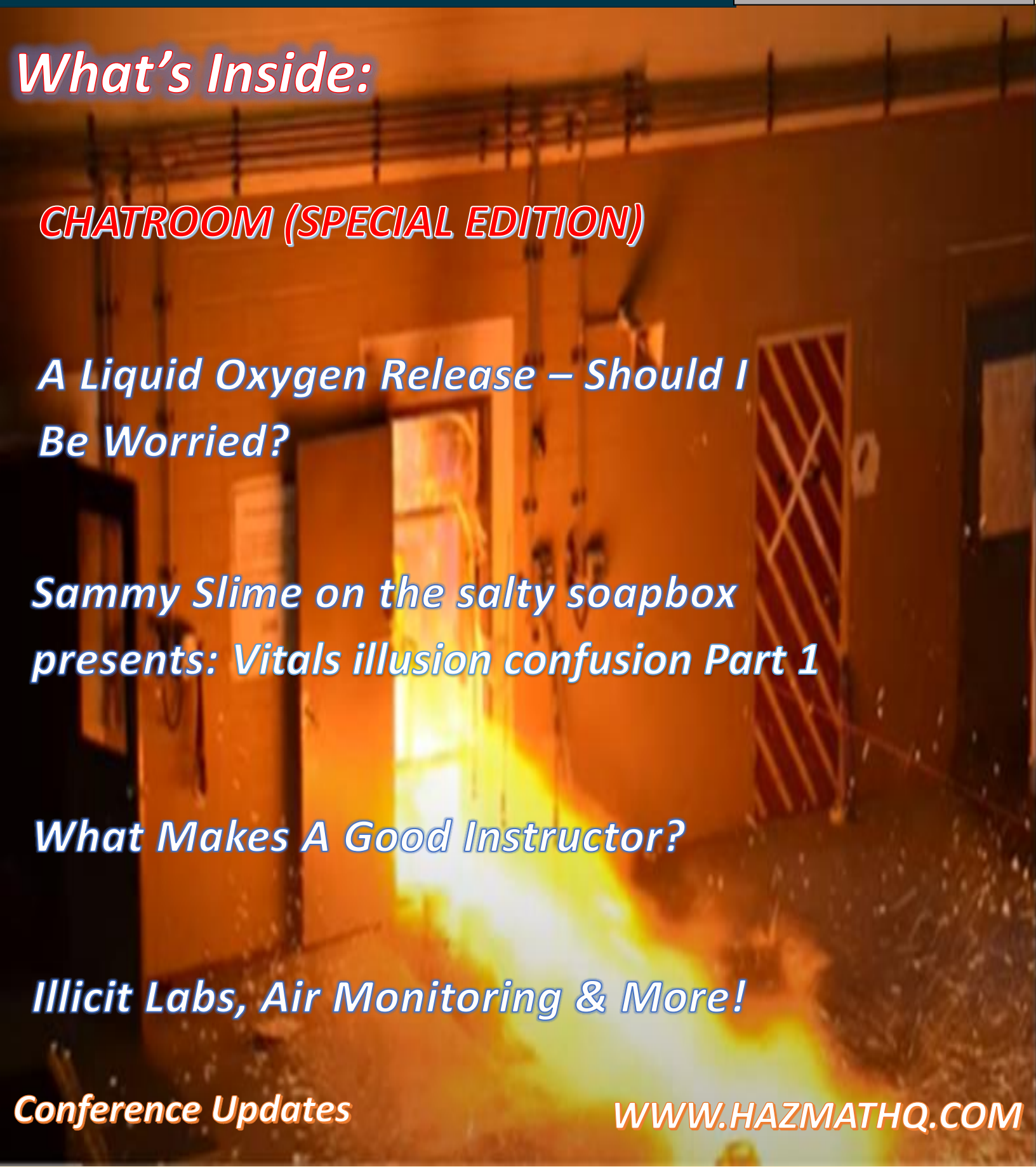
HAZMAT HQ Digital Magazine™

February 2024 Issue



What's Inside:

WWW.HAZMATHQ.COM

HAZMAT HQ
Digital Magazine

Editorial Staff

Bob Coschignano

Mike Bloski

Derek Schaumann

Contributing Writers

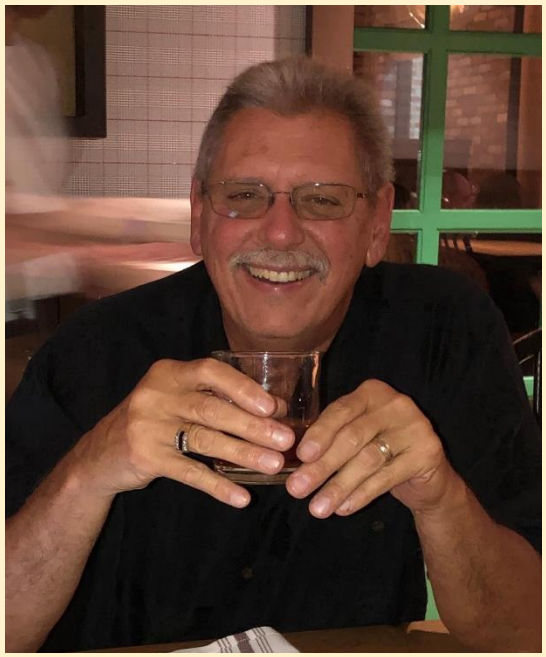
Armando Bevelacqua

Todd Burton

Kevin Ryan

Andrew Byrnes

CHATROOM



This month's chatroom is dedicated to a very special hazmat person who we lost on 1/27/24. Chief Rick Stilp was a leader in the hazmat community and helped us move in the direction we all are going today. Chief Stilp, along with his firefighting brother Toby Bevelacqua, helped introduce the hazmat community to the concept of HazMat Medicine and they have written several books on the subject. Chief Stilp served on many state and federal committees, including the NFPA, and was one of the key figures behind the Florida HazMat Symposium which just finished its 11th year. His passion to help citizens and the fire service / hazmat world is only second to the love he had for his family! He was a mentor to so many and his teachings will carry on forever!

Rest in Peace Rick and thanks from all of us!!!!

A Liquid Oxygen Release – Should I Be Worried?

By Andrew Byrnes
M.Ed. EFO, Utah Valley University

Interviewing dozens of experienced hazmat instructors and students I found some interesting opinions regarding a Liquid Oxygen (LOX) response. The standard precautions taken by most responders to ensure safety are: 1) do not step on frozen asphalt, it could explode, 2) do not drive over frozen asphalt, the pressure could detonate under the weight of the vehicle, 3) do not allow LOX to come into contact with combustible materials, such as dried grass in the median, or hydrocarbons, such as diesel fuel, because it will spontaneously ignite resulting in a fast and

intense fire and, 4) wait 30 minutes after the last frost is gone before stepping on the asphalt.

I've taught these precautions over the years myself, trusting what I have always been taught. The chemistry side of my brain said – "wait a minute". What is providing ignition? I have fuel, and I have oxygen, but where is the energy of the ignition? Have these precautions ever been scientifically tested and verified? Understanding that oxygen is a powerful oxidizer, would it really "ignite" hydrocarbons by simply contacting them? I asked myself if it could really happen. I decided it was time to test the "standard" precautions related to LOX response.

I spent hours researching books, articles, and research papers in any way related to LOX. The sum of the precautions and "facts" I found regarding LOX were unsubstantiated and not independently verifiable. Most of the research was anecdotal and like Martel's *Chemical Risk Analysis*, "George Claude was seriously injured in 1903 after inserting a candle into liquid oxygen" (2000, pg. 242), or from the National Fire Protection Association (NFPA) 53, Annex D, which lists 63 types of LOX incidents but with the caveat, "NFPA cannot guarantee the accuracy of the reports" (NFPA 53, D.1.3). None of the 63 "incidents" in NFPA 53 Annex D were corroborated. The Compressed Gas Association pamphlet 2.7 on the handling and use of LOX systems in healthcare facilities states, "Stepping on or rolling equipment

across a liquid oxygen spill can result in explosive ignition of combustibles." (CGA, 4.1.2.7).

In my research efforts, I could not find a verifiable incident in the nation. Regardless, our testing at Utah Valley University (UVU) showed that when LOX saturates a combustible material *and then an ignition source is introduced* – violent and vigorous combustion occurs with increased burn rates, light, and heat. Without an ignition source or when ignition sources were controlled, LOX did not pose a significant hazard beyond those associated with cryogenic liquids.

We subjected LOX frozen asphalt samples to a series of impact tests by raising an object to a specified height and dropping it onto the sample. We used a weighted rubber fire boot

to step and stomp on a frozen sample. We then struck samples with a 10 lb. sledgehammer, dropped a halligan (blunt headfirst), pipe wrench (headfirst), pike pole (point first), screwdriver (point first), and drove a fire engine over a larger conditioned asphalt surface and liquid pool of LOX. Forces were determined by subjecting a force plate device to these objects and digitally measuring the results of the force and calculating the height, pressure, and energy of the drop. None of the sources of mechanical impact or pressure caused any reaction in the asphalt after a minimum of five tests.

NASA, in 1973, impact tested LOX and crumbled asphalt as runway material. To everyone's surprise, the LOX-soaked asphalt detonated and blew the NASA apparatus 30

meters into the air and created a debris field 50 meters in diameter (Moyers, Bryan, & Lockhart, 1973, p.11). At UVU, we wanted to replicate and verify NASA's 1973 test using a scientific method. We were successful in replicating the NASA test, and so could endorse and validate their results. Using the American Society of Testing and Materials (ASTM) *Standard Test Method for Determining Ignition Sensitivity of Materials to Mechanical Impact in Ambient Liquid Oxygen and Pressurized Liquid and Gaseous Oxygen Environments* (G86-17), the configuration of drop mechanisms used to test the sensitivity of materials to mechanical impact pressure was built at UVU in compliance with the ASTM standard. (Figure 1).

The ASTM states that any one reaction in 20 drops indicates the tested material is “reactive.” We experienced five reactions in 20 drops and were able to duplicate those reactions again 60 days later.

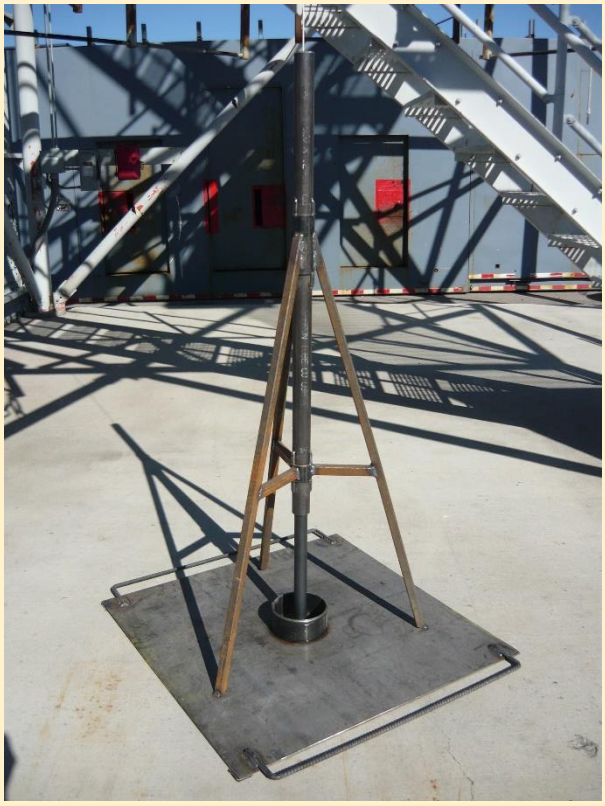


Photo credit: Eugene Ngai

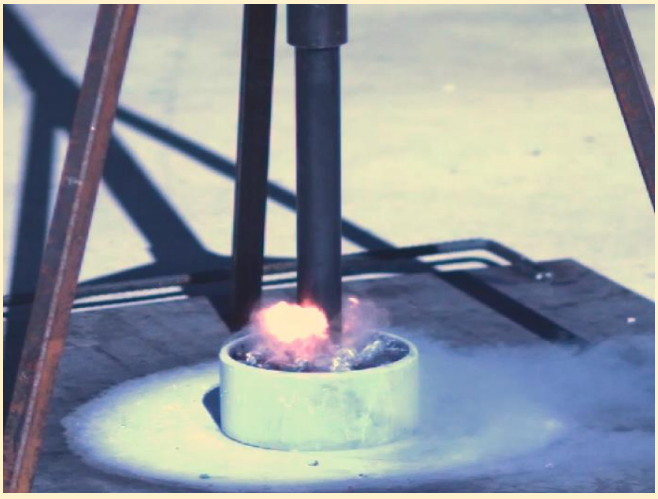
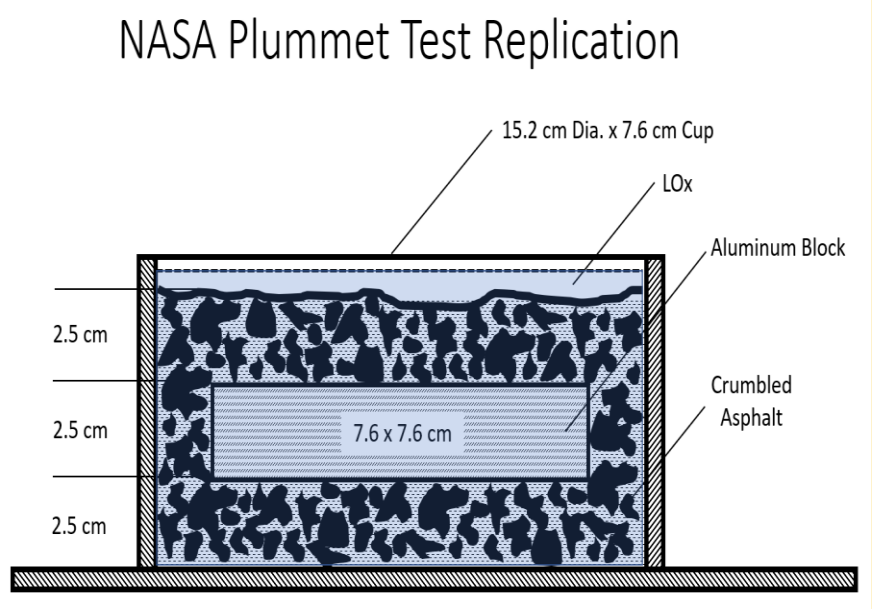


Photo credit: Brian Patchett

(Figure 2). The tested strata, used by NASA and UVU, were composed of crumbled asphalt, on which an aluminum block was placed, then covered by additional crumbled asphalt before being immersed in

LOX. (Figure 3). Testing other configurations



Source: Author

resulted in no reactions. Our highways do not consist of crumbled asphalt covered with a one-inch-thick plate of aluminum which is then covered with more crumbled asphalt. These reactions should be viewed with that important context.

In real time, we knew that a reaction had occurred when we heard what sounded like a gunshot. The subsequent flash was too quick for the naked eye. Chemistry and physics faculty at UVU in consultation with Eugene Ngai, a compressed gas expert, explained the likely ignition source. The reaction occurred as

the plummet compressed the micro-bubbles in the LOX against the aluminum, almost instantaneously increasing the pressure and temperature of the oxygen gas inside the bubble, then releasing that energy as adiabatic heat. The adiabatic heat principle is like what occurs in the cylinder of a diesel engine due to compression.

To determine non-impact reactivity, we poured LOX directly onto an asphalt surface and dropped a road flare into the LOX pool. Other than some increased flare length and burning of the flare paper, no flaming combustion or explosion occurred. We poured LOX directly into 11 different, commonly available, hydrocarbon compounds and observed no reaction other than creating a frozen liquid. Saturated and unsaturated

hydrocarbons, synthetic and natural compounds, alcohol-based products, various viscosities, and three liquids with flash points below 100° F did not react in contact with LOX. Likewise, combustible materials, such a cup of potato chips, oily and organic, did not react in contact with LOX. That said, when any of these combinations of hydrocarbon liquids or organic materials and LOX met with an ignition source, the combustion was rapid and intense. Combustion, influenced by LOX, is noticeably more rapid and vigorous than “normal” combustion occurring in our atmosphere of 21% oxygen.

The UVU tests also considered static electricity. We found a static spark to be an unreliable source of ignition. The spark was certainly hot enough (+1,800° F), however, the

duration of the heat source, only milliseconds, may have been too brief to cause ignition. Arcing, caused by shorting out the positive and negative sides of a 12V battery, produced visible sparks and molten metal beads which immediately ignited any combustible fuel in LOX. Don't discount the arcing of a vehicle battery short circuit on the scene when controlling ignition sources.

Conclusions:

1. LOX soaked and frosted over asphalt will not react from the pressure associated with being stepped on, stomped on, driven over, or impacted by common response tools that are dropped on it, or the pressure from a direct sledgehammer strike.
2. LOX, spilled on asphalt, would be extremely difficult to ignite with common

ignition sources found on the emergency scene. Heat sources added to LOX/asphalt combinations only increased the rate of vaporization of the LOX.

3. LOX will not react on contact with common combustibles, organic materials, flammable materials, flammable liquids, and other common hydrocarbons *unless an ignition source is introduced* – in which case the combustion will be violent and instantaneous.

4. The NASA explosion from the plummet test in 1973 was successfully replicated at UVU however, circumstances leading to the detonation of the LOX and asphalt configuration are unlikely to be encountered, i.e., the aluminum plate inserted in a crumbled asphalt stratum.

Explosions could not be replicated using solid or crumbled asphalt and LOX alone, a much more likely configuration.

5. Practical testing of hazards associated with LOX should be expanded in the future.

Responders should take every precaution necessary when dealing with the primary hazards of LOX, namely embrittlement of surfaces in contact with the super-cooled liquid, high expansion ratios, and frost formations. Anytime LOX is mingled with combustible materials or flammable and combustible liquids, sources of ignition should be eliminated due to the possibility of extremely vigorous combustion. Any modifications to your agency's procedures

should be evaluated carefully based on these conclusions.

Website: https://www.uvu.edu/es/liquid_oxygen/index.html

References:

American Society of Testing and Materials. (2017). Standard Test Method for Determining Ignition Sensitivity of Materials to Mechanical Impact in Ambient Liquid Oxygen and Pressurized Liquid and Gaseous Oxygen Environments (G86-17). ASTM International.

Compressed Gas Association. (2018). Guideline for the safe storage, handling, and use of small portable liquid oxygen systems in health care facilities. 5th Ed. P-2.7-2018. CGA Inc.

Martel, B. (2000). Chemical risk analysis: A practical handbook. London: Penton Press.

Moyers, C., Bryan, C., & Lockhart, B. (1973, December). Test of LOX compatibility for asphalt and concrete runway materials. TM X-64086. National Aeronautics and Space Administration (NASA). Kennedy Space Center, FL.

National Fire Protection Association. (2021). NFPA 53: Recommended practice on materials, equipment, and systems used in oxygen-enriched atmospheres. NFPA. Quincy, MA.

Sammy Slime on the salty soapbox presents: Vitals illusion confusion Part 1!

By Armando S. Bevelacqua,
City of Orlando Fire Department, Retired District Chief of SOC

Let me set the stage. Most of you know me, as a hazmat guy, and specifically medical hazmat guy. Yes, it's true that most of my career has been in the hazmat and paramedical field. But there was a time where I was involved with technical rescue, dive rescue, and even a flight medic. However, basically 90% of my career has been in some form or shape of special operations. Yes, fire was fun, EMS was challenging, but special operations was an area that really spoke to me, and more specifically hazardous materials response.

The one thing that transcends all of emergency work is the fact of safety. Special operations will take a motivated educated individual but more importantly someone that is safety minded and trains them in specific skills. Hazardous materials response is part of this segment population of responders. They are always looking for the safety aspects of an emergency incident. I don't have a problem with safety on an emergency scene, God knows how many firefighters we lose and injury every year. Could some of these events be curtailed? Who knows, but there are a few things to get my crawl and the reason for this article this month (and maybe next month).

One of these issues that gets my craw…… standby let me get Sammy up on his salty soapbox…… Is the idea, or the desire is

probably a better word, for an easy button. A formula, if you will, to readily justify the physiology of an individual prior to entry into a hazardous materials incident. That is the nice way of saying that a formula to one's health is on a piece of paper which we will fill out at the scene of an event and will somehow justify the medical "I did it" box. I am speaking directly to pre-entry physicals! I have even heard that this philosophy or idea has even transcended into other special operational disciplines such as confined space and trench rescue. Well, let me set the record straight I believe in the concept of pre-entry physicals, I just don't think they are being applied properly. Why you ask, because from what I have seen and read about is that it is the responders that are not being educated properly. That's possibly one

explanation, or maybe there is such a heightened awareness of safety that we're forgetting that this is an emergency service and you may have to forgo a procedure to save a life. I'm not sure where it's coming from but I'd like to address this issue head on and investigate it on several levels.

Let's start out by using our time machine and go back to the historical documents we called NFPA 471. Ok so back in the old days (for you young guys and gals 1985–1989-time frame and lasted until 2008) there was a document that outlined the basic concepts and procedures of a hazmat response. It wasn't a bad document; looking back on 471 it was actually fairly good. The reason for this document was to give a framework of what a HazMat response should look like. At the time

very few books and classes out there to identify what is needed, how it is done and what to consider. It outlined hazmat definitions (wow this is a whole area of concern – Sammy will have to address this one in another article), and incident response planning, site safety, PPE, Mitigation, decon, and medical monitoring, this document was NFPA 471. It was retired in 2008 because the hazmat committee at the time felt that there was very little need to continue with general basic practice. A few years later the committee asked if 471 can be brought back, but instead NFPA 475 was developed to highlight the changed environment that had occurred in the special operations arena.

Back to 1985; as a part of the document, chapter 10 to be exact, looked at the medical

monitoring with the discussions centering around the medical issues at the hazmat event. We have to remember that the medical science of the day, or rather the best practice, was considered as a recommended practice to be employed easily and established in the field prior to entry. But let's restate that sentence again, it was the opinion of the medical community back then, the current medical guidelines that could be used as a bases of field

medical evaluations. During the 80's and into the 90's establishing range numbers for blood

pressure, pulse and respiratory status was different then the numbers that we use today, especially blood pressure. The guidelines that were used in the 1980s would give us pause today as the numbers have lowered. What was once good “normal” numbers have changed and would be considered out of range, or an unhealthy individual today.

The idea back then was to give guidance to the medical crew at the scene of the hazardous materials incident. Remember that the education in those day was extremely limited so to have knowledgeable responders towards hazmat was sparce. It was basically a quick medical looksee which could give an indication of whether that individual should go into the hazardous environment or not. Oh boy does this have holes worse than Swiss cheese! Let

me address each issue. But I am going to start this criticism with a project I was involved with a few years back.

Don Abbott the founder of Project Mayday and retired chief officer had been looking at fire maydays trying to see the common thread within these incidents. He spread his wings to encompass HazMat Maydays as well. He had many incidents that were well documented from incidents reports to radio transmissions, scene documentation as well as interviews of the crews on scene which he performed himself. The amount of information was not lacking it was daunting. Myself and another HazMat Medic looked at the plethora of information and identified a few issues with the pre-entry physical documentation. What we saw was that the medical responders were

either not educated, didn't care, or knew but couldn't do anything about it. Not sure which one it is, but what was observed and what was documented as vitals should have indicated to that medical responder that the person they evaluated should have never been allowed into the environment. And this was not just one incident there where many. Now for those of you that are looking at this statement and reading this article and are hard core pre-entry physical enthusiasts, and take this as, you see there; pre-entry physicals should be done; need to be done; have to be done!!! Hold your horses for a second Tiger (an extremely derogatory term I learned from my engineer many years ago). Let's review, nothing was done to intercede the problem, was the problem actually identified, understood or

ignored? These reports were very telling in that these pre-entry physicals are done as a bench mark of the event and not what they are intended for, and that is of health and safety of the responders. It would have been better if they never did anything, rather they documented case after case of individuals that should have not be allowed in a Level A suit!

They went through the process of taking vitals; of documenting the vitals, and even in some cases, responding to the safety officer, telling the safety officer that these entry team members were good to go. In several cases, I believe the responder, the paramedic or EMT whoever was performing the pre-entry physicals, didn't understand some of the numbers. In these cases, they were borderline heat stress, even before they went into their

Level A suit, and you guessed it what was the mayday… heat stress!! Some of you are sitting back and saying see you just made my argument for me, please continue! Hold on!!

They were involved in the process, acted but no follow through. Which is worse? I am not saying that pre-entry physicals should not be a part of your entry procedure all I am saying is that we need to be better at looking at this complex problem, understand it and manage it. We are not in my opinion managing it properly. Back when HazMat became a response, wgen we didn't know much about the levels of complexity taking a blood pressure, evaluating pulse and respirations along with mentation seemed rational. However, this is back when pulse oximetry was

in the operating rooms and capnography was years in the future.

Now we are better equipped and hopefully better educated. We have both the ability to look at SaO_2 and $EtCO_2$ along with weight would give us much better indication as baseline then the BP, P, R or even EKG. Remember we are not talking about an injured person, of an individual that has a disease process progressing. We are talking about men and women that have taken an annual (or biannual) physical and are considered medically fit. We have to because of our jobs pass the medical along with a respiratory lung evaluation in order to wear and use our respirators. Now that is OSHA. Let's see what OSHA has to say about this issue next month.

Because that drives our response and the pre-entry physical is in OSHA! Right?

Armando S. Bevelacqua *is 37 plus year veteran of the fire service. Retired from City of Orlando Fire Department, Orlando Florida where he served as Chief of Special Operations, Homeland Security and* Emergency Medical Services Transport.

Armando also teaches at local colleges, instructing Fire and EMS Classes. Armando lectures to fire departments throughout North America, Canada and Europe. He is an adjunct instructor through the Department of Defense as well as with several federal agencies involved with forced protection.

Chief Bevelacqua serves on several federal, state and local committees. He held membership to the Inter-Agency Board (IAB) for Training and Exercise development. Technical Consultant and member to the NFPA 470 (472, 1072, 473), and 475 Technical Committees along with representation on the ASTM standards development committee for emergency

response. Chief Bevelacqua has assisted in the development of standards and protocols such as with Rocky Mountain Poison Control for the development of standardized Medical Protocol for the WMD event and for the State Department for WMD training of embassy delegates.

His latest endeavor is to create educational videos and comics for the first response community. Educating new and seasoned responders to the ever-advancing technologies that are entering the first response arena.

What Makes A Good Instructor?

By Kevin Ryan

The quest for learning never ends. The sources available are endless. There is a never-ending stream of books (audible included), videos and podcasts from some of the best hazmatters in the business. A technician can learn at their pace and convenience as a result of technology.

One of my primary roles for the Baltimore City FD (BCFD) Hazmat is as an instructor. In an effort to expand my own learning, I began to look at instructors from other disciplines and interests in my life. Fitness and golf are activities where I used instructors for improvement. Each instructor I encountered had developed their own teaching style in order to reach their students. The best instructors all have common traits regardless of

their discipline. The traits common to these instructors are safety, experience and student success. The most important of these three are the instructor having a genuine interest in the improvement of the student. Let's look at each of these individually.

Safety in training can mean many things. Students in the fire and hazmat service must feel as though all safety precautions have been taken to prioritize learning. A student that is afraid of injury is definitely not focused on the objectives for learning. Live fire and chemical agent training are an absolute must for the success of students. NFPA and OSHA standards must be strictly adhered to when any live training is conducted.

What does safety look like for fitness instruction? Your first impression is that all forms of exercise are not life threatening, so how does safety matter? Safety in these

methods means injury prevention. A fitness instructor must teach proper form for maximum development without risking injuries. The best fitness instructors will always tell you form over failure. Less weight on the bar and emphasizing proper form not only protects the student but leads to the most gains. A really good fitness pro will use alternate methods when working with injuries.

Experience in an instructor is invaluable in the learning process. Instructors that have gone through the struggles of learning know all too well the frustration. The experienced instructor can be thought of as providing a foundation for better student comprehension. A student's skill level and ability to learn can be quickly assessed by the instructor.

A golf instructor that has many hours of teaching and learning will quickly diagnose swing flaws in as little as 5 to 10 swings.

Experienced golf pros will look at the ball flight to begin. They will then work backwards to determine the swing path and club face direction in a swing. A sliced golf shot will always have an out to in swing path and open club face at impact. Experienced golf instructors will then offer swing drills to teach the student to correct these flaws.

Fire\Hazmat instructors can work in the same manner to improve student performance. Flaws or errors that are recognized can be corrected relatively quickly. Once corrections are made, repeated practice can ingrain the skill to a level of mastery. The key for an experienced instructor is to not get caught up in instruction that does not move the needle. Staying focused on the outcome avoids common pitfalls that inexperienced instructors do not recognize.

I saved the most important trait to be discussed last. An instructor that is genuinely interested in student success is one that will be most effective. The student's learning must be placed above all other priorities. The experienced instructor will quickly connect with students to find out their why. Why is the student here? What does the student hope to learn? A few well directed questions by the instructor will allow them to understand motivations. Knowing how to motivate a student is one of the single most powerful pieces of knowledge an instructor can gain. A student that has chosen to be in your class is easier to reach than one that is told to be there. I see this every time I take mandatory EMT refresher with other suppression members. Members would much rather spend 4 days involved in other aspects of our job. BCFD EMS Academy instructors deserve a lot of

credit for their dedication despite knowing most of us would rather not be there.

The recent Florida Hazmat Symposium gave me an opportunity to be a presenter. My class covered a lot of the topics you see me write about in this magazine. I opened the class by introducing myself then asking the audience various questions. Questions like where are you from? What is your rank? Questions like this help me figure out where the conversation goes. My slide presentation is nothing more than information to provoke conversation. A successful presentation is where the audience is engaged in the discussion. The single most powerful tool an instructor has is to learn from the audience. A teacher that can become a student in their own class will be far more effective at delivering the message. Ultimately, a good instructor encourages the student to take ownership of their learning. You want the

student to process the information, make it their own and apply it to their decision-making process.

I will close with this quote from Bruce Lee to sum up information from a good instructor. “Absorb what is useful, discard what is not, add what is uniquely your own”.

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.

Illicit Labs, Air Monitoring & More!

By Todd Burton

San Diego County Hazmat

When I started on the Hazmat team in San Diego in 1999, Meth Labs were still going strong down in the Southwest. We used to see a lot of Red Phosphorous (Red-P) methods down here; it's funny how drug manufacturing methods are regional. It seems like one cook learns from the next and that method dominates the area. Meth was popular along with Cocaine and Ecstasy in the early 2000's. They used to use good old R-12 refrigerant as a solvent for meth. I remember opening a small (10 gal) orange drum in the backcountry mountains on a hot day. My training officer at the time was all caught up in bashing everything on the scene, upon opening the drum I got a nice burst of pressure and spray of

R-12. Nice. Well, I'm still here to write about it but hopefully you have a better training officer than I did.

The thing with drug manufacturing is that it is always changing and it's hard to keep up with current methods. It's always a good idea to work closely with your DEA contacts or specialized teams to gain that much needed knowledge that transforms into safety protocols and correct mitigation measures. I think one of my attractions to drug lab manufacturing calls is the challenge.

There are so many types of drugs, explosives, biological agents and more that can be made in a clandestine lab. I remember a call back in 2007 at an apartment complex. Both dumpsters were filled with chemicals and glassware. As we started to segregate chemicals by hazard class, we started to

scratch our heads as we were finding some chemicals that could be used to make explosives. It took some dumpster diving and research to figure out what they were making, Ecstasy. That was one of those moments where you go, *"Crap, I need to figure out how can we do this better and faster?"* I decided to work with the DEA and Bomb Squad to identify all precursors for various narcotics and explosives, put them in a chart (Figure 1)

CLAN LAB IDENTIFICATION

HAZMAT – BOMB SQUAD – FIRE – LAW ENFORCEMENT – EMS

START HERE -Identify precursor chemicals listed below -Match to possible drug or HME lab-Blue rows are dual use chemicals for drugs & HME -Most "X" in one column most likely lab	METH																					HOMEMADE EXPLOSIVES											
	RED P METH	NAZI METH	THIONYL CHLORIDE METH	P-2-P METH	PHENYLACETIC ACID METH	ONE POT METH	BENZALDERHYDE METH	METHCATHIONE METH	ICE METH	ECSTASY 2012	ECSTASY	MDA	THC EXTRACTION / HHC	THC A	PCP	LSD	GHB	COCAINE CONVERSION	FENTANYL	DMT	MUSHROOMS	STEROIDS	MERCURY FULMINATE	AMMONIUM NITRATE	ACID BOMBS	BLACK POWDER MIX	CHLORATE MIXTURES	EGDN MIX	ETN	HMTD	HYDROGEN PEROXIDE	MEKP	TATP	UREA NITRATE
Acetic Acid											X			X						X													
Acetic Anhydride				X	X																												
Acetone	X								X	X		X	X																			X	
Aluminum Powder																							X		X								
Aluminum Foil				X						X															X		X						
Ammonium Formate				X							X	X																					
Ammonium Hydroxide																		X		X													
Ammonium Nitrate						X																	X										X
Aniline																			X														
Anhydrous Ammonia		X																															
Aryl Sulfonic Acid																																	

that could be used on scene.

When you start to think about how to ID a lab, a lot of it has to do with KEY precursors and equipment/processes. Those KEY

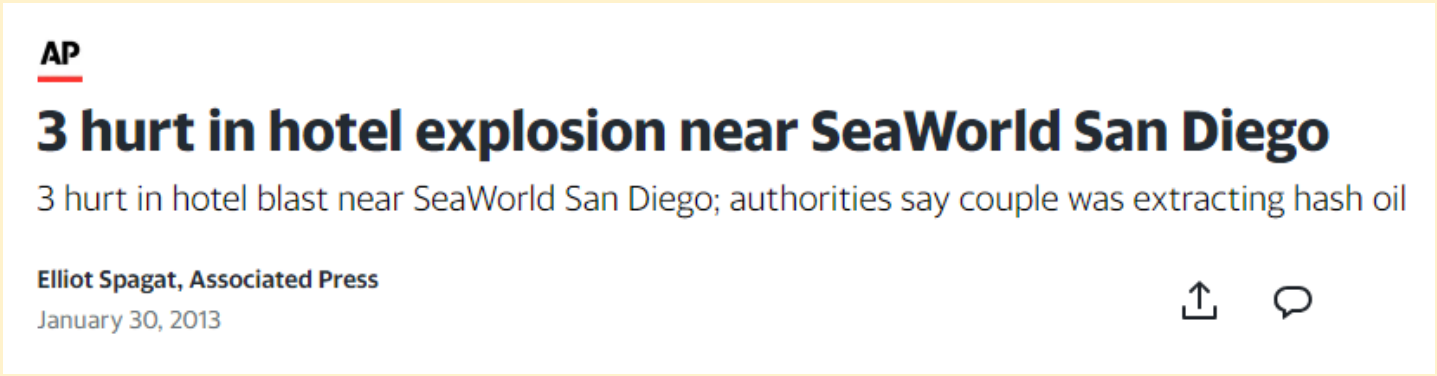
precursors can lead you to the right lab quickly, but don’t jump to conclusions until you have waded through all the crap, sometimes literally. Thankfully, there are some advanced instruments and databases like Chemical Companion

https://www.chemicalcompanion.org/

(From Dr. Baxter and Crew) that can do that for you quickly. As you can see from the CLAN LAB ID chart meth, Ecstasy, MDA, THC A, PCP, LSD, GHB, Cocaine, Fentanyl, DMT, Mushrooms, Steroids, and all the explosives can be a boat load of stuff to figure out. We have used this chart on POLY LABS (Making drugs & explosives) and have filled out 60% of the chart, insane. But let's take a left and go down THC lane.

THC Extraction

I have never been to a METH LAB EXPLOSION like you see in the movies. 95% of labs are in static mode when you get there, but this changed with THC extraction/concentration. My first LAB EXPLOSION was in 2013. An extended stay hotel (Figure 2) https://abc7.com/hash-oil-weed-pot-marijuana/60344/had an explosion



AP

3 hurt in hotel explosion near SeaWorld San Diego

3 hurt in hotel blast near SeaWorld San Diego; authorities say couple was extracting hash oil

Elliot Spagat, Associated Press

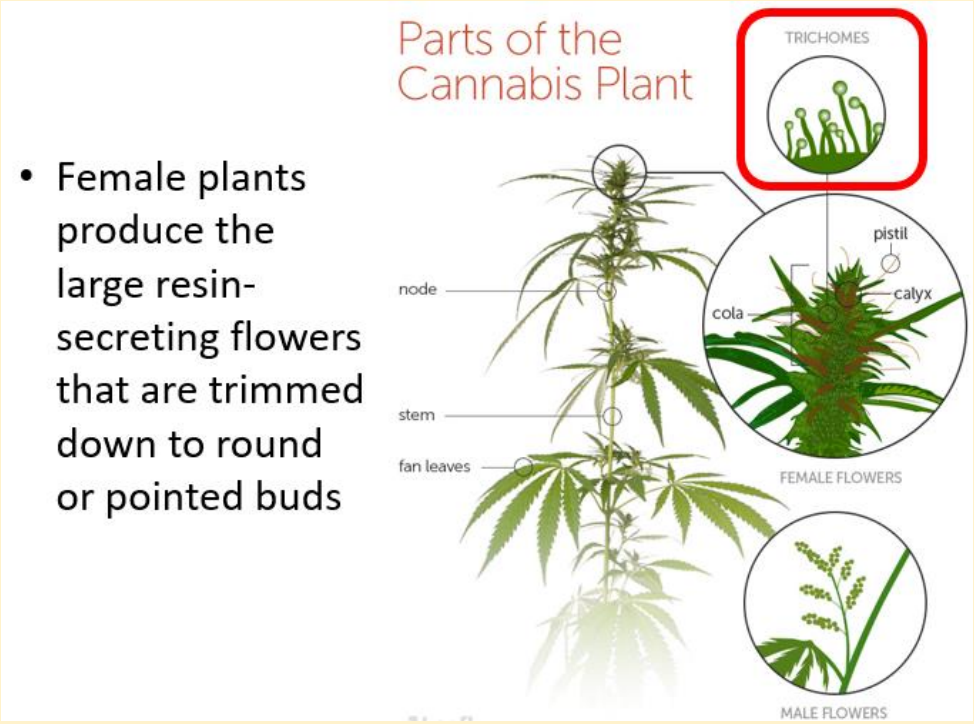
January 30, 2013

in one of the units that blew apart the adjacent units. En route, I was thinking to myself, this does not add up. By this time, I had done a lot of labs and the closest thing to a lab explosion was a Nazi Lab method (Ammonia) in a pressure cooker that blew up.

Back to the THC explosion. As we walked up to the extended stay hotel, all the windows were blown out, glass everywhere, blood all over the walkway with hair and other human pieces. The resident ran down the hallway to another room and got in the shower. As we entered the room to monitor there were a lot of small cans. He was OPEN BLASTING butane in a very small space. Lit a cigarette and K'BOOM. The fire ball consumed most of the Butane and the residual must have evaporated as we didn't get much on the 4-gas, calibrated to Hexane, monitoring around my shins (remember this) but we found a lot of Honey Oil. That was the start of a journey in THC extraction for me.

Let's take a look at the Marijuana plant. You have male and female plants (Figure 3).

You want the female plants that produce the large resin-secreting flowers that are trimmed down to round or pointed buds. That shiny, sticky icky are made up of TRICOMES (Figure 4). The resin material where the Delta 9 resides. Ever heard of the term, like dissolves like? Non-polar substances like resin need a non-polar solvent to pull the resins off the flowers (more on alcohol extraction later).



This works best with non-polar solvents like Butane, Propane and Isobutane. That's typically what you find in one of those cans (Figure 5) they used for blasting.

There are many methods to extract the Trichomes. You can fly under the radar with Ice Water Extraction, Dry Ice, Liquid Nitrogen and Resin Press. Lots more out there but let's stick to the hazardous stuff. I think most of you know about OPEN BLASTING. This is the most hazardous way to extract the Trichomes. You basically pack a tube with shake (trimmings from the plant as it has Trichomes all over the plant), push your pressurized solvent through a small opening on one side

and it expels from the other through multiple holes or a coffee filter into a Pyrex dish. ***NOTE:*** Some of these extractors or small tubes have been mis-identified as pipe bombs. The advice to give the bomb squad is to look for ONE hole on one end and multiple holes or open end at the other side. Once the butane has hijacked the Trichomes, is pulling them through the column and they land in the dish, the butane (Mix) must evaporate leaving the Trichomes behind. Thus, the gas is liberated in the immediate area. Any open flame or static discharge equals peeled skin. We did some studies on how we could ignite the flammable gases and were surprised on the results being only open flames and static discharge (Disclaimer, you may get ignition with other sources, but we did not).

You can see many of the YouTube videos here on my YouTube channel, Hazmatter7 Butane Hash Oil Ignition Sources . Once the Butane evaporates, they have a semi-usable product depending on their quality control. They may choose to do a vacuum purge and reduce atmospheric pressure to allow the Butane to escape resin matrix reducing harm to the user.

That's basically it for open blasting but I would be remiss if I did not tell you the most important lesson, I learned during our THC study: monitoring for flammable gases. I thought I was good at what I was doing, 13 years or so on the team. We expelled 4 cans in a 10x10x12' space. Let it rest for 2 minutes. We had 4-gas monitors at 12, 24 & 36" in that room. We ignited the gas with a taser on the

floor (Figure 6). That flame exploded out of the room with such force it shook the entire building! Thankfully we didn't cause any damage, except for many of our observers needing to check their pants!

Remember I said above I monitored at my knee, or so, in these labs. I didn't have a good mental picture of where this gas goes. The properties state 2.5 times heavier that air, ok somewhere below my knee. The 4-gas monitor at 12" was at 3% Lower Explosive Limit (LEL) when that explosion occurred. Got your attention?

I should have all your attention if you are still reading this. You must monitor within 1" of the ground!!! It pancakes! You may get lucky (Well not really) and kick it up into your monitor intake. This was an eye opener for me as this stuff spreads out and lays so low. We advise you to evacuate as soon as you are getting low LEL readings. We can talk about other methods and exploding refrigerators, winterization, closed loop systems and bit more later. For now, keep the 4-gas very low. The manufactures have moved to closed loop systems that keeps their skin on. The distillation processes of other Cannabinoids, Terpenes and Flavonoids is really mind blowing!

Thanks for letting me chat with ya.
Cheers!
Todd Burton

Hazardous Identification Testing System (HITS)™

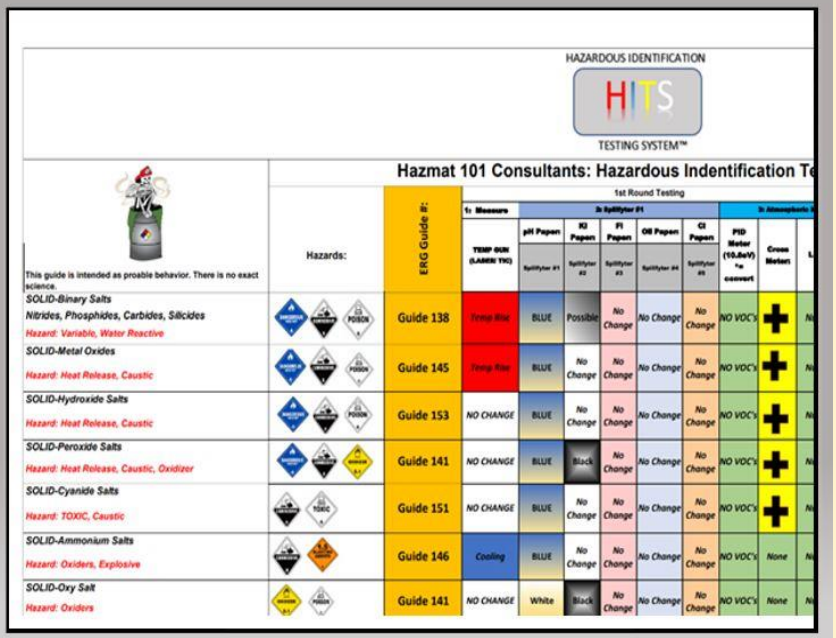
Meets: NFPA 470 - OSHA 1910.120

The basics of research is one of the most important but confusing subjects on a hazardous materials incident. Using the Hazardous Identification System (HITS) the technician will be able to identify chemical properties of a substance or compound by simple field testing. Conducting basic testing such field papers, flammability, and solubility the technician then may move into advance testing with detection equipment to classify a chemical into a chemistry group. Although the technician may not be able to know the exact name following the HITS system, they should be able to recognize the general group in under 15 minutes. The chart provided is a collective wealth of information that before was scattered among accepted reference sources. The HITS system brings this information together in for easier access. This course addresses competencies in NFPA 470 and designed for experienced technicians familiar with most terms and equipment used in hazardous materials response. The format will be instructor lead, in-class with practical demonstrations.

Target Audience: Fire Service (Hazardous Materials Technician or higher

Student Maximum: **twenty-five per session**

Contact: Bob@hazmat101consultants.com



Social Media Shout Out

At Hazmat HQ, we value interaction and engagement from our community. Like, Follow, and Subscribe to our social media for more content and a opportunities to contribute.

Last month, we asked our followers to provide the Molecular Weight of Dichloromehtane. The first to provide the answer was Raymart De Guzman.

Tell us a little about yourself and your department.

Senior Fire Officer 1, Raymart De Guzman, from the Special Force Bureau of Fire Protection Philippines. Designated as the Non-Commission Officer In-Charge of Training and Doctrine Development.The Bureau of Fire Protection is the Philippine National Government Fire Agency (Bureau). The Special Rescue Force of the BFP is the elite technical rescue unit and the national support service of the BFP.

I enjoy your monthly magazine releases! The reference material is very useful and informative.

We're glad you are enjoying the magazine. Our goal is to make information available so we can all share knowledge that will make each of us stronger.

You can count on us that we will advocate for sharing this throughout the Philippines.

CONFERENCE DATES

Massachusetts HazMat MAHMT
Mar 26th – 28th 2024

Ontario HazMat Conference
April 8th – 10th 2024

Michigan HazMat Responders Conference
Apr 15th – 17th 2024

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

Oklahoma HazMat Conference
May 15th – 17 2024

IAFC Baltimore HazMat Conference
Jun 5th – 9th 2024