

## Hydrogen Sulfide Training Programs

### PS: Why should safety professionals be familiar with ANSI/ASSE Z390.1?

**Chuck:** The standard is important because hydrogen sulfide is one of the primary hazards associated with oil and gas operations. It is also a problem in the chemical industry, municipal sewer systems and in laboratories.

ANSI/ASSE Z390.1-2017 is a revision of a standard originally created in 1994. The revision was driven by a couple different factors. First, American Conference of Governmental Industrial Hygienists' (ACGIH) changed its established time-weighted average threshold limit values (TLV-TWA) from 10 ppm to 1 ppm. The standard's previous version anticipated training based on the 10-ppm measurement level. Additionally, there were some necessary changes to update references to technology, such as VHS tapes, that are now obsolete. We also did some editorial cleanup and reorganized the standard to make it a little bit more user friendly.

We tried to make the standard slightly less focused on the oil field by accommodating the needs of other industries. The original standard was written with the oil field in mind, but we recognized that there are other industries that have hydrogen sulfide hazards.

For example, in the oil and gas business, when there is a hydrogen sulfide release, there is a potential for an extremely large volume, but there was some emphasis on things like including dispersion modeling and training. However, if you are in a university lab setting, that does not make any sense so requiring it did not make sense.

We revised the standard to say that workers should only be trained on the material that is applicable to their potential exposure. Also, there was some interest on the part of research labs participating in this standard, so we included an appendix with some information that would be helpful in teaching a class.

The biggest change was with the TLV-TWA. The committee walked away from mandating that 10 ppm TLV-TWA be taught. Instead, the standard says the instructor or the instructing organization shall determine the appropriate action levels based on state, federal and local regulations, as well as consensus standards and the assessments of local safety people. So, what we're doing is saying that you're not tied to 1 ppm. Your organization is to make an assessment as to what the safe action level is depending on the work setting.

When we wrote the standard we wanted to make sure we maintained the level of safety. We tried to make it a little more flexible to accommodate different industries.

One area that is somewhat strict is that the abbreviated, abridged version of visitor safety training that was done in some locations in the past is no longer acceptable. In other words, sometimes



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when VIPs came out to a location, they would get a 15-minute presentation on H<sub>2</sub>S safety, then be allowed to walk onto the drill floor where the hazard is potentially present. The 2017 version of the standard does not sanction that. What we encourage people to do is give anyone who has a potential for exposure to the hazard the full class. The full class would probably take about 4 hours to get through, but we just do not believe that an abbreviated class is appropriate.

### PS: What industries and professions are specifically going to be affected by this standard?

**Chuck:** Oil and gas drilling production, petrochemical, paper mills, municipal sewer systems, research labs, as well as many other industries that could potentially be impacted.

### PS: For workers who do not regularly work on job sites that might be potentially hazardous and might not find the 4-hour classes necessary, how can you encourage them that this is important training?

**Chuck:** Where a hydrogen sulfide hazard has been identified, everyone should be trained to an established minimum standard, which Z390.1-2017 establishes as about 4 hours of training. That includes discussion of properties and characteristics of H<sub>2</sub>S, contingency plans, respiratory protection and gas detection. The class covers a fairly large amount of material in 4 hours.



The other somewhat controversial aspect of Z390.1-2017 is that it says the class takes 3.5 to 4 hours to complete. Some people believe that the class might only take an hour, which the committee does not agree with. We believe that there is no such thing as a refresher class. Instead, the worker must be retrained and must do so annually. There is no refresher on this because it is important enough that everybody needs to hear it.

**PS: Is there anything we have not discussed about the standard that is important for OSH professionals to know?**

**Chuck:** This revision was in the works for nearly 4 years. This process started in 1993. Frank Perry was the guy whose passion really brought the standard to fruition. He was the chair from 1993 until his retirement about 2 years ago.

**PS: Frank must have left some big, passionate shoes to fill. How have you been working to continue his legacy?**

**Chuck:** I was on the committee from the outset, since 1993, as the vice-chair. And the reason that I had interest is because I had spent 7 days in intensive care as a result of an exposure to H<sub>2</sub>S during my first year in the oil field. So I am very passionate about it.

**Chuck Simpson, CSP,** is a senior risk control consultant for EPIC Insurance Brokers and Consultants. Chuck holds a B.S. from University of South Alabama. He is a professional member of ASSE's New Orleans Chapter and a member of the Society's Oil & Gas Practice Specialty.

## Birth of a Standard: The Inception & Development of Z390.1

By Frank Perry, Retired Z390 Chair

Leading up to 1987, I was one of many in the oil and gas industry who taught hydrogen sulfide safety. It usually took me 30 to 60 minutes to do a class. I normally showed a 15- to 25-minute film during the class. Usually that was "Three Minutes to Live"—the Dr. Death video. There were certain topics that I felt were of vital importance and absolutely had to be covered in the class.

But across the oil patch, we still had sour gas fatalities occurring and for no obvious causes. We talked about those deaths across company lines with our competitors and other companies that had similar exposures. We began to realize that the common factor appeared to be the inconsistency in training, including the content and conduct of the course. So, a group of us, about seven safety and training mid-level managers met in a hotel conference room in the Midland/Odessa, TX, area. Our primary goal at that time was to study as many hydrogen sulfide training programs that were offered and used by many companies in sour gas operations.

Over the course of about 5 years, we dissected as many programs as we could access. We compared the individual modules contained in those programs and studied each module to determine what makes it work, what appeared to be wasted resources in some modules, and how was the trainer able to determine and measure the students' comprehension of the topic.

From this very involved exercise, we identified about 14 technical topics that we felt were critical to the success of an H<sub>2</sub>S safety training program. Our next task was to closely examine each of these topics to see which of those components would be required as part of the overall training program.

As we crafted what we thought to be a good comprehensive hydrogen sulfide training program, individually the ad hoc committee members took the draft program into the classroom and started its implementation. Over the coming months and years, we were flexible in our continued analysis of this infant program.

After a few years of tweaking the program, we began to consider the "how" of enforcement of this training. It was one thing to have a good comprehensive program, but quite another to see how it was received and utilized in our industry. We felt that we needed more teeth in the requirement to train in accordance with the program that we had developed.

At some point I approached Tom Bresnahan at ASSE and sold the concept of an H<sub>2</sub>S training document that would benefit all affected by this silent killer. Tom took the project and, acting as secretary of the proposed secretariat, edited the document to conform to ANSI guidelines. It was eventually approved Oct. 19, 1992. The rest is history.

For almost 5 years we laid the groundwork of the document leading up to its accreditation. A long arduous process, to say the least.



**Frank Perry, P.E., CSP,** served as chair of the ANSI/ASSE Z390.1 Accredited Standards Committee for 22 years. He is an emeritus professional member, past president and Fellow of ASSE.