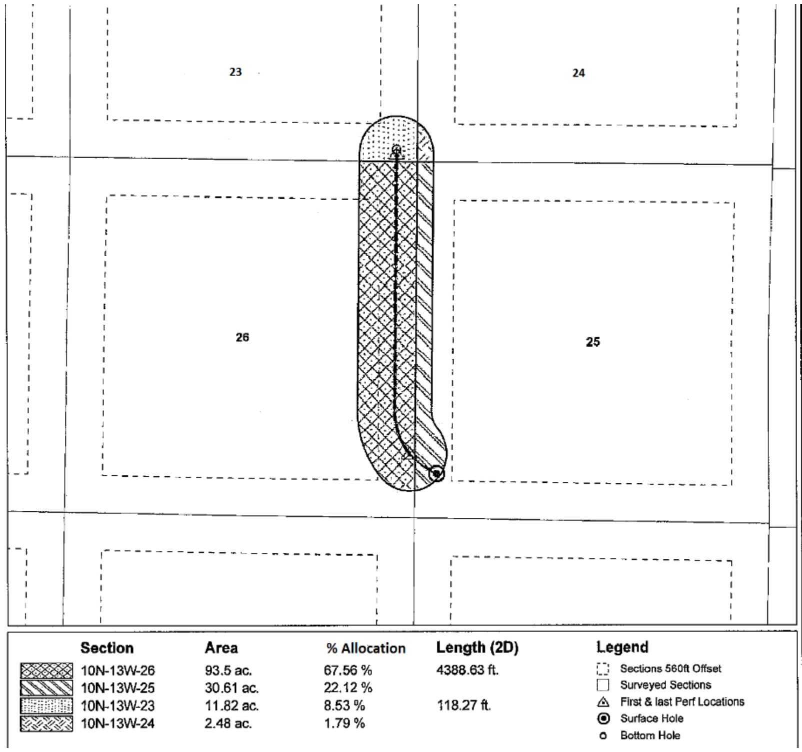
156. 178-00-001 ARK. CODE R. B-43(o)(2)(E).

157. 178-00-001 ARK. CODE R. B-43(o)(2)(E).

158. The total perforated interval length is the distance from the first toe perforation of the casing back to the last heel perforation.

159. Note that the cross-unit well is shared among the units underlying the Band-Aid according to the sharing formula. Unit owners outside of the Band-Aid share in that unit's portion of the well along with owners within the Band-Aid proportionate to their respective unit interests. The Band-Aid area does not become a down-sized unit for the well. Thus, the process complies with Arkansas Code Annotated section 15-72-302(b)(2)(A), which states that a unit, once formed, will constitute a unit for as long as there is commercial production therefrom. *See* ARK. CODE ANN. § 15-72-302(b)(2)(A) (Repl. 2009).

FIGURE 2: CROSS-UNIT WELL BAND-AID MAP



Since the adoption of General Rule B-43, other states have authorized cross-unit wells.[160] However, most of these states calculate the sharing formula based upon a simple proration of the line of the wellbore, rather than by allocating according to a Band-Aid.[161] The Arkansas method is superior. The line-based, cross-unit method permits a unit line to be crossed but does not deal with non-line-crossing encroachments. If we were to use a proration of only the line traversing the perforated interval in Figure 2, no allocation would be given to Section 24 or 25. Then, because of the well's extreme encroachment upon a unit boundary, the well would violate spacing rules. We would be stuck trying to conform our wells not to subsurface geology, surface topography, and/or cultural considerations, but rather to

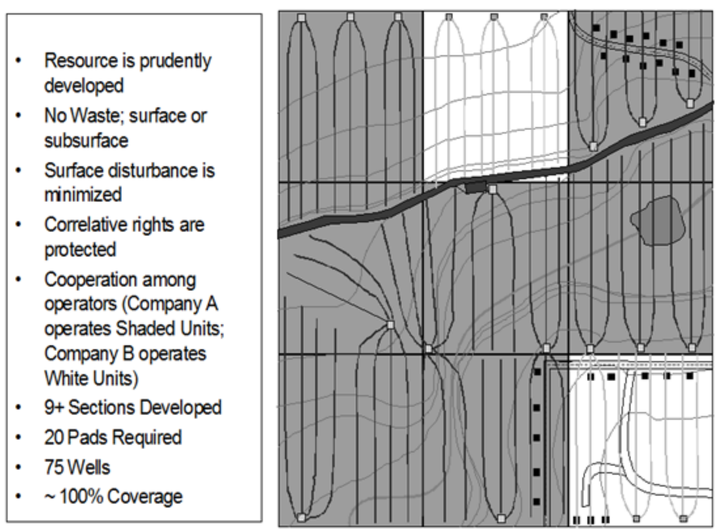
160. *See, e.g.*, OKLA. STAT. ANN. tit. 52, §§ 87.6–.9 (West 2014) ("2011 Shale Reservoir Development Act").

161. *See, e.g.*, OKLA. STAT. ANN. tit. 52, § 87.8 (West 2014).

an artificial spacing pattern designed to keep wells away from boundaries. Wells need to be located where they do the most good, in an engineering sense, with the least adverse impact on the surface estate. The Band-Aid does it better.

Similarly, line-based sharing of cross-unit wells only works when wells are drilled with near-polar orientation, either north-to-south or east-to-west, parallel and perpendicular to governmental section boundaries. Some geologists and engineers believe a different orientation, like northwest-to-southeast, in the natural fracturing pattern results in better production in the shales of certain areas. That is easy with the Band-Aid but not so with the line.

FIGURE 3: THE END OF THE GAME PICTURE



It is obvious that the cross-unit well in Arkansas is a great invention that is here to stay. According to AOGC records, more than 85% of all wells permitted to be drilled in the Fayetteville Shale play today are cross-unit wells.[162] Figure 3 shows what the result looks like.

162. *See* SHANE E. KHOURY, FRACKING AND DEEP INJECTION WELLS IN ARKANSAS: STATE OF THE STATE 49 (2012), *available at* https://www.uaex.edu/environment-nature/water/docs/4_Khoury_Hydraulic_Fracturing.pdf. This is a pretty conservative number,

C. The Sixteen-Well Problem: Nothing is Perfect

In most respects, General Rule B-43 is a model of intelligent modern regulation of today's shale boom, but it is not quite perfect. In the above discussion of section (i) of General Rule B-43, the part relating to its limit of sixteen "wells" per unit, per common source of supply was deferred. The sixteen-well problem is complicated. General Rule B-43 section (i) defers to section (a)(2) of General Rule B-3 for the definition of a well's location.[163] The "location," as defined therein, means every point along a well's perforated interval.[164] This would not be a problem without cross-unit wells, but of course they exist in Arkansas and have proved a positive development. However, each cross-unit well will be counted against the sixteen-well limit in every unit penetrated by its perforated interval.[165] Incongruously, only the actual perforated wellbore is considered. In the process of counting wells, the Band-Aid is ignored altogether.

Thus, the well shown in Figure 2—which has its perforated interval mostly within Section 26 but has a short segment within Section 23—is counted against the sixteen-well limit of both Sections. However, it is not counted at all against Section 25, which owns 22.12% of the well's production, or Section 24, which owns a much smaller share.

Clearly, the AOGC has the statutory authority to limit the number of wells to be drilled within a unit,[166] but does the sixteen-well limitation prevent waste or protect correlative rights? At first blush, it might be viewed as a rule which prevents excessive well density. But is it? General Rule B-43 already requires wellbores to be 560 feet apart unless the AOGC grants a location exception.[167] Viewed as a limitation upon well density, the sixteen-well rule is redundant. Moreover, it arbitrarily punishes units which are developed by multiple short segments of shared horizontal wells. The well in Figure 2 is a

actually. The AOGC calculated this figure by comparing the number of wells drilled in the Fayetteville Shale area with the number of Form 25 filings for administrative approval of cross-unit wells, both for 2011. Since some cross-unit wells are approved at AOGC hearings, rather than by Form 25, the percentage is likely somewhat higher.

163. 178-00-001 ARK. CODE R. B-43(i) (LexisNexis 2014).

164. 178-00-001 ARK. CODE R. B-3(a)(2)(C) (LexisNexis 2014).

165. *See* 178-00-001 ARK. CODE R. B-43(i) (LexisNexis 2014).

166. *See* ARK. CODE ANN. § 15-72-302(b)(2)(B) (Repl. 2009).

167. 178-00-001 ARK. CODE R. B-43(i)(2) (LexisNexis 2014).

perfect example of this. The perforated wellbore extends only a few feet into Section 23, yet it counts against that Section's limit of sixteen.

Nor does the sixteen-well rule appear to protect the correlative rights of any party. Even though it is accepted that protection of the surface is within the power of the AOGC, the rule has nothing to do with surface use. A well is counted as one of the sixteen, regardless of whether its surface location is in the unit or not.

So far, the AOGC has declined to consider changing or abolishing this rule, despite its apparent lack of a valid purpose. Fortunately, however, the Commission has granted exceptions to the rule when it has been shown that a significant portion of a unit would otherwise go undeveloped.

D. Other Important AOGC Rules

General Rule B-43 is certainly not the only place where the AOGC has revised its rulebook to deal with unconventional production or horizontal wells. Indeed, the AOGC recently reviewed all of its rules and amended many to apply appropriately to horizontal development.

General Rule B-19, which regulates fracking, is a relatively new rule requiring hydraulic fracturing treatments to be performed only by AOGC-licensed contractors.[168] General Rule B-19 also regulates each frack job, requiring that it be designed to protect fresh water supplies.[169] General Rule B-19 also requires the person conducting the frack job to file a list of all additives which will be included within frack fluids.[170] The composition of frack fluid is generally considered a confidential trade secret, except in the case where exact and complete information might be needed for medical treatment of a person who may have been injured by contact with any frack fluid or component thereof.[171]

Hydraulic fracture treatments require the injection of large quantities of water, with additives, into a wellbore.[172] When this

168. *See* 178-00-001 ARK. CODE R. B-19(m) (LexisNexis 2014).
169. 178-00-001 ARK. CODE R. B-19(e).
170. 178-00-001 ARK. CODE R. B-19(m)(4).
171. 178-00-001 ARK. CODE R. B-19(m)(5).
172. NAT'L ENERGY TECH. LAB., *supra* note 6, at 56.

water is then recovered during early production, it must be disposed or recycled for use in future fracking.[173] Recycling is good, of course, but some of this used water must be disposed. Most often, it is returned to the deep subsurface by what are known as Saltwater Disposal (SWD) wells.[174] These are regulated by General Rules H-1, H-2, and H-3. General Rule H-1 covers the permitting process for all SWD wells.[175] Importantly, it also creates a Moratorium Zone where SWD wells are prohibited due to suspected seismic activity associated with certain deep faults.[176] These faults might be stimulated by deep saltwater injections immediately above and could thus create earthquake activity.[177]

VI. CONCLUSION

Arkansas's early regulatory development was fairly typical of that in a number of other producing jurisdictions. Like many of these jurisdictions, it was largely based upon early conservation legislation, the provisions of which were not always rigidly followed. However, unlike some other states, Arkansas providently amended its own Conservation Act in time to enable regulators to keep pace with changes in the industry. Most importantly, the 2003 amendment of Arkansas Code Annotated section 15-72-302 redefined the unit and expressly authorized multiple-unit wells. Then, when the Fayetteville Shale play began, the AOGC acted promptly to take its regulation in a different direction from that used for previous conventional drilling and production and, in so doing, designed General Rule B-43, which is a model worth copying elsewhere.

The shared cross-unit well, done "Arkansas-style" with a Band-Aid, is a legal invention that is nearly as important as the scientific developments that inspired it. Incorporating an operating agreement and default lease terms into an integration order, rather than leaving the parties as common law cotenants, is another example of improved regulation. All in all,

173. 178-00-001 ARK. CODE R. B-19(k) (LexisNexis 2014) (referencing the disposal and recycling provisions of General Rules B-17, E-3, H-1, H-2, and H-3).

174. *See* 178-00-001 ARK. CODE R. H-1(a) (LexisNexis 2014) (defining "Class II Fluids" and "Class II Disposal Well").

175. 178-00-001 ARK. CODE R. H-1.

176. 178-00-001 ARK. CODE R. H-1(s).

177. 178-00-001 ARK. CODE R. H-1(s).

Arkansas's regulation of the unconventional, while not yet perfect, is very good.

As was observed at the beginning of this article, oil and gas development is constantly evolving as technology advances. While regulation of the industry will remain vital tomorrow, regulation must have the ability to adapt. Otherwise, we risk allowing our regulations to hamper technological innovation. For the most part, Arkansas has become a leader in the transition of its regulatory environment to accommodate the industry's shift to unconventional reservoir development. Inevitably, the future will see more technological advances. The challenge then will be to continue to adapt regulation to exploit, rather than hamper, future developments, whatever they turn out to be, while still preventing waste and protecting the correlative rights of all interested parties.

APPENDIX A

Act 964 of 2003

For An Act To Be Entitled
AN ACT TO AMEND ARKANSAS CODE § 15-72-302 PERTAINING TO WELL DRILLING UNITS; AND FOR OTHER PURPOSES.

Subtitle
AN ACT TO AMEND ARKANSAS CODE § 15-72-302 PERTAINING TO WELL DRILLING UNITS; AND FOR OTHER PURPOSES.

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF ARKANSAS:

SECTION 1. Arkansas Code § 15-72-302 is amended to read as follows:

15-72-302. Just and equitable shares—Preventing waste, avoiding risks, etc.—Drilling units.

(a) Whether or not the total production from a pool is limited or prorated, no rule, regulation, or order of the Oil and Gas Commission shall be such in terms or effect:

(1) That it shall be necessary at any time for the producer from, or the owner of, a tract of land in the pool, in order that he may obtain the tract's just and equitable share of the production of the pool, as the share is set forth in this section, to drill and operate any well or wells on the tract in addition to the well or wells as can without waste produce the share; or

(2) As to occasion net drainage from a tract unless there is drilled and operated upon the tract a well or wells in addition to the wells thereon as can without waste produce the tract's just and equitable share, as set forth in this section, of the production of the pool.

(b)(1) For the prevention of waste and to avoid the augmenting and accumulation of risks arising from the drilling of an excessive number of wells, the commission shall, after a hearing, establish a drilling unit or units for each pool, except in those pools which, prior to February 20, 1939, have been developed to an extent and where conditions are such that it would be impracticable or unreasonable to use a drilling unit at the present stage of development.

(2)(A) ~~As used in this subchapter, unless the context otherwise requires, "drilling unit" means the maximum area which may be efficiently and economically drained by one (1) well,~~ As used in this subchapter, unless the context otherwise requires, "drilling unit" means a single governmental section or the equivalent, unless a larger or smaller area is requested by an owner, as defined in § 15-72-102, within the drilling unit to be established and a larger or smaller area is established by order of the commission, and the drilling unit shall constitute a developed unit as long as a well is located thereon which is capable of producing oil or gas in paying quantities.

(B) The commission shall have the continuing authority to:

(i) Designate the number of wells that may be drilled and produced within a drilling unit; and

(ii) Regulate the spacing among multiple wells drilled and produced within a drilling unit.

(c)(1) Each well permitted to be drilled upon any drilling unit shall be drilled ~~approximately in the center thereof~~ at a location that is in compliance with rules adopted by the commission, with such exception as may be reasonably necessary where it is shown, after notice and upon[178] hearing, and the commission finds, that ~~the unit is partly outside the pool or, for some other reason, a well approximately in the center of the unit would be nonproductive or where topographical conditions are such as to make the drilling approximately in the center of the unit unduly burdensome~~ a well drilled at a different location is likely to prevent waste or protect correlative rights of owners within the unit, or both.

178. Act 1175 of 2009 struck the word "upon" and replaced it with "an opportunity for a." *See* Act 1175, § 15, 2009 Ark. Acts 5679, 5688.

(2) Whenever an exception is granted, the commission shall take action to offset any advantage which the person securing the exception may have over other producers by reason of the drilling of the well as an exception, and so that drainage from developed units to the tract with respect to which the exception is granted will be prevented or minimized and the producer of the well drilled as an exception will be allowed to produce no more than his just and equitable share of the oil and gas in the pool, as such share is set forth in this section.

(d)(1) Subject to the reasonable requirements for prevention of waste, a producer's just and equitable share of the oil and gas in the pool, also sometimes referred to as a tract's just and equitable share, is that part of the authorized production for the pool, whether it is the total which could be produced without any restriction on the amount of production, or whether it is an amount less than that which the pool could produce if no restriction on amount were imposed, which is substantially in the proportion that the quantity of recoverable oil and gas in the developed area of his tract in the pool bears to the recoverable oil and gas in the total developed area of the pool, insofar as these amounts can be practically ascertained.

(2) To that end, the rules, regulations, permits, and orders of the commission shall be such as will prevent or minimize reasonably avoidable net drainage from each developed unit, that is, drainage which is not equalized by counter drainage, and will give to each producer the opportunity to use his just and equitable share of the reservoir energy.

(e)(1) The commission may, after public hearing held pursuant to notice given as required by law and by any rules or orders of the commission, establish a drilling unit as defined in subsection (b) of this section for an exploratory well to be drilled therein.

(2) Any drilling unit so established shall be comprised of a governmental section or the equivalent thereof, unless a larger or smaller area is requested by an owner, as defined in § 15-72-102, within the drilling unit to be established and a larger or smaller area is established by order of the commission, determined by the commission to be prospective of oil or gas, or both, and the commission shall have the authority

to integrate separately owned tracts embraced therein when the owners thereof fail or refuse voluntarily to do so, provided that persons who own at least an undivided fifty percent (50%) interest in the right to drill and produce oil or gas, or both, from the total proposed unit area agree thereto.

(3) However, any such order of the commission and drilling unit as established for exploratory purposes thereunder shall remain in force for a period no longer than the later of one (1) year following the effective date thereof or one (1) year following the cessation of drilling operations or production within the unit, whereupon the order of the commission and the provisions thereof shall automatically terminate.