BY BRIAN KROMER

Time, Topology and Technology: The Compliance Equation

Industrial regulation in the United States is generally based upon several key legislative acts, one of which is almost universal in scope and coverage of the energy sector. This article will show that the basic, dynamic elements of compliance are a complex mixture.

Regulatory activity focused on air emissions in the United States is based on Amendments to the Clean Air Act (CAA) of 1990. Air permits, often referred to as "Title IV" regulations were based upon almost 20 years of experience since passage of the original Clean Air Act of 1970, under the Nixon administration.

Today, the air emissions permitting process is based primarily on two key factors:

1. "NESHAPS" — National Emissions Standards for Hazardous Air Pollutants, which applies to an original list of 189 pollutants.
2. "NAAQS" — National Ambient Air Quality Standards, which comprise joint federal and state monitoring programs for six "Criteria Pollutants" deemed indicative of air quality. NAAQS's continuous monitoring serves to identify and isolate the counties in the United States that fail to meet the minimum standard.

The CAA not only established NESHAPS and NAAQS, but it also enhanced the scope of the Environmental Protection Agency (EPA). In general, the Federal Government, mainly through the EPA, mandates "minimum" standards, which each state is responsible for promulgating within its territorial boundaries. As a result, many new agencies at the state level are now responsible for air quality standards. The EPA will further take a leading role with regard to Indian Nations and Tribal Lands as well as other areas within a given state if noncompliance is continual.

The Federal role is in the creation and establishment of what can be considered "minimum" standards. However, U.S. states such as California have traditionally and continually exceeded the federal minimum mandates — adding to the dynamic nature of the compliance equation. Compliance indeed is a full-time vocation for some employees in the energy sector as companies have also created internal compliance departments to address the mandates resulting from the CAA.

Service industries have been established over the past 19 years to assist companies in their compliance efforts, and industry focus groups have also been created to address current and future compliance obligations. Although much of this activity has been invisible to the general public, environmental issues increasingly arise on the public and corporate agenda.

Environmental concerns and emissions compliance are anything but black and white issues. The bases of compliance mandates are dynamic by nature and relevant mostly when considering the viewer's perspective. It is through a lens consisting of three key elements that one can establish a basis for what the actual compliance obligation might be. Those elements are summarized in Figure 1.

Time is synonymous with the past legislation that created the CAA, current mandates that have been added and future regulation that is still yet to come. Similar to mobile markets, where engines and equipment have scheduled reductions and improved efficiency targets over time, stationary markets face known mandates in the present and future horizon. However, the fundamental difference between mobile and stationary markets is where the compliance obligation ultimately rests. In mobile markets, it is predominantly with the engine manufacturer or manufacturer of record, but in stationary markets compliance is the obligation of the facility. In many cases, it is actually the facility that is certifying equipment or processes rather than the equipment manufacturer.

Topology deals with geographical considerations such as distance, density and proximity. Each facility first has a uniform and equal obligation regarding control of the original list of hazardous pollutants. A particular facility is categorized as a Major, Synthetic Minor or Minor source according to the amount of those pollutants it produces. However, simply existing in or near a county designated as a Nonattainment area might itself trigger regulation for a facility that would not otherwise fall under the regulatory process.

The Compliance Equation

Time – references past, current and future legislation resulting from the Clean Air Act of 1990, under which all facilities operating in the United States have an equal and unilateral obligation with regard to hazardous pollutants. Further, regional and specific compliance obligation may then result in an individual state basis with regard to local air quality in areas designated as nonattainment.

Topology – references geographical considerations like distance, density and proximity to Nonattainment areas or the Nation's National Parks. Such geographic considerations can trigger compliance even outside of a Nonattainment area.

Technology – references the actual compliance mandates that then apply to specific equipment or process within the constraints of Time and Topology factors.

Figure 1. The compliance equation.

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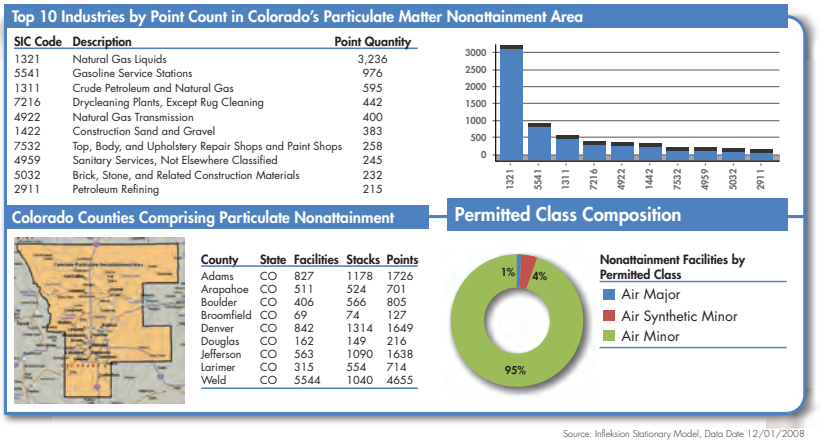

Figure 2. Inflexion Nonattainment Industry Index.

State and federal employees constantly monitor all six of the criteria pollutants identified under NAAQS. Designation of any county or group of counties as Nonattainment is based upon the concentration of any one of those six criteria pollutants. They include: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM) and sulfur dioxide (SO_2).

Geographical proximity to a national park also triggers regulatory action. Ultimately, this gives a single county in the United States eight different ways of triggering compliance regulation for any single facility located there.

Technology, appropriate to a given time and in consideration of topological factors, provides the path to the mandated emissions result. However, the given equipment or process within the facility one is examining must also be included and considered, too, as different compliance mandates can be found for gas turbines, reciprocating engines, chemical processes, condensates, or even storage tanks and similar assets. These factors explain why the process of compliance in stationary markets is so dynamic in nature.

Note that the preceding description does not take into account or even address political and societal influences or free market forces of capitalism.

Using a single state to illustrate compliance dynamics, one can see the Nonattainment region in the U.S. state of Colorado (for PM only) in Figure 2. A similar grouping of counties in Colorado also comprises the Nonattainment area for O_3. These are the only two Nonattainment criteria for Colorado, and it should be noted for all states that the provision of NO_2 is really for its precursory role in the formation of both PM and O_3. The main reason for the inclusion of NO_2 in the list as it ultimately shows up as O_3 or PM.

Colorado has a particular statewide focus on the oil and gas industry that must be considered in addition to any hazardous pollutant or criteria pollutant mandate. Ultimately, each individual state may have different requirements for the exact same types of activity or equipment. Companies operating over multiple states may be faced with varying compliance scenarios.

Figure 3 illustrates current statewide regulations in Colorado for natural gas-fired reciprocating internal combustion engines only. In the event such an engine was also in either of Colorado's Nonattainment areas, further compliance mandates would be triggered. The dynamic nature of compliance requirements is evident in not only the geographical elements, but also in the time component as pointed out in this chart showing evolving reciprocating engine emission mandates.

Technology also enters into the equation when the engine horsepower is viewed in consideration of the emission target. Furthermore, this example only considers natural gas-fired reciprocating engines. Most likely, such an engine would be driving a natural gas compressor and therefore subject to compliance obligations for fugitive leaks related to compressor valves, and requirements for glycol dehydration units and condensate tanks that would most likely be found at the same location as the reciprocating engine.

Colorado is only used as an example and, as stated earlier, the actual obligations will vary between and even sometimes within a given state due to the various dynamic elements presented in this general overview. It should be noted that this article is intended to serve as witness to the complex nature of a post regulatory world that began with the Clean Air Act. It is not a guide for determining compliance or even stating definitively the entire scope encompassing compliance. Such a process should be deservedly left to the experts and compliance departments of the regulatory agencies and facilities operating in this field of expertise.

Together, the international scope of companies operating in the energy sector of the United States economy and the undeniable trend toward global environmental consciousness present opportunities alongside the environmental risks that must be weighed and mitigated. Transparency and new findings will likely bring even more complexity to environmental regulatory policy. Only time, topology and technology will define the results of this process as it continues to grow in reach and scope.

Maximum HP	Construction or Relocation Date	Emission Standards in G/hp-hr		
		NO_2	CO	VOC
Greater than 100 hp but less than 500 hp	1/1/2008	2	4	1
	1/1/2011	1	2	0.7
500 hp and Greater	1/1/2007	2	4	1
	1/1/2010	1	2	0.7

Source: State of Colorado, data as of January 2009

Figure 3. Colorado statewide emissions standards for natural gas-fired reciprocating engines.