HAZMAT HQ

Digital Magazine™

May

2024 Issue

What's Inside:

CHATROOM

LEAK AND SPILL CONTROL ON INTERMODAL PORTABLE TANK CONTAINERS

ONE SIMPLE THING

ADSORPOTION vs ABSORPTION: IT'S NOT FOR CHEMICALS

HAZMAT ACADEMY

Conference Updates

WWW.HAZMATHQ.COM

Editorial Staff

Bob Coschignano

Mike Bloski

Derek Schaumann

Contributing Writers

Mike Hildebrand

Kevin Ryan

Tyler Broughton

Derek Schaumann

If you would like to contribute an article want to advertise or have a question, please contact us at the following:

submission@hazmathq.com *advertise@hazmathq.com* *editor@hazmathq.com*

CHATROOM

Make sure you download the 2024 ERG
to get the latest update with great additions.

Leak and Spill Control on Intermodal Portable Tank Containers

By: Michal S. Hildebrand, CSP

The recent collapse of the Key Bridge in Baltimore, Maryland was caused by the container ship *Dali* losing control and colliding with the bridge. If the ship stood upright, it would almost reach two-thirds of the Empire State Building in New York. The ship was carrying nearly 4,700 intermodal containers, on a ship with a capacity of 10,000 containers. This is impressive, but there are even larger container ships with capacities up to 20,000 containers or more. There were reports in the news media that some of these containers were damaged, however, there is a big difference between a damaged intermodal

container and one that is leaking, as this article will reveal. **See Figure-1**.

Figure 1 -Many intermodal containers were damaged during the Key Bridge collision, but damage to the outside of the container seldom results in the breaching of packages, drums, etc., inside of the intermodal container. Photo: U.S. Coast Guard.

The advantage of intermodal containers is that they can be shipped by marine, highway, or rail, and the same containers can easily be carried by different means of transportation without any changes or modifications to the containers themselves; they are simply lifted by cranes from one mode of transportation to another. If you have a highway, rail track, or port in your community, you have the potential for an intermodal container emergency.

General Types of Containers

There are two general types of Intermodal Containers:

1) **Freight Containers** – also known as "boxes", "isotainers", or "TEU's" (Total Equivalent Units in 20 or 40 foot standard lengths). Freight Containers are basically

tractor trailer type boxes that can transport almost any type of hazardous materials in boxes, drums, totes, sacks packaged inside the intermodal freight container.

2) **Intermodal Portable Tank Containers** – These containers range from food grade liquids like cooking oil and drinking alcohol to all classes of hazardous materials in non-pressure or pressurized containers. They primarily contain liquids, although some intermodal tank containers are designed to transport gases, solids like powders, and cryogenics.

The focus of this article is on the most common types of leaks that emergency responders may encounter involving nonpressure intermodal tank containers for liquids and solids (Hazard Classes 3-9) with T

Codes 1 to 22 (IM 101 and 102 and IMO Type 1 and IMO Type 2) described in the DOT Regulations.

Information in this article are based on the textbook *Intermodal Container Emergencies,* Second Edition, by Michael S. Hildebrand, Gregory G. Noll, and William T. Hand, Burlington, MA: Jones & Bartlett Learning (2018) and are reproduced with permission from the authors and the publisher. **See Figure-2**.

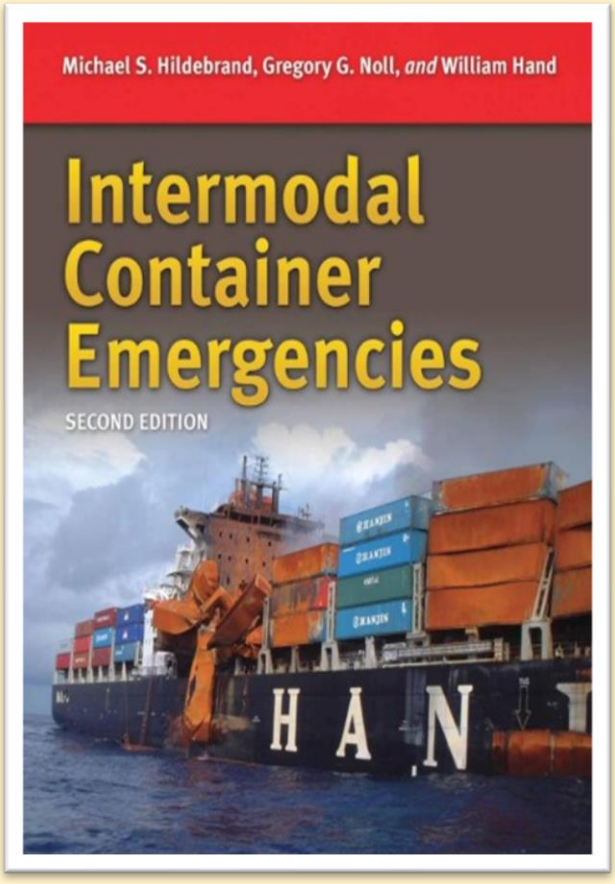


Figure 2 -The textbook *Intermodal Container Emergencies* 2nd Ed.,

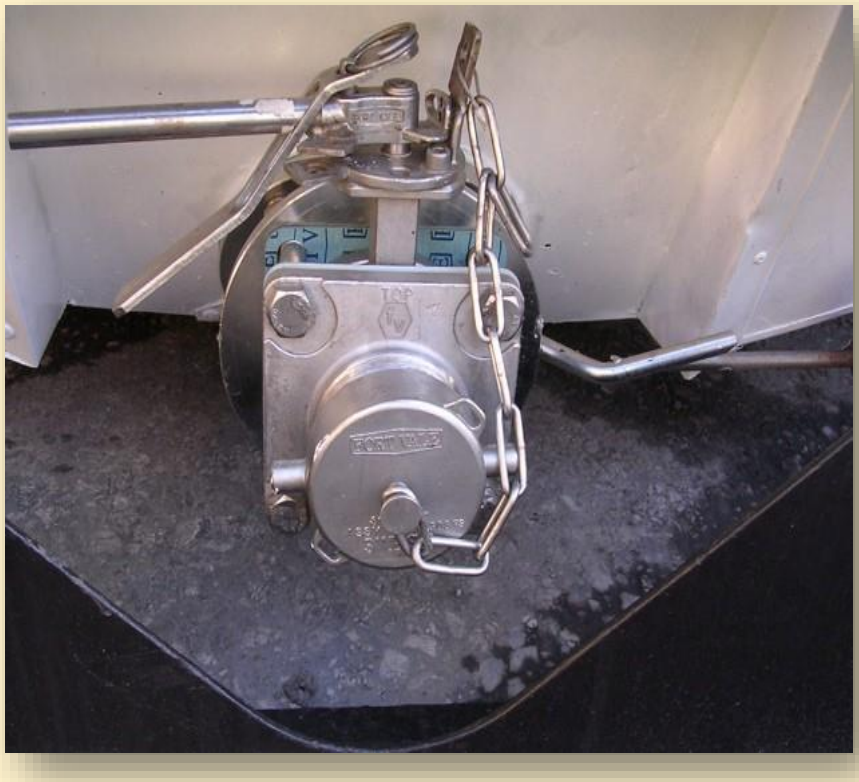
covers design and construction features, marking systems, intermodal freight

containers, intermodal portable tank containers for liquids and gases, as well as fire spill and leak control techniques.

Most Common Sources of Leaks

The majority of spill and leak situations encountered on IM-101 and IM 102 (IMO Type 1 and 2 – T Code-1 – T22) tank containers involve loading and unloading accidents. Common scenarios include loose fittings and valves, overfills caused by product expansion, and "mystery leaks" through the tank shell. **See Figure 3 A & B**.

Figure 3 A&B - The primary source of leaks on intermodal portable tank containers comes from the foot valve (F-3-A-Photo: Guard Europe) found at the bottom of the tank. The valve handle placed across the valve indicates the valve is closed. The photo of the disassembled foot valve shows the butterfly



shutoff valve which would be outside the tank shell and the internal emergency shutoff valve. (F-3-B Photo: Qualitank Services).

Overfills – Overfills can be caused when a tank container is overfilled with product without room for expansion. Once the container is subjected to ambient heating after sitting in the hot sun for a while, the product may begin to overflow through the manhole cover or pressure relief devices. In this situation, the container must be cooled to reduce the internal pressure and the effects of the ambient heating. Product may need to be transferred from the container to reduce the potential for the problem to happen again, and burst discs may need to be replaced.

Mystery Leaks – Other common scenarios with tank containers are mystery leaks through the

tank shell. For example, liquid might drip from an opening or crack through the insulating jacket in the lower half of the tank. If the tank has not been involved in an accident, the source of the leak is often water from condensation on the tank. If a previous bump or scrape has torn the outer jacket, the inner tank shell may have been exposed to warm air, causing condensation. The insulation between the inner tank and outer jacket becomes saturated with water, and eventually water drips out through openings in the outer jacket. If it is a warm day, the tank has an opening in the outer jacket, and the container has not been involved an accident, you probably have water on the ground. Standard hazmat identification procedures, air monitoring, and

sampling usually take the mystery out of the situation. **See Figure 4**.

Figure 4
This intermodal portable tank container has had its outer aluminum jacket ripped open on the end. The outer container shell has been “Damaged”. The inner tank shell has been dented but the shell has not been breached. Note the layer of insulation and the insulation between the jacket and the tank shell. (Photo: Trans Ocean).

Bottom Outlet Leaks – If product is leaking from the bottom outlet valve cap or a blind flange, make sure the cap or flange are tight. Do not remove the valve cap without first checking the position of the valve. The valve handle should be in the closed position– horizontal to the valve. If the valve handle is in the open position (in line with the valve), the remote emergency shutdown handle can be activated to close the internal foot valve. Intermodal tank containers are equipped with a remote shutoff device. The bottom outlet valve can be closed by activating the device.

Container Shell Leaks – Portable tank containers are mounted and attached to a rigged tank frame which protects the container from damage. The tank container is built with an outer shell, usually made from aluminum,

and an inner shell. An insulation barrier is often found between the inner and outer shell so protect the liquid contents from the ambient temperature fluctuation. If a tank container is damaged and the inner tank has been breached, the insulating jacket will make leak control tactics very hard. In this way, jacketed tank containers share the same problems as jacketed MC-307/DOT-407 and MC-312/DOT-412 cargo tank trucks. **See Figure 5**.

Figure 5 This intermodal portable tank containers construction features include a

steel frame which holds the portable tank. This tank is usually wrapped in an aluminum shell that displays the hazard markings and holds the insulation around the tank in place. The inner tank shell is made from steel compatible with the tank's product. (Photo: Tank Global).

If the tank container is a single-shell container, standard leak control tactics and techniques can usually slow the leak. Important factors determining the success of patching and plugging operations will include the pressure of the leak (i.e., higher pressures = less effective leak control operations) and compatibility between the chemical and the patching / plugging device.

Top Fittings and Manhole Leaks - In rollover situations the topside manhole cover may leak because the wing nuts were not properly

tightened. These leaks are sometimes caused when the manhole dome cover wing nuts are tightened sequentially in a clockwise direction rather than in an alternating pattern (e.g., the way you tighten lug bolts on an automobile wheel so the rim and tire are straight). Alternately tightening down the wing nuts can sometimes stop the leak. **See Figure 6**.

Figure 6
This shows the spill box on top of a tank container.

If the dome cover is leaking in an overturn situation, make sure to tighten down right-to-tight and

alternate like you would the lug bolts on a car so the dome seals correctly. Tank overfills are usually first detected from drips or a liquid pool under the tank. Note that the spillbox has a drain to the ground to remove rain water. The leaking liquid may be hazardous cargo or water dripping saturated tank insulation or melting ice on top of the tank. Always test the leak for corrosivity to determine pH. (Photo: Southern Cross Tank Containers).

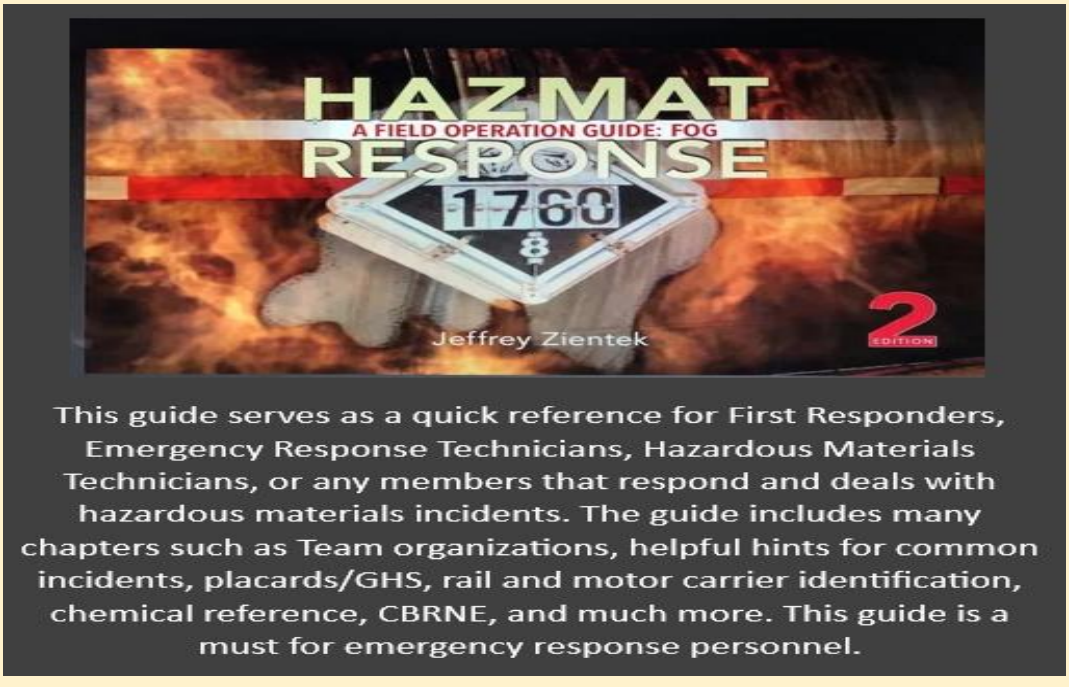
Summary

Intermodal Portable Tank Containers can take a lot of battle damage because they are attached to and suspended within a rigged steel frame for handling and stacking in transportation. Most accidents do not involve a breach of the container shell, they involve loose fittings and valves, or are simply water

leaking from condensation between the inner tank shell and the outer tank shell.

For more information on intermodal container fire and leak control, see Intermodal Container Emergencies, Second Edition, by Michael S. Hildebrand, Gregory G. Noll, and William T. Hand, Burlington, MA: Jones & Bartlett Learning (2018).

Mike Hilderbrand is President at Yvorra Leadership Development Foundation. Experienced consultant skilled in emergency planning and response for public safety, industry, and the military. Coauthor of six textbooks on hazardous materials emergency response, including Hazardous Materials: Managing the Incident (5th edition) - now in its 35th year of continuous print.



ONE SIMPLE THING

By Kevin Ryan,

Hazmat incidents can often become complex and over-complicated. It is not uncommon to see paralysis by analysis taking place. Simple and efficient Incident Management principles can often get bypassed, overlooked, or ignored.

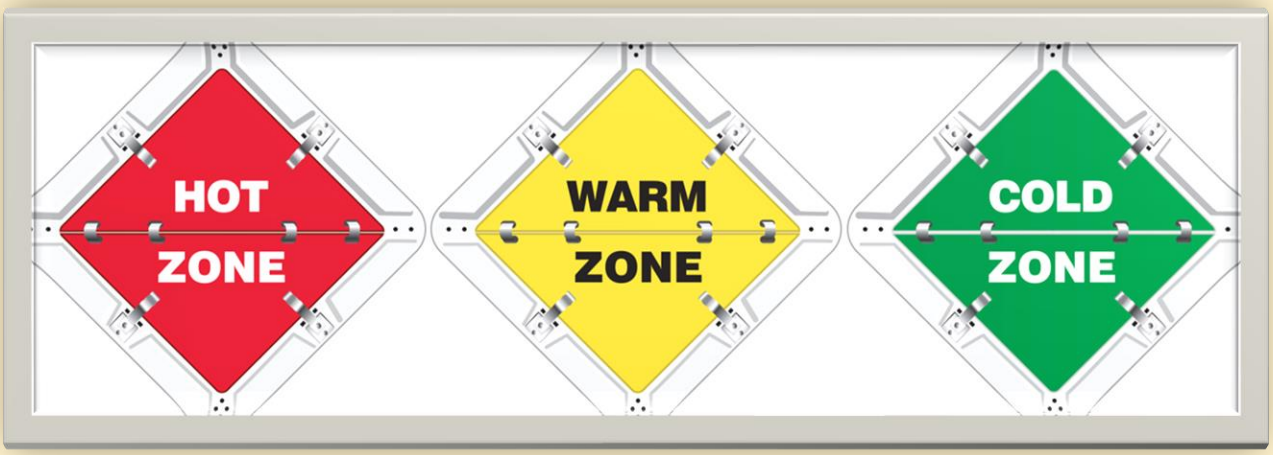
One of the most basic yet essential principles is that of control zones. Establishing the hot, warm, and cold zones are your ticket to success at an incident. The reality of this principle really became obvious to me during recent department wide training in the Baltimore City FD (BCFD). The BCFD conducts weekly 2 and 1 training that covers various topics relevant to all members of the department. Hazmat had the privilege of

presenting a natural gas leak response during the last (8) months. We are no different than most departments in that we suffer from complacency when faced with these responses.

In the year 2022, there were over 1100 recorded responses for leaking natural gas in Baltimore. The interactions with the members who take these responses every day proved to be valuable in our assessment of how to improve. Complacency was leading to the ignorance of adhering to basic hazmat response principles. Lack of control zones, exposing to many personnel, poor apparatus placement, meter training are just some of the issues identified.

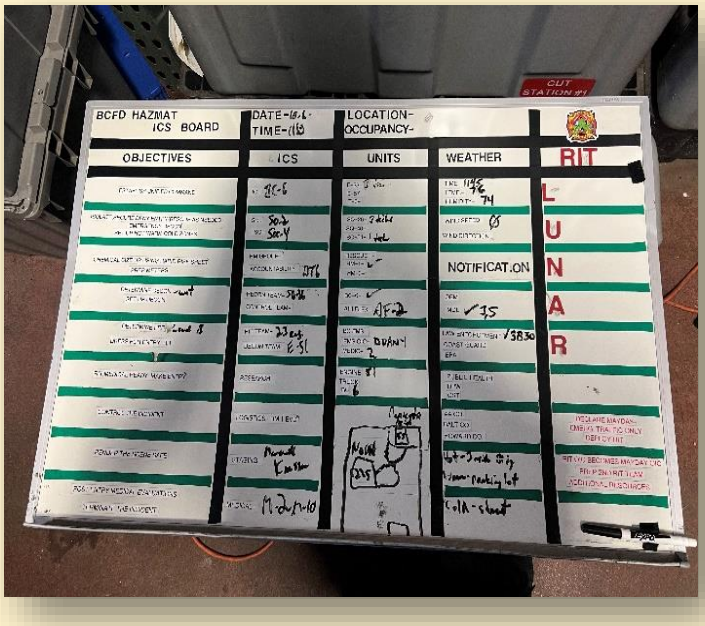
One simple thing stood out to me throughout the entire training cycle. The one thing that most of us took for granted is the key to a

successful incident. What could be so simple that brought so much success? The establishment of a hot zone was one common factor in every single successful hazmat incident I have ever been witness to. Could it really be that easy to ensure a successful outcome despite the ever-changing scenarios



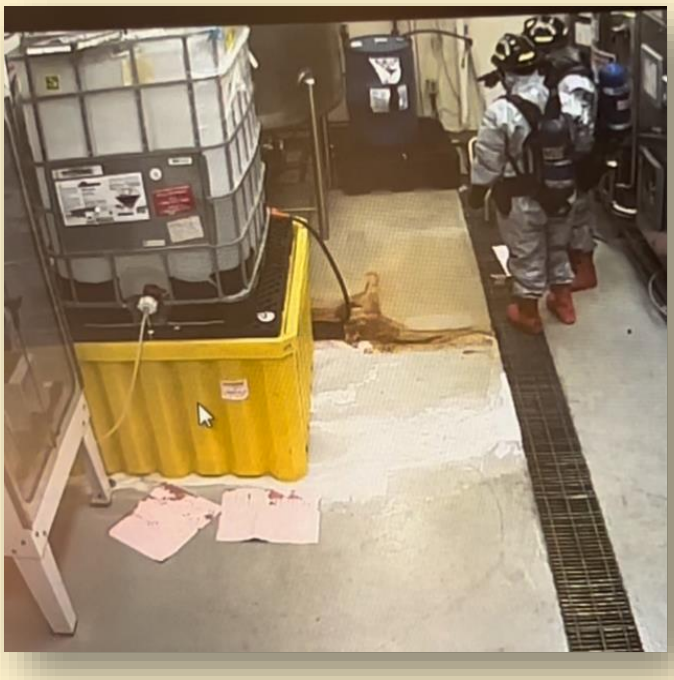
that we face? Why was this possible? What does a hot zone do for our incident? The answer lies in the fact that it establishes a clear playing field that all members understand. It means ICS established, full PPE, minimal entry, RIT teams, decon etc. The simple act of

establishing a hot zone frames the incident for everyone involved. Framing the incident in this manner provides a clear picture to the members involved. Incident Commanders (IC's) now have 3-dimensional areas to assist with



accountability and removing free lancing from the equation. Incident Command Systems (ICS) exist on 2-dimensional command boards and via radio traffic. The hot, warm, and cold zones can be visually defined so that members know where they are supposed to be operating. A clear briefing from the IC will denote these three separate zones.

An example of this was a mixed chemical reaction incident at a local cola bottling plant in East Baltimore. The reaction took place in a mechanical room where sodium hydroxide was stored and came in contact with a peracetic acid sanitizing solution. A small hallway from the mechanical room led to the open warehouse floor with a doorway to the main office area nearby. The IC of the incident informed all members by announcing the control zones at the beginning of the briefing. The hot zone was designated as the area around the small hallway, warehouse and office area. The office area was access controlled, so accountability was easy to



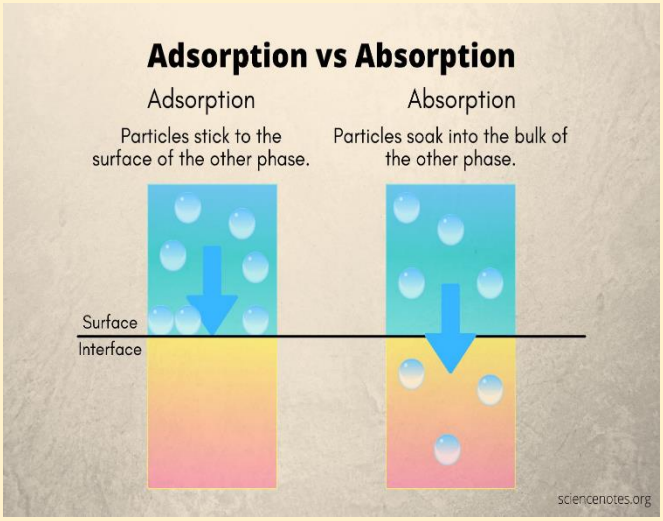
manage for the Safety Officer. The warm zone was set up just beyond the access point with decon at the ready. The cold zone was set at the street where the Incident Command Post (ICP) had a clear view of the building and members entering\exiting the hot zone. The simple act of establishing a hot zone defined the incident for all members. It is no surprise that this incident ended successfully because of our Hazmatters understanding their roles. The physically defined areas enhanced that understanding. The beauty of this is in its simplicity. The control zones are basic actions that can be taken by initial responders arriving on scene first. Your first arriving IC does not even have to be a hazmat tech to implement these principles. A strong approach to the basics will reap success at every incident encountered. All it takes is One Simple Thing to put you on the path to success. problem.

Kevin Ryan leads the Baltimore City FD Hazmat Operations Office. A 31-year veteran of the fire service with 26 years of experience in the world of hazmat response. He is a Level III instructor and adjunct at the BCFD Fire Academy.

Adsorption vs Absorption It's not just for chemicals, Unconventional thinking for the fire service instructor

By Tyler Broughton

This article is going to be a collection of my thoughts pertaining to building relationships as an educator with a focus on the fire service. I always think about the terms "adsorption" and "absorption." They have always stood out to me as such a finite way to describe two diverse ways of doing a job in such separate ways. At the time of writing, my team and I are midway through a Hazmat Tech class here in Oklahoma. Our Hazmat Technician Class is 80 hours – two weeks of instruction and a half day of testing.



The certification testing will cover ICS paperwork, a written test, and a skills portion. I have been an instructor for Oklahoma State University for 10 years and I have seen the testing process and class syllabus change multiple times over the years. The classes I instruct vary from hazmat awareness (8 hours), hazmat operations (40 hours), hazmat technician (80 hours) and hazmat technician and operation refreshers. I also instruct on the industrial side, doing hazwoper classes and refreshers for different entities. I say all that because I run into many diverse types of responders and individuals at a lot of various levels. As instructors, we find ways to adapt to the changes. Our goal is to educate, so we

change our production and delivery until the material seems right. But who is it right for?

I believe one of the most underutilized parts of human interaction is the very first connection. The students in class have a perception of what is expected of them and the instructors from outside sources, no matter the class or the level of class. You want your class to want to be there, and this is great if it was a class they signed up for on goodwill and not a refresher of some sort. At the start of each new class, our audience always gets my attention. I start wondering about where these people are from – not just their department,

name, and rank. A good friend of mine I work with started with this opening question: “What did you do before the fire service?” Such a simple question, but it opens doors to human interaction. After seeing this several times, I thought to myself, it is important to see the person behind the uniform. I want you to be thinking of your situation and your program as you continue reading these thoughts!

Our audience is always different in a couple of separate ways on a simple level: different jobs, different departments, different careers. On a more complex level, what will they be doing when they leave this class? For example, we teach responders on an industrial fire brigade who respond to a list of known chemicals, to the police officers getting a prerequisite for bomb school, and to everyone

in between. The concepts and scenarios we deliver in class are important to them but are especially important to the instructor! I want you to think at a post-class level, most of our students will never be involved in the situations we present to them. Building blocks are important for developing a structured hazmat program that's also fluid enough to withstand the changes and challenges you and your department have.

Somewhere along the way, hazmat became the backseat passenger in the fire service, even on the way to a hazmat scene. In Oklahoma we have a regional response system made up of 8 regions. Of those 8 regions, 5 have a hazardous materials unit on an actual fully equipped hazmat-dedicated response truck.

That said, many of our people leaving class will be on a first due engine, not a hazmat rig. So, after spending 80 hours in our class what can they take away? What changes for them? That is a question for you to find out in your program. I believe we find these things through conversations at the personal level once again at the very beginning of a class. As you know, teaching comes with many challenges! If you are still reading, I hope you are asking yourself many questions about your program and delivery!

I think most would agree that we teach from experience, whether from personal experience or something you heard someone say at some time, but even that has an expiration date that we must account for. I believe we should also teach from a

relationship perspective. What does that mean? We need to take the time to get to know the people in our class. What drives them? Why are they here? What is their motivation? When we take the time to learn the answers to these questions, we can focus our material on the students and have some fluidity.

We all know the difference between adsorption and absorption. In the classroom setting, we are normally dealing with people who are adsorbing information. They are adhering to the information and protocols we are laying out before them because they need to know the material to pass a test. They may or may not feel the information applies to them, but it will “stick” with them long enough to get through the next few days of class time

so they can get back to their normal routine. To absorb the information means that what we are teaching them is really sinking in. They can relate to it. They understand the scenarios and the techniques, they can relate it to real-life situations and experiences. Our goal is absorption, and as in any situation, absorption is only possible when we know what/with whom we are dealing. Relationships are key to absorbing information. I believe that strong relationships between instructors and students can dramatically enhance students' level of motivation and promote learning.

My question for you is how do you build that relationship? It could be a simple conversation. Finally, I want you to think about progressing your program the best way you can, and I hope you think about the terms

“adsorption” and “absorption” during your next class.

Tyler Broughton, has been on the Tulsa Fire Department for 12 years and has been in the fire service for 16, currently working on Hazmat 1 for the Tulsa Fire Department. He has worked for the Bureau of Indian Affairs for wildfire management and has been an Instructor for Oklahoma State Fire Service training for 10 years Tyler.broughton@okstate.edu

Hazmat Academy

By Derek Schaumann

"Just because you're certified, it doesn't mean you're qualified."

I heard this quote spoken by Ron Gore *(Jacksonville Fire Rescue, retired, Safety Systems Training)* nearly 20 years ago. While these words have always been true, it feels even more so today. The problem isn't the students, the instructors, or the curriculum. The reality is that hazmat response has evolved, and the learning curve is increasing. The question below *(Fig. 1)* is from a survey I conducted in 2016. The survey included a series of questions intended to determine the

self-assessed readiness of newly certified technicians.

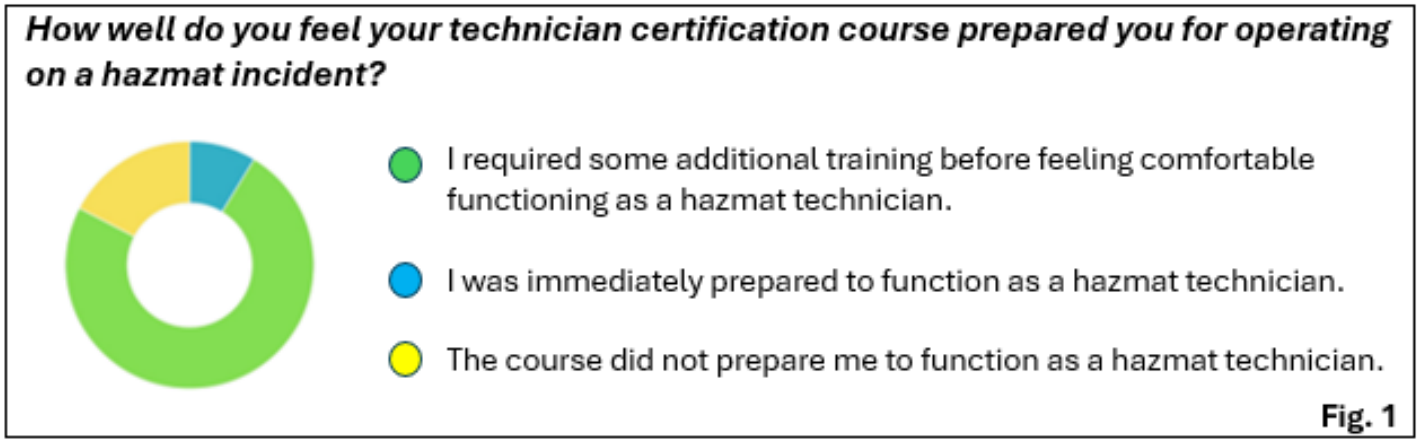


Fig. 1

Certification vs Qualification

The State of Florida, and the Florida Fire College, adopted NFPA 472, *now NFPA 470*, as the standard for which fire service Hazardous Materials Technicians should be certified. Training programs adopted the IAFF 160 hours hazmat technician training curriculum. In 2016, Florida transitioned to the IFTSA curriculum while also adopting a hybrid (online/in-person) format for delivery. Regardless of the format,

students completed a 34-page task book which was submitted to the Florida Fire College in order to receive state certification.

This transition brought many benefits, as well as new challenges. The greatest challenge was determining what amount of coursework should be online versus in-person. A few institutions/agencies continued providing all 160 hours in-person, some opted for 120 online/40 in-person, while others settled on something in between. Depending on where students received their training, the completion of the task book was subjective. Some student completed rudimentary “watch and then demonstrate” assessments while other programs worked the skills into scenarios that required the students to apply the skill in a

way that more closely reproduced what they could be expected to do in the field. This resulted in a significant disparity in preparedness and qualification of skills for new technicians. For some, this meant almost needing to teach them all over again. Unfortunately, certificates became little more than confirmation of participation.

Class is Over, What Now?

It was at this time I found myself at a crossroads. I was moving from the role of hazmat instructor to program manager for hazmat training. As part of my new role, the VP of the college wanted to know our plans for embracing the hybrid training format to avoid losing students to other educational institutions. My team was hesitant to make the

change; our primary concern being a reduction in the quality of our program. With the data from the survey, I was certain we could support our position. The battle came when a respected advisor weighed in and stated we were doing too much. *“You should be teaching to the NFPA Standard only, not trying to make them rock stars. Their agencies are responsible for everything else.”* While I agreed with this advisor, I knew the reality didn’t support this. At least, not my reality.

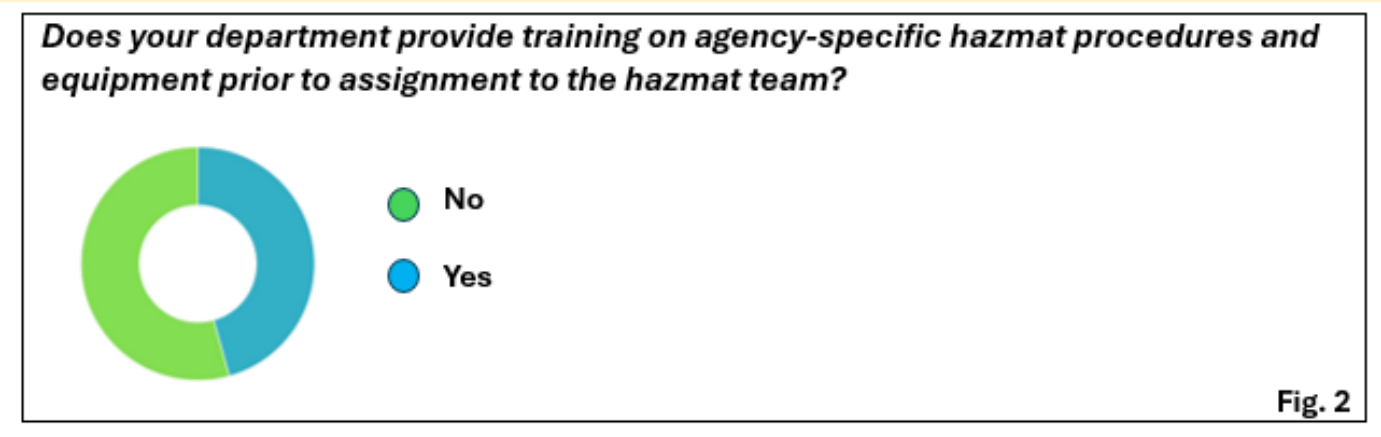


Fig. 2

When I wasn't teaching at the college, my full-time ride was as a Hazmat Team Lieutenant. My greatest challenge was always: time. Finding time to train and maintain competence on a growing inventory of equipment and technologies can be overwhelming, especially if you run more than just hazmat. As new members joined the team, a significant amount of that time was spent introducing them to our department's specific equipment, SOP/SOG's, etc. This was an informal process and varied from shift to shift. Through survey responses, I realized that this experience wasn't uncommon *(Fig. 2).*

One Small Step

Nothing happens overnight. Well, that's not true, a lot of things happen overnight.

Department change usually isn’t one of them. When I joined the hazmat team in 2003, we didn’t have much of a training program for new members. My crew was always happy to train or go over equipment, but most had only been on the team for less than two years. This led to focus on the things they were comfortable with and the rest was learning together. I probably spent a year locked in the hazmat office reading every manual, reference text, and watching VHS training tapes from the 80’s and 90’s. For me, this was perfect as I enjoy technical information. The problem is this method doesn’t work for everyone and there was no systematic/repeatable method of training.

Fast-forward to my assignment as a Lieutenant and within the first year my crew of experienced techs had promoted and I found myself with an eager, yet inexperienced, team. The remaining senior member of my team, a true wealth of knowledge backed by real world experience, worked with me to implement a plan. Simplicity was the key since everything would have to work within the confines of our regular shift and running first due calls. Enter the checklist. It was a simple one-page document designed to guide each member through a progressive familiarization and training program.

In addition to the checklist, each member was assigned a piece of equipment or a specific skill. Their task was to learn as much as they

could about their assignment and develop a basic class. The requirements included presenting the information, demonstrating the application, and creating a skill sheet which they would have the other members complete with a simple exercise. This serves two purposes: the members learned the equipment/skill and we were creating a training library. A systematic/repeatable method was finally in place.

The Giant Leap

If you've staying with me this long, it's time for the Hazmat Academy. While the checklist, training and skill sheet development were great we still had a problem. Our biggest problem was the other two shifts. Not because they always left mess, broke or lost things,

which they did. A lot. The real problem was each shift approached training differently resulting in discrepancies between the shifts.

The solution, we needed a program that prepared and evaluated new members, across the board. My greatest ally in this mission was my C Shift brother, Bob Coschignano. Bob and I taught and worked together for most of my fire service career. We both saw the writing on the wall. Our team of senior personnel was quickly turning over and we needed a solution.

Bob and I drafted a training proposal which included the first outlines for a Hazmat Academy. We laid out a curriculum, assessment tool, resource list, and presented our work.

Reception to our plan was mixed to say the least. There were positives, a few negatives, and a lot of questions. What we thought was low hanging fruit ended up being out of reach. As I look back now, I understand that what we felt was a very simple and “duh” proposal was really one of many needs for the department. At the time, we were frustrated. We had two options, throw our hands up and admit defeat or continue to pursue what we knew was needed. Spoiler alert, Bob and I did not implement the Hazmat Academy.

The Hazmat Academy came after our tenure. The team who made it a reality may have used the general ideas we laid out, but the successful creation of the program is very much the hard work and dedication of the

current team. They have developed a program that addresses the concerns Bob and I identified. Having just completed a year, they have facilitated four academies that trained and assessed nearly 50 new team members and alternates. The response from those members as been positive and their performance in the field reflects the value of the program.

Okay, but What is a Hazmat Academy?

It's different for everyone. This may seem like an overly simplistic answer, but it is the truth. Some agencies train their technicians in-house while others have their technicians trained by outside resources. It is the latter that I believe most benefits from the Hazmat Academy. This is how most of our members

became certified. By attending external training, members usually receive the "Minimum Standards" of hazmat. They are presented with basic equipment and skills needed to know you need to learn more. So here is our program as an example.

Remember, we aren't training members to become technicians. They have already completed their 160-hour technician course and the Hazmat Academy is an opportunity to reinforce and enhance their competence and confidence.

Day 1:

- PPE familiarity and decision making
- Chlorine A Kit

- Lithium Battery Response
- Hydrocarbon Spill & Leak
  - Transfer Pump, Flaring, Gas Line tools

Day 2:

- Basic Detection Devices
- Chlorine B Kit
- Air Monitoring & Confined Space operations
- Documentation

Day 3:

- EOD Interface
- Research Overview
- Intermediate Detection Devices
- Unknown Odor Scenario

Day 4:

- Intermediate Research
- Sampling and Field Analysis
- Advance Detection Devices
- Suspicious Powder Scenario

Day 5:

- Decontamination Procedures
- Chlorine C Kit
- Full Scale Scenario

Wrap Up

To understand where you're heading you have to know where you are and how you got there in the first place. Our Hazmat Academy didn't come quick or easy. It required the

efforts of many and more importantly, it required buy-in. Identify your challenges, define your goals, and layout a plan. Be open to feedback and criticism as they provide the road map for your follow-up meeting(s). In the end, our goal is to build teams that are successful and sustainable. The juice is worth the squeeze!

The success of the Hazmat Academy is due to the many dedicated members who develop and deliver the program. The author would like to recognize the following personnel whose efforts brought the academy from concept to reality: District Chief Edward Angelotti, Lieutenant Brandon Lange, Lieutenant Michael Callahan, Firefighter Jesse Radig, and Engineer Kyle DiVirgilio.

Derek Schaumann has been in the fire service for 23 years and currently serves as a District Chief with the City of Orlando Fire Department. He is a hazardous materials instructor and Program Manager for the Hazardous Materials Technician program at Valencia College. Mr. Schaumann has also worked for the Department of Homeland Security as an equipment/logistics specialist for a terrorism response team. He is also DEA certified for Clandestine Labs response. Mr. Schaumann holds an A.S. degree in Fire Science. He is a Chief Editor for HazMat HQ Digital Magazine


Your
add
here

CONFERENCE DATES

Oklahoma HazMat Conference
May 15th – 17 2024

Mid-West HazMat Conference
May 3rd & 4th 2024

IAFC Baltimore HazMat Conference
Jun 5th – 9th 2024