

2023

## *Briggs v. Southwestern Energy Production: Hydraulic Fracturing and Subsurface Trespass*

Thomas W. Merrill  
*Columbia Law School*, [tmerri@law.columbia.edu](mailto:tmerri@law.columbia.edu)

Henry E. Smith  
*Harvard Law School*, [hesmith@law.harvard.edu](mailto:hesmith@law.harvard.edu)

Follow this and additional works at: [https://scholarship.law.columbia.edu/faculty\\_scholarship](https://scholarship.law.columbia.edu/faculty_scholarship)



Part of the [Energy and Utilities Law Commons](#), [Oil, Gas, and Mineral Law Commons](#), and the [Torts Commons](#)

---

### Recommended Citation

Thomas W. Merrill & Henry E. Smith, *Briggs v. Southwestern Energy Production: Hydraulic Fracturing and Subsurface Trespass*, 16 J. TORT L. 1 (2023).

Available at: [https://scholarship.law.columbia.edu/faculty\\_scholarship/4174](https://scholarship.law.columbia.edu/faculty_scholarship/4174)

This Article is brought to you for free and open access by the Faculty Publications at Scholarship Archive. It has been accepted for inclusion in Faculty Scholarship by an authorized administrator of Scholarship Archive. For more information, please contact [scholarshiparchive@law.columbia.edu](mailto:scholarshiparchive@law.columbia.edu).

Thomas W. Merrill\* and Henry E. Smith

# ***Briggs v. Southwestern Energy Production:* Hydraulic Fracturing and Subsurface Trespass**

<https://doi.org/10.1515/jtl-2023-0026>

Received June 8, 2023; accepted June 8, 2023; published online July 18, 2023

**Abstract:** The tort of trespass to land has proven to be controversial as applied to airplane overflights (and more recently to drones) as well as to oil and gas production using hydraulic fracking technology. The key to applying trespass to intrusions above and below the surface of land is to distinguish between possession of land and the right to possess land. Surface owners have the right to possess the column of space above and below the surface (a kind of option value), but only to the extent that this space is subject to possible effective possession. The Pennsylvania Supreme Court in *Briggs v. Southwestern Energy Production* concluded that fracking can result in physical intrusions that can be detected using available monitoring technology. The court further concluded that such physical intrusions should be subject to trespass liability. We argue that these conclusions are correct insofar as such intrusions interfere with a surface owner's possible effective possession – the action of the intruder necessarily means that the surface owner could also find it economically advantageous to engage in production activity in this portion of subsurface space itself. The decision confirms the utility of the law of trespass to the architecture of property, in that it establishes an indispensable baseline against which exchanges of rights and regulatory modifications of rights can occur.

**Keywords:** *ad coelum*; hydraulic fracturing; possession; property law; right to possess; trespass

---

The authors would like to thank Yun-chien Chang, Greg Keating, Malcolm Lavoie, and participants at the Great Torts Cases Symposium at the University of Arizona James E. Rogers School of Law. All errors are solely owned by the authors.

---

**\*Corresponding author: Thomas W. Merrill**, Charles Evans Hughes Professor of Law, Columbia Law School, New York, USA, E-mail: [tmerril@law.columbia.edu](mailto:tmerril@law.columbia.edu)

**Henry E. Smith**, Fessenden Professor of Law, Harvard Law School, Cambridge, USA, E-mail: [hsmith@law.harvard.edu](mailto:hsmith@law.harvard.edu)

# 1 Introduction

At one level, *Briggs v. Southwestern Energy Production Co.*<sup>1</sup> was a familiar dispute from gas-patch country. The Briggs family, the plaintiffs, owned eleven acres of land in Susquehanna County, Pennsylvania. The land was located above the Marcellus Shale formation, rich in embedded natural gas. Southwestern, the defendant, held production rights obtained through leases on three sides of the plaintiffs' property.<sup>2</sup> The plaintiffs alleged that Southwestern had drilled one or more wells on its leaseholds, which was causing natural gas to drain from the shale under their land. The plaintiffs sought damages reflecting the value of gas obtained in this manner.

Disputes of this nature – one surface owner complaining of drainage of oil, gas, or groundwater from beneath the surface of their land caused by a neighbor drilling a well on nearby land – are common in areas having valuable underground minerals. Traditionally, such disputes have been resolved by applying the rule of capture. This holds that a surface owner is free to capture any quantity of “fugacious minerals” that enter into the column of space under their land. Fugacious minerals are defined as those that move about in underground reservoirs or fissures in response to changes in pressure gradients – just as wild animals wander about from one tract of land to another in search of sustenance or shelter.<sup>3</sup> The wild animal analogy is made explicit by invoking the rule of capture in resolving disputes among surface owners over the rights to fugacious minerals that have been drawn to the surface. Thus, a surface owner who drills a well, reducing the pressure from overburden in the area of the well bore, which causes underground minerals to rise to the surface, owns all minerals so captured without regard to whether the minerals may have migrated from under another owner's land. Just as the owner of the surface who baits a trap on the land is entitled to retain any wild animals that wander onto the land from elsewhere and are captured by the trap.

The rule of capture as applied to subsurface minerals has long been qualified by another legal understanding: that the rights of a surface owner extend to the column of space above and below the surface (the *ad coelum* doctrine) and the corollary that a physical invasion into this column of space is actionable as a trespass. Thus, in order to invoke the rule of capture, the surface owner must confine its drilling activity to the column of space extending downward from the surface area it owns or in which it has the right to operate by a mineral deed or lease. This means a surface owner cannot drill a well bore at an angle that enters into the column of space below other

---

1 224 A.3d 334 (Pa. 2020).

2 *Id.* at 356 n. 4 (Dougherty, J. dissenting) (citing allegations in plaintiff's complaint).

3 Restatement of the Law Fourth, Property Vol. 2, Div. I, § 1.2C (Am. L. Inst., Tent. Draft No. 4, 2023) (Oil, Gas, and Other Fugacious Minerals).

land – something called slant drilling or deviated drilling. Any fugacious minerals extracted by means of a well bore that physically invades the column of space belonging to another is deemed to be the product of a trespass, which gives rise to an action for damages measured by the value of the minerals wrongfully obtained.<sup>4</sup>

The combination of the rule of capture and the qualification based on the law of trespass describes the basic legal architecture that applies to the production of fugacious minerals in the United States. All states adhere to this basic legal architecture. This is true without regard to whether the state in question treats fugacious minerals as owned by the surface owner before they are extracted (the rule in Pennsylvania and Texas), or considers such minerals to be *ferae naturae* and therefore not owned by anyone (the rule in California, Indiana, Louisiana, Ohio, and other states).<sup>5</sup> Indeed, both the majority opinion and the dissent in *Briggs* expressly reaffirmed these propositions as foundational principles of oil and gas law.<sup>6</sup>

What then was the source of the dispute in the *Briggs* case? The issue was how these settled principles should be applied when valuable oil and gas are obtained using hydraulic fracturing technology. Fracking, as it is commonly called, entails pumping a fluid under very high pressure into a well bore in an effort to fracture or crack rock in which valuable minerals are trapped. When the fluid is pumped back out, the valuable minerals are drawn from the fractured rock and rise to the surface to be gathered by the operator. Natural gas production in the Marcellus Shale area has been made possible by the development of modern fracking technology. Southwestern Energy, like all other natural gas production companies operating the area, was using fracking on its production wells. This was the source of the objection by the Briggs family.

Why does fracking technology pose a challenge to the conventional legal architecture that governs the production of subsurface minerals – the rule of capture as qualified by the *ad coelum* doctrine and the law of trespass? Fracking technology problematizes, or can be said to problematize, the established legal architecture in two ways.

The first concerns the definition of “fugacious minerals.” In the conventional extraction of minerals from the subsurface, the mineral in question – whether it is oil, gas, groundwater, or something else – is “fugacious” both before and after its extraction. That is, the mineral wanders about or is capable of wandering about in both

---

4 See, e.g., *EQT Prod. Co. v. Crowder*, 828 S.E.2d 800 (W. Va. 2019); EUGENE KUNTZ, A TREATISE ON THE LAW OF OIL AND GAS § 11.9 (1993); Christopher S. Kulander & R. Jordan Shaw, *Comparing Subsurface Trespass Jurisprudence-Geophysical Surveying and Hydraulic Fracturing*, 46 N.M. L. REV. 67, 73–74 (2016); Kate Mantle, *Directional Drilling Practices*, 25 OILFIELD REV. (Winter 2013/2014), <https://www.slb.com/-/media/files/oilfield-review/defining-directional-drilling.ashx>.

5 See Bruce M. Kramer & Owen L. Anderson, *The Rule of Capture—an Oil and Gas Perspective*, 35 ENVTL. L. 899 (2005).

6 224 A.3d at 336–37; *id.* at 353–54 (Dougherty, J., dissenting).

its original condition underground and after it is drawn to the surface. When the mineral can be extracted only by using fracking technology, the mineral is arguably *not* fugacious in place, but is trapped in a rock formation. It becomes fugacious only when artificially extracted from the rock. To borrow a metaphor from the plaintiffs in *Briggs*,<sup>7</sup> obtaining valuable minerals by fracking is not like shooting or trapping a wild animal running loose; rather, it is like directing a hose against the latch on a pen in which wild animals are secured, causing the door to fly open and the animals to escape. In short, fracking poses the question whether minerals should be defined as fugacious only if they are fugacious in place, in addition to being fugacious after production.

The second way in which fracking technology problematizes the established legal architecture concerns the definition of a trespass. Trespass is a tort that has been said to be “exceptionally simple and exceptionally rigorous” – at least as applied to trespasses on the surface of land.<sup>8</sup> Trespass to land occurs when a defendant invades another’s land with an object large enough and solid enough to displace the plaintiff from possession of some portion of the plaintiff’s land. The only intent required is that the defendant intend to place the object where it ends up – there is no requirement that the defendant “knows” it is crossing the boundary into another’s land.<sup>9</sup> Trespass liability has been found to apply to invasions as relatively innocuous as protruding footings under a wall, overhanging wires, and misdirected golf balls.<sup>10</sup> And of course it is well established that drilling a well bore that angles into the column of space under the land of another constitutes a trespass.

Many of the activities associated with fracking would seem to qualify as trespasses if proven, such as drilling a horizontal well bore that crosses into the column of space under another’s land.<sup>11</sup> The same can probably be said of injecting highly pressurized fracking fluid that crosses the subterranean boundary into the column of space of another. This would be analogous to aiming a fire hose and shooting highly pressurized water at a neighbor’s property. But what if the well bore and the fracking fluid stop short of the subterranean boundary line, and yet the pressure

---

7 224 A.3d at 345.

8 WILLIAM L. PROSSER, *HANDBOOK OF THE LAW OF TORTS* 63 (4th ed. 1971) (quoting 1 THOMAS ATKINS STREET, *THE FOUNDATIONS OF LEGAL LIABILITY* 19 (1906)).

9 Restatement of the Law Fourth, Property Vol. 2, Div. I, § 1.5 (Am. L. Inst., Tent. Draft No. 2, 2021) (Intent Required for Trespass to Land).

10 See, e.g., *Golden Press v. Rylands*, 235 P.2d 592 (Colo. 1951) (encroachment by footings); *Butler v. Frontier Telephone*, 79 N.E. 716 (N.Y. 1906) (overhanging wire); *Fenton v. Quaboag Country Club, Inc.*, 233 N.E.2d 216, 219 (Mass. 1968) (golf balls); *Amaral v. Cuppels*, 831 N.E.2d 915, 918 (Mass. App. Ct. 2005) (golf balls). Litigation involving golf clubs often turns on the interpretation of easements. *Tenczar v. Indian Pond Country Club, Inc.*, 491 Mass. 89, 107, 199 N.E.3d 420, 434 (2022).

11 *Briggs* expressly affirms that a horizontal well bore that crosses into the column of space under another’s subsurface rights is a trespass. 224 A.2d at 349 n. 17. But the court noted that there was no evidence Southwestern had engaged in horizontal drilling. *Id.*

exerted by the fracking fluid causes cracks to radiate across the boundary line into the subterranean pore space in rock under another's land? The closest analogy in tort law would seem to be vibrations set off by blasting, which is subject to strict liability if the vibrations cause injury but is not regarded as a trespass.<sup>12</sup> To revert to the wild animal analogy, if someone ignites an explosive device near a pen in which wild animals are secured, and the vibrations from the explosion cause the door to fly open and the animals to escape, does the rule of capture still apply? Or is this a form of tortious conduct, perhaps a trespass or something else, that gives rise to an action for damages for the value lost because of the explosion?

The issues here are both conceptual and empirical. The conceptual issues turn on how we understand the *ad coelum* doctrine. No one wants to endorse the proposition that ownership of the surface of land entails unrestricted ownership of everything in the column of space up “to the heavens” or down “to the depths.” Rejection of this full-blown doctrine as applied to airplane overflights seems to have settled this. But the dictum in *United States v. Causby*<sup>13</sup> that the *ad coelum* maxim “has no place in the modern world”<sup>14</sup> cannot be taken literally, since everyone assumes ownership of the surface includes at least the exclusive right to erect structures above the surface (some of them quite tall) and the exclusive right to dig building foundations or mine for solid minerals below the surface (sometimes at considerable depths).<sup>15</sup> We thus need a better understanding of the rights entailed by the *ad coelum* doctrine that is more refined than either “everything up or down” or “nothing up or down.”

The empirical issues center on how surface owners and courts can figure out what is happening at considerable depths underground. Traditionally, subsurface trespass could be detected only by using conventional surveying technology used with respect to disputes on the surface. Surveyors could enter the opening of a cave or mine shaft and compute whether subsurface activity was encroaching into the column of space of another, or they could measure the angle of descent of a well bore and compute whether it was going to deviate into the column of space under another.<sup>16</sup> More recently, seismic technology has made great strides, to the point

---

12 Restatement of the Law Second, Torts §§ 519–524 (Am. L. Inst. 1977).

13 328 U.S. 256 (1946).

14 *Id.* at 261.

15 Restatement of the Law Fourth, Property Vol. 1, Div. III, Topic 1 Introductory Note (Am. L. Inst., Tent. Draft No. 4, 2023) (The Vertical Scope of Rights in Land).

16 See, e.g., 1 W.L. SUMMERS, OIL AND GAS § 2.2 (3d ed. 2004) (“In some oil-producing states, the regulations of conservation agencies require producers to make directional surveys of wells and to preserve records of these surveys. By using this information, a landowner or lessee can discover if land has been subject to subsurface trespass by adjoining owners through directional or slant drilling.”); Colleen E. Lamarre, *Owning the Center of the Earth: Hydraulic Fracturing and Subsurface Trespass in the Marcellus Shale Region*, 21 CORNELL J.L. & PUB. POL’Y 457, 471–72 (2011).

where the location of a well bore encased in solid material like concrete or steel can be detected from the surface.<sup>17</sup> Also, if pressurized fluid is discharged from openings in the well bore, it is possible to compute – albeit not with certainty but in terms of a probability distribution – how far the fluid is likely to disperse underground from perforations in the well bore.<sup>18</sup> But it does not appear that current seismic technology can detect whether minerals are flowing out of pore space within rock underneath the surface of one owner's land into a fracturing well located within the column of space of another surface owner – or whether minerals are flowing into pore space within rock underneath the surface of an owner's land from an injection well that remains within the column of space of another surface owner. So, the limits of detection technology must be taken into account in considering how the *ad coelum* doctrine should be defined with respect to production or disposal activity at significant depths underground.

The answers to these issues have very large policy implications for the future of use of subsurface resources, whether in the form of extraction of valuable minerals from under the ground or the storage or disposal of minerals under the ground, including (many hope) the sequestration of greenhouse gases like carbon dioxide.<sup>19</sup> Courts in states that have benefitted greatly from the development of fracking technology have unsurprisingly adopted rules of subsurface trespass that do not interfere with the continued use of this technology. Some of the same courts have adopted rules of subsurface trespass that do not interfere with the use of injection wells for either the subsurface storage of valuable minerals or the disposal of waste materials. Whether these rules are consistent with conventional understandings about slant drilling or mining underneath another's land is debatable. *Briggs* answers some of these questions, but leaves others unanswered.

This Article will set the *Briggs* opinion in its doctrinal, technological, and economic context and will show how its approach based on ordinary trespass fares well from a theoretical and policy point of view. Section 2 sets the stage by setting forth three alternatives to conventional trespass that could be employed to determine the rights and duties of landowners at least one of whom is engaging in production of hydrocarbons using fracking technology: the subsurface as a commons, ownership in place, and the fair opportunity doctrine. All such approaches depend on a notion of vertical ownership in land, but the *ad coelum* doctrine is often left ambiguous in the

---

<sup>17</sup> Christopher S. Kulander & R. Jordan Shaw, *Comparing Subsurface Trespass Jurisprudence—Geographical Surveying and Hydraulic Fracturing*, 46 N.M. L. REV. 67, 113 (2016).

<sup>18</sup> *Id.*

<sup>19</sup> R. Lee Gresham & Owen L. Anderson, *Legal and Commercial Models for Pore-Space Access and Use for Geologic CO<sub>2</sub> Sequestration*, 72 U. PITT. L. REV. 701 (2011). In 2010, the Alberta passed legislation declaring all underground pore space to be owned by the Crown, in order to promote carbon capture and storage projects. Mines and Minerals Act, RSA 2000, c M-17, § 15.1.

caselaw and commentary. Section 3 will offer a restatement of the *ad coelum* doctrine based on possession and possible effective possession and will sharpen the distinction between possession and the right to possess. Section 4 sets forth the challenges of fracturing technology to trespass doctrine that stem from the difficulty of monitoring such activity. With these considerations in hand, we turn in Section 5 to the opinion in *Briggs*, and argue that its incrementalist approach remains faithful to the architecture of trespass and possession law in a way that both makes functional sense and furthers the guidance function of the law.

## 2 Three Alternatives to Conventional Trespass

The Pennsylvania Supreme Court in *Briggs* determined that the conventional law of subsurface trespass applies to the production of hydrocarbons using fracking technology. In Section 3, we offer a qualified defense of that conclusion. First, however we offer a brief description and critique of three alternative conceptions of the rights of surface owners insofar as they are affected by mineral extraction, storage, or waste disposal that is alleged to enter their column of space below the surface.

### 2.1 The Subsurface as a Commons

In a decision rendered a few years before *Briggs*, the Texas Supreme Court effectively adopted the understanding that the column of space deep below the surface should be regarded as a commons open to access by all. The court in *Coastal Oil & Gas Corp. v. Garza Energy Trust*<sup>20</sup> expressed this understanding by holding that the rule of capture applies to all valuable minerals released from porous rock formations under the surface, without regard to whether any trespassory invasion may have occurred by the production company in securing the release of such minerals. The court implicitly analogized the deep subsurface to the atmosphere high above the surface, where airplane overflights occur without any suggestion that they are guilty of trespassing into the surface owner's column of space.<sup>21</sup>

The conception of the deep subsurface as a commons effectively removes any threat of trespass liability from fracking, which appears to have been the central policy objective of the *Garza* court.<sup>22</sup> Logically, it would also remove any threat of trespass liability for injecting water, oil, or natural gas into the ground for storage or

---

<sup>20</sup> *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008).

<sup>21</sup> See *id.* at 11 (“Wheeling an airplane across the surface of one’s property is a trespass; flying the plane through the airspace two miles above the property is not.”).

<sup>22</sup> *Garza*, 268 S.W.3d at 45–47 (Johnson, J., concurring).



for injecting waste products into the ground, when it is foreseeable that the stored or waste material will migrate into fissures or pore space under the surface of other owners. And it would presumably meet with the approval of those who envision using fissures and porous rock deep underground as a situs for sequestering greenhouse gases like carbon dioxide extracted from the atmosphere.

Nevertheless, the conception of the deep subsurface as a commons runs into problems. One is precedent. The Texas courts have long recognized that slant or deviated drilling is a trespass.<sup>23</sup> If a deviated pipe is a trespass, then there must be a principled reason why inserting a horizontal pipe or injecting a stream of pressurized fracking fluid into the column of space of another is not a trespass. Conceivably, the Texas courts could hold that deviated drilling is a trespass if committed near the surface, but not if committed at some depth far below the surface. But at what depth does the *ad coelum* rule run out, and the underground commons begin? Presumably, the Texas legislature or the Texas Railroad Commission could adopt a rule defining the point of transition from private to public rights.<sup>24</sup> But this would have to be periodically updated as monitoring technology improves, and would likely elicit challenges from surface owners as a taking of their property.

The proposal to declare the deep subsurface a commons also runs up against all the standard critiques of making any resource a commons: this will encourage wasteful racing to be the first to capture the resource, will likely generate overly rapid or excessive production, and will elicit unnecessary duplication of activity.<sup>25</sup> All these problems have been generated by the rule of capture as applied to oil and gas production, and after long and painful experience oil and gas production states have generated various regulatory regimes designed to mitigate these problems. But the existing regulatory solutions are designed to maximize production and minimize waste. They are not designed to mediate disputes over the use of the deep subsurface as a storage venue, a waste repository, or a situs for sequestering carbon dioxide. Those uses, if the subsurface is regarded as a commons, would generate new pathologies of first possession requiring new regulatory solutions. And developing appropriate regulatory solutions would be made vastly more difficult without any baseline understanding of who is entitled to participate in the commons and with what respective shares.<sup>26</sup>

---

23 *Hastings Oil Co. v. Texas Co.*, 234 S.W.2d 389 (Tex. 1950).

24 Cf. John G. Sprankling, *Owning to the Center of the Earth*, 55 UCLA L. REV. 979 (2008).

25 GARY D. LIBECAP, CONTRACTING FOR PROPERTY RIGHTS 95–107 (1989); see also ELEANOR OSTROM, GOVERNING THE COMMONS; THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990); Eric C. Edwards & Bryan Leonard, *Contracting and the Commons: Linking the Insights of Gary Libecap and Elinor Ostrom*, in THE ENVIRONMENTAL OPTIMISM OF ELINOR OSTROM 149 (M.E. Jenkins, R.T. Simmons, & C.H. Harmer eds., 2020).

26 Gary D. Libecap & James L. Smith, *Regulatory Remedies to the Common Pool: The Limits to Oil Field Unitization*, 22 ENERGY J. 1 (2001); Gary D. Libecap & Steven N. Wiggins, *Oil Field Unitization: Contractual Failure in the Presence of Imperfect Information*, 75 AM. ECON. REV. 368 (1985).

## 2.2 The Subsurface as Ownership in Place

A second solution to the dilemmas posed by fracking technology is to declare that the rule of capture no longer applies when such technology is used. This was the solution adopted by the federal district court in West Virginia.<sup>27</sup> Superficially considered, the idea seems logical. The rule of capture applies to subsurface minerals deemed “fugacious,” meaning they move around in subsurface reservoirs in response to changes in pressure gradients. The analogy is to wild animals, which are deemed to be “fugitive” rather than stationary. When courts first considered the extraction of minerals like oil, gas, or groundwater from the subsurface, they observed that all one had to do was insert a pipe into a subsurface reservoir and the mineral would “escape” to the surface because of the sudden reduction in pressure from the overburden, allowing the operator to capture the fugitive resource.<sup>28</sup> Fracking entails blasting shale and other rock formations with pressurized water in order to release oil or gas trapped in fissures or pores in the rock. The West Virginia court reasoned that if underground minerals are not fugacious because they are trapped inside a rock formation, then the extraction of such minerals should be regarded as being no different from the extraction of solid minerals, that is, hard rock mining.<sup>29</sup> In effect, the court ruled that the rule of capture applies only to minerals found in underground reservoirs which can be extracted by simply sticking a wellbore into the ground. If the minerals must be blasted out of a rock formation, the rule of capture does not apply.

The short answer to the District Court’s reasoning is that it only accentuates the need to apply the law of trespass to cases involving the use of fracking. If minerals that can be extracted only with the use of fracturing technology are subject to a rule of ownership in place, like subsurface coal or limestone, then it becomes even more critical to delineate the boundaries in the subsurface. Specifically, it becomes necessary to delineate the zone of “natural” extraction of fugacious minerals, where the rule of capture applies, from the zone in which extraction is made possible only by using the “unnatural” technology of fracking, and the rule of capture does not apply. Any use of fracking that drains minerals from subsurface space subject to rights of another would be a trespass, just as digging a shaft underground to extract coal from underneath surface over which another holds rights is a trespass.<sup>30</sup>

---

<sup>27</sup> *Stone v. Chesapeake Appalachia, LLC*, 2013 WL 2,097,397 (N.D. W. Va. Apr. 10, 2013).

<sup>28</sup> *Westmoreland & Cambria Natural Gas Co. v. De Witt*, 18 A. 724 (Pa. 1889).

<sup>29</sup> Restatement of the Law Fourth, Property Vol. 1, Div. III, § 1.14 (Am. L. Inst., Tent. Draft No. 4, 2023) (Solid Minerals and Other Solid Objects).

<sup>30</sup> *Pan Coal Co. v. Garland Pocahontas Coal Co.*, 125 S.E. 226 (W. Va. 1924).

The Texas Supreme Court that decided *Garza* would object to this solution on the ground that it would subject operators using fracking technology to great uncertainty in the form of vexatious trespass suits alleging that fracking has resulted in drainage of minerals from rock formations under their surface. Since it is difficult if not impossible to know where oil and gas brought to the surface was originally located, the litigation risk would threaten the future of the use of this technology. The Pennsylvania Supreme Court in *Briggs* offered a more principled objection: the distinction between “natural” extraction and “unnatural” extraction makes no sense in this context. Oil and gas producers have long used a variety of techniques to stimulate greater production, ranging from injecting water or gas into underground fissures in order to force minerals to the surface to (in the early days) dropping nitroglycerine into a well to dislodge minerals reluctant to escape from the comforts of the pore space in which they reside.<sup>31</sup> Indeed, as the court observed, the very act of drilling a well is an “unnatural” disruption of the original state of the minerals, since the well creates an artificial change in the pressure gradient that does not exist before the well is drilled.<sup>32</sup> Following the understanding implicit in the industry, the court defined minerals as “fugacious” if they move around once brought to the surface, as opposed to being fugacious in place.

### 2.3 The Fair Opportunity Doctrine

A third solution to the dilemmas of fracking has been proposed by commentators and generally goes by the name of the fair opportunity doctrine.<sup>33</sup> The idea here builds on the notion of correlative rights. The basic concept is that operators using fracking technology should be subject to liability only if they have denied neighboring mineral rights owners a “fair opportunity” to participate in extraction of subsurface minerals using fracking technology. For example, if an operator has invited neighboring owners to participate in a voluntary pooling or unitization agreement on reasonable terms, this would immunize the operator from any liability for subsurface trespass. The fair opportunity doctrine is sometimes grounded in the proposition that conflicts over subsurface rights should be governed by nuisance law (that is, in a balancing of interests) rather than trespass; at other times it has been extrapolated from limitations on the remedial rights of surface owners complaining of subsurface intrusions (such as no injunction without significant harm); at still other times it has been

---

<sup>31</sup> See *Tillery v. Ellison*, 345 P.2d 434 (Okla. 1959).

<sup>32</sup> 224 A.3d at 347–48.

<sup>33</sup> See Joseph A. Schremmer, *Subsurface Trespass: Private Remedies and Public Regulation*, 101 NEB. L. REV. 1005 (2023); see also David E. Pierce, *Minimizing the Impact of Oil and Gas Development by Maximizing Production Conservation*, 85 N.D. L. REV. 759, 771 (2009).

supported by generalizations from the regulatory regimes designed to prevent the excesses generated by the rule of capture.<sup>34</sup>

Interestingly, the Texas Supreme Court, in a post-*Garza* decision, has endorsed a version of the fair opportunity doctrine. As in *Garza*, the facts in *Lightning Oil Co. v. Anadarko E & P Onshore, LLC*<sup>35</sup> were somewhat unusual. Anadarko held rights to operate on the surface of one tract of land and the rights to extract minerals from the subsurface of another tract of land; the most feasible way to reach the minerals under the other tract of land was to engage in horizontal drilling that would require constructing a wellbore through the mineral estate of Lightning. Lightning claimed that allowing Anadarko to penetrate space subject to its mineral lease with a horizontal wellbore would be a trespass, even though Anadarko promised that there would be no perforations in the horizontal well bore that would inject fracturing fluid into Lightning's mineral estate. The court acknowledged that it was "indisputable" that the cuttings from the wellbore pushed to the surface would contain some minerals.<sup>36</sup> But the quantity of minerals lost would be small. Balancing the interests of Anadarko in being able to reach its subsurface rights against the small quantity of minerals that Lightning would lose if Anadarko was allowed to construct a horizontal well through its mineral lease, the court held that Lightning could not claim an actionable trespass. Quoting the lower court, the Texas Supreme Court said that "the mineral estate owner is only entitled to 'a fair chance to recover the oil and gas in place or under' the surface estate."<sup>37</sup> Lightning's "fair chance" was not unduly sacrificed by allowing Anadarko to drill through its mineral estate.

The fair opportunity doctrine is normatively attractive – how could it not be when it is grounded in fairness? The problem with the fair opportunity solution is that it does not tell us who is entitled to claim unfairness, nor does it tell us what is

---

<sup>34</sup> For the invocation of nuisance law, see Joseph A. Schremmer, *Getting Past Possession: Subsurface Property Disputes as Nuisances*, 95 WASH. L. REV. 315 (2020). Schremmer's more recent work draws on equitable limits on remedial rights and the structure of public regulation. See Schremmer, *supra* note 33. <sup>35</sup> 520 S.W.3d 39 (Tex. 2017). In *Garza*, the plaintiffs held only a reversion, which under Texas law required that they prove actual injury in order to establish trespass. Ordinarily, a party claiming trespass can obtain a declaratory judgment or an award of nominal damages without showing actual harm. Restatement of the Law Fourth, Property Vol. 2, Div. II, § 1.4 (Am. L. Inst., Tent. Draft No. 4, 2023) (Trespass to Land and Harm).

<sup>36</sup> *Id.* at 47.

<sup>37</sup> *Id.* The court also invoked the "accommodation" doctrine, whereby the owner of the surface estate is required to accommodate a severed mineral estate by allowing the holder of the mineral estate reasonable access to the surface to engage in exploration and production of the mineral estate. *Id.* at 49–50. In effect the court transformed the accommodation doctrine into a two-way street: the mineral estate must also accommodate the surface estate (here the assignee of the surface estate holder) by allowing it to cross the mineral estate in a minimally intrusive manner in order to reach another production zone.

unfair. The doctrine implicitly assumes some version of the *ad coelum* principle – that the rights of the surface owner extend downward into the subsurface below the land. Thus, the *ad coelum* rule implicitly defines the universe of surface owners entitled to claim a fair share. But given the difficulty of determining the original source of fugacious minerals extracted using fracking technology, how do we know which surface owners are entitled to claim an entitlement to a fair share based on their *ad coelum* rights? The fair opportunity doctrine also implicitly assumes that some version of the rule of capture continues to apply. Implicit in the caselaw is a notion of reciprocity in the sense that if one owner is engaged in extraction, others in the area can do likewise. Thus, if one surface owner incurs the expense and takes the risk of deploying fracturing technology in an effort to capture minerals, courts do not regard it as unfair if neighboring surface owners have done nothing other than complain of drainage. Reciprocity means equal opportunity, not an allocation of the output of production proportionate to surface rights. Nonetheless, more intense activity here puts pressure on these somewhat rough and ready notions. Conceivably regulatory solutions could be adopted to answer these questions. In the meantime, and as a prelude to potentially better regulatory solutions, we need a more workable understanding of the respective rights of contesting parties as a matter of common law.

### 3 A Better Understanding of *Ad Coelum*

One key to sorting out the dilemmas posed by fracturing technology and the application of trespass law to subsurface invasions is to develop a better understanding of the *ad coelum* doctrine that defines the rights of owners of land. A critical distinction, which has been recognized in some aerial trespass cases,<sup>38</sup> is between possession and the *right to possession*. As conventionally formulated, trespass entails an interference with possession. But trespass also applies to interferences with “constructive possession,” as when the defendant invades land owned by an absentee owner. “Constructive possession,” we believe, is best regarded as a term that mostly refers to the right to possession as opposed to possession in fact and expresses the need for a functionally sensitive approach to questions of possession.<sup>39</sup> In the context of the *ad coelum* doctrine, one can think of the right to possession as an exclusive option of the

---

<sup>38</sup> *Smith v. New England Aircraft Co.*, 170 N.E. 385, 393 (Mass. 1930).

<sup>39</sup> Possession one could say is a social fact – one often relevant to determining property rights. The right to possession is a proposition about the scope of rights of ownership, here, how far the ownership of land should be understood to extend above and below the surface of land. See, e.g., ALBERT KOCOUREK, *JURAL RELATIONS* 364–371 (2d ed. 1928); Yun-chien Chang, *The Economy of Concept and Possession*, in *LAW AND ECONOMICS OF POSSESSION* 103 (Yun-Chien Chang ed., 2015); Henry E. Smith, *The Elements of Possession*, in *LAW AND ECONOMICS OF POSSESSION* 65 (Yun-Chien Chang ed., 2015).

owner of the surface of land to develop up or down from the surface within the column of space.<sup>40</sup> Absent a severance of air rights or mineral rights, only the surface owner can determine how high above the surface or how low below the surface development efforts may proceed. These development rights may be subject to statutory or regulatory limits (like height restrictions in a zoning ordinance). But as a matter of common law, the *ad coelum* doctrine means that the surface owner has the right to possess above and below the surface, which means only the surface owner can engage in development activity that occupies the column of space up and down.

Reconceptualizing the *ad coelum* doctrine as entailing both the protection of possession and the right to possession is useful because the right to possession is necessarily qualified by the type of possession that is foreseeable. As some of the aerial trespass cases put it, the option to develop up and down is limited to “possible effective possession.”<sup>41</sup> The portion of the column of space which is subject to possible effective possession is a function in significant part of the state of technology. In earlier times, one could build above the surface perhaps as high as the towers on a cathedral or dig down below the surface far enough to tap into an underground aquifer. Today, we know it is possible to build 100-story skyscrapers and construct wells that use fracturing technology 10,000 feet below the surface. Technology has stretched the extent of possible effective possession considerably, both up and down.

The idea of possible effective possession is also, however, a function of economics. The Kentucky Court of Appeals erred in a famous case by applying the *ad coelum* doctrine to ownership of the Great Onyx Cave.<sup>42</sup> There was no evidence that Lee, who owned part of the surface above of the cave but had no entrance to the cave on his land, would find it cost-justified to construct an opening to the cave. Constructing a shaft and elevator might have been technologically feasible, but no sane surface owner would do so given the cost relative to the economic benefit. So, Lee could not claim a right to possession of the cave, because he had no possible effective possession of the cave. And although Lee’s interest in blocking development by Edwards is valuable in the sense of hold-up potential, such an interest is not complementary or synergistic in any way with Lee’s other rights in land, nor does it facilitate any development efforts on the part of Lee. For these reasons, the decision to apply *ad coelum* in such a literal fashion created only

---

<sup>40</sup> Restatement of the Law Fourth, Property Vol. 1, Div. III, Topic 1 Introductory Note (Am. L. Inst., Tent. Draft No. 4, 2023) (The Vertical Scope of Rights in Land).

<sup>41</sup> *Smith v. New England Aircraft Co.*, 529, 170 N.E. 385, 393–94 (Mass. 1930); *Swetland v. Curtiss Airports Corp.*, 41 F.2d 929, 937 (N.D. Ohio 1930), modified, 55 F.2d 201 (6th Cir. 1932), quoting *POLLOCK ON TORTS* (13th ed.) p. 362 (“It does not seem possible on the principles of the common law to assign any reason why an entry above the surface should not also be a trespass, unless indeed it can be said that the scope of possible trespass is limited by that of possible effective possession, which might be the most reasonable rule.”).

<sup>42</sup> *Edwards v. Sims*, 24 S.W.2d 619 (Ky. 1929).

“dog in the manger” law and needless conflict and litigation.<sup>43</sup> Thus, notions of possession are relative to what is being possessed. One might make use of land thousands of feet below the surface for purposes of mining yet not be able to access a cave located much closer to the surface for exploration purposes.

Notice that the concept of possible effective possession provides a perfectly plausible explanation for why surface owners can sue for trespass when neighbors construct balconies or install wires that intrude into the air space above the surface, but have no right to enjoin or demand compensation for aerial overflights – at least those that occur at a comfortable distance above existing structures. Overhanging balconies or power lines do not typically interfere with actual possession. But they deprive the surface owner of the right to possession, because the surface owner may foreseeably want to occupy, that is, exercise their exclusive option to develop, the space taken up by the balcony or the wire.<sup>44</sup> In contrast, under current construction technology, it is not foreseeable that the surface owner will ever possess the space taken up by overflying airplanes. Again, what constitutes possession and possible effective possession is a matter of technology, social custom, and pragmatic sense. Spite pylons to deter overflights afford owners no extra possessory rights, and flying kites and toy rockets are activities that may or may not under relevant social norms be substantial, valuable, and regular enough to count as the kind of control required for possession. (They are the kinds of activities that may also be regulated in the interest of safety.) Thus, overflights at a sufficiently high altitude do not interfere with the right to possession, and are not trespasses. At any rate, there was no need for the Supreme Court to assert some kind of inherent public right to “aerial navigational space” in order to disclaim rights of surface owners to block aerial overflights.<sup>45</sup>

The distinction between possession and the right to possession can also be deployed in considering what constitutes a subterranean trespass. A defendant who inserts a physical pipe into the subsurface subject to the rights of a neighboring plaintiff might at first blush be seen as not depriving the plaintiff of actual possession of a portion of the subsurface. But the pipe *does* interfere with the plaintiff’s right to possession, because the plaintiff may foreseeably want to use this portion of the subsurface to drill a well of its own. Further, the availability to all owners of the possibility of using drilling equipment leads courts to treat invasions by such equipment as per se trespass, either because for such purposes it is an invasion of possession (possession relativized to activity) or because the interference with

---

<sup>43</sup> Prosser and Keeton on the Law of Torts §13 (5th ed. 1984). The phrase refers to an ancient Greek fable, often attributed to Aesop, in which a dog prevents oxen from eating hay that he has no interest in eating himself.

<sup>44</sup> Restatement of the Law Fourth, Property Vol. 1, Div. III, § 1.5, Illus. 1 Note (Am. L. Inst., Tent. Draft No. 4, 2023).

<sup>45</sup> See *United States v. Causby*, 328 U.S. 260–61, 266 (1946).

possible effective possession is so obvious or non-temporary enough that harm can be presumed. (Compare permanent invasions of airspace, as by eaves and cornices, which are also treated as trespasses per se no matter how high up.) The same kind of interference (with some version of possession or the right to possession) is presented by the injection of pressurized fracking fluid into a portion of the plaintiff's column of space. We know that fracturing technology can be deployed by surface owners at great depths. And we know that there is considerable economic benefit in doing so – great enough to warrant the expense of deploying such technology. Thus, horizontal pipes or highly-pressured fracturing fluid are properly regarded as trespasses, if they can be shown to have crossed the boundary into another's subsurface space. This is the unambiguous holding of *Briggs*, and that determination is correct.<sup>46</sup>

The distinction between possession and the right to possess may also be helpful in reconciling another seemingly discordant aspect of the decisional law as it applies to subsurface mineral extraction. The courts have generally held that if a surface operator uses a technique for the enhancement of production like the injection of water that destroys or severely impairs existing production wells of another operator, this gives rise to trespass liability.<sup>47</sup> These holdings rest comfortably on the idea that an intrusion into the column of space of another that interferes with actual possession is a trespass. Such an intrusion is analogous to an airplane crashing into a building. In contrast, courts have generally denied liability for trespass when a surface operator injects waste material such as produced water into an abandoned well, based on the claim that some of the waste material is likely to migrate into underground fissures or pores in the subsurface of another.<sup>48</sup> These holdings can be rationalized on a number of grounds, including the absence of the requisite intent to invade the space of another.<sup>49</sup> But it is also quite possible that in a number of these cases the complaining surface owner would not find it economically justifiable to drill a well for the sole purpose of disposing the waste water generated in another producer's operations.<sup>50</sup> The fee for providing such a service would not cover the cost

---

<sup>46</sup> 224 A.3d at 346, 350.

<sup>47</sup> Restatement of the Law Fourth, Property Vol. 2, Div. I, § 1.2F Reporters' Note (Am. L. Inst., Tent. Draft No. 4, 2023).

<sup>48</sup> *Chance v. BP Chemicals, Inc.*, 670 N.E.2d 985 (Ohio 1996); see also Keith B. Hall, *Hydraulic Fracturing: If Fractures Cross Property Lines, Is There an Actionable Subsurface Trespass?*, 54 NAT. RES. J. 361, 380–81 (2014) (noting that courts have generally rejected trespass liability based on the migration of waste fluids into the subsurface of property absent a showing of “actual damages or an interference with some reasonably anticipated use of his property”).

<sup>49</sup> Restatement of the Law Fourth, Property Vol. 2, Div. I, § 1.2E (Am. L. Inst., Tent. Draft No. 4, 2023) (Injection of Liquids or Solids into Subsurface Cavities).

<sup>50</sup> And if there is no synergy with the landowner's other land uses or prospect for investment, protecting an interest in the hold-up value would raise again the problem of the dog in the manger. See *supra* note 43 and accompanying text.



of drilling the well. Thus, these are cases in which the right to possess does not rise to the level of possible effective possession, meaning there is no basis for imposing trespass liability.

## 4 The Limits of Monitoring Technology

The Pennsylvania Supreme Court left other, potentially critical, issues about subsurface trespass undecided. These issues relate to a more general problem: the difficulty of determining exactly what is going on in deep underground fissures when an operator uses fracturing technology to bring oil or gas to the surface. Trespass liability is dependent on monitoring for intrusions by tangible objects that cross into the column of space of another on, above, or below the surface. Monitoring for intrusions, in turn, is dependent on technology that can detect and record the existence of an intrusion. The limits of monitoring technology no doubt help explain why intrusions by gases, radiation, odors, or sound waves are generally not regarded as trespasses.<sup>51</sup> Those limits also help explain why courts in the 1920s and 1930s uniformly rejected liability for airplane overflights; the cases arose before the development of modern radar that could be used (in theory today) to detect and document intrusions by airplanes into any particular surface owner's column of space. Similarly, the difficulty of detecting invasions that occur thousands of feet below the surface, often below one or more layers of impermeable rock, presents obvious obstacles to applying the ordinary rules of trespass to fracking.

One issue left unresolved in *Briggs* is how to determine whether pressurized fracturing fluid will remain within the column of space in which the defendant is authorized to operate, or whether it will move across the boundary into the subsurface space of another. After the fact, it may be possible to use seismic technology to detect cross-boundary movements of pressurized fluid. But trespass liability requires that the intruder either intends or knows to a near certainty that a tangible

---

51 See, e.g., *Adams v. Cleveland-Cliffs Iron Co.*, 602 N.W. 2d 215 (Mich. Ct. App. 1999). Some courts have purported to blur the line between trespass and nuisance by counting as trespasses certain extreme invasions that would not pass the “visible to the naked eye test.” See, e.g., *Martin v. Reynolds Metals Co.*, 342 P.2d 790, 798 (Or. 1959). Nevertheless, these decisions do not apply the strictness of trespass to these invasions and wind up in effect replicating the trespass-nuisance divide in a way that suggests the continuing importance of everyday notions of monitoring. See, e.g., Restatement of the Law Fourth, Property Vol. 2, Div. I, § 1.1 Cmt. h & Reporters’ Note (Am. L. Inst., Tent. Draft No. 3, 2021); see also Thomas W. Merrill, *Trespass, Nuisance, and the Costs of Determining Property Rights*, 14 J. LEGAL STUD. 13, 29–32 (1985); Henry E. Smith, *Exclusion and Property Rules in the Law of Nuisance*, 90 VA. L. REV. 965, 993–96 (2004).

object will enter space that turns out to belong to another.<sup>52</sup> Predicting how far fracturing fluid will travel from perforations in a horizontal pipe is very difficult.<sup>53</sup> It depends on the composition of the fracturing fluid, its pressure, the porosity of the subsurface material in which it is released, the porosity of the subsurface of the neighboring property, and other variables.<sup>54</sup> It is probably not sensible to require that a fracking operator ensure that all fluid remain some prescribed distance short of the boundary, since if all operators followed such a practice this would leave a zone of unrecovered minerals on both sides of the boundary, which “would, in the aggregate, constitute mass waste.”<sup>55</sup> The better view is probably that the requisite intent to trespass does not exist so long as the operator designs the system so that the *expected* dispersion of fracturing fluid from the wellbore does not cross the boundary.<sup>56</sup> But the issue remains unresolved, and, as the Pennsylvania Supreme Court observed, expert testimony will necessarily be required to resolve it in any particular case.<sup>57</sup>

Another vexing issue is whether fracking activity, even if all pipes and pressurized fluid remain entirely within subsurface space over which the actor has the right to operate, can give rise to trespass liability when the pressure of the fluid causes cracks to form in (and minerals to drain from) the subsurface rights of one or more neighboring properties. An analogy might be to the blasting cases, where the use of explosives on one parcel of land creates tremors or concussive air waves that cause walls to crack on structures on nearby land. The blasting cases no longer rest on trespass, at least if large rocks are not thrown onto neighboring land.<sup>58</sup> They are said to rest on liability for engaging in “abnormally dangerous” activity.<sup>59</sup> In most cases it will be difficult to characterize fracking as abnormally dangerous, since there is little or no danger of physical harm to the surface or injury to persons on the

---

52 Trespass does not require an intent to violate rights, only the intent to place or keep an object or oneself in a particular spot. *See supra* note 9 and accompanying text.

53 A separate opinion in *Briggs*, relying on statements in *Garza*, observed that fracking fluid can sometimes travel 2500 feet or more from the wellbore. 224 A.3d at 353 (Dougherty, J., concurring and dissenting).

54 Christopher S. Kulander & R. Jordan Shaw, *Comparing Subsurface Trespass Jurisprudence—Geographical Surveying and Hydraulic Fracturing*, 46 N.M. L. REV. 67, 113 (2016).

55 *Id.*

56 As argued in Hall, *supra* note 48, at 401–03.

57 224 A.3d at 349.

58 *See Spano v. Perini Corp.*, 250 N.E.2d 31 (N.Y. 1969) (overruling prior decisions requiring that large rocks be thrown on the plaintiff’s land, which implicitly treated the matter as being governed by the law of trespass).

59 *See* RESTATEMENT (SECOND) OF TORTS §520 (AM. L. INST. 1977) (Abnormally Dangerous Activities); RESTATEMENT (THIRD) OF TORTS: LIABILITY FOR PHYSICAL AND EMOTIONAL HARM §20 (AM. L. INST. 2010) (Abnormally Dangerous Activities); *see also* *Rylands v Fletcher*, (1868). LR 3 HL 330 (UK).

surface.<sup>60</sup> Nor does trespass seem to apply, given that there has been (by assumption) no invasion of a tangible object into the subsurface space of another. Nuisance liability would potentially be available, but if fracturing is a common practice in the locality and there is no evidence of physical harm to neighboring possessory rights, recovery on such a theory seems like a remote prospect. Nevertheless, the fact remains that courts have not yet spoken on the issue. So, one cannot say with confidence that the application of pressure by a producer in an area in which the producer is allowed to operate that causes fractures in subsurface rock where the producer is not allowed to operate, will or will not be characterized as a trespass.

## 5 Ordinary Trespass and the Architecture of Property

The timeliness and the stakes involved in *Briggs* are not the only reason *Briggs* is an important opinion. The opinion is remarkable for being so unremarkable. It is unremarkable because it embodies an approach to common law that is on the endangered species list: applied conceptual analysis that respects – and benefits from – the loose architecture of the common law of property.

As we have seen, many courts explicitly take hydraulic fracturing as a discrete policy problem and then work backwards to a rule that will serve the purpose. And in recent times commentators have likewise applied the same standard to judicial reasoning in this as in so many areas. And “recent” extends back at last to Oliver Wendell Holmes’s pronouncement that “a body of law is more rational and more civilized when every rule it contains is referred articulately and definitely to an end which it subserves, and when the grounds for desiring that end are stated or are ready to be stated in words.”<sup>61</sup> When it comes to underground rights and duties, commentators have taken the Holmesian line as amplified by the Legal Realists and their successors down to the present. To take one example of this thinking, the metaphor of minerals as being fugacious like wild animals is mocked as primitive common law analogizing that misses the point.<sup>62</sup>

---

<sup>60</sup> See *infra* note 77 and accompanying text.

<sup>61</sup> Oliver Wendell Holmes, Jr., *The Path of the Law*, 10 HARV. L. REV. 457, 469 (1897).

<sup>62</sup> See, e.g., Bruce M. Kramer & Patrick H. Martin, *The Law of Pooling and Unitization* 2–5 (3d ed. 1989); Laura H. Burney, *A Pragmatic Approach to Decision Making in the Next Era of Oil and Gas Jurisprudence*, 16 J. ENERGY NAT. RESOURCES & ENVTL. L. 1, 11 (1996) (“To clarify the contours of the pragmatic approach I envision, and to demonstrate its value, I will contrast it to two formalistic approaches used throughout the Great Era. As noted above, by analogizing to the law of wild animals, many early judges myopically adhered to common-law rules rather than venturing to fashion a

This has things backwards, and is in our view a parody of Cartesian rationality. Instead, the common law is a system that is loosely connected internally and semi-open to social context, and nowhere more characteristically so than in property.<sup>63</sup> “System” has become a bad word in legal academic circles, because the Realists succeeded in equating system with deductive system. Even if some of the more extreme formalists thought that law could be stated in axioms from which legal results could be derived “mechanically,” this kind of formalism is rarer than the Realists self-servingly portrayed.<sup>64</sup> Instead, systems come in all kinds of varieties, including those in which concepts are loosely connected and “derivations” would be presumptive at best.<sup>65</sup> Moreover, many systems are open, not closed, and reliance on context outside the system is also a matter of degree.<sup>66</sup> Law employs open-textured concepts in many ways, from reasonableness in negligence to the locality rule in nuisance to what counts as control to gain possession, to name but a few prominent examples.

Why does this matter? As illustrated by possession and related notions of trespass and *ad coelum*, the architectural approach to system carries with it advantages in terms of institutional specialization and the guidance function of the law.

The architectural approach builds in a concern for institutional specialization. Courts are not the only institutions that deal with problems like the common-pool problem of oil and gas. Nor is what they do about subsurface trespass the last word on such topics. Instead, courts do some things well and others not at all. What courts can do well is adjust bilateral relations with respect to easily detected harms. Sometimes

---

unique jurisprudence for oil and gas law.”); John Parmerlee, *Mines and Minerals-Leases-Rentals Accruing Under a Subterranean Gas Storage Lease*, 21 U. Kan. City L. Rev. 217, 219–20 (1953) (“If the law pertaining to minerals in this country is to retain its stability and uniformity it is mandatory that this vicious analogy drawn between natural gas and animals *ferae naturae* which has reared its ugly head be destroyed without delay.”); Kenneth J. Vandeveld, *The New Property of the Nineteenth Century: The Development of the Modern Concept of Property*, 29 BUFF. L. REV. 325, 354–57 (1980). See generally Rance L. Craft, *Of Reservoir Hogs and Pelt Fiction: Defending the Ferae Naturae Analogy Between Petroleum and Wildlife*, 44 EMORY L.J. 697, 699, 713–14 (1995) (documenting hostility to the *ferae naturae* metaphor and collecting references); Henry E. Smith, *Exclusion and Property Rules in the Law of Nuisance*, 90 VA. L. REV. 965 (2004).

<sup>63</sup> Thomas W. Merrill & Henry E. Smith, *The Architecture of Property*, in RESEARCH HANDBOOK ON PRIVATE LAW THEORIES 134 (Hanoch Dagan & Benjamin Zipursky eds., 2020).

<sup>64</sup> For an excellent discussion of varieties of formalism in private law, see Paul B. Miller, *The New Formalism in Private Law*, 66 AM. J. JURIS. 175 (2021).

<sup>65</sup> See, e.g., Simon Deakin, *Juridical ontology: the evolution of legal form*, 40 HISTORICAL SOCIAL RESEARCH 170, 173–74 (2015); Henry E. Smith, *Systems Theory: Emergent Private Law*, in THE OXFORD HANDBOOK OF THE NEW PRIVATE LAW 139 (Andrew Gold et al. eds., 2020).

<sup>66</sup> *Id.*; Henry E. Smith, *The Language of Property: Form, Context, and Audience*, 55 STAN. L. REV. 1105, 1167–90 (2003).

the proxy for the violation of a right is deliberately rough in order to make it possible for courts to solve conflicts in bulk, as in exclusion as opposed to governance strategies.<sup>67</sup> We could imagine a world in which there is no law of trespass, only nuisance, but such a world would be a costly one indeed, because the open-ended and more fine-grained standard of nuisance would be invoked in situations in which it was not worth the effort to be so granular (e.g., pelting land with rocks). It would also be a very unpredictable one. In keeping with focusing litigation on bilateral conflicts, the architectural approach tends to line up sometimes with simple local forms of morality, which are like those invoked by corrective justice and Kantians and less like global distributional justice.<sup>68</sup>

When taking a first approximation to a problem, local rights and duties get us off the ground. When it comes to misuse of these rules, as when someone insists on an injunction ordering the removal of an innocent building encroachment, we can start getting more fine-grained. And distributional considerations tend to be more in the nature of adjustment when courts are involved, in contrast to the kinds of distributional design possible in government taxation and other social programs. What the right allocation of considerations is exceeds the scope of this paper. However, in the context of underground drilling, the need to unitize, complex spacing and other regulation of techniques, and considerations of owner size and wealth are not facets of the problem courts are adept at incorporating into their doctrines. There are other actors and institutions, ranging from contracting parties to regulatory agencies, to legislatures, which can address problems courts leave on the table.

This is not a counsel of despair for courts. On the contrary, what courts decide can make the job of these other actors and institutions much harder or easier. We have argued that the law of trespass, in conjunction with a fairly traditional but flexible version of *ad coelum* and an articulated law of possession, can provide good baselines for further contracting and regulation.

The approach taken by the opinion in *Briggs* and extended here has the merit of what might be termed “architectural fit.”<sup>69</sup> In private law theory and in reform circles, there is a concern with how formulations and reformulations of the law do or

---

67 See Merrill & Smith, *supra* note 63; Henry E. Smith, *Exclusion versus Governance: Two Strategies for Delineating Property Rights*, 31 J. LEGAL STUD. 5453 (2002).

68 Andrew S. Gold & Henry E. Smith, *Sizing Up Private Law*, 70 U. TORONTO L.J. 489 (2020); Thomas W. Merrill & Henry E. Smith, *The Morality of Property*, 48 WM. & MARY L. REV. 1849 (2007); Henry E. Smith, *Modularity and Morality in the Law of Torts*, 4 J. TORT L. 1 (2011), <http://www.bepress.com/jtl/vol4/iss2/art5>.

69 Andrew S. Gold & Henry E. Smith, *Restatements and the Common Law*, in THE AMERICAN LAW INSTITUTE: A CENTENNIAL HISTORY 441 (Andrew S. Gold & Robert W. Gordon eds., 2023). Cf. Jeremy Waldron, “*Transcendental Nonsense*” and *System in the Law*, 100 COLUM. L. REV. 16, 47 (2000).

not fit with existing law.<sup>70</sup> This can be at the level of results: does a proposed rule give the same results as reached in previous cases even if by another route? Some would argue for the criterion of fit to extend to courts' reasoning. Fit considerations can also refer to the morality of the law, and by extension to other goals, like efficiency and fairness. Another kind of fit is architectural fit: does the proposed rule or reform of the law match the structure of existing law, in terms of its concepts and how they interrelate? Far from being an exercise in formalism, achieving architectural fit can make the law easier to communicate and results easier to predict. If the structure of the law is doing a good job, it may even suggest results that make substantive or institutional sense.

Underground drilling is a good example. As we have argued, the cases are consistent with a distinction between possession and the right to possess. Possession is a status related closely to social facts. What it takes to gain and maintain possession depends on social convention: a chair on a lawn, by the side of the street, and at the beach can be interpreted in everyday ways in terms of whether they are possessed.<sup>71</sup> Much of this set of social facts has to do with acts of control, but possession as a status is not lost automatically when control is relinquished. If one parks a car on the street and flies overseas, one does not lose possession. One could say that one does not possess the car but retains a right to possess – the right to get a court to put one back in possession if someone else has taken possession. Conventionally, though, courts express this by saying that possession persists if there is no abandonment or displacement of possession by another. If a thief takes the car, the owner has lost possession but still has the right to possess.

Ironically, this more articulated approach to possession meets some of the classic criticisms of the Realists and their sympathizers. Some of the earliest and most famous “debunking” of concepts was in the area of possession.<sup>72</sup> The consensus became that looking for a unitary notion of possession, especially from which results could be derived, was a formalist pipe dream, and that one needed a raft of possession-like concepts for different purposes, ranging from acquisition to adverse possession, to property torts, and so on.<sup>73</sup> Once we distinguish the legal status of possession from the social conventions of possession on the one hand and the right to possess on the other, we can avoid much of the force of such criticisms and the

---

<sup>70</sup> Gold & Smith, *supra* note 69; see also STEPHEN A. SMITH, *CONTRACT THEORY* 28–30 (2004); Andrew S. Gold, *Internal and External Perspectives: On the New Private Law Methodology*, in *THE OXFORD HANDBOOK OF THE NEW PRIVATE LAW* (Andrew S. Gold et al. eds., 2020).

<sup>71</sup> Thomas W. Merrill, *Ownership and Possession*, in *LAW AND ECONOMICS OF POSSESSION* 9 (Yun-Chien Chang ed., 2015); see also James Krier & Christopher Serkin, *The Possession Heuristic*, in *LAW AND ECONOMICS OF POSSESSION* 149 (Yun-Chien Chang ed., 2015).

<sup>72</sup> Joseph W. Bingham, *The Nature and Importance of Legal Possession*, 13 *MICH. L. REV.* 535 (1915).

<sup>73</sup> Burke Shartel, *Meanings of Possession*, 16 *MINN. L. REV.* 611 (1932).

usefulness of possession and related notions to actual problems like subsurface activity becomes apparent.

In the *ad coelum* doctrine, the ambiguity in earlier times involved failing to distinguish possession from the right to possession. Before the advent of artificial flight, this conflation did not matter much. The only way to interfere with possession was to do things the owner was likely to do, namely build up and downward, extract minerals, build tunnels, and the like. Temporary interferences took the form of projectiles, which tended to be in the near-airspace. Rarely would an interference be beyond the zone of the possession. In the zone of effective possession, the invasion was likely to be either permanent (eaves, projecting foundations) or not harmful at all. It is only with the rise of aircraft and the development of deep underground drilling that activities might be more or less temporary invasions beyond the zone of possession, not permanent and yet not so far beyond that they would be beyond any notion of possession. The idea that the owner has a right against interference with possible effective possession, which includes the option to build upward, captures the results that started accreting in this area. And possible effective possession must be evaluated relative to activities: it is possible not to have economically feasible access to a cave for tourist purposes while being able to engage in mineral development at greater depths such that any invasion of the column of space by a neighboring extractor is automatic interference that amounts to per se invasion for trespass. In general, a permanent invasion of space that an owner has a right to possess interferes with possible effect possession, as does a temporary invasion that causes an interference with the owner's use and enjoyment of possessed space.<sup>74</sup>

This incremental adjustment to a set of loosely connected concepts accommodates technological change in a sensible way, if only as a simple baseline from which to contract over and regulate. Indeed, the architectural approach implicit in the *Briggs* opinion has the advantage of serving the guidance function of law.<sup>75</sup> Anyone paying close attention to the way that concepts of possession, *ad coelum*, and trespass work would be able to come to a conclusion roughly like that of the court in *Briggs*. If we had more of a consensus that the law has an architecture, which can be developed incrementally by courts before more drastic overhauls need be considered, we would be in a world where people knew better where they stood. Or so we would argue.

---

<sup>74</sup> This is the position taken in Restatement of the Law Fourth, Property §§ 1.2A–1.2F (Am. L. Inst., Tent. Draft No. 4, 2023), in the drafting of which both authors have been involved.

<sup>75</sup> LON L. FULLER, *THE MORALITY OF LAW* 39, 49–51, 63–65 (2d ed. 1969); H.L.A. HART, *THE CONCEPT OF LAW* 39, 54–58, 79–88 (2d ed. 1994); Jeremy Bentham, *Of Laws in General*, in *THE COLLECTED WORKS OF JEREMY BENTHAM* (H.L.A. Hart ed., 1970); Joseph Raz, *Authority, Law, and Morality*, in *ETHICS IN THE PUBLIC DOMAIN* (1994); Paul B. Miller & Jeffrey A. Pojanowski, *The Internal Point of View in Private Law*, 67 *AM. J. JURIS.* 247 (2022).

## 6 Conclusions

A central concern expressed by courts and commentators about applying ordinary principles of trespass in the context of hydraulic fracturing is the prospect of vexatious litigation undermining the dramatic upsurge in oil and gas production associated with the use of fracking. A principal problem in this regard is the perceived difficulty in determining whether a boundary line has been crossed deep below the surface, often ten thousand feet or more, with multiple layers of rock or sediment in between. The evidentiary problem is real. Seismic technology has been developed that can detect the presence of a pipe deep below the surface. The distance that fracking fluid will travel from the end of the well bore can be estimated with expert testimony about composition of the fluid, the pressure with which is injected, and the nature of the sedimentary layer in which the injection takes place. But both of these forms of proof are expensive. The fact that proof of invasion will be expensive, and that the burden of proof is on the plaintiff, plausibly offers an adequate answer to the prospect of vexatious litigation. The plaintiff will sue for trespass only if it has reason to believe fracking is being used on nearby property in such a way as to deprive it of significant royalties. So the idea that trespass liability will discourage fracking is likely misplaced.

The expense of litigation gives rise to a related objection grounded in distributive justice: small fry surface owners like the Briggs family cannot afford the cost of vindicating their rights by suing for trespass. But as both the Texas and Pennsylvania courts observed, legislative and regulatory solutions are available to offset disparities in wealth, including mandatory pooling or unitization requirements, and obligations that lessees exercise good faith in protecting the interests of small surface owners.<sup>76</sup> Environmental concerns raised by fracking technology, whether it be contamination of aquifers by migrating fracking fluids or seismic activity, are another matter.<sup>77</sup> But these sorts of harms are best addressed by invoking other torts, such as nuisance, negligence, or abnormally dangerous activities. And the risks of such harms can be reduced by the adoption of best practices regulations by state regulatory commissions.<sup>78</sup>

---

<sup>76</sup> Briggs, 224 A.3d at 348; Garza, 268 S.W.3d at 14–15.

<sup>77</sup> Michael Goldman, *A Survey of Typical Claims and Key Defenses Asserted in Recent Hydraulic Fracturing Litigation*, 1 TEX. A & M L. REV. 305, 311–12 (2013); Thomas W. Merrill, *Four Questions About Fracking*, 63 CASE W. RES. L. REV. 971, 981–82 (2013); Jason Schumacher & Jennifer Morrissey, *The Legal Landscape of “Fracking”*: *The Oil and Gas Industry’s Game-Changing Technique is its Biggest Hurdle*, 17 TEX. REV. L. & POL. 239, 252–53 (2013).

<sup>78</sup> Thomas W. Merrill & David M. Schizer, *The Shale Oil and Gas Revolution, Hydraulic Fracturing, and Water Contamination: A Regulatory Strategy*, MINN. L. REV. 286 (2013).



In short, we see no compelling reason why the standard legal architecture which determines the rights to subterranean minerals needs to be modified in order to accommodate the use of fracking technology. There is no need to amend the *ad coelum* doctrine to cut off the surface owner's rights at some specified depth; there is no need to change the relevant tort doctrine from trespass to nuisance or negligence; there is no need to declare some immunity for fracking operators from trespass liability. All that is needed is to understand that trespass protects not only possession but the right to possession, the right to possession extends only to those portions of the column of space that are subject to possible effective possession, and the rule of capture applies to all extraction of oil and gas obtained in a fashion consistent with these principles. With those understandings in place, the remaining difficulties associated with fracking can be gradually worked out with gradual improvements in monitoring technology, by relying on economic incentives to encourage the consolidation of production activity, through the invocation of common law liability for damage to the use and enjoyment of the surface and near-surface areas actively possessed, and by pragmatic regulation designed to minimize waste and prevent harms to workers and the environment.