INTRODUCTION

This chapter provides an overview of the structure of the industry for oil and gas shale exploration and development in the United States. Specifically, it outlines how companies are organized during the exploration and production phase and how contractual relationships among operators and oilfield service companies are structured and how they have changed. This chapter also discusses industry best practices in anticipating and preventing accidents in high-risk technologies, including industry-proposed collaboration with stakeholders for baseline scientific research, model disclosure statutes, and regulatory oversight. Although this chapter does not address recent tort cases, it references related articles.1 For a technical overview of the process of exploration, drilling, and bringing a well online, see chapter 1.

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WHAT COMPRISSES THE SHALE OIL AND GAS INDUSTRY?

Far from being monolithic, this industry is comprised of oil and gas companies that range from some of the largest companies in the world—both privately and publicly held—to small players active in one region of the United States. In addition to these “operators,” which are essentially companies responsible for oilfield management and day-to-day operation, there are manifold companies providing services of all types, from specialized downhole operations to logistics and trucking. Bringing such a diverse set of companies together on a given well pad necessitates establishing some key operational and contractual relationships, including agency and insurance, to address responsibility, risk, and liability.

What is known as the U.S. “oil and shale gas industry” actually includes entities active in each of three sectors: upstream, midstream, and downstream. The upstream sector, also known as exploration and production (E&P), includes entities engaged in one or more of the following activities: finding, developing, or producing oil or gas. The midstream sector encompasses activities related to processing, transportation, storage, and marketing of both raw hydrocarbons and refined products. Downstream sector activities include refining and processing as well as marketing and distribution. Some companies may have investments or operations in more than one sector. The figure below provides an overview of the activities necessary to bring oil and gas products from underground deposits to consumers and how the activities are structured. As this diagram indicates, there is some overlap in function among the three sectors.

Operators

Oil and gas companies are probably the best-known component of the E&P sector. Also known as “operators,” they decide where to drill; specify well depth, diameter, and direction; obtain drilling permits; and secure the right to access the well site.2

To access the hydrocarbon reserves, operators usually lease the mineral rights from landowners. For a more extended treatment of mineral estate and surface access and other issues involved in leasing, see chapter 3.

Among operators, there is a basic distinction between “fully integrated” companies, which are active in all three sectors, and
“independent producers”, which typically are active in the upstream and midstream sectors but do not have refining capacity. Fully integrated companies include the so-called oil majors, such as ExxonMobil, BP, ChevronTexaco, and Shell Oil. These companies—some of the largest in the world—are engaged in all aspects of the oil industry, from E&P to refining and marketing of refined products. Independent producers explore and/or produce crude oil and natural gas, and they may also own pipeline infrastructure or otherwise be active in the midstream sector. These include companies like Devon Energy, Anadarko, Apache Corporation, Range Resources, Southwestern Energy, Chesapeake Energy, and some 8,000 other entities varying in number of employees from a handful to thousands.

Many fully integrated and independent producers also have midstream operations in the areas where they have extensive shale oil and gas E&P operations. However, these entities, including most independent producers, may also rely on some third-party midstream operators in many of the shale oil and gas plays. This is particularly true in regions with new plays that lack gathering and transmission infrastructure, or where the pipeline and processing infrastructure requires upgrades to handle the increased pressures associated with unconventional wells and to carry liquids.
There is not a direct correlation between the size of an operator and the number of sectors in which it operates. A common way to measure the size of operators is natural gas produced per day. In the third quarter of 2012, both fully integrated and independent companies were listed among the top 10 producers of natural gas in the United States. ExxonMobil topped this list with 3,847 MMcf/day produced and was followed by independent Chesapeake Energy with 3,095 MMcf/day. Hess Corporation, a large integrated company, ranked near the bottom with daily production of 112 MMcf.4

**Private vs. Nationally Controlled Oil Companies**

Not all companies operating in U.S. plays of unconventional hydrocarbons are U.S. companies. In addition, it is also important to distinguish between privately held operators and those that are state-owned. To varying degrees, government-controlled national oil companies (NOC) like PDVSA, Venezuela's state oil company, operate with state-mandated, non-market objectives, such as wealth re-distribution and jobs creation. This is in contrast to the private international oil companies (IOC), which are responsive to shareholders. A further distinction between many IOCs and NOCs is that the degree of vertical integration among NOCs is typically lower, though it appears to be growing. Much like their counterparts in the private sector, some state-controlled oil companies have refining and sales operations, which oil companies—especially IOCs—have long used to capture the value-added of downstream products, create demand security, and hedge risk in volatile, changing oil markets. Other NOCs are less integrated and have activities concentrated primarily in the upstream sector.5 In contrast, IOCs appear to be concentrating on the more profitable upstream sector. An example of this trend is a steady decrease of retail sales (e.g., gasoline at gas stations) as a percentage of total sales of U.S. refiners.6

Some large NOCs also are conducting business in the United States as operators. In some instances, they have taken positions in U.S. unconventional plays to replace declining reserves at home.7 Foreign investment in U.S. shale gas plays—whether by NOCs or other private investors—has generally increased. Since 2008, there have been at least 21 joint ventures between U.S. acreage holders or operators and foreign companies.8 For example, Statoil, which is majority-controlled by the Norwegian government, has become an
active operator in several U.S. unconventional plays, including the Marcellus, Eagle Ford, and Bakken formations. Chinese oil companies, many of which are now stock corporations whose assets remain majority-controlled by the central government, also have a significant presence in U.S. shale plays. Since 2010, there have been several joint ventures between U.S. operators and Chinese firms. These deals allow U.S. companies to access capital while Chinese and other foreign firms benefit from exposure to unconventional drilling technology. Some transactions have involved purchase of drilling rights as well. For example, Sinopec recently purchased from Chesapeake Energy rights to drill in Oklahoma, and state-owned China National Petroleum Corp. (Cnooc), China’s largest oil company, has purchased Canadian company Nexen Inc.

The Cnooc-Nexen deal is instructive in terms of the degree of control U.S. regulators exercise over access to mineral resources: Cnooc was blocked from access to Nexen’s Gulf of Mexico operations in U.S. waters. Indeed, legislation passed in the wake of a controversial attempt by a company ultimately owned by the United Arab Emirates to acquire operating leases to six major U.S. ports led to a broadening of oversight of “major energy assets.” This has caused increased scrutiny for transactions involving U.S. energy resources.

Oilfield Services Companies

The E&P sector also includes oilfield services companies (OFS)—the “unsung workhorses” of the oil and gas industry. Entities providing a very wide range of services constitute OFS. While they were much smaller in the 1980s when operators performed more of their own drilling work, OFS have since grown as operators have outsourced a number of these functions. Recent growth has been driven by both higher oil and gas prices and investment in new technology (e.g., 4D seismic and directional drilling).

The activities of OFS companies can be divided into at least three categories: manufacturing and supply of drilling equipment and materials; owning and leasing of drilling equipment; and carrying out tasks associated with finding and extracting oil and natural gas. Some analysts also include seismic and oil/gasfield analysis as a fourth category. Drilling companies provide equipment (e.g., a drill rig), personnel, and expertise to drill the well according to specifications provided by well operators. These entities can be large companies
with global operations and many rigs, subsidiaries of the oil companies operating gas wells, or small companies with a few rigs and operations limited to one play.

OFS also includes a host of companies of all sizes that provide various services, such as pipe and equipment suppliers; trucking firms; sand, chemical and drilling additive producers; general construction and excavation contractors; water and waste water hauling, treating, and disposal firms; consulting engineers, geologists, land surveyors, landmen and right-of-way agents; tubing and downhole equipment manufacturers; well testing and completion entities; drilling mud engineers; and a multitude of other enterprises.

Some OFS companies that provide an array of sophisticated technologies, services, and other products to support well drilling and completion are, by some measures, larger than the oil companies they serve. For example, the market capitalization of Schlumberger, at $91 billion, exceeds that of Statoil and Conoco-Philips by over 20 percent. One thing that differentiates the largest OFS companies, such as Schlumberger, Halliburton, and Baker Hughes, from operators is that OFS companies spend higher percentages of revenue on research and development.16

Putting It Together

The process of drilling a well can involve a complex relationship between an operator, OFS companies, and companies involved in the midstream sector. With some exceptions, operators do not own drilling equipment but perform management and interpretive functions, such as using geophysical data provided by OFS companies to locate drilling activities.17 Typically, once the location of a well is determined, the principal contractual relationship during the drilling phase is between an operator, which has the legal right to drill in a particular place, and a drilling contractor, which supplies the drill rig and labor.18 Under this standard model, the operator is responsible for well designs and supervision of well construction activities, and the drilling contractor is responsible for implementing this design. Yet operators, as well as drilling contractors in turn, can utilize many sub-contractors to perform a range of functions.19 Thus, a number of additional OFS companies become third parties providing a variety of essential services, such as site preparation, equipment supply, logging and testing, well completion, well servicing, etc.
Due in part to the intensity of drilling and completion activity involved with the development of shale hydrocarbon resources and in part to a long-term trend in which operators contract more “noncore activities” to the service sector, the contractual terms and requirements insisted upon by many operators for OFS services have recently undergone rapid change so that the drilling and completion more resembles a continuous manufacturing setting compared to the more or less “one off” deal terms of the past. What is broadly changing is a move toward the packaging of services within incentive-based relationships focused on “the well” as a product and a move away from proliferating individual contracts that sometimes placed the interests of operators and OFS at odds.

A good example of this is the integrated services drilling process model used by Schlumberger. In traditional drilling processes, operators might supervise, coordinate, and manage many discrete tasks. For instance, during well construction, tasks treated separately might include directional drilling, cementing, and testing functions—sometimes under individual contracts. Each task would be treated separately, and each contractor would have a narrowly defined scope of work. Operators, responsible largely for well design, would be required to supervise the implementation program.

Under integration, defined as “the packaging of various services or products under a single contract,” these tasks are grouped, or “bundled,” as an integrated drilling services contract, potentially involving several OFS company product lines as well as third-party contracts. Separate integrated contracts might then be issued for other bundled services under the broader heading of “well construction.” These could include drilling rig operations (e.g., logistics and casing running) and data acquisition (e.g., geophysical data, drilling reports, and completion drawings). Among the variables influencing how these relationships will play out are the size of the operator, the extent of an operator’s presence in a particular play, the specific geologic conditions, and any changes in well conditions.

Market conditions for supply of OFS are also important. For example, a scarcity of available OFS providers, along with the dynamic changes in downhole equipment and diagnostic technologies, can mean rapid evolution of relationships between operators and suppliers. In some cases, this has resulted in the use, in long-term contracts between operators and rig contractors, of rates indexed to commodity and labor prices, thus maintaining a degree of certainty for both parties and allowing each to share in market pricing risks.
Market conditions may also have an impact on the availability of skilled OFS providers. These in turn may be a factor in the incidence of accidents or system failures, such as blowouts or cement casing failures.26

**Cross-Indemnification and Risk Apportionment**

In the oil and gas industry, the contractual relationships commonly governing these multiple interlocking operations are “relatively uniform in how the risks are allocated.”27 Under contracts known as “knock-for-knock” indemnities, or KK indemnities, parties (e.g., operators and drilling contractors) indemnify each other for claims arising out of death or personal injury of their personnel, loss or damage to their property, and pollution emanating from their property—regardless whether any negligence, breach of contract, or violation of statutory duty exists.

In addition, so-called pass-through indemnification may extend these indemnities to cover members of a named party’s group—subcontractors and third parties, for example—whether named in the agreement or not. Although there may be no privity of contract between the operator, including its agents and assigns, and the landowners or mineral rights owners (“landowners”) who granted exploration and development rights to the operator, some leases now provide such indemnifications to landowners. See, for example, this model lease language from the state of Ohio:

**Indemnity:**

Lessee agrees to defend, indemnify, and hold harmless Lessor and Lessor’s heirs, successors, representatives, agents, and assigns (“Indemnitees”), from and against any and all claims, demands, and causes of action for injury (including death) or damage to persons, property and/or natural resources and fines or penalties, or environmental matters arising out of, incidental to, or resulting from the operations of or for Lessee or Lessee’s servants, agents, employees, guests, licensees, invitees, or independent contractors, and from and against all costs and expenses incurred by Indemnitees by reason of any such claim or claims, including attorneys’ fees; and each assignee of Lessee of this Lease, or an interest therein, agrees to indemnify and hold harmless Indemnitees in the same manner provided above. Such indemnity shall apply to any claim arising out of operations conducted under or pursuant to this Lease, however caused.28
Although indemnification clauses in leases are increasingly common, absent such provisions the landowners may be limited to compensation provided by tort law.

The justification for widespread use of KK indemnities in the oil and gas industry rests on the following conditions: the difficulty of proving fault where complex, inherently hazardous operations are taking place; the complex structure of relationships and numerous parties involved in developing any single well; and the possibility that contractors and third parties would each require insurance for the manifold potential risks due to exposure created by these many relationships.

Indeed, the BP Macondo well blowout in 2010 (BP Macondo incident), even though offshore, has functioned as something of a test of the use of KK indemnities in the onshore oil and gas industry. Some states, notably Louisiana, Texas, New Mexico, and Wyoming have in place Oilfield Anti-Indemnity Acts that impose limitations on KK indemnities. Insurance industry commentators suggest that certain jurisdictions may have public policy objections to these indemnities. Protection of local firms is one example. The Texas and Louisiana statutes limiting indemnities appear to have been driven by some oil companies' attempts to contractually transfer all liability to local providers of materials and services. Many states, including Texas and Louisiana, have statutes that limit the ability of parties to indemnify themselves against their own negligence. In fact, Texas and Louisiana take different and conflicting approaches to that problem.

Cross-indemnification agreements attempt to apportion risk, which is then backed by several types of insurance. Perhaps the most common form of coverage is commercial general liability (CGL), yet there are more specialized insurance products available. These are predominantly carried by operators, which assume control of a drilling site, although additional coverage might also be purchased by some large drilling contractors. Among these are operators extra expense (or OEE, which is also known as “control of well”) coverage, which covers blowouts, as well as coverage designed specifically to cover environmental risks, broadly called environmental impairment liability (EIL) coverage, which covers gradual release from a well site—“latent hazards,” like groundwater contamination. This form of coverage is used to supplement GCL policy extensions, most of which limit coverage to “abrupt and instantaneous” releases.
Although unconventional operations entail new risks, EIL-type coverage is less commonly carried by onshore operators compared to GCL and OEE coverage. While its use is growing, only a subset—about 30 percent to 40 percent of oil and gas companies “with significant fracturing operations” currently carry it. There are concerns that fewer insurers will be willing to provide EIL coverage for fracking operations and that EIL coverage prices may make this coverage prohibitively expensive for operators. Lack of regulatory clarity and high profile announcements by insurers like Nationwide that they will not insure against fracking-related risks are part of the reason for insurers’ trepidation. The potential for coverage disputes are another, with some observers likening the issues raised by fracking to asbestos litigation. The potential for widespread contamination presents a particular problem in light of how KK indemnities relate to insurance risk transfer and the incentives these contracts create to reduce pollution risk.

Regional Diversity

Underlying these and other variables influencing the nature of production activities are “the realities of regional diversity” as articulated in 2011 by the Shale Gas Production Subcommittee of the Secretary of Energy Advisory Board (Subcommittee Report), which highlights the fact that the nature of operations can be highly variable within and between individual plays. Much variation is attributable to differences in underlying geologic conditions. Moreover, the rapid integration of regions across the United States into the “supply mix,” particularly those areas without a recent history of drilling and production activity but now experiencing significant development pressure, has led to the evolution of drilling and completion technology, field practices, and regulation.

Best Practices

The evolution in technology and practice, the geological diversity in shale oil and gas exploration, and the increased potential for—and awareness of—environmental contamination risks posed by shale exploration and development have each brought new attention to best practices within the industry. The Subcommittee Report...
defined best practices as “industry techniques or methods that have proven over time to accomplish given tasks and objectives in a manner that most acceptably balances desired outcomes and avoids undesirable consequences.”48 The drilling technology is rapidly evolving, so there is understandable concern49 lest a specific technology become a regulatory requirement.

Best Practices and Regional Variation

How closely regulations governing industry practices are tailored to local conditions and the needs of industry remains a potent issue. According to the Subcommittee Report, “A single best engineering practice cannot [be] set for all locations and for all time.”50 Local variation in regulation can be beneficial because it results in regulatory controls more responsive to region-specific variables, such as geology and history of hydrocarbon development, and is less “removed from field operations.”51

The idea that best practices can serve as a basis for environmental protection is not a new one.52 For example, a well-known analogy from the water quality arena is the National Pollutant Discharge Elimination System (NPDES) Phase II requirements, which place primacy upon decisions taken at the municipal level. The oil and gas industry also has a history of using best management practices (BMPs).53

One recent example in the oil and gas industry is a collaboration between independent producer Southwestern Energy and the Environmental Defense Fund (EDF) to develop a set of model regulations for hydraulically fractured wells. The effort focuses on well integrity because it was found to be common to all reported cases of water well contamination linked to fracking.54 Still in draft form, this document is an outgrowth of a review of state regulatory programs as well as industry standards. It sets out standards for all phases of well construction, from well planning and permitting, to predrilling water sampling, casing and cementing, well completion and fracturing, and plugging and abandonment. The document also contains disclosure provisions.55

A related effort is the set of fifteen performance standards developed by the Center for Sustainable Shale Development (CSSD) tailored to shale gas development in the Appalachian Basin, which includes the Marcellus formation. The performance standards include the following provisions: 90 percent recycling of flowback and
produced water; use of closed loop containment in place of open pits for handling of flowback; analysis of stratigraphic confinement adequacy to prevent migration of frac fluids from the target formation; implementation of a sourcewater (surface and groundwater) monitoring program; and frac fluid disclosure, among others. In addition, these standards will be linked to a certification process, which is currently under development.

At the time of writing, the CSSD partnership includes operators like Shell, Chevron, and Consol Energy as well as environmental groups like EDF and the Pennsylvania Environmental Council. As some observers have commented, strategic collaborations like these are “lonely in the middle,” where the pressure of pro-industry groups, opposition of environmental interests, and primacy of state regulation have created a challenging and polarized environment.

The Subcommittee Report concludes that “a more systematic commitment to a process of continuous improvement to identify and implement best practices is needed, and should be embraced by all companies in the shale gas industry.” This includes a public health and protection element. The Subcommittee Report states, “Many companies already demonstrate their commitment to the kind of process we describe here, but the public should be confident that this is the practice across the industry.” For example, FracFocus, the industry-supported disclosure mechanism increasingly required by states such as Pennsylvania, is intended to satisfy the public’s need to know what chemicals are used locally in frac fluids.

**Beyond Best Practices**

The specification of best practices is not a guarantee that oil and gas operations will always be safer from an environmental or a health perspective. Organizational theorists dealing with socio-technical systems that involve high-risk technologies and high catastrophic potential have recognized that certain features of these systems, including deepwater drilling, are inherently risky and that accidents can be considered “normal.” That is, a degree of unpredictability, complexity, and tight coupling of system elements makes accidents intrinsically likely—even under proper management and even after careful design. This may be applicable to mineral resource recovery technologies, such as hydraulic fracturing and underground
injection wells, and to dam construction and failure, where interactions between an industrial activity and the natural environment may as one system generate highly unpredictable consequences causing what Perrow calls an “eco-system accident.” An example might be increased seismic activity at certain wastewater injection wells.

Although the theory of “normal” accidents is based upon on high-risk enterprises and the organizations responsible for their operation, such as nuclear power, aircraft and airways, and marine shipping accidents—where the likelihood of an accident may be relatively small, but the consequences can be drastic—arguably, certain aspects of shale oil and gas exploration carry many of the same risks. While the “interactive complexity” of common high-volume hydraulic fracturing operations may be relatively low and the possibility for failure to cascade unpredictably through the system may, therefore, be limited, certain identified risks do carry the potential to cause an ecosystem accident, as defined by Perrow. Such accidents might include induced seismicity (i.e. earthquakes) and the potential for “fracture intersection” with abandoned or “orphanned” wells, which is “a rare, but known occurrence.”

Normal accident theory rests on the relationship between high-risk systems and organizational structure, finding that failures occur even when operators are doing their best. Other research on accidents highlights certain high reliability organizations, such as aircraft carriers, in which accidents are extremely uncommon when everyone involved is aware, knowledgeable, and attuned to the ramifications of what everyone else is doing. This includes the ability of an organization to manage surprises through an understanding of detail and capacity for action.

Transposing this more optimistic view of organizations to the development of an unconventional gas well, there are risks inherent in how OFS and operators work together and understand one another’s jobs and how responsibility for safety is distributed and managed. In short, accident risk is not just a function of equipment failure. Organizational form and performance are also important. Attentiveness to safety underlies every aspect of the shale exploration and development process, such as ensuring the integrity of cement casings—not just fracturing.

This also means that to be effective, regulators—and regulations—need to proactively emphasize training, process, and understanding, rather than merely being prescriptive. To the extent that
the BP Macondo incident raises awareness of the possibility of similar accidents in onshore shale exploration, it is important for stakeholders to learn from the BP Macondo failures, including miscommunications, economic pressures, inadequate training, undue reliance upon engineering, and issues of organizational culture, as underscored in the Chief Counsel’s Report.67

In addition, there are lessons from the BP Macondo incident about reliance on regulation and regulatory enforcement that may be pertinent in unconventional shale development.68 A number of questions emerged about the relationship between the offshore drilling industry and regulators, particularly the Minerals Management Service (MMS), which was reorganized and renamed following the blowout and spill.69 As analysts have noted, the approach of MMS to regulating the novel challenges posed by offshore oil and gas developments was premised upon collaboration with major oil companies and equipment vendors in the development of standards, highlighted by the DeepStar Research Project. While MMS cooperated with large, integrated oil companies, it focused its limited resources on the smaller independents launching deep sea operations.70

Thus, MMS was primed to accept these well design changes—however risky. Further, MMS was known to have suffered from a lack of technical capacity due to gaps in employee skills and experience. The agency has consistently had difficulty hiring, training, and retaining experienced staff, which may have compromised its oversight and management responsibilities.71 These challenges have affected the agency’s ability to measure and verify production in particular.72 As the Government Accountability Office recently found, these challenges remain in spite of the reorganization of activities previously overseen by MMS.73

Whether a similar capacity gap will affect state-level agencies charged with oversight of unconventional oil and gas operations is an ongoing issue, and there have been suggestions of developing new regulatory paradigms. Meehan, for example, has suggested the creation of a new regulatory agency for transitional and clean energy technologies to separate the promotion and regulatory roles of the Department of Energy. Osofsky and Wiseman suggest a range of paradigms to address the current fragmented, yet overlapping, jurisdictions.74 A shale play rarely is located beneath a single state. For example, the Haynesville
shale lies beneath the states of Texas, Arkansas, and Louisiana. Well sites may be located beneath more than one state, as well as beneath overlapping local jurisdictions with their separate road regulations, noise, light ordinances, and zoning requirements.

As Wiseman notes, industry often has an important claim to technical knowledge associated with unconventional shale oil and gas development and should, therefore, be among the key voices influencing how the process of exploiting these resources unfolds. Still, there are pitfalls. In an analysis of industry disclosure of frac fluid chemical composition, Wiseman notes that best practices and other voluntary industry initiatives have several drawbacks. These include the fact that industry itself may not know the full range of risks; the potential that agencies and the public can be “boxed in” by precedents set using industry-derived voluntary standards and agreements; the squelching of voices of non-industry actors; and the fact that they are potentially weighted toward industry needs.

In the substantive realm, efforts by state regulators and industry to work together to identify risks, write guidelines, and propose regulatory changes have been impressive, although not comprehensive. More consistent efforts to compare gaps among states and regulatory change in response to suggestions from STRONGER [The State Review of Oil and Natural Gas Environmental Regulations], industry groups, scientists and other stakeholders will be needed.

CONCLUSION

This chapter has described broadly the form and organization of companies involved in the upstream segment of unconventional resource development. It has described the entities involved, including fully integrated oil majors, national oil companies, independent operators, and oilfield services companies; shown how relationships among each are structured and risk is apportioned; and introduced some of the actors behind the increasing focus on best management practices. As the ongoing push for use of best practices illustrates, it is increasingly necessary to have a basic understanding of the industry in order to gauge its impacts and effects.
NOTES


13. Id.
14. Id.
17. Oilfield Services, supra note 12.
22. This section is adapted from Stephane Chafcouloff et al., INTEGRATED SERVICES, OILFIELD REV., SUMMER 1995, at 11–25, available at http://www.slb.com/-/media/Files/resources/oilfield_review/or95/sum95/06951125.pdf.
23. Id. at 11.
29. See, e.g., Thomas West and Cindy M. Monaco, Presentation at the 3rd Law of Shale Plays Conference: Do Conventional Leases Work for Unconventional Plays in Unconventional Times? 18 (June 6–7, 2012) (unpublished manuscript) (discussing the fact that it is increasingly common for leases to include indemnifications between landowners and operators in favor of landowners).


32. Egobuchue, supra note 27, at 10–11 and n.18.

33. Egobuchue, supra note 27, at 10, 14.

34. Lambert, supra note 31, 10.

35. Authors’ communication with Bruce Kramer, Esq. (July 28, 2013).

36. Swartz, supra note 27.


38. See Swartz, supra note 27, for a discussion of the additional risks to insurers posed by shale gas fracking operations.


40. Jokajtys, supra note 37.

41. Jokajtys, supra note 37, at 4.


43. See, e.g., Swartz, supra note 27, discussing involvement of “nonoperating” owners, who may be required under operating agreements to purchase their own insurance programs.

44. Subcommittee Report, supra note 24, at 10.

45. Subcommittee Report, supra note 24, at 6, 10.

46. Swartz, supra note 27, at 31.

47. Boling, supra note 24.


51. U.S. Dep’t ENERGY, STATE OIL AND NATURAL GAS REGULATIONS DESIGNED TO PROTECT WATER RESOURCES 37 (May 2009).

52. This section draws heavily upon a 2012 presentation by Kathryn Mutz and Bruce Kramer. See Kathryn Mutz and Bruce M. Kramer, Presentation at the 3d Law of Shale Plays Conference: Should Best Management Practices Be Defined By Regulation? (June 6–7, 2012).

53. For instance, the Intermountain Oil and Gas BMP Project (IOGP) maintains a database of both required and recommended BMPs (see http://www...
.oilandgasbmps.org/). The federal Bureau of Land Management uses BMPs as part of its drilling permit program (see http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices.html). And in the eastern United States, the Marcellus Shale Coalition has identified “recommended practices” that provide guidance on a range of issues, such as water pipelines, motor vehicle safety, pre-drilling water supply surveys, and supply chain management, among others (recommended practice documents are available for download at http://marcelluscoalition.org/category/library/recommended-practices/).


58. Peter Behr, Authors of Model Fracking Regulation Find that it’s Lonely in the Middle, MIDWEST ENERGY NEWS (Oct. 4, 2012), http://www.midwestenergynews.com/2012/10/04/authors-of-model-fracking-regulation-find-its-lonely-in-the-middle/.


60. Subcommittee Report, supra note 24, at 10.


63. Id. at 14.


69. While official reports found that BP allowed a number of risky decisions to take place, some of which violated industry best practices, only one—an unusual temporary abandonment design—required MMS approval. Id. at 246.


73. See generally id. at 3 (discussing failure at Interior to incorporate recommendations of GAO during reorganization intended to address “numerous weaknesses and challenges”).


75. Wiseman, supra note 61, at 66.

76. Id. at 58, 61–66.

77. Id. at 63.