



1-1-2014

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Pierce, David E. (2014) "Resolving Intra-Reservoir Horizontal Drilling Conflicts Using a Reservoir Community Analysis," *North Dakota Law Review*: Vol. 90 : No. 2 , Article 2.
Available at: <https://commons.und.edu/ndlr/vol90/iss2/2>

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RESOLVING INTRA-RESERVOIR HORIZONTAL DRILLING CONFLICTS USING A RESERVOIR COMMUNITY ANALYSIS

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ABSTRACT

When an owner's activities within an oil and gas reservoir physically invade the portion of the reservoir owned by its neighbors, the immediate response is "trespass." The trespass response is based upon the extension of surface property lines to define rights to subsurface geologic structures. The basic flaw with this analysis is that the oil and gas reservoir is an interconnected geologic system that cannot be divided into segregated parts. Instead, each owner has collective as well as individual rights in the reservoir. This article identifies the collective rights of reservoir owners and the reservoir community analysis used to distinguish appropriate from inappropriate use of the reservoir. These rights, and the reservoir community analysis, will be illustrated by applying them to cross-boundary intra-reservoir issues associated with hydraulic fracturing. The first are frac fissures that invade neighboring portions of the reservoir. The second are frac pressures that invade neighboring portions of the reservoir and sometimes disrupt existing production operations.

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I. INTRODUCTION

Each oil and gas reservoir comprises a community of owners.¹ Members of the community own discrete portions of the reservoir that are

1. As used in this article the term “reservoir” consists of an interconnected rock structure under pressure. JOHN S. LOWE, ET AL., *CASES AND MATERIALS ON OIL AND GAS LAW* 21 (6th ed. 2013).

defined by surface boundaries.² Their ownership includes exclusive rights plus non-exclusive rights held in common with other community members. Because of the interconnected nature of the reservoir, no individual member of the community has exclusive possession of its portion of the reservoir. Although not a cotenancy, each owner possesses correlative rights in the reservoir that confer collective reservoir rights as well as individual rights.³

This article identifies the two categories of correlative rights held by each owner in a reservoir by defining those things each owner has a right to do in a reservoir, called “positive” rights. And those things no owner has a right to do in a reservoir, called “negative” rights. The positive rights are also described as “possessory” because the owner will often have the right to possess portions of the reservoir that extend beyond its portion of the reservoir. The negative rights are non-possessory because the “right” is actually a prohibition against doing anything within an owner’s portion of the reservoir that is detrimental to the reservoir community.

The positive possessory rights of reservoir owners remain undefined. The focus to date has been solely upon the negative non-possessory rights that impose liability on community members that harm the reservoir community.⁴ This article advocates a “reservoir community analysis” that assists in defining positive possessory reservoir rights and in distinguishing acceptable from unacceptable conduct within the confines of the reservoir.

II. *AD COELUM* OWNERSHIP AND ITS TRESPASS REMEDY MODEL

Courts have defined reservoir rights by using an *ad coelum* analysis based upon surface boundaries.⁵ The North Dakota Territorial Supreme Court, in *Duggan v. Davey*,⁶ observed: “The ownership and possession of the soil extended to the center of the earth, and *usque ad coelum*, and

2. As will be seen, the individual properties are discrete only to the extent that surface boundaries create property lines that are projected into the subsurface area that consists of an oil and gas reservoir.

3. The North Dakota Supreme Court has described “correlative rights” as “interdependent rights and duties of each landowner in the common source of supply.” *Hystad v. Indus. Comm’n*, 389 N.W.2d 590, 596 (N.D. 1986). Conceptually the parties exist in a sort of condominium environment where each owner possesses certain rights that are more individual while other rights are more collective.

4. *See, e.g., Eliff v. Texon Drilling Co.*, 210 S.W.2d 558, 562-63 (Tex. 1948) (drainage not protected by the rule of capture when caused by negligent operations on discrete portion of reservoir resulting in damage to the reservoir community).

5. The complete maxim is: *cujus est solum ejus est usque ad coelum et ad inferos*, which is translated: “To whomsoever the soil belongs, he owns also to the sky and to the depths.” BLACK’S LAW DICTIONARY 341 (5th ed. 1979).

6. 26 N.W. 887 (Dakota 1886), *cert. dismissed*, 131 U.S. 433 (1889).

included everything upon its surface and within its bosom.”⁷ Even before the *Duggan* case, North Dakota adopted the following statute: “The owner of land in fee has the right to the surface and to everything permanently situated beneath or above it.”⁸ These statements are consistent with the rules of subsurface ownership that are recognized throughout the United States.⁹ More recently, the Federal District Court for North Dakota, in *Fisher v. Continental Resources, Inc.*, observed: “In North Dakota, property rights extend to the sky and to the depths.”¹⁰ In 2009, North Dakota adopted a “pore space” act that, for transactions on or after April 9, 2009, provides: “Title to pore space in all strata underlying the surface of lands and waters is vested in the owner of the overlying surface estate.”¹¹ However, special provisions apply when a “severed mineral owner” exists.¹²

The law of trespass reigns supreme under the *ad coelum* model by drawing stark lines of demarcation between “yours” and “mine.”¹³ The Restatement (Second) of Torts section 158 imposes liability for trespass when a person “intentionally . . . enters land in the possession of the other, or causes a thing or a third person to do so”¹⁴ Subsurface trespass is addressed in the Restatement (Second) of Torts section 159, where a “trespass may be committed on, beneath, or above the surface of the earth.”¹⁵ Professor Anderson recommends amending section 159 to treat “intrusions into the subsurface beneath the land of another” in the same

7. *Id.* at 890. *Usque ad coelum* translates “up to the heavens” to complete the “Heaven-to-Hell” common law ownership maxim. BLACK’S LAW DICTIONARY 1684 (9th ed. 2009).

8. REVISED CODES OF THE TERRITORY OF DAKOTA § 265 (1877). This statute was part of the Field Code adopted by North Dakota and several other states.

9. 1 EUGENE KUNTZ, A TREATISE ON THE LAW OF OIL AND GAS § 60-1 (1987) (“Ownership of land carries with it ownership of or the exclusive right to enjoy substances under the surface . . .”).

10. No. 1:13-cv-097, 2014 WL 4410206, at *11 n.3 (D.N.D. Sept. 8, 2014).

11. N.D. CENT. CODE § 47-31-03 (2013). “Pore space” is defined as “a cavity or void, whether natural or artificially created, in a subsurface sedimentary stratum.” N.D. CENT. CODE § 47-31-02 (2013).

12. North Dakota Century Code section 47-31-08 states: “In the relationship between a severed mineral owner and a pore space estate, this chapter does not change or alter the common law as of April 9, 2009, as it relates to the rights belonging to, or the dominance of, the mineral estate.” N.D. CENT. CODE § 47-31-08 (2013).

13. The problem, however, is that the oil and gas reservoir has never been amenable to an *ad coelum* model because separately-owned portions of the reservoir cannot be isolated from the other portions of the reservoir. Instead, they are connected.

14. RESTATEMENT (SECOND) OF TORTS § 158(a) (1965).

15. RESTATEMENT (SECOND) OF TORTS § 159(1) (1965).

manner as the aircraft exception found at subsection (2) of section 159.¹⁶ That section imposes liability for “flight by aircraft” only when “it interferes substantially with the other’s use and enjoyment of his land.”¹⁷

Comment e to section 159 states that a subsurface trespass is “any . . . *unprivileged* entry on land beneath the surface.”¹⁸ The reservoir community analysis offers two ways that an “entry” into the portion of the reservoir in another owner’s possession would be permissible. Either the community member “owns” the right or its entry is “privileged.” Regardless of how the correlative right is viewed, the result will be the same: a mere physical entry will not automatically give rise to a trespass. Instead, the qualitative nature of the entry must be evaluated applying the reservoir community analysis.

North Dakota courts have recognized that pooling or unitizing lands to coordinate development can create a community of interest. For example, in *Continental Resources, Inc. v. Farrar Oil Co.*,¹⁹ a compulsory pooling order allowed an operator to use all of the subsurface encompassed by the pooled area to drill its horizontal well.²⁰ The federal district court held: “The police powers exercised by the Commission here effectively superseded Farrar’s right to use its oil and gas properties as Farrar pleases.”²¹ Notably, the court cited *Nunez v. Wainoco Oil & Gas Co.* and quoted the following passage:

[W]hen the Commissioner of Conservation has declared that landowners share a common interest in a reservoir of natural resources beneath their adjacent tracts, such common interest does not permit one participant to rely on a concept of individual ownership to thwart the common right to the resource as well as the important state interest in developing its resources fully and efficiently.²²

16. Owen L. Anderson, *Lord Coke, The Restatement, and Modern Subsurface Trespass Law*, 6 TEX. J. OIL & GAS ENERGY L. 203, 211 (2011).

17. RESTATEMENT (SECOND) OF TORTS § 159(2)(b) (1965).

18. *Id.* cmt. e (emphasis added).

19. 1997 ND 31, 559 N.W.2d 841.

20. *Id.* ¶ 5, 559 N.W.2d at 843.

21. *Id.* ¶ 16, 559 N.W.2d at 846.

22. *Id.* ¶ 17 (quoting *Nunez v. Wainoco Oil & Gas Co.*, 488 So. 2d 955, 964 (La. 1986)).

In *Fisher v. Continental Resources, Inc.*, the federal district court recognized a similar community of interest under North Dakota's compulsory unitization statute.²³

Professor Anderson advocates dealing with the cross-boundary entries this article addresses by first accepting that a trespass occurs under the strictures of the *ad coelum* doctrine.²⁴ But, under Professor Anderson's proposal, no trespass liability results unless the impacted owner can prove substantial damages.²⁵ Under a reservoir community analysis, if the conduct is compatible with community interests, it would not be a trespass. The community member would possess the right to engage in the conduct and the objecting member would lack the exclusivity required to establish a trespass claim. The foundation for this approach is the connected nature of the reservoir geophysical system.

III. RESERVOIR AS A GEOPHYSICAL SYSTEM

The oil and gas reservoir is comprised of a rock structure under pressure and possessing the physical characteristics of porosity and permeability.²⁶ When a well is drilled into the rock structure, it creates a low-pressure zone causing oil, gas, and water to move toward the low-pressure zone.²⁷ The connections are intricate and cause the reservoir to operate as a complex geophysical system where actions taken on one separately-owned portion of the reservoir have the capacity to impact all other portions. Courts have marshaled rights in the geophysical system only in the crudest of terms under the rubric of "correlative rights."²⁸ This is not because of a lack of technical expertise, but rather the lack of an effective legal theory.

The one aspect of the geophysical system that has eluded the law is the concept that something that is connected cannot be isolated when defining

23. No. 1:13-cv-097, 2014 WL 4410206 (D.N.D. Sept. 8, 2014). The court held that the compulsory unitization order allowed the unit operator to make reasonable use of all lands encompassed by the unit to pursue unit operations. *Id.* at *9.

24. Owen L. Anderson, *Subsurface "Trespass": A Man's Subsurface is Not His Castle*, 49 WASHBURN L.J. 247, 247 (2010).

25. *Id.* Professor Anderson summarizes his thesis as follows: "Whenever the trespasser's subsurface intrusion accomplishes an important societal need, including private commercial needs, and so long as the subsurface owner suffers no actual and substantial damages, subsurface trespass should not be actionable." *Id.*

26. NORMAN J. HYNE, *NONTECHNICAL GUIDE TO PETROLEUM GEOLOGY, EXPLORATION, DRILLING, AND PRODUCTION* 156-64 (2d ed. 2001).

27. *Id.* at 405-12.

28. See, e.g., *Elliff v. Texon Drilling Co.*, 210 S.W.2d 558, 562-63 (Tex. 1948) (destruction of the reservoir caused by a blowout and out-of-control well).

property rights. It is not possible to draw a line through a reservoir and effectively separate one portion from another. Property lines cannot break the connections and isolate each owner's part from the reservoir whole.

IV. DEFINING POSITIVE POSSESSORY RIGHTS IN THE RESERVOIR

Correlative rights traditionally focus on prohibiting inappropriate use of the reservoir by other reservoir owners. This section introduces the positive possessory correlative rights that allow reservoir owners to make appropriate use of the reservoir to efficiently develop their portion of the reservoir.

A. POSITIVE POSSESSORY RESERVOIR RIGHTS AND TRESPASS

Positive possessory rights refer to the right of a reservoir community member to affirmatively use, and possess, portions of the reservoir that extend beyond the member's reservoir boundary lines. In the *ad coelum* world of trespass, possessing portions of the reservoir beyond reservoir boundaries is a tort. For example, in *Stone v. Chesapeake Appalachia, LLC*,²⁹ the court, reciting West Virginia's adherence to the *ad coelum* doctrine, held that West Virginia would find "that hydraulic fracturing under land of a neighboring property without that party's consent . . . constitutes an actionable trespass."³⁰

The authority cited for a different rule is *Coastal Oil & Gas Corp. v. Garza Energy Trust*,³¹ where the court found no "actionable" trespass when a frac fissure extended into adjacent lands.³² The court in *Coastal*, however, acknowledged it was not addressing the core trespass issue. Referencing its withdrawn opinion in *Geo Viking, Inc v. Tex-Lee Operating Co.*,³³ that held "fracing beneath another's land was a trespass," the court stated: "[W]e need not decide the broader issue here."³⁴ The court instead

29. No. 5:12-CV-102, 2013 WL 2097397 (N.D. W. Va. April 10, 2013), *vacated*, *Stone v. Chesapeake Appalachia, LLC*, No. 5:12-CV-102, 2013 WL 7863861 (July 30, 2013).

30. *Id.* at *8.

31. 268 S.W.3d 1 (Tex. 2008).

32. The trial court and court of appeals held there was an actionable trespass with the court of appeals affirming damages of \$543,776 and punitive damages of \$10,000,000. *Mission Res., Inc. v. Garza Energy Trust*, 166 S.W.3d 301, 309 (Tex. Ct. App. 2005), *rev'd*, *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008). The court of appeals relied upon "Coastal's specific intent to cause substantial injury to appellees" by engaging in hydraulic fracturing to increase production from Coastal's wells. *Id.* at 314-15. The court of appeals also upheld the finding that Coastal's hydraulic fracturing activities constituted felony theft. *Id.* at 315.

33. 839 S.W.2d 797, 798 (Tex. 1992) (per curiam) (opinion withdrawn).

34. *Coastal*, 268 N.W.2d at 12.

held that any damages the plaintiffs could assert were related solely to drainage that the majority deemed encompassed by the rule of capture.³⁵ The court in *Stone*, however, accepted Chesapeake's characterization of the *Coastal* holding and found that *Coastal* "held that the landowners' claims of trespass where the operator extended hydraulic fracturing underlying the landowners' property was barred by the rule of capture."³⁶ The *Stone* court also quoted the Texas Supreme Court's statement of the issue: "The Court in *Garza* stated the issue as being 'whether subsurface hydraulic fracturing of a natural gas well that extends into another's property is a trespass for which the value of gas drained as a result may be recovered as damages.'"³⁷ Regardless of what the Texas Supreme Court decided, the court in *Stone* was not impressed, noting: "The *Garza* opinion gives oil and gas operators a blank check to steal from the small landowner."³⁸

B. NORTH DAKOTA CASE LAW RECOGNIZING CORRELATIVE RIGHTS

North Dakota, like all other states, has not directly focused on positive possessory reservoir rights. However, the North Dakota Supreme Court has recognized correlative rights that give members of the reservoir community rights in adjoining portions of the reservoir.

1. *Secondary Recovery Operations: Waterflooding and Gas Cycling*

In *Syverson v. North Dakota State Industrial Commission*,³⁹ the Industrial Commission approved a voluntary agreement to conduct secondary recovery operations in the Tioga-Madison reservoir.⁴⁰ The agreement authorized the injection of water to conduct a waterflood operation to recover otherwise stranded oil.⁴¹ Ninety-eight percent of the 1,058 owners agreed to participate on identical terms.⁴² The Syversons thought the offered terms were inadequate and refused to join the agreement

35. Accordingly, the court found "that damages for drainage by hydraulic fracturing are precluded by the rule of capture." *Id.* at 17.

36. No. 5:12-CV-102, 2013 WL 2097397, at *4 (N.D. W. Va. April 10, 2013), *vacated*, *Stone v. Chesapeake Appalachia, LLC*, No. 5:12-CV-102, 2013 WL 7863861 (July 30, 2013).

37. *Id.* (quoting *Coastal Oil and Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1, 4 (Tex. 2008)). That was the precise issue the Texas Supreme Court failed to address.

38. *Id.* at *6.

39. 111 N.W.2d 128 (N.D. 1961).

40. *Id.* at 131.

41. *Id.*

42. *Id.*

unless given better terms.⁴³ The operators that created the unit proceeded without the Syversons' consent and the Syversons objected to the Commission's approval of the unitization agreement.⁴⁴

Affirming the Commission's order, the North Dakota Supreme Court observed that the Syversons had the right to refuse to sign the agreement, noting: "Their rights are independent of this agreement, and the order approving the unit agreement and the order permitting repressuring of the field affect only those owners who have joined in this agreement."⁴⁵ Although the court was careful to recognize the Syversons' right not to participate in the unit,⁴⁶ it refused to let the Syversons dictate development of the reservoir for the rest of the reservoir community. The court stated: "By refusing to join such agreement, however, appellants may not, at the same time, prevent other interests in the field from developing adjoining tracts under such agreement."⁴⁷ This recognized rights in the broader reservoir community and prevented the Syversons from limiting the rights of owners who desired to fully develop their oil and gas resources.

The court, however, did note that if the unit operations caused damage to the Syversons, they may have a right of action: "Whatever the result would be if the appellants could show actual damages, they certainly are not entitled to complain in the absence of such showing."⁴⁸ The court ended this sentence citing *Tide Water Associated Oil Co. v. Stott*.⁴⁹ In *Tide Water*, the lessor sued its lessee under various implied covenant theories because the lessee was participating in a gas recycling operation.⁵⁰ The lessor refused to participate, but its lessee, and other interest owners in the field, formed a unit and commenced recycling operations that produced wet gas and re-injected the dry gas.⁵¹ The trial court awarded the lessor damages equal to the amount of wet gas beneath the lessor's land that had been displaced by dry gas.⁵² Reversing the trial court, the Fifth Circuit Court of Appeals found the lessor had rejected a fair offer to participate in the unit

43. *Id.*

44. *Id.*

45. *Id.* at 133.

46. North Dakota did not have a compulsory unitization statute until 1965. See 1965 N.D. Laws ch. 260, § 5 (codified at N.D. CENT. CODE § 38-08-09.5). At the time of the *Syverson* case, all unitization was pursuant to voluntary agreement with no ability to compel joinder of any minority non-consenting interest. See N.D. CENT. CODE § 38-08-09 (1961).

47. *Syverson*, 111 N.W.2d at 134.

48. *Id.*

49. 159 F.2d 174 (5th Cir. 1946), *cert. denied*, 331 U.S. 817 (1947).

50. *Id.* at 175-76.

51. *Id.*

52. *Id.* at 178.

and the court would not allow the lessor to adversely impact operations by asserting it had been damaged by the operations.⁵³ The court held: “Any damage which they suffer is *damnum absque injuria* and in nowise are such damages chargeable to appellants.”⁵⁴

The court in *Tide Water* prevented a member of the reservoir community from impairing development it found to be beneficial to the community. The *Tide Water* case recognized a positive possessory interest in other reservoir community members by allowing entry of dry gas into the non-consenting member’s portion of the reservoir. This was the case even when the reservoir community member was the lessee of the objecting mineral owner.

2. *When Government Limits the Self-Help Capture Remedy*

The essence of oil and gas ownership is the rule of capture. Absent field-wide unitization, to obtain the benefits of oil and gas ownership requires association with a producing well.⁵⁵ Therefore, whenever a conservation commission restrains an oil and gas owner’s capture rights, it must do so equitably.⁵⁶ This is the most common context in which the term “correlative rights” is used.⁵⁷ For example, in *Amoco Production Co. v. North Dakota Industrial Commission*,⁵⁸ the dispute was over the proper orientation of a 320-acre spacing unit.⁵⁹ The initial orientation was north/south using lay-down units that the Commission subsequently changed to an east/west orientation using stand-up units.⁶⁰ The change in orientation changed the sharing arrangement in the well located on each unit.⁶¹ Because production from the wells differed markedly, changing the acreage associated with each well had a significant economic impact on

53. *Id.* at 179. The lessor had been offered the same deal that had been accepted by all the other owners in the unitized area.

54. *Id.*

55. David E. Pierce, *Minimizing the Environmental Impact of Oil and Gas Development by Maximizing Production Conservation*, 85 N.D. L. REV. 759, 760-61 (2009).

56. See *Hanson v. Indus. Comm’n*, 466 N.W.2d 587, 594 (N.D. 1991) (“[W]aste prevention measures restrict the right to produce and share in production from one’s property under the rule of capture; unless the state affords some compensation or protection to the rights restricted, the state will be taking property without due process of law.”) (quoting 1 B. KRAMER & P. MARTIN, *THE LAW OF POOLING AND UNITIZATION* § 5.01[1] (3d ed. 1990)).

57. Pierce, *supra* note 56, at 761.

58. 307 N.W.2d 839 (N.D. 1981).

59. *Id.* at 840.

60. *Id.*

61. *Id.*

various owners.⁶² The owners suffering a substantial reduction in revenue attacked the Commission's order by asserting it violated correlative rights.⁶³

After noting that the Commission has a continuing duty to protect correlative rights,⁶⁴ the court reviewed the evidence presented at the spacing hearing.⁶⁵ Although there was conflicting evidence, the court held there was sufficient evidence to support the Commission's decision to order stand-up spacing units to protect the correlative rights of the owners within the spacing units.⁶⁶ When the Commission has not collected the necessary technical evidence to make an informed decision, or when it fails to adequately articulate the reasoning for its decision, the order will be subject to attack.⁶⁷ For example, in *Hystad v. Industrial Commission*,⁶⁸ the Commission's decision to allow 640-acre spacing units and 320-acre spacing units in the same reservoir required further factual development to explain the departure from the use of uniform spacing units.⁶⁹

3. *When Government Marshals Specific Conduct in the Reservoir*

The second context in which the term correlative rights is used focuses on actions that may impact the entire reservoir community. Instead of focusing on a particular producer's capture rights, the focus is on the capture rights of the community. For example, in *Hanson v. Industrial Commission of North Dakota*,⁷⁰ the Commission denied a request to inject produced saltwater into a currently producing formation. A producer in the same reservoir objected, asserting past experience with its well had shown that when water injection ceased, oil production would increase, along with a decrease in produced saltwater.⁷¹ Both parties asserted correlative rights in the reservoir.⁷² The Commission heard conflicting technical evidence and chose to adhere to its normal policy of not allowing disposal of

62. *Id.* at 840-41.

63. *Id.* at 841.

64. *Id.* at 843.

65. *Id.* at 843-48.

66. *Id.* at 848.

67. *Id.* at 842 (using the substantial and credible evidence standard).

68. 389 N.W.2d 590 (N.D. 1986).

69. *Id.* at 598.

70. 466 N.W.2d 587 (N.D. 1991).

71. *Id.* at 589.

72. *Id.* at 589-90.

produced water into a producing reservoir unless it is done as part of an enhanced recovery project.⁷³

4. *Trees, Lateral Support, Water, and Correlative Rights*

The court in *Herring v. Lisbon Partners Credit Fund, Ltd. Partnership*⁷⁴ applied the North Dakota *ad coelum* statute⁷⁵ and a tree statute⁷⁶ to define the respective rights of owners when a tree located on one property has roots or branches that extend into or over an adjacent property.⁷⁷ The court quoted from *Abbinett v. Fox* for the rule that there is “a correlative duty of a landowner to ensure that the use of his property does not materially harm his neighbor.”⁷⁸ The quote continued with an observation equally applicable to the oil and gas reservoir: “The privilege of a landowner to make use of his property as he sees fit is generally qualified by the requirement that he exercise due regard for the interests of those who may be affected by the landowner’s activities on the property.”⁷⁹ This is another way of saying that property “ownership” is relative, not absolute. When there are mutual rights and obligations in a common property, “ownership” is correlative.

Although the adjacent owner will have a cause of action for damage caused by invading tree roots or branches, the court held there would be no liability because trees “cast shade, drop leaves, flowers, or fruit, or just because they happen to encroach upon adjoining property either above or below ground.”⁸⁰ This recognizes that not all trespasses or nuisances are actionable. This is another way of saying that the community finds falling leaves and encroachments associated with trees acceptable so long as no actual harm is caused to the adjoining landowner.

73. *Id.* at 593.

74. 2012 ND 226, 823 N.W.2d 493.

75. N.D. CENT. CODE § 47-01-12 (2013).

76. N.D. CENT. CODE § 47-01-17 (2013).

77. The court in *Herring* held the owner of the tree was responsible for ensuring it does not cause actual harm or pose an imminent danger of actual harm to adjoining property. *Herring*, ¶ 23, 823 N.W.2d at 501. This gave effect to section 47-01-17, which recognized the owner of the land where the tree trunk existed was responsible for all of the tree. At the same time, however, the adjoining landowner may, at its own expense, cut away encroaching vegetation to the property line. *Id.* at 502. This gave effect to section 47-01-12 that the adjoining landowner owned everything above and below the surface of its land. *Id.* ¶¶ 22-23, 823 N.W.2d at 500-01.

78. *Id.* ¶ 21, 823 N.W.2d at 500 (quoting *Abbinett v. Fox*, 703 P.2d 177, 181 (N.M. Ct. App. 1985)).

79. *Id.* (quoting *Abbinett v. Fox*, 703 P.2d 177, 181 (N.M. Ct. App. 1985)).

80. *Id.* at 501 (quoting the “Hawaii rule” as stated by the Tennessee Supreme Court in *Lane v. W.J. Curry & Sons*, 92 S.W.3d 355, 364 (Tenn. 2002)).

The law of lateral support also illustrates the correlative nature of property ownership. In *Hermanson v. Morrell*,⁸¹ the North Dakota Supreme Court noted the North Dakota statute addressing lateral support that provides:

Each coterminous owner is entitled to the lateral and adjacent support that the owner's land receives from the adjoining land, subject to the right of the owner of the adjoining land to make proper and usual excavations on the same for purposes of construction using ordinary care and skill, taking precautions to sustain the land of the other, and giving previous reasonable notice to the other of the intention to make such excavations.⁸²

Therefore, the absolute right of each property owner to use their property is restricted to benefit all landowners. The restriction enhances the value of the property to each landowner because it will secure the land from damage caused by negligent excavations. The lateral support statute is a specific statement of the more general limit on all property owners created by North Dakota Century Code section 9-10-01 that provides: "Every person is bound without contract to abstain from injuring the person or property of another or infringing upon any of that person's rights."⁸³

Early water law provides one of the first instances in which the term "correlative rights" was used.⁸⁴ The court in *Volkman v. City of Crosby*⁸⁵ adopted the doctrine of reasonable use for percolating water in part to preserve the common source of supply for landowners owning land over the reservoir.⁸⁶ The court noted that "regardless of what may be the correlative rights of owners of land lying above subterranean percolating waters constituting a common source of supply," it would not allow a landowner to extract and move water off his land when it would cause injury to other landowners that have made "a prior reasonable beneficial use" of the water resource.⁸⁷ In many ways the usufructuary nature of water is similar to use of a reservoir to maximize removal of oil and gas. No single owner "owns" the geophysical system where the oil and gas reside, but they all seek to use it to recover the oil and gas within.

81. 252 N.W.2d 884 (N.D. 1977).

82. *Id.* at 888 (quoting N.D. CENT. CODE § 47-01-18 (1975)).

83. N.D. CENT. CODE § 9-10-01 (2013).

84. *See, e.g.,* *Katz v. Walkinshaw*, 74 P. 766, 772 (Ca. 1903) (equating the doctrine of reasonable use of percolating waters to a correlative rights analysis).

85. 120 N.W.2d 18 (N.D. 1963).

86. *Id.* at 23.

87. *Id.* at 23-24.

V. RESERVOIR COMMUNITY ANALYSIS: IDENTIFYING RIGHTS IN A GEOPHYSICAL SYSTEM

The reservoir community analysis offers a principled process to define appropriate and inappropriate conduct within any connected rock structure.⁸⁸ The analysis is best illustrated by considering situations that involve affirmative use of portions of the reservoir that extend beyond a reservoir owner's *ad coelum* subsurface property lines. The first are invading frac fissures and the second are invading frac pressures.

A. INVADING FRAC FISSURES

Courts to date have been asked to respond to frac fissures crossing subsurface boundary lines by applying a trespass analysis.⁸⁹ The *ad coelum* doctrine establishes the boundary lines and any invasion of an owner's reservoir space is treated the same as a surface invasion.⁹⁰ The basic problem with such an *ad coelum* analysis is that it fails to account for what each party actually owns, and does not own, within the reservoir.

All owners within a reservoir possess rights to use the geophysical system to maximize the recovery of oil and gas within their portion of the reservoir. This is subject, however, to the traditional correlative rights limitation that no owner can unreasonably use the geophysical system in a way that impairs the rights of other owners to maximize recovery from the reservoir. These are the negative non-possessory rights that in North Dakota could be the object of North Dakota Century Code section 9-10-01 prohibiting any person from injuring the "property of another or infringing upon any of that person's rights."⁹¹ It is revealing that the North Dakota Supreme Court, in *Volksmann v. City of Crosby*, quoted section 9-10-1 immediately before quoting from another case: "'The principles of natural justice and equity demand the recognition of correlative rights in percolating subterranean waters'"⁹²

88. The reservoir community analysis can be applied to any rock structure that has some degree of porosity and permeability, whether the permeability is natural or artificially-enhanced. It need not be an oil and gas reservoir. The analysis is equally applicable to a rock structure used for liquid waste disposal. It can also be used to address enhanced recovery operations undertaken when all parties fail to consent and no compulsory process is available to deal with those who reject a reservoir-wide project.

89. See *supra* text accompanying notes 29-38.

90. See *supra* text accompanying notes 6-11.

91. N.D. CENT. CODE § 9-10-01 (2013).

92. *Volksmann v. City of Crosby*, 120 N.W.2d 18, 23 (N.D. 1963) (quoting *Patrick v. Smith*, 134 P. 1076, 1079 (Wash. 1913)).

The more difficult issue is defining rights to affirmatively and physically invade the space of other reservoir owners. These are the positive affirmative rights previously discussed.⁹³ Frac fissures created during the hydraulic fracturing process provide an excellent example. Does an owner of a portion of a reservoir have the “ownership right” or “privilege” to deliberately cause frac fissures to extend beyond the boundaries of its land into adjoining lands? Before this question can be properly answered, the total bundle of sticks for each owner must be examined. First, every owner has certain exclusive rights within their portion of the reservoir that are defined by surface boundaries. This also establishes each owner’s membership in the reservoir community. Second, every owner has communal rights in the entire reservoir that we call correlative rights. Third, to the extent other community members have correlative rights in a member’s portion of the reservoir, that member’s exclusivity of ownership is lacking.

The community reservoir analysis is a process for defining correlative rights within a reservoir. Using the facts in *Coastal Oil & Gas Corp. v. Garza Energy Trust*,⁹⁴ the Texas Supreme Court found that the Vicksburg T formation would be of no value unless it could be hydraulically fractured.⁹⁵ Therefore, fracing the Vicksburg T formation would be an acceptable activity within the Vicksburg T reservoir community. North Dakota has addressed this first step, in general terms, with North Dakota Century Code section 38-08-25, which states: “Notwithstanding any other provision of law, the legislative assembly designates hydraulic fracturing, a mechanical method of increasing the permeability of rock to increase the amount of oil and gas produced from the rock, an acceptable recovery process in this state.”⁹⁶ Any specific protocol for developing a reservoir must, however, be tailored to the reservoir’s unique geophysical system.

The next inquiry is whether allowing frac fissures to cross boundary lines is a permissible exercise of the reservoir owners’ correlative rights and therefore compatible with the Vicksburg T community standards. This is a technical question that should focus on the reservoir’s geophysical system and not a surface boundary line. In many instances, to avoid leaving bands of unrecovered oil and gas, it may be desirable to frac across boundary lines. This question should be answered by what is best for the Vicksburg

93. See *supra* text accompanying notes 29-38.

94. 268 S.W.3d 1 (Tex. 2008).

95. *Id.* at 16 (“hydraulic fracturing is not optional; it is essential to the recovery of oil and gas in many areas, including the Vicksburg T formation in this case.”).

96. N.D. CENT. CODE § 38-08-25 (2013).

T reservoir community to allow each owner to maximize the recovery of oil and gas from the reservoir.

Once the focus is on what is best for the Vicksburg T reservoir community, then the conduct can be qualitatively evaluated instead of conducting a survey to establish a boundary line. This approach gives meaning to all owners' correlative rights and allows them to exercise those rights even when it may impact portions of the reservoir owned by others. These correlative rights, as defined for a particular reservoir community, become a collective ownership right and limitation.

B. INVADING FRAC PRESSURES

More invasive factual scenarios are those in which one reservoir owner causes pressures to flow through a frac fissure that comes into communication with another wellbore. The result has been termed "frac hits." In theory, it can occur whenever two wells are in close proximity in the same reservoir and, in the process of fracture treating what is typically the newly-drilled horizontal well, the resulting fracture is brought into communication with an existing, typically vertical well.⁹⁷ The Alberta Energy Regulator ("AER"),⁹⁸ on May 21, 2013, adopted Directive 083, which, among other things, addresses the frac-hit phenomenon.⁹⁹ One purpose of the Directive is to "reduce the likelihood of unintentional interwellbore communication between a subject well and an offset well."¹⁰⁰ The Directive describes the issue as follows:

Interwellbore communication occurs when a communication pathway has been established between a subject well and an offset well. A communication pathway may cause a well-control event at an offset well, which may result in subsurface impacts or a release of fluids to the surface, placing the public and the environment at risk.¹⁰¹

97. The communication could even be the result of an existing frac fissure associated with the existing vertical well that had traveled into close proximity of the new horizontal well.

98. Formerly the Energy Resources Conservation Board.

99. ALBERTA ENERGY REGULATOR, DIRECTIVE 083: HYDRAULIC FRACTURING – SUBSURFACE INTEGRITY (2013), available at <https://www.aer.ca/documents/directives/Directive083.pdf>.

100. *Id.* at § 1.1.

101. *Id.* at § 3.1.

The primary regulatory requirement is to identify “at-risk” offset wells and prepare a “control plan” to ensure the well is monitored and any necessary action taken to avoid a well-control event.¹⁰²

A reservoir community analysis can be used to allocate rights and responsibilities among developers operating differently within the same reservoir—for example, vertical operators and horizontal operators. For discussion purposes, assume a reservoir owner desires to drill a horizontal well in a reservoir containing an existing vertical well. The horizontal well developer is concerned about avoiding or minimizing any interwellbore communication with an offsetting vertical well. Assume the remedy is to shut in the vertical well while the horizontal well is undergoing hydraulic fracturing. Suppose the vertical well owner (1) refuses to shut in, (2) demands compensation for lost revenue during the shut-in period, or (3) asserts damage to the well or the reservoir. How will these issues be resolved?

As with the frac fissure situation, the immediate tendency would be to look at boundary lines and proceed down the *ad coelum*/trespass line of arguments. Again, a reservoir community analysis offers a solution that properly defines the parties’ ownership interests and the interests of the reservoir community. The community goals are to ensure the reservoir geophysical system is used in a manner that will achieve the greatest possible recovery of oil and gas. When the question is posed in this manner, the rights and liabilities of the community members may be viewed differently. For example, if horizontal development of the reservoir will likely increase the recovery of oil and gas from the reservoir, should the existing vertical well operators be obligated to take the necessary action to accommodate horizontal development? It is not a first-in-time first-in-right proposition. No operator should be able to impair technological progress in the reservoir when progress promotes reservoir community goals.

If vertical well operators, through litigation or threat of litigation, can chill community-compatible horizontal development, the situation begins to look much like the mineral owner that refused to consent to the waterflood operations in *Syverson v. North Dakota State Industrial Commission*.¹⁰³ The court refused to allow 2% of the reservoir owners to dictate whether the remaining 98% could pursue secondary recovery without the consent of the objecting owners.¹⁰⁴

102. *Id.* at § 3.3.3.

103. 111 N.W.2d 128 (N.D. 1961).

104. *Id.* at 134 (“appellants may not . . . prevent other interests in the field from developing adjoining tracts . . .”).

Proper definition of each owner's correlative rights in a reservoir will resolve these issues because the conclusion will often be that the complaining owner never owned the right they seek to protect. Often the "exclusivity" they seek to advance is a qualified right as a member of the reservoir community. As the North Dakota Supreme Court observed in *Hystad v. Industrial Commission*, "correlative rights includes interdependent rights and duties of each landowner in the common source of supply."¹⁰⁵ The owners are a member of a reservoir community.

VI. CONCLUSION: "PROPERTY" IS A CONTINUING PROCESS OF DEFINITION

Property theorist Carol Rose has observed that the definition of property is an evolutionary process that takes place as the need becomes clear.¹⁰⁶ Property "ownership" is not a static concept. The contours of ownership become further defined as issues arise and are resolved. Until circumstances cause parties to focus on an ownership issue, there is no need to expend resources to further define ownership in the new context. For example, as techniques are developed to detect and accurately measure frac fissures, disputes are more likely to arise. This will result in court cases focusing on issues associated with hydraulic fracturing. Any new declaration of rights will, in turn, redefine each party's "bundle of sticks." A more complete definition of "ownership" will result. Correlative rights provide the framework for better defining the nature of an owner's rights in the reservoir. The reservoir community analysis provides the framework for resolving disputes among reservoir owners by defining what is best for the reservoir community in maximizing the economic recovery of oil and gas from the reservoir.

105. 389 N.W.2d 590, 596 (N.D. 1986).

106. See Carol M. Rose, *A Dozen Propositions on Private Property, Public Rights, and the New Takings Legislation*, 53 WASH. & LEE L. REV. 265, 269 (1996); David E. Pierce, *Carol Rose Comes to the Oil Patch: Modern Property Analysis Applied to Modern Reservoir Problems*, 19 PENN ST. ENVTL. L. REV. 241, 242-43 (2011).