Balance

The Nature of Regulation

Perhaps it was President Theodore Roosevelt who first taught Americans the importance of the federal government protecting our nation's natural resources. One hundred years after his presidency, an entire federal agency and several state and local government departments are dedicated to striking a delicate balance between development and environmental preservation. Many of these agencies' environmental regulations are designed to protect one of three major environmental elements: air, water and earth.

AIR

One of the ongoing programs of the U.S. Environmental Protection Agency (EPA) is its continuing work to produce cleaner fuels for American roadway vehicles.

The EPA first mandated catalytic converters on vehicles during the 1970s to reduce harmful emissions. Over subsequent decades, catalytic converters continued to be present on vehicles, but as emissions regulations became more stringent, the effectiveness of catalytic converters was diminished by the natural presence of sulfur compounds in fuels. As the sulfur compounds passed through the catalyst in a converter, the sulfur molecules slowly "poisoned" the catalyst, steadily diminishing and ultimately eliminating their effectiveness to meet new emission standards.

In order to meet new emission requirements, the sulfur levels in fuels were a principal target of the U.S. Clean Air Act amendment in 1990. The Clean Air Act amendment triggered a two-part response from the EPA. It first mandated that the sulfur content in on-road diesel fuel be reduced to 500 parts-per-million (ppm) in the early 1990s. This program was known as the low-sulfur diesel program. The next step was to reduce the sulfur content in gasoline. The new requirement for gasoline was to reduce sulfur levels to 30 ppm in gasoline by 2004, also known as low-sulfur gasoline. A second phase for on-road diesel was implemented during the last few years, and it reduced sulfur in on-road diesel fuel from the previous standard of 500 ppm to 15 ppm (ultra-low-sulfur diesel), effective by June 1, 2006.

Those requirements led to a revamping of numerous oil refineries serving the U.S. market to meet the standards. The EPA has reported that it estimates the diesel program alone will result in more than $70 billion of annual benefits to the environment and $4 billion per year in reduced public health costs.

"The next major component of gasoline that the EPA wants to reduce is benzene," explains Dave Nispel, Burns & McDonnell refining business development manager. Benzene is a known carcinogen, and most of the nation's benzene emissions come from mobile sources. The average national benzene content of gasoline today is about 1 percent by volume, and the EPA is requiring that a refiner's annual nationwide average gasoline benzene content be 0.62 percent by volume by 2011. In addition, refiners must also meet an individual refinery maximum average benzene standard of 1.3 percent by volume by July 1, 2012. The EPA in early 2007 estimated that the "additional cost of producing gasoline to comply with the new benzene standard is expected to average $0.0027 per gallon. This per-gallon cost would result from an average of $14 million in capital investment in each refinery that adds equipment to reduce gasoline benzene levels. We estimate that the annual net social costs of this rule will be approximately $400 million in 2030 (expressed in 2003 dollars)." However, recent work by Burns & McDonnell at seven different refineries in the United States has shown that the EPA's original estimates for implementation and capital costs are considerably lower than current estimates.

"The next major component of gasoline that the EPA wants to reduce is benzene," explains Dave Nispel, Burns & McDonnell refining business development manager.

WATER

Waste heat is a byproduct of many industrial facilities, and more than half of all U.S. power plants and nuclear reactors employ once-through cooling to remove that byproduct, according to the Northeast Midwest Institute. This relatively inexpensive process draws water from lakes, rivers or other water bodies, passes it through a condenser to absorb excess heat from boilers and then discharges it back into the surface water at an elevated temperature.

Who to Contact

Burns & McDonnell has a variety of experts who can help you navigate the regulations discussed in this story. Below we match the experts with the regulations and tell you how you can reach them.

For more information on regulations not seen here, and their respective contacts, please visit www.burnsmcd.com/regulations.

Air

Clean Air Act, Benzene and Sulfur Regulations
Dominic Varraveto, (816) 822-4282
dvarraveto@burnsmcd.com

Water

Clean Water Act Section 316(a)
Greg Howick, (816) 822-3845
ghowick@burnsmcd.com

Long Term 2 Enhanced Surface Water Treatment Rule (LT2)
Mark Lichtwardt, (303) 721-9292
mlichtwardt@burnsmcd.com

Earth

Vapor Intrusion
Diana Marquez, (816) 822-3453
dmarque@burnsmcd.com

Security

Chemical Facility Anti-Terrorism Standards
Tom Dean, (816) 822-3873
tdean@burnsmcd.com

Sustainability

Renewable Portfolio Standards
Jeff Greig, (816) 822-3392
jgreig@burnsmcd.com

Certification of Environmental Compatibility and Public Need
Bob Sholl, (816) 822-3154
bsholl@burnsmcd.com

U.S. Department of Defense LEED® Silver Requirement
Wendy Hageman, (816) 822-3224
whageman@burnsmcd.com

However, water temperature has direct effects on the cold-blooded organisms that live in water, and the heated discharge from industrial facilities can be disruptive or even fatal to those populations, constituting thermal pollution.

The Clean Water Act regulates thermal pollution through the National Pollutant Discharge Elimination System (NPDES) permit program by regulating industries and municipalities that discharge pollutants, including heat, directly into surface water. If an industrial facility or power plant cannot meet federal or state thermal water quality standards but it can demonstrate that its discharge will "assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on that body of water," then it may apply for a variance from those standards under the Clean Water Act's section 316(a). "In other words," explains Burns & McDonnell's Greg Howick, senior aquatic ecologist, "A 316(a) variance can be granted if a plant can show that despite exceeding thermal water quality standards, the receiving water body is still maintaining a balanced, indigenous community."

Many industrial facilities and power plants applied for and received 316(a) variances in the 1970s, shortly after the Clean Water Act was enacted, and many others have subsequently received variances as they have been constructed. NPDES permits, which include the section 316(a) variances, are renewed every five years. While industrial facilities and power plants have always technically been required to demonstrate a continued need for section 316(a) variances in their permit reapplications, automatic renewals since the 1970s have been commonplace. However, in light of improvements in overall water quality, increases in ambient temperatures and development of new thermal water-quality standards by some states, the EPA and state regulators have recently shown renewed interest in requiring industrial facilities and power plants to re-examine their section 316(a) variances.

That leaves many facilities needing to repeat their section 316(a) variance studies for the first time in decades. This may require technically sound waste load allocations to show the maximum heat load a facility can be allowed to release into its waterway without a variance. Or a facility may need a thermal-plume study to demonstrate the actual physical extent of the thermal-discharge plume. Finally, a facility may need biological impact field studies to demonstrate that the receiving water body is still maintaining a balanced, indigenous aquatic community.

U.S. refiners are meeting requirements for sulfur and benzene, which were targets of the Environmental Protection Agency. Burns & McDonnell is currently helping seven refineries in the United States look for ways to meet benzene regulations.

Heated discharges can be disruptive to cold-blooded organisms that live in water. Facilities can receive a variance from water quality standards regulating the temperature of discharges through Section 316(a) of the Clean Water Act if they can show the receiving water body is maintaining a balanced, indigenous aquatic community.

EARTH

While there is no single, sweeping body of legislation that affects American soil and earth that is comparable to the clean air and water acts, the environmental condition of our land still has health and legal ramifications. One area of environmental concern in the earth is vapor intrusion, which is the migration of volatile chemicals from the subsurface into overlying buildings. It can be a problem when structures have been built near former industrial or commercial facilities in which chemicals were spilled, dumped on the ground or leaked from a storage tank. Large or steady contaminant flows are enough to percolate into underlying groundwater and then be broadly dispersed. (Some chemicals can also travel through soil as vapors.)

Some time later — in many cases, decades later — structures have been built above the soil or groundwater dispersion area without a developer or builder knowing that the contaminant has passed from a liquid into a vapor, or volatilized. Those vapors then migrate into overlying homes and businesses through crawlspaces, cracks or other openings in foundations. Examples of volatile organic compounds include petroleum products such as gasoline or diesel fuel that were leaked from storage tanks or were simply spilled at gas

stations. Other examples include industrial chemicals such as the dry cleaning solvent tetrachloroethylene (also known as perc or PCE) and trichloroethylene (also known as TCE), which is a common solvent for degreasing and washing metal parts. There are other volatile compounds as well: industrial paint strippers and residuals from defunct manufactured gas plants.

If developers and property owners suspect vapor intrusion, they should have the site investigated with soil, groundwater and soil gas (air trapped between soil particles) tests. "Vapor intrusion can be remedied easily and inexpensively," explains Diana Marquez, associate risk assessor with Burns & McDonnell. In contrast, the loss of people's health and the potential debilitating liability for a health risk is neither easy nor inexpensive. "It is in people's best interest to be aggressive in solving the problem," Marquez continues. "So, there is no benefit in delay." If site samples determine that the soil or groundwater pose a health concern, the most common solutions are sub-slab depressurization or soil vapor-extraction systems, which are much like in-home radon-removal systems. Both of those systems use extraction pipes placed in contact with subgrade materials through one or more holes cut in the building slab; a fan or blower then draws soil gas from beneath the slab and discharges it into outdoor air. "Even though there are no regulatorally enforceable standards for air quality on this topic, the goal is to get breathable air to acceptable levels that do not cause adverse health affects," says Marquez.

When these systems are needed, the party responsible for contamination — typically a public entity or corporation — usually pays for them. If liability cannot be assigned to a responsible party, there may be state funding available for orphan sites, especially in cases of former dry cleaning facilities.

Most Americans would say long after Roosevelt's time that it is important to strike the right balance between development and environment — whether in the air, water or earth.

The Rest of the Story

Security and sustainability are two important regulatory drivers in the 21st century. Below is a synopsis of some of the most important regulations deriving from them.

Security

In an effort to protect chemical and covered facilities from terrorist attacks, the Department of Homeland Security mandated the Chemical Facility Anti-Terrorism Standards (CFATS). Under CFATS, chemical and covered facilities must assemble classified information — a Security Vulnerability Assessment and Site Security Plan (SSP) — as well as undergo compliance audits. By combining process design and security expertise, Burns & McDonnell offers a holistic approach to vulnerability analysis and SSP development.

Sustainability

State-by-state Renewable Portfolio Standards (RPS) instruct electric power generators to secure a set minimum percentage of power from renewable energy resources such as wind, solar and biomass. As of June 2007, 24 states plus the District of Columbia mandate RPS ranging from 4 percent to 25 percent renewable energy by as soon as 2009 and as late as 2025. Burns & McDonnell is assisting with the development of the world's largest wind farm, covering 200,000 acres across five Texas counties. The $10 billion Mesa Power facility will generate 4,000 megawatts of electricity starting in 2011.

In an era of increasing demand for electrical generation and transmission resources, the state-centric Certification of Environmental Compatibility and Public Need requires utility companies to present key information to regulators involving need, environmental impact, proposed mitigation measures, cost and alternatives that were considered. Bob Sholl of Burns & McDonnell's Environmental Studies & Permitting Group finds that client certification efforts are most successful when paired with strong public relations initiatives and organized document management.

The U.S. Department of Defense now requires silver Leadership in Energy and Environmental Design (LEED®) certification on all new vertical construction. The Army will implement the standard in 2008 and the Air Force in 2009. In advance support of this policy, Burns & McDonnell is taking on the challenge to LEED-certify three training facilities being designed for Eglin Air Force Base, Fla.

Safe Drinking Water

To further protect public water systems, the U.S. Environmental Protection Agency recently published the Long Term 2 Enhanced Surface Water Treatment Rule (LT2) that requires increased monitoring and removal of cryptosporidium, among other potential disease-causing microorganisms from drinking water. LT2 requires that systems using surface water or groundwater influenced by surface water be classified into one of four treatment categories based on their monitoring results. Additional treatment often requires advanced technologies such as membrane filtration or ultraviolet disinfection. Many communities are benefiting from Burns & McDonnell's advanced treatment experience, including Rapid City, S.D.; Thornton, Colo.; and Lander, Wyo.

For more information on regulations not seen here, and their respective contacts, please visit www.burnsmcd.com/regulations.