

Paper #2-2

REGULATORY FRAMEWORK

Prepared by the Environmental & Regulatory Subgroup
of the
Operations & Environment Task Group

On September 15, 2011, The National Petroleum Council (NPC) in approving its report, *Prudent Development: Realizing the Potential of North America's Abundant Natural Gas and Oil Resources*, also approved the making available of certain materials used in the study process, including detailed, specific subject matter papers prepared or used by the study's Task Groups and/or Subgroups. These Topic and White Papers were working documents that were part of the analyses that led to development of the summary results presented in the report's Executive Summary and Chapters.

These Topic and White Papers represent the views and conclusions of the authors. The National Petroleum Council has not endorsed or approved the statements and conclusions contained in these documents, but approved the publication of these materials as part of the study process.

The NPC believes that these papers will be of interest to the readers of the report and will help them better understand the results. These materials are being made available in the interest of transparency.

The attached paper is one of 57 such working documents used in the study analyses. Also included is a roster of the Subgroup that developed or submitted this paper. Appendix C of the final NPC report provides a complete list of the 57 Topic and White Papers and an abstract for each. The full papers can be viewed and downloaded from the report section of the NPC website (www.npc.org).

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Overview of North American Oil & Gas Operations
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A. History of Permitting and Environmental Regulations

Sharon Zubrod, Sandra McSurdy

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A. History of Permitting and Environmental Regulations

State regulation of oil and natural gas exploration and production activities are approved under state laws that typically include a prohibition against causing harm to the environment. This premise is at the heart of the regulatory process. The purpose of oil and natural gas regulations is to provide a framework within which regulatory and environmental programs insure protection of public health, safety and the environment. While not the only way in which protection is insured, regulations do form the backbone of control to ensure safe and environmentally protective development of oil and gas resources and it is important to understand how these regulations have evolved over time.

This discussion of the history of oil and gas regulation is reprinted by permission of the Groundwater Protection Council from "State Oil and Natural Gas Regulations Designed to Protect Water Resources," May 2009. (Available for download at www.gwpc.org/e-library/e_library_list.htm#S)

The evolution of water and environmental resource protection regulations governing oil and gas exploration, production, and well abandonment did not follow the same pattern as other waste producing industries, including those related to the refining of oil into petroleum products, and other “downstream” petroleum operations. These “downstream” operations developed controls for preventing pollution to air, water, and land resources primarily in response to a series of federal pollution control acts passed by Congress between 1972 and 1990. However, the “upstream” (production) sector of the petroleum industry began to initiate water protection measures in response to individual state statutes and regulations enacted after 1900.

Most of these early regulations on well construction and plugging were not specifically designed to protect ground and surface water from the impacts of oil and natural gas production. Early casing and cementing programs of oil and gas wells were practical measures to prevent waters from adjacent non-productive formations and upper aquifers from flooding the oil producing reservoir during drilling and subsequent production activities. Occasionally, the influx of alien waters was of such volume that drillers “lost the hole” prior to penetrating the target oil horizon. Consequently, these protection activities were incipient oil conservation measures that recognized flooding out of the oil reservoir created “loss” of a valuable salable product. This kind of thinking was evident in the technical books of the period. For example, in 1919, a geologist named Dorsey Hager wrote a book called “Practical Oil Geology.”¹ In Chapter 9, entitled "Water - Enemy of the Petroleum Industry," Mr. Hager states “The danger of water in oil fields must not be underestimated. Water flooding is a danger often present where care is not

¹ Dorsey Hager, “Practical Oil Geology, 3rd. Edition, McGraw Hill, 1919 253 pp.

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taken in advance to protect the wells.” In these early years, the principal focus was on protection of the petroleum resource from the effects of water incursion and not on protection of water resources themselves.

Most oil producers of the early period (prior to 1935) believed that royalty payments to the landowner for the privilege of extracting oil or gas from beneath their land adequately compensated the landowner for any surface and water resource damages caused to the property. These damages included accidental spillage of oil or salt water, leakage of produced water from storage and disposal pits and loss of agricultural land taken out of production by the occupancy of property by oil field related equipment, structures, or around the working vicinity of each well. Prior to the 1940's, pollution to ground water from activities at individual tank battery locations to the extent where fresh water aquifers would be rendered unusable for a long period of time was not a concept widely understood by the oil industry, landowners or state regulatory agencies. Even landowners who had experienced considerable damage to their farms first viewed surface pollution as a necessary evil and an inherent part of the oil or gas production process.

A major portion of this discussion portrays how states legislative bodies responded to an increasing concern by landowners, farmers and municipal officials that water and land resources were being unnecessarily contaminated by oil field practices. A historical perspective also shows how state oil and gas environmental regulations have been philosophically influenced in some ways by the influx of Federal environmental laws during the past thirty-five years, but not by others.

1. Prior to 1935; The Early Years

From the time the first documented oil well was drilled in Pennsylvania in 1859 by Colonel Drake to the early 1930s, the exploration and producing industry generally proceeded without much formal regulation, either at the state or federal level. New York required the plugging of abandoned wells as early as 1879. Ohio reported enacting the first law for regulating methods used to case and plug oil and gas wells to prevent water from penetrating and contaminating the oil bearing rock in 1883. In 1890, Pennsylvania passed the first law requiring non-producing wells to be plugged in order to protect the integrity of the producing formation. In 1915, the Oil and Gas Division of the Oklahoma Corporation Commission (OCC) was given exclusive jurisdiction over all wells drilled for the exploration and production of oil and gas and, in 1917, the OCC was given authority over related ground water protection and mandated to develop procedures for plugging and abandonment. The Texas Railroad Commission was given similar authorities in 1917 and 1919, respectively. California enacted a plugging program in 1915 and added a ground water protection component in 1929. Other states set up oil and gas regulatory commissions, often without specific authority to promulgate regulations and where enforcement authority was only available under the general statutes and civil or county control.

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Around 1931, a barrel of oil, which cost about 80 cents to produce, sold for as low as \$.15.² This differential between supply and demand improved somewhat in ensuing years through the early 1930s. However, the potential for serious gluts of unmarketable oil remained and several governors, over the objections of oil producers, some state legislators and landowners, felt that some framework of government controls over the production of oil was necessary. The United States was then, and still is the only oil producing country in the world where minerals rights can be privately owned and the owner of the oil and gas rights can make a lease agreement with a company to extract hydrocarbons in return for a royalty payment based on a percentage of each barrel produced and sold.

2. 1935; Oil and Gas Conservation Is Born

In 1935, after several aborted attempts to come up with an acceptable concept for government intervention into the supply-demand roller coaster, six states, Oklahoma, Texas, Colorado, Illinois, New Mexico and Kansas, formed the Interstate Oil Compact Commission (IOCC). In 1991, the organization changed its name to the Interstate Oil and Gas Compact Commission (IOGCC). The purpose of the IOCC was to promote conservation of oil resources through an orderly development of oil reservoirs. Companies would predict a market demand for their product and the state agency would then set an annual or semiannual extraction allowable for each producing field (or producing horizon) based on the market prediction. Governor Marland of Oklahoma supported a concept addressing “economic waste” and believed that government should prorate production to obtain a fair price for crude oil. This concept was eventually changed to embrace the term “physical waste” and the six states ratified the Compact agreement.

One of the early efforts of the Compact was the development of a set of model regulations, which the states could use as a pattern to establish their own regulatory framework. Even though the model established a format for oil and gas conservation, the protection of ground water from pollution was carried as a secondary consideration in most regulations; particularly as the regulations applied to well construction and plugging. In the early 1960s, the IOCC also developed a model for gas regulation similar to that created for oil in 1935.

From 1941 through the end of World War II, several state legislatures enacted moratoriums on the enforcement of any environmental regulations and many conservation practices controlling supply and demand due to the increased need for oil for the war effort. In late 1941, the beneficial effect of conservation in the late 1930s had been proven and the United States had a surplus capacity of about 1 million barrels of oil,

² Interstate Oil and Gas Compact Commission, “Making a Difference: A Historical Look at the IOGCC”, January 2006, 25 pp. Accessed April 2011 at <http://www.gwpc.org/e-library/documents/general/Making%20a%20Difference.pdf>

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approximately 80 percent of which was produced from Compact states. By 1945, the IOCC had grown in membership to 17 states and was a sustaining force in providing models for oil and gas producing states to follow in promulgating regulations.

3. 1945 to 1970: The Years of U.S. Oil Production Dominance

Throughout the period 1946 to 1960, most oil and gas producing states established a regulatory agency to enforce oil and gas conservation practices. Still, the environmental protection aspects of the oil regulatory picture developed sporadically. State statutes regarding pollution abatement and control of oil field practices and waste emanated from individual events rather than from an overall “welfare of the nation” impetus. Kansas, for example, gave its Board of Health (not the Corporation Commission) authority in 1946 to issue orders against oil field brine disposal pits that were causing salt water pollution, but it wasn’t until January, 1958, that the Board could issue permits for acceptable pit usage and deny permits for those deemed to cause potential pollution. Texas adopted “no-pit” rules in the late 1960s, and several other states developed a stricter approach to how long produced fluids could be retained in a pit. The concern over pit usage stemmed from a realization that these so-called “produced water evaporation pits” were little more than unsealed seepage pits and, as a result, domestic water wells were being contaminated with salt water.

4. The Environmental 1970s and 1980s

The 1960s and 1970s brought the nation’s environmental consciousness to the forefront, including the landmark passage of the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. § 4321 et seq., as amended). The Federal Water Pollution Control Act (FWPCA) in 1972 sent the message that the discharges of pollutants to the nation’s waterways, estuaries and drainages, even intermittent ones, was no longer acceptable and discharges of specific inorganic pollutants were to be regulated either by state or federal permit. Congress authorized formation of the U.S. Environmental Protection Agency (EPA) to implement the FWPCA and successive environmental and water resource protection acts. Section 311 of the FWPCA and its successor, Clean Water Act (CWA) of 1977, elevated the consequence of accidental spillage of oil from a producing lease to a finable offense when the oil entered a flowing stream. The non-reporting of an oil spill was also a finable offense. Another part of the CWA required containment dikes around tank batteries and oil storage facilities to prevent releases of oil to “navigable streams,” which by definition included almost every intermittent upper reach of a stream if it connected to a potential flowing watercourse. This rule, called Spill Prevention Control and Countermeasure (SPCC), was administered under the direct implementation authority of EPA. Prior to FWPCA, most state oil and gas regulatory agencies required operators to contain, report, and clean up serious oil spills on water. However few operators were fined unless they refused to obey a state agency directive. EPA’s enforcement of the SPCC program was sporadic throughout the first twenty years of the FWPCA and CWA and its overall impact on day-to-day oil and gas operations was minor. The CWA,

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however, marked the first time that the oil and gas producing industry was subject to direct dealings with a federal agency on environmental protection issues.

Similarly, the Clean Air Act of 1970 (CAA) (42 U.S.C. § 7401 et seq., as amended), was a major overhaul of prior federal legislation to address air pollution in the United States. The CAA prescribes the measures that Federal agencies, state and local governments, and private entities must take in order to decrease air pollution in the country.

In 1974, Congress passed the Safe Drinking Water Act (SDWA); which authorized EPA to promulgate regulations for wells used to inject fluids into subsurface formations, including those used for either disposal of excess produced water or injection of produced water to increase recovery of oil. This section of the SDWA was called the Underground Injection Control (UIC) Program. Between 1982 and 1990, twenty oil producing states applied for and received primary enforcement authority (primacy) from EPA to administer the program under Section 1425 of SDWA. Delegation of authority for this program to the states allowed those with longstanding oil and gas regulatory programs to demonstrate that their programs were equally effective in protecting ground water as those promulgated and administered by EPA under Section 1422 of SDWA. The major initial impact of the UIC program was that operators had to verify the mechanical integrity of each of their injection wells once every five years. Prior to the UIC program, most regulatory agencies only required operators to test an injection well if it was known or suspected to be leaking.

The 1970s also marked the beginning of the decline in domestic oil production. Some landowners, who were actively engaged in agriculture, began to view the oil production on their acreage with its declining productivity as a nuisance, rather than a blessing. The state oil and gas regulators received increasing demands from landowners and tenants to have operators plug wells that were idle and appeared to be no longer productive. Many states set up “temporarily abandoned” or “idle” well programs that required operators to monitor the mechanical integrity and certify annually that these idle wells had a future purpose.

In the 1980s, and particularly after the 1986 depression in the industry, several states (Kansas, Texas, California and others) received legislative authorization to establish dedicated funding to contract for the plugging of abandoned wells. The use of these abandoned or “orphan” well plugging funds resulted in the permanent closure of thousands of wells that might have posed a threat to the environment.

Congress passed the Resource Conservation and Recovery Act (RCRA) in 1976, which gave EPA authority to regulate the disposition and disposal of those substances, which, by a preset definition, were declared to be hazardous. Fluids produced during exploration and production (E&P) of oil and gas were originally excluded from RCRA and set aside for further study. In 1988, the EPA Administrator issued a Regulatory Determination that wastes produced in connection with oil and gas (E&P) operations would continue to be

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regulated by the states and would be “exempt” from the RCRA Subtitle C regulatory regime. In response to this decision, IOGCC committees developed a set of environmental program guidelines for states to use in strengthening their oil and gas waste management programs (other than the UIC program) and, beginning in 1991, the IOGCC began using state review committees comprised of state oil and gas regulators, state environmental regulators, major and local oil and gas producers, and members of the environmental advocacy organizations to systematically review state oil and gas environmental regulatory programs against the guidelines.

5. 1990-2008: The Era of Environmental Regulation Refinement

The last two decades have provided new environmental regulatory challenges to oil and gas. Many states formed separate departments to administer overall environmental regulations because of the programmatic shift in emphasis toward protection of water and land resources and the special technical knowledge needed to implement programs. Such changes provided better coordination of environmental permitting and field inspection activities, and improved documentation of accountable actions to state legislatures, the public and the petroleum industry. Several states revised existing regulations concerning pits, tanks and well construction during this period to reflect the latest technological, environmental and public policy needs of the state. There was also an increased level of enforcement against those operators who failed to maintain compliance. For example, several states, including Kansas, Oklahoma, Indiana, and Louisiana, set up formal penalty schedules and operator suspension procedures to address habitual or flagrant non-compliance. The types of penalties that at one time only applied to Class II (oil and gas related) injection wells, were now utilized for a whole range of environmental programs. Operators were also subjected to increases in well and/or performance bonding requirements and additional financial assurance requirements.

Since 1990, increased environmental awareness has resulted in the implementation of several new environmental programs. Some of these programs are listed below.

The discovery of Coal Bed Methane (CBM) in Montana, Wyoming, the Four Corners area and the Black Warrior Basin of Alabama, brought the search for gas into some areas previously unexplored for hydrocarbons. Colorado and California, which had always regulated oil and gas at the state level under Home Rule statutes, now experienced increased pressure from citizens to have a significant part of the regulation done through county or city ordinance, often in duplication to the mandate of the state regulatory agency. In 2008, Colorado revised its regulations to allow for expanded public participation in the permitting and environmental assessment of oil field sites. This participation included review by other state water protection agencies.

In the mid-1990s, citizens became concerned over the amount of Naturally Occurring Radioactive Material (NORM) that was being produced at some oil and gas lease locations. Some produced water had sufficient radium and other radioactive isotopes to

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develop a coating of precipitate in tubular goods (pipes) and at pump connections. Operators were concerned when loads of salvage pipe were rejected by prospective buyers and were returned to them for disposal. As a result, some states, such as Louisiana and Texas, developed regulations governing the disposition of this pipe and other NORM materials and wastes.

The Community Right-To-Know portion of Superfund amendments in 1988 (Section 312 of SARA Title III) required oil operators to submit Material Safety Data Sheets (MSDS) reporting how much hydrocarbon was stored on-site at a lease facility. The state level administration of this program is usually administered by the principal state environmental agency rather than the oil and gas regulatory agency. This law also has a provision under Section 304 whereby the operator has to make changes in their facility design if a large release of hydrocarbons occurs.

The Oil Pollution Act (OPA) of 1990 has had some impact on oil and gas production operations, primarily throughout the U.S. coastal areas of Louisiana, Texas, Mississippi and Alabama. This Act began as a reaction to the Exxon Valdez incident in Alaska in 1989, and required, among other things, the use of double-hulled vessels to transport oil.

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Any assessment of the regulatory process for natural gas exploration and production operations must acknowledge the potential influence of public perception on the outcome of regulatory decisions. In the early years of this regulatory process, which originated in energy-producing states decades ago, the primary emphasis was on conservation and efficient production of the resource. ‘Conservation,’ in fact, initially served as a legal term of art to describe measures to avoid physical and economic waste of oil and gas resources. State regulations developed to address well spacing, pooling and unitization in producing natural gas and oil fields, among other issues, recognizing a public interest in orderly development of oil and natural gas resources in a particular state, and in balancing the interests of those holding rights to those resources. The governing assumption was that those interests were primarily economic in nature.

During this period, conflicts over surface uses, and occasional controversies over surface or groundwater pollution incidents, were most often resolved by the legal system under principles of tort law or nuisance. In the case of surface use conflicts, the resolution was occasionally through local zoning ordinances. Oil and gas drilling and production operations were broadly seen as legitimate industrial activities. The post war development of metropolitan Los Angeles provides evidence of this previous social consensus, through the fact that historic oil fields are interspersed with urban and suburban development in Baldwin Hills, a number of the beach communities, and even Beverly Hills.

The postwar decades have seen changes along several lines that have come to influence the regulatory processes governing natural gas and oil development. In some cases, this has influenced the achievability of such development on a field-wide scale in economic and practical terms. Among these changes are: the emergence of grass-roots networks able to influence local community opinion about controversial oil and gas projects; the shift in the approach of some regulatory agencies from an historic pro-development mission to a position of adjudicating the interests of opposing parties; the emergence of a strong sense of public entitlement to manage, restrict or prevent projects they see as affecting their interests; and the erosion of a social consensus that development of energy resources is at all times in the public interest.

A portent that this social consensus might change was provided by the controversy in the 1950’s and early 1960’s over development of the portion of California’s Wilmington Oil Field that extends under much of the City of Long Beach and out into Long Beach Harbor. Development of the original section of the Wilmington Field north and west of Long Beach, under the communities of Wilmington and Carson, led to extensive areas of subsidence of the land surface, and the proliferation of surface production equipment and pipelines. When the State of California, which owned the mineral rights to the Wilmington Field under state tidelands in Long Beach Harbor, first proposed

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development of the resource, the City of Long Beach vigorously opposed the State's proposal, with the strong support of city residents. The outcome of years of litigation and administrative delay resulted in an historic decision by which the State committed to develop the Long Beach portion of the field (separately unitized) using water injection to control subsidence and to increase oil recovery. That this dispute occurred in the middle of a dynamic and growing metropolitan area assured substantial media coverage, and led many in the public to recognize that an energized citizenry could influence not only local government but oil field development promoted by state government.

The seminal event that shifted public perception about oil and gas drilling was the Santa Barbara, California, oil spill in 1969. A drilling accident at an offshore oil rig led to the leakage of almost 3 million gallons of oil into the marine waters and the Santa Barbara channel. As volunteers rushed to the beach and harbor to assist with clean-up, the day's events led to the start of a new environmental movement – beginning that evening in Santa Barbara and soon extending throughout the United States. Public clamor over the spill led Congress to pass (and President Richard Nixon to sign) the National Environmental Policy Act (NEPA). Similar public pressure led to the passage of the California Environmental Quality Act (CEQA). The spill was used again and again as a justification for passage of other environmental statutes or the adoption of new regulations intended to address pollution and environmental risk. The experience of the spill and its aftermath was among the factors leading to passage of the Coastal Zone Management Act (CZMA). The State of California imposed a moratorium on further exploration drilling in State tidelands that was not lifted until 1981, and which was re-imposed several years later. Many major environmental groups made opposition to offshore oil and gas drilling and production a primary element of their position statements. In reaction to the Santa Barbara spill and media coverage of the spill, many in the general public developed a distrust of the competence and credibility of the oil and gas industry that has never fully abated. In the lore and literature of the environmental movement, the Santa Barbara spill was woven into a narrative that came to include other major oil spills, such as the spills from the oil tankers *Amoco Cadiz* and *Exxon Valdez*, along with industrial disasters such as Three Mile Island and Bhopal.

In the early 1980's, the California State Lands Commission cautiously lifted the moratorium on drilling from new locations in state tidelands (drilling from existing offshore structures had been allowed with state permit approvals). At the same time, the Reagan Administration, through then-Interior Secretary James Watt, proposed an ambitious plan of new federal oil and gas lease sales in the Pacific Outer Continental Shelf (OCS). Oil and gas companies proposing to drill or to develop federal OCS leases promptly found themselves challenged by energized and resourceful community groups, not just in Santa Barbara County, but up and down the California coast from San Diego to Humboldt County. These groups proved adept at using early generation telecommunications and computer networks and a web of personal relationships to exchange strategies and lessons learned on grass-roots organization, local referendum campaigns and other methods to mobilize community opposition to offshore oil and gas

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projects. They recruited activists to attend public hearings to speak out against oil projects, particularly hearings of the California Coastal Commission, the State Lands Commission and the Board of Supervisors of Santa Barbara County. As a result, administrative hearings that two decades before might have taken place in relative obscurity were forums for creative acts of ‘street theatre,’ notably at Minerals Management Service (MMS) scoping hearings for OCS lease sales proposed off the coast of Northern California in the mid-1980’s. In time, grass roots opponents of new projects in the California Pacific offshore found funding to sustain their efforts.

The oil and gas industry did not readily adapt to this transition in the regulatory environment in California. Nor was the industry nimble in forming coalitions and mustering its supporters at public hearings. While there was often debate about the percentage of the public represented by opponents of offshore oil and gas development, the energy of the opponents could not be argued. Declining oil prices in the mid-1980’s, the complexity of a post-NEPA, post-CEQA regulatory environment, and the efforts of opposition groups in California’s coastal counties combined to discourage many of the major companies from further pursuit of new projects in the California offshore. Most have since sold or decommissioned their assets there.

The lessons of California for the environmental movement have been discussed frequently and at length. The effects on regulatory processes elsewhere from the controversies surrounding the development and production of oil and gas in the California offshore operating environment have been significant, and less discussed. California became the proving ground for use of administrative hearings to demonstrate public opposition (or at least skepticism) about oil and gas projects, and for the use of such hearings to subject project proposals to rigorous third party scrutiny. Whereas agencies in the early decades of regulating oil and gas development were often in the position of encouraging development (and in many cases, statutorily charged to do so), beginning with California and the west coast states, some agencies took on the role of arbiters between the interests of those advocating and opposing oil and gas projects. Also, the experience of California spread through the broader public to nurture an expectation that administrative processes existed not merely to resolve the interests of owners of mineral rights, but to recognize and address the interests of those who saw themselves as potentially affected by oil and gas development.

This transition in purpose and expectation for administrative processes has not been linear, and it has varied in pace and in outcome from state to state. But to some extent, underscored by media coverage of controversies over energy projects at some level wherever they occur, this transition is occurring everywhere in the U.S. And to the great majority of the public, this expectation that the administrative process for oil and gas projects will somehow address their concerns has ripened into an entitlement.

The historic approach toward development of a natural gas or oil field was grounded in property transactions and in the administrative adjudication of the rights of participants in

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those transactions. Companies acquired oil and gas leases through negotiation with owners of mineral rights. Companies then voluntarily farmed out or pooled their leasehold acreage to assemble sufficient working interest and capital to drill. Subsequently, companies would negotiate, or work within the framework of state regulatory processes, to form units to optimize the development and production of the resource discovered through drilling. Over time, as state (and later, federal) laws were enacted to assure safe and environmentally responsible operations, such companies would also obtain necessary permits and approvals. In the early years of enforcement of these laws, issuance of such permits and approvals most often occurred on strictly technical grounds. The company would submit an application demonstrating its ability to comply with the law in question and, upon review by agency staff, sometimes accompanied by a largely technical hearing, the permit or approval would be issued. Sometimes companies would need to obtain site construction permits, zoning variances or similar approvals from local governments, but these were likewise based on technical and factual showings.

The contemporary approach toward development of a natural gas or oil field adds to this transaction-based history an evolving emphasis on the rights and interests of those who see themselves as potentially affected by the asset-based transactions. The potential for controversy is greatest where there are large numbers of people who see themselves affected by natural gas and oil development, and they have no direct economic interest in the proceeds from development. As has been shown, this was and to a certain extent remains the case along the California coast, where many residents came to see themselves at the mercy of decisions made between the federal government and oil companies. This potential likewise exists in situations where a severance has occurred between ownership of the surface estate and ownership of the mineral estate. Examples may be found in both fee land states like Texas, and on public lands in the Intermountain West, where the U.S. government issued patents and deeds to the surface while retaining the minerals. It is likewise taking shape in certain natural gas plays such as the Barnett Shale near Fort Worth, Texas, where severance between surface and mineral estates may exist, or where mineral interest ownership may be so fragmented by small lots that a mineral interest owner may not see himself with an economic benefit that outweighs the inconvenience of proximity to drilling.

Similar controversy has more recently emerged where a critical mass of a local public see themselves as stakeholders in the maintenance of intangible but nonetheless closely held values in the surrounding landscape or community way of life. Many Santa Barbara residents in the offshore oil debates of the 1980's feared that their community and region could take on an unwanted industrial character if offshore oil projects proliferated. They fought to preserve vistas free of offshore platforms (though some twenty platforms could be found in Santa Barbara Channel at the time). Opponents of natural gas exploration in the Intermountain West have fought to preserve the notionally undeveloped character of Colorado's Roan Plateau, Wyoming's Red Desert, or New Mexico's Galisteo Basin. A more recent example of controversy surrounding proposed natural gas development has

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occurred in New York, where not only many local residents, but customers of the New York City Water Supply System and the City's government oppose plans to develop the Catskill portion of the Marcellus Shale.

Controversy and opposition to energy development projects can find fertile ground in situations where the scale of development – or perceptions and fears about future development – exceed the capability of existing regulatory processes to resolve the issues in dispute. One example is the State of New York. There, many members of the public opposed to development of the Marcellus Shale natural gas resource in the state have petitioned the State's Department of Environmental Conservation (DEC) not to approve a new regulatory scheme for drilling and production projects, even though the Department is statutorily directed to issue such regulations. The protracted delay in the issuance of new New York DEC regulations is resulting in a suspension of new project activity in the New York Marcellus.

The transaction-based framework for oil and gas development that was guided by a regulatory process that supported conservation and efficient production of the resource has been superseded. The new framework now is open to the influence of parties who may be strangers to the underlying transactions. These parties express interests that often fall outside the scope of agencies with traditional authority over oil and gas drilling and production operations, and that may even fall outside the scope of authority of other state or federal agencies with an environmental remit. In the breadth of ongoing public debate over subjects pertaining to energy and the environment, a consensus that may once have existed in support of development of energy resources, and that recognized their economic and general social value, no longer exists. With this change, long-prevalent assumptions about what rights a party holds to the development of rights in minerals acquired through ownership, lease or contractual arrangement are also open to question.

This leaves mineral rights owners, their lessees, and operating companies, along with administrative agencies and governments at every level, with the challenge of addressing public perceptions and responding to public concerns in order to foster a decision-making environment in which resource development can proceed. The need to secure the legal right to drill through the appropriate sequence of property transactions has not changed. The need to secure the appropriate permits and regulatory approvals to be able to drill in compliance with applicable laws and regulations has not changed. What has changed is the need to identify those who see themselves as potentially affected by the project that is being proposed. Not only must they be identified, but the prudent operator must make best efforts to understand their convictions, questions and concerns, and to determine means to address them within the budget and scope of his project. It has long been understood that oil and natural gas projects take place within boundaries of economic feasibility and rate of return, and in the context of legal title and geologic, logistical and site surface characteristics. Over the past few decades, the enactment of new laws and regulations have also clarified that such projects must be considered in the context of their receiving environment, and their effects on air quality, on the surface environment

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and the uses to which that environment may be put, on soils, surface water and groundwater, on habitat and wildlife, and, in some areas, on impacts to traffic and other infrastructure.

Now the task of effective project planning is expanding to include measures to address concerns of people who live in the community or region in which the project is proposed to take place. Project success or failure, timely completion or uneconomic delay, are increasingly coming to depend on the degree to which issues of public perception are recognized and addressed in the project plan. Likewise, the pace of development of our natural gas and oil endowment will be influenced by the ability to accomplish this project by project, field by field and region by region. The specific approaches will vary greatly across the universe of projects. But, as has been the case with many other attributes of successful natural gas and oil development projects, resolution will depend upon informed observation, thoughtful consideration of past experience, and adaptability to circumstance.

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The regulatory framework for exploration and production of oil and natural gas resources in the United States offers certain patterns for the experienced project manager or regulatory specialist, but it can be greatly influenced by concerns that are specific to particular operating areas. Even issues that have become national in scope, such as hydraulic fracturing, frequently present challenges for planning or execution of drilling and production projects that are specific to a given area. In addition, safety or environmental incidents that may occur at one operation can, depending upon notoriety and media coverage, focus local public attention on all operations in a given operating area, and on particular aspects of those operations. Such public attention can change the priorities for regulatory oversight, in turn leading to a shift in emphasis or the addition of new criteria for project planning.

Certain general observations can be made about factors that influence the regulatory framework in a particular region or operating area. For example, are the natural gas and oil resources proposed for exploration and development predominantly federally owned, or predominantly in the ownership of private hands? If the resources are federally owned, permits and regulatory approvals required for operations to proceed will be subject to federal process requirements administered by the Bureau of Land Management (BLM) for onshore public lands, and the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) for resources in the federal Outer Continental Shelf (OCS). In addition, federal actions to approve plans for exploration, drilling operations, and development and production of resources, and responses to project proposals and permit applications submitted by an operator, will require review under the National Environmental Policy Act (NEPA) at a level deemed appropriate under the regulations implementing NEPA at 40 C.F.R. Part 1500 et seq. Hence, a more well-defined and elaborate federal approval process will be required for proposals to develop the federal mineral estate.

The presence of federal mineral ownership introduces the presence of persons and organizations that identify themselves as stakeholders in federal decisions regarding the disposition of resources owned by the federal government. Although there are indeed persons and organizations who see themselves as stakeholders in administrative and private or commercial decisions that may affect resource development and the environment, generally, statute, regulation, and administrative practice and custom cause these stakeholders and their claims to have far more significant influence on decisions affecting federal resources. This factor introduces questions of both substance and process that affect the courses of action for operators and agencies alike. From a substantive standpoint, the presence and engagement of interested stakeholders often increases the amount of information, the subject matter covered and the degree of detail that must be assembled for regulatory and administrative decisions. From a process standpoint, these stakeholders expect and seek a greater degree of participation and/or

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opportunity to influence such decisions, and the federal decision processes have evolved to accommodate their interest and participation.

Perhaps the next strongest influence on the regulatory framework for resource decisions to be made in a particular area is the presence – or the perception of the presence – of a more than normally sensitive receiving environment. This admittedly generic description covers issues ranging from the presence of species deemed threatened, endangered or candidates for protection under the Endangered Species Act, or their habitats, to such ecosystems as coastal wetlands, prairie potholes, proximity to rivers and streams, offshore reefs or kelp beds, and many Arctic habitats generally. The presence or proximity of an ecologically sensitive environment can not only lead to increased agency scrutiny, but can determine and/or increase the number of agencies from which concurrence or approval may be required. To the extent a project and the review process for the project may require NEPA review (or state process equivalent) the existence of a sensitive receiving environment is often a criterion for requiring more detailed review under the federal or state scheme. Finally, where such ecologically sensitive environments can be found, there are often groups of individuals who see themselves as stakeholders in the protection of those environments. This usually assures a greater quantity and detail of public comment, and may result in a higher profile and greater level of controversy for the regulatory process.

A receiving environment can likewise raise the profile and the potential for controversy for a project if it can be distinguished by its scenic or aesthetic character. The potential for overlap obviously exists between a receiving environment characterized by its scenic and aesthetic attributes and one identified by its ecological, species or habitat values. But in the case of the latter, the potential exists to resolve regulatory and permitting decisions for natural gas or oil projects occurring in, on or nearby such environments with recourse to science-based criteria and findings. In the case of the former type of environment, the opinions and preferences of interested members of the public depend on fundamentally intangible factors that are difficult if not impossible to resolve by science-based or technical criteria. Perhaps the archetypal example of a receiving environment that is valued for its aesthetic character is the California coast. In some respects this is ironic considering that the first offshore wells – drilled from piers – were drilled off Summerland, California in the late 1890's. In fact, among the factors contributing to nearby Santa Barbara's evolution as a destination for tourists was the prevalence of the belief in that same period that hydrocarbon vapors from the many natural seeps offshore were healthful. Huntington Beach – Surf City, USA – began its life as an oil production town and only later became a beach resort. The 1969 oil spill off Santa Barbara not only proved seminal in the launch of the contemporary American environmental movement, but it helped transform public opinion in California to broadly oppose new offshore facilities. Indeed, no new federal leases have been issued in the Pacific OCS since the early 1980's, and the last new production platform off the California coast was installed in the Santa Ynez Unit in 1993. While objection to offshore projects proposals has been raised in California on various technical or environmental grounds, public opposition

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overall stems from the fact that a great many Californians simply do not wish to look at platforms.

The opportunity for controversy and for a potentially complex, protracted and expensive regulatory process increases still further if the receiving environment for the project becomes a subject of national (or at least trans-regional) concern. Discussion of the challenges facing such a project often focuses on the possibility for litigation more than the effects on the regulatory framework for the project, but the effect on the permit and approval process from nationalizing the controversy surrounding a project can be profound. National attention usually indicates that a project presents one or more issues that are believed to be precedent-setting in broader policy terms. This in turn can draw the attention of organizations and interest groups that possess the resources to fund research and advocacy efforts on leading issues, as well as the sophistication to challenge the decision process for the project as opportunities to do so arise. Such situations likewise invite the attention of persons who identify themselves as stakeholders in the regulatory process and its outcome, though they may live half a continent away. The likelihood increases that agency decision-makers will be under considerable pressure to justify their decision with reference to non-technical factors, or to juxtapose the value of going forward with the project against non-market criteria. In such situations, it is also likely that project opponents will try to create an environment in which the decision on the project is portrayed as a proxy for broader policy decisions. In general, most regulatory processes – and many among agency staff who find themselves facing regulatory decisions in these contexts – are ill-equipped to resolve the resulting controversies on the policy grounds put forward.

Although any of the sets of circumstances described in this section can present opportunities for later litigation, litigation is highly likely in projects that receive national attention. This factor also affects and overshadows the regulatory framework for a project, and can often diminish the room for maneuvering and compromise that a successful regulatory process can provide.

Another circumstance that can have strong influence on the regulatory framework for a particular project is the proximity of the project to significant numbers of people. The greater the number of people nearby, the greater the number of people who will see themselves as potentially affected by project operations. In a number of such cases, the range of public concerns will also expand from the traditionally ‘environmental’ or other operational subjects that are the subject of federal or state regulation, to include matters such as effects from project-related traffic, noise, ambient light, water use, demand on local services, or proximity to schools, parks and residential homes. Generally, these matters are addressed in local ordinances or regulations. However, there is not always a link between federal or state processes under which approval for the underlying project may occur, and local ordinance procedures and approvals. In these subject areas, a project’s success in moving through the local portion of the regulatory process often

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depends upon the operator's degree of engagement with nearby residents, and its willingness to address concerns in practical ways prior to seeking formal approvals.

Directly related to this criterion is the degree that a potentially affected public possesses familiarity with exploration and production operations. Where it exists, such familiarity provides a context for many regulatory and permit decisions that can lead to greater public acceptance of operator proposals and representations, and of agency requirements and decisions. It can also lead to an increase in the accountability of operators and agencies to the public because of a broader public understanding of the operational and technical criteria which operators and regulators act upon. This broader public understanding may be expressed word-of-mouth, by speaking out at public hearings, or in letters to the editor. It often results in a context for consideration and decision-making regarding a natural gas or oil project that is focused on those issues that the regulatory process is best equipped to resolve (because of their technical or fact-based nature), and on outcomes that acknowledge the art of the achievable in the balance between development of energy resources and potentially competing uses and values.

It follows that a region that can be characterized by the public's prevailing *lack* of familiarity with oil and natural gas operations often presents a less hospitable and more challenging context for a regulatory process. Lack of familiarity frequently translates to reduced acceptance of risk, reduced tolerance for operational error or inconvenience (traffic, for example) resulting from exploration and production activities, and a likelihood to view with suspicion representations made by project proponents. In such situations it may also prove difficult for agencies to achieve the public confidence necessary to carry out their roles – particularly if there are grounds to make a pro-development decision.

The degree to which ownership of mineral rights in the region is in private hands is another factor that can lead to a broader public willingness to accept operator representations and agency decisions. This contrasts with the situations where federal ownership of minerals prevails, as discussed above. In areas where private ownership of mineral rights prevails, mineral owners/lessors share an obvious economic interest in development of the resource. This does not make them indifferent to the effects of exploration or production operations on the environment, but it usually predisposes them to accept the balance between development of the resource and protection of the environment that results from regulatory approval of development. Also, in many cases, individual mineral interest owners have the opportunity to discuss surface protection issues of particular concern in the course of lease negotiations, and to resolve these issues through lease terms and conditions. This pattern can sometimes serve to narrow the range and scope of the issues that must be addressed through the regulatory process.

However, a factor that can work in the opposite direction and diminish the public willingness to accept pro-development outcomes is the existence of significant numbers of surface property owners who have no ownership interest in the mineral estate. A

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traditional principle of property law identifies the mineral estate as the “dominant estate,” out of recognition that the owner of the mineral estate is denied the opportunity to obtain value from his property if he cannot gain access to his minerals through the surface. Discussion of the increasing debate over the equity of this principle is beyond the scope of this section. But, the opportunity for controversy over the prospect of resource development should be obvious where “split estate” ownership patterns result in large numbers of individuals, the surface property owners, who see themselves as merely the recipients of impacts from development, rather than its beneficiaries. This situation virtually assures the attention and participation in the regulatory process by those who will look to the regulatory process to provide what individual negotiations have been unable or – through decisions or inaction of project proponents – unavailable to resolve.

The circumstance of “split estate” in the Intermountain West, where the U.S. government often granted deeds to the surface and withheld the mineral estate for federal ownership, is considered in BLM’s “Operating Standards and Guidelines for Oil and Gas Exploration and Development” (the so-called “Gold Book”). With the onset of development of tight gas or shale gas formations, where much more intensive drilling is required, reaching understanding and agreement with surface owners is presenting new challenges. This is occurring not only in the public lands areas of the West, where the surface owners are most often engaged in agriculture or stock raising, but also in areas where resource development encounters suburban growth, such as in the Barnett Shale outside of Fort Worth, Texas, and the Haynesville Shale outside of Shreveport, Louisiana.

The presence or perception of threats to (or scarcity of) other basic resource values – notably water supplies and air quality – will also affect the regulatory framework within which natural gas and oil projects are considered for approval. Somewhat related to this is the presence of widespread concern over urban growth or industrialization in certain areas. In areas where air quality is seen as compromised, differential public and regulatory scrutiny will fall upon any new industrial projects proposed in those areas. From the standpoint of the effects on the regulatory framework, this additional scrutiny, and its potential effects on the length, complexity or controversy of the regulatory process overall, can affect the pace and cost of development of natural gas and oil resources.

Examination of the effects of exploration and production operations on regional air quality has long been a focus of regulatory review in California’s San Joaquin Valley and Los Angeles Basin. As EPA air quality standards tighten, and as public concern about adverse developments in air quality grows in different regions, regulatory focus on air quality has become a dominant factor in the regulatory process for projects proposed in northeastern Colorado’s Wattenberg Field, in Wyoming’s Pinedale Anticline, and in Texas’ Barnett Shale, to name three examples.

Such a trend is likewise observable with respect to water resources. With the emerging importance of hydraulic fracturing to extraction of natural gas from tight sand or shale formations, considerable public attention now centers on the water required for ‘fracing,’

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the sources from which this water will be obtained, the effects of the operation on groundwater resources, and the disposition of water used in the process. Regulation of hydraulic fracturing is treated elsewhere in this report. For the purpose of discussion here, it is important to identify that public perception about availability and quality of water resources has emerged as a significant new factor to be addressed in the regulatory process. Perhaps nowhere is this more true than in the Catskill region of New York. For over a century, New York City's complex system of aqueducts, tunnels and reservoirs has drawn water from watersheds both east and west of the Hudson River, supplying this water to over 8 million customers with a minimum of treatment. The determination that the natural gas-rich Marcellus Shale extended through much of the Catskill region led swiftly to the mobilization of opposition by a variety of groups – including New York City's government – who identified themselves as stakeholders in the maintenance of the status quo for the City's water system. Elsewhere, concerns over the sufficiency of regional water supplies, from North Dakota to Texas, and from Colorado to Pennsylvania, are compelling operators to make a persuasive case that such supplies can accommodate water requirements for hydraulic fracturing operations. These concerns, and the operators' responses to these concerns, are affecting not only the regulatory process (which in some instances is hastening to catch up) but leading the operators to come up with innovative approaches to water management and recycling.

The question of urban growth and what some prefer to call 'industrialization' is also a factor that can influence the dynamics of the regulatory process in certain areas. The Barnett Shale area in Texas offers the example of heightened public concern over the effects of long term development and production of natural gas on the residential character of certain neighborhoods – varying, it must be said, from community to community within the seventeen county Barnett Shale area. The pattern of activity associated with shale gas development plays a role here, because the activity is at its most intensive during the drilling and completion phase, which can occur over a number of months to more than a year in some areas. This sets public expectations in ways that may be difficult to overcome, particularly if there are local incidents related to rig operations, traffic or noise that generate neighbor complaints during this period. But expression of concern over 'industrialization' has also been voiced in predominantly rural areas of the Intermountain West as well, often accompanied by land and mineral ownership patterns where "split estate" situations are found. In such areas, newcomers, who are often surface owners, have relocated or retired to areas that they have selected because of their rural, scenic and "western" character. To a number of these residents, the pattern of activity required for drilling and development of the natural gas resources of the tight sands of Colorado's Piceance Basin, or the coal bed methane resources of the state's San Juan Basin, represents an unacceptable industrial intrusion into a non-industrial environment. The concerns that drive these residents to engage in the regulatory process and in the debate that takes shape around that process arise not merely from dissatisfaction with the "present" drilling and development activities, but fear that this activity could lead to additional future industrialization of the rural environment in which they have made their homes.

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In virtually any of these contexts, the regulatory framework can be strongly influenced by a noteworthy event – particularly if the event is a safety, operational or environmental incident involving oil and gas operations. A number of studies have commented on the unwillingness of members of the public to accept risks that are unfamiliar to them, or that arise from activities or operations with which they have no direct experience. The occurrence of a mishap or an incident can therefore demonstrate to a latently concerned public that the incident not only *can* happen, but that it *will*. When well-publicized incidents begin to drive the regulatory framework, it becomes exceedingly difficult for either project proponents or agency decision-makers to justify analysis or subsequent decisions framed in terms of minimizing but not eliminating the risk. In the Barnett Shale, several thousand wells were drilled and completed within levels of public inquiry and concern that in most cases were effectively resolved. The release of information about benzene emissions from process and liquids storage equipment, followed by media accounts that questioned the reliability and objectivity of emissions testing, proved capable of adjusting public perceptions about the credibility of Barnett Shale operators and one of the key oversight agencies. This resulted in additional media accounts about the benzene emissions controversy, “stories about the story,” that shifted both operators and reviewing agencies into the difficult position of attempting to prove a negative: namely, that the benzene emissions were and are not at levels of public concern. Because the effectiveness of regulatory processes depends on a high level of public trust, the credibility and, potentially, the complexity and efficiency of the permit processes for individual Barnett Shale projects going forward may be affected. The more noteworthy the safety, operational or environmental incident – for example, a major safety or pollution incident – the greater the likelihood that the incident will not only affect the regulatory framework in a project area, but result in legislation, regulation, or judicial decisions that will conclusively alter the terms on which future projects are considered.

To summarize, regional variations in the regulatory framework in which individual projects for natural gas or oil development may be considered depend upon factors that can be evaluated with reference to the public’s experience with such projects on a case study basis, across regions, and over time. No regulatory process occurs within some ‘box’ that is insulated from events and public perceptions and concerns in the surrounding area (or in some cases, elsewhere in the nation). Few regulatory processes are determined solely with reference to criteria derived from science, technology or conventional measures of value, although rigorous analysis of such criteria is essential for an appropriate decision. In a society governed by the 24/7 news cycle, supplemented by communications and social networking tools that are transforming our public dialogue, it is increasingly important for project proponents to obtain a careful and ground-truthed understanding of the physical, ecological, community and cultural environment in which the responsible agencies will be considering their projects. It is good planning. And the agencies themselves will be doing so

