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Mapping the Energy-Water Policy Landscape

Final Report to the Union of Concerned Scientists

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About the Union of Concerned Scientists and the Energy and Water in a Warming World initiative

The Union of Concerned Scientists is a nonprofit partnership of scientists and citizens combining rigorous scientific analysis, innovative policy development, and effective citizen advocacy to achieve practical environmental solutions. Established in 1969, UCS seeks to ensure that all people have clean air, energy, and transportation, as well as food that is produced in a safe and sustainable manner. UCS strives for a future that is free from the threats of global warming and nuclear war, and a planet that supports a rich diversity of life. Sound science guides our efforts to secure changes in government policy, corporate practices, and consumer choices that will protect and improve the health of our environment globally, nationally, and in communities throughout the United States. In short, UCS seeks a great change in humanity's stewardship of the earth. More information on UCS is available at www.ucsusa.org.

Energy and Water in a Warming World is a collaborative effort between UCS and a team of independent experts to build and synthesize policy-relevant research on the water demands of energy production in the context of climate variability and change. EW3 includes core research collaborations intended to raise the national profile of the water demands of energy, along with policy-relevant energy development scenarios and regional perspectives. More information on EW3 is available at www.ucsusa.org/ew3.

About the Environmental Law Institute

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I. Introduction

The Union of Concerned Scientists recently launched an Energy and Water in a Warming World (EW3) initiative to examine the implications of energy choices for water quantity and quality, particularly in the context of climate change. Water quality, quantity, reuse, and discharge are integral to many of our energy production activities. For example, most thermoelectric power generation plants require substantial amounts of water for steam generation and cooling. Disposal of combustion byproducts raises issues of water quality, and new carbon capture and sequestration technologies require large amounts of water.

Extraction of oil and natural gas using enhanced recovery techniques or hydraulic fracturing uses large volumes of water, and dealing with produced water (as well as injected water) is a substantial issue for most oil, gas, and geothermal energy production. Mining of fuel minerals, such as coal, uranium, and oil shale, implicates both water quality and quantity. Issues related to energy activities include discharges to surface waters, evaporation, and injection into deep underground formations. Biomass growing and refining can be water-intensive, involving both agricultural and industrial processes.[1]

This publication by the Environmental Law Institute identifies the regulatory laws and policies currently affecting the connections between energy and fresh water within the United States. The review is limited to federal, state, and interstate legal regimes affecting thermoelectric generating facilities and transportation fuels and their related feedstocks; it does not address taxes or subsidies.

II. Overview of Water Law Framework

This section defines the legal powers and bases of authority for federal, state, and interstate government actions affecting water and the water/energy connection. These sources define the range of opportunities and constraints within which legal policy changes can be undertaken, including the constitutional, sovereignty-based, and common law powers of respective levels of government to address water quantity and quantity, allocation, and property. Sections III-V discuss current laws, so readers may prefer to skip ahead to those sections, and refer back to this framework where the issue is what type of authority may support new lawmaking by state, interstate, or federal institutions.

A. Federal Authority

The federal government has only those powers conferred on it by the U.S. Constitution. Authority for Congress to legislate controls of water quality and quantity in the energy context is principally based upon the Constitution's Commerce, Property and Treaty clauses. Other authorities, such as the Spending Clause, also apply.[2]

1. *Commerce Clause*

Congress is endowed with the power "to regulate commerce...among the several states."[3] The Commerce Clause has been construed broadly over time, and Congress now relies upon it to authorize most of its economic and regulatory laws, including the Clean Water Act and Safe Drinking Water Act and other environmental legislation, as well as interstate energy regulation. Federal control over navigation is one aspect of the commerce power that is particularly relevant to water. Protection of navigation enabled federal regulation of the use, preservation, and quality of waters that were "navigable in fact."[4] By 1899, federal jurisdiction expanded further, to encompass non-navigable-in-fact waters upstream as necessary to protect downstream navigation.[5] Subsequently, federal jurisdiction attached to waters that potentially could be made navigable by improvements, as well as non-navigable upstream tributaries and wetlands.[6]

2. Property Clause

A second source of authority is the Constitution's grant to Congress of power "to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States."[7] Lands owned by the federal government are subject to this plenary power, including disposal of mineral interests through leasing or entry for mining claims, or construction of government facilities, or private facilities under lease or license. Water occupies a somewhat different role, however.

In the original thirteen states, under the common law inherited from Britain, rights in water were attached to land ownership, especially ownership of riparian and submerged lands. Under the common law, water cannot be owned until it is *captured* and used; thus water rights consist of the right to *use* water, not abstract ownership of flowing water. In forming the United States, the original states retained their lands but ceded their western lands to the federal government. Additional territories were later acquired by the federal government by treaty with foreign governments. What the federal government acquired were lands and un-captured waters thereon.[8] However, the Supreme Court has held that the federal government had no riparian rights to the use of water on the public lands, and that no such rights applied until the land was legally settled and the water used by the settler-owners.[9] In 1845, the Supreme Court also held that states retain title to their shores and to submerged lands such as the beds of rivers.[10] Because new states can be

admitted to the Union only on an "equal footing" with existing states, the federal government grants the submerged lands beneath navigable waters to each new state. [11] The federal government owns no claim to water based on its riparian ownership. Nor does it own the submerged lands in the states. Thus there is little federal property in water, even on public domain lands, and the federal government defers to state laws for most water rights determinations.[12]

The primary exception to federal deference is in "reserved rights." Since many federal lands and Native American reservations were created without explicit water rights under state law, the reserved rights doctrine ensures that those lands have sufficient access to water to meet the purposes for which they were set aside. The doctrine originated in the 1908 Supreme Court decision in *Winters v. United States*, where the court implied the right to water for the Native American reservation at issue from the circumstances, finding it hard to believe that Congress "took from them the means of continuing their old habits, yet did not leave them the power to change to new ones."[13] This doctrine was subsequently extended to other federal lands reserved out of the public domain for a specific public purpose.[14] Reserved rights are limited to the original purposes of the land reservation: the rights to water of Native American reservations commonly are based on practicably irrigable acreage,[15] and rights on other federal lands are based on the purposes expressly stated in the grant of congressional authority when the land was set aside.[16]

The federal government also has exercised its authority under the Property Clause, and the "Necessary and Proper" Clause,[17] to construct large public works projects on the federal domain, such as dams and irrigation works under the Reclamation Act of 1902.[18] As a consequence of this federal construction, the federal government was able to establish rules for the distribution of water made available through these works and also to establish limits to access (such as acreage limits for irrigators using the water). Water rights "are perfected under state law, but reclamation law also assumes some continuing federal control over the use of the water."[19]

3. Treaty Clause

Article II of the Constitution authorizes the President to make treaties with the advice and consent of the Senate. In addition to treaties, the federal government enters into other forms of agreements with other countries; these include congressional-executive agreements, which require the consent of both houses of Congress, and executive agreements, which are not subject to congressional approval.[20] Both treaties and international agreements have affected water rights and acquisitions.

Native American tribes have rights arising from treaties signed with the U.S. Such treaties commonly included grants of land to the United States, which, if interpreted to retain in the tribes those rights not expressly given away, may mean a reserved right to water dated long before any others.[21] The treaties also may include express rights of the tribes that directly or indirectly affect water quantity and quality management. For example, the Klamath Tribe's 1864 treaty with the United States gave the Tribe exclusive rights to hunt, fish, and gather on its reservation, and courts have held that the Tribe has a water right dated to time immemorial in the amount necessary to protect the hunting and fishing rights.[22]

The U.S. has entered into several international treaties specifically relating to sharing of water resources across international boundaries. For example, the Treaty for Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande apportioned the waters in these rivers between the U.S. and Mexico and provided for the joint construction and operation of structures to store and divert waters to implement the apportionment. The 1909 Canada-U.S. Boundary Waters Treaty addresses water quantity and quality issues and is administered by the International Joint Commission, which is empowered to evaluate water control projects, resolve disputes,

manage water flows and levels in the Great Lakes and operations in Columbia River dams, and measure and apportion the waters of the St. Mary's and Milk River systems.

4. Federalism and State Law

The Constitution, federal law, and treaties are "the supreme Law of the Land."[23] One consequence of the "Supremacy Clause" is that federal laws can preempt state regulation. Preemption of state laws can occur expressly in federal legislation, or it may be implied. In turn, implied preemption may arise in two ways. Preemption can be implied if state law directly conflicts with the provisions of a federal law that does not otherwise preempt state regulation, or if the federal government "occupies the field" – regulating so pervasively in an area that any state efforts to regulate are barred as inconsistent with federal authority. In determining preemption, courts "start with the assumption that the historic police powers of the States were not to be superseded...unless that was the clear and manifest purpose of Congress."[24] This is particularly applicable in areas of traditional state regulation, such as water law.

The Supreme Court has also determined that by authorizing the Federal government to regulate interstate commerce, the Constitution necessarily and implicitly restricts state regulations that improperly burden such commerce, unless Congress has enacted the restriction. This "Dormant Commerce Clause" bars state laws that privilege in-state businesses by restricting the flow of commerce. In *Sporhase v. Nebraska*, the U.S. Supreme Court held that a Nebraska statute forbidding commercial export of water constituted an unconstitutional burden on interstate commerce and was therefore invalid.[25]

Most federal U.S. environmental laws operate under a paradigm known as "cooperative federalism," in which federal laws provide a minimum baseline of environmental protection, and states can enact more protective legislation if desired. Cooperative federalism only works if states are willing to take on responsibility for implementing programs designed by federal legislation (so-called "delegation"). The constitutional Spending Clause provides a key tool for encouraging states to develop delegated programs.[26] But cooperative federalism has limits. In *New York v. United States*, the Supreme Court held that a program to pay states for accepting low-level radioactive waste was an "unexceptional" exercise of the spending power. The court also upheld an access limitation based on the Commerce Clause, where states missing deadlines could lose access to disposal. However, the Court struck down a "take title" provision requiring states to assume liability for waste if they failed to comply, ruling that provision to violate the Tenth Amendment, which reserves some powers to the states.[27] Thus, the federal government cannot simply "commandeer" or compel state governments to participate in federal programs.

In applying federal Constitutional limits protecting property rights, the courts will look to state laws to determine what the owner or rights holder owns. Federal actions that destroy state-recognized private property rights may give rise, under some circumstances, to claims under the Fifth Amendment[28] for payment of just compensation.

B. State Authority

State authorities to legislate and adjudicate concerning water derive from several sources, including state constitutions, common law (judge-made law derived from English jurisprudence and carried forward in the U.S.), and the states' inherent "police power" to provide for the public health, safety, welfare, and morals.

1. State Constitutions

Some state constitutions explicitly protect rights to water, water quality, or the environment in general. These provisions limit the options available to government and parties interested in water management, but they also provide greater certainty and leverage to parties in disputes. For example, the Colorado Constitution expressly adopts the prior appropriation doctrine (see below) as the means of water allocation in the state and declares that "[t]he right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied."[29] The Montana Constitution provides that the right to a "clean and healthful environment" is an "inalienable right,"[30] that "all lands disturbed by the taking of natural resources shall be reclaimed,"[31] that "all surface, underground, flood, and atmospheric waters within the boundaries of the state are the property of the state for the use of its people and are subject to appropriation for beneficial uses as provided by law," and that "all existing rights to the use of any waters for any useful or beneficial purpose are hereby recognized and confirmed."[32]

2. Public Trust Doctrine

The public trust doctrine applies to certain navigable waters and littoral lands, and is based on the concept that the public possesses "inviolable rights in certain natural resources."[33] The doctrine has been recognized by the U.S. Supreme Court and has variations among states that recognize the doctrine.[34] In general, the state owns the lands beneath navigable waters in trust for its citizens. In addition to prohibiting the state from conveying these submerged lands in conflict with the trust, the courts have interpreted the doctrine to protect numerous uses of the water, such as fishing, swimming and other forms of recreation as well as navigation and other commercial uses.[35]

3. State Common Law

Common law forms the background principles of property rights in the use of water. These apply except as modified by state statutory law. The ***riparian rights doctrine*** was the first system of water rights allocation used in the colonies and in the United States. The doctrine, still used in more than half the states, has had many permutations, but at its core is the premise that the *owners* of land *bordering* a waterbody have a set of rights that include the use of that water. Today, all riparian doctrine states allow the "reasonable use" of water, so long as it does not interfere with the "reasonable use" of other users.[36] In the Western U.S., water was scarce, and the places where it was needed (for mining, farming, or stock raising) were not always adjacent to where it flowed. Settlers developed an alternative approach to the riparian doctrine, the ***prior appropriation doctrine***, usually summarized as "first in time, first in right." Under this system, an appropriation of water is valid under law if there is intent to apply water to a beneficial use, a diversion of water from the water body, and the actual application of the water for a beneficial purpose.[37] The first person to meet these criteria is perpetually the first in line to receive all the water necessary to fulfill that original purpose of use; the next appropriator is second in line; and so forth until all the water is consumed or all users are satisfied, whichever comes first.

Groundwater presents another issue. Most states do not recognize ownership rights in groundwater.[38] However, at common law the ***absolute ownership doctrine*** gave a surface landowner the right to draw an unlimited amount of water found beneath his or her land. Only a few states still rely on the doctrine in principle, and the courts have interpreted it in a manner that reduces its adverse effects on other users.[39] The ***correlative rights doctrine*** is also based on land ownership, but the owner is limited to a reasonable amount of water in light of the total supply, usually determined by the amount of acreage owned.[40] Some states apply the prior appropriation doctrine to groundwater. Regardless of the doctrine employed, some states administer groundwater that is hydrologically linked to surface water differently from isolated groundwater sources, incorporating the former into the state's surface water appropriation system.

Nuisance law provides another important common law doctrine sometimes relevant to water use. Private nuisance, a tort, allows one landowner to sue another when the former's use or enjoyment of private property is unreasonably impaired by the actions of the other. Public nuisance is founded on the police powers of the state and is applicable when there is an injury to public welfare rather than to land. Most public nuisance actions seek injunctive relief, and provide a legal means for states or local governments to abate hazardous or unsafe conditions.[41] For example, unregulated water pollution that is a detriment to human health or impairs the usefulness of water can be a public nuisance. Water quantity issues, such as groundwater depletion or flooding of property, also may be addressed through common law private or public nuisance actions. Most states have adopted nuisance and public health statutes that serve much the same purpose as the common law of nuisance.[42]

4. State Statutory Law

States have enacted statutes codifying and modifying the common law of water rights. States have also used their police powers to regulate water quantity, quality, land use and energy siting and permitting. States often delegate certain portions of their police power to units of government such as counties, municipalities, and towns, or to special districts or authorities. The authority of local units of government over land use indirectly affects water quality and quantity. Some districts or units of government are charged with administering water utilities or treatment plants. But many states expressly do not delegate their authority over specific issues, such as water allocation and pollution control, energy regulation, oil and gas development, mining, agriculture, forestry and fish and wildlife matters – choosing to retain exclusive authority over these matters at the state level.

C. Interstate Authority

The U.S. Constitution authorizes states to "enter into any Agreement or Compact with another State" only with "the Consent of Congress."[43] Compacts can legally bind multiple states on a variety of issues. There are 26 interstate compacts primarily addressing water allocation, most of them in the West; 7 compacts concerning water pollution control, most of them in the East; and 7 compacts on flood control or water management generally; most of them in the East.[44] Compacts also can create structures with regional regulatory and permitting authority, such as the Delaware River Basin Commission. When Congress consents to a compact, it becomes federal law. Exactly what constitutes "consent" and whether it is required for all interstate agreements is not entirely resolved. It may be that only those agreements that would affect the political balance in the federal system of government require consent; but it is widely held that at least those interstate compacts allocating water always require congressional consent.[45] For example, in 2008, Congress gave its consent to the Great Lakes-St. Lawrence River Water Resources Compact, which prohibits new diversions of Great Lakes water out of the basin.[46]

The U.S. government can play a significant role in interstate water management. For example, the Clean Water Act encourages the involvement of interstate agencies and requires interstate cooperation on some water quality issues.[47] The Boulder Canyon Project Act of 1928 not only ratified the 1922 Colorado River Compact, it set out the allocation of water among Arizona, California and Nevada.[48] Federal regulations and other agency activities, such as EPA guidelines and establishment of water quality standards for interstate bodies of water, also can affect interstate water management.

The Constitution gives the U.S. Supreme Court original jurisdiction over litigation between or among states.[49] Thus litigation commenced by a state against another state concerning the

allocation or quality of water is heard by the U.S. Supreme Court, usually with evidence being taken by a “special master” who prepares a report with recommendations.

III. Major Laws Relevant to Water and Energy

This section describes major federal laws and categories of state law that have broad application to water issues relevant to energy activities. It identifies the framework within which current regulatory choices are being made, as well as areas for the exercise of discretion, and opportunities for incremental changes.

A. Clean Water Act

1. Overview

The Federal Water Pollution Control Act, generally known as the Clean Water Act, and last substantially amended in 1987, establishes the primary framework for regulation of water quality by the federal government and the states and tribes.[50] It applies to "navigable waters," defined in the Act as "waters of the United States, including the territorial seas."[51] Federal regulations further define these terms, but within the last decade Supreme Court cases have interpreted and narrowed the reach of the Act. The Court has determined that such waters need not be "navigable in fact" and that waters adjacent to navigable waters are covered by the Act; but the Act's authority over activities affecting isolated wetlands, ephemeral and intermittent streams, and some headwaters streams and their associated wetlands is now in considerable doubt.[52] Bills are pending in Congress to restore the reach of Clean Water Act jurisdiction to the fullest extent of Congress's "commerce power," but it is not certain that such legislation can make it through Congress.[53] The Clean Water Act is generally interpreted not to apply to groundwater.[54] The Clean Water Act does not address water quantity except very indirectly. The Act declares it the policy of Congress that "the authority of each state to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act."[55]

The Act establishes a system of cooperative federalism. It invites states to submit for Environmental Protection Agency review a state permit and enforcement program consistent with the National Pollutant Discharge Elimination System (NPDES) in the Act.[56] If a state does not seek delegation, EPA administers the NPDES program directly in that state. If EPA approves the state program, the state issues and enforces the permits in place of EPA, although EPA exercises review and enforcement authority if a state fails to carry out its program in accordance with the Act.[57] States may impose requirements that are more stringent than those required by the EPA.[58] States have additional responsibilities under the Act, including the setting of water quality standards to guide permitting as well as planning processes and programs to improve and maintain water quality. Federally-recognized Indian tribes may also set water quality standards and seek delegation of the permit program.

2. Regulatory Standard-setting

Two types of standards are especially important under the Clean Water Act: *water quality standards*, established by the states (with federal guidance) to protect water quality in the waters themselves, and *technology-based effluent limitation guidelines*, established by EPA to specify federal minimum requirements for discharges from point sources that must be met by the discharger regardless of the quality of the receiving water.

a. Water Quality Standards

Water quality standards define the goals for ambient conditions within waters. Section 303 of the Clean Water Act directs states (and allows tribes) to adopt water quality standards to protect the public health and welfare, enhance the quality of water and serve the purposes of the Act.[59]

The standards must identify the designated use or uses to be made of the waters (e.g. drinking water, fisheries), provide narrative or numerical water quality criteria sufficient to protect those uses, and establish an antidegradation policy to protect those waters currently meeting or exceeding levels necessary to protect designated uses.[60] States must review their water quality standards at least every three years and, as appropriate, revise them or adopt new standards. Water quality standards must be submitted to and approved by EPA. If EPA disapproves a state standard, EPA must promulgate a water quality standard; it must also do so if it determines that a new or revised standard is needed to meet the Act's requirements.[61] EPA develops and updates water quality criteria, a component of water quality standards, to reflect advances in scientific knowledge; and states are also to update these components of their standards in accordance with EPA criteria.[62]

Water quality standards explicitly include, in addition to chemical pollutants, heat and heat loadings ("thermal water quality standards"). Thermal water quality standards must be sufficient to assure "protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife" taking into account normal water temperatures, flow rates, seasonal variations, existing sources of heat input, dissipative capacity of the identified waters, and a margin of safety.[63]

Water quality standards are primarily used for three purposes. First, because they establish the intended end-state condition for the water body in question, they are used on certain water bodies to impose more stringent discharge limitations for state or federally-issued discharge permits for point sources (NPDES permits) than would normally be required by technology-based effluent limitations alone.[64] Second, they are used to assess the conditions of waters and to determine whether additional controls are needed to reach the designated use condition, including the establishment of Total Maximum Daily Loads (TMDLs) for pollutants (discussed below).[65] Third, they are used by states under Section 401 of the Act to determine that an application for any federal license or permit to conduct any activity which may result in any discharge into the waters of the United States will not impair the state's water quality in violation of the standards.[66] In issuing permits, states must comply with their own water quality standards, as well as the water quality standards of downstream states where the permitted discharge will implicate water quality in those states.[67]

b. Technology-based effluent limitations

EPA is charged with setting technology-based effluent limitations for discharges from point sources. These limitations become the basis for state or EPA issuance of NPDES permits.[68] EPA first set effluent limitation guidelines based on Best Practicable Control Technology (BPT) for existing point source discharges, and then Best Conventional Pollutant Control Technology (BCT) for conventional pollutants. EPA established Best Available Control Technology (BAT), a more strict set of limitations, which now applies to toxic pollutants and to pollutants that are neither toxic nor conventional (e.g. iron, ammonia). Best Professional Judgment (BPJ) is used for categories where EPA has not established effluent limitation guidelines by regulation.[69] New sources are required to meet the greatest degree of effluent reduction achievable, including, where practicable, a standard permitting no discharge of pollutants;[70] this New Source Performance Standard (NSPS) is frequently equivalent to BAT.

In the energy sector, EPA has established specific effluent limitations for coal mining, oil and gas exploration and extraction, mineral mining and processing, petroleum refining, fertilizer and phosphate manufacturing and steam electric power generation, among others.[71] Effluent limits do not specifically require the use of particular technologies, but specify the pollutant limits that can be achieved by best available control technology, and require the permit to reflect these limits. In

some circumstances this can affect water quantity, such as effluent limits that really require water recycling and closed-loop technologies.

Although it has authority to do so, EPA has not promulgated effluent limitation guidelines for heat from steam electric generating facilities after an early abortive attempt to do so in the 1970s. Most dischargers whose heat discharge would require such an effluent limitation (set by Best Professional Judgment in the absence of a promulgated guideline) consequently apply under Clean Water Act section 316 for variances. Section 316 allows a discharger to demonstrate that thermal effluent limitations that could be imposed based on technology standards are more stringent than necessary, and that an alternative permit limit proposed by the discharger is adequate to assure the "protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on" the receiving water; as well as that the "location, design, construction and capacity of the intake structures reflect the best technology available for minimizing adverse environmental impact."[72]

3. NPDES Permitting

Section 301 of the Act prohibits discharge of a pollutant from a "point source" into waters of the United States without a permit. Section 402 describes the NPDES permit scheme. The NPDES permit program is administered by 46 states, while EPA is the permitting authority in Idaho, Massachusetts, New Hampshire and New Mexico, as well as in the District of Columbia, Puerto Rico and several territories.[73] Thirty-nine federally recognized Indian tribes have also taken delegation of the NPDES program.

A "point source" is a "discernible, confined and discrete conveyance," such as a pipe, ditch, or channel.[74] However, the Act expressly excludes agricultural stormwater discharges and return flows from irrigated agriculture from the definition.[75] Moreover, no permit requirement applies to nonpoint source pollution – typically runoff not artificially collected or channeled – such as from agriculture and most (but not all) silviculture activities.

NPDES permits are required for a large array of industrial activities, for wastewater treatment, for most construction activities and for municipal stormwater systems. Thermoelectric generation plants discharging to surface waters need NPDES permits, as do mines and other extractive operations discharging to surface waters. Most industrial and energy-related dischargers will be required to apply for individual permits, subject to notice and comment. EPA has chosen not to require individual permits for some kinds of activities that are widespread and that have similar characteristics, instead issuing "general permits" with terms and conditions that, if complied with serve to satisfy the permit requirement without an individual application and review.[76]

EPA regulates "stormwater runoff" from certain activities as a point source, and EPA has adopted regulations addressing *industrial* and *construction* activities, both relevant to energy issues.[77] However, the Clean Water Act provides that NPDES permits shall *not* be required for discharges of stormwater runoff from "mining operations or oil and gas exploration, production, processing or treatment operations or transmission facilities," where the discharge is composed entirely of flows that are not "contaminated" with or in "contact" with overburden, raw materials, products, byproducts or waste products.[78] The 2005 Energy Policy Act specified that this provision is intended to apply "whether or not" the oil and gas field activities could be considered "construction activities."[79] Based on the 2005 amendment, EPA subsequently tried to exempt oil and gas well construction runoff containing only sediment; but in 2008, a court struck down the regulatory amendment finding that such "contaminated" runoff was not exempted by the section.[80]

NPDES permit limits do not directly regulate stream flow or regulate water use, but they can have significant influence on these water quantity issues. For example, permit discharge limits may affect discharges in low-flow and high-flow periods, making it impossible to site some uses on low flow or highly variable streams. And the relevant technology standards (effluent limitation guidelines) may base limits on particular water use assumptions (single use vs. recycle water), or even specify zero discharge in some instances where the technology warrants.

4. Impaired Waters

States must regularly identify waters that do not meet water quality standards, and must periodically submit to EPA a list of those impaired waters. States must develop total maximum daily loads (TMDLs) for waters impaired by a pollutant, identifying allowable pollutant loadings from permitted point sources and nonpoint sources, plus a margin of safety, that would allow those waters to meet water quality standards. If the EPA disapproves the TMDL or the state fails to submit one, the EPA will develop the TMDL.[81] Determinations of impairment and TMDLs include thermal discharges and determination of a total maximum daily thermal load.[82] TMDLs are used to develop newer and stricter permit limits and control strategies, including strategies affecting nonpoint sources, in order to recover the impaired water and enable it to meet water quality standards. Air deposition of mercury and nitrogen to impaired waters raises complex issues of how these sources may be regulated to achieve the TMDL.

5. Nonpoint Sources

The Clean Water Act does not establish a regulatory permit program for nonpoint sources. "Discharge of a pollutant" is defined as a discharge "from any point source."[83] However, the Act does establish a grant program for assistance to states in controlling nonpoint source pollution.[84] States that prepare TMDLs for waters impaired, in whole or in part, by nonpoint sources are required to prepare load allocations addressing these sources. Coastal states are required, as a condition of maintaining their federal coastal zone funding, as well as their EPA nonpoint funding, to develop a program of "enforceable mechanisms" for the control of nonpoint sources in the coastal zone (defined more or less broadly depending on the state).[85]

6. Section 401 – Water Quality Certification

Section 401 of the Clean Water Act requires states (or interstate agencies with jurisdiction) to review applications for federal permits and licenses and to certify that the federally authorized actions will not violate adopted water quality standards. No federal license or permit may be granted until the certification has been obtained, or waived by state inaction.[86] The Supreme Court upheld Washington State's requirement under this section, in certifying a hydropower plant, that minimum stream flow conditions be maintained.[87]

7. Section 404 Permit Program – Dredge and Fill in Waters of the U.S.

Section 404 of the Clean Water Act establishes a separate permit program, administered by the U.S. Army Corps of Engineers under guidelines developed by the EPA, to regulate discharges of dredged and fill material into the waters of the United States.[88] Thus filling associated with construction of thermoelectric generating facilities by waters of the U.S. and filling of stream valleys with coal mine overburden, are regulated under Section 404. The discharges of fill permitted under Section 404 are exempt from Section 402 NPDES permitting.[89] The Act exempts from 404 permitting "the discharge of dredged or fill material from normal farming, silviculture, and ranching activities," as well as maintenance of certain structures, maintenance of drainage ditches, construction or maintenance of farm roads or forest roads or temporary roads for moving mining equipment constructed in accordance with specified best management practices.[90] The regulations provide detailed requirements for avoidance of unnecessary fills, minimization of

remaining impacts and for compensatory mitigation of any unavoidable impacts.[91] The Section 404 federal permit triggers state water quality certification under Section 401.

Many Section 404 permits are individual permits, but the Corps has adopted (and every five years must review and re-adopt) "nationwide permits" that establish standard conditions for activities that occur frequently and for which the Corps has determined that activities are "similar in nature, will cause only minimal adverse environmental effects when performed separately and will have only minimal cumulative adverse effect on the environment."[92] Corps districts may also adopt general permits to address certain kinds of common activities, including statewide programmatic general permits to improve coordination with state permitting programs, for example. States review both nationwide permits and general permits under Section 401, and may deny certification to any that violate state water quality standards. Because the Section 404 permit is a federal action, permit actions are subject to environmental impact review under the National Environmental Policy Act (NEPA), discussed below. Being federal, this permit may also trigger consultation under the Endangered Species Act (ESA), also discussed below.

States are authorized to "assume" the permit program and operate in lieu of the Corps upon meeting appropriate conditions, but only New Jersey and Michigan have done so. States that have not assumed the 404 program nevertheless often coordinate their 401 review, and often their independent administration of state-enacted wetlands protection laws, with the Corps of Engineers permit program.

8. Treatment Ponds

In 1979, EPA amended its regulations to clarify that "water treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act (other than cooling ponds...) are *not* waters of the United States".[93] In 1980, EPA followed up with a rule limiting the exclusion "only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area [*sic*] in wetlands) nor resulted from the impoundment of waters of the United States." This change was designed to prevent dischargers from evading the NPDES by impounding waters or discharging directly into wetlands.[94] After outcry from industry, however, EPA suspended this limitation, thereby returning the reach of the exclusion to its original form.[95] EPA and the Army Corps of Engineers thereafter included the exclusion not only in the NPDES regulations[96] but also in the 404 program.[97] As a result, the exclusion for waste treatment systems applies to such features as ash ponds at power plants, settling ponds, constructed wetlands and instream settling ponds (and upstream segments of otherwise-navigable waters) to capture sediment from coal mining valley fills. EPA is currently reconsidering the waste treatment system exclusion, however, so policy reform may be forthcoming in the future.

9. Oil and Hazardous Substance Spills

Section 311 of the Clean Water Act establishes liability for spills; requires immediate notification to the government of a spill; and provides for removal, remediation and compensation for natural resource damages. The Oil Pollution Act provides additional liability and other provisions for discharges of oil.[98]

B. Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) is intended to protect public drinking water supplies against contaminants that pose a risk to human health. The contaminants include "any physical, chemical, biological, or radiological substance or matter in water."[99] It also provides regulatory

authority over many subsurface water-affecting activities, including some associated with oil and gas, uranium, oil shale and tar sands extraction.

1. Public Drinking Water Systems

The SDWA directs EPA to regulate contaminants in public water systems. EPA accomplishes this by determining which contaminants raise health concerns, determining the safe levels of these contaminants and setting the maximum levels of contaminants allowed in public drinking water. EPA is required to issue national primary drinking water regulations (NPDWRs) [100] for contaminants:

- that may have an adverse effect on health;
- that are likely to occur in the public water supply; and
- the regulation of which may reduce health risks.[101]

EPA must also publish a list of contaminants not subject to an NPDWR that are known or anticipated to occur in the public water supply and that may require regulation in the future due to public health concerns. The agency must revisit the list every five years and determine whether any of the listed contaminants requires issuance of a NPDWR.[102]

For each contaminant subject to a NPDWR, EPA must issue a maximum contaminant level goal (MCLG).[103] Each MCLG establishes the level of a given contaminant below which there is no known or anticipated adverse risk to health, after allowing for an adequate margin of safety.[104] Based on these goals, EPA then is required to determine a maximum contaminant level (MCL) for each contaminant. MCLs must be set as close to the MCLG as is feasible.[105] "Feasible" means using the best available technology, treatment techniques and other available means, while taking cost into consideration.[106] NPDWRs list, but do not mandate the use of, the technology, treatment techniques or other means that are feasible for public water supplies to meet the MCLs.[107] Variances from MCLs are allowed in certain cases based on the characteristics of raw water sources, but cannot result in unreasonable risk to human health.[108] (MCLs are often used in federal and state environmental remediation programs such as Superfund and the Resource Conservation and Recovery Act (RCRA) to establish presumptive groundwater cleanup levels. They are also used to determine "endangerment" under SDWA programs described below.)

NPDWRs apply only to public water systems.[109] Irrigation districts are not considered public water systems if they provide only incidental residential or other use. The public water system program (Part B of the SDWA) operates through a cooperative federalism structure; EPA has granted primary enforcement authority to every state other than Wyoming and the District of Columbia.[110]

2. Groundwater Protection Areas

The SDWA further directs states to submit to EPA a program to protect public water system wellhead areas from contaminants that might adversely affect human health. The Act defines "wellhead protection area" as "the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield."[111] State wellhead protection area programs are subject to minimum standards, including determining the protection areas for each wellhead, identifying contaminant sources and establishing appropriate measures to protect the water supply.[112] All states but Virginia have wellhead protection programs.[113]

The 1996 SDWA amendments created a new "source water assessment program," which requires states to identify the land areas that provide water to each public drinking water source, inventory the existing and potential sources of contamination in those areas, determine the susceptibility of each PWS to contamination and release the results of the assessment.[114] Finally, the sole source

aquifer protection provisions of the SDWA provide EPA with authority to designate aquifers that are the sole or principal drinking water source for the areas and that would create a significant hazard to public health if contaminated.[115] After publication of such notice by EPA, "no federal financial assistance (through a grant, contract, loan guarantee, or otherwise)" can be provided to any "project" that may contaminate the aquifer through a recharge zone in a designated area, although funding may be provided, if authorized by another provision of law, to plan or design the project to assure that it will not contaminate the aquifer.[116]

3. Underground Injection Control Program

The Underground Injection Control (UIC) Program seeks to protect groundwater from contamination by injection wells. Just 33 states and 3 territories currently have primacy over the UIC program, and responsibility is shared between the state and EPA in 7 states. EPA directly administers UIC programs in the remaining states. [117] The SDWA provides EPA no explicit authority to review, comment on or object to state-issued UIC permits.

The SDWA and EPA regulations establish minimum standards for state UIC programs. UIC programs must prohibit unpermitted injections in the absence of a rule authorizing injection.[118] States cannot issue permits unless the applicant shows that underground injection[119] from an injection well[120] will not endanger[121] underground sources of drinking water (USDW). A USDW is an aquifer or part of an aquifer that (i) supplies a Public Water System; or (ii) contains a sufficient amount of groundwater to supply a Public Water System and either currently supplies water for human consumption or contains less than 10,000 mg/L total dissolved solids; and is not an exempted aquifer.[122]

"Underground injection" means "the subsurface emplacement of fluids by well injection," but the term *does not include* "underground injection of natural gas for purposes of storage" nor, since the 2005 Energy Policy Act, "the underground injection of fluids or propping agents, other than diesel fuels, pursuant to hydraulic fracturing operations related to oil, gas, or geothermal production activities."[123]

EPA's permitting provisions establish five categories of injection wells. Different regulations apply for each class based on its potential to endanger sources of drinking water.

Classes	Use	Inventory
Class I	Inject hazardous wastes, industrial non-hazardous liquids, or municipal wastewater beneath the lowermost USDW	549 wells
Class II	Inject brines and other fluids associated with oil and gas production, and hydrocarbons for storage. They inject beneath the lowermost USDW.	143,951 wells
Class III	Inject fluids associated with solution mining of minerals beneath the lowermost USDW.	18,505 wells
Class IV	Inject hazardous or radioactive wastes into or above USDWs. These wells are banned unless authorized under a federal or state ground water remediation project.	32 sites
Class V	All injection wells *not included* in Classes I-IV. In general, Class V wells inject non-hazardous fluids into or above USDWs and are typically shallow, on-site disposal systems. However, there are some deep Class V wells that inject below USDWs.	400,000 to 650,000 wells

Source: EPA, Classes of Wells, http://www.epa.gov/safewater/uic/wells.html

Class I, II and III wells in existence when the relevant UIC program was implemented were permitted by rule, but in some cases were required to apply for a permit within the first five years. All new Class I, II and III wells are required to apply for permits prior to construction. Class IV wells are banned except for certain specific uses in remediation.[124] Class V wells, the catch-all category, have generally been authorized by rule, but must notify the UIC program and provide inventory information. The UIC program can require these wells to obtain a permit if needed to assure protection of USDWs.[125]

Application of UIC programs to energy production is limited by several specific provisions. First, hydraulic fracturing related to oil, gas or geothermal production activities is unregulated federally.[126] Second, EPA is *prohibited* by law from prescribing state UIC minimum program requirements that "interfere with or impede the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production or natural gas storage operations, or any underground injection for the secondary or tertiary recovery of oil or natural gas, unless such requirements are essential" to prevent endangerment of USDW.[127] Nevertheless, the UIC program applies to many oil and gas injection wells. In Class II wells, injected fluids may include "waste fluids produced from downhole in connection with primary production of oil and gas, some fluids generated in the field in connection with oil and gas production..., or fluids used for enhanced recovery of oil or gas."[128] While fluids produced downhole can be injected in Class II wells, unused oil field chemicals cannot. In addition to oil and gas production, wells used for *in situ* solution mining.are Class III wells; in the energy context these are most commonly associated with the solution mining of uranium and salt.[129] Certain other energy-related wells, including tar sands and oil shale (and coal and lignite) injection wells not falling into either Class II or III, are considered Class V "in situ fossil fuel recovery wells."[130]

UIC regulations address injection of hazardous wastes under both the SDWA and RCRA.[131] With limited exception, all wells discharging hazardous waste must not only comply with UIC regulations but also must obtain an exemption from RCRA's "land ban," under which land disposal of hazardous waste is illegal after a specific date. To qualify for a land ban exemption, the applicant must "demonstrate, to a reasonable degree of certainty, that there will be no migration of hazardous constituents from the injection zone for as long as the wastes remain hazardous."[132]

EPA has begun to address regulation of carbon capture and sequestration under the UIC, as discussed in Section IV, below.

C. Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) is a federal law addressing management and disposal of solid and hazardous waste.[133] Solid waste is discarded material other than domestic sewage, irrigation return flows, industrial discharges regulated under the Clean Water Act NPDES program or certain nuclear-related materials; it includes sludge or discarded material from a wastewater treatment plant or air pollution control facility. [134] Hazardous waste is a solid waste that is potentially dangerous to human health or the environment.[135]

In general, RCRA establishes stringent regulations for hazardous waste under Subtitle C, including detailed permitting requirements. The Subtitle C hazardous waste permitting program is delegated to states with EPA oversight and back-up enforcement.[136] Non-hazardous solid waste is managed under Subtitle D, which provides national minimum standards for landfills, but which has fewer regulatory requirements. Subtitle D is carried out by states but is basically a solid waste

planning and implementation program, not a delegated "permit" program. Subtitle D does address waste-to-energy facilities.[137] RCRA also prescribes a separate regulatory program with standards and requirements for underground storage tanks, including those containing petroleum.[138] RCRA provides for citizen suits and for cleanup orders. Because of the breadth of the definition of solid waste and the remediation sections, it is often seen as a backstop law where substances of uncertain regulatory status under other laws find their way into the environment.[139]

In 1980, RCRA expressly provided, pending completion of certain legislatively-mandated studies, temporary regulatory exemptions from Subtitle C for:

- drilling fluids, produced waters and other wastes associated with oil, gas and geothermal projects;
- solid waste from extraction, beneficiation and processing of ores and minerals including phosphate mining and overburden from uranium mining; and
- coal ash, slag waste and flue gas emission control waste.[140]

In 1988, EPA determined that regulation of oil and gas exploration and production wastes and geothermal wastes under RCRA Subtitle C was not warranted, and that environmental concerns could be addressed by relying on state regulation, the Clean Water Act and Safe Drinking Water Act, noting that EPA could adopt standards under subtitle D if warranted.[141] In general, state regulation and UIC regulation applies to these wastes.

EPA determined in 1986 that wastes from the extraction and beneficiation of metallic ores, phosphate rock, asbestos, overburden from uranium mining and oil shale should continue to be excluded from the definition of hazardous waste, thus leaving them to be regulated under state law or (potentially) under Subtitle D.[142]

In June 2010, after having made several previous determinations and regulatory exclusions of coal combustion residuals from RCRA regulation,[143] EPA proposed for the first time to regulate coal combustion residuals, including coal ash and residues captured by pollution control technologies.[144] These residuals, amounting to 136 million tons/year, often contain mercury, arsenic, cadmium, selenium and other substances of concern; if storage facilities and impoundments fail, or are poorly maintained and monitored, contaminants may adversely affect water resources including sources of drinking water.[145]

D. Emergency Planning and Community Right-to-Know Act

The Emergency Planning and Community Right-to-Know Act (EPCRA) requires emergency planning for release of extremely hazardous substances, and notice to the local and state emergency planning commission. In addition, it provides that where there are hazardous chemicals for which a material safety data sheet must be prepared under the Occupational Safety and Health Act, the facility operator must submit such data sheets, as well as an emergency and hazardous chemical inventory form, to the state and local commissions and the local fire department. [146] The list of chemicals is not all-inclusive, but some oil and natural gas companies maintain that the inventory information is sufficient to address any concerns with the contents of hydraulic fracturing fluids.

E. Rivers and Harbors Act, and Water Resources Development Act

The Army Corps of Engineers has significant authority over water transport and navigation. In "any of the waters of the United States," an obstruction to navigation, such as a pier, jetty or other

structure, or the modification of the course, condition or capacity of a waterway or navigation terminus must be authorized by permit from the Corps.[147] Thus the Corps influences water quantity and quality by reviewing the construction of certain water storage and diversion facilities, as well as construction and modifications affecting navigation, such as for energy platforms, pipelines and coal terminals. Also, every few years, Congress passes legislation under the title Water Resources Development Act (WRDA) to authorize and fund federal water resource projects and studies, most of which are administered by the Corps.

F. National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to undertake a comprehensive assessment of any "major federal action significantly affecting the quality of the human environment."[148] This includes federal leases, permits, funding and other approvals as well as actions taken directly by the federal government. NEPA is triggered by such federal actions as an oil and gas or alternative energy leases under the Mineral Leasing Act, approval of a plan of operations under the General Mining Law of 1872 or issuance of a Clean Water Act Section 404 permit. Federal agencies must prepare an environmental impact statement (EIS) detailing the impacts of the proposed action, any adverse environmental effects, alternatives to the proposed action, the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity and any irreversible and irretrievable commitments of resources involved in the proposed action should it be implemented.[149] If an EIS is required, the lead agency will hold a public scoping meeting to identify issues and then will prepare a draft EIS, accept public comments and prepare a final EIS. The Council on Environmental Quality's NEPA regulations provide for the preparation of an Environmental Assessment (EA) if it is uncertain whether an EIS will be needed; and EAs resulting in Findings of No Significant Impact are frequently used by federal agencies to determine not to prepare an EIS, often by identifying mitigation that will keep the environmental effects below the threshold of significance.[150] Federal agencies may adopt "categorical exclusions" (CEs) for certain categories of actions they have determined "do not individually or cumulatively have a significant effect on the human environment."[151] Agencies must consult with CEQ when developing a categorical exclusion, summarize the information in the agency's record that supports the proposed exclusion, identify how extraordinary circumstances may "limit the use of the categorical exclusion" and provide for public comment.[152] In recent years, Congress has legislatively defined certain actions as warranting classification as categorical exclusions, such as, for example, oil and gas exploration and development activities under the Mineral Leasing Act where the individual surface disturbance is less than five acres or drilling is on a previously disturbed site.[153]

Unlike some state NEPAs, NEPA does not require selection of the environmentally preferable outcome, nor the adoption of any mitigation identified in the documents. Rather it serves to inform the decision maker of the consequences of an action. NEPA will often be the primary vehicle for identifying water quality or quantity constraints appropriate for an activity on federal land or conducted under a federal permit. Under Council on Environmental Quality regulations implementing NEPA, states and Indian tribes may seek to become "cooperating agencies," which allows them more continuous access to the evaluation being conducted by the federal "lead agency" responsible for preparing an EIS.[154] The CEQ has proposed draft guidance that would improve agency practice on identifying and implementing mitigation and monitoring.[155]

NEPA may be used by federal agencies to develop lease stipulations and to provide detailed information to carry out requirements set out in federal regulations for leasing on federal lands of fuel minerals under the Mineral Leasing Act (including oil and gas, coal and phosphate) or

approval of plans of operations under the General Mining Law, for mining of uranium, for example.[156] These may affect water withdrawal, water use, technology choices, and water quality.

G. Endangered Species Act

The Endangered Species Act (ESA) protects and requires the recovery of species listed as endangered or threatened.[157] Pursuant to Section 9 of the Act, it is illegal for any person to "take" any endangered species.[158] Take is defined as to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[159] This obligation applies to any person. Section 7 of the Act prohibits any federal agency from authorizing, funding or carrying out any action that may jeopardize the existence of a listed species or result in the "destruction or adverse modification" of their critical habitat.[160] It requires agencies to "consult" with the U.S. Fish and Wildlife Service (or National Oceanic and Atmospheric Administration for some species) to determine that the action will not jeopardize such species or habitat.

The ESA declares a policy to avoid water conflicts through federal-state cooperation.[161] It also requires the Fish and Wildlife Service to consult with states "before acquiring any land or water, or interest therein, for the purpose of conserving" listed species.[162] However, these provisions affect neither Section 9 nor Section 7 prohibitions.

Many listed species have specific water needs (including for temperature and amount). When water usage, or issuance of a permit for water usage, is incompatible with those needs, take, jeopardy or adverse modification may result. In such cases, the ESA can limit water use, even in the face of a valid state water right. For example, in *U.S. v. Glenn-Colusa Irrigation District*,[163] a court enjoined the irrigation district from pumping water from a stream during the winter-run Chinook salmon migration to prevent salmon mortality. State ESA laws can have the same effect.[164]

ESA limitations can affect groundwater as well as surface water use, even where groundwater pumping is otherwise unregulated. In *Sierra Club v. Babbitt*,[165] private groundwater pumping from the Edwards Aquifer in Texas, a "rule of capture" state, caused two large springs to dry up, resulting in take of four endangered species found there. The Sierra Club prevailed in its suit against the federal government, which alleged that although no federal approval was needed to pump, the Fish and Wildlife Service was required to determine minimum streamflows necessary to protect the species and to exercise its authority to impose pumping restrictions necessary to maintain those flows.

H. Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) establishes a voluntary program within the U.S. Department of Commerce (implemented by the National Oceanic and Atmospheric Administration) that offers cost-sharing grants to coastal states, including the Great Lakes states and U.S. territories, to develop and implement coastal zone management programs.[166] In addition to these financial incentives, the Act authorizes the federal government to delegate "federal consistency review" authority to each coastal state that has an approved coastal management program.[167] Federal consistency review allows states to monitor proposed federal agency activities and ensure that they are consistent with the enforceable policies of the state's program.[168] This power of review,[169] the financial incentives and the voluntary nature of the CZM Program have led 34 of the 35 eligible states and territories to participate in the Program.[170]

The statutory authority of the CZMA is confined to the "coastal zone." With only rough guidance, states have the authority to designate the inland boundary of their coastal zone, and they do so with very different results.[171] For example, Florida's coastal zone includes the entire state. Indiana's coastal zone was founded on watershed boundaries in Lake, Porter, and LaPorte counties. California's coastal zone is variable, extending less than 1,000 yards inland in urban areas and more than 1,000 yards inland in coastal estuarine habitats and recreational areas.[172] But regardless of the size of the state's coastal zone, federal consistency review applies to any federal activity that may affect the coastal zone, whether or not the activity occurs in it.[173]

Activities performed by, on behalf of, requiring a permit from or receiving financial assistance from a federal agency, and that are reasonably likely to affect the coastal zone, must comply with the enforceable state policies identified in the state's approved coastal zone program.[174] Since the enforceable policies are based on state laws, the laws apply in the state already, but through federal consistency may apply to parties and on lands that they otherwise would not.[175] If the siting or operation of an energy generation facility, extraction facility or refinery qualifies as a "federal agency activity" and is reasonably likely to affect a use or resource in a state's coastal zone, it must comply with the enforceable policies of the state coastal management program, which may include enforceable water quality and quantity policies.

I. State Water Allocation Laws

Property rights and rights to use water are largely determined by state law. The common law approaches outlined in Section II, above, have largely been modified by state statutes. State water allocation schemes do not trump water quality regulation or other proper exercises of federal and state regulatory power. However, they have a profound influence over access to water and the hierarchy of its permissible uses. And the federal Clean Water Act expressly disclaims any impairment or abrogation of states authority to allocate water quantity.

1. Water Rights Systems in Use

Twenty-nine states use the ***riparian rights doctrine*** as the primary basis for allocation of surface waters.[176] The owner of land that abuts a natural stream, river, lake or pond has rights to the flow of the stream and to its water of a quality suitable for use. Most riparian states give riparian landowners an unlimited right to the use of water for "natural" purposes, including drinking, washing and meeting modest animal and garden needs; while "artificial" uses, such as irrigation and industry, are generally limited to "reasonable use."[177] Reasonableness of use commonly is based on the purpose of the use, the suitability of the use to the water body, the economic and social value of the use, the extent of harm that the use causes, the practicality of adjusting the amount of water used by each party and of avoiding the harm, the protection of existing values of water uses and the justice of making the user causing the harm to bear its cost.[178] Most riparian rights states consider it unreasonable to use water outside the watershed of origin.[179] If the available water is insufficient to meet the reasonable needs of all riparian landowners, usage is reduced proportionately, commonly based on the amount of land owned.[180]

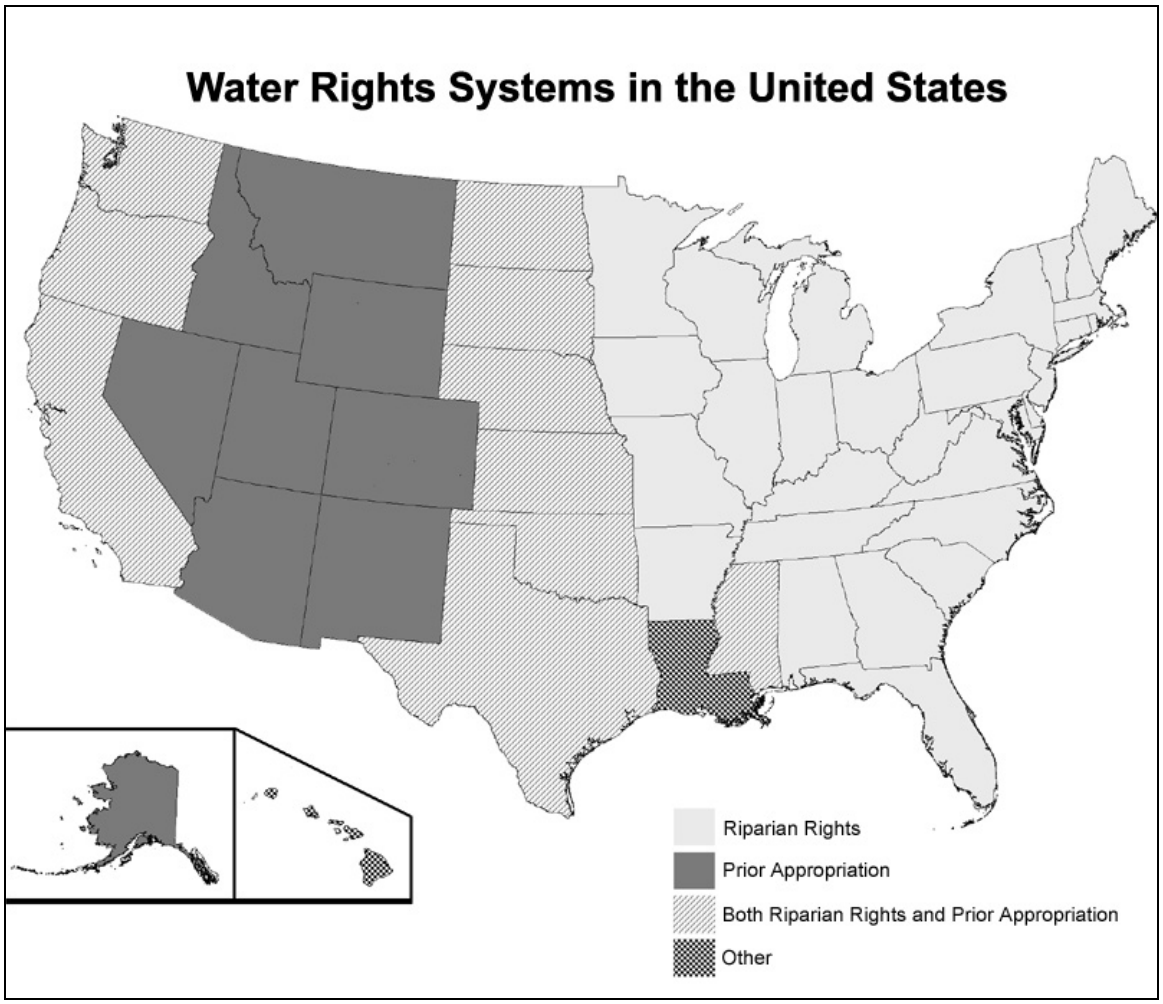
Most, but not all, riparian rights states now have some form of "regulated riparianism," a permitting system for water use. The majority of these states require permits *only* for users of large amounts of surface water. A few states also require permits for groundwater usage. Florida and Iowa have established intricate and comprehensive permitting systems.[181] Some riparian rights states have expressed preferences for certain types of "artificial" uses. For example, some states grant miners a right of access to water, and others skew the reasonableness analysis in mining's favor by deeming it to be in the public interest. Similarly, some states express

preferences for agriculture by exempting that use from permitting requirements or by applying a much higher threshold of water use compared to other uses before a permit is required.[182]

Nine states use the ***prior appropriation doctrine*** as the sole basis for surface water allocation.[183] A water right under prior appropriation is limited to the use of water for a specific purpose, a use right. Appropriative rights are based in time; the earlier that one or one's predecessors in interest began using the water (or acquired a permit) relative to other users, the higher one's priority for receiving available water to meet that use need. Since the seniority of a right dictates who receives water, junior users can be left without water in dry years while senior users receive their full allotment. Many prior appropriation states identify preferences for certain uses of water through statute or constitutional provision, but since true enforcement of this preference structure in times of shortage would disrupt the system of priority, they tend to be ignored or interpreted as either authority to acquire water by condemnation or applicable only when two petitions for water rights are simultaneously pending.[184]

Appropriative rights are limited to use for a "beneficial" purpose. Exactly what constitutes a "beneficial use" varies from state to state but traditionally includes agriculture, mining, industry and municipal use. More recently, many states have defined the term to include water conservation, instream flows and alternative storage techniques, among other purposes of use. This limitation on what one can do with the water also prohibits the "waste" of water, requiring "reasonable" or "reasonably efficient" water usage.[185] But while the specific uses to which one may put water is enforced through permitting, the doctrine of waste is rarely enforced. Appropriative right holders are prohibited from impairing the rights of other water right holders, a restriction commonly resulting in the limitation of a water right to the historic amount of use (consumptive right) not amount diverted (paper right). This protection of other users also limits the reclamation and reuse of water, complicates transfer procedures and requires a water right holder to get permission to change the place of use, purpose of use, time of use and point of diversion or return.

Ten states recognize both riparian rights and appropriative rights, and two others (Louisiana and Hawaii) have systems not based directly on either doctrine.[186] California adopted both doctrines from the beginning, but the other nine states initially adopted the riparian rights doctrine and later converted to prior appropriation.[187] Since these two doctrines are fundamentally incompatible, all hybrid states limit the exercise of existing riparian rights and restrict, if not prohibit, the assertion of new riparian rights.[188] Many states recognize only those riparian rights that had been used at the time that the state adopted prior appropriation, in some instances requiring permits with similar information as required of appropriative rights.[189]



2. Procedures

a. acquisition

Traditionally, riparian rights are not acquired and cannot be conveyed; rather they are attached to property that abuts a natural body of water. When a permit is required to use water under a riparian right, however, the procedure commonly involves application to a state administrative agency.[190] The permitting agency will approve the amount of water that the applicant may divert as well as other terms and conditions, including compliance with minimum stream flow requirements, if any.[191]

Most prior appropriation and hybrid states have a system requiring a permit application to a state administrative agency, often the "state engineer."[192] To obtain a water right under prior appropriation, typically an applicant must publish a notice of filing the application, the agency must hold a public hearing and the agency will issue a permit with specific conditions that, if met, will ripen into a water right.[193] This procedure is meant to ensure that the right complies with state law.[194]

Where regulated, groundwater usage commonly is governed by permit. These permits typically vary based on the water source, whether connected to surface waters or isolated.[195] In addition, special permitting requirements may apply to aquifers of particular concern, such as the Edwards Aquifer.[196] Most western states also have critical area legislation, authorizing the identification of

over-drafted aquifers and curtailment of pumping in specific areas.[197] Where a permit is required, there commonly are two types: a permit to drill a well and a permit to use the water from the well.[198] A well permit application typically covers the amount and use of the water, well location and geologic information. For permits evidencing a water right, the agency must determine that the usage will not impair other water users and the permissible rate of aquifer depletion.[199]

b. transfer

Riparian rights are real property interests, typically transferred only through conveyance of riparian land. The transfer of riparian water rights absent riparian land is either challenging or impossible, depending on the state.[200] Similar to riparian rights states, prior appropriation states presume the transfer of water rights during the conveyance of property.[201] In contrast to riparian rights states, prior appropriation states more freely allow the severance of water from land. A vested appropriative right may be transferred from one person to another and the place of use, purpose of use, time of use and point of diversion or return also may be changed. However, a change in the right shall not harm another water right holder, junior or senior.[202] Since many water users only consume a portion of the water that they have a right to divert and downstream users rely on return flows to fulfill their rights, states often limit the water available for transfer to the amount historically consumed so as to prevent harm to others. Commonly, the state agency, or court in Colorado, in charge of permitting rights also has authority over transfers.[203]

c. loss of right

Although riparian rights traditionally could not be lost through non-use, there are a number of other means by which such a right can be lost. Avulsion, the sudden change of a stream's channel, can cause a riparian land owner to lose her water right if her land no longer abuts the stream.[204] In addition, restrictions in a permitting system can cause the loss of a riparian water right. Many permit statutes in riparian and hybrid states require the use of a permit within a reasonable time of its issuance and prohibit the discontinuance of use for more than a set number of years, each with the penalty of forfeiting the permitted right.[205]

Appropriative rights can be lost most notably through nonuse. Abandonment commonly requires the intent of the right holder to no longer use the right. Forfeiture, however, can occur regardless of the right holder's intent, just so long as nonuse extends beyond the statutory forfeiture period, which ranges from five to ten years depending on the state. There are numerous variations in this basic structure and its implementation in each prior appropriation and hybrid state. For example, Colorado has no forfeiture statute, but it is effectively replaced by a presumption of abandonment after ten years of nonuse.[206] New Mexico requires a one-year notice period after four years of nonuse before forfeiture will be deemed to have occurred.[207]

J. State Water Quality and Groundwater Protection Laws

In addition to state laws implementing federal programs, states also often address issues and waters not covered by national laws. For example, the Porter-Cologne Water Quality Control Act initiated the regulation of nonpoint sources of water pollution in California.[208] Arizona's groundwater protection law requires facilities, such as injection wells and mine leaching units that discharge a pollutant to an area where it is reasonably likely to reach an aquifer, to obtain an "aquifer protection permit."[209] To receive a permit, the facility must, among other things, show that it will use the best available demonstrated control technology and that aquifer water quality standards will not be violated.[210] Many states have enacted wetland protection laws that cover different waters and aquatic resources than the Clean Water Act Section 404 program. Some of these laws require permits to work in or alter waters that are not jurisdictional under the Clean Water Act.[211]

State-created districts, authorities, and other units can also make important local and regional decisions that affect the overall management of water. Some states have developed water districts that serve as regulatory bodies. California's municipal water districts and replenishment districts manage imported waters and groundwater resources.[212] Water districts also can be very influential and cover large areas. For example, Florida is divided into five water management districts, administering flood protection programs; developing water management plans; managing water use, well construction and aquifer recharge and administering the state's stormwater management program.[213] Water users' organizations also can have significant influence over water management. They can take several forms, private companies and utilities, some for-profit and others not, as well as public irrigation and conservancy districts. Depending on the form, these organizations can manage water use, develop and implement strategies for weathering drought and be a strong force in water politics and transfers.

K. State Fish and Game Laws

State fish and game laws can influence water quantity and quality management. Many states have laws that include prohibitions against certain types of discharges to water that cause damage to fish and their habitats, or that affect diversions from streams. Such laws have been used in response to catastrophic discharges and fish kills relating to energy activities. Some states also have more extensive environmental protections in this chapter of their laws. For example, the California Fish and Game Code prohibits substantial diversion or obstruction of the natural flow of a waterbody without permission of the Department of Fish and Game.[214]

L. State Environmental Impact Assessment Laws

About 1/3 of states have enacted environmental impact assessment laws (so-called "little NEPAs"). These state laws often address decisions or activities that are not subject to review under the federal NEPA, and apply to state decisions that may also be subject to federal NEPA for their federal aspects. Most state little NEPAs are limited in focus to a very small subset of state-funded or state-sponsored activities. However, six states have little NEPAs that apply to a significant set of private activities conducted under state or local permits and/or to local government decisions: California, Washington, New York, Massachusetts, Hawaii, and Montana.[215] These can have significant influence over energy-related projects and their water uses. California, in particular, has utilized its California Environmental Quality Act to drive policymaking and decisions on particular energy technologies affecting water resources. Unlike the federal NEPA, most of these state laws have substantive requirements directing the selection of environmentally preferable outcomes unless otherwise justified, and for the implementation of feasible mitigation.

IV. Water Regulatory Aspects of Thermoelectric Power Generation and Refineries

We focus here on some specific water regulatory issues presented by thermoelectric power plants and refineries, keeping in view the legal regimes presented in Section III, and addressing some additional ones as appropriate.

A. Thermoelectric Power Generation

1. Siting

Decisions about siting of generating facilities affect water resources; these include consideration of the available sources and amounts of cooling water and the options available for discharge. Some states regulate the siting of electric power generating plants through their public utility commissions or public service commissions (collectively, PUCs). Others use the PUC for energy supply regulation of certain generating facilities, but address the siting issues, including those related to water use, separately through environmental permitting. Virginia's State Corporation Commission, for example, decides whether to approve electric generating facilities, and relies on the permit provisions and conditions of state environmental agencies for most environmental concerns.[216]

Some states have siting bodies, such as Washington's Energy Facility Site Evaluation Council (EFSEC). EFSEC oversees a "one-stop" siting process for major energy facilities, defined as "stationary thermal (non-hydro) power plants with electrical generating capacity of 350 Megawatts" as well as certain other electricity generating facilities that choose to be certified by EFSEC. An EFSEC Site Certification Agreement is issued in place of other state or local permits. To issue a Site Certification Agreement, EFSEC must determine that the facility will have "minimal adverse effects on the environment, ecology of the land and wildlife and ecology of the state waters and aquatic life."[217] Florida's Electrical Power Plant Siting Act provides a centralized review process for steam or solar electrical generating facilities of 75MW or more that have already received a certificate of need from the state public service commission; the Act provides a one-stop consolidated licensing process for all environmental and land use considerations relevant to siting.[218] Siting criteria include environmental considerations.[219]

The U.S. Nuclear Regulatory Commission (NRC) licenses nuclear power plants, including siting and environmental considerations.[220] State siting and public utility requirements also apply. NEPA environmental impact review is intended to inform the decisionmaking of environmental consequences and alternatives, including impacts on waters and water supplies.

Local land use regulation may affect siting of some energy facilities, but many states preempt local regulation for large generating facilities subject to PUC regulation; and local regulation may be preempted by state environmental regulations as to subjects covered by state regulation. Local land use regulation of nuclear plants is preempted by NRC regulation.

2. Regulation of Water Quantity

Water is a vital component in thermoelectric generation, from producing steam and turning turbines, to cooling the steam back to water, to emissions scrubbing. Apart from determinations driven by cooling water intake regulations, water quantity for electric power plants is almost entirely a matter of state law. In prior appropriation and hybrid states, which include the states of the Southwest, a new power plant would need to procure a water right if relying on surface water flows. In closed basins, those with full allocation of their flows, the only option for a new facility would be to purchase or lease a right from another water user, which involves an often lengthy

and expensive transfer procedure. Agricultural and ranching interests are the ones most likely to have senior rights to the large volumes of water that would be needed for electric power generation.

Where new water rights are still being granted, a new electric power plant could procure a right through an administrative or judicial procedure, depending on the state. This right, however, would be very junior and likely not fulfilled in times of drought, so a power plant is likely to choose to purchase or lease a much more senior right from another water user. If there is insufficient water to fulfill a power plant's water right, different states have different options, including the temporary transfer of a more senior water right, source substitution or a water bank.[221]

As noted above, most riparian rights states require permits for users of large quantities of water, although some states exempt steam electric power plants from that requirement.[222] Different states have different permit criteria, but consideration of the effect on other users and the public generally, including the condition of the water supply, is common. Some states issue permits that may be amended in times of shortage.[223] All riparian rights states follow some form of the reasonable use doctrine, so even if a permit is not required of the power plant, its rights to water likely still may be limited during periods of low flow.

Systems of allocating rights to groundwater vary significantly between and sometimes within states, and as a result, controls on groundwater usage by power plants can be very location-specific. In addition, some states allow aquifer storage, source exchanges between surface and groundwater or other innovative usage strategies involving groundwater that make water supplies more secure.[224]

Under most of these systems of allocation, the amount of water needed for the power production process will depend heavily on the type of cooling system used. Open-loop cooling systems require a large amount of water, but consume only about one percent of it.[225] Closed-loop systems require less than five percent of the water needed for open-loop cooling, but consume almost all of it through evaporation.[226] Dry cooling uses air rather than water, so thermoelectric generation using this technology requires little water.

As a result of these characteristics, the different cooling systems have different consequences and effects under water quantity laws. The larger the quantity of water needed to be diverted to operate the power plant, the less feasible it may be to site the plant in dry and drought-prone areas. In prior appropriation and hybrid states, an open-loop power plant either would need to have rights for the full amount of its diversion needs or coordinate with another senior right holder user immediately downstream to ensure that the water would be delivered to the plant and not consumed upstream. In riparian rights states, the diversion needs of the open-loop plant would be compared with the needs of upstream riparians whose nonuse would be needed to give the power plant the flows it needs.

With these constraints, along with water quality concerns from open-loop systems, it is not surprising that closed-loop systems have been far more common since 1980. In prior appropriation states, a much smaller water right would be needed. However, the higher water *consumption* of a closed-loop system as compared to an open-loop one may mean that less water may be available in the basin. In riparian rights states, a closed-loop system would put greater strain on downstream riparian users because there will be less water available for them; thus siting a closed loop plant may pose difficulties in the reasonableness determination.

Dry cooling reduces these water quantity concerns but is uncommon to date given its increased cost and complexity as well as reduced performance and scalability.[227] In its current form, the technology is most economical in wet, cool climates, not the arid climates in which it may most be needed for water quantity reasons.[228] Dry-wet systems, which wet-cool on hot days, offer a means of reducing these productivity losses. Some proposed power plants have elected to go for dry cooling when they have found themselves unable to acquire sufficient water rights, or to persuade the relevant water management district to deliver sufficient water to support wet cooling.[229]

State permitting agencies often must consider environmental concerns, which offers them an opportunity to require dry cooling or hybrid systems where the water usage of wet cooling would have too great an adverse impact. In California, for example, developers planning utility-scale concentrating solar power plants likely will not be permitted to build a wet cooling system, a view supported by the recent California Energy Commission approval of a 250 megawatt project conditioned on the use of dry cooling.[230] California also has a policy against using drinking-water quality water for wet cooling.

3. Regulation of Cooling Water Intake Structures

Under section 316(b) of the Clean Water Act, EPA's NPDES standards require "that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." Until 2001, EPA and delegated state programs implemented section 316(b) and its state analogues on a case-by-case basis when issuing permits. EPA then initiated a three-phase rulemaking to standardize regulation of cooling water intake structures. In Phase I, issued in 2001, EPA regulated structures for new facilities. Phase II, issued in 2004, regulates structures at large existing electric power generation plants. Phase III was finalized in 2006 and covers new offshore oil and gas extraction facilities.[231] Facilities not covered by any of these categories continue to be regulated on a case-by-case basis.

Phase I applies to any new facility that: (i) is a point source that uses or proposes to use a cooling water intake structure, (ii) has at least one structure that uses at least 25 percent of the water it draws for cooling purposes and (iii) has a design intake flow of at least two million gallons per day.[232] "New facilities" is defined by reference to include any "new source" or "new discharger" under the NPDES regulations that is a green-field or standalone facility constructed after 2002 that uses a new intake structure or expands the capacity of an existing structure.[233] The scope of the regulation thus includes, but is not limited to new electric power generation facilities (see refineries, infra). The Phase I regulations establish two alternative "tracks" that the operator may choose for compliance with the criteria and standards for cooling water intake structures at new facilities.[234] "Track I" facilities that withdraw 10MGD or more must reduce flow to a level commensurate with closed-cycle recirculating systems and are subject to flow intake velocity limits. Track I facilities between 2MGD and 10MGD may follow lesser requirements that do not require reductions to closed-cycle levels but otherwise follow Track I requirements. Design and construction and operational measures for all Track I facilities must minimize impingement and entrainment mortality of fish and shellfish if the facility may affect threatened or endangered species or migratory, sport or commercial species. "Track II" facilities must demonstrate reduction of adverse environmental *impact* to a level equal to the closed-cycle and maximum flow provisions of Track I, including with respect to impacts on fish and wildlife. Regardless of track, no facility can take more than 5% of the mean annual flow of the waterway, disrupt thermal stratification or turnover or take more than 1% of the flow in tidal rivers and estuaries during a single tidal cycle. Provisions for variances are included in the regulations.

The Phase II regulations apply to facilities for which construction commenced before 2002,[235] and that are electricity generation point sources using or proposing to use cooling water intake structures withdrawing 50 MGD or more of which at least? 25 percent is used exclusively for cooling.[236] The regulations established five compliance alternatives as the best technology available to reduce adverse environmental impact at these facilities.[237] After challenges from both environmental groups and the energy industry, the Second Circuit Court of Appeals remanded many provisions of the Phase II regulations for reconsideration by EPA, and EPA suspended the rule in its entirety.[238] The case eventually reached the Supreme Court, which reversed and remanded with respect to the specific question of whether EPA can use cost-benefit considerations in designing regulations where Congress is silent on the issue.[239] Despite this victory, EPA has not taken further action with respect to its Phase II regulations to date, and they remain suspended. As a result, cooling water intake structures at existing power generation facilities continue to be regulated on a case-by-case basis.

4. Regulation of Water Quality

Electric power plants must meet NPDES effluent limitation guidelines for their discharges into surface waters. These discharges must also satisfy water quality standards. Industrial stormwater provisions also apply, requiring preventive measures to address runoff from coal piles, exposed industrial areas and construction. The Willamette Partnership in Oregon is experimenting with a market-based approach whereby instream thermal standards are being met by utility-funded tree planting (because of the temperature effects of shading the river) and other management measures.

Disposal and management of coal combustion residues, a serious water quality issue, are currently addressed only by inconsistent state laws. Management practices may become more uniform after EPA finalizes a version of its June 2010 proposed RCRA regulation of such wastes. These regulations are likely to include requirements for lined disposal facilities and for some form of groundwater monitoring. EPA proposed two alternatives for public comment. Under one proposal, EPA would list coal combustion residuals as "special wastes" subject to regulation under RCRA subtitle C when destined for disposal in landfills or surface impoundments. Under the second proposal, EPA would regulate coal ash as a non-hazardous waste under RCRA subtitle D by issuing minimum national criteria. EPA notes that the Subtitle C option "would require the development of state or federal permit programs, would allow for direct federal enforcement, and would include related storage, manifest, transport, and disposal requirements and mechanisms for corrective action and financial responsibility. Before the Subtitle C rule would become effective, authorized states would need to adopt the rule, a process that could take several years." In contrast, the Subtitle D option would "go into effect sooner than a Subtitle C rule, with implementation required approximately six months after promulgation. However, the Subtitle D option would not require permit programs to be established, although states can establish such permit programs under their own authorities. Also, the federal Subtitle D proposal would not be federally enforceable…and would not establish the same extensive management requirements for coal combustion residuals destined for disposal."[240] Both proposals would require single lining of disposal facilities and groundwater monitoring. The subtitle C proposal would require bonding of the disposal site, the subtitle D proposal would not. Both versions of the rule would exempt from regulation coal combustion residuals that are "beneficially reused." Neither version of the rule would regulate coal combustion waste that is placed in coal mines as mine fill. Disposal of coal combustion residuals in abandoned mines is generally regulated by states, albeit none too strictly, under the Surface Mining Control and Reclamation Act (SMCRA) (see section V.A.1 below).[241]

EPA's decision on RCRA regulation of coal combustion residues could be important because, although many states regulate various forms of such wastes under state laws independent of

RCRA, approaches vary widely depending upon the state, the type of disposal or reuse and the facility involved. For example, Iowa has detailed management standards and Illinois has in recent years been requiring liners and groundwater monitoring for coal ash impoundments at power plants, while Montana exempts from solid waste regulation the disposal of coal ash by power plants on their own property.[242] Tennessee regulates ash disposal facilities under its solid waste law and regulations, and recently fined the Tennessee Valley Authority for a large ash waste impoundment failure that polluted the waters of the state.[243]

5. Geothermal and Solar Generation

In general, thermoelectric plants are not located on federal domain lands because private lands are available and because specific authorizations for such uses would need to be granted by law. However, geothermal and solar plants are authorized. The Bureau of Land Management oversees siting and approval for solar and geothermal power generation on federal lands. Federal geothermal leases are authorized under the Geothermal Steam Act[244] and the Energy Policy Act of 2005. BLM currently uses a right-of-way application process for commercial-scale solar projects under its Solar Energy Development Policy (Instruction Memorandum No. 2007-097), which, among other objectives, establishes requirements for solar energy project environmental review.

The fundamental performance standard is the Federal Lands Policy Management Act, which directs the government in its decisionmaking to avoid "unnecessary or undue degradation" of the public lands.[245] Mineral lease stipulations for geothermal leasing, right-of-way decisions for solar, and decisions about whether or not to offer areas are made using the NEPA environmental impact review process, but the federal agency has very broad discretion within the context of its land management plans.[246] Water rights are subject to state laws or federal reserved water rights if applicable.

In general, geothermal facilities withdraw heated water from the geothermal area and use it for energy purposes such as electric power generation, but some newer technologies fracture underground rock formations and inject water from other sources. BLM leasing regulations issued in 2007 provide the terms and conditions of leasing, including the posting of bonds to guarantee compliance and closure and reclamation.[247] Water-related conditions apply to exploration, drilling, utilization permits and site licenses and commercial use permits. Among other provisions are requirements at each stage to "protect the quality of surface and subsurface waters" and to retain "all materials and fluids" resulting from drilling or other operations.[248] The regulations require operators of utilization facilities to describe flow rates and the "source, quality and proposed consumption rate of water to be used during facility operations, and the source and quantity of water to be used during facility construction."[249] Utilization facility operations must protect the quality of surface and subsurface waters, prevent unnecessary or undue degradation of the lands (the FLPMA land management standard) and accommodate other land uses as much as possible.[250] The regulations do not directly address water quantity, but lease conditions must assure that the facility is properly operated and prevents waste of or damage to geothermal and other energy and minerals resources, and detailed information on water flow and steam flow is required.[251] Of course, in the western states, if water is being withdrawn, or withdrawn from another source and injected, appropriate water rights will be needed.[252] In 2008, BLM completed a Programmatic Environmental Impact Statement to guide geothermal leasing on federal lands, including a "comprehensive list of stipulations, conditions of approval, and best management practices."[253] Certain areas with special resource values, or legislatively protected (such as federal lands immediately west and southwest of Yellowstone National Park) are closed to geothermal leasing.

Geothermal activities on private lands (or on state lands under state leases) are subject to state laws. In addition to environmental laws and water laws relevant to these operations, some states, such as California, have adopted explicit schemes governing geothermal permitting.[254] California's law requires the operator to exclude "detrimental substances from strata containing water suitable for irrigation or domestic purposes and from surface water suitable for such purposes, and to prevent the infiltration of detrimental substances into such strata and into such surface water."[255] California law also requires a determination that the water extracted is for geothermal purposes and not for domestic or agricultural uses.[256]

B. Oil Refineries

In most instances, refineries are subject to the same legal authorities relating to water use and quality that govern electric power generating plants. However, petroleum refining is a highly regulated industry and in some cases refineries are subject to specific provisions that affect siting as well as the quantity of waters that may be used and discharged into the environment.[257]

1. Siting

Refineries generally must be sited to accept raw materials; as a result, they are commonly located in the coastal zone. This may raise CZMA consistency issues, as well as NEPA and little NEPA compliance requirements where siting has a state or federal nexus (for example, if the project will require a section 404 permit from the Corps of Engineers). For example, the New Jersey Coastal Area Facility Review Act, a state CZMA analogue, provides that "[n]ew oil refineries and petrochemical facilities are prohibited in the CAFRA area."[258] These laws thus may have substantial impact on the siting and potential development of new refinery facilities, as well as (in some cases) expansion of existing facilities.

2. Water Quantity

The petroleum refining industry uses 65 to 90 gallons of water to refine a barrel of crude oil. Most of this water is consumed via steam production and cooling.[259] Refineries must have the right to use surface or ground water; the means of acquiring such a right is defined by state law. The law and policy implications of these acquisitions are similar to issues discussed in the earlier section on power plants and are not repeated here.

3. Water Quality

Water that is not consumed (process water) may become contaminated with pollutants during the refining process. If not evaporated, this water – averaging 1.5 million gallons per day in 1996 – must be treated as wastewater under the Clean Water Act.[260] In 1982, EPA established effluent limitations guidelines and standards for petroleum refining.[261] In 2004, EPA reviewed the category due to its high levels of toxic and nonconventional pollutant discharges, but this review did not lead to alteration of refinery regulations. [262]

EPA's effluent limitation guidelines apply to petroleum refining permitting under the NPDES program. They apply only to facilities under the relevant industrial classification system code for which the raw material is petroleum; as a result, they do not cover biorefineries.[263] The guidelines and standards establish five subcategories of facilities, including topping refineries, cracking refineries, petrochemical refineries, lube refineries and integrated refineries. Each subcategory is subject to specific limitations as set out in the regulations.[264]

EPA has developed regulations for cooling water intake structures under section 316(b) of the Clean Water Act, as noted in the previous discussion of power generating facilities. Petroleum refineries are within the scope of the first of the three phases of the regulations. Phase I applies to

"new electric generating plants and manufacturers that withdraw more than two million gallons per day (MGD) from waters of the U.S., if they use 25% or more of their intake water for cooling." Petroleum refineries are considered manufacturing facilities due to their industrial code. As a result, new petroleum refineries are subject to the Phase I regulations rather than site-by-site review of cooling water intake. Existing refineries, on the other hand, are not subject to these regulations and their cooling water intake structures will continue to be regulated on a site-by-site basis under the NPDES permitting guidelines.[265]

Petroleum refineries are also subject to stormwater regulations, which require regulated facilities to obtain coverage under a NPDES permit and implement stormwater pollution prevention plans or stormwater management programs. Refineries meeting applicability requirements are also required to prepare and implement oil spill prevention plans.

C. Biorefineries

Biorefineries produce ethanol, biodiesel, and co-products through processes analogous to those used in petroleum refining. Biorefineries require water in amounts that may exceed petroleum refinery needs as measured per gallon of fuel produced.[266] Biorefineries are "manufacturers" and therefore are subject to EPA's Phase I cooling water intake regulation.[267] Biorefineries also are subject to water quality regulation; they discharge some of the same effluents, including cooling tower blowdown, and they produce effluents such as brine and organic byproducts with substantial biological oxygen demand.[268] They produce fewer toxic effluents and are not yet subject to specific effluent limitation guidelines. As a result, discharges from biorefineries are subject to NPDES permits issued by states or EPA on a case-by-case basis with effluent limits determined by best professional judgment.

D. Carbon Capture and Sequestration

Carbon capture and sequestration (CCS) is under increasing consideration as a climate change mitigation strategy. Defined as "[t]he process of capturing CO2 from an emission source, (typically) converting it to a supercritical state, transporting it to an injection site, and injecting it into deep subsurface rock formations for long-term storage," both carbon capture and injection have potential impacts for water use and quality and are regulated accordingly under state and federal law. [269]

Both pre- and post-combustion carbon capture require water inputs. The majority of these inputs are consumed during the process, and the remainder, produced waters, may be either recycled or discharged. Power plants may obtain the additional water needed for capture from surface or groundwater, and will need water rights or permits as required by state law. Produced waters that are discharged at the surface will be subject to the same limitations as other such discharges, including the Clean Water Act and its state analogues. If waste water is injected, it will be subject to the SDWA and its state analogues. In addition, planning statutes such as CZMA, NEPA, and little NEPAs may be implicated if CCS has a federal or state nexus or occurs in a coastal zone. Such a nexus may arise from the need for a section 404 permit from the Army Corps of Engineers, participation in the project by the Department of Energy or other mechanisms.

Injection of carbon for long-term storage is subject to the UIC program of the Safe Drinking Water Act. Carbon sequestration will be directly regulated by state UIC programs in most states, but each state program must comply with EPA's minimum standards. EPA has begun to regulate CO2 injection for long-term storage under the UIC, beginning with a 2007 guidance document and including a pending proposed rule. The 2007 guidance, which remains effective, is intended

to aid UIC program directors in evaluating geologic sequestration (GS) well applications and setting appropriate permit conditions for Class V experimental technology wells.[270] Under the SDWA, "experimental technology" is "a technology which has not been proven feasible under the conditions in which it is being tested."[271] The guidance notes that injection of fluids, including CO2, for enhanced oil and gas recovery is long-standing,[272] but that GS injection is an experimental application of the existing technology.[273] The guidance identifies two phases – validation and deployment – both of which qualify as experimental. The guidance anticipates commercialization in 2012, by which point a management framework is needed.

EPA took a step towards creating that management framework in its 2008 proposed rule for CO2 GS wells.[274] The rule proposes a new class of well (Class VI) and minimum technical criteria for wells intended for long-term storage. The new Class VI proposal includes components including siting, area of review, well construction, operation, mechanical integrity testing, monitoring and well plugging and post-injection site care. In 2009, the agency supplemented the proposed rule, presenting field data from the regional carbon sequestration partnership and other research, as well as alternative injection depth requirements.[275] According to EPA, the final rule is expected in late 2010 or 2011.

While the SDWA is the primary regulatory limitation on injection of carbon for long-term storage, it is not the only relevant legal authority. To the extent that injection causes harm, injectors may be subject to liability not only under the SDWA but also under state tort or nuisance law. In addition, injection is likely to implicate NEPA where, as in the pilot projects currently underway, the Department of Energy plays a role.

V. Water Regulatory Aspects of Related Extractive Industries

This section examines laws affecting the water use of certain industries associated with the production of fuels for thermoelectric plants and inputs to refineries for transportation fuels. Energy choices to support particular generating technologies and transportation fuels necessarily imply impacts at the extraction phase.

A. Coal Mining

1. SMCRA Regulation

Coal mining, unlike extraction of other fossil fuels, is comprehensively regulated by a federal law that sets up a federally-delegated program administered by states subject to federal oversight and backup enforcement. The Surface Mining Control and Reclamation Act (SMCRA) provides for environmental permitting, preparation of reclamation plans, performance bonding for reclamation and inspection and enforcement of both surface and underground coal mines.[276] SMCRA also regulates coal washing and processing facilities located at or near the mine site. SMCRA contains a number of provisions that address water, including performance standards requiring mine operators to "minimize the disturbances to the prevailing hydrologic balance at the mine-site and in associated off-site areas and to the quality and quantity of water in surface and ground water systems both during and after surface coal mining operations and during reclamation."[277] A permit applicant must submit detailed information on the baseline hydrology, a determination of the probable hydrologic consequences of the operation (PHC) and plans for hydrologic reclamation and monitoring. The state regulatory agency must prepare a cumulative hydrologic assessment (CHIA) for the mine, to evaluate the effect of the mine and other existing and anticipated mining on the hydrologic balance of the area.[278]

SMCRA prohibits surface coal mining on alluvial valley floors significant to farming in the western U.S, as determined by state regulators.[279] SMCRA also provides a process for state (or federal) designation of areas "unsuitable for surface coal mining" (including surface effects of underground mines), thus prohibiting issuance of a permit. Any person, including individuals and governments, may petition the relevant state or federal regulators for designation of lands where, among other things, probable coal mining impacts to hydrologic balance, including acid mine drainage, would prevent effective reclamation.[280]

Surface owners who suffer loss of water supply for any beneficial use due to surface coal mining, and surface owners who lose drinking water, domestic or residential water supplies due to underground coal mining, are entitled to have their water replaced by the mine operator.[281] A number of states have adopted water replacement provisions that go beyond federal requirements.

SMCRA regulations prohibit mining within 100 feet of a perennial or intermittent stream, unless the regulatory authority specifically authorizes it based on a finding that it will not cause or contribute to the violation of applicable State or Federal water quality standards and will not adversely affect the water quantity and quality or other environmental resources of the stream.[282] A long history of litigation and regulatory changes has countenanced the placement of excess spoil in stream valleys in association with mountaintop removal mining. Most recently the U.S. Department of Interior's Office of Surface Mining has proposed to replace a rule adopted at the end of the Bush administration that supported such uses of stream valleys, seeking to develop a new rule and commencing preparation of an environmental impact statement to evaluate the new approach.[283]

2. Clean Water Act Regulation

At the same time, the Corps of Engineers has been exercising simultaneous jurisdiction over these "valley fills" under Section 404 of the Clean Water Act. Courts, and especially the Fourth Circuit Court of Appeals in Richmond, have upheld Section 404 permits for valley fills, including fills and ponds in streams.[284]

Some Corps approvals over the years were essentially automatic under Nationwide Permit 21, applicable to coal operations regulated under SMCRA, but the Corps generally required applications for individual Section 404 permits with more detailed review for the larger fills. On June 17, 2010, the Corps announced that it was suspending use of Nationwide Permit 21 in six Appalachian states, and that operators would hereafter need to use the individual permit process.

The U.S. EPA has authority to object to or even veto Section 404 permits. In 2009, EPA took action to review and delay permitting of some of these fills. And in April 2010, EPA issued a guidance document in order to gain greater control and consistency in its review and potential veto of Corps of Engineers Clean Water Act Section 404 permits for valley fills associated with coal mines in the Appalachian states. Specifically, the new guidance sets numeric water quality criteria for conductivity – a measure that stands in for salts, sulfides and other pollutants that impair macroinvertebrate health in streams. In so doing, the new guidance reinterprets existing state narrative water quality standards and provides a technical basis for insisting that states include strict water quality-based effluent limits in their NPDES permits as well. EPA is accepting comments on the guidance document until December 1, 2010, but is applying the guidance during the comment period.[285]

NPDES permits apply to coal mines and related processing facilities and prescribe effluent limits for a number of pollutants including acidity, iron, manganese and total suspended solids.[286] Technology-based effluent limits may be modified for an area that previously has been mined if the applicant demonstrates that the remining operation has the potential to improve water quality. The modified requirements are determined using best professional judgment.[287]

3. Federal Lands Activities

Coal mining is authorized on federal lands managed by the Bureau of Land Management, under coal leases awarded under the Mineral Leasing Act.[288] SMCRA, the Clean Water Act, and other laws apply, and lease terms and stipulations must comply with standards in the Federal Lands Policy Management Act to prevent "unnecessary or undue degradation" as well as with environmental standards set out by regulation, and as identified in environmental impact assessments under NEPA.

B. Oil & Gas

1. State Regulation

State oil and gas agencies regulate drilling in private and state-owned mineral estates. Some state oil and gas regulations are built on federal models such as the SDWA. However, federal laws contain several substantive exclusions for oil and gas activity. As noted previously, RCRA subtitle C does not apply to drilling wastes, and the SDWA's UIC provisions prohibit EPA from adopting rules setting minimum standards for states that would impede the underground injection of brine or other fluids which are brought to the surface in connection with oil or natural gas production. State laws commonly include limits on permitting and operations of oil and gas wells and disposal of drilling waste. These restrictions include limitations and requirements on injection wells for recovery, disposal and storage.

Drilling for oil, gas and geothermal resources on state and private mineral estates generally requires a permit from the state oil and gas commission or other relevant agency. Permits include requirements for conditions such as well casing, depth and cement, as well as well spacing. These conditions are intended to prevent waste of oil and gas resources and to protect groundwater resources during drilling, subsequent well operation, well completion, closure and drilling site restoration. Issuance of drilling permits in some states is subject to the state's "little NEPA" and thus permits can only be issued in accordance with an EIS, often written in generic fashion.[289]

Oil and gas drilling produces a substantial amount of drilling wastes that must be disposed of during and after completion of drilling. According to a Fish and Wildlife Service estimate, approximately 402 million barrels of drilling waste were produced in 2008, and, according to 2000 data, 68 percent of wells use reserve pits for waste disposal.[290] These wastes are generally allowed to evaporate and then are buried onsite along with their synthetic liner. This disposal method may result in the contamination of soil, groundwater and surface water with a variety of substances, as well as harm to birds and wildlife (including endangered species). Migration can be minimized through solidification of drilling wastes. The amount of drilling waste also can be reduced through pitless or closed-loop drilling and treatment and reuse of drilling fluids, but these methods may not fully prevent contamination. In some locations, fluids may be injected underground.

State oil and gas agencies require or recommend a variety of different practices for disposal of drilling wastes in reserve pits and as solid waste. Therefore, determination of the specific requirements for drilling and disposal, such as timeframes for closure of pits and construction guidelines, requires consultation of requirements in specific states. These requirements differ substantially; for example, operators may be required to close pits from 30 days to one year after completion of a well. In California, however, no time limit applies; instead, performance bonds are not released until drill sites are reclaimed. In Maryland, no mandatory time limit applies; instead, 30 days is recommended.[291] Operational requirements also differ. For example, Arizona regulations include construction standards and require recycling or commercial offsite disposal of drilling mud that has more than a certain level of specific pollutants.[292] Indiana's regulations are less specific, requiring owners and operators to "construct and maintain necessary mud circulation and reserve pits"[293] and prohibiting evaporation pits for salt water and other waste liquids except for pits used for emergencies, backwash water or in connection with Class II wells.[294]

A specific issue in waste treatment is the regulation of Naturally Occurring Radioactive Material (NORM), which is a component of oilfield waste. Regulation of NORM varies from state to state; while New York has concluded that NORM presents no threat to public health or the environment,[295] states with high levels of NORM regulate its disposal. In New Mexico, for example, the Environmental Improvement Board has issued NORM regulations that apply to "any person who engages in the extraction, transfer, transport, storage, or disposal of NORM."[296] These regulations apply to the disposal of these wastes in surface waters by waste treatment facilities and injection, among other methods.

In addition to the use of pits, states regulate oil and gas injection wells for enhanced recovery, disposal and storage. Injection may in fact be the preferred method for disposal of waste fluids.[297] For example, in New Mexico, "[u]nderground injection to below fresh water is the preferred method for disposal of oil and gas waste fluids. However, surface disposal is necessary for solid and in locations where injection is not practical due to subsurface geology."[298] Underground injection for oil and gas waste disposal and enhanced recovery is subject to delegated state UIC

programs under the SDWA. Unlike surface restrictions, state UIC programs may have concurrent authority on injections on federal lands.

Oil and gas wells generally are Class II wells and are subject to construction and operation requirements on that basis to prevent harm to USDWs. Some states, such as New Mexico, regulate storage wells under their UIC programs even though the SDWA excludes these wells. Other well classes may apply to oil and gas activity as well; in New Mexico, mineral extraction wells that inject water to produce salt brine for oil and gas operations are considered Class III wells, wells that dispose of non-exempt, non-hazardous oilfield waste are Class I wells, and oilfield service wells are Class V wells.[299] These different well classes are reviewed by different agencies under different legal authorities. Unless a provision exists for permitting by rule, injection wells require permits, which may include provisions for public notice and hearings, in accordance with their well classification. Careful consideration therefore is necessary to determine the exact reach of state regulations and the classification of specific oil and gas wells.

Sediment and erosion controls at oil and gas sites are primarily a matter of state law; however, the Clean Water Act's construction stormwater and industrial stormwater provisions have some application as noted above, despite exemption language for uncontaminated runoff.

2. Federal Lands

Oil and gas are leasable minerals on federal lands. The lease regulations and stipulations include requirements that the operator –

> conduct operations in a manner which protects the mineral resources, other natural resources, and environmental quality. In that respect, the operator shall comply with the pertinent orders of the authorized officer and other standards and procedures as set forth in the applicable laws, regulations, lease terms and conditions, and the approved drilling plan or subsequent operations plan….and exercise due care and diligence to assure that leasehold operations do not result in undue damage to surface or subsurface resources or surface improvements. All produced water must be disposed of by injection into the subsurface, by approved pits, or by other methods which have been approved by the authorized officer. Upon the conclusion of operations, the operator shall reclaim the disturbed surface in a manner approved or reasonably prescribed by the authorized officer.[300]

BLM regulations include reserve pit construction requirements and the agency also provides standard operating procedures and guidelines in its Gold Book.[301] The Gold Book, last revised in 2007, "was developed to assist operators by providing information on the requirements for obtaining permit approval and conducting environmentally responsible oil and gas operations on Federal lands and on private surface over Federal minerals (split-estate)."[302] Oil and gas operations on federal lands are subject to NEPA, and leasing occurs with an EIS or EA, but individual drilling sites are presumptively eligible for a categorical exclusion from NEPA review under the Energy Policy Act of 2005.

C. Oil Shale

Oil shale occurring on federal lands is a leasable mineral under the Mineral Leasing Act. Oil shale development on federal lands has received renewed interest after approximately a 25-year hiatus. BLM solicited Research, Development and Demonstration (R, D & D) lease nominations and awarded six leases in 2007. In February 2009, BLM withdrew a second proposed solicitation

and asked for more public comment. In November 2009, BLM re-solicited for R, D & D lease nominations for 160-acre leases, with the opportunity for potential conversion to commercial leases on 640 acres. Among the relevant issues BLM will consider in lease approval are approaches that "demonstrate the potential to (a) Minimize water usage; (b) Protect surface and subsurface waters…"[303]

A Programmatic EIS record of decision was approved that same month, amending land use resource management plans in Colorado, Utah, and Wyoming for potential oil shale leasing. Individual EAs or EISs will be required for each lease. Oil shale leasing regulations, including environmental and economic provisions, were adopted in November 2008.[304] The new regulations allow BLM to require an operator to establish a trust fund or other financial mechanism to support long term water quality treatment to achieve water quality standards, and to meet other long term postmining maintenance requirements.[305] The regulations do not contain detailed performance standards on water. Rather, a broad performance standard requires that "All mining and in situ development and production operations must be conducted in a manner to yield the MER [Maximum Economic Recovery] of the oil shale deposits, consistent with the protection and use of other natural resources, the protection and preservation of the environment, including land, water, and air, and with due regard for the safety of miners and the public."[306]

D. Coal Bed Methane (CBM)

Production of methane gas from deep wells into coal seams requires removal of large volumes of water to allow the methane to be released. The produced water is either discharged into surface or groundwater, discharged into evaporation ponds, applied to land or often injected into even deeper formations to avoid contamination of shallower aquifers.

Dewatering for CBM production raises the issue of whether the production of the water is itself a beneficial use for purposes of state-defined water rights and limitations.[307] New Mexico requires water rights permits from the state engineer for dewatering at a depth of less than 2500 feet, but not for saline water pumped from a greater depth.[308] In Colorado, a recent state Supreme Court decision subjects CBM dewatering to regulation and permitting by the state engineer as a beneficial use subject to prior appropriation rules, when previously it had been exempt under the exclusive jurisdiction of the Colorado Oil and Gas Conservation Commission.[309] A Montana state trial judge in 2010 ruled that the discharge of CBM water to evaporation pits violates the Montana state constitution's provisions for beneficial use of the state's waters.[310]

Other legal water quantity issues arise because of the effects of dewatering on other landowners and water users. Montana requires coalbed methane operators to offer water mitigation agreements to owners of water wells or natural springs within one-half mile of a CBM field.[311] In 2007, Montana sued Wyoming in an original action in the U.S. Supreme Court, alleging violation of the 1951 Yellowstone River Compact. The Compact concerned rights to the water in the Tongue and Powder Rivers in the Yellowstone River Basin. Montana contends that Wyoming's CBM development, resulting in production and disposal of water, has deprived Montana of water it is entitled to under the Compact. The Supreme Court assigned a special master to decide the case; in a preliminary ruling in 2009, the master decided that groundwater pumping must be counted toward each state's water allocation.[312]

Some states address disposal of produced water from CBM operations like other oil and gas regulations – providing for injection under Class II of the UIC program, discharge to surface waters pursuant to a NPDES permit or beneficial use on farmland if supported by a permit from the state engineer. The Montana Supreme Court in 2010 ruled that the state's attempt to authorize

operators to discharge untreated CBM-produced saline water under a NPDES permit is unlawful.[313] Interestingly, at the same time, Montana has been attempting to use new water quality standards to limit the discharge of saline water from CBM operations in Wyoming. Wyoming currently allows the discharge of produced water without treatment.[314]

E. Deep Shale Gas

The largest new gas discoveries involve production of natural gas from tight shale formations at depth. These formations, including the Barnett shale in Texas and Marcellus shale in northern Appalachia to New York, are developed by hydraulic fracturing – injecting large volumes of water with added chemical agents and propants. The millions of gallons of fracking water associated with each well must then be disposed of, either by injection or discharge to surface waters, sometimes via municipal wastewater treatment plants under contract. The contents of the fluids are held close by the companies as trade secrets. When discharged, waters can carry substantial total dissolved solids, a pollutant for which water quality standards are lacking in some states.

Water used for hydraulic fracturing is obtained via whatever water quantity regulatory system applies. In 2008, on an emergency basis, Pennsylvania began to require notification of the source and amount of all water withdrawals associated with Marcellus shale operations; this supplemented action taken by the Susquehanna and Delaware River Basin Commissions to require such information.

Bills are pending in Congress to remove the exemption for hydraulic fracturing from the Safe Drinking Water Act and to require operators to disclose the chemicals they use in hydraulic fracturing.[315] EPA has launched a two-year, congressionally mandated study into the effects of hydraulic fracturing on drinking water and water supplies. In the meantime, state regulation applies. On June 8, 2010, the Wyoming Oil and Gas Conservation Commission became the first state to adopt rules to require operators to report the chemicals used in hydraulic fracturing for natural gas development and recovery.[316]

In April 2010, the New York Department of Environmental Conservation determined that drilling of the Marcellus shale within the watersheds serving New York City and Syracuse water supplies would be excluded from the two-year environmental impact review being conducted under New York's "little NEPA" law covering Marcellus drilling in the state.[317] This determination still allows companies to apply for drilling permits on a well-by-well basis, but will require detailed environmental impact review on each well, a process regarded by companies as a de facto moratorium. The Delaware River Basin Commission, an interstate body, in May 2010 expressly imposed a temporary moratorium on new water withdrawals for Marcellus drilling in its area of Pennsylvania pending development of new rules.

The Pennsylvania Environmental Quality Board in May 2010 adopted a rule setting a discharge limitation for total dissolved solids (500 Mg./L) and requiring Marcellus Shale operators to treat any wastewater that they discharge to rivers and streams, rather than discharge it untreated or send it to public wastewater treatment plants with no capacity to remove the contaminants.[318] Also in May 2010, West Virginia regulators announced their own plans to develop a water quality standard for total dissolved solids.

F. Uranium Mining and Milling

Uranium mining on federal lands is conducted under the General Mining Law of 1872, which allows the location of a claim for valuable minerals and which does not require payment of a lease or royalty. Areas of the public domain may be withdrawn from mineral location under various federal laws to protect other resources or values. Uranium mining practices are regulated by BLM or the Forest Service under approval of a plan of operations, which requires environmental impact review under NEPA.

Uranium mining, whether on federal or state or private land, may be subject to additional permitting. If the uranium is extracted by solution mining, a UIC permit will be needed, which will include submittal and approval of a plan to protect potential sources of drinking water from contamination. Uranium mills are licensed by the Nuclear Regulatory Commission or by states under agreements with the NRC.[319] Discharges to surface waters are regulated by the NPDES program. The Uranium Mill Tailings Remediation Control Act of 1978 provides standards for licensing of tailings disposal sites by NRC or agreement states. Title II of the Act provides NRC authority to control radiological and non-radiological hazards, provides EPA authority to set generally applicable standards for both radiological and non-radiological hazards, and provides for federal or state ownership of the disposal sites under a NRC license after cleanup and decommissioning.[320] EPA has set drinking water standards for radionuclides which can be used as cleanup standards for aquifers.

G. Biomass Production

1. Siting

Siting of biomass production is largely affected only by local zoning laws that do not depend on an analysis of water availability or quality. In many states, rural areas are either unzoned or subject only to very general land use ordinances regulating subdivision of land. In addition, virtually all states have right-to-farm legislation that protects agricultural uses from nuisance lawsuits. As a result, unless farming affects critical habitat of a threatened or endangered species or raises other similar concerns, siting of primary biomass production usually will not require permit issuance or regulatory review. (Generally speaking, water quantity allocation regulations apply the same to agriculture as they do to other water uses, although some riparian doctrine states do not require permits for agricultural water withdrawals.) In rare cases, biomass crop planting may be subject to unique provisions; for example, Florida requires producers to post a bond and implement containment measures prior to engaging in biomass plantings of nonnative crops.[321]

Federal programs may indirectly affect where crops are grown. The federal Farm Bill contains provisions providing incentives for farmers to adopt practices that may reduce water use or protect water quality. For example, the Conservation Reserve Program (CRP) provides farmers with payments for fallowing highly erodible and riparian lands, thereby reducing sediment inflows into streams, reducing water temperature and providing other benefits. Description of the full suite of Farm Bill programs is beyond the scope of this report, as they do not specifically address where biomass crop production can be sited, nor do they directly regulate water allocation or quality. Federal payments and benefits for commodity crops do contain cross-compliance provisions so that, for example, such benefits cannot be received for conversion of wetlands or highly erodible lands to commodity production.[322] Conceivably future Farm Bill programs could contain provisions that address energy biomass issues.

2. EPA's Biosolids Rule

EPA's biosolids rule governs the land application of residuals from wastewater treatment. It applies to agricultural lands, forests and other sites collectively referred to as "nonpublic contact sites."[323] Growing crops on a biosolids surface disposal site is a "dedicated beneficial use."[324] The biosolids rule includes certain requirements for biosolid preparers and appliers. Landowners and leaseholders are not directly subject to the limitations on appliers unless they directly apply the biosolids. Preparers must ensure that biosolids meet the requirements for one of four categories, which have different regulatory requirements; these may include site restrictions and management practices. Application requirements vary depending on the category of solids used and include notice, recordkeeping and monitoring requirements as well as substantive limitations on application practices. Application requirements ensure the use of site-specific management plans to avoid environmental harm, including pollution. While "exceptional quality" biosolids are subject to no application restrictions, two classes of biosolids cannot be applied so that they enter U.S. waters except pursuant to a Section 404 dredge and fill permit, nor can they be applied within 10 meters of U.S. waters unless otherwise specified by the permitting authority.[325] The biosolids cannot be applied in amounts greater than the agronomic rate for nitrogen for the relevant crop, and the solids may not harm or contribute to harm of a threatened or endangered species or their critical habitat. Land appliers must certify that applicable management practices have been met. Finally, food, feed and fiber crops cannot be harvested until a certain amount of time has passed after application of biosolids (30 days in the case of corn).

Looking beyond the biosolids rule, RCRA limits the amount of hazardous waste that can be included in fertilizer. Food chain crops can be grown on lands where hazardous waste-bearing fertilizers are used, provided that the producers demonstrate that there is no substantial risk to human health caused by the growth of such crops. RCRA does not apply to normal agricultural wastes. The federal Superfund law also includes a "pesticide exemption" that applies to the application of pesticides registered under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).[326]

3. Nonpoint Source Regulations

Nonpoint source runoff from agricultural lands is a leading contributor to water quality impairments in the United States.[327] However, because of definitions and other limitations in the Clean Water Act, the states must either develop their own authorities or simply rely on promoting best management practices through technical assistance, financial support and other non-regulatory tools. A few states have a permit program that covers some nonpoint sources of water pollution.[328] Some states, such as Maryland, address the agricultural nonpoint issue by requiring the development of enforceable nutrient management plans for agricultural lands, identifying the ideal amount, placement, timing and application of plant nutrients to prevent pollution while maintaining productivity.[329]

A 1990 amendment to the CZMA directed participating states and territories to develop coastal nonpoint pollution control programs that "provide for the implementation, at a minimum, of management measures in conformity with [a federal] guidance … to protect coastal waters generally."[330] Management measures are defined as "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of *nonpoint sources* of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives."[331]

EPA issued the relevant guidance to implement this mandate in 1993, as updated in 1998.[332] The guidance focuses on five sources, including agricultural and silvicultural runoff. Management

measures specified for agriculture include several relevant provisions. For sediment and erosion control, EPA directs states either to apply the erosion component of USDA's Conservation Management System through conservation tillage, strip cropping, contour farming and terracing, or to design and install a combination of practices to remove settleable solids and associated pollutants in runoff for all but the larger storms. Other management measures include development and implementation of comprehensive nutrient management plans, use of integrated pest management to reduce pesticide use and uniform application of irrigation water based on accurate measures of crop needs and volume applied, as well as additional requirements applicable to chemigation.[333] Silvicultural management measures include preharvest planning, protection of streamside management areas (SMAs), minimizing pollution from road construction and management, harvest, revegetation, fire management and chemical management.[334] Participating states develop enforceable regulations to implement the CZMA nonpoint source provisions. As each state has its own legal authorities, the manner in which the management measures are implemented will differ, and determination of the management measures and practices applicable to a particular biomass producer requires consideration of state and local law, as described in the applicable 15-year program strategy required for program approval.[335]

4. Section 404

Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into waters of the United States. Section 404 exempts several activities from permitting, including discharges "from normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices."[336] Discharges "for the purpose of construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches" are similarly exempted.[337] The agricultural exemption is not unlimited. It does not apply to "[a]ny discharge of dredged or fill material into the navigable waters incidental to any activity having as its purpose bringing an area of the navigable waters into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach of such waters be reduced."[338]

Consideration of how biomass crop production interacts with Section 404 depends on whether changing the use (e.g., commodity crop to switchgrass or algae production) constitutes a "normal farming" activity exempt from the Clean Water Act. In 1990, EPA and the Corps issued guidance on the meaning of "normal farming" and its relationship to cropland conversion.[339] The agencies interpret the statutory language to allow "ongoing" agricultural and forestry operations to discharge dredge or fill material into wetlands and other waters without first acquiring a permit, but to prohibit wetlands conversion without authorization. Changes to practices or crop rotation (including fallowing) are considered "normal," unless they require hydrological modifications. New uses that are not exempt require authorization, which may be obtained in some states via a general permit.[340]

Prior converted croplands (wetlands converted to agricultural commodity production prior to 1985) are not considered waters of the United States and therefore are exempt from the Clean Water Act, including Section 404. These lands are also exempt from the wetlands conservation provisions of the Food Security Act ("Swampbuster"), which suspend certain USDA farm program benefits (e.g., price supports) to producers of commodity crops who convert wetlands.

5. Safe Drinking Water Act

The SDWA provides authority to states to protect underground sources of drinking water, including from agricultural chemicals. States thus may directly regulate agricultural activities to address pesticide and fertilizer residues in drinking water in amounts that threaten public health.

EPA has set MCLs for a variety of agricultural chemicals. Biomass producers can be directly regulated by the SDWA if they are considered public water systems (i.e., if they provide water to more than 25 contract laborers or other persons). In addition, agricultural facilities with injection wells (class V agricultural drainage wells) are subject to the UIC and may be required to submit inventory information. Finally, state source water protection programs, and in particular the comprehensive state groundwater protection program, authorizes states and tribes to directly regulate activities threatening USDWs.

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[1] *See generally*, DEP'T OF ENERGY, ENERGY DEMANDS ON WATER RESOURCES: REPORT TO CONGRESS ON THE INTERDEPENDENCY OF ENERGY AND WATER (2006), http://www.sandia.gov/energy-water/docs/121-RptToCongress-EWwEIAcomments-FINAL.pdf; NAT'L ENERGY TECH. LAB., DEP'T OF ENERGY, WATER REQUIREMENTS FOR EXISTING AND EMERGING THERMOELECTRIC PLANT TECHNOLOGIES DOE/NETL-402/080108 (2009), http://www.netl.doe.gov/energy-analyses/pubs/WaterRequirements.pdf.
[2] *See generally* Jay Austin & Bruce Myers, *Anchoring the Clean Water Act: Congress's Constitutional Sources of Power to Protect the Nation's Waters*, Environmental Law Institute White Paper (July 2007)
[3] U.S. CONST. art. IV, § 8, cl. 3
[4] Gibbons v. Ogden, 22 U.S. (9 Wheat.) 1 (1824).
[5] U.S. v. Rio Grande Dam & Irr. Co., 174 U.S. 690 (1899).
[6] U.S. v. Appalachian Elec. Power Co., 311 U.S. 377 (1940).
[7] U.S. CONST. art. IV, § 3.
[8] While it is sometimes said the states "own" waters, this is a sovereign, not a possessory right. See Frank J. Trelease, Government Ownership and Trusteeship of Water, 45 Cal. L. Rev. 638 (1957) (examining various conceptions of ownership and trusteeship under state and federal law).
[9] Atchison v. Peterson, 87 U.S. 507 (1874); Sturr v. Beck, 133 U.S. 541 (1890).
[10] Pollard v. Hagan, 3 How. (44 U.S.) 212, 223 (1845).
[11] U.S. Const. art. IV sec 3; Escanaba v. City of Chicago, 107 U.S. 678 (1883).
[12] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 339 (2009).
[13] 207 U.S. 564, 577 (1908).
[14] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 335 (2009).
[15] *See* Arizona v. California, 373 U.S. 546 (1963).
[16] United States v. New Mexico, 438 U.S. 696 (1978).
[17] U.S. Const. Art I, sec. 8.
[18] 43 U.S.C. § 371 et seq.
[19] George C. Coggins, et al., Federal Public Land and Resources Law (6th ed. 2007), at 108.
[20] Restatement (Third) of Foreign Relations Law of the United States § 303, comment e (noting prevailing view that congressional-executive agreements and treaties are interchangeable).
[21] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 343 (2009).
[22] United States v. Adair, 478 F. Supp. 336 (D. OR. 1979), aff'd 723 F.2d 1394 (9th Cir. 1984), cert. denied 476 U.S 1252 (1984).
[23] U.S. const. art. VI, cl. 2.
[24] Medtronic, Inc. v. Lohr, 518 U.S. 470, 485 (1996).
[25] 458 U.S. 941 (1982).
[26] South Dakota v. Dole, 483 U.S. 203 (1987) (upholding linking of federal highway funds with establishing legal drinking age at 21).
[27] 505 U.S. 144 (1992).
[28] U.S. Const., Am. V: "nor shall private property be taken for public use, without just compensation."
[29] COLO. CONST. art. XVI, § 6.
[30] Mont. Const. Art II, § 3.
[31] Mont. Const. Art IX, § 2.
[32] Mont. Const. Art IX, § 3.
[33] Richard Lazarus, *Changing Conceptions of Property and Sovereignty in Natural Resources: Questioning the Public Trust Doctrine*, 71 IOWA L. REV. 631, 632 (1986).

[34] Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 Mich. L. Rev. 471, 475 (1969); Robin Kundis Craig, *A Comparative Guide to the Eastern Public Trust Doctrines: Classifications of States, Property Rights, and State Summaries*, 16 PENN ST. ENVTL. L. REV. 1, 4-5 (2007).
[35] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 242-243 (2009).
[36] *Id*. at 4.
[37] *Id*. at 77-78.
[38] *Id*. at 273.
[39] *Id*. at 268.
[40] *Id*. at 269.
[41] SHELDON M. NOVICK, ET AL., LAW OF ENVIRONMENTAL PROTECTION 7-15 (2009).
[42] James M. McElfish, Jr., State Enforcement Authorities for Polluted Runoff, 28 ELR News & Analysis 10190 (1998).
[43] U.S. CONST. art. I, § 10.
[44] U.S. Fish and Wildlife Service, Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service: Interstate Compacts, *at* http://www.fws.gov/laws/lawsdigest/compact.html.
[45] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 440 (2009).
[46] http://www.cglg.org/projects/water/CompactConsent.asp
[47] *See, e.g.*, 33 U.S.C. § 1288(a)(3).
[48] 43 U.S.C. § 617c.
[49] U.S. CONST. art. III, § 2.
[50] 33. U.S.C. §§ 11251-1387.
[51] 33 U.S.C. § 1362(7).
[52] United States v. Riverside Bayview Homes, Inc., 474 U.S. 121 (1985); Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001); Rapanos v. United States, 126 S. Ct. 2208 (2006). The *Rapanos* decision produced no majority opinion, but was a 4-1-4 split, comprising at least three alternative jurisdictional tests. For a practical look at jurisdictional issues see Environmental Law Institute, The Clean Water Act Jurisdictional Handbook (2007), available at http://www.eli.org/New_Books/cwa_handbook.cfm
[53] H.R. 5088, 111th Cong., 2d Sess. (April 21, 2010) ("America's Commitment to Clean Water Act").
[54] Exxon Corp. V. Train, 554 F.2d 1310 (5th Cir. 1977). EPA's regulatory definition of "waters of the United States" also does not list groundwater among the waters encompassed in the definition. 40 CFR 230.3.
[55] 33 U.S.C. § 1251(g).
[56] 33 U.S.C. § 1342; 40 CFR Part 123.
[57] 33 U.S.C. §§ 1342(c) (withdrawal of federal approval), (d) (EPA objection to state-issued permit), (i) (EPA retained enforcement authority).
[58] 33.U.S.C. § 1370.
[59] 33 U.S.C. §1313. Tribes are authorized to establish water quality standards for waters within their jurisdiction, but state standards will apply in the absence of approved tribal standards.
[60] 40 CFR Part 131.
[61] 33 U.S.C. §§ 1313(c)(3),(4).
[62] 33 U.S.C. § 1314(a).
[63] 33 U.S.C. § 1313(g).
[64] This is done by writing limitations into the permit which impose stricter discharge requirements than those that would be applicable to the discharger based on its technological classification irrespective of the receiving waters. 33 U.S.C. § 1311(b)(1)(c) (NPDES permit under section 402 must include those limitations necessary to meet water quality standards); 33 U.S.C. § 1312 (water quality based effluent limitations)
[65] 33 U.S.C. 1313. See generally, Oliver Houck, The Clean Water Act TMDL Program: Law Policy and Implementation (2d ed.) (Environmental Law Inst. 2002).
[66] 33 U.S.C. § 1341, discussed below.
[67] Arkansas v. Oklahoma, 503 U.S. 91 (1992) (applying Oklahoma section 401 review to NPDES permit being issued by EPA for discharge in Arkansas, but upholding EPA permit).

[68] "Technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under section 402 of the Act."40 CFR 125.3.
[69] 33 U.S.C. § 1314(b).
[70] 33 U.S.C. § 1316(a)(1).
[71] 40 CFR Part 400-467. The regulations for steam electric power generation apply only to fossil fuel and nuclear thermoelectric plants, however. 40 CFR Part 423.
[72] 33 U.S.C. § 1326.
[73] http://cfpub.epa.gov/npdes/statestats.cfm
[74] 33 U.S.C. § 1362(14).
[75] Id.; see also 33 U.S.C. § 1342(l)(1) (No NPDES permit required for irrigation return flows).
[76] 40 CFR 128.28 (e.g. stormwater permits).
[77] 33 U.S.C. § 1342(p);40 CFR 122.26.
[78] 33 U.S.C. § 1342(l)(2).
[79] Pub. L. No. 109-58, § 323, 119 Stat. 694 (codified as amended at 33 U.S.C. § 1362(24))
[80] NRDC v. U.S. Envtl. Protection Agency, No. 06-73217, 38 ELR 20126 (9th Cir. May 23, 2008)
[81] 33 U.S.C. § 1313(d).
[82] 33 U.S.C. §1313(d)(1)(B),(D).
[83] 33 U.S.C. 1362((12).
[84] 33 U.S.C. § 1319.
[85] 16 U.S.C. §§ 1455(d)(16), 1455b.
[86] 33 U.S.C. § 1341.
[87] PUD No. 1 of Jefferson County v. Washington Dep't of Ecology, 511 U.S. 700 (1994).
[88] 33 U.S.C. § 1344. For a complete review of the § 404 program, see M. Strand & L. Rothschild, Wetlands Deskbook, 3d. ed (Envtl L. Inst. 2009).
[89] Coeur Alaska, Inc. v. Southeast Alaska conservation Council, 129 S. Ct. 2458 (2009)(upholding §404 permit for discharge of mine tailings into waters of the United States).
[90] 33 U.S.C. § 1344(f)(1)
[91] 33 CFR Parts 320-332, 40 CFR Parts 230-233.
[92] 33 U.S.C. § 1344(e).
[93] 40 CFR 122.2. The status of cooling ponds depends on their nexus to interstate commerce. For example, cooling ponds used for fishing affect interstate commerce and are covered by the Clean Water Act.
[94] 45 Fed. Reg. 48620.
[95] In re Borden, Inc./Colonial Sugars, 1 EAD 895 (Envtl. Appeals Bd. 1984).
[96] 40 CFR 122.2.
[97] 40 CFR Part 230; 33 CFR 323.2(a).
[98] 33 U.S.C. § 1321, §§ 2701-2761.
[99] 42 USC § 300f(6).
[100] In addition to NPDWRs, EPA is required to issue secondary regulations for contaminants that may cause cosmetic or aesthetic (organoleptic) effects in drinking water. These secondary regulations are not enforceable unless made so under state law, but are recommended. 42 USC 300g-1(c).
[101] 42 U.S.C. § 300g-1(b)(1)(A).
[102] 42 U.S.C. §300g-1(b)(1)(B).
[103] 42 U.S.C. § 300g-1(b)(1)(A).
[104] 42 U.S.C. § 300g-1(b)(4)(A).
[105] 42 U.S.C. § 300g-1(b)(4)(B),
[106] 42 U.S.C. § 300g-1(b)(4)(D).
[107] 42 U.S.C. 300g-1(b)(4)(E). However, if EPA finds that it is not economically or technologically feasible to set the level of a contaminant, or when there is no reliable or economic method for determining the level of a contaminant in water, EPA may issue an NPDWR requiring the use of a treatment technique in lieu of setting an MCL for that contaminant. 42 USC 300g-1(b)(7)(A).
[108] 42 U.S.C. § 300g-4.
[109] 42 U.S.C. §§ 300g, 300f(4). These include: any constructed system for providing water to the public for human consumption that includes at least 15 connections or serves 25 individuals, and includes all collection, treatment, storage, and distribution facilities used primarily for the system and under control of

the system's operator, as well as pre-treatment storage and collection facilities even if not under the system operator's control.
[110] 42 U.S.C. § 300g-2(a).
[111] 42 USC 300h-7.
[112] *Id.*
[113] EPA,Wellhead Protection (WHPP) Program, at http://permanent.access.gpo.gov/lps21800/www.epa.gov/safewater/whpnp.html (2010).
[114] EPA, State Source Water Assessment and Protection Programs: Final Guidance, EPA 816-R-97-009 (Aug. 1997).
[115] 42 USC 300h-3(e).
[116] Id. However, actions or programs carried out by the federal government directly, such as federal construction, are not considered federal financial assistance. *See, e.g.* 40 CFR 149.101(g) (regulations for Edwards Aquifer).
[117] 42 U.S.C. § 300h-1; EPA, Basic Information about Injection Wells, at http://www.epa.gov/safewater/uic/basicinformation.html (2010).
[118] Injection by rule cannot endanger drinking water sources.
[119] 42 U.S.C. § 300h(d).
[120] EPA defines an injection well as: (i) a bored, drilled, or driven shaft, or a dug hole that is deeper than it is wide; (ii) an improved sinkhole; or (iii) a subsurface fluid distribution system; production wells are excluded.
[121] "Endangerment" occurs if injection may result in the presence of any contaminant in a USDW that may cause a Public Water System to violate a NPDWR or that may otherwise adversely affect human health. 42 U.S.C. §300h(d).
[122] An aquifer may be exempted if it is not currently being used — and will not be used in the future — as a drinking water source, or it is not reasonably expected to supply a public water system due to a high total dissolved solids content. 40 CFR Part 146.4. Note that "[a]quifers which do not fit the definition of ''underground source of drinking water'' are not ''exempted aquifers.'' They are simply not subject to the special protection afforded USDWs." 40 CFR 144.1.
[123] 42 U.S.C. § 300h(d)(1).
[124] 40 CFR 144.21-144.28.
[125] EPA, Technical Program Overview: Underground Injection Control Regulations, EPA 816-R-02-025 (2001). Certain Class V wells – notably, large capacity cesspools and motor vehicle waste disposal wells – have been phased out under EPA regulations.
[126] 42 U.S.C. § 300h(d).
[127] 42 U.S.C. § 300h(b). The SDWA also sets forth minimum requirements for state UIC programs that are unrelated to oil and gas production. By law, state programs must include monitoring and enforcement provisions and must apply to federal agencies and to injections on federal lands. *Id*.
[128] EPA, Technical Program Overview: Underground Injection Control Regulations, EPA 816-R-02-025 (2001).
[129] *Id.*
[130] EPA, The Class V Underground Injection Well Control Study, vol. 13: In-Situ Fossil Fuel Recovery Wells, EPA/816-R-99-014m (1999), available at http://www.epa.gov/ogwdw000/uic/class5/pdf/study_uic-class5_classvstudy_volume13-in-situfossilfuelrecovery.pdf
[131] 40 CFR 144.1. Hazardous wastes exhibit "one of four characteristics (corrosive, reactive, ignitable or toxic)" or are listed wastes under 40 CFR Part 261 Subpart D. EPA, Technical Program Overview: Underground Injection Control Regulations, EPA 816-R-02-025 (2001).
[132] EPA, Incorporation of UIC "No Migration Petition Conditions into Class I Hazardous Waste Injection Well Permits: Underground Injection Control Program Guidance # 73, Jan 30, 1991. 40 CFR 148.20. Applicants can meet this "no migration" standard by showing that injected hazardous wastes will not migrate to a USDW within 10,000 years or will be rendered non-hazardous. The degree of hazard acceptable is subject to EPA guidance and requires determination of whether an EPA "health-based level" applies. These levels may include MCLs, ambient water quality criteria established under section 304(a) of the Clean Water Act or other sources. EPA, Determination of "Hazardous Levels" for "No Migration" Demonstrations Pursuant to 40 CFR Section 148.20, Underground Injection Control Guidance No. 71 (Oct.

17, 1990). EPA, Technical Program Overview: Underground Injection Control Regulations, EPA 816-R-02-025 (2001).
[133] 42 U.S.C.§ 6901 et seq. Solid and hazardous waste have complex definitions and exclusions. See 40 CFR 261.2-261.4.
[134] 42 U.S.C. § 6903(27).
[135] 42 U.S.C. § 6903(5).
[136] 42 U.S.C. § 6926.
[137] 42 U.S.C. § 6941-6949a.
[138] 42 U.S.C. §§ 6991-6991m.
[139] 42 U.S.C. §§ 6972, 6973.
[140] 42 U.S.C. §§ 6921(b)(2),(3).
[141] Regulatory Determination for Oil, Gas, and Geothermal Exploration, Development and Production Wastes, 53 Fed. Reg. 25466 (July 6, 1988). For later explanations and documents see generally http://epa.gov/wastes/nonhaz/industrial/special/oil/index.htm
[142] 51 Fed. Reg. 24496 (July 3, 1986). See 40 CFR 261.4(b)(7). EPA recently reconfirmed that spent oil shale from above ground heating or retorting is not a hazardous waste. http://epa.gov/wastes/nonhaz/industrial/special/oil/oilshale.htm
[143] See generally http://epa.gov/wastes/nonhaz/industrial/special/fossil/index.htm. EPA
[144] 75 Fed. Reg. 35128 (June 21, 2010).
[145] EPA, Frequent Questions: Coal Combustion Residues (CCR) – Proposed Rule, available at http://epa.gov/wastes/nonhaz/industrial/special/fossil/ccr-rule/ccrfaq.htm
[146] 42 U.S.C. §§ 11021, 11022.
[147] 33 U.S.C. § 403 (Popularly known as Section 10, Rivers and Harbors Act). It operates along with § 404 of the Clean Water Act to address discharges and filling of waters of the U.S.
[148] 42 U.S.C. §§ 4332.
[149] 42 U.S.C. § 4332(C).
[150] 40 C.F.R. 1501.3, 1508.9.
[151] 40 C.F.R. 1508.4.
[152] *Id.* CEQ also recommends periodic review by an agency of the agency's CEs, relying on 40 C.F.R. § 1507.3, which directs federal agencies to review their NEPA procedures.
[153] Section 390 of the Energy Policy Act of 2005, 119 Stat. 747-748, codified at 42 U.S.C. § 15942 ("subject to a rebuttable presumption that the use of a categorical exclusion…would apply").
[154] 40 C.F.R. 1501.6, 1508.5.
[155] Council on Environmental Quality, Memorandum for the Heads of Federal Departments and Agencies, "Draft Guidance for Mitigation and Monitoring," availability notice at 75 Fed. Reg. 8046 (Feb. 12, 2010).
[156] 30 U.S.C. § 181 et seq. (Mineral Leasing Act); 43 CFR Part 3100 (onshore oil and gas leasing).
[157] 16 U.S.C. § 1533.
[158] Section 9, 16 U.S.C. § 1538. Endangered plants are separately listed under section 10 of the Act. Listed plants enjoy lesser protections under section 9.
[159] 16 U.S.C. § 1532.
[160] Section 7, 16 U.S.C. § 1532(a)(2).
[161] 16 U.S.C. § 1531(c)(2), ESA sec. 2(c)(2).
[162] 16 U.S.C. § 1535(a).
[163] 788 F. Supp. 1126 (E.D. Cal. 1992)
[164] See *Cal. Dep't of Fish & Game v. Anderson-Cottonwood Irrigation Dist.*, 8 Cal. App. 4th 1554, 11 Cal. Rptr. 2d 222 (1992) (issuing injunction against pumping under California Endangered Species Act to protect salmon).
[165] 995 F.2d 571 (5th. Cir. 1993),
[166] *See* 16 U.S.C. §§ 1453(1), 1455(a), 1455b(f) (2005).
[167] *See id.* at §§ 1454, 1456(c)-(d).
[168] *See id.* at § 1456(c).
[169] NAT'L OCEANIC & ATMOSPHERIC ADMIN. AND COASTAL STATES ORG., ENVISIONING OUR COASTAL FUTURE 7 (2007), http://coastalmanagement.noaa.gov/czm/media/PhaseIII.pdf.
[170] NAT'L OCEANIC & ATMOSPHERIC ADMIN., CZMA FEDERAL CONSISTENCY OVERVIEW 3 (2007). The single non-participating state, Illinois, currently is developing its coastal management program.

[171] *See* 16 U.S.C. § 1453(1).
[172] NAT'L OCEANIC AND ATMOSPHERIC ADMIN., STATE COASTAL ZONE BOUNDARIES (2004).
[173] *See* 16 U.S.C. § 1456(c).
[174] *Id*. at § 1456(c)-(d); 15 C.F.R. §§ 930.33.
[175] *See, e.g.*, Cal. Coastal Comm'n v. Granite Rock Co., 480 U.S. 572 (1987).
[176] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 5 (2009) (Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia, and Wisconsin).
[177] *Id.* at 35, 48.
[178] *Id*. at 50.
[179] *Id*. at 54.
[180] *Id*. at 4.
[181] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 58-59 (2009). States with permitting for large water uses: Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Hawaii, Illinois, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Mississippi, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, Virginia, and Wisconsin. States with groundwater permitting: Illinois, Kentucky, Maryland, and South Carolina.
[182] *Id.* at 36.
[183] *Id.* at 7 (Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming).
[184] *Id.* at 111-113.
[185] *Id*. at 129.
[186] *Id.* at 8 (California, Kansas, Mississippi, Nebraska, North Dakota, Oklahoma, Oregon, South Dakota, Texas, and Washington). Hawaii's system of water allocation is based on a combination of recent statues and laws from the ancient Hawaiian Kingdom; water law in Louisiana is based on the French Civil Code.
[187] *Id*. at 205.
[188] *Id*. at 206, 212 (California, Nebraska, and Oklahoma still allow riparian landowners to assert new uses superior to those with appropriative rights under some circumstances).
[189] *Id*. at 214.
[190] *Id*. at 59.
[191] *Id*. at 60. For example, Georgia's regulations require a permitted riparian withdrawer, such as a power plant, to meet state-required "instream flow at or immediately downstream of the point of withdrawal." Ga. Comp. R & Regs. r. 391-3-6-.07(4)(b)9.(iii)(II)
[192] Colorado relies on its judicial system to perform a task similar to that expected of an agency in other states. DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 148 (2009).
[193] *Id*. at 152-153.
[194] *Id*. at 155.
[195] *Id*. at 173, 284.
[196] *Id*. at 285.
[197] *Id*. at 290-291. Arizona, California, Colorado, Hawaii, Idaho, Kansas, Nebraska, Montana, Nevada, New Mexico, Oklahoma, Oregon, Texas, Washington, and Wyoming have critical area legislation. *Id*.
[198] *Id*. at 285.
[199] *Id*. at 286.
[200] *See id*. at 62-68.
[201] *Id*. at 62, 167.
[202] *Id*. at 174.
[203] *See id*. at 175.
[204] *Id*. at 71.
[205] *Id*. at 76.
[206] COLO. REV. STAT. § 37-92-402(11).
[207] N.M. STAT. ANN. § 72-5-28.
[208] *See* CAL. WATER CODE § 13000.
[209] ARIZ. REV. STAT. § 49-201(12), -241.
[210] ARIZ. ADMIN. CODE 18-9-A202.

[211] See Environmental Law Institute, ELI Study of State Wetland Programs (clickable map at http://www.eli.org/Program_Areas/state_wetlands.cfm)
[212] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 468 (2009).
[213] Florida Dep't of Envtl. Protection, Water Management Districts, *at* http://www.dep.state.fl.us/secretary/watman/.
[214] CAL. FISH & GAME CODE § 1602.
[215] See generally, McElfish, § 7.11 in Novick, Law of Environmental Protection (Clark Boardman Callaghan, updated annually).
[216] Va. Code § 56-46.1
[217] http://www.efsec.wa.gov; Rev. Code Wash. 80.50.010 et seq.
[218] Fla. Stat. § 403.501-.518
[219] Fla. Stat. § 403.509(3).
[220] 42 U.S.C. § 2235 et seq.
[221] "Water bank" has been defined as "an institutional mechanism that facilitates the legal transfer and market exchange of various types of surface, groundwater, and storage entitlements." Peggy Clifford, et al., Washington Department of Ecology, Analysis of Water Banks in the Western United States ii (2004).
[222] DAVID H. GETCHES, WATER LAW IN A NUTSHELL, 58-59 (2009). There is no comprehensive list of states with such exemptions. For instance, Georgia has no such exemption; Kentucky does. *See, e.g.*, Ky. Rev. Stat. Ann. § 151.140 "…no permit shall be required for water used in the production of steam generating plants of companies whose retail rates are regulated by the Kentucky Public Service Commission or for which plants a certificate of environmental compatibility from such commission is required by law."
[223] *Id*. at 61.
[224] ENVIRONMENTAL LAW INSTITUTE, WESTERN WATER IN THE 21ST CENTURY: POLICIES AND PROGRAMS THAT STRETCH SUPPLIES IN A PRIOR APPROPRIATION WORLD (2009). For example, Montana includes as a permissible use of surface water "aquifer recharge or mitigation," California classifies "aquifer storage" as a permissible use, and Arizona exempts from forfeiture water unused because of using water from another source such as groundwater.
[225] U.S. DEPT. OF ENERGY, ENERGY DEMANDS ON WATER RESOURCES: REPORT TO CONGRESS ON THE INTERDEPENDENCY OF ENERGY AND WATER, 18 (2006).
[226] *Id*. at 19.
[227] U.S. DEPT. OF ENERGY, ENERGY DEMANDS ON WATER RESOURCES: REPORT TO CONGRESS ON THE INTERDEPENDENCY OF ENERGY AND WATER, 37-40 (2006).
[228] *Id*. at 40.
[229] Todd Woody, *Alternative Energy Project Stumble on a Need for Water*, NY Times, Sept. 30, 2009 (Solar Millennium unable to persuade water district to deliver 815 million gallons/year; Tessera Solar funding irrigation district improvements to gain access to reclaimed water)
[230] *See, e.g.*, Andrew Williams, *Cooling: Cost-efficiency vs. water-usage*, CSP TODAY, May 14, 2010, *at* http://social.csptoday.com/industry-insight/cooling-cost-efficiency-vs-water-usage; Colin Sullivan, *California Regulators Ask Genesis Solar to Revise Water-Use Proposal*, E&E NEWSPM, June 15, 2010, *at* http://www.eenews.net/eenewspm/2010/06/14/6. Genesis Solar subsequently agreed to adopt dry cooling in order to obtain CEC approval. Colin Sullivan, *NextEra subsidiary agrees to Calif. water use proposal*, E&E NEWSPM, July 12, 2010.
[231] Phase III of the cooling water regulations is limited to intakes at new offshore oil and gas facilities because the agency determined that "uniform national standards are not the most effective way at this time to address cooling water intake structures at existing facilities that were not covered under the earlier Phase II rule." EPA, Final Rule for Cooling Water Intake Structures at Phase III facilities, EPA Fact Sheet EPA-821-F-06-007, available at http://www.epa.gov/waterscience/316b/phase3/ph3-final-fs.html.
[232] 40 CFR 125.81. Coastal and offshore oil and gas extraction facilities are not covered by Phase I.
[233] 40 CFR 125.83.
[234] 40 CFR 125. 84.
[235] 40 CFR 125.93.
[236] 40 CFR 125.91.
[237] 40 CFR 125.94.
[238] Memorandum from Benjamin Grumbles to Regional Administrators re: *Implementation of the Decision in* Riverkeeper, Inc. v. EPA, *Remanding the Cooling Water Intake Structures Phase II Regulation* (March

20, 1997) EPA, National Pollutant Discharge Elimination System – Suspension of Regulations Establishing Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, 72 Fed. Reg. 37,107 (July 9, 2007)

[239] *Entergy Corp. v. Riverkeeper, Inc.*, 556 U.S. 208, 126 S. Ct. 1498 (2009).

[240] http://epa.gov/wastes/nonhaz/industrial/special/fossil/ccr-rule/ccrfaq.htm

[241] See generally, USEPA, REGULATION AND POLICY CONCERNING MINE PLACEMENT OF COAL COMBUSTION WASTE IN SELECTED STATES Final DRAFT(December 2002), available at http://epa.gov/wastes/nonhaz/industrial/special/fossil/meeting4/com-mine.pdf

[242] http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480adcb33

[243] In the Matter of Tennessee Valley Authority, Case No. SWM 09-0014, WPC-08-0290 (June 14, 2010), avail. at http://tn.gov/environment/kingston/pdf/orders/06_14_2010.pdf (assessing $11.5 million in civil penalties, with certain credits for response costs, supplemental environmental projects).

[244] 30 U.S.C. §§ 1001-1028.

[245] 43 U.S.C. § 1732(b).

[246] Thus, for example, BLM has issued a final EIS for a proposed 709 MW commercial solar generating plant that has proposed using treated wastewater for cleaning panels rather than local groundwater, but has not rendered a final decision. Scott Streater, *Solar firm credited for wastewater reuse plan, but concerns persist*, Land Letter (Aug. 5, 2010).

[247] 72 Fed. Reg. 24358 (May 2, 2007), codified at 43 CFR Part 3200.

[248] 43 CFR 3252.11, 3262.11, 3275.12.

[249] 43 CFR 3272.11(b), (e).

[250] 43 CFR 3275.12

[251] 43 CFR 3275.11(c), 3275.14, 3275.15.

[252] "Groundwater depletion is not one of the issues addressed in the proposed lease stipulations, except indirectly through the requirement for compliance with applicable laws and regulations. The state engineer is responsible for assigning water rights and managing groundwater resources." USDOI BLM and USDA Forest Service, Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States (October 2008), at 5-22.

[253] USDOI BLM and USDA Forest Service, Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States (October 2008).

[254] Cal. Pub. Res. Code § 3700 et seq.; Cal. Govt. Code § 65960 (single permit for geothermal field for geothermal steam supplied to a power plant).

[255] Cal. Pub. Res. Code § 3740.

[256] Cal. Pub. Res. Code § 3742.2

[257] Refinery impacts on water quality include process water from desalting, distillation, cracking, and reforming operations, as well as cooling water.

[258] N.J.A.C. 7:7E-7.4(o).

[259] EPA, Technical Support Document for the 2004 Effluent Guidelines Program Plan, EPA-821-R-04-014 (2004).

[260] EPA, Technical Support Document for the 2004 Effluent Guidelines Program Plan, EPA-821-R-04-014 (2004).

[261] 40 CFR Part 419.

[262] EPA, Technical Support Document for the 2004 Effluent Guidelines Program Plan, EPA-821-R-04-014 (2004).

[263] EPA, Technical Support Document for the 2004 Effluent Guidelines Program Plan, EPA-821-R-04-014 (2004).

[264] 40 C.F.R. Part 419.

[265] 40 C.F.R. 125.81

[266] Wu, M., M. Wang & Arora, S., *Consumptive Water Use in the Production of Ethanol and Petroleum Gasoline*, Argonne Nat'l Lab. Ener. Sys. Div. ANL/ESD/09-1 (2009).

[267] Biorefineries for both diesel and ethanol are under SIC code 2869 (Industrial Organic Chemicals, not Otherwise Classified). Major group 28, like 29 (which includes petroleum refineries) is under SIC Division D, Manufacturing. See Occupational Health & Safety Admin., SIC Manual, *at* http://www.osha.gov/pls/imis/sic_manual.html; Missouri Dep't Nat. Res., Permit to Construct No. 012008-011 (2008), available at

http://www.epa.gov/region7/air/nsr/archives/2008/finalpermits/aepi_biodiesel_final_psd_permit.pdf (noting SIC Codes of soybean processing and biodiesel plant).
[268] Nat'l Research Council, Water Implications of Biuofuel Production in the United States (2008).
[269] EPA, Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells, 73 Fed. Reg. 43,492 (July 25, 2008).
[270] EPA, Using the Class V Experimental Technology Well Classification for Pilot Geologic Sequestration Projects – UIC Program Guidance (UICPG # 83).
[271] 40 CFR 146.3.
[272] Wells that transition from Class II EOR or EGR use to CCS may be subject to different permit restrictions at that time.
[273] Note that CO2 does not fall under the natural gas exemption to the UIC program, because "natural gas" is defined according to its common meaning, i.e., gaseous hydrocarbons.
[274] EPA, Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells, 73 Fed. Reg. 43,492 (July 25, 2008).
[275] EPA, Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells; Notice of Data Availability and Request for Comment, 74 Fed. Reg. 44,802 (Aug. 31, 2009).
[276] 30 U.S.C. § 1201 et seq. Of the major coal producing states, all but Tennessee have taken primary authority for implementation. The program in Tennessee is administered by the federal government's Office of Surface Mining.
[277] 30 U.S.C. §§ 1265(b)(10), 1266(b)(9).
[278] 30 U.S.C. § 1257(b)(11).
[279] 30 U.S.C. § 1260(b)(5).
[280] 30 U.S.C. § 1272. This section expressly allows designation where mining will "affect renewable resource lands in which such operations could result in a substantial loss or reduction of long-range productivity of water supply or of food or fiber products, ans such lands to include aquifers and aquifer recharge areas." Id. at § 1272(a)(3)(C).
[281] 30 U.S.C. §§ 1307(b), 1309a.
[282] 30 CFR 816.57.
[283] 74 Fed. Reg. 62664 (Nov. 30, 2009) (advance notice of proposed rulemaking); 75 Fed. Reg. 22723 (April 30, 2010)(notice of intent to prepare EIS).
[284] "We conclude that stream segments, together with the sediment ponds to which they connect, are unitary "waste treatment systems," not "waters of the United States," and that the Corps' has not exceeded its § 404 authority in permitting them." Ohio Valley Environmental Coalition v. Aracoma Coal Co., 556 F.3d 177 (4th Cir. 2009)
[285] 75 Fed. Reg. 18500 (April 12, 2010). EPA Administrator Lisa Jackson was quoted as saying that "no or very few [typical] valley fills…are going to meet this standard" and that the practices of burying large sections of Appalachian headwaters streams would need to change. E&E News, April 1, 2010.
[286] 40 CFR Part 434.
[287] 33 U.S.C. § 1331(p).
[288] 30 U.S.C. § 181 *et seq.*
[289] *See, e.g.* New York Dep't of Envtl. Conserv., Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program (GEIS) (1992), *available at* http://www.dec.ny.gov/energy/45912.html
[290] FWS, Reserve Pit Management: Risks to Migratory Birds (2009).
[291] *Id.*
[292] Az. Admin. Code R12-7-108.
[293] 312 Indiana Admin. Code 16-5-12.
[294] 312 Indiana Admin. Code 16-5-13.
[295] N.Y. Dep't of Envtl. Conserv., An Investigation of Naturally Occurring Radioactive Materials (NORM) in Oil and Gas Wells in New York State (1999), available at http://www.dec.ny.gov/docs/materials_minerals_pdf/normrpt.pdf.
[296] N.M. Energy, Minerals, and Nat. Res. Dep't, Oil Conserv. Div., In re: Application of Oil Conservation Commission for an Order Adopting a New Rule for the Disposal of Naturally Occurring Radioactive Material (NORM) Associated with the Oil and Gas Industry, No. 11391 (June 20, 1996).

[297] Alaska allows disposal of slurried solids underground as well. FWS, Reserve Pit Management: Risks to Migratory Birds (2009).
[298] New Mexico Oil Conserv. Div., Environmental Handbook, at attachment I (, available at http://www.emnrd.state.nm.us/ocd/EnvironmentalHandbook.htm.
[299] See, e.g. New Mexico Oil Conserv. Div., Underground Injection Control Program Manual (Feb. 26, 2004).
[300] 43 CFR 3162.5-1
[301] BLM, Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development : The Gold Book (4th ed. 2007).
[302] See BLM, The Gold Book, at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html.
[303] 74 Fed. Reg. 56867, 56869 (Nov. 3, 2009).
[304] 72 Fed. Reg. 69414 (Nov. 18, 2008). The previous oil shale leases had been offered in 1973, and there had been no development operations under leases since the industry collapsed in 1982 due to lack of demand.
[305] 43 CFR 3904.40.
[306] 43 CFR 3930.20
[307] See generally, Colby Barrett, Fitting a Square Peg in a Round (Drill) Hole: The Evolving Legal Treatment of Coalbed Methane-Produced Water in the Intermountain West, 38 Entl. L. Rep. 10661 (Sept. 2008).
[308] N.M. Stat. Ann. § 72-12-25.
[309] Vance v. Wolfe, 205 P.3d 1165 (Colo. Sup. Ct. 2009).
[310] http://northernplains.org/judge-rules-coal-bed-methane-wastewater-ponds-unconstitutional (referencing Mt. Const. Art. IX, § 3).
[311] Montana Board of Oil and Gas Conservation, Final Coal Bed Methane Order for Powder River Basin Controlled Groundwater Area, Order No. 99-99 (Dec. 1999)
[312] Montana v. Wyoming, No. 137 (U.S. Supreme Court), Memorandum Order June 2, 2009, and First Interim Report of the Special Master (Feb. 10, 2010).
[313] Northern Cheyenne Tribe v. Montana Dept. of Environmental Quality, 2010 MT 111 (Montana Supreme Court, May 18, 2010).
[314] Pennaco Energy, Inc. v. U.S. EPA, No. 06-CV-100-B (October 13, 2009)(vacating EPA's approval of Montana's water quality standards for conductivity and sodium adsorption ratio, finding that a proper record had not been made).
[315] H.R. 2766 and S.1215, 111th Cong. 1st Sess. (June 9, 2009).
[316] Katie Howell, Wyo. becomes first state to require disclosure of fracking chemicals, Greenwire (June 9, 2010).
[317] Abrahm Lustgarten, New York Puts Brakes on Drilling in NYC Watershed, Clears Way for Upstate Wells by Next Spring, ProPublica, April 23, 2010.
[318] Pennsylvania Environmental Quality Board, 25 Pa. Admin. Code Chapter 95 (May 17, 2010); approved by Independent Regulatory Review Commission, June 17, 2010.
[319] 42 U.S.C. §§ 2093, 2021.
[320] Pub. L. 95-604; see regulations at 10 CFR Part 40
[321] Fl. Stat. 581.011.
[322] 16 U.S.C. §§ 3811, 3821.
[323] EPA, A Plain English Guide to the EPA Part 503 Biosolids Rule, EPA/832/R-93/003 (1994).
[324] According to EPA guidance, application of sewage sludge for a beneficial purpose does not give rise to CERCLA liability. EPA, A Plain English Guide to the EPA Part 503 Biosolids Rule, EPA/832/R-93/003 (1994).
[325] The fourth category, "annual pollutant loading rate" biosolids, is used primarily on lawns and home gardens and is not considered here.
[326] 42 U.S.C. 9607(i).
[327] EPA, National Water Quality Inventory: Report to Congress, 2004 Reporting Cycle, EPA 841-R-08-001 (2009).
[328] *See* CAL. WATER CODE § 13000.

[329] *See e.g.*, Md. Code Ann., Agric. § 8-803.1 (Maryland Water Quality Improvement Act nutrient management plan requirements).
[330] 16 USC 1455b(b).
[331] 16 U.S.C. § 1455b(g)(5) (emphasis supplied).
[332] EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, EPA 840-B-92-002 (1993); EPA & NOAA, Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA) (1998).
[333] State water laws take precedence over these irrigation management measures.
[334] EPA, Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, EPA 840-B-92-002 (1993).
[335] See generally Environmental Law Institute, Almanac of Enforceable State Laws to Control Nonpoint Source Water Pollution (1998).
[336] 33 U.S.C. § 1344(f)(1)(A).
[337] 33 U.S.C. § 1344(f)(1)(C).
[338] 33 U.S.C. § 1344(f)(2).
[339] EPA & USACE, Memorandum: Clean Water Act Section 404 Regulatory Program and Agricultural Activities (1990)
[340] 33 U.S.C. § 1344(e).

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