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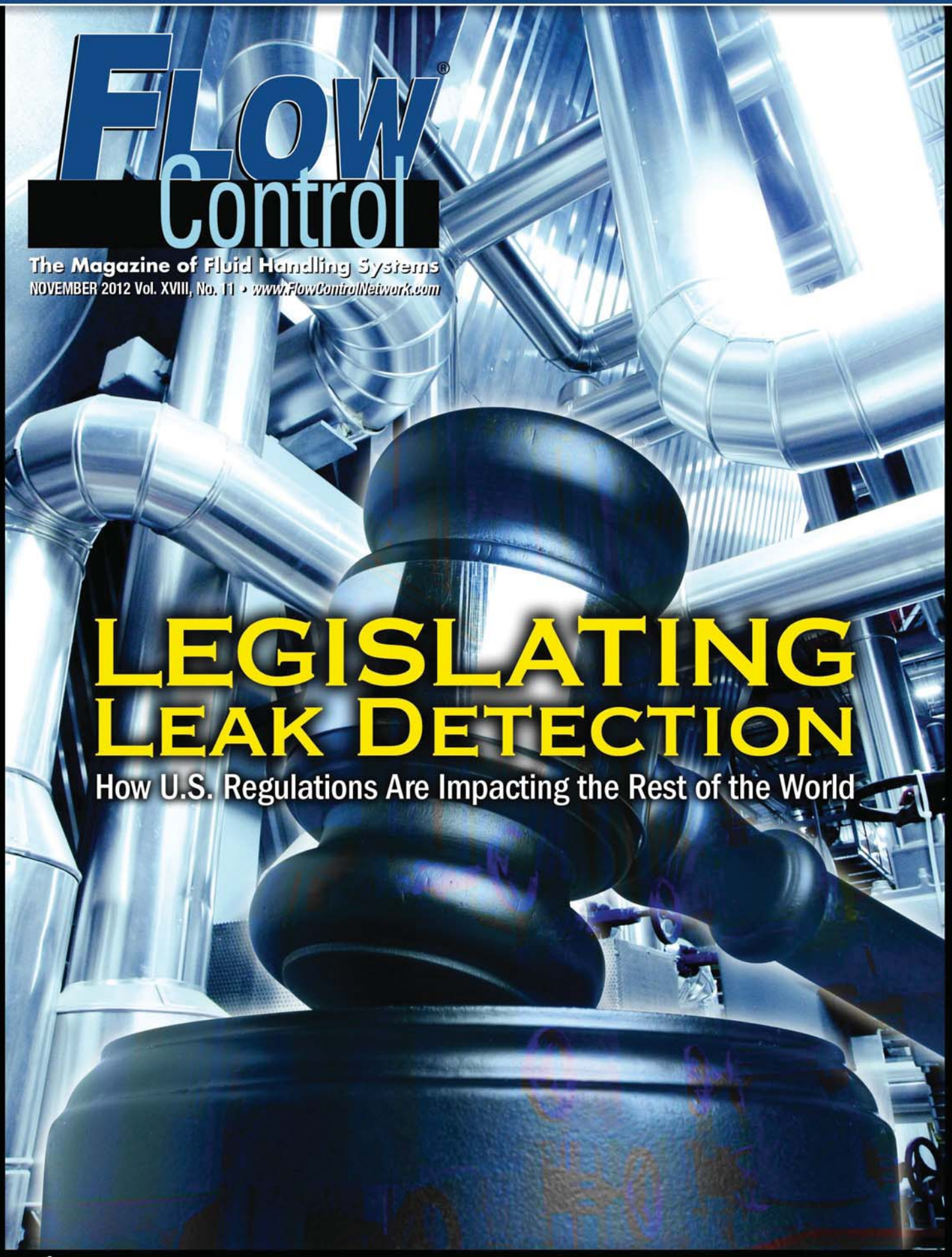


LEGISLATING LEAK DETECTION

How U.S. Regulations Are Impacting the Rest of the World

GRAND VIEW MEDIA GROUP

Regulatory Watch

Global trends in enhanced leak detection & repair

Since my last article in *Flow Control*, "Legislating Leak Detection: Strategies for Achieving Enhanced LDAR Compliance," in the February 2011 issue (pages 16-20), six more judicial consent decrees have been issued. These decrees have mandated Enhanced Leak Detection and Repair (LDAR) measures, with one including fence line monitoring for fugitive emissions, all of which point to an EPA that is rigorously enforcing the Clean Air Act and compelling compliance.

Before proceeding, it might be useful to briefly review the evolution of Enhanced LDAR and its requirements. It all began with the Air Pollution Control Act of 1955, followed by the Clean Air Act of 1963, which was amended in 1990 to include Leak Detection and Repair programs for refineries and chemical plants. Not satisfied with the results, the EPA in 2008 required that all those not complying with LDAR requirements implement Enhanced LDAR programs using certified low-leak valves and sealing technologies. In 2009, the programs began being mandated in consent decrees that indicated equipment and components to be monitored, leak criteria and remediation, and required documentation and reporting.

Recent Penalties

With that as background, a review of recent consent decrees illustrates just how serious the EPA is about enforcing the Clean Air Act. In May 2012, SABIC Innovative Plastics U.S. LLC agreed to pay a $1,012,873 civil penalty and to improve leak detection and repair practices at its chemical manufacturing facilities in Mt. Vernon, Ind. and Burkville, Ala. Injunctive relief mandated the use of low-emission valves and packings and increased monitoring frequency.

That same month, BP North America agreed to pay an $8-million penalty and invest more than $400 million in state-of-the-art pollution controls, including low-leak valves and packings, for its petroleum refinery in Whiting, Ind.

In addition, BP was ordered to install, operate and maintain a $2 million fenceline monitoring system at the site, and make the collected data available on a publicly accessible website. Fence line sensors will continuously monitor benzene, toluene, pentane, hexane, sulfur dioxide, hydrogen sulfide, and all reduced sulfur compounds.

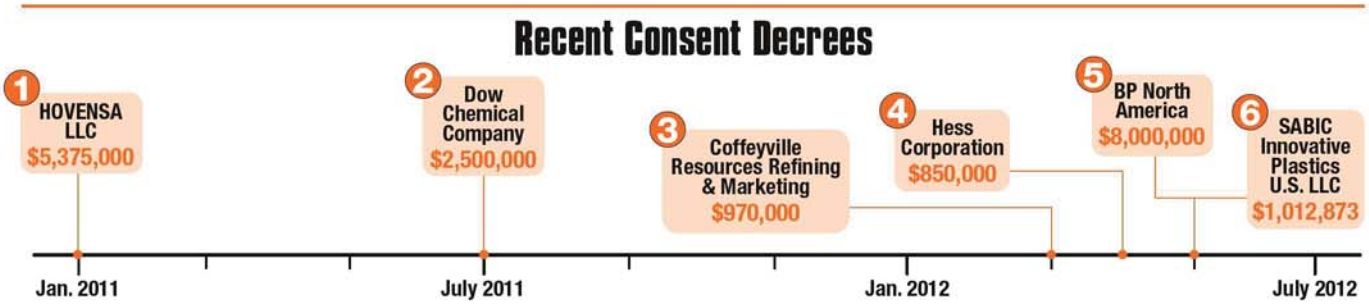
The requirement to install a fence line system with Web publication of the data is an interesting development. In September 2010, a consent decree ordered Murphy Oil to construct and operate an ambient air monitoring station adjacent to its Meraux, La. refinery, and post emissions data on an Internet website maintained by the company. This was a first, making BP's Whiting refinery only the second to be required to perform a supplemental environmental program (SEP) of this type. It should be noted that Conoco Phillips's Rodeo, Calif. refinery has voluntarily operated such a system for a number years.

Figure 1. *Method 21 requires each regulated component to be monitored for fugitive emissions at monthly, quarterly or annual intervals, using organic or toxic vapor analyzers. In a typical chemical plant or oil refinery, this could involve tens of thousands of points. (Photo courtesy of TEAM® Industrial Services)*

The use of SEPs in consent decrees in turn has prompted regulatory action, such as the December 2008 addition of the Alternative Work Practice allowing the use of forward-looking infrared (FLIR) cameras to optically monitor emissions. Past SEPs mandated projects using the FLIR instruments and procedures to gain experience which ultimately produced this regulatory addition in 2008.

Hess Corporation in April 2012 agreed to pay an $850,000 civil penalty and invest more than $45 million in new pollution controls at its Port Reading, N.J. refinery.

In March of 2012, Coffeyville Resources Refining & Marketing



agreed to pay more than $970,000 and spend over $4.25 million in new pollution controls, plus $6.5 million in operating costs to resolve alleged violations of air, superfund, and community right-to-know laws at its Coffeyville, Kan. refinery.

In July 2011, Dow Chemical Company incurred a $2.5 million civil penalty to settle alleged violations of the Clean Air Act, Clean Water Act and Resource Conservation and Recovery Act at its chemical manufacturing and research complex in Midland, Mich.

And in January 2011, HOVENSA LLC, owner of the second-largest petroleum refinery in the U.S., agreed to pay $5.375 million and invest more than $700 million in pollution controls to resolve Clean Air Act violations at its St. Croix refinery in the U.S. Virgin Islands.

In addition to new and upgraded pollution controls, the settlement called for more stringent emission limits, aggressive monitoring, and leak detection and repair practices, including low-leak valves and packings.

On January 18 HOVENSA reported that losses at the refinery had totaled $1.3 billion in the past three years alone and were projected to continue. According to the company, the losses were caused primarily by weakness in demand for refined petroleum products due to the global economic slowdown and the addition of new refining capacity in emerging markets. In July 2012 the plant was closed.

The number and severity of these consent decrees underscore the EPA's shift in emphasis from remedial to preventive action. It is not inconceivable, therefore, that Enhanced LDAR and optical fence line monitoring could become part of the agency's standard regulations, not just consent decree mandates.

The Global Perspective

Because the refining and chemical industries are global in scope, it might be helpful to put these developments into the perspective of global emissions regulations.

Having recently presented a paper on advances in U.S. air pollution rules at the World Gas Conference (*www.wgc2012.com*) in Kuala Lumpur, it was evident the rest of the world is interested in the U.S. regulatory environment and how it might impact their own air pollution control efforts.

Much as California is a bellwether for the rest of the U.S., the rest of the world looks to the U.S. for what their regulatory future may hold. A comparison of U.S. requirements with those of the European Union, Japan, Singapore, and Thailand shows that some key countries in the global economy rely heavily on their companies' sense of corporate social responsibility to "do the right thing" with regard to air pollution.

At one end of the regulatory spectrum is the highly regulated United States, where fugitive emission levels are limited to 100, 250 and 500 PPM, depending on location, and monitoring is conducted with organic vapor analyzers per Method 21 (Figure 1) and forward-looking infrared (FLIR) cameras (Figures 2, 2a).

The regulations also dictate equipment repair requirements and reporting to local, state and federal agencies, which necessitates advanced database systems and record-keeping software.

In the middle of the spectrum is the EU, motivated by sensitivity to cross-border pollution. The European Integrated Pollution Prevention and Control (IPPC) Directive requires permits setting a site's allowable pollution levels, and each site is responsible for establishing practices to meet its requirements. The IPPC publishes best available technique (BAT) processes in BAT Reference (BREF) Documents for each industry, but constant point monitoring is not the norm. A recent trip to Eastern Europe revealed a sense by one provider of emission monitoring services and its refinery/petrochemical customer that the EU may be moving in the direction of a monitoring and reporting requirement. Time will tell.

At the other end of the spectrum are Japan, Singapore and Thailand where compliance is, for all intents and purposes, voluntary. Japan's pollution control efforts, for example, are driven largely by cultural imperatives of maintaining company honor. Ambient air standards are established by law and monitored via bag, canister, filter samplers, and optical methods. Monitoring of individual components, such as valves, pumps and flanges, is not required. There are no prearranged permits, and emission limits are regulated on a

Figure 2. *An alternative to Method 21 is optical gas imaging using handheld, forward-looking infrared cameras, the optics and analyzers of which are tuned to "see" fugitive emissions. (Photo courtesy of Sage Environmental Consulting)*

Figure 2a. *If a component is leaking the emissions will absorb IR light, appearing as dark smoke on the viewing screen. (Photo courtesy of FLIR Systems Inc.)*

regional site-by-site basis by way of a notification system.

It is incumbent upon each site to comply with accepted technical practices as a matter of corporate social responsibility, and non-compliance is subject to harsh media and public criticism.

In Singapore, site inspections are conducted to ensure compliance with emission standards. Ambient air quality is monitored by a telemetric air quality monitoring and management system at 18 remote stations. The country's National Environment Agency (NEA) source emission test scheme for industry requires measurements by the site or by certified consultants.

Screenshot of a database system for enhanced LDAR. (Image courtesy of Orr Corporation, Inspection Logic Division)

At the far opposite end of the spectrum is Thailand, where there are no fugitive emission levels for individual components, but 44 different volatile organic compounds are monitored.

An ambient air quality network consisting of stations located throughout the country uses Tedlar gas-sampling bags per EPA TO-14, canisters and analysis by gas chromatography or gas chromatography/mass spectroscopy to monitor air quality. Pollution control and compliance is a matter of voluntary corporate social responsibility.

At the same time, however, the country has developed VOC standards in cooperation with Japan, which shares a similar philosophy of corporate responsibility.

Motivated both by public health concerns and the economic benefits of more efficient plants, Thailand encourages a combination of monitoring with gas detectors and corporate social responsibility.

The future of the country's pollution control efforts appears to be shaping up as a mixture of voluntary action and legally binding regulations to follow industry accepted technical guidelines, self-monitor and report. Enforcement is the responsibility of the Industrial Estate Authority of Thailand.

Putting It All Together

Most countries, even those in the EU, are less highly regulated than the U.S. But even though they may find that the complexity and extent of our regulations make them all but impossible to comply with, it is virtually inevitable that they will eventually adopt some form of them. This is already occurring on a de facto basis with the globally dispersed operations of a leading U.S. chemical manufacturer. Regardless of geographical location, these sites are subject to the same standards that govern the company's operations in the U.S.

It is a reasonable expectation that global emissions regulations and enforcement will become stricter. In the final analysis, however, the ultimate success of any effort to reduce fugitive emissions and improve air quality will rely both on regulatory efforts and what the Japanese would refer to as company honor. FC

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