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I. INTRODUCTION

Until recently unlocked by new drilling technology, vast potential wealth was secreted thousands of feet underground in ancient shale strata—an energy source unrecognized by the world at the dawn of the Twenty First Century. The discovery of enormous shale gas reservoirs in the United States has triggered what some have termed a "gas rush"—likened to the great Gold "rush" of the latter half of the nineteenth century in the American West.[1] A *Philadelphia Inquirer* article titled *Pa.'s Natural Gas Rush* reported in early 2011:

> Natural gas companies have been drilling in Pennsylvania for more than a century, but Marcellus Shale exploration is unlike anything before.... As Marcellus Shale operators move into full-scale production, several trends are emerging that underscore the huge transformation under way in Pennsylvania.... The bigger wells require larger amounts of water, steel—and money. Operators say they are spending $4 million to $6 million per well. The drilling is producing greater environmental anxiety, measured by a growing opposition to hydraulic fracturing, the method used to extract gas from shale. But investors are still bullish.... "The Marcellus is going to be far more prolific than we ever imagined," said ... [the] managing director of ... an investment company. "It's almost scary how good the Marcellus is. It's supereconomic."[2]

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* Judge Charles H. Haden II Professor of Law, West Virginia University College of Law. The author acknowledges the research support of the Arthur B. Hodges Faculty Research Fund and the excellent research assistance of Vanessa A. Baxter, J.D., West Virginia University (2012). Errors are the author's.

1. Andrew Maykuth, *Pa.'s Natural Gas Rush,* THE PHILADELPHIA INQUIRER, Apr. 3, 2011, *available at* http://www.philly.com/philly/business/20110403_Pa__s_Natural_Gas_Rush.html?viewAll=y&c=y\. The article documents enormous investment by the top twenty drilling companies. The article reports that just seven of these companies plan to spend more than $6.5 billion drilling new Marcellus wells in Pennsylvania during calendar year 2011.

2. *Id. See also* TIMOTHY CONSIDINE, ROBERT WATSON, REBECCA ENTLER & JEFFREY SPARKS, *AN EMERGING GIANT: PROSPECTS & ECONOMIC IMPACTS OF DEVELOPING THE MARCELLUS SHALE NATURAL GAS PLAY* (Penn. St. Univ. 2009), *available at*

Pennsylvania is not alone in experiencing a nascent natural shale gas boom.[3] Shale gas "plays" underlie wide swaths of surface lands stretching west and south from New York and Pennsylvania in the East to Texas, Louisiana, and New Mexico in the Southwest and to parts of the Intermountain West.[4] Those shales carry names like Marcellus, New Albany, Barnett, Haynesville, Mancos, Hermosa, Lewis Mowry, and Eagle Ford—arcane names found in geology texts and until recently mentioned, if at all, only in graduate school petroleum geology lectures.[5]

With so much at stake as the new shale gas industry takes wing, it is not surprising that a plethora of attendant legal issues have begun to surface. Many legal issues related to Marcellus and other gas-rich shale plays must be confronted and resolved if this new energy source is to be responsibly exploited. Scholars and bar commentators have already begun to address a variety of legal concerns attendant shale gas exploration and development.[6] These issues will be addressed in detail

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http://www.alleghenyconference.org/PDFs/PELMisc/PSUStudyMarcellusShale072409.pdf.

3. The heart of the Marcellus shale gas boom is located in Pennsylvania where, in 1859, the world's first oil boom began with a successful well drilled at Titusville, Crawford County. *See* Thomas A. Mitchell, *The Future of Oil and Gas Conservation Jurisprudence: Past as Prologue,* 49 WASHBURN L.J. 379, 380-94 (2010). Other states are beginning to experience the Marcellus shale gas boom. *See* Hannah J. Wiseman, *Regulatory Adaptation in Fractured Appalachia*, 21 VILL. ENVTL. L.J. 229, 240-41 (2010) [hereinafter *Fractured Appalachia*].

4. A shale or resource "play" is a term associated with oil and gas exploration and development. A "play" has been defined as "an area in which hydrocarbon accumulations or prospects of a given type occur" and as a "conceptual model for a style of hydrocarbon accumulation used by explorationists to develop prospects in a basin, region or trend and used by development personnel to continue exploiting a given trend." SCHLUMBERGER OILFIELD GLOSSARY, *available at* http://www.glossary.oilfield.slb.com/Display.cfm?Term=play. "A play (or a group of interrelated plays) generally occurs in a single petroleum system." *Id.*

5. *See* U.S. DEP'T OF ENERGY, OFFICE OF FOSSIL ENERGY NAT'L ENERGY TECH. LAB., MODERN SHALE GAS DEVELOPMENT IN THE UNITED STATES: A PRIMER 56 (2009), *available at* http://www.netl.doe.gov/technologies/oil-gas/publications/epreports/shale_gas_primer_2009.pdf. Among the major shale plays identified are the vast Marcellus shales of the Appalachian Basin; the New Albany shale in the Illinois basin; the Barnett shale in the Fort Worth Basin; the Haynesville shale in Louisiana; the Mancos, Hermosa, Lewis, and Mowry shales in the Inter-Mountain West; the Eagle Ford shale in South Texas; and the Gammon in the Williston Basin. For a map of these basins showing the states involved, see http://www.eia.gov/oil_gas/rpd/shale_gas.pdf. Shale gas is also found in many countries and continents. *See* Kevin Heffernan, *SHALE GAS IN NORTH AMERICA: EMERGING SUPPLY OPPORTUNITIES*, NORTHEAST ENERGY AND COMMERCE ASSOCIATION FUELS CONFERENCE (September 24, 2008), http://www.necanews.org/dev/documents/080924heffernan_kevin_1.pdf.

6. *See, e.g.*, Owen L. Anderson, *Subsurface "Trespass": A Man's Subsurface is Not His Castle*, 49 WASHBURN L.J. 248 (2010); Robert E. Beck, *Current Water Issues in Oil and Gas Development and Production: Will Water Control What Energy We Have?*, 49 WASHBURN L.J. 423 (2010); Laura H. Burney, *The Texas Supreme Court and Oil and Gas Jurisprudence: What Hath Wagner & Brown v. Sheppard Wrought?*, 5 TEX. J. OIL

by the bench, bar, and legal scholars as the shale gas boom matures. Billions of dollars of investment and the future of shale play communities and their natural environment hang in the balance.[7]

The goal of this essay is quite modest—to stimulate discussion of the extent to which constitutional regulatory takings rules may operate as a constraint on development of, or as a license to exploit, gas-bearing shales. Public policy debate over impacts of shale gas extraction has included consideration of citizen demands for federal, state, and municipal government regulatory intervention to minimize environmental and related harms. In this context, regulatory takings issues related to shale gas extraction are ripe for discussion.

I begin by briefly discussing the nature of shale gas and the new technology involved in releasing huge quantities of natural gas from eons of imprisonment far below the earth's surface. The discussion then moves to a review of basic tenets of the constitutional protection of private property afforded by the takings jurisprudence of the Supreme Court of the United States. Also examined are the leading cases from which the contours of regulatory takings analysis have evolved. In

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GAS & ENERGY L. 219 (2010); David A. Dana, *The Foreclosure Crisis and the Antifragmentation Principle in State Property Law*, 77 U. CHI. L. REV. 97 (2010) (discussing statutory unitization of underground oil and gas fields); Wes Deweese, *Fracturing Misconceptions: A History of Effective State Regulation, Groundwater Protection, and the Ill-Conceived FRAC Act*, 6 OKLA. J. L. & TECH. 49 (2010); Harper Estes & Douglas Prieto, *Contracts as Fences: Representing the Agricultural Producer in an Oil and Gas Environment*, 73 TEX. B.J. 378 (2010); Keith B. Hall, *The Continuing Role of Implied Covenants in Developing Leased Lands*, 49 WASHBURN L.J. 313 (2010); Bill Jeffery, *Oops!—Accidents Happen: Oil Pollution Prevention at Onshore Production Facilities*, 49 WASHBURN L.J. 493 (2010); Kendor P. Jones, *Something Old, Something New: The Evolving Farmout Agreement*, 49 WASHBURN L.J. 477 (2010); Bruce M. Kramer, *Keeping Leases Alive in the Era of Horizontal Drilling and Hydraulic Fracturing: Are the Old Workhorses (Shut-in, Continuous Operations, and Pooling Provisions) Up to the Task?*, 49 WASHBURN L.J. 283 (2010); John S. Lowe, *The Future of Oil and Gas Law*, 49 WASHBURN L.J. 235 (2010); Mitchell, *supra* note 3; Phillip E. Norvell, *Prelude to the Future of Shale Gas Development: Well Spacing and Integration for the Fayetteville Shale in Arkansas*, 49 WASHBURN L.J. 457 (2010); Bruce M. Pendery, *BLM's Retained Rights: How Requiring Environmental Protection Fulfills Oil and Gas Lease Obligations*, 40 ENVTL. L. REV. 599 (2010); David E. Pierce, *Royalty Jurisprudence: A Tale of Two States*, 49 WASHBURN L.J. 347 (2010); Kermit L. Rader, *Protecting Clients from Going Bust in the Gas Boom*, 32 PENNSYLVANIA LAW. 30 (2010); Laura C. Reeder, Note, *Creating a Legal Framework for Regulation of Natural Gas Extraction from the Marcellus Shale Formation*, 34 WM. & MARY ENVTL. L. & POL'Y REV. 999 (2010); *Fractured Appalachia*, *supra* note 3; Travis Zeik, *Hydraulic Fracturing Goes to Court: How Texas Jurisprudence on Subsurface Trespass Will Influence West Virginia Oil and Gas Law*, 112 W. VA. L. REV. 599 (2010).

7. "Gas Patch" is a colloquial term frequently used to describe those geographical areas where there is significant oil and/or natural gas production. An example of the use of the term in connection with shale gas operations may be found in SANDRA STEINGRABER, RAISING ELIJAH: PROTECTING OUR CHILDREN IN AN AGE OF ENVIRONMENTAL CRISIS, 276 (2011) [hereinafter RAISING ELIJAH].

Pennsylvania Coal v. Mahon, the Supreme Court's seminal 1922 regulatory takings case, Justice Holmes cautioned:

> Government hardly could go on if to some extent values incident to property could not be diminished without paying for every such change in the general law. As long recognized some values are enjoyed under an implied limitation and must yield to the police power. But obviously the implied limitation must have its limits or the contract and due process clauses are gone. One fact for consideration in determining such limits is the extent of the diminution. When it reaches a certain magnitude, in most if not in all cases there must be an exercise of eminent domain and compensation to sustain the act.[8]

While many scholars and the Court itself have found Holmes's explanation of the line between valid regulation and unconstitutional taking of private property to be cryptic, subsequent cases have provided significant guidance that allow crafting of regulatory efforts so as to avoid constitutional infirmity.[9]

Applying extant regulatory taking analysis to government regulation of shale gas operations, the essay identifies regulatory takings issues that will likely receive close scrutiny as regulatory efforts advance in the shale gas patch. Probable contexts of takings challenges to federal, state, and municipal regulatory action are examined, and the possible constitutional limits on the reach of such regulation of shale gas drilling and production activities are analyzed.

Ultimately I suggest that constitutional takings principles can, in limited circumstances and at the margins, limit shale gas regulation. However, in most cases, I conclude that carefully sculpted regulatory initiatives will create regulatory regimes largely impervious to constitutional takings challenges. As explained below, most shale gas regulatory efforts intended to protect the environment and related important interests generally will be sustained as permissible exercises of the police power. However, such a result will require legislators and regulators to recognize and observe well-established regulatory takings parameters.

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8. Pa. Coal Co. v. Mahon, 260 U.S. 393, 413 (1922).

9. See *Lingle v. Chevron U.S.A., Inc.*, 544 U.S. 528, 537-38 (2005) wherein Justice O'Connor observed:

> Beginning with Mahon . . . the Court recognized that government regulation of private property may, in some instances, be so onerous that its effect is tantamount to a direct appropriation or ouster-and that such "regulatory takings" may be compensable under the Fifth Amendment. In Justice Holmes' storied but cryptic formulation, "while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking." The rub, of course, has been—and remains—how to discern how far is "too far."

II. TAPPING A NEW ENERGY SOURCE: SHALE GAS

Shale gas production differs substantially from conventional vertical rotary drilling natural gas extraction methods that have been used to produce natural gas from other geologic strata for more than a century.[10] Brilliant technological innovation of petroleum engineers introduced horizontal drilling[11] and high volume hydraulic fracturing ("HVHF") techniques that led to unlocking huge reserves of natural gas in deep shale zones.[12] When used in conjunction with horizontal drilling, HVHF allows extraction of shale gas at reasonable cost commensurate with production expenditures. These combined techniques stimulate natural gas to flow rapidly to the well; commercial quantities of gas cannot be produced from shale using the conventional vertical drilling method.[13]

Initial success using horizontal drilling and HVHF methods in the Barnett Shale Basin of North Central Texas first confirmed the economic viability of large scale shale gas operations, paving the way for exploration and production from shale strata in other North American

10. Energy in Brief, United States Energy Information Agency (2011) [hereinafter Energy in Brief], *available at* http://www.eia.gov/energy_in_brief/about_shale_gas.cfm. For almost a century and a half, natural gas has been extracted from gas reservoirs created by the migration of gas toward the surface. Over geologic time, the gas flowed upwards from lower organic-rich source strata into highly permeable reservoir rock. There, its migration was blocked by a layer of overlying impermeable rock. *Id.* In contrast, shale gas is found within the organic-rich shale source strata. The shale's low permeability greatly inhibits gas from migrating upward to more permeable reservoir rocks. Horizontal drilling combined with hydraulic fracturing allows shale gas extraction. Shale gas production would not be economically feasible without use of these techniques because the gas would not achieve flow rates high enough to justify the cost of drilling. *Id. See also Fractured Appalachia*, *supra* note 3, at 236-39. For an excellent summary of horizontal drilling and fracing techniques used in the extraction of shale gas, see RICHARD C. MAXWELL, PATRICK H. MARTIN & BRUCE M. KRAMER, OIL AND GAS: CASES AND MATERIALS, 1-11 (8th ed. 2007) (explaining conventional vertical rotary drilling methodology used for extracting natural gas from porous strata).

11. Horizontal drilling provides greater access to the gas located deep in the producing formation than does conventional vertical natural gas drilling. A vertical well is first drilled to a targeted geologic formation. At a predetermined depth, the drill bit is remotely turned to horizontally drill a hole that extends hundreds of feet horizontally through the shale layer, exposing the well to much more of the producing shale than would a solely vertical well. Energy in Brief, *supra* note 10. A readily understandable, simplified diagram of the shale gas extraction process is available at http://www.propublica.org/special/hydraulic-fracturing-national.

12. *See* Reeder, *supra* note 6, at 1003-05. *See also* Fueling North America's Energy Future, The Unconventional Natural Gas Revolution and the Carbon Agenda, IHS Cambridge Energy Research Associates, Executive Summary, ES-4, *available at* http://www2.cera.com/docs/Executive_Summary.pdf [hereinafter Fueling North America's Energy Future] (last visited, March 12, 2011) ("These innovations have unlocked the potential of natural gas shales that have greatly increased the potential supply of natural gas in North America and at a much lower cost than conventional natural gas.").

13. Energy in Brief, *supra* note 10.

basins.[14] The understanding of the scope of the gas shale resource in the United States increased dramatically in an extraordinarily short period of time. The United States Energy Information Administration ("USEIA") reported a one year increase in expert assessment of the amount of technically recoverable (although unproved) shale gas from 347 trillion cubic feet to 827 trillion cubic feet (as of January 1, 2009), "reflecting additional information that has become available with more drilling activity in new and existing shale plays."[15]

The USEIA indicates that this increased reserve will lead to a doubling of shale gas production and more than a twenty percent higher total output of natural gas in the lower forty eight states by 2035.[16] The agency predicts attendant lower natural gas prices as a result.[17] Analysts report that the newly discovered shale gas resource potential significantly increases North American recoverable gas reserves to an amount sufficient to meet current levels of consumption for more than a hundred years.[18]

The possible scale of the resource was not recognized until late 2007, and discussions of its import in the world's energy future did not appear until the latter part of 2009.[19] A recent report of an influential think-tank observed:

> A major new factor—unconventional natural gas—is moving to the fore in the . . . national energy discussion. . . . [I]t ranks as the most significant energy innovation so far this century—and one that, because of its scale, requires a reassessment of expectations for energy development. It has the potential, at least, to cause a paradigm shift in the fueling of North America's energy future.[20]

Expert energy commentator and Pulitzer Prize-winning author Daniel Yergin has observed that the unconventional gas "has the potential to boost gas production far beyond North America . . . [it] can have far-reaching impact on the electric power industry and the fuel choices in the years ahead."[21] These projections, however, are tempered

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14. *See, e.g.*, *Fractured Appalachia*, *supra* note 3, at 233-34.

15. AEO Annual Energy Outlook, 2011 Early Release Overview, at 1, *available at* http://www.eia.gov/forecasts/aeo/pdf/0383er(2011).pdf [hereinafter Annual Energy Outlook 2011].

16. *Id.*

17. *Id.*

18. *Natural Gas Enters New Era of Abundance*, XINHUA NEWS AGENCY, Mar. 10, 2011, *available at* http://news.xinhuanet.com/english2010/world/2011-03/10/c_13769546.htm [hereinafter *New Era*].

19. Fueling North America's Energy Future, *supra* note 12, at ES-1.

20. *Id.*

21. *New Era*, *supra* note 18. *See generally* DANIEL YERGIN, THE PRIZE: THE EPIC QUEST FOR OIL, MONEY, AND POWER (2009).

by USEIA warnings that a variety of factors may affect actual outcomes.[22] Notwithstanding such extraordinary positive predictions of the future of shale gas, there are skeptics who challenge such forecasts.[23]

III. CONSTITUTIONAL PROTECTION OF PRIVATE PROPERTY—TAKINGS JURISPRUDENCE LIMITS ON GOVERNMENT REGULATION OF SHALE GAS DRILLING AND PRODUCTION ACTIVITIES

Significant controversy has accompanied the accelerating pace of shale gas drilling across the American shale gas patch. Recent media attention and public discourse has focused on the proper role of government in protecting the environment and related important public interests. In New York State, for example, a temporary moratorium on shale play development triggered by state statutory environmental assessment requirements has been applauded by some and condemned by others.[24] Gas industry interests as well as environmental and conservation advocates have demanded legislative action—albeit in differing forms and for different reasons. The former lobby for laws and

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22. *See* Annual Energy Outlook 2011, *supra* note 15, at 8. The USEIA cautioned that:

> [T]here is considerable uncertainty about the amounts of recoverable shale gas in both developed and undeveloped areas. Well characteristics and productivity vary widely not only across different plays but within individual plays. Initial production rates can vary by as much as a factor of 10 across a formation, and the productivity of adjacent gas wells can vary by as much as a factor of 2 or 3. Many shale formations, such as the Marcellus Shale, are so large that only a small portion of the entire formation has been intensively production-tested. Environmental considerations . . . lend additional uncertainty.

23. *See* Ian Urbana, *Drilling Down: Insiders Sound an Alarm Amid a Natural Gas Rush*, N.Y. TIMES, Jun. 25, 2011 [hereinafter *Insiders Sound Alarm*], *available at* http://www.nytimes.com/2011/06/26/us/26gas.html?pagewanted=all. *The New York Times* reported that:

> [T]he gas may not be as easy and cheap to extract from shale formations deep underground as the companies are saying, according to hundreds of industry e-mails and internal documents and an analysis of data from thousands of wells. In the e-mails, energy executives, industry lawyers, state geologists and market analysts voice skepticism about lofty forecasts and question whether companies are intentionally, and even illegally, overstating the productivity of their wells and the size of their reserves. Many of these e-mails also suggest a view that is in stark contrast to more bullish public comments made by the industry, in much the same way that insiders have raised doubts about previous financial bubbles.

But see Ken Boehm, *NY Times Asked to Investigate Shale Gas 'Bubble' Series,* National Legal & Policy Center Blog, *available at* http://nlpc.org/stories/2011/07/07/ny-times-asked-investigate-shale-gas-bubble-series.

24. Exec. Order No. 41, issued December 13, 2010 (Requiring Further Environmental Review of High-Volume Hydraulic Fracturing in the Marcellus Shale), *available at* http://www.dec.ny.gov/energy/46288.html#41

regulations that will facilitate exploitation of the economic potential of shale gas; the latter advocate for enhanced regulation and enforcement power to protect the environment and related public interests.

Regulatory takings claims have already begun to surface in Pennsylvania and West Virginia courts. Legislative and regulatory restrictions on natural gas drilling within government-owned parklands and a municipal ban on HVHF near a city drinking water source have been challenged.[25] Not surprisingly, in the wake of more than two decades of private property rights activism in the United States,[26] the dramatic increase of shale gas development activities has triggered widespread concern among homeowners and communities throughout the Marcellus Shale gas basin over the impacts of gas extraction and the value of gas drilling rights. Litigation will likely ensue in the not-too-distant future in a variety of contexts challenging state and federal efforts to regulate gas shale drilling and related activities. The extent to which constitutional takings doctrine may limit state and federal government efforts to regulate shale gas development is discussed below.

A. Eminent Domain and Inverse Condemnation

At the heart of constitutional takings jurisprudence is the Fifth Amendment's prohibition of government "taking" of private property for a public use unless just compensation is paid to the affected property owner.[27] Unconstitutional takings of private property by government

25. *See* Cabot Oil & Gas Corp. v. Huffman 705 S.E.2d 806 (W. Va. 2010); Belden & Blake Corp. v. Dept. of Conservation & Natural Res., 969 A.2d 528 (Pa. 2009). *See also* Minard Run Oil Co. v. U.S. Forest Serv., Nos. 10-1265 and 10-2332, slip op. at 27-28 (3d Cir. Sept. 20, 2011) (holding federal agency lacks power under statute to impose additional regulations on gas drilling operation in National Forest, thus avoiding regulatory taking issue).

26. With regard to growing concerns over the rights of property and the private property "movement" in the United States, see generally JOHN CHRISTMAN, THE MYTH OF PROPERTY: TOWARD AN EGALITARIAN THEORY OF OWNERSHIP (1994); WHO OWNS AMERICA? SOCIAL CONFLICT OVER PROPERTY RIGHTS (Harvey M. Jacobs ed., 1998); CAROL M. ROSE, PROPERTY AND PERSUASION: ESSAYS ON THE HISTORY, THEORY, AND RHETORIC OF OWNERSHIP (1994); LET THE PEOPLE JUDGE: WISE USE AND THE PRIVATE PROPERTY RIGHTS MOVEMENT (John Echeverria & Raymond Booth Eby eds., 1995); JOSEPH WILLIAM SINGER, THE EDGES OF THE FIELD: LESSONS ON THE OBLIGATIONS OF OWNERSHIP (2000); Craig Anthony (Tony) Arnold, *The Reconstitution of Property: Property as a Web of Interests*, 26 HARV. ENVTL. L. REV. 281 (2002); LAURA S. UNDERKUFFLER, THE IDEA OF PROPERTY: ITS MEANING AND POWER (2003); Eric T. Freyfogel, *Property and Liberty*, 34 HARV. ENVTL. L. REV. 75 (2010).

27. The Fifth Amendment to the Constitution provides in relevant part: "No person shall be . . . deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation." U.S. CONST. amend. V. The Fifth Amendment protects rights of citizens from federal government action; ratification of the Fourteenth Amendment extended the protection afforded by the Takings Clause to state action. The Takings Clause was first applied to the states through

action may occur directly by exercise of the power of eminent domain to condemn private land. A taking may also occur when government regulatory action effectively devalues land without first undertaking formal condemnation proceedings.

A government entity may physically "take" private real property by initiation of formal condemnation proceedings in administrative or judicial fora. At the conclusion of the condemnation process and payment of just compensation, private real property owner's interests are extinguished, and legal title to the real estate is transferred to the government or a related entity. Property may also be "taken" by so-called "inverse condemnation."[28] Inverse condemnation is distinguishable from a taking by eminent domain in so far as the latter is "a shorthand description of the legal action taken by a landowner to recover just compensation for a taking of his property when the Government did not initiate condemnation proceedings."[29]

B. Regulatory Takings

Regulatory takings of private property are quite different from takings resulting from a government decision to take land by condemnation or inverse condemnation. A regulatory taking may occur as a result of the application or enforcement of a law or regulation enacted to advance or protect the public interest; when the directive has the effect of reducing or destroying the economic value of real property, an owner of the property affected may seek to invalidate it by claiming a regulatory taking. The concept of regulatory taking was not recognized until the beginning of the Twentieth Century when the Supreme Court of

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the Fourteenth Amendment in *Chi. Burlington & Quincy R.R. Co. v. Chicago*, 166 U.S. 226, 239 (1897). The Takings Clause was the first Bill of Rights provision to be found applicable to the states. *Id.* at 239. *See* ERWIN CHEMERINSKY, CONSTITUTIONAL LAW PRINCIPLES AND POLICIES 640 (3d ed. 2006) (describing the Takings Clause and its purpose).

28. *See, e.g.*, Jacobs v. United States, 290 U.S. 13 (1933).

29. In *Jacobs v. United States*, a Government dam created intermittent overflows of water onto private land resulting in the "taking" of a servitude. Jacobs, the landowner, filed suit against the Government to recover just compensation for the "taking" of his property. Commenting on the nature of the landowner's claim, the Court stated:

> The suits were based on the right to recover just compensation for property taken by the United States for public use in the exercise of its power of eminent domain. That right was guaranteed by the Constitution. The fact that condemnation proceedings were not instituted and that the right was asserted in suits by the owners did not change the essential nature of the claim. The form of the remedy did not qualify the right. It rested upon the Fifth Amendment. Statutory recognition was not necessary. A promise to pay was not necessary. Such a promise was implied because of the duty to pay imposed by the Amendment."

Id. at 16.

the United States declared unconstitutional a state law that sought to limit adverse impacts of coal mining.[30]

The property interest involved in *Pennsylvania Coal Co. v. Mahon* was an interest in coal that had been severed from a fee simple interest in land.[31] The coal company claimant alleged that the state statute prohibiting mining under buildings to prevent subsidence damage effected an unconstitutional taking of its property.[32] Thus, in *Mahon*, the Court dealt directly with the issue of severed mineral interests alleged to have been destroyed by operation of the 1921 Pennsylvania coal mine subsidence law.[33]

Mahon emphasized that "the question depends upon the particular facts" and "this is a question of degree—and therefore cannot be disposed of by general propositions."[34] Nevertheless, the Court held the law prohibiting mining under occupied dwellings "took" the company's property—property that included only a reserved coal seam and attendant mining rights. The 1921 Pennsylvania statute (the "Kohler Act") made "it commercially impracticable to mine certain coal" and thus had "very nearly the same effect for constitutional purposes as appropriating or

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30. Pa. Coal Co. v. Mahon, 260 U.S. 393 (1922). Some commentators have questioned the assertion that *Mahon* was a case involving the just compensation clause, arguing that the opinion was actually grounded in a version of the later discredited substantive due process doctrine of *Lochner v. New York*, 198 U.S. 45 (1905), and its progeny. *See, e.g.*, Robert Brauneis, *The Foundation of Our 'Regulatory Takings' Jurisprudence: The Myth and Meaning of Justice Holmes's Opinion in Pennsylvania Coal Co. v. Mahon*, 106 YALE L.J. 613, 668 (1996) (discussing Justice Holmes's unquestionable acceptance of "a version of the fundamental rights theory of the Due Process Clause"); Patrick C. McGinley, *Regulatory "Takings": The Remarkable Resurrection of Economic Substantive Due Process Analysis in Constitutional Law*, 17 ENVTL. L. REPTR. 10369 (1987).

31. *Pa. Coal Co.*, 260 U.S. at 412.

32. *Id.* In a 1988 case involving a state law regulating coal mining subsidence, the Supreme Court explained the impact of unregulated, underground, coal mining induced subsidence:

> Coal mine subsidence is the lowering of strata overlying a coal mine, including the land surface, caused by the extraction of underground coal. This lowering of the strata can have devastating effects. It often causes substantial damage to foundations, walls, other structural members, and the integrity of houses and buildings. Subsidence frequently causes sinkholes or troughs in land which make the land difficult or impossible to develop. Its effect on farming has been well documented-many subsided areas cannot be plowed or properly prepared. Subsidence can also cause the loss of groundwater and surface ponds. In short, it presents the type of environmental concern that has been the focus of so much federal, state, and local regulation in recent decades.

Keystone Bituminous Coal Ass'n v. DeBenedictis, 480 U.S. 470, 474-75 (1987).

33. *Id.* at 412.

34. *Id.* at 413, 416.

destroying it."[35] In the parlance of today's takings cases, the owner's entire interest, or bundle of rights, in the coal had been taken.[36]

As noted above, Justice Holmes's opinion for the *Mahon* Court cryptically observed that "while property may be regulated to a certain extent, if regulation goes too far it will be recognized as a taking."[37] Holmes elaborated vaguely on the point of "going too far":

> As long recognized some values are enjoyed under an implied limitation and must yield to the police power. But obviously the implied limitation must have its limits, or the contract and due process clauses are gone. One fact for consideration in determining such limits is the extent of the diminution. When it reaches a certain magnitude, in most if not in all cases there must be an exercise of eminent domain and compensation to sustain the act. So the question depends upon the particular facts. The greatest weight is given to the judgment of the legislature but it always is open to interested parties to contend that the legislature has gone beyond its constitutional power.[38]

Since the *Mahon* decision, the Court's "regulatory takings" jurisprudence has evolved in a series of cases decided over the next nine decades. In nearly a century of the evolution of regulatory takings jurisprudence since *Mahon*, courts have made *ad hoc*, case by case, adjudications identifying in each instance whether a particular law or regulation falls on the side of a valid police power exercise or has gone "to far" and violates the constitutional takings prohibition. Distinguishing between appropriate police power regulation that advances important public interests and government regulation that goes too far resulting in unconstitutional takings often requires courts to make difficult choices. A quarter of a century ago Professor Richard Epstein aptly described this dilemma:

> The two sides of the debate are well marked. On the one hand, private property has often been praised as the bulwark of individual liberty, to be held sacred and inviolate against any and all intrusions. On this view, its protection becomes, as it was for Locke, the raison

35. *Id.* at 414.

36. The Court reasoned that because the law extinguished all economic value of the company's coal and mining rights, "private persons or communities" bore "the risk of acquiring only surface rights." "[T]he fact that their risk ha[d] become a danger [did not] warrant the giving to them [of] greater rights than they bought." *Id.* at 414-16.

37. *Id.* at 415. Over time, the term "regulatory" taking became synonymous with government regulatory actions that go "too far" and will be considered an unconstitutional taking of private property unless accompanied by payment of just compensation.

38. *Id.* at 413.

> d'être for the state. On the other hand, private property has been attacked as the mark of social privilege—indeed theft—that allows the lucky few to dominate the unfortunate many. It becomes the social institution that mark's mankind's fall from grace. Neither of these extreme positions can be maintained. But quickly ruling out the extremes, there remains open the difficult and vexing task of marking the intermediate path.[39]

In the years since Professor Epstein's' observation, the vexing task of deciding when regulation goes "too far" remains elusive, notwithstanding multiple judicial efforts to bring clarity to regulatory takings jurisprudence.

Despite this continuing constitutional conundrum, it is possible to extract from the cases basic principles that will guide courts in resolving potential regulatory takings challenges to government efforts to regulate shale gas development activities. Even as the outer edge of regulatory takings law continues to intrigue scholars and bedevil lawyers and judges, the results of some potential constitutional challenges to shale play regulation are predictable upon careful analysis of regulatory takings precedent.

In *Loretto v. Teleprompter Manhattan CATV Corp.*, the Court held that when a government entity enters land and occupies it or permits others to do so under color of law, a *per se* takings rule is to be applied by the Court requiring that the owner of the occupied land be paid "just compensation."[40]

Lucas v. South Carolina Coastal Council established a second categorical rule ("total taking rule") applicable to those "relatively rare" and "extraordinary" government regulations that deprive an owner of "*all* economically beneficial use" of one's property.[41] In *Lucas*, the Court held that the government must compensate for "total regulatory takings," except to the extent that "background principles of nuisance and property law" independently restrict the owner's intended use of the property.[42]

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39. Richard Epstein, *Takings: Decent and Resurrection*, 1987 SUP. CT. REV. 1 (1987). For a more lengthy presentation of Professor Epstein's sometimes controversial takings perspective, see EPSTEIN, TAKINGS, PRIVATE PROPERTY AND THE POWER OF EMINENT DOMAIN (1985).

40. Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 421 (1982) (holding a state law requiring landlords to permit cable companies to install cable facilities in apartment buildings amounted to a taking).

41. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1019 (1992). *See* John D. Echeverria, *Making Sense of Penn Central*, 23 UCLA J. ENVTL. L. & POL'Y 171, 173 (2005) ("[T]he Court has given the Loretto *per se* rule a narrow interpretation [and] . . . the *Lucas per se* rule an even narrower reading. . . .").

42. *Lucas*, 505 U.S. at 1026-32.

Outside of these two relatively narrow *per se* takings categories, the Court has said that "regulatory takings challenges are governed by the standards set forth in *Penn Central* [*Transp. Co. v. New York City*]."[43] "The *Penn Central* factors . . . have served as the principal guidelines for resolving regulatory takings claims that do not fall within the physical takings or *Lucas* rules."[44]

The *Penn Central* Court admitted that, since *Mahon*, it had not been able "to develop any 'set formula'" for determining regulatory takings claims. But, *Penn Central* did identify several significant factors to be considered from its earlier cases stretching back to *Mahon*: "[t]he economic impact of the regulation on the claimant and, particularly, the extent to which the regulation has interfered with distinct investment-backed expectations,"[45] and the "'character of the governmental action'—for instance whether it amounts to a physical invasion or instead merely affects property interests through 'some public program adjusting the benefits and burdens of economic life to promote the common good'—may be relevant in discerning whether a taking has occurred."[46]

The following discussion examines potential regulatory takings challenges to shale gas regulation. The *per se* categorical takings principles discussed above will be reviewed and then applied to foreseeable government regulatory action involving shale gas development. The more generally applicable *Penn Central* taking rules will then be appraised and their potential application to shale gas regulation discussed.

IV. CONTOURS OF REGULATORY TAKINGS ANALYSIS

The Court's regulatory takings jurisprudence focuses on the impact of the government's action on the private property interests allegedly "taken" by government action. As mentioned above, the Court has developed two threshold *per se* taking rules applicable to the analysis of regulatory takings claims.

43. Lingle v. Chevron U.S.A. Inc., 544 U.S. 528, 538 (2005) (citing Penn Cent. Transp. Co. v. New York City, 438 U.S. 104 (1978)).

44. *Id.* at 539 (citing Palazzolo v. Rhode Island, 533 U.S. 606, 617-18 (2001)).

45. *Penn Cent.*, 438 U.S. at 124.

46. *Lingle*, 544 U.S. at 539 (citing *Penn Cent.*, 438 U.S. at 124).

A. Categorical Per Se Takings Rules

1. Regulatory Taking by Physical Occupation

The first *per se* takings rule is simple to apply. The takings plaintiff has the burden of showing that the government's action involves physical occupation of private real property.[47] Such physical occupation may involve government assertion of complete dominion and control of the property or over only a portion of the property.[48] *Loretto v. Teleprompter Manhattan CATV Corp.* is the leading modern case articulating this *per se* rule.

Loretto involved a New York statute requiring landlords to permit cable television companies to install equipment in and on rental property. The law allowed a State Commission to decide appropriate compensation for the intrusion of cable lines into privately owned residential rental property. The fee was set by the Commission at one dollar—an amount found by the Commission to be reasonable under the statute. Upon purchasing a five-story apartment building in New York City, a landlord found that a cable television company had installed cables in the building to serve tenants living there. The landlord brought a class action suit in a New York state court seeking damages and injunctive relief, alleging that the statute constituted a taking without just compensation.

The Supreme Court ultimately agreed that the statute affected an unconstitutional taking.[49] The Court did not question the government's assertion that the cable television law fell within the State's police power as the statute clearly served legitimate public purposes of enhancing communications that have "important educational and community aspects."[50] However, the Court emphasized, "[i]t is a separate question . . . whether an otherwise valid regulation so frustrates property rights that compensation must be paid."[51] The Court concluded "that a permanent physical occupation authorized by government is a taking

47. Personal property has also been the subject of takings analysis, but the Supreme Court has extended scant protection to it. *See* Lucas v S.C. Coastal Council, 505 U.S. 1003, 1027-28 (1992). In *Lucas*, Justice Scalia's opinion for the Court emphasized that owners of "personal property, by reason of the State's traditionally high degree of control over commercial dealings . . . ought to be aware of the possibility that new regulation might even render his property economically worthless (at least if the property's only economically productive use is sale or manufacture for sale)." *Id.* (citing Andrus v. Allard, 444 U.S. 51, 66-67 (1979)).

48. Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 421 (1982).

49. *Id.*

50. *Id.* at 425 (citing Loretto v. Teleprompter Manhattan CATV Corp., 423 N.E.2d 320, 329 (N.Y. 1981)).

51. *Id.* at 425-26 (citing Penn Cent. Transp. Co. v. New York City, 438 U.S. 104, 127-28 (1978)); Delaware, L. & W. R. Co. v. Morristown, 276 U.S. 182, 193 (1928).

without regard to the public interests that it may serve."[52] Historically, the Court observed, "[w]hen faced with a constitutional challenge to a permanent physical occupation of real property" it has "invariably found a taking."[53]

A closely related corollary to this "permanent physical occupation doctrine" is that government acquisitions of resources to permit or facilitate uniquely public functions have been held to be unconstitutional takings.[54] For example, in two early, pre-*Mahon* cases, the Court held that in both situations—repeated firing of guns over the taking claimant's land from a federal military base and intermittent flooding of land caused by a water project—the government action affected a taking.[55] Later, in *United States v. Causby,* direct airplane over-flights above a claimant's land were found so noisy and intrusive that they destroyed the use of the land as a chicken farm. The Court held this to be a taking, observing that the government was effectively "using" part of the property as a flight path for its planes.[56] Similarly, in *Griggs v. Allegheny County,* the Court held that commercial airplane over-flights on landing and takeoff paths from a municipal airport required "use" of a claimant's property and therefore constituted a taking requiring compensation.[57]

While there have been few cases delineating the parameters of *per se* takings involving physical occupation of property by the government, the categorical rule is not difficult to apply. *Loretto* makes clear that any appreciable entry into private property that constitutes a "use" of that property is compensable, unless it is *de minimis*. While the court has not articulated a *de minimis* rule, common sense suggests that some incursions of government activity into private property would not constitute a taking, including, for example, the wafting of the smell of baking apple pies from a military base bakery, one airplane over-flight per month above a tract of private land, or many over-flights at an elevation that renders the noise barely perceptible. Such narrow exceptions notwithstanding, the *Loretto per se* rule requiring

52. *Loretto,* 458 U.S. at 426.

53. *Id.* at 428 (citing Pumpelly v. Green Bay Co., 80 U.S. 166 (1872)) (holding that defendant's construction, pursuant to state authority, of a dam which permanently flooded plaintiff's property constituted a taking). In *Pumpelly*, "real estate [was] actually invaded by superinduced additions of water, earth, sand, or other material, or by having any artificial structure placed on it, so as to effectually destroy or impair its usefulness. . . . *Pumpelly*, 80 U.S. at 181. The *Loretto* Court noted the distinction between physical occupation and mere restriction of the use of private property by regulation. *Loretto*, 458 U.S. at 427-28 (citing N. Transp. Co. v. Chicago, 99 U.S. 635, 642 (1879)).

54. *See Penn Cent.*, 438 U.S. 104.

55. Portsmouth Co. v. United States, 260 U.S. 327 (1922); United States v. Cress, 243 U.S. 316 (1917).

56. United States v. Causby, 328 U.S. 256, 262-63 (1946).

57. Griggs v. Allegheny County, 369 U.S. 84 (1962).

compensation for government physical takings is strict; more than *de minimis* physical invasions of private property will fall within its purview.

2. *Per Se* Physical Occupation Rule and Shale Gas Regulation

It is difficult to foresee many circumstances when government regulation of shale gas development would trigger invocation of *Lorretto's per se* takings rule. The actual capture and use of shale gas by the government as a result of horizontal drilling and HVHF could fall in this category if the horizontal well bore or the fracing fluid entered into a subterranean area owned by a private party—and actually extracted the shale gas located there. Of course, if the common law "rule of capture" were to apply to shale gas extraction, the government might successfully claim a right to shale gas produced by horizontal drilling into and fracing of shale strata beneath lands adjoining its own.[58] Such an argument is problematic, but beyond the scope of this essay.[59]

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58. The rule of capture has been explained and defined by a distinguished commentator:

> The rule of capture states that a landowner in a common source of oil and gas supply is legally privileged to take oil and gas from his or her land, even though in so doing he or she may take some of the oil or gas from adjoining lands. When the "rule of capture" applies, the landowner incurs no liability for causing oil or gas to migrate across property boundaries and is not required to compensate adjoining landowners for draining oil and gas from their lands. The only protection that an owner has against loss of oil and gas to neighboring owners because of migration is the right to drill offset wells that would interrupt the flow of oil and gas being drawn to the neighboring wells. The rule of capture has been modified by the doctrine of correlative rights and by conservation legislation designed to protect the interest of the public. Although a mineral owner has a right to its fair share of the minerals on and under its property, this right does not extend to specific oil and gas beneath the property. The minerals owner is entitled, not to the molecules actually residing below the surface, but to a fair chance to recover the oil and gas in or under his land, or their equivalents in kind.

1 NANCY SAINT-PAUL, SUMMERS OIL AND GAS § 3:7 (3d ed. 2010) (citations omitted).

59. *See* Anderson, *supra* note 6 ("I conclude that courts should not allow subsurface trespass claims unless the plaintiff shows substantial and actual damages. Moreover, subject to the limited exceptions already noted, courts should deny injunctive relief for subsurface trespass."). It is difficult to conceive, at least in the shale gas extraction context, how horizontal drilling that encroaches into subsurface property of another, either by a well bore or via injection of fracing fluid, could be interpreted as anything other than an actionable trespass. The very purpose of the HVHF process would be to remove the gas and market it. Professor Anderson does not address "judicial taking" theory which may be relevant to his view of the power of courts to interpret common law property rights. *See* Stop the Beach Renourishment, Inc. v. Fla. Dep't of Envtl. Prot., 130 S. Ct. 2592, 2603 (2010). Justice Scalia, joined by Chief Justice Roberts, Justice Thomas, and Justice Alito, wrote that the assertion that courts need flexibility to change the common law has "little appeal when directed against the enforcement of a constitutional guarantee. . . ." *Id.* at 2609 (Scalia, J., plurality opinion). Justice Kennedy,

It is also possible that government activities on nearby land could physically impact nearby properties making it impossible to carry on shale gas-related drilling and production operations. For example, as in the case involving the government-caused flooding of private land, state actions that cause foreign material to enter private land and significantly disrupt shale gas activities would likely be held a *per se* physical taking. One would expect that because of the bright line nature of the *Loretto* categorical takings rule, legislators and government managers would be careful to avoid such invasions. Care would be especially appropriate because of the extraordinarily high compensation that might accrue should a court find that the value of shale gas ownership and production rights has been "taken."

B. Regulatory Takings Analysis under Penn Central and Lucas

As explained above, *Lucas* established a second categorical rule applicable to regulations that deprive an owner of "*all* economically beneficial use" of one's property; just compensation must accompany such a "total regulatory taking."[60] The *Lucas* total taking rule included an important caveat—the nuisance exception—discussed below. Under that exception, to the extent that "background principles of nuisance and property law" independently restrict the owner's intended use of the property, the regulatory action is not to be considered a compensable taking, but rather a non-compensable legitimate exercise of a State's police power.[61] In those cases where no categorical rule applies, the appropriate standards guiding judicial assessment of regulatory takings claims are found in *Penn Central Transportation Co. v. New York.*

1. *Lucas* Facts

David Lucas, a real estate developer, purchased a fee simple interest in two residential lots on a South Carolina barrier island intending to build single-family homes like those on immediately adjacent parcels.[62] At the time of the purchase, the lots were not subject to regulation under

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joined by Justice Sotomayor, found that "[s]tate courts generally operate under a common-law tradition that allows for incremental modifications to property law, but 'this tradition cannot justify a carte blanch judicial authority to change property definitions wholly free of constitutional limitations.'" *Id.* at 2615 (Kennedy, J., concurring in part and concurring in the judgment) (emphasis in original) (quoting Roderick E. Walston, *The Constitution and Property: Due Process, Regulatory Takings, and Judicial Takings*, 2001 UTAH L. REV. 379, 435 (2001)).

60. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1019 (1992).

61. *Id.* at 1026-32.

62. *Id.* at 1006-07.

the State's coastal zone building permit regulations.[63] Two years later, the South Carolina legislature enacted the Beachfront Management Act ("BMA").[64] Provisions of the BMA prohibited construction of any permanent habitable structures on the two lots.[65]

Lucas sued the South Carolina Coastal Council in state court. The Council was the regulatory agency charged with enforcing the BMA. The developer alleged that the Council's construction ban deprived him of all economically viable use of his land and that, consequently, his property had been taken in violation of the Fifth and Fourteenth Amendments.[66] He argued that "complete extinguishment" of the value of his two lots triggered the constitutional compensation requirement, even though the coastal zoning law may have substantially advanced an important and valid public interest.[67] The State trial court found that the two lots were rendered "valueless by the statute"[68] and entered a judgment for Lucas of more than $1.2 million.[69]

On appeal, the South Carolina Supreme Court reversed.[70] It held that the coastal zoning law was a valid exercise of the State's police power to regulate nuisance-like activities. The Court's opinion found important Lucas's concession "that the Beachfront Management Act

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63. *Id.*

64. S.C. CODE ANN. § 48-39 (1987).

65. Speaking for the *Lucas* majority, Justice Scalia observed:

> The Beachfront Management Act brought Lucas's plans to an abrupt end. Under that 1988 legislation, the Council was directed to establish a "baseline" connecting the landward-most "point[s] of erosion . . . during the past forty years" in the region of the Isle of Palms that includes Lucas's lots. In action not challenged here, the Council fixed this baseline landward of Lucas's parcels. That was significant, for under the Act construction of occupable improvements was flatly prohibited seaward of a line drawn 20 feet landward of, and parallel to, the baseline. The Act provided no exceptions.

Lucas, 505 U.S. at 1008-09 (citations omitted) (quoting Lucas v. S.C. Coastal Council, 404 S.E.2d 895, 896 (S.C. 1991)). The Act allowed construction of non-habitable improvements including "wooden walkways no larger in width than six feet," and "small wooden decks no larger than one hundred forty-four square feet." S.C. CODE ANN. § 48-39-290 (1987).

66. *Lucas*, 505 U.S. at 1009.

67. *Id.*

68. The trial court found that "at the time Lucas purchased the two lots, both were zoned for single-family residential construction and . . . there were no restrictions imposed upon such use of the property by either the State of South Carolina, the County of Charleston, or the Town of the Isle of Palms." *Id.* The court further found that the BMA permanently banned construction of houses on the developers' lots. Thus, Lucas could make no "reasonable economic use of the lots . . . [and the BMA] eliminated the unrestricted right of use" thereby rendering them valueless. *Id.*

69. *Id.* Upon remand the state court held that the Act caused the developers' land to be "taken," and ordered the Coastal Council to pay "just compensation" in the amount of $1,232,387.50. *Id.*

70. *Lucas*, 404 S.E.2d at 896.

[was] properly and validly designed to preserve . . . South Carolina's beaches."[71] The State Court's rejection of the developer's taking claim reflected long-established state law recognizing that government regulation intended to prevent "harmful or noxious uses" of property—public nuisances—did not trigger the Constitution's just compensation obligation under the Takings Clause.[72]

2. *Lucas* Holding

The Supreme Court of the United States disagreed with the South Carolina Supreme Court, holding that "when . . . a regulation that declares 'off-limits' all economically productive or beneficial uses of land goes beyond what the relevant background principles would dictate, compensation must be paid to sustain it."[73] *Lucas* defined "relevant background principles" as "the restrictions that background principles of the State's law of property and nuisance . . . place upon land ownership," including the State's common law of private and public nuisance.[74]

Writing for the *Lucas* majority, Justice Scalia alluded to "numerous occasions" on which the Court had previously said that "the Fifth Amendment is violated when land-use regulation . . . *'denies an owner economically viable use of his land.*'"[75] A "total taking" or "wipeout" of fee simple interests in land must be "guided by the understandings of our citizens regarding the content of, and the State's power over, the 'bundle of rights' that they acquire when they obtain title to property," *Lucas* explained.[76] It is noteworthy that *Lucas* viewed the South Carolina BMA as "land use regulation" rather than an effort to prevent the creation of a common law nuisance.

All of the Court's modern taking cases require the property alleged to have been taken to be specifically identified before a judicial assessment is made as to whether compensation is required. *Lucas* was

71. *Lucas*, 505 U.S. at 1009-10. The state supreme court emphasized that Lucas "admittedly fails to attack the validity of the Act, and therefore concedes the validity of the legislative declaration of its 'findings' and 'policy' embodied in [the BMA]." *Lucas*, 404 S.E.2d at 896. The South Carolina Court thus considered itself "in no position to question the legislative scheme or purpose." *Id.* at 896.

72. *Lucas*, 404 S.E.2d at 899 (citing Goldblatt v. Hempstead, 369 U.S. 590 (1962) (prohibiting excavating below the water table in order to extract gravel); Miller v. Schoene, 276 U.S. 272, 277 (1928) (involving state action that destroyed diseased cedar trees of certain property owners to prevent the infection of apple orchards); Hadacheck v. Sebastian, 239 U.S. 394, 404 (1915) (prohibiting the manufacture of bricks near residents in Los Angeles); Mugler v. Kansas, 123 U.S. 623, 662 (1887) (prohibiting the manufacture and sale of intoxicating liquors)).

73. *Lucas*, 505 U.S at 1030.

74. *Id.* at 1029.

75. *Id.* at 1019 (quoting Agins v. City of Tiburon, 447 U.S. 255, 260 (1980)).

76. *Id.* at 1027.

no exception.[77] It is important to note that the Court's opinion in *Lucas* made clear its new "categorical" or "*per se*" takings rule was expected to arise only in the "relatively rare," indeed, "extraordinary circumstance" when a government regulation destroys all economic value of property.[78]

In either instance, whether a statute or regulation results in the physical occupation or the "total taking" of real property, application of the Court's categorical *per se* regulatory takings rules requires just compensation be paid, or the government action will be nullified as an unconstitutional taking of private property.

3. *Lucas* "Nuisance Exception"

As mentioned above, *Lucas* recognizes that regulations that prohibit all economically beneficial use of land may withstand a taking claim if the limitation on property use:

> [I]nhere[s] in the title itself, in the restrictions that background principles of the State's law of property and nuisance already place upon land ownership . . . in other words, do no more than duplicate the result that could have been achieved in the courts-by adjacent landowners (or other uniquely affected persons) under the State's law of private nuisance, or by the State under its complementary power to abate nuisances that affect the public generally, or otherwise.[79]

Thus, *Lucas* explains that regulations do not constitute a taking even when they eliminate the only economically productive use of land—if the owners' use of the property qualifies as a common law nuisance. That is, when the regulation simply augments existing common law and "does not proscribe a productive use that was previously permissible under relevant property and nuisance principles" it does not affect a

77. *See* Suitum v. Tahoe Reg'l Planning Agency, 520 U.S. 725, 734 (1997) (quoting Pa. Coal Co. v. Mahon, 260 U.S. 393, 412 (1922) ("'only a regulation that goes too far' results in a taking under the Fifth Amendment")); MacDonald, Sommer & Frates v. Yolo County, 477 U.S. 340, 348 (1986) ("A court cannot determine whether a regulation has gone 'too far' unless it knows how far the regulation goes."); *Lucas*, 505 U.S. at 1015, 1019 (noting that a regulation "goes too far" and results in a taking "at least in the extraordinary circumstance when *no* productive or economically beneficial use of land is permitted").

78. *Lucas*, 505 U.S. at 1018. While *Lucas* identified a categorical takings rule applicable in any case where regulation totally devalues particular property, it did not find that David Lucas had suffered a compensable taking of his two lots. Rather, the Court remanded the case to the South Carolina court with the admonition that "South Carolina must identify background principles of nuisance and property law that prohibit the uses he now intends in the circumstances in which the property is presently found." *Id.* at 1031. "Only on this showing" said the Court, "can the State fairly claim that, in proscribing all such beneficial uses, the Beachfront Management Act is taking nothing." *Id.* at 1031-32.

79. *Id.* at 1029.

taking. Use of property "for what are now expressly prohibited purposes was always unlawful, and (subject to other constitutional limitations) it [is] open to the State at any point to make the implication of those background principles of nuisance and property law explicit."[80]

4. *Penn Central* Analysis of Distinct Investment-Backed Expectations

As reviewed above, *Pennsylvania Coal Co. v Mahon* has been seen as providing the first articulation of the Court's *ad hoc* regulatory takings analysis:

> As long recognized some values are enjoyed under an implied limitation and must yield to the police power. But obviously the implied limitation must have its limits, or the contract and due process clauses are gone. One fact for consideration in determining such limits is the extent of the diminution. When it reaches a certain magnitude, in most if not in all cases there must be an exercise of eminent domain and compensation to sustain the act. So the question depends upon the particular facts. The greatest weight is given to the judgment of the legislature but it always is open to interested parties to contend that the legislature has gone beyond its constitutional power.[81]

The property interest involved in *Mahon* was coal that had been severed from a fee simple interest in land.[82] The coal company argued that the state statute prohibiting mining under buildings to prevent subsidence damage effected an unconstitutional taking of private property without just compensation.[83] The Supreme Court agreed.

Penn Central Transportation Co. v. New York City synthesized the seminal regulatory takings principles of *Mahon* and the Court's post-*Mahon* regulatory takings cases in identifying the relevant considerations to be used by courts in determining whether a compensable regulatory taking has occurred.[84] The Court stated:

> [W]hether a particular restriction will be rendered invalid by the government's failure to pay for any losses proximately caused by it depends largely "upon the particular circumstances [in that] case." In engaging in these essentially ad hoc, factual inquiries, the Court's decisions have identified several factors that have particular significance. *The economic impact of the regulation on the claimant*

80. *Id.* at 1029-30. *See also* Freyfogel, *supra* note 26, at 98.
81. Pa. Coal Co. v. Mahon, 260 U.S. 393, 413 (1922).
82. *Id.* at 412.
83. *Id.*
84. Penn Cent. Transp. Co. v. New York City, 438 U.S. 104 (1978).

> *and, particularly, the extent to which the regulation has interfered with distinct investment-backed expectations are, of course, relevant considerations. So, too, is the character of the governmental action.*[85]

Unlike *Lucas*, *Penn Central* involved a claim of the taking of less than a full fee simple interest in land allegedly rendered valueless by government regulation.[86] The Penn Central Company asserted that a New York City historic landmarks preservation ordinance effected a taking because it barred the use of airspace above the company's Grand Central Station to construct a high-rise building.[87] The takings claim was based upon the theory that one hundred percent of the economic value of the airspace owned by a company had been taken as a result of the historic preservation law, notwithstanding the fact that Penn Central owned the entire tract in fee simple.[88] The Court characterized the company's argument as follows:

> They first observe that the airspace above the Terminal is a valuable property interest. . . . They urge that the Landmarks Law has deprived them of any gainful use of their "air rights" above the Terminal and that, irrespective of the value of the remainder of their parcel, the city has "taken" their right to this superjacent airspace, thus entitling them to "just compensation" measured by the fair market value of these air rights.[89]

Thus, the *Penn Central* Court was called upon to identify the "property interest" against which Penn Central's alleged loss of property

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85. *Id.* at 124 (citations omitted) (emphasis added). Among the post-*Mahon* cases synthesized by the Court in *Penn Central* are: *Moore v. City of E. Cleveland*, 431 U.S. 494, 495 (1977); *City of Eastlake v. Forest City Enter., Inc.*, 426 U.S. 668, 672 (1976); *YMCA v. United States*, 395 U.S. 85, 93 (1969); *Goldblatt v. Town of Hempstead*, 369 U.S. 590, 590 (1962); *Griggs v. Allegheny County*, 369 U.S. 84, 85 (1962); *Armstrong v. United States*, 364 U.S. 40, 43 (1960); *United States v. Cent. Eureka Mining Co.*, 357 U.S. 155, 168 (1958); *Atchison, Topeka & Sante Fe R.R. Co. v. Pub. Utils. Comm'n*, 346 U.S. 346, 347 (1953); *United States v. Caltex, Inc.*, 344 U.S. 149, 151 (1952); *United States v. Causby*, 328 U.S. 256, 258 (1946); *United States v. Willow River Power Co.*, 324 U.S. 499, 503 (1945); *Demorest v. City Bank Farmer's Trust Co.*, 321 U.S. 36, 38 (1944); *Miller v. Schoene*, 276 U.S. 272, 279–80 (1928); *Nectow v. City of Cambridge*, 277 U.S. 183, 185 (1928); *Gorieb v. Fox*, 274 U.S. 603, 605 (1927); *Village of Euclid v. Ambler Realty Co.*, 272 U.S. 365, 367 (1926). Pre-*Mahon* cases cited by Justice Holmes as informing the Court's analysis are: *Portsmouth Harbor Land & Hotel Co. v. United States*, 260 U.S. 327, 328 (1922); *Walls v. Midland Carbon Co.*, 254 U.S. 300, 309 (1920); *United States v. Cress*, 243 U.S. 316, 328 (1917); *Hadacheck v. Sebastian*, 239 U.S. 394, 404 (1915); *Reinman v. City of Little Rock*, 237 U.S. 171, 173 (1915); *Welch v. Swasey*, 214 U.S. 91, 93 (1909); *Mugler v. Kansas*, 123 U.S. 623, 625 (1887).

86. *Penn Cent.*, 438 U.S. at 130.

87. *Id.*

88. *Id.*

89. *Id.* (citations omitted).

value was to be measured—now often referred to by courts and scholars as the "denominator" issue.[90] The Court rejected the company's argument, declaring "'[t]aking' jurisprudence does not divide a single parcel into discrete segments and attempt to determine whether rights in a particular segment have been entirely abrogated."[91]

5. The Denominator Issue

Consider the situation where the owner of shale gas owns only the gas and the right to extract it by virtue of a conveyance granting or reserving that interest from a fee simple estate. Setting aside the nuisance exception, the owner might have a colorable takings claim based on a *Lucas* total takings theory.[92] Such an argument would likely trigger a judicial inquiry into "the denominator issue"—how a court should identify "the property interest against which the loss of value is to be measured."[93]

Identifying the appropriate denominator is a threshold question for courts applying the *Lucas* total taking rule.[94] Whether the amount of property taken deprives an owner of all economically viable uses is measured by what is taken (the numerator) against what was left (the

90. *See generally* Keith Woffinden, *The Parcel as a Whole: A Presumptive Structural Approach for Determining When the Government Has Gone Too Far*, 2008 B.Y.U. L. REV. 623 (2008) [hereinafter *Parcel as a Whole*] (discussing horizontal divisions of property and the Supreme Court's jurisprudence regarding the denominator problem); Timothy J. Dowling, *Tahoe-Sierra's Effect on the Parcel-as-a-Whole Rule and Its Importance in Defending Against Regulatory Takings Challenges*, *in* TAKING SIDES ON TAKINGS ISSUES: THE IMPACT OF *TAHOE-SIERRA* 33 (Thomas E. Roberts ed., 2003) (discussing the parcel-as-a-whole rule).

91. The opinion observed that "[w]ere this the rule this Court would have erred not only in upholding laws restricting the development of air rights, but also in approving those prohibiting both the subjacent and the lateral development of particular parcels." *Penn Cent.*, 438 U.S. at 130 (citations omitted).

92. *See* Patrick C. McGinley, *Bundled Rights and Reasonable Expectations: Applying the Lucas Categorical Taking Rule to Severed Mineral Property Interests*, 11 VT. J. ENVTL. L. 525, 556-63 (2010) [hereinafter "*Bundled Rights*"].

93. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1016 n.7 (1992). The text in the *Lucas* opinion referenced by footnote 7 states "the Fifth Amendment is violated when land-use regulation . . . '*denies an owner economically viable use of his land.*'" *Id.* at 1016 (citing Agins v. City of Tiburon, 447 U.S. 255, 260 (1980)). The footnote to this statement begins with a caveat: "Regrettably, the rhetorical force of our 'deprivation of all economically feasible use' rule is greater than its precision, since the rule does not make clear the 'property interest' against which the loss of value is to be measured." *Id.* at 1016 n.7. *Lucas* did not reach the denominator issue because the property interest involved was a fee simple and the Court found the entire economic value of the land had been taken. However, the Court emphasized "uncertainty regarding the composition of the denominator in our 'deprivation' fraction has produced inconsistent pronouncements by the Court." *Id.*

94. *See generally Parcel as a Whole*, *supra* note 90.

denominator). Defining the denominator too broadly would mean very few government actions would be found to be a taking. Defining the denominator too narrowly would result in virtually all government regulation affecting private property being held a taking requiring compensation, thus greatly limiting the power of government to protect important public interests.[95]

In *Penn Central*, the company's right to build a structure on top of Grand Central Station (referred to as its "air rights") was viewed by the Court as just one part of the strand of real property ownership inuring in a fee simple estate. The Court brushed aside the Penn Central Company's argument that one hundred percent of the air rights had been taken:

> [T]he submission that appellants may establish a "taking" simply by showing that they have been denied the ability to exploit a property interest that they heretofore had believed was available for development is quite simply untenable.... *"Taking" jurisprudence does not divide a single parcel into discrete segments and attempt to determine whether rights in a particular segment have been entirely abrogated.*[96]

Though the observation that "taking jurisprudence does not divide a single parcel into discrete segments . . ." seemed clear, *Lucas* muddied the waters. In footnote *dicta*, the Court observed:

> When, for example, a regulation requires a developer to leave 90% of a rural tract in its natural state, it is unclear whether we would analyze the situation as one in which the owner has been deprived of all economically beneficial use of the burdened portion of the tract, or as one in which the owner has suffered a mere diminution in value of the tract as a whole.[97]

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95. *See* John E. Fee, *Unearthing the Denominator in Regulatory Takings Claims,* 61 U. CHI. L. REV. 1535, 1536 (1994).

96. *Penn Cent.*, 438 U.S. at 130 (emphasis added). *See* Keystone Bituminous Coal Ass'n. v. DeBenedictis, 480 U.S. 470, 500 (1987). In *Keystone*, the takings claimants argued that a Pennsylvania law prohibiting coal companies from mining underground coal in such a manner as to cause subsidence of surface lands, reduced to zero an estate in land they owned—the support estate. The court refused to consider the support estate as the denominator in its takings analysis emphasizing that "[t]o focus upon the support estate separately when addressing the diminution of the value of plaintiffs' property caused by the Subsidence Act therefore would serve little purpose. The support estate is more properly viewed as only one "strand" in the plaintiff's "bundle" of property rights, which also includes the mineral estate." *Id.* at 480. "It is clear . . ." said the Court "that our takings jurisprudence forecloses reliance on such legalistic distinctions within a bundle of property rights." *Id.*

97. *Lucas*, 505 U.S. at 1016 n.7.

This *dicta* applies only to a fee simple estate in land as that was the focus of the case presented by the *Lucas* facts. The Court did not actually reach the denominator issue because the property interest involved was a fee simple. The Court accepted the South Carolina trial court's finding that one hundred percent of the economic value of David Lucas's two residential lots had been taken.[98]

V. APPLYING REGULATORY TAKING ANALYSIS TO GOVERNMENT REGULATION OF SHALE GAS OPERATIONS

Beyond the limited scenarios involving physical occupation under *Loretto*, a more likely, though equally limited context in which a regulatory taking claim might arise is where a shale gas owner alleges a *Lucas* total taking that deprives "all economically beneficial use" of her property.[99] As explained below, successfully making a takings claim under the *Lucas per se* rule is problematic. Even where the only interest of the takings claimant is in a severed mineral interest in shale gas and the right to extract and market the gas, the *Lucas* nuisance exception may stymie claims for compensation under the takings clause.

A. Per Se Total Takings Where the Claimant Owns the Surface and Shale Gas Rights

The scope of application of the *Lucas* "total taking" rule is limited by the unusual facts of the case. The South Carolina trial court found as a fact that the entire value of David Lucas's two residential lots had been taken and that no economically beneficial use of the parcels existed because of the application of the state coastal zoning law. The impact of government regulation in *Lucas* was quite unlike most government regulations that devalue property. Generally, when regulation decreases the economic value of real property, the land continues to retain a measure of economic value for uses other than those proscribed. *Lucas*, then, was an anomaly in that the challenged state regulation reduced the value of the claimant's property to *zero*—a "total taking." That is precisely why the *Lucas* Court indicated that its total taking rule would apply to the "rare situation" where regulation destroyed all value of a fee simple interest.[100]

It is apparent that where the owner of shale gas rights also owns the surface, in almost all instances the surface will have some significant

98. *Id.*
99. *Id.* at 1019.
100. *Id.*

economic value over and above the value of the underlying gas.[101] Simply put, in such a factual setting, the *Lucas* total taking analysis would not apply because the property owner would have some remaining economically beneficial use(s) of her property. It will be the rare case where a government regulation of shale gas-related activities will deprive the owner of both surface and shale gas rights of all economically beneficial uses of her property.

B. Considering the Denominator Issue in Shale Gas Regulatory Takings

1. Severed Mineral Interests in Shale Gas Should be Treated Differently than the Fee Simple Interest Involved in *Lucas*

The denominator issue has not been resolved by the Supreme Court in more than three decades since it first was articulated in *Penn Central*. It would be little more than speculation to attempt to predict the outcome of future regulatory takings cases where shale gas ownership is severed from a fee interest, and identification of the proper denominator becomes an issue. The present state of the law does, however, provide a measure of guidance when applied to some contexts.

First, however the denominator is identified—even if a government regulation renders the value of one's shale gas property valueless—if the government action was intended to forestall harm to public interests in the nature of a common law nuisance, no *per se* taking will be found. Second, until modified, the Supreme Court's taking jurisprudence requires that total takings be judged "by the property as a whole."

Both points are driven home in a case involving a government ban on coal mining to prevent pollution of a small Pennsylvania watershed. Owners of a severed coal estate possessing no surface rights over part of the coal tract, claimed the ban affected a total taking. The Supreme Court of Pennsylvania rejected this argument in *Machipongo Land and Coal Co. v. Commonwealth*, ruling that the "'property as a whole rule' remains controlling" in view of prevailing United States Supreme Court precedent.[102] Applying that rule, the Court held that the relevant parcel

101. *See, e.g.*, Machipongo Land and Coal Co. v. Commonwealth, 799 A.2d 751 (Pa. 2002).

102. *Id.* at 766 (citing *Keystone, Penn Central, and Tahoe-Sierra*). In choosing the "property as a whole" analytical approach, the Pennsylvania Court recognized that cases involving severed mineral and other estates in land can be characterized in a number of ways: "(1) the horizontal, physical division of property--is the relevant parcel all the land in a given geographic area that one owns or some smaller portion of that acreage; (2) the vertical division of property--can the parcel be divided among air rights, surface rights, and mineral rights; or (3) the temporal division of property--can the property be viewed in discrete temporal units." *Id.* (citations omitted). The Court further held, however, if

at issue "cannot be vertically segmented and must be defined to include both the surface and mineral rights."[103]

In an earlier essay on takings and severed mineral interests, I addressed the application of the *Lucas per se* rule to severed coal property interests. I concluded that "quite unlike the interest of David Lucas or, indeed, most owners of a fee simple estate in land," severed coal property interests do not deserve the same level of protection afforded owners of fee simple estates in land by *Lucas's per se* rule. In reaching this conclusion, I analyzed the history of the severance of coal interests from fee simple estates in land and found a significant distinction between the economic expectations of owners of land in fee simple and owners of severed coal interests.[104]

Similarly, I submit that there is a significant difference between fee simple ownership of land and ownership of rights to extract and market shale gas. The distinct difference between the investment-backed expectations of the owner of a fee simple interest in land and the economic expectations of an owner of severed mineral interests militates in favor of application of the *Penn Central* analysis. That analysis is grounded upon the view that speculative investments in severed estates in land are not entitled to the same protection as fee simple interests.[105]

Moreover, courts reviewing regulatory taking claims should be alert to the possibility that some involved in the shale gas boom may attempt to sever shale gas property interests by slicing them into smaller and smaller parcels and seek to "game" the *Lucas* rule by manipulating fractional property interests to facilitate total takings claims. As Justice Stevens's dissent in *Lucas* predicted, "developers and investors may market specialized estates to take advantage of the Court's new rule."[106]

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the government regulation falls within the *Lucas* nuisance exception, the *per se* rule is inapplicable.

103. *Id.* at 768. *Machipongo* adopted a "flexible approach, designed to account for factual nuances." That approach involved a balanced analysis of a variety of factors in determining how to define the relevant parcel; that approach did not recognize one factor as more important than any other. Among the factors identified by the Court were "unity and contiguity of ownership, the dates of acquisition, the extent to which the proposed parcel has been treated as a single unit, the extent to which the regulated holding benefits the unregulated holdings; the timing of transfers, if any, in light of the developing regulatory environment; the owner's investment backed-expectations; and, the landowner's plans for development." *Id.*

104. *Bundled Rights*, *supra* note 92.

105. *See id.*

106. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1065-66 (1992) (Stevens, J., dissenting). *See also* Echeverria, *supra* note 41, at 174 ("[T]he *per se Lucas* rule is potentially subject to artful manipulation by clever investors who can structure land acquisitions in order to manufacture apparent regulatory wipeouts and create potential claims under that precedent.").

"The smaller the estate," Justice Stevens emphasized, "the more likely that a regulatory change will effect a total taking."[107]

2. *Penn Central's* Distinct Investment-Backed Expectations Inquiry Applies to Claims of Total Taking of Shale Gas Interests

With one exception, the Supreme Court has been silent since *Lucas* regarding clarification of the denominator issue.[108] However, lower courts have expressed opinions on the issue. Some courts have held that when only a portion of a real property interest has been taken—for example where a regulation makes it impossible to mine one of several contiguous tracts of a severed coal seam—the "denominator" is the amount of coal that cannot be mined (100%) under the affected tract, and the *Lucas per se* rule applies.[109] These courts find a taking and require

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107. *Lucas*, 505 U.S. at 1065-66. Justice Stevens provided a hypothetical example:

> [A]n investor may, for example, purchase the right to build a multifamily home on a specific lot, with the result that a zoning regulation that allows only single-family homes would render the investor's property interest "valueless." In short, the categorical rule will likely have one of two effects: either courts will alter the definition of the "denominator" in the takings "fraction," rendering the Court's categorical rule meaningless, or investors will manipulate the relevant property interests, giving the Court's rule sweeping effect. To my mind, neither of these results is desirable or appropriate, and both are distortions of our takings jurisprudence.

108. *See* Palazzolo v. Rhode Island, 533 U.S. 606 (2001), in which the Court held that the Lucas *per se* rule was inapplicable even though the value of the claimant's land was reduced by 93.7%—from $3.15 million to $200,000—as a result of the state's regulation. *Id.* at 616, 631. The Court referred to a "persisting question of what is that proper denominator in the takings fraction. . . . Some of our cases indicate that the extent of deprivation effected by a regulatory action is measured against the value of the parcel as a whole. . . ." *Id.* at 631 (citing Keystone Bituminous Coal Ass'n. v. DeBenedictis, 480 U.S. 470, 497 (1987). "[B]ut we have at times expressed discomfort with the logic of this rule." *Id.* (citing *Lucas*, 505 U.S. at 1016-17 n.7). "The issue was not properly raised below in the state courts nor presented in the petition for certiorari." *Id. Palazzolo* was decided "on the premise that petitioner's entire parcel serves as the basis for this takings claim, and, so framed, the total deprivation argument fails." *Id.*

109. *See* Cane Tenn., Inc. v. United States (*Cane I*), 44 Fed. Cl. 785 (1999); Cane Tenn., Inc. v. United States (*Cane II*), 54 Fed. Cl. 100 (2002); Cane Tenn., Inc. v. United States (*Cane III*), 57 Fed. Cl. 115 (2003); Cane Tenn., Inc. v. United States (*Cane IV*), 62 Fed. Cl. 481 (2003); Cane Tenn., Inc. v. United States (*Cane V*), 60 Fed. Cl. 694 (2004); Cane Tenn., Inc. v. United States (*Cane VI*), 62 Fed. Cl. 703 (2004); Cane Tenn., Inc. v. United States (*Cane VII*), 63 Fed. Cl. 715 (2005); Cane Tenn., Inc. v. United States (*Cane VIII*), 71 Fed. Cl. 432 (2005), *aff'd per curiam*, 214 Fed. Appx. 978, (Fed. Cir. 2001). Further background facts may be found in decisions involving earlier takings claims involving the same property. *See* Wyatt v. United States, 271 F.3d 1090 (Fed. Cir. 2001), *rev'd*, E. Minerals Int'l Inc. v. United States, 36 Fed. Cl. 541 (1996). *See* Kristine Tardiff, *Expectations: The Final Lucas Frontier*, 11th Annual CLE Conference on Litigating Regulatory Takings and Other Challenges To Land Use and Environmental

compensation without reference to the more generally applicable takings standards of *Penn Central*. Other lower courts have held that *Penn Central* does apply to total takings claims, even if the evidence shows that the affected property interest has been reduced to zero.[110] In my view, the better argument is that *Penn Central* should apply in those unusual cases where a takings claimant can show that government regulation has reduced the value of a severed mineral estate to zero.

An opinion of the Federal Circuit cogently articulates the rationale for applying *Penn Central* to *Lucas* total takings claims:

> Lucas did not mean to eliminate the requirement for reasonable, investment-backed expectations to establish a taking. It is true that . . . Lucas set out what it called a "categorical" taking "where regulation denies all economically beneficial or productive use of land." The Lucas Court, however, clarified that by "categorical" it meant those "categories of regulatory action [that are] compensable without case-specific inquiry into the public interest advanced in support of the restraint." A Lucas-type taking, therefore, is categorical only in the sense that the courts do not balance the importance of the public interest advanced by the regulation against the regulation's imposition on private property rights. . . . The Lucas Court did not hold that the denial of all economically beneficial or productive use of land eliminates the requirement that the landowner have reasonable, investment-backed expectations of developing his land. In Lucas, there was no question of whether the plaintiff had satisfied that criterion.[111]

It is quite clear the *Lucas* holding applies narrowly to claims of takings of fee simple interests in real property. The "infamous footnote 7" of *Lucas* clearly states that the issue of total taking of lesser interests

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Regulation (Stanford, CA., November 6-7, 2008) at 12-17, for a detailed description of this complex litigation and an explanation of the courts' decisions.

110. *See, e.g.*, Appolo Fuels, Inc. v. United States, 381 F.3d 1338, 1347 (Fed. Cir. 2004) ("It is a settled principle of federal takings law that under the *Penn Central* analytic framework, the government may defend against liability by claiming that the regulated activity constituted a state law nuisance without regard to the other *Penn Central* factors."); Coal. for Gov't Procurement v. Fed. Prison Indus., Inc., 365 F.3d 435, 481 (6th Cir. 2004) (indicating that the first step in a *Penn Central* takings inquiry is to determine whether claimant has a cognizable property interest as defined by *Lucas*); M & J Coal Co. v. United States, 47 F.3d 1148, 1153 (Fed. Cir. 1995) (finding "the *Lucas* formulation is useful for analyzing takings claims involving land use restrictions even when deprivation is not complete; specifically, there can be no compensable interference if such land use was not permitted at the time the owner took title to the property."). *See also* DOUGLAS T. KENDALL ET AL., TAKINGS LITIGATION HANDBOOK: DEFENDING TAKINGS CHALLENGES TO LAND USE REGULATIONS 117 (2000) (explaining that a defense based upon background principles of nuisance and property law is applicable to all inverse condemnation claims).

111. Good v. United States, 189 F.3d 1355, 1361 (Fed. Cir. 1999).

in land was reserved for another day.[112] When that day comes regarding claims of total takings of severed shale gas interests, there are strong arguments that the court should consider the distinct investment-backed expectations of the claimant under *Penn Central*, rather than limiting the takings analysis solely to a determination of the denominator to apply to less than a fee simple interest in land. Refusing to consider investment-backed expectations of the shale gas owner would have the perverse effect of encouraging the manipulation of mineral (and other) property rights to allow broader constitutional protection than is afforded fee simple owners of real property.

In his *Lucas* concurrence, Justice Kennedy said "[p]roperty is bought and sold, investments are made, subject to the State's power to regulate."[113] "Where a taking is alleged from regulations which deprive the property of all value . . . the test must be whether the deprivation is contrary to reasonable, investment-backed expectations."[114] Seizing on this point and connecting it to *Penn Central*, Justice Kennedy observed that "the finding of no value must be considered under the Takings Clause by reference to the owner's reasonable, investment-backed expectations."[115] Justice Kennedy's observation has merit, given that three years ago very few individuals knew of the potential to exploit shale gas. As the bonanza potential of shale gas has begun to surface in the public consciousness, serious issues relating to the short and long-term costs of exploitation of the resource remain unresolved.

C. *Shale Gas and the Lucas Nuisance Exception*

1. Allegations of Shale Gas Operations-Related Environmental Impacts

The harms that shale gas development may cause, or allegedly cause, fall within traditional concepts of common law nuisance. Critics of shale gas development identify a litany of harms they assert

112. *Lucas*, 505 U.S. at 1016 n.7. The description of footnote 7 as "infamous" captures the perspectives of critics of Justice Scalia's dicta that suggests further takings clause limitation of government land use regulation when the Court finally resolves the "denominator" issue. Professor David Callies is the source of this descriptive term. *See* David L. Callies, *After Lucas and Dolan: An Introductory Essay*, *in* TAKINGS LAND DEVELOPMENT CONDITIONS AND REGULATORY TAKINGS AFTER *DOLAN* AND *LUCAS* 15 (David L. Callies ed., 1996).

113. *Lucas*, 505 U.S. at 1034 (Kennedy, J., concurring).

114. *Id.*

115. *Id.* (citing Kaiser Aetna v. United States, 444 U.S. 164, 175 (1979)); Penn Cent. Transp. Co. v. New York City, 438 U.S. 104, 124 (1978). *See* W.B. Worthen Co. v. Kavanaugh, 295 U.S. 56 (1935).

accompany shale gas extraction operations.[116] Without suggesting agreement that such externalities are common or occur at all, legal analysis of potential obstacles attendant shale gas exploration, drilling, road building, and transportation must include consideration of potential common law nuisance liability exposure. Such analysis necessarily implicates issues involved in determining whether the impact of certain forms of regulation constitute *per se* takings under *Lucas* principles.

For example, critics have alleged that shale gas development can cause diverse harms including contamination of ground water, soil erosion and stream sedimentation, explosions during drilling and production activities, pollution of streams and domestic and municipal water supplies, toxic emissions from shale gas transmission facilities, and noxious noise and odors. Other nuisance-like effects of gas shale operations have been suggested.[117] These include impacts to water resources,[118] floodplains,[119] freshwater wetlands,[120] ecosystems and

116. For examples of various assertions of adverse impacts of shale gas operations on important public and private interests, see generally *Fracking: Gas Drilling's Environmental Threat* (a series of articles exploring environmental concerns about shale gas operations) (ProPublica, 2011), *available at* http://www.propublica.org/series/fracking. *See also* RAISING ELIJAH, *supra* note 7, at 272-84.

117. For a government agency's non-exhaustive list of potential harmful, nuisance-like externalities of shale gas extraction, see New York State Dep't. of Environmental Conservation, *Preliminary Revised Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program: Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs,* at ch. 6. (July, 2011), Executive Summary, at 10 [hereinafter PRDSG-EIS]. The PRDSG-EIS is available at http://www.dec.ny.gov/data/dmn/ogprdsgeisfull.pdf.

118. *Id.* at ch. 6.1 (discussing stormwater runoff, surface spills and releases at the well pad, hydraulic fracturing procedure, waste transport, fluid discharges, solids disposal). HVHF requires more than 3 million gallons or more of fresh water per well. The PRDSG-EIS estimates, "based upon multiplying the peak projected annual wells by current average use per well results in calculated peak *annual* fresh water usage for high-volume hydraulic fracturing of 9 billion gallons." The PRDSG-EIS explains that fresh water for hydraulic fracturing may be obtained by withdrawing it from surface water bodies a distance away from the well pad or through new or existing water-supply wells drilled into aquifers. "Without proper controls on the rate, timing and location of such water withdrawals, the cumulative impacts of such withdrawals could cause modifications to groundwater levels, surface water levels, and stream flow that could result in significant adverse impacts, including but not limited to impacts to the aquatic ecosystem, downstream river channel and riparian resources, wetlands, and aquifer supplies," according to the PRDSG-EIS. Also, the draft New York report indicates that "at peak activity the cumulative impact of high-volume hydraulic fracturing could potentially be significant, if such withdrawals were temporally proximate and from the same water resource." *Id.*, Executive Summary at 9-10.

119. *Id.* at ch. 6.2.

120. *Id.* at ch. 6.3.

wildlife,[121] air quality,[122] greenhouse gas emissions,[123] naturally occurring radioactive materials in the Marcellus Shale,[124] visual impacts,[125] noise,[126] road use,[127] community character impacts,[128] and seismicity.[129] In addition, HVHF utilizes a variety of chemicals mixed with fresh and flowback water shot under high pressures deep underground to the shale gas zone. The possibility of the escape of these polluted fluids has raised concerns.[130] This is not intended as an exhaustive list of possible shale gas externalities that fit within the *Lucas* description of activities triggering the nuisance exception.[131]

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121. *Id.* at ch. 6.4 (discussing impacts of fragmentation to terrestrial habitats and wildlife and invasive species).

122. *Id.* at ch. 6.5 (discussing regulatory review, air quality impact assessment, regional emissions of ozone precursors and their effects on the attainment status in the state implementation plan, air quality monitoring requirements for marcellus shale activities, permitting approach to the well pad and compressor station operations).

123. *Id.* at ch. 6.6 (discussing greenhouse gases, emissions from oil and gas operations, emissions source characterization, emission rates, drilling rig mobilization, site preparation and demobilization, completion rig mobilization and demobilization, well drilling, well completion, well production, and a summary of GHG emissions).

124. *Id.* at ch. 6.7.

125. *Id.* at ch. 6.8.

126. *Id.* at ch. 6.9.

127. *Id.* at ch. 6.10.

128. *Id.* at ch. 6.11.

129. *Id.* at ch. 6.12.

130. According to the PRDSG-EIS, spills or releases of HVHF contaminants might harm surface and groundwater:

> [S]pills or releases in connection with HVHF could have significant adverse impacts on water resources. A significant number of contaminants are contained in fracturing additives, or otherwise associated with HVHF operations. Spills or releases can occur as a result of tank ruptures, equipment or surface impoundment failures, overfills, vandalism, accidents (including vehicle collisions), ground fires, or improper operations. Spilled, leaked or released fluids could flow to a surface water body or infiltrate the ground, reaching subsurface soils and aquifers. Also assessed were the potential significant adverse impacts on groundwater resources from well drilling and construction associated with HVHF include impacts from turbidity, fluids pumped into or flowing from rock formations penetrated by the well, and contamination from natural gas present in the rock formations penetrated by the well.

Id. at 10.

131. I do not intend to suggest that these impacts necessarily or commonly attend shale gas operations. Evidence of such impacts will be based upon objective cross-disciplinary studies generated by experts in the fields of geohydrology, physics, petroleum engineering, economics and the ecological sciences. Of course, some adverse impacts may be proven by lay testimony; a stream littered with dead fish, foul smelling drinking water or noxious ambient air could provide probative evidence of adverse effects of shale gas extraction activities. In *Pa. Coal Co. v. Mahon* Justice Holmes emphasized that whether a compensable taking has occurred "depends upon the particular facts" and "this is a question of degree—and therefore cannot be disposed of by general propositions." Pa. Coal Co. v. Mahon, 260 U.S. 393, 413, 416 (1922).

2. Nuisance Exception: Eligibility of Regulatory Action

In making the argument that loss of all economically beneficial use of shale property gas rights caused by a regulatory mandate should not be held a taking, the government must provide ample evidence that the taking claimant's land use activities fall within *Lucas's* nuisance exception.

The mere allegation that shale HVHF operations contaminate groundwater used for domestic drinking or livestock watering will not suffice to substantiate a nuisance exception defense to a regulatory taking claim. As a general rule, a common law private or public nuisance must be established by evidence of a risk or probable risk of the occurrence of harm[132] in the form of a substantial and unreasonable interference with the use of another's land[133] or with rights common to the public.[134]

Lucas provides helpful direction as to the type and quantum of evidence a government regulator must tender for a court to reject a takings claim and uphold a challenged regulation as a valid police power initiative:

> [T]o win its case South Carolina must do more than proffer the legislature's declaration that the uses Lucas desires are inconsistent with the public interest, or the conclusory assertion that they violate a common-law maxim such as *sic utere tuo ut alienum non laedas* . . . Instead, as it would be required to do if it sought to restrain Lucas in a common-law action for public nuisance, South Carolina must identify background principles of nuisance and property law that prohibit the uses he now intends in the circumstances in which the property is presently found.[135]

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132. *See* RESTATEMENT (SECOND) OF TORTS § 821F (1979) ("There is liability for a nuisance only to those to whom it causes significant harm, of a kind that would be suffered by a normal person in the community or by property in normal condition and used for a normal purpose").

133. *See id.* § 821D ("A private nuisance is a nontrespassory invasion of another's interest in the private use and enjoyment of land.").

134. *See id.* § 821B(1) ("A public nuisance is an unreasonable interference with a right common to the general public."). *See also id.* § 821B(2) ("Circumstances that may sustain a holding that an interference with a public right is unreasonable include . . . (a) Whether the conduct involves a significant interference with the public health, the public safety, the public peace, the public comfort or the public convenience, or (b) whether the conduct is proscribed by a statute, ordinance or administrative regulation, or (c) whether the conduct is of a continuing nature or has produced a permanent or long-lasting effect, and, as the actor knows or has reason to know, has a significant effect upon the public right.").

135. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1031-32 (1992). *Lucas* looked to the *Restatement (Second) of Torts* to provide guidance regarding the evidence needed to defeat a "total takings" claim via the nuisance exception:

Instead of changing takings law to favor land owners over government regulators, the *Lucas* nuisance exception is best seen as creating an affirmative defense that has been relied upon as the basis for judicial rejection of regulatory takings claims.

Professor Blumm and Lucas Richie explain:

> Rather than heralding in a new era of landowner compensation or government deregulation, *Lucas* instead spawned a surprising rise of categorical defenses to takings claims in which governments can defeat compensation suits without case-specific inquiries into the economic effects and public purposes of regulations. *Lucas* accomplished this by establishing the prerequisite that a claimant must first demonstrate that its property interest was unrestrained by prior restrictions. The decision suggested that those restrictions had to be imposed by common law courts interpreting state nuisance and property law, but *Lucas* has not been interpreted by either the lower courts or the Supreme Court so narrowly.[136]

Pollution of land, water, and air during mineral extraction generally rises to the level of a public or private nuisance. Illustrative is *Machipongo Land and Coal Co. v. Commonwealth*, in which the Pennsylvania Supreme Court reversed a lower court's determination that a state environmental agency's ban on coal mining in a pristine watershed constituted a regulatory taking.[137] The court stressed that while coal mining might not constitute a nuisance *per se*, "experts need not wait until acid mine water flows out of mines in the area to predict

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> The "total taking" inquiry we require today will ordinarily entail (as the application of state nuisance law ordinarily entails) analysis of, among other things, the degree of harm to public lands and resources, or adjacent private property, posed by the claimant's proposed activities, *see, e.g.*, RESTATEMENT (SECOND) OF TORTS §§ 826, 827, the social value of the claimant's activities and their suitability to the locality in question, *see, e.g., id.*, §§ 828(a) and (b), 831, and the relative ease with which the alleged harm can be avoided through measures taken by the claimant and the government (or adjacent private landowners) alike, *see, e.g., id.*, §§ 827(e), 828(c), 830. The fact that a particular use has long been engaged in by similarly situated owners ordinarily imports a lack of any common-law prohibition (though changed circumstances or new knowledge may make what was previously permissible no longer so, *see id.*, § 827, Comment *g*. So also does the fact that other landowners, similarly situated, are permitted to continue the use denied to the claimant.

Id. at 1030-31. Where the facts do not support a total takings claim, judicial application of the Penn Central takings calculus should be substantially more deferential to government regulation that seeks to forestall gas shale activities that may create a public or private nuisance.

136. Michael C. Blumm & Lucas Ritchie, *Lucas's Unlikely Legacy: The Rise of Background Principles as Categorical Takings Defenses*, 29 HARV. ENVTL. L. REV. 321, 322 (2005).

137. Machipongo Land and Coal Co. v. Commonwealth, 799 A.2d 751 (Pa. 2002).

the likely results of mining this land."[138] With a nod to the necessity of preventing harm like water pollution before it starts, the court found it "beyond dispute that the resources needed to correct pollution once it has occurred are far greater than those needed to prevent it."[139]

It is not difficult, then, to appreciate that in cases involving shale gas operations, a government entity might marshal sufficient proof to sustain its evidentiary burden to prove entitlement to the *Lucas* nuisance exception. General observations regarding common law nuisance limits on mineral extraction activities lead the discussion to specific concerns about HVHF shale gas extraction contamination of water resources. HVHF operations that pollute streams or water supplies used by the public exemplify the type of activity that may be banned or enjoined as a public or private nuisance.[140] As mentioned above, one state regulatory agency report has identified specific potential significant adverse impacts of hydraulic fracturing on water resources including harm caused by water withdrawals for HVHF.[141]

Lucas reminds courts that regulation of property uses fall within a government's broad police powers. When adequate evidence supports the assertion that a law or regulation is intended to protect the public from common law nuisance-like activities,[142] a court must recognize the legitimacy of the use of the police power to minimize or prohibit the negative impacts of the activity. Thus, when the government produces

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138. *Id.* at 775.

139. *Id.* The Supreme Court of Pennsylvania observed:

> While the Commonwealth contends that mining would, in addition to destroying the trout population, adversely affecting the use of the stream as a water supply, the nature of the public use of the water should not be the focus of our inquiry. To the contrary, we have explained that "we believe that the public has a sufficient interest in clean streams alone regardless of any specific use thereof . . . [to warrant] injunctive relief." Accordingly, if the Commonwealth is able to show that the Property Owners' proposed use [discharge of coal mine drainage] of the stream would unreasonably interfere with the public right to unpolluted water, the use, as a nuisance, may be prohibited without compensation, *citing*, *Barnes & Tucker I,* 319 A.2d at 882 (preserving the water from acid mine runoff despite the fact that the only use of the water was recreational).

140. Examples of possible sources of HVHF-caused water resource contamination include, "[a]ll phases of natural gas well development, from initial land clearing for access roads, equipment staging areas and well pads, to drilling and fracturing operations, production and final reclamation." Each has "the potential to cause water resource impacts during rain and snow melt events if stormwater is not properly managed." PRDSG-EIS, *supra* note 117, at 10.

141. *See* discussion at footnote 118 *supra*, citing, PRDSG-EIS at 9-10 and Ch. 6.1.

142. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1029 (1992) ("A law or decree with such an effect must, in other words, do no more than duplicate the result that could have been achieved in the courts—by adjacent landowners (or other uniquely affected persons) under the State's law of private nuisance, or by the State under its complementary power to abate nuisances that affect the public generally, or otherwise.").

adequate evidence of the nuisance character of a regulated shale gas extraction activity, a court must deny a regulatory taking claim of a constitutional right of compensation even if the regulation renders shale gas drilling rights worthless.

D. Applying Penn Central Analysis to Shale Gas Takings Claims

In regulatory cases similar to *Penn Central* where less than total economic deprivation has occurred, the application of the *Lucas* background principles nuisance exception is a threshold issue that can be outcome determinative.[143] A finding by the court that the regulation is consistent with background principles ends the inquiry and requires the regulatory taking claim to be rejected. The nuisance exception defense to takings claims allows governments, as Professor Blumm observed, to defeat compensation suits without case-specific inquiries into the economic effects and public purposes of regulations."[144]

The *Penn Central* calculus analyzes the economic impact of the regulation on the claimant, the extent to which the regulation has interfered with distinct investment-backed expectations, and the character of the governmental action. Thus, *Penn Central* comes into play (1) when challenged regulatory action is not a total taking and (2) the regulated land use activity falls outside basic background principles of property and nuisance law. Generally, such regulation would fall in the category of land use or zoning restrictions.

As noted below, in cases where a zoning or other land use regulation limits shale gas extraction activities to certain areas of a community, a court should consider the economic impact of the regulation. Court's should be mindful of the fact that even where the diminution of value of a property right seems extreme, the amount of the diminution is not outcome determinative. For example, in *Palazzolo v. Rhode Island*, the Supreme Court of the United States found a 97%

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143. *See* Blumm & Ritchie, *supra* note 136, in which the authors observe:

> Courts in multiple jurisdictions have determined that *Lucas*'s threshold inquiry applies not only to *Lucas*-style complete economic wipeout takings, but also to physical occupation cases and, more importantly, to *Penn Central*-type regulatory cases where less than total economic deprivation has occurred. Consequently, the first question a court must address in any takings case (whether a *Lucas, Penn Central*, or physical occupation scenario) is whether the property use at issue was in fact one of the sticks in the bundle of rights acquired by the owner. If the contested use was not authorized by the claimant's title at purchase, a court should reject the takings claim at the threshold level.

Id. at 327 (citations omitted).

144. *Id.* at 322.

reduction in value of the taking claimant's land did not result in a regulatory taking.[145]

The second prong of the *Penn Central* test would direct the reviewing court's attention to the distinct investment-backed expectations of those who have a financial interest in shale gas properties. At this seminal stage of shale gas development, it seems evident that investment in shale gas property is speculative—so speculative that some in the industry have raised serious questions about the long-term viability of the new business.[146] Whether the expectations of shale gas property owners bear fruit depends in significant measure upon the identification of short and long-term costs and risks as well as the extent to which government regulation is deemed necessary to protect important public interests. The ultimate value of shale gas property rights can be expected to fluctuate—fueled in part by market speculation.[147]

E. Legislative Prohibition of Shale Gas-Related Operations

1. Land Use Regulation

While such situations will likely be limited, one scenario that could bring the *Lucas per se* "total taking" rule into play is a local government zoning or other land use ordinance barring all natural gas drilling and production activities. Serious concerns about the possible adverse impacts of gas shale production have, in fact, already fueled local legislative action in Pennsylvania and elsewhere.[148] For example, in

145. Palazzolo v. Rhode Island, 533 U.S. 606, 622-23 (2001).

146. *See Insiders Sound Alarm*, *supra* note 23:

> In the e-mails, energy executives, industry lawyers, state geologists and market analysts voice skepticism about lofty forecasts and question whether companies are intentionally, and even illegally, overstating the productivity of their wells and the size of their reserves. Many of these e-mails also suggest a view that is in stark contrast to more bullish public comments made by the industry, in much the same way that insiders have raised doubts about previous financial bubbles.

147. Moreover, courts must be on notice of the potential for property owners to sever shale gas interests by slicing them into smaller and smaller parcels. Such segmentation of real estate ownership provides the opportunity to "game" the system allowing manipulation of property interests to facilitate total takings claims. As Justice Stevens's dissent in *Lucas* predicted, "developers and investors may market specialized estates to take advantage of the Court's new rule." "The smaller the estate," Justice Stevens emphasized, "the more likely that a regulatory change will effect a total taking." *Lucas*, 505 U.S. at 1065.

148. R. Marcus Cady II, *Drilling into the Issues: A Critical Analysis of Urban Drilling's Legal, Environmental, and Regulatory Implications*, 16 TEX. WESLEYAN L. REV. 127 (2009); Timothy Rile, *Wrangling with Urban Wildcatters: Defending Texas*

December 2010, the City Council of Pittsburgh, Pennsylvania enacted an ordinance banning all natural gas drilling and production activities within the city.[149] The City of Buffalo, New York, enacted a similar measure, and other local government bodies are considering like legislative action.[150] The Pittsburgh ordinance appears to conflict with a Commonwealth statute preempting local government regulation of oil and natural gas drilling to the extent it purports to ban such operations anywhere within the city.[151] A more narrowly drawn ordinance would likely avoid the preemption pitfall.[152]

Municipal Oil and Gas Development Ordinances Against Regulatory Takings Challenges, 32 VT. L. REV. 349 (2007).

149. PITTSBURGH, PA., CODE § 618 (2010). The Ordinance expresses the legislative intent of the City Council:

> The City Council of Pittsburgh finds that the commercial extraction of natural gas in the urban environment of Pittsburgh poses a significant threat to the health, safety, and welfare of residents and neighborhoods within the City. Moreover, widespread environmental and human health impacts have resulted from commercial gas extraction in other areas. Regulating the activity of commercial gas extraction automatically means allowing commercial gas extraction to occur within the City, thus allowing the deposition of toxins into the air, soil, water, environment, and the bodies of residents within our City.... The City Council recognizes that environmental and economic sustainability cannot be achieved if the rights of municipal majorities are routinely overridden by corporate minorities claiming certain legal powers.

The text of the ordinance is available at http://pittsburgh.legistar.com/Legislation Detail.aspx?ID=766814&GUID=3306C0FD.

150. *See Buffalo Council Votes to Ban 'Hydrofracking'*, BUFFALONEWS.COM, (Feb. 9, 2011), http://www.buffalonews.com/wire-feeds/state/article336970.ece. The City of Buffalo ordinance is available at http://ia600403.us.archive.org/10/items/BuffaloNatural GasExtractionProhibition/OrdAmendGasExtraction-11-0208_text.pdf.

151. 58 PA. CONS. STAT. ANN. § 601.602 (West 2010). *See* Huntley & Huntley, Inc. v. Borough Council of Oakmont, 964 A.2d 855, 865-69 (Pa. 2009) (holding zoning ordinances preempted to the extent that they either "contain provisions which impose conditions, requirements or limitations on the same features of oil and gas well operations "regulated by" the Act, or "accomplish the same purposes as set forth in" the Act.). Borough's zoning restriction of "extraction of minerals" to certain residential districts was permissible and not preempted, but the municipality too narrowly interpreted the zoning ordinance definition of "extraction of minerals" to exclude oil and gas drilling and extraction from approved conditional uses. *Huntley & Huntley, Inc.* involved conventional natural gas drilling and not Marcellus Shale gas production. *See* Reeder, *supra* note 6, at 1015-20; John M. Smith, *The Prodigal Son Returns: Oil and Gas Drillers Return to Pennsylvania with a Vengeance are Municipalities Prepared?* 49 DUQ. L. REV. 1, 30-33 (2011) (discussing municipal zoning rights in Pennsylvania and regulatory takings in context of Marcellus shale drilling). Other states have also enacted statutes preempting municipal regulation of oil and gas extraction activities to the extent that they conflict with State regulation. *See, e.g.*, N.Y. ENVTL. CONSERV. LAW § 23-0303(2) (McKinney 2010).

152. *See* Range Res. v. Salem Twp., 964 A.2d 86, 872 (Pa. 2009) ("the [Oil and Gas] Act's preemptive scope is not total in the sense that it does not prohibit municipalities from enacting traditional zoning regulations that identify which uses are permitted in

As indicated above, facial *Lucas* challenges alleging a total taking by ordinances flatly banning shale gas drilling and production would be problematic if the law is based upon a legislative finding that gas drilling and production in urban areas present unacceptable health and/or environmental risks akin to traditional common law nuisances. For well over a century the Court has reiterated that the State's police power to protect public health and safety and advance the general public interest is broad indeed. "Long ago it was recognized that 'all property in this country is held under the implied obligation that the owner's use of it shall not be injurious to the community,' and the Takings Clause did not transform that principle to one that requires compensation whenever the State asserts its power to enforce it."[153]

Banning noxious industrial uses from a highly urbanized city area would seem to fit within *Lucas's* "nuisance exception" to its total taking rule. A municipal ordinance banning shale gas extraction and production does not appear inconsistent with centuries of common law public nuisance restrictions on otherwise legal activities that are undertaken in the wrong place—"a pig in a parlor rather than in the barnyard"—or are otherwise considered "noxious uses."[154]

Certainly if an urban, suburban, or rural legislative body were willing to eschew flat prohibitions for more focused ordinances limiting shale gas to areas away from residential and other populated areas, they should find judicial review more deferential. For example, in *Penneco Oil Co. v. County of Fayette*, the Pennsylvania Commonwealth Court held that a traditional county zoning ordinance was not preempted by the Pennsylvania Oil and Gas Act:

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different areas of the locality, even if such regulations preclude oil and gas drilling in certain zones.").

153. Keystone Bituminous Coal Ass'n v. DeBenedictis, 480 U.S. 470, 491-92 (1987) (citing Mugler v. Kansas, 123 U.S. 623, 664-65 (1887)). In *Keystone*, the Court upheld a Pennsylvania law much like the one declared a regulatory taking in *Pennsylvania Coal v. Mahon*. For an analysis and discussion of the two statutes and the Court's disparate treatment of them, see *Bundled Rights*, *supra* note 92, at 26-30. It has been asserted:

> *Keystone* "is arguably the broadest articulation of the traditional nuisance exception. While denying a takings challenge to certain mining restrictions that protected against subsidence, the *Keystone* majority announced that government action designed to prevent serious harm does not effect a taking, even where it destroys property value. The Court concluded that regulations designed to prevent public harms were immune from Fifth Amendment liability because "no individual has a right to use his property to create a nuisance or otherwise harm others."

Blumm & Ritchie, *supra* note 136, at 331 (citing *Keystone*, 480 U.S. at 491-92).

154. *See* Vill. of Euclid v. Ambler Realty Co., 272 U.S. 365, 388 (1926) ("A nuisance may be merely a right thing in the wrong place, like a pig in the parlor instead of the barnyard.").

> [W]hile there may be some overlap between the goals of Fayette County's Zoning Ordinance and the purposes set forth in the Act, the most salient objectives underlying restrictions on oil and gas drilling in certain zoning districts appears in Fayette County to be those pertaining to preserving the character of residential neighborhoods, as well as each zoning district, and encouraging beneficial and compatible land uses. As such, the limited provisions of the Zoning Ordinance governing oil and gas wells in Fayette County do not accomplish the same purposes as set forth in Section 102 of the Act, 58 P.S. § 601.102 . . . traditional purposes of zoning are distinct from the purposes set forth in the Act . . . the provisions of the Zoning Ordinance do not reflect an attempt by Fayette County to enact a comprehensive regulatory scheme relative to the oil and gas development within the county but instead reflect traditional zoning regulations that identify which uses are permitted in different areas of the locality. The Zoning Ordinance, on its face, is clearly a zoning ordinance of general applicability. . . .[155]

As the Supreme Court of the United States has observed, "many enterprises cause undesirable externalities . . . [f]actories, for example, may cause pollution, so a city may seek to reduce the cost of that externality by restricting factories to areas far from residential neighborhoods."[156] For example, in Texas, a state closely associated for more than a century with large-scale oil and natural gas production, mineral extractive industries have long been subject to state and local government regulations and land use restrictions.[157] In particular, local well spacing, zoning restrictions, and other provisions designed to protect the safety and welfare of the general public have consistently been upheld as a valid exercise of state and local government police powers.

Thus, there is little doubt that a landowner or mineral estate lessee should have actual or constructive knowledge that drilling wells and producing oil and gas within populated communities likely entails compliance with strict regulatory requirements. Or, perhaps more importantly, even if such local laws are not on the books at the time the

155. Penneco Oil Co, v. County of Fayette, 4 A.3d 722, 732-33 (Pa. Commw. Ct. 2010). Two suits have been filed in New York trial courts seeking to enjoin, on preemption grounds, local zoning regulations that purport to prohibit oil and gas drilling. *See* Anschutz Exploration Corp. v. City of Dryden, No. ___, (Sup. Ct. N.Y., Tompkins County, NY, filed September 16, 2011). The complaint is available at http://drydensec.org/sites/default/files/AnschutzComplaint.pdf. *See also* Cooperstown Holstein Corp. v. Town of Middlefield, No. __, (Sup. Ct. N.Y., Ostego County, NY, September 15, 2011). The complaint is available at http://media.syracuse.com/news/other/Middlefield%20Complaint%20-091511.pdf.

156. City of Los Angeles v. Alameda Books, Inc., 535 U.S. 425, 446-47 (2002).

157. Timothy Rile, *supra* note 148, at 396-97.

mineral interest ripened, there still is a reasonable and foreseeable expectation that such regulations could be promulgated in the future.

However, it is possible that an "as applied" takings challenge to a local land use ordinance might, in limited circumstances, have some chance of success. The shale gas owner in such a case might allege that it could not tap shale gas because the ordinance's prohibition rendered the property without any economic value. But, in highly developed urban areas there are few "right places" to position shale gas wells with attendant intense activities including trucking, use and storage of huge amounts of water and chemicals, and potential operational risks such as explosions and toxic air emissions. Certainly shale gas extraction could be excluded from all residential areas as well as most commercial areas. Moreover, the very recent emergence of the ability to cost-effectively extract gas and the speculative nature of those plans to drill wells in urban areas likely will have to surmount both the *Lucas* nuisance exception and the *Penn Central* "distinct investment-backed expectation" analysis.

Drilling and production of shale gas might be possible in a few highly industrialized areas of a city if the risks could be minimized to a level generally thought acceptable for such areas. Even in such circumstances, the gas owner's takings claim would not be viable if the natural gas production activities could be shown to constitute a common law public or private nuisance—based upon "restrictions that background principles of the State's law of property and nuisance already place upon land ownership."[158] However, as Justice Scalia put it in *Lucas*:

> A law or decree with such an effect must . . . do no more than duplicate the result that could have been achieved in the courts-by adjacent landowners (or other uniquely affected persons) under the State's law of private nuisance, or by the State under its complementary power to abate nuisances that affect the public generally. . . ."[159]

In sum, the *Lucas* total taking rule applies only "when . . . a regulation that declares 'off-limits' all economically productive or beneficial uses of land goes beyond what the relevant background

158. Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1030 (1992). The *Lucas* "total taking inquiry" also requires "analysis of, among other things, the degree of harm to public lands and resources, or adjacent private property, posed by the claimant's proposed activities . . . and their suitability to the locality in question . . . and the relative ease with which the alleged harm could be avoided through measures taken by the claimant and the government (or adjacent private land owners) alike. . . ." *Id.* at 1030-31 (citations omitted).

159. *Id.* at 1029 (emphasis supplied).

principles would dictate. . . ."[160] It is probable that even a flat legislative ban of drilling and gas production in urban areas might withstand a *Lucas* total takings attack. That said, it is also important to emphasize that total bans or other forms of regulation of shale gas extraction and production might be challenged as takings under the *ad hoc Penn Central* analysis.

2. Buffer Zones Protection of Water Resources

A similar issue in the same vein as land use regulation of shale gas activities relates to the scope of government power to prohibit shale gas hydraulic fracturing within a defined geographic "buffer zone" as a means of protecting public drinking water supplies from contamination or diminution. Such regulation is being considered in New York State, and a municipal ordinance in West Virginia banned shale gas HVHF upstream from a municipal water supply source.[161]

In New York, a draft environmental impact statement indicates that the State's Department of Environmental Conservation ("NYDEC") is seriously considering the "buffer zone" approach as a means to protect public drinking water supplies from the potential adverse consequences of HVHF operations. Areas proposed as off-limits for surface drilling for shale gas using HVHF methods include:

> [T]he watersheds associated with unfiltered water supplied to the New York City and Syracuse areas pursuant to Filtration Avoidance Determinations issued by the U.S. Environmental Protection Agency ("EPA"), reforestation areas, wildlife management areas, state parks, and "primary" aquifers as defined by State regulations, and additional setback and buffer areas. Forest Preserve land in the Adirondacks and Catskills is already off-limits to natural gas development pursuant to the New York State Constitution.[162]

160. *Id.* at 1030.

161. *See* PRDSG-EIS, *supra* note 117, at 2.

162. *See* MORGANTOWN, W. VA. BUS. & TAX CODE art. 721 (2011). The Morgantown ordinance identifies specific potential harms alleged to be a consequence of hydraulic fracturing and declares the activity to be a public nuisance:

> It is hereby found and determined that the horizontal drilling for oil and gas with fracturing or fracking methods in oil and gas drilling operations are activities which adversely impact the environment, interfere with the rights of citizens in the enjoyment of their property, and have the potential for adversely affecting the health, well being and safety of persons living and working in and around areas where such horizontal drilling with fracturing or fracking drilling operations exist. Accordingly, it is found that horizontal drilling of oil and gas wells with fracturing or fracking in oil and gas well operations if performed within this municipality or within one mile of the City of Morgantown constitutes a public nuisance. It is also found and determined that the processes

The New York buffer zone rule clearly implicates regulatory takings rules. To the extent that a governmental entity can support a buffer zone rule with evidence of the potential to contaminate a public water supply, it stands on firm ground in resisting a regulatory takings challenge. Such regulation would likely be held to be a valid exercise of the police power—even if the possessor of shale gas rights cannot exploit its mineral property diminishing the shale gas interest to zero.

Although use of HVHF to produce shale gas may not rise to the level of a *per se* common law public nuisance activity, polluting public drinking water should qualify as a *per se* nuisance.[163] Generally, background principles of state nuisance and property law allow an exercise of the police power to protect important public interests from activities that may harm them, notwithstanding that limiting or even prohibiting the potentially harmful activity causes substantial monetary loss or even an economic wipeout. *Lucas* makes this point clear when it suggests two hypotheticals:

> [T]he owner of a lake-bed, for example, would not be entitled to compensation when he is denied the requisite permit to engage in a landfilling operation that would have the effect of flooding others'

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known as horizontal drilling with fracturing or fracking have an increased level of potential harm which includes, but may not be limited to, contamination of ground water and hazards associated with the storage, treatment and transportation of the water or other liquid after being used in the process of horizontal drilling with fracturing or fracking. These potential hazards associated with horizontal drilling with fracturing or fracking may impact the citizens, drinking water, and property within the City of Morgantown, even though the horizontal drilling with fracturing or fracking activity may take place outside the corporate limits of the City.

A civil action was filed in a state trial court by a shale gas drilling company seeking injunctive and declaratory relief and alleging, *inter alia*, that the ordinance is preempted by state oil and gas regulatory law and constitutes a regulatory taking. The complaint sought compensation for the taking. *See* Ne. Natural Energy L.L.C. v. City of Morgantown, CA No. 11-C-411 (Cir. Ct. of Monongalia County, WV, Aug. 12, 2011). The complaint is available at http://marcellusdrilling.com/2011/06/driller-sues-morgantown-wv-over-fracking-ban-monongalia-county-considers-suing-the-city-too/. The trial court ruled that the city ordinance was preempted by the West Virginia Oil and Gas law regulating drilling and production of those substances. *See id.* (granting Northeast's Motion for Summary Judgment and concluding that the City ordinance was invalid because it was preempted by state legislation regulating oil and gas drilling). The trial Court concluded that the state legislature intended to give the West Virginia Department of Environmental Protection exclusive regulatory control of all oil and gas drilling operations within the state including operations requiring sub-surface fracking of shale gas zones. The opinion is available at http://www.mitchellwilliamslaw.com/wpcontent/files_flutter/13149889459-2attach3.pdf

163. *See, e.g.*, Machipongo Land and Coal Co. v. Commonwealth, 799 A.2d 751, 774 (Pa. 2002) ("although mining is not a nuisance *per se*, pollution of public waterways is. The key to protecting our water is to prevent pollution from occurring.").

> land. Nor the corporate owner of a nuclear generating plant, when it is directed to remove all improvements from its land upon discovery that the plant sits astride an earthquake fault.[164]

"Such regulatory action," *Lucas* instructs, "may well have the effect of eliminating the land's only economically productive use, but it does not proscribe a productive use that was previously permissible under relevant property and nuisance principles."[165]

In essence, the *Lucas* nuisance exception focused on *activities* that harm important public interests. Activities that cause such harm may be regulated, limited, or banned pursuant to the police power. In *Lucas*, the South Carolina Coastal Management Act proscribed construction of a residential dwelling on land owned in fee simple. The activity of constructing a single family residence certainly has never been subject to being enjoined or banned by government under established principles of state property and nuisance law. However, profit making activities on or under land that harm neighbors or important public interests have for centuries been subject to restriction or prohibition under such principles.

Obvious examples of clearly valid nuisance restrictions are those restricting or banning the keeping of a house of ill-repute, a pigsty, and land uses that cause excessive noise, air, or water pollution.[166] As *Lucas* emphasizes, "[t]he use of these properties for what are now expressly prohibited purposes was *always* unlawful, and . . . it was open to the State at any point to make the implication of those background principles of nuisance and property law explicit.[167] In the context of buffer zones that may limit HVHF or other shale gas operations to protect the public interest in clean streams and potable water, there is no question that background principles of property and nuisance law allow such legislative prohibitions.

F. Public Parkland

Perhaps the most likely scenario for a successful *Lucas* takings claim would be where shale gas extraction is prohibited in order to protect government-owned parkland. Where shale gas ownership has been severed from a fee simple estate and the surface parkland is owned by a government entity, the total takings issue would be presented. Recent West Virginia and Pennsylvania cases involving conventional vertical gas drilling into privately owned (non-shale) gas reserves from

164. *Lucas*, 505 U.S. at 1029.
165. *Id.* at 1029-30.
166. For other examples, see RESTATEMENT (SECOND) OF TORTS § 821B, cmt. c.
167. *Id.*

government-owned surface parkland raised the takings issue.[168] In each case however, the State Supreme Court resolved the case on established oil and gas property law or statutory interpretation grounds rather than adjudicate the constitutional takings claims.

The prohibition of shale gas extraction from under public parkland allows a glimpse of the best-case scenario for a successful, albeit not assured, *Lucas* total takings claim. The argument for a total taking is at its zenith when government regulation totally devalues real property to enhance the aesthetic and/or recreational value of government-owned public parkland. In *Lucas*, the Court found affirmative support for:

> [A] compensation requirement, [in] the fact that regulations that leave the owner of land without economically beneficial or productive options for its use—typically . . . by requiring land to be left substantially in its natural state—carry with them a heightened risk that private property is being pressed into some form of public service under the guise of mitigating serious public harm.[169]

Lucas emphasized that there are many state and federal statutes that provide for condemnation of land to impose servitudes or acquire title to lands and that such laws "suggest the practical equivalence in this setting of negative regulation and appropriation."[170] The *Lucas* Court concluded that "there are good reasons for our frequently expressed belief that when the owner of real property has been called upon to sacrifice *all*

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168. *See* Cabot Oil & Gas Corp. v. Huffman, 705 S.E.2d 806 (W. Va. 2010); Belden & Blake Corp. v. Dept. of Conservation & Natural Res., 969 A.2d 528 (2009). *See also* Minard Run Oil Co. v. U.S. Forest Serv., Nos. 10-1265 and 10-2332, slip op. at 27-28 (3d Cir. Sept. 20, 2011) ("we are reluctant to construe the Weeks Act in a manner raising difficult constitutional takings questions absent a clear indication of congressional intent"). In *Minard Run*, the Third Circuit avoided the regulatory taking issue. It ruled that federal laws governing mineral property in-holdings within boundaries of a National Forest did not authorize the agency administering the forest (the United States Forest Service) to impose additional environmental regulatory requirements upon natural gas extraction activities of mineral rights owners.

169. *Lucas*, 505 U.S. at 1018 (citing Annicelli v. S. Kingstown, 463 A.2d 133, 140-41 (R.I. 1983) (prohibition on construction adjacent to beach justified on twin grounds of safety and "conservation of open space"); Morris County Land Improvement Co. v. Parsippany-Troy Hills Twp., 193 A.2d 232, 240 (N.J. 1963) (prohibition on filling marshlands imposed in order to preserve region as water detention basin and create wildlife refuge)).

170. *Lucas*, 505 U.S. at 1018-19. The Court also quoted Justice Brennan's observation in *San Diego Gas & Elec. Co.* that "[f]rom the government's point of view, the benefits flowing to the public from preservation of open space through regulation may be equally great as from creating a wildlife refuge through formal condemnation or increasing electricity production through a dam project that floods private property." *Id.* (quoting San Diego Gas & Elec. Co., v. City of San Diego 450 U.S. 621, 652 (1981) (dissenting opinion)).

economically beneficial uses in the name of the common good, that is, to leave his property economically idle, he has suffered a taking."[171]

Notwithstanding the admonition in *Lucas* that close scrutiny be given to allegations of total takings of all economically beneficial value of property, its *per se* takings rules require additional analysis before a court may conclude compensation is due. The *Lucas* nuisance exception presents a serious obstacle for the shale gas developer in such circumstances. Even when the total takings argument is strongest, it may be defeated by a showing that regulation of shale gas drilling and related activities would be consistent with background principles of property and nuisance law.

VII. CONCLUSION

Three decades ago Justice Brennan referred to the Court's search for a clear regulatory takings rule as the "lawyer's equivalent of the physicist's search for the quark."[172] Today, thirty years later, legal scholars, lawyers and judges are still perplexed by regulatory takings issues.[173] Perplexed or not, regulatory takings questions will most certainly arise as energy companies seek to tap the underground reserves of the nation's shale gas basins.

The shale gas boom provides a fascinating context for a debate over the contours of constitutional protection afforded private property. Owners, lessors, and production companies will inevitably clash with homeowners and communities concerned that shale gas development will lead to environmental degradation and/or boom-bust-cycle economic decline. The power of government to regulate extraction of the new energy resource will be debated in Legislatures and litigated in the courts. "Protection of private property rights" will take on a significantly different meaning in this context where one powerful group of private property owners is pitted against another.

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171. *Id.* at 1019.

172. Williamson County Reg'l Planning Comm'n v. Hamilton Bank, 473 U.S. 172, 199 (1985); San Diego Gas & Elec. Co. v. City of San Diego, 450 U.S. 621, 650 (1981) (Brennan, J., dissenting) ("The attempt to determine when regulation goes so far that it becomes, literally or figuratively, a 'taking' has been called the 'lawyer's equivalent of the physicist's hunt for the quark.'")

173. *See, e.g.*, Robert H. Thomas, Mark M. Murakami, Tred R. Eyerly, *Of Woodchucks and Prune Yards: A View of Judicial Takings from the Trenches*, 35 VT. L. REV. 437 (2010) ("Eighty-four years after the Supreme Court acknowledged that an exercise of governmental authority other than the eminent domain power could be a taking, it appears the search for what might fit the bill has devolved from 'the lawyer's equivalent of the physicist's hunt for the quark' to the riddle of a nursery rhyme.") (citations omitted).

Setting aside the difficulty in articulating a generally applicable regulatory taking rule, it is apparent that the Constitution recognizes the right, indeed the duty, of government to protect important public interests as well as private property rights from activities that may cause harm. In this context, the Supreme Court's recognition of the overarching importance of common law nuisance principles in resolving regulatory takings claims is not surprising. As Professor Freyfogel has succinctly observed:

> Far from being a land-use constraint arising out of the public sphere, nuisance law (that is, the sic utere tuo principle) is the very essence of what it means to own. It is the rule that gives a landowner the key entitlement to private property: the right to complain about interferences with one's use and enjoyment. It is chiefly a source of property rights, not a limit on them.[174]

Thus, Courts faced with takings claims arising from shale gas extraction regulation must be mindful not only of the property rights of mineral owners but of their neighbors and the public as well.

As discussed above, regulatory takings jurisprudence applied in accord with precedent will resolve most shale gas takings claims. Where shale gas rights are a strand of the broader bundle of rights inuring in real property, it will be difficult for one to prevail on a regulatory takings claim.

When the takings claimant owns only the shale gas and the right to extract and sell it, a *Lucas* "total taking" claim would lie. *Lucas* recognizes, however, that if the government regulation at issue is based upon "background principles of nuisance and property law" independently restricting the shale gas owner's extraction, no compensable taking occurs. *Lucas* teaches that this is true even where application of a regulation has reduced the value of shale gas rights to zero.

Where the claim is that less than a total taking has occurred by virtue of a regulation based on land use concerns, rather than using common law nuisance principles, courts should look to the *Penn Central* calculus to resolve the dispute, including an analysis of the reasonable investment-backed expectations of the takings claimant.

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174. Freyfogel, *supra* note 26, at 98. The maxim, "sic utere tuo ut alienum non laedas" refers to the Latin phrase used by courts to describe the correlative rights of neighboring property owners and the public. It means simply "use your own property in such manner as not to injure that of another." The Supreme Court first mentions the term in the context of a discussion of common law nuisance in *Munn v. Illinois*, 94 U.S. 113, 124-25 (1876).

Many view shale gas as having the potential to provide an important bridge to our country's energy future. The promise of jobs and economic growth attendant shale gas expansion comes at a crucial time as the nation struggles with myriad problems. The development of this vast resource must move forward in a manner that protects the natural environment with appropriate respect for the protection of the private property rights of all concerned. Only then will the full potential of shale gas be realized.