

# MINIMIZING THE ENVIRONMENTAL IMPACTS OF OIL AND GAS DEVELOPMENT: THE CHALLENGE OF FINDING THE RIGHT REGULATORY BALANCE

*Melinda E. Taylor \**

1. Environmental Issues; 2.Regulations and Standards Applicable to Oil and Gas Operations; 3. U.S. Environmental Law; 4. International Issues: Ocean Transport; 5. International Issues: Oil and Gas Production in the Developing World; 6. Conclusion. 7. Notes.

Demand for energy resources is growing around the globe as nations expand their economies. Increased demand for crude oil and natural gas, coupled with political instability in the Middle East, regional labor shortages, rising costs of steel and equipment, and changing regulatory structures are driving up energy prices, at least for the short term.<sup>1</sup> Future crude prices are up significantly this year, from a range of \$48 - \$55/bbl two years ago to \$58- \$78/bbl in 2006.<sup>2</sup>

Strong demand and high prices have led to a surge in drilling activity world-wide. Last year, the number of oil and gas wells drilled around the world was about 9% higher than in 2004, and more than any year

since the mid-1980s.<sup>3</sup> There is strong activity both within and outside the United States. Drilling in Canada and Mexico is occurring at record pace, and drilling is predicted to increase this year in South America, Russia, Eastern Europe, Africa, the Middle East, and the Far East.<sup>4</sup>

The environmental and human health impacts associated with oil and gas exploration and development increase as the rate of drilling and production increases, but the effects are not directly related to the number of wells or the volume of hydrocarbons produced. Rather, the environmental impacts are determined by the stringency of the policies in place to prevent releases of pollution, the sensitivity of the ecosystems where the operations are taking place, and the proximity of human activity. This paper provides an overview of the environmental issues associated with drilling and production, a summary of United States law as it pertains to drilling and production, a brief description of the relevant international conventions, and an overview of issues relevant in the developing world.

## *1. Environmental Issues*

There are environmental impacts associated with each stage of exploration and production of oil and gas. For example, the construction of roads and drill sites can result in pollution of surface water from sediment runoff. The land clearing necessary for road building causes habitat destruction and fragmentation. The operation of vehicles, motors, and processing equipment during development and production results in noise and air pollution. During drilling and production, the disposal of wastes – drill cuttings, drilling muds, fluids, and associated wastes – and produced water<sup>5</sup> can result in soil or groundwater contamination or surface water pollution, if the wastes are not properly managed. In offshore areas, releases of oil and hazardous chemicals from the drill site or from ships and tankers can harm marine ecosystems.

The U.S. Environmental Protection Agency (EPA) has documented a number of types of environmental damage from oil and gas operations, including:

1. Damage to agricultural land, crops, streams, and livestock from disposal of produced water and drilling fluids;

2. Threats to endangered species, fish, and other aquatic life from exposure to hydrocarbons and other pollutants;
3. Degradation of soil and groundwater from seepage from storage and disposal pits and improper disposal of produced water;
4. Potential contamination of aquatic and bird life in estuaries and bays from exposure to produced water;
5. Potential endangerment of human health from consumption of contaminated fish and shellfish; and
6. Potential damage to the tundra on the Alaska North Slope from road spreading oil wastes and seepage and discharges from reserve pits.<sup>6</sup>

Exploration and production wastes are generated in high volumes around the globe, making their proper management technically challenging and often expensive. In the U.S., for example, EPA estimated in its 1985 Report to Congress on Oil and Gas Pollution that 361 million barrels of drilling waste were generated from about 70,000 crude oil and natural gas wells and that 800,000 active production sites generated 20.9 billion barrels of produced water.<sup>7</sup> Generally, the older and more depleted the well, the greater the volume of produced water that is generated during production.<sup>8</sup>

The pollutants found in drilling and associated wastes and produced water include mainly hydrocarbon compounds<sup>9</sup>, but may also consist of solvents, hazardous chemicals, radioactive materials and concentrated salts. EPA has determined that a significant portion of oil and gas wastes contains constituents of concern above EPA's health-based standards. For example, produced water at 23 percent of sampled sites contained benzene, arsenic, barium, and boron at levels that exceeded EPA's health-based standards.<sup>10</sup> Seventy-five percent of the sample sites generating produced water contained chlorides at levels greater than 1,000 times the EPA secondary maximum contaminant level for chloride.<sup>11</sup>

The extent to which oil and gas wastes pose a threat to human health or the environment depends on a range of factors, in addition to the concentration of pollutants they contain. The factors include the rate of release from the management practices in place, the fate and transport of the contaminants in the environment, and the potential for human

health or ecological exposure to the contaminants.<sup>12</sup> Generally speaking, major oil spills, such as the 10.8 million barrel release from the Exxon Valdez in Prince William Sound, Alaska, in 1989, have a more dramatic, immediate impact on the environment than smaller volume, chronic leaks from pits or pipes. Nevertheless, long-term exposure to certain constituents, even in small quantities, can threaten human and ecological health.

## *2. Regulations and Standards Applicable to Oil and Gas Operations*

In the U.S., a complex array of federal and state laws governs the exploration and production process and the management of wastes from oil and gas operations. Similarly, Canada and the European Union have enacted regulatory schemes to manage the environmental impacts associated with oil and gas exploration and production on- and off-shore. In the developing world, however, environmental concerns historically have not been major factors in government policies regarding resource development. In addition, regulatory agencies in some countries lack substantial financial and political support. The result is that environmental problems associated with energy development have developed and concerns about the impacts of resource development have intensified. Some oil and gas producing countries have responded to the problems by enacting stronger regulations and increasing enforcement. There is also a trend toward applying international standards through contracts, especially when international companies are involved, to impose more rigorous environmental standards. Following is a description of the United States laws that apply to exploration and development and an overview of the issues that are relevant to international upstream oil and gas operations.

## *3. U.S. Environmental Law*

Activities that impact the environment are regulated in the United States by a mosaic of laws that were enacted in the 1970s and 1980s. Most of the laws focus on environmental media, such as air, water, and land (for example, the Clean Air Act,<sup>13</sup> Clean Water Act,<sup>14</sup> and the Solid Waste Disposal Act<sup>15</sup>), though a few are non-media-specific, such as the Endangered



Species Act<sup>16</sup> and the Emergency Planning and Community Right to Know Act<sup>17</sup>. In addition to federal laws, many states have enacted additional environmental laws that cover exploration and production. Environmental laws may impose land use restrictions, such as limits on activities that will affect sensitive ecosystems (wetlands, endangered species habitat, and aquifers used for drinking water), waste management requirements, pollution control requirements, and other measures designed to protect human health and the environment. Other laws impose liability on owners and operators who contributed to soil or groundwater contamination or a spill in surface water. There is considerable overlap and redundancy in the regulatory requirements and the Environmental Protection Agency (EPA) has made little progress simplifying compliance with the overlapping requirements.

The first legal consideration for oil and gas drilling is whether a given site is "open" to drilling. In the United States, certain areas are off-limits entirely to oil and gas development. Federally-established wilderness areas, some specific off-shore areas, and the Arctic National Wildlife Refuge have all been declared off-limits to oil and gas development by Congress. Other laws impose land use limitations through permitting requirements. The Clean Water Act requires that a lessee obtain a permit if she proposes to develop an area that has been designated a "wetland." Wetlands are defined as low areas (1) in which water stands during a portion of the growing season, (2) that contain soil that is saturated during the growing season, and (3) that have vegetation commonly found in areas with standing water during a portion of the growing season.<sup>18</sup> The permit requirement is triggered by the Clean Water Act's provision that gives the Corps of Engineers the authority to issue a permit to authorize the "discharge" of "dredged or fill material" into "navigable waters."<sup>19</sup> The term "navigable waters" is defined in the statute as "waters of the United States."<sup>20</sup> The Corps of Engineers has exempted certain activities from the permit requirement and has issued general, nationwide permits that cover a number of other activities. Individual permits are required for activities not exempt or covered by one of the Corps' general permits.

The Endangered Species Act (ESA) may also affect decisions about siting oil and gas operations. Section 9 of the ESA prohibits the "take" of one of the roughly 1200 species that have been listed as endangered

or threatened by the Secretary of the Interior.<sup>21</sup> "Take" is defined broadly to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct."<sup>22</sup>

The Secretary of the Interior has defined "harm" in regulation to include habitat degradation. Specifically, the regulations define harm as:

[A]n act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.<sup>23</sup>

Activities related to exploration and development, such as road building, clearing, and construction, may cause harm to an endangered species if they take place in endangered species habitat.

The ESA provides two mechanisms for obtaining authorization for a "take." First, Section 10 provides that a taking that is incidental to, and not the purpose of, an otherwise lawful activity can be authorized by the Secretary if the permittee applies for an incidental take permit and agrees to abide by a habitat conservation plan that minimizes to the "maximum extent practicable" the impacts of the taking.<sup>24</sup> Second, Section 7 of the act provides that any federal agency that proposes to authorize, fund, or carry out an activity that "may affect" an endangered species must consult with the Secretary of the Interior to ensure that the action will not "jeopardize the continued existence" of the species. If the Secretary finds that the action will not jeopardize the species, but will nonetheless "affect" the species, he will provide a statement to the permittee and permitting agency that contains "reasonable and prudent measures" that must be implemented in order to minimize the impacts to the species.<sup>25</sup> The section 7 consultation requirement is relevant to private parties who propose to lease an exploration site from the federal government, if the site contains endangered species habitat.

In addition to section 404 of the Clean Water Act and the Endangered Species Act, the Safe Drinking Water Act<sup>26</sup> contains provisions that may affect certain sites' eligibility for drilling. The Safe Drinking Water Act authorizes funding to create state programs to create "critical aquifer protection areas."<sup>27</sup> The state is required to create a comprehensive plan to protect the aquifer in those areas from contamination. Legal scholars have suggested that an effective aquifer protection plan might include prohibitions

on drilling within the protection area.<sup>28</sup> In addition, the Safe Drinking Water Act requires that states establish "wellhead protection areas" to protect public drinking water supplies.<sup>29</sup> Within those areas, it is possible that states may decide to limit drilling, in order to protect the aquifer.

After the lessee obtains all necessary permits to site a new well, he should consider whether any additional environmental permits will be required to cover drilling and production activities. In general, water discharge permits are required by the Environmental Protection Agency for discharges of pollutants into "waters of the United States."<sup>30</sup>

The permit requirement is relevant to drilling and production operations in two ways. First, the law requires permits for discharges associated with most construction activities.<sup>31</sup> However, Congress clarified in the Energy Policy Act of 2005 that storm water discharges from construction activities associated with oil and gas operations do not require a permit.<sup>32</sup> After construction, however, storm water permits are required for discharges associated with most types of "industrial activity," including "oil and gas exploration, production, processing, or treatment operations."<sup>33</sup> No permit is required from an oil and gas operation, though, if the water is channeled around the site to ensure that the storm water has not become "contaminated by contact with" oil or hazardous substances.<sup>34</sup>

In addition to storm water, lessees must obtain legal authorization to dispose of the produced water that accompanies the production of oil and gas. Produced water is usually the highest volume waste at the production site. Many operators inject the produced water either back into the well from which it was drawn, in order to enhance product recovery, or into an injection well. The CWA does not require a permit for the injection of produced water. The Clean Water Act excludes from the definition of "pollutant" the following:

[W]ater, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil or gas production and disposed of in a well, if the well used either to facilitate production or for disposal purposes.<sup>35</sup>

Rather than requiring a permit under the CWA, the injection of produced water must be authorized by the underground injection control

program of the Safe Drinking Water Act.<sup>36</sup> The UIC program is usually administered by the state.

The discharge of produced water to surface waters requires a permit under the Clean Water Act. EPA has promulgated "effluent limitations" pursuant to the CWA that impose restrictions on the chemical, biological, and physical composition of the water that can be discharged in waters that are "onshore," "offshore," and "coastal."<sup>37</sup> The stringency of the limitation is linked to the location of the proposed discharge. For example, the effluent limitation for "onshore" and coastal shoreline discharges is "no discharge," meaning that no discharge of produced water is permitted in those areas.<sup>38</sup>

Federal environmental law also requires that solid wastes from the drilling and production site – drill cuttings, drilling muds, fluids, and other wastes associated with oil and gas production – be disposed of properly. Many of the solid wastes contain constituents that would cause them to fall into the category of "hazardous wastes" regulated pursuant to the Resource Conservation and Recovery Act, if they were generated by a different industry.<sup>39</sup> EPA decided not to regulate oil and gas wastes as hazardous wastes after conducting a study on the environmental and economic impacts of doing so in the 1980s.<sup>40</sup> EPA determined that wastes that originate in the well (i.e., are brought to the surface during oil and gas exploration and production activities) or waste generated by contact with the oil and gas production stream during the removal of produced water or other contaminants from the product, are exempt from the hazardous waste regulations.<sup>41</sup> The exemption is limited to wastes that are "generated from a material or process uniquely associated with the exploration, development, and production of crude oil and natural gas."<sup>42</sup> In contrast, a material used at the site to clean surface equipment would not be an exempt waste, because it is not "uniquely associated" with exploration and development activities. The exemption from the hazardous waste regulations gives oil and gas operators substantial flexibility and relieves them from extensive and expensive requirements that would otherwise apply to the transportation, storage, and disposal of the wastes from the drilling site.

Though most drilling wastes are not considered hazardous wastes by EPA, the operator must nevertheless follow applicable state law requirements for disposal, storage, and transportation of the wastes. Some

states prohibit the use of open pits for waste disposal, for example, and others require that pits be lined with an impermeable material to prevent groundwater contamination or covered to prevent harm to birds and other wildlife.

Operators must be cognizant of the fact that they can be held liable for clean-up costs associated with groundwater or soil contamination caused by the release of hazardous substances, even if they have complied with every applicable federal and state waste disposal regulation. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) provides that persons who arrange for the disposal or treatment of a hazardous substance may be held liable for clean-up costs if there is a "release" of the substance.<sup>43</sup> In addition, the Resource Conservation and Recovery Act gives EPA and citizens the authority to compel persons who have contributed to a situation that presents an "imminent and substantial endangerment" to human health of the environment to take necessary actions to address the situation.<sup>44</sup>

The provision applies to non-hazardous, as well as hazardous, wastes. CERCLA and RCRA also impose liability on owners of sites that have been contaminated with hazardous substances. As a result, surface owners should include provisions in their leases that require lessees to properly remediate any spills or releases of hazardous substances that occur during drilling and production.

The Clean Air Act requires that an operator obtain a permit to authorize the emission of certain air pollutants. Air permits are required for statutorily defined "major sources" of regulated air pollutants. A source is considered "major" if it emits more than 100 tons per year of so-called "ambient air pollutants," 10 tons per year of a hazardous air pollutant, or 25 tons per year of any combination of hazardous air pollutants.<sup>45</sup> The trigger levels are lower in areas with poor air quality.

Most upstream oil and gas facilities do not trigger the CAA's permit requirement, because the emissions from equipment at the sites are relatively low. Moreover, EPA is prohibited by the law from aggregating oil and gas production wells in an area for purposes of regulating air emissions.<sup>46</sup> The CAA provides an exception, however, when wells are located in a metropolitan statistical area with a population in excess of one million, if the Administrator determines that emissions of haz-

ardous air pollutants from the wells present more “than a negligible risk of adverse effects to public health.”<sup>47</sup>

In addition to the potential environmental damage that can result from pollution associated with oil and gas production, spills of oil itself can cause substantial environmental harm, especially when the spills occur in water. Section 311(f) of the Clean Water Act imposes liability on owners and operators of onshore facilities from which there is a discharge of oil or a hazardous substance into waters of the United States.<sup>48</sup> The Oil Pollution Act (OPA) also imposes liability for cleanup and damages on the “responsible party” for a facility from which there is a discharge of oil or a substantial threat of a discharge of oil into waters of the United States.<sup>49</sup> “Responsible party” is defined to include any person owning or operating an onshore facility or a vessel, including a person who has the right to use the property by lease, assignment, or permit. The OPA provides for more compensation and damages than the CWA, CERCLA, or RCRA, but it is limited to oil contamination and covers spills into “waters of the United States.”

#### *4. International Issues: Ocean Transport*

Over the last forty years, many of the worst environmental disasters in the world have been associated with oil spills. The scene is familiar: a tanker runs ashore onto a reef, breaks apart, and the result is millions of barrels of oil spilled into the ocean. Thousands of birds die because their feathers become coated with oil. Dead fish are washed ashore and miles of previously pristine coastline are coated with black oil and tar. The wreck of the Torrey Canyon in 1967, the Amoco Cadiz in 1978, the Exxon Valdez in 1989 and the Braer in 1992 all became emblematic of the environmental hazards associated with the transportation of oil on the high seas.

In large part as a response to the tanker catastrophes, as well as a growing awareness of ocean pollution caused by ocean shipping,<sup>50</sup> a body of international law has evolved that addresses oil pollution on the high seas. The rules fall into two broad categories: (1) requirements that are designed to prevent pollution from oil and hazardous substances and ensure ship safety; and (2) provisions that provide for compensation and

clean-up responsibility for damages due to accidents.<sup>51</sup> For the most part, the conventions are sponsored by the International Maritime Organization, a United Nations agency headquartered in London.

In general, sovereign nations bear the responsibility for marine pollution under the international law of the sea.<sup>52</sup> Sovereign countries are required to minimize ocean pollution from all sources, including pollution from ships, and take measures to prevent accidents.<sup>53</sup> The flag states have the primary obligation to ensure that ships comply with international pollution control laws as well as the laws that apply within their jurisdictions.<sup>54</sup> In addition, coastal countries have the right to enforce pollution standards to maintain marine resources and preserve and protect the marine environment within their Exclusive Economic Zones.<sup>55</sup>

In addition to the Law of the Sea Convention, the International Convention for the Prevention of Pollution from Ships (MARPOL) was intended to reduce oil pollution in the oceans by minimizing the risk of accidental discharges.<sup>56</sup> MARPOL imposes design requirements for certain ships, especially tankers, and has restrictions on the discharge of all forms of pollution from ships, including garbage, plastics, and synthetic waste, in addition to oil and hazardous materials. Pursuant to MARPOL, each country regulates discharges by its own ships and also has the authority to enforce the MARPOL standards against all ships in its territorial waters.

Two treaties address civil liability for pollution damage caused by spills of oil. The International Convention on Civil Liability for Oil Pollution Damage<sup>57</sup> and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution<sup>58</sup> established mechanisms for providing funds to compensate victims of oil spills. The United States is not a party to either convention, however.

### ***5. International Issues: Oil and Gas Production in the Developing World***

In contrast to the detailed and sometimes overlapping environmental requirements in U.S. law, international law governing the exploration and production of oil and gas is sparse and lacks specific substantive requirements. Of course, transnational oil companies are obli-

gated to abide by the laws in place in the countries in which they operate, and they routinely cite their commitment to do so in the "corporate responsibility" section of their annual reports. However, a number of observers have noted that, in the developing world, at least, the laws are ambiguous in meaning or weak, and the host government lacks the power to ensure that companies minimize their environmental impacts.<sup>59</sup> There have been numerous documented instances of alarming levels of environmental degradation from oil and gas operations in developing countries, including Texaco's oil and gas fields in the Amazon in Ecuador, the Camisea gas pipeline project in Peru, and, recently, the extensive oil spills in the Niger Delta, largely from Shell's operations.<sup>60</sup>

There are two main international standards that apply to oil and gas operations, but neither imposes any specific environmental standards on the operators. The International Organization for Standardization (ISO) adopted a standard in 1996, known as ISO 14001, which requires a series of procedures for an environmental management system.<sup>61</sup> ISO 14001 is a private voluntary standard for environmental management systems. It does not mandate specific substantive requirements and it contains no performance standard. Rather, it is a series of procedures that a company must follow to establish an environmental management system if it wishes to be certified as ISO compliant. To be certified under ISO 14001, a company must (1) establish an environmental policy that includes a commitment to comply with applicable laws and work towards continual improvement and pollution prevention; and (2) develop an internal process to manage and review the policy.<sup>62</sup> To be certified, the company seeking certification hires a private company that certifies the management system. The certifier is not required to evaluate whether the company has complied with the applicable law in the country in which it is operating, but only to review the system that the company has established.

The World Bank has published non-binding guidelines for pollution abatement and prevention in projects that are financed by the World Bank Group. The guidelines are industry-specific and include onshore oil and gas development. The guidelines "represent good environmental management practices which can be achieved and maintained with the levels of skills and resources typically available in countries in which the World Bank group operates."<sup>63</sup>



The guidelines are not modeled after the most stringent environmental standards in place around the world, but they do include some specific parameters, such as permissible levels for pollutants in wastewater discharges and air emissions.<sup>64</sup> Nevertheless, the guidelines are less protective than U.S. standards and regulations that have been in place for several decades.<sup>65</sup>

In the absence of stringent environmental programs in many countries and meaningful international standards, transnational companies' contractual commitments to apply "best industry practices" and "responsible standards" have emerged as a dominant mechanism for achieving environmental protection at oil and gas production sites. The major international oil companies have adopted corporate policies that articulate their support for sustainable environmental practices. They generally include aspects of their corporate policies in their contracts with foreign governments.

Some scholars and environmentalists have been critical of the contractual approach to environmental compliance.<sup>66</sup> They write that often the contract's commitments are ambiguous, because they incorporate "international standards" or "best practice," terms which are rarely defined. There is no international consensus about what constitutes "best practices" in the environmental arena with respect to oil and gas development. Moreover, in the developing world, oil companies often use standards and practices that have been abandoned in the U.S. and other parts of the first world.<sup>67</sup>

The contracts sometimes refer to standards and guidelines that have been published by industry trade groups, such as the American Petroleum Institute and the Oil Industry International Exploration and Production Forum. Many of the provisions are very vague and define abstract goals for the environment, such as "minimizing pollution," rather than specific standards or practices.

## **6. Conclusion**

Oil and gas operators in the United States must comply with a complex, often confusing array of environmental requirements that cover all aspects of their operation, from siting to waste disposal and the trans-

port of their products. Similarly, companies operating in other parts of the developed world are required to comply with strict regulations. In the developing world, however, the environmental requirements vary from nation to nation and are often not vigorously enforced. In response to recently documented cases of serious pollution, most transnational oil companies have stated their commitment to comply with "best industry practices" and "international law." Environmentalists remain concerned, however, because the companies' commitments are vague and usually not based on the best achievable, or most stringent, practices in place in the developed world. As the world's demand for oil and gas continues to grow, we can expect pressure on some of the globe's most sensitive ecosystems to become more intense. Increasingly, environmentalists advocate the importance of binding, substantive international requirements for exploration and development. If such requirements are developed, it will be important to strike the right regulatory balance, so that the result is improved environmental protection, but without an undue amount of regulatory red tape.

---

\* Clinical Professor, Director of the Environmental Law Clinic  
University of Texas School of Law.

## 7. Notes

1 World Oil Magazine, *High Prices, Instability Keep Activity High*, (Sept. 2006) [http://www.worldoil.com/MAGAZINE/MAGAZINE\\_DETAIL](http://www.worldoil.com/MAGAZINE/MAGAZINE_DETAIL).

2 *Id.*

3 *Id.*

4 *Id.*

5 Produced water is water that occurs naturally in the reservoir from which the hydrocarbon is produced, and which is pumped to the surface during oil or gas production.

6 "Regulatory Determination for Oil and Gas and Geothermal Exploration, Development and Production Wastes," 53 Fed. Reg. 25,447, 25448 (July 6, 1988).

7 *Id.*

8 Oil in the Sea III: Understanding the Risk, Chapter 2, p. 19-25, National Academies Press (2003).

9 Hydrocarbon compounds in crude oil are characterized by their structure such as saturates, olefins, aromatics, and polar compounds. *Id.* In general, non-aromatic organic compounds are relatively nontoxic because they are volatile and evaporate easily. Neff, J.M. "Biological Effects of Oil in the Marine Environment," Chemical Engineering Progress. Vol. 83, No. 11, pp. 27-33 (Nov. 1987). In contrast, aromatic hydrocarbons and Polycyclic Aromatic Hydrocarbons (PAH) pose the greatest toxicity threat to the environment. *See Oil in the Sea III*, Chapter 5. The most toxic components may kill organisms rapidly, while others cause a long term, chronic problem. *Id.*

10 53 Fed. Reg. 25,447, 25,455.

11 *Id.*

12 *Id.*

13 Clean Air Act of 1970, 42 U.S.C. §§ 7401 – 7671q (2005).

14 Federal Water Pollution Control Act of 1972, 33 U.S.C. §§ 1251 – 1387 (2005).

15 Solid Waste Disposal Act of 1976, 42 U.S.C. §§ 6901 – 6992k (2005).

16 Endangered Species Act of 1973, 16 U.S.C. §§ 1531- 1544 (2005).

17 Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. §§ 11001-11050 (2005).

18 See generally Recognizing Wetlands, U.S. Department of Commerce, National Technical Information Service (1989).

19 33 U.S.C. § 1344(a).

20 33 U.S.C. § 1362(7). "Discharge" and "waters of the United States" are terms that have been litigated extensively. The U.S. Supreme Court recently interpreted the term "waters of the United States" to mean "relatively permanent, standing, or continuously flowing bodies of water forming geographic features that are described in ordinary parlance as streams, oceans, rivers [and] lakes." *Rapanos v. U.S.*, 126 S. Ct. 2208 (2006). The court's plurality opinion states that only wetlands with a "continuous surface connection" to such waters are considered "waters of the United States."

21 ESA § 9(a)(1)(B); 16 U.S.C. § 1538(a)(1)(B).

22 ESA § 3(19); 16 U.S.C. § 1532(19).

23 50 C.F.R. § 17.3 (2006). The regulation was upheld by the U.S. Supreme Court in *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687, 698-701 (1995).

- 24 ESA § 10(a); 16 U.S.C. § 1539(a).
- 25 ESA § 7(b)(4); 16 U.S.C. § 1536(b)(4).
- 26 Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-26 (2005).
- 27 42 U.S.C. § 300h-6 (2005).
- 28 David E. Pierce, "Assessing Thirty Years of Federal Environmental Regulation of Upstream Oil and Gas Activities," 50<sup>th</sup> INST. ON OIL & GAS LAW & TAX'N 5-1 (1999), p. 5-14.
- 29 42 U.S.C. § 300h-7(a)(4)(2005).
- 30 CWA § 301(a), 33 U.S.C. § 1311(a) (2006).
- 31 40 C.F.R. § 122.26(b)(14)(x)(2006).
- 32 Energy Policy Act of 2005, Pub. L. 109-58, Section 323. In response to the new law, EPA amended its stormwater regulations to exempt oil and gas construction sites. 71 Fed. Reg. 33,628 (June 12, 2006).
- 33 40 C.F.R. § 122.26(b)(14)(iii)(2006).
- 34 40 C.F.R. § 122.26(c)(1)(iii)(2006).
- 35 CWA § 502(6)(B), 33 U.S.C. § 1362(6)(B) (2006).
- 36 40 C.F.R. § 144.6(b) (2006).
- 37 40 C.F.R. § 435.30; 40 C.F.R. § 435.10; 40 C.F.R. § 435.40 (2006).
- 38 40 C.F.R. § 435.32 & 435.40 (2006).
- 39 EPA estimates that approximately 10 – 70% of large-volume oil and gas waste would meet the agency's definition of "hazardous waste" if it were not exempt from the hazardous waste regulations. 53 Fed. Reg. at 25455.
- 40 The exemption is found at 40 C.F.R. § 261.4(b)(5) (2006).
- 41 Environmental Protection Agency, "Exemption of Oil and Gas Exploration and Production Wastes from Federal Hazardous Waste Regulations," p. 8. Available at [www.epa.gov/epaoswer/other/oil/oil-gas.pdf](http://www.epa.gov/epaoswer/other/oil/oil-gas.pdf).
- 42 *Id.*, p. 18.
- 43 CERCLA § 107(a)(3), 42 U.S.C. § 9607(a)(3).
- 44 RCRA § 7003, 42 U.S.C. § 6973 (2005).
- 45 CAA § 112(a)(1), 42 U.S.C. § 7412(a)(1) (2006).
- 46 CAA § 112(n)(4), 42 U.S.C. § 7412(n)(4) (2006).
- 47 *Id.*
- 48 CWA § 502(7); 33 U.S.C. § 1362(7) (2006).
- 49 Oil Pollution Act § 1002(a), 33 U.S.C. § 2702(a) (2005).
- 50 Approximately half of all marine pollution, primarily oil pollution, is caused by ocean shipping. Most comes from standard ship operations such as deballasting and tank washings. Only about 10% results from tanker accidents. Thomas J. Schoenbaum, "The International Framework for Pollution Control," 2 ADMIRALTY & MAR. LAW § 18-1 (4<sup>th</sup> ed.).
- 51 *Id.*
- 52 Dec. 10, 1982, U.N. Doc. A/CONF. 62/122, U.N. Sales No. E.83 B.5., reprinted in 21 I.L.M. 1262 (1982). [hereinafter LOS]
- 53 LOS Convention, Article 211.
- 54 *Id.*, Articles 211, 217.
- 55 *Id.*, Article 211(2) and (5).
- 56 Protocol of 1978, opened for signature

June 1, 1978, IMCO Doc. TSPP/Conf/11 (1978) reprinted in 17 I.L.M. 546 (1978).

57 Open for signature, Nov. 29, 1969, 973 U.N.T.S. No. 14097, 9 I.L.M. 45 (1970).

58 Open for signature, December 18, 1971, reprinted in 11 I.L.M. 284 (1972).

59 See, e.g., Judith Kimerling, "International Standards in Ecuador's Amazon Oil Fields: The Privatization of Environmental Law," 26 Colum. J. Envtl. L. 289 (2001),

60 The World Wildlife Fund reports that over 1.5 million tons of oil have been released into the Niger Delta over the last 50 years. This is fifty times more than the Exxon Valdez spill of 1989. Over 7,000 acres of ecologically sensitive mangrove swamps have been harmed and populations of rare primates, fish, turtles, and birds are threatened. Shell contends that most of the releases have been due to sabotage, but corrosion and failing equipment appears also to be at fault. The Independent,

October 25, 2006, available at <http://news.independent.co.uk/world/africa/article19301.ece>.

61 International Organization for Standardization, ISO 14001. Environmental Management Systems – Specifications with Guidance for Use (Geneva 1996) (ISO Standard).

62 ISO 14001 Standard.

63 The World Bank Group, Pollution Prevention and Abatement Handbook, 1998: Toward Clean Production (1998) at v-vi.

64 *Id.* at 447.

65 For example, discharges of produced water to fresh water have been prohibited in the U.S. since 1979. The World Bank guidelines permit discharges, provided they do not exceed certain concentrations of certain pollutants.

66 See Kimerling, *infra*.

67 *Id.* at 320.