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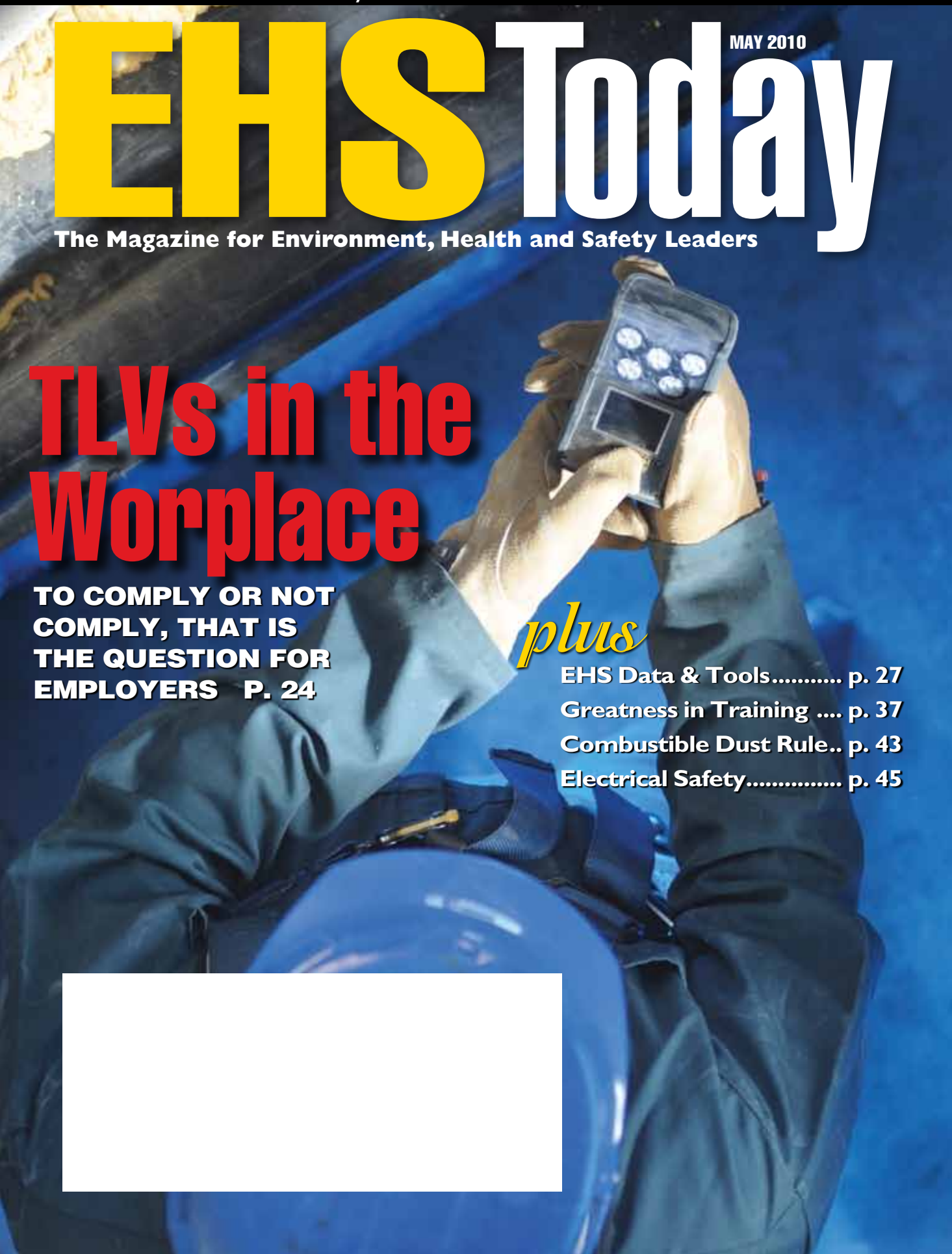

TLVs in the Worplace

TO COMPLY OR NOT COMPLY, THAT IS THE QUESTION FOR EMPLOYERS P. 24

plus

What's All This TLV Stuff About *Anyhow?*

Although compliance with the threshold limit values set for chemicals and other substances by the American Congress of Governmental Industrial Hygienists is not mandatory, many employers scramble to do so, fearing that non-compliance might come back to bite them later.

BY DAVID D. WAGNER

In February, the American Conference of Governmental Industrial Hygienists (ACGIH) approved and officially changed their threshold limit value (TLV) recommendation for hydrogen sulfide. Just 1 year previous, ACGIH changed its TLV recommendation for sulfur dioxide. While changes to ACGIH TLV recommendations are not uncommon, the significance of these two in particular has sent the industrial hygiene and safety communities scrambling in search of the gas detection instrumentation that allows them to monitor these hazards and implement the new TLV levels into their safety and IH programs.

The changes were not unexpected and were adopted after a 5-year period where they were under a notice of intended change, offering industry representatives the opportunity to voice their concerns over the recommendations. So, what's all this TLV stuff about anyhow?

According to the ACGIH, the TLV refers to the airborne concentration of a substance that nearly all workers may be exposed to repeatedly without adverse health effects.[1] TLVs may be expressed in terms of a time-weighted average (TWA) exposure during an 8-hour workday; a short-term exposure level (STEL) measured as a 15-minute TWA that should not be exceeded during a workday; or a ceiling level (TLV-C) that should not be exceeded at any point during a working period.

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The recommended TLV for hydrogen sulfide represented an order of magnitude change from a TWA of 10 parts per million (PPM) to a TWA of 1 PPM, and a STEL of 5 PPM, down from the previous recommendation of 15 PPM. The changes for sulfur dioxide in 2009 reduced the recommended STEL value to 0.25 PPM from its previous level at 5 PPM, a 20-times reduction in the exposure limit. To say the least, the changes are significant.

WHY COMPLY?

Compliance to ACGIH TLV recommendations is not mandatory. TLV recommendations are based on accumulated data on the health effects of the various substances and are an expression of scientific opinion. There is no consideration of the economic impact or technical feasibility of implementing a program that ensures that worker exposure levels are below the recommended guidelines. Although some regulatory agencies do set standards based on the recommendations, the ACGIH TLV levels generally carry no jurisdictional or statutory significance.

Even so, many companies are compelled to adopt these values into their safety and industrial hygiene programs. Corporate industrial hygiene professionals who are responsible for employee health – as well as the company's health – know that effectively

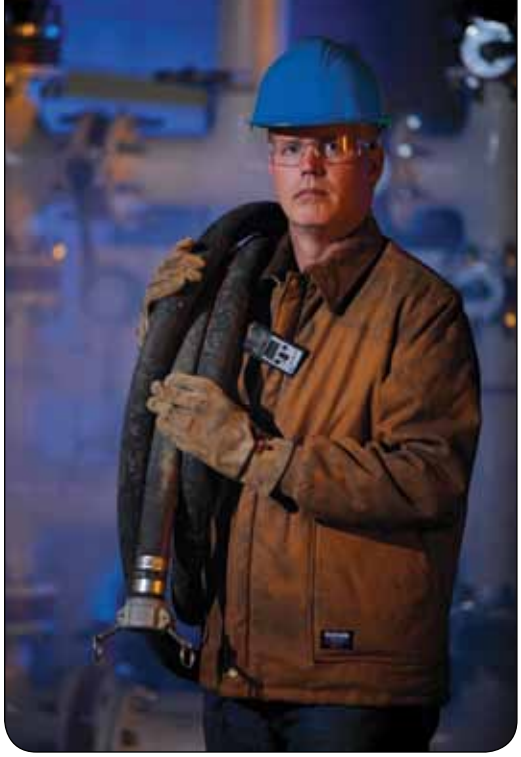
controlling exposures or even monitoring various substances at these levels may not be practical in their business. However, they have to contend with the possibility that a worker who becomes seriously injured or ill from an alleged exposure to a hazardous substance will retain an attorney, who can present evidence that ACGIH recognizes and publishes guidelines saying that exposures above the recommended levels present serious health hazards.

Is monitoring for hydrogen sulfide and sulfur dioxide to comply with the new TLV recommendations practical or even possible? Although the TLV recommendations point to TWA or STEL average exposure readings, end users often lean toward setting action points based on instantaneous exposures exceeding the limit values.

In order to minimize false alarms from gas monitoring equipment due to measurement error alone, the reading resolution and minimum detection threshold should be at least an order of magnitude below the exposure limit. This means that a hydrogen sulfide monitor with an alarm set point of 1 PPM should be able to read at least as low as 0.1 PPM, and a sulfur dioxide monitor with an action point of 0.25 PPM should be capable of reading at 0.01 PPM or lower.

When the notice of intended change for hydrogen sulfide TLV levels was introduced, instrument manufacturers began to move toward producing hydrogen sulfide monitors that provided a reading resolution at 0.1 PPM intervals. Several single-gas and multi-gas monitors readily are available that provide that reading capability. There may be ongoing debates about the overall accuracy of a hydrogen sulfide reading below 0.5 PPM or so, but the monitors certainly operate with the stability and precision necessary to provide a 1.0 PPM reading without false alarms.

While the monitoring capability for hydrogen sulfide appears to be sufficient for the new TLV recommendations, the same cannot be said for sulfur dioxide. Industrial hygiene and safety grade monitors for detecting sulfur dioxide at 0.01 PPM levels are not readily available, largely beacuse the major sensor manufacturers do not produce a sulfur dioxide sensor with resolution better than 0.1 PPM. At the current action levels, typically set at 2.0 PPM, sulfur dioxide monitors are notorious for producing false alarms. Sulfur dioxide sensors have significant cross interferences to commonly encountered substances. With cross interference factors of as much as 150 percent, unsaturated hydrocarbons such as acetylene or ethylene in relatively low concentrations commonly produce sulfur dioxide readings that exceed 2.0 PPM. These sensors also produce transient responses to changes in relative humidity that routinely result in false alarms at the higher action points. If the monitors did provide the resolution necessary to reduce the action points by 20 times, the false alarms would prove to be such a nuisance that even the most patient of end-users would lose faith in the detector's reliability.



THE PROBLEM WITH ACTION POINTS

Placing aside all concerns about the ability to adequately monitor exposure levels, is it feasible to establish action points around the new TLV recommendations in the plant environments where hydrogen sulfide and sulfur dioxide readily exist?

There is a fear that setting action points based on the new ACGIH recommendations will cause customers to lose confidence in the quality and reliability of their instruments based on the increasing occurrence of false alarms. This particularly is true in the case of sulfur dioxide. But false alarms should not be the main concern. There is more likelihood that reduced action points will produce alarms that are based on real exposures and uncover conditions that have routinely been hidden by the higher monitoring points.

Gas monitors that have provided the datalogging capability that would allow these conditions to be reviewed from a historical perspective have been used in these facilities for years. Conclusive decisions could be made whether or not to implement the new ACGIH recommendations based on the same type of quantitative scientific evidence that led ACGIH to make the TLV changes in the first place. But this data historically has been ignored. Industrial hygiene and safety professionals now are compelled to routinely collect and review this data to determine if adoption of new TLV action points into their monitoring programs is possible. Without a comprehensive review of the data, no one can truly say whether implementing the TLV recommendations is practical or not.

A MANUFACTURER'S PERSPECTIVE

ACGIH has determined through an evaluation of scientific evidence that exposures to hydrogen sulfide and sulfur dioxide above the recommended TLV levels may present a threat to worker health and safety. It is not the responsibility of the instrument manufacturers to establish the safety programs of their customers or to debate the practicality of the ACGIH recommendations or any other regulatory standards.

As a manufacturer of gas monitoring instruments with a vision to eliminate death and injury in the workplace due to accidental gas exposure, we are compelled to review the established guidelines and work to develop and provide the technologies and equipment that enable our customers to comply with them. EHS

David D. Wagner is director of product knowledge for Industrial Scientific Corp.

[1] *2009 Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices, ACGIH, Cincinnati, OH, 2009.*