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CHATROOM

If your meters CGI sensor reads 100% of the LEL, are you in 100% flammable environment?

No. You are at the Lower Explosive Limit (LEL) or beginning of the flammable range of the gas that it was calibrated to.

So everything is sees it thinks it's that gas?

Yes. If you know the chemical, you're dealing with, you would have to use a conversion factor (CF). You then multiply that number by what you are getting and that is your TRUE LEL reading. For instance, for a RAE systems meter, if you had a reading of 9% LEL and you know the chemical was Turpentine, you would have to multiply it by that chemicals CF which is 2.9. You could round up to 3. Thus $9 \times 3 = 27\%$ LEL. **Note:** your LEL sensor didn't alarm at 10 % like it is set to because it's calibrated to Methane. This is why you can't just wait for the meter to beep before you react.

Achieving Excellence in Hazardous Materials

By The Haz Mat Guys Productions, Inc.

A Complete Mastery Guide

Diving into the hazmat world is like a mix of tricky obstacles and big wins. It might look daunting if you're interested in getting the hang of this tricky area. But don't sweat it, all you hazmatters! Keep pushing hard, soak up all the knowledge you can over your journey, and be excited about sharing what you learn. This playbook will get you on track to greatness.

It all starts with the foundation: Cultivating Experience and Acquiring Knowledge.

Your adventure begins with gaining practical experience. Get into the Hazmat sector by engaging with entities such as fire departments, specialized hazmat squads, environmental consultancies, logistics firms, or chemical production facilities. Some

of these venues frequently face high staff turnover, opening doors for individuals eager



One of the authors yelling at students. Never a good thing to do, so we're told.

to make their mark. Select organizations known for their robust training offerings, prestigious accreditations (consider OSHA

HAZWOPER, DOT hazmat transport, NFPA certifications), and distinguished performance histories. Avoid establishments with questionable legitimacy or those whose qualifications may not be recognized universally. You want to be proud of the patch you wear. Don't settle. This initial foray into the business is an important one.

After establishing your professional foothold, aim for roles that immerse you

directly in hazmat operations, crisis management, or educational initiatives. This ensures you gain hands-on experience and the necessary skills to excel in this discipline. Remember, possessing knowledge is crucial, but practical application solidifies your expertise.

Enhancing Your Skill Set: Continuous Learning

Education is the cornerstone of your expertise development. Engage deeply with courses covering OSHA HAZWOPER, DOT hazmat transport, and NFPA Hazmat Awareness/Ops/Technician levels. Explore areas that spark your interest, whether the nuances of biological hazards, the mysteries of radioactive substances, or the intricacies of chemical agents. Pursue self-learning through online resources, webinars, specialized literature, and sector-specific publications.

Hell, check out the podcast. It's not hard to find; it's the only one out there. Forge connections with peers, actively engage in industry events, and keep up with relevant news to stay informed about the dynamic hazmat field. You can attend conferences to network with people and organizations nationwide. At the same time, there are classes on topics that interest you. Not only will you learn about the content, but you can learn the dos and don'ts of being a good instructor.

Additionally, try to attend advanced schools



Engaging with the class to drive home the points

throughout the nation.

Dugway (if still

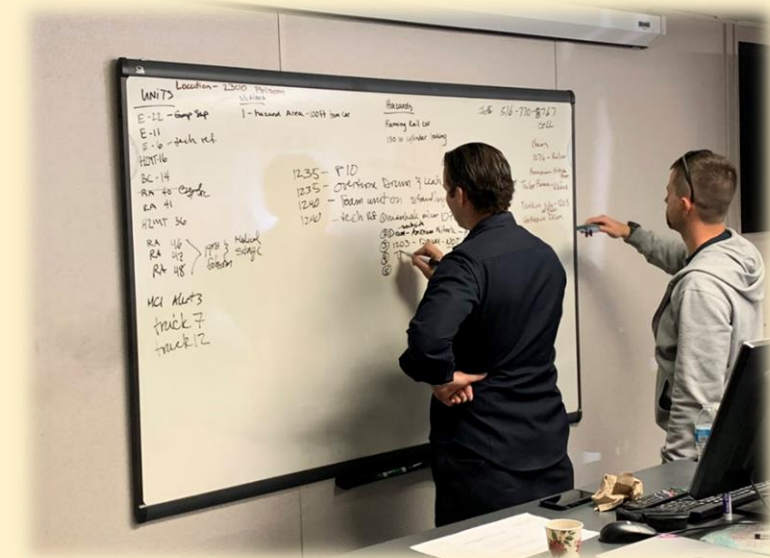
available to

responders),

CTOS, CDP, CERTC, etc. They are usually covered by grant money and cost your department nothing. Check out the National Fire Academy. They have many superb classes. Education is an ongoing journey rather than a final goal in this profession.

Fostering passion to make a Difference.

While technical knowledge is foundational, ascending to a leading position in the hazmat realm also requires nurturing a passion and striving for impactful contributions. Consider



Group discussion brings conflict, navigating that is a form of mastery.

what profoundly motivates you, whether it's the detailed decontamination process, conducting thorough risk evaluations, or

spearheading educational courses. Look for avenues to apply your insights, whether through research that pushes the field forward, public speaking to raise awareness, or writing to educate others. Share your knowledge, participate in meaningful discussions, and actively contribute to the hazmat community. True expertise transcends knowledge—it involves significantly impacting your surroundings. It took us a while to understand this. We thought that knowing meant being good. It's more than that.

Elevating Through Teaching and Leadership: Shaping Future Experts

Progressing to the upper echelons often involves engaging in teaching and leadership roles. After solidifying your knowledge and experience, head towards educating others. Start with introductory courses or hands-on

stations, enhancing your confidence and establishing your standing while mentoring the next wave of hazmat pros. And to further this point, when you are up in front doing your thing, actively seek criticism for your delivery. Take that information in and adjust.

Adhere to the 30/30/30 rule: allocate 30% of your time to guiding others, 30% to learning from colleagues, and 30% to seeking advice from mentors to fuel your growth. As your experience broadens, refine your techniques through workshops on adult education principles and instructional design. Remember this critical point: If you can teach a concept or topic to someone who has never heard it before and then answer the questions that pour out of their mouth on the fly with no preparation, you are showing your mastery of the subject. A Hazmat Tech that is "passable" is someone who knows what they know. But a

mastery of Hazmat Tech can convince others of their thought and give counterarguments for yours. To argue successfully, I need to understand my points AND yours better than you do. The

more you practice this technique, the more rounded your explanations and

understanding will be.

Expand your influence by offering online courses or creating educational materials, reaching audiences beyond traditional classroom settings.



Steering Program Development and Leaving a Legacy

Ultimately, I aim for a program leadership role. This vantage point enables you to shape hazmat preparedness's strategic direction, tackle staffing challenges, advise educators, and manage comprehensive training agendas to guarantee efficiency and high standards. This pinnacle of your career merges your experiences, insights, and passion, allowing you to establish a legacy that empowers future generations to manage hazardous materials with competence and care, thus ensuring public safety and environmental preservation.

Remember, achieving distinction in the hazmat field is a rigorous endeavor, not a casual journey. It requires unyielding dedication to lifelong learning and a heartfelt commitment to enhancing the sector. Embrace the hurdles, celebrate your milestones, and

above all, share your zeal with the community. Your expertise, leadership, and dedication are invaluable to the hazmat field.

The HazMat Guys

Bobby Salvesen's firefighting journey began in 1994 when he joined the East Meadow Volunteer Fire Department. In 2000, he was hired by the FDNY. He spent a short time in Ladder 159 before moving over to Squad 288 after 9/11, where he remained for the next 13 years. During this time, he became certified in high-angle rope rescue, collapse, confined space, rigging, extrication, diving, shoring, and firefighter removal. After his tenure in the rescue branch of the FDNY, he transferred to the Hazardous Materials Command, and in 2015, he attained his Hazardous Materials Specialist certification.

Currently, Bobby is a member of the NY-TFI FEMA resource as a specialist. He's been a Deputy Chief instructor for the Nassau County Fire Service Academy for the last nine years and has taught everything from Hazardous Materials to Confined Spaces. His volunteer career is ongoing, and he's gone through the company-level ranks three times. Most recently, he went through the ranks as Chief of Department of a department with roughly 300 members.

Mike Monaco is a loving father of three with a gift for teaching dry topics and making them interactive and entertaining. He joined the fire service in 1997 as a volunteer firefighter for Mt. Sinai Fire Department. Eventually, he became a career firefighter with the FDNY, as well as an A.L.S. (Advanced Life Support) provider in 2002. For two years he served in Engine 233 until joining Hazmat Company 1 in 2004 where he became a Hazardous Materials Technician. In 2008, he started teaching, and in 2012, he became a local instructor with the International Association of Firefighters (IAF).

In 2013, Mike became a Master Instructor with the IAF. He currently teaches multiple courses in various jurisdictions. He also does private classes and industry-based hazmat. He holds a degree from SUNY Stonybrook University in Neurological Physiology (the study of the nervous system).



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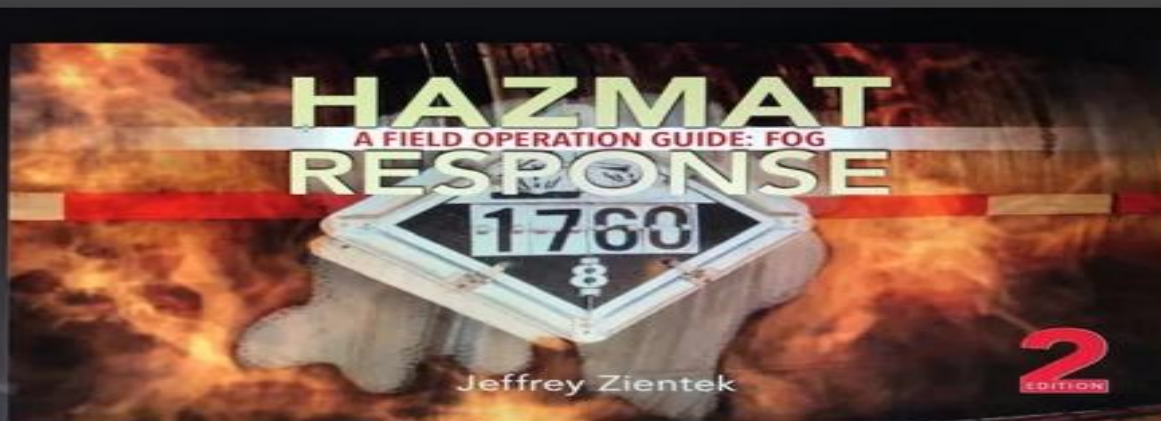
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This guide serves as a quick reference for First Responders, Emergency Response Technicians, Hazardous Materials Technicians, or any members that respond and deals with hazardous materials incidents. The guide includes many chapters such as Team organizations, helpful hints for common incidents, placards/GHS, rail and motor carrier identification, chemical reference, CBRNE, and much more. This guide is a must for emergency response personnel.

Sammy Slime on the salty soapbox presents: Vitals illusion confusion Part 2!

By Armando S. Bevelacqua,

*City of Orlando Fire Department, Retired District
Chief of SOC*

Welcome back. Last month we went back into the past and looked at some historical documents i.e. *NFPA 471 and Don Abbotts HazMat Mayday project*. This month, let's look at this from the OSHA lens and explore this from a more systematic approach.

So, if a responder is going to wear SCBA, PAPR's as part of their job duties that they must meet the respiratory standard (1910.134). Which has several components thereof. But basically, the worker will have to pass a physical, and fit test (I am not going to get into the details of this standard). So, for our discussion, the responder has had an

annual or biannual physical (we will get there on this issue) to establish that he/she can perform the tasks required from a medical perspective, i.e., he/she can wear a respirator. Or stated differently are “fit for duty”!

Oh, you say that OSHA requires a pre-entry physical. First let’s go back to the 1980’s when NFPA 471 was developed, and the bases of medical documentation used a best practice AT THE TIME. We are going back to the day when



there were NFPA documents to guide us, but the OSHA document that is quoted as CFR1910.120 had

not been developed yet, it was still being written. And actually, some of the concepts from the original 471 was infused into what we now know as 1910.120. However, the

developer of the OSHA document, used language that was a little less restrictive and more general. So, while we are here let's dive into the OSHA document a bit, because what usually happens when this issue is brought up is the response of "well it's in OSHA". Which then stops the argument because truthfully how many of you have read 1910.120 in its entirety. Come on I am waiting!.....How many have actually read 1910.120? To be honest, it was several years of my career that I actually sat down and read the document. And it wasn't until I co-authored the first Hazmat Medic book that I actually read the OSHA and the NFPA documents several times in their entirety so that I could speak about it within the Hazmat medic document.

In OSHA 1910.120 we see that medical examinations and consultations are given and a general guideline for these physicals are

annual or biannual physicals unless the physician in charge believes that a longer interval is appropriate {1910.120 (f)(3)}. In the following paragraph {1910.120 (f)(3)(I)(D)} we see identification of medicals when a potential exposure has occurred. In other words, when signs and symptoms are presented. But no where do we see a pre-entry criteria. However, what we do see is reference towards a medical surveillance program which should be instituted by the employer. The annual or biannual physical would be part of that medical surveillance program, as well as the entry and post entry physicals. It's the medical surveillance program that outlines what we do, not OSHA.

In chapter 10 of NFPA 471 we see pre-entry medical monitoring with chapter 10.3 establishing exclusion criteria which was in all editions through and including the 2002

edition. It was soon after this edition of 471 that it was abolished. Although this was the mainstream thought process in the 80's through the 90's, by the time of 2000 we see accepted practice for strenuous activity changing. What was accepted practice in previous years turned out to be different as time moved forward, we learned. Medical science was changing, and so were the concepts of best practice and recommended procedures. Rather functional assessments started to take hold. Meaning that annual physicals, before shift evaluations, proper hydration during the workday and exposure analysis became the focus. In other words, it is up to the authority having jurisdiction medical professionals to establish what and how this should be done, the medical surveillance program. I will say this, that baseline medicals should be done and are prudent to be done,

but they are baselines and should be captured for just that a baseline. Take blood pressure as one example, moves up and down during the course of a day. There are patterns. For blood pressure a few hours before we wake, our pressures are high and increase peaking around lunch time. During the afternoon and evening the blood pressure starts to decrease (for you responders that are fighting BP problems make that doctors appointment in the afternoon!).

So, let's revisit the main question of how we give medical crews guidance towards the health and safety of the hazmat team, the entry team specifically. What is the ability of an individual to go into a hot zone? Listen we have to realize a simple fact that when we place a responder into a fully encapsulating suit that we are basically placing that person in a hazardous environment to walk in an even

higher level of concern. Yes, the interior of that suit is a hazard and should be considered a hazard! It is a hazard from a heat stress perspective. So yes, I am placing you in a layer of protection that can cause harm in order to place you in an environment that will cause even more harm! Then I ask you to do strenuous activity within the suit within the environment, an added layer of stress.

The real question becomes can I truly evaluate you before I place you in that environment? Do I evaluate you before you enter the fire building, how about that complex pin job in the middle of the summer (or winter for that matter)? But I do want to medically evaluate you before a hazmat call?! I am not saying here that evaluating our personnel before the entry is a bad idea, I just think we need to re-evaluate the process, and

by doing so we can evaluate the potential outcomes.

I have presented this issue as to poke fun at a complex yet needed evaluation of a procedure that is blindly done without thought. It is currently done as an objective to meet and a box to check off in the beginning stages of a hazmat event. Am I a proponent of pre-entry physicals, yes but depending on the circumstances. Let

me get in to the weeds a bit more. To give a complete picture of a medical evaluation



Blood Pressure, Pulse (Heart Rate and EKG), and respirations (SaO_2) are the factors we can look at in the field. We also have capnography which along with SaO_2 can establish how well (or not so well) we are metabolizing. But this

only gives us the moment in time from which we have to make a decision. Can this person go or not? We could take these “vital signs” in the morning at the beginning of shift or before shift just to get a baseline. But are we truly doing this to make us feel comfortable? Is it necessary? We have stated earlier that during evaluations of some documented maydays that vitals were such that the individual that got hurt was evaluated as having a problem before they went into the hazard area. Would vitals check in the morning at the beginning of shift pick up on that? Would the medic in charge pick up on that?

Having a list of objectives from a medical perspective is a good thing but should not have exclusionary clauses for them. Determination of allowing an entry team member to make entry into the hot zone **MUST** be done by an educated medic. The entry criteria must be

flexible based on each entry member, the incident, and the activity. It should serve as guidance to the team not a hindrance. Lastly are pre-entry physicals required by OSHA..... if you find it in 1910.120 let me know because I have not seen it!

If you hoped to have a black and white answer here let me start with this. Something I brought up last month; Complex problems are truly managed by understanding the basic concepts – be a critical thinker. With that said here is my formula for pre-entry physicals:

1. Take the entry physicals in the morning at the beginning of shift. Yea the numbers may be jacked up because it is the morning (Remember what I said earlier about BP), but we are just getting a baseline. These are just to evaluate in comparison to post entry physicals.

2. Look at your incident if this is going to be a protracted event, then yes pre-entry at the time of event is warranted. If this is a bread-and-butter case skip it, remember we all have an annual physical and have to meet the respiratory standard we should be fit for duty.
3. No matter what there is NO exclusion criteria, this is managed on a case-by-case basis depending on what the educated and experienced medic evaluates. You don't have a hazmat medic ok, then train one or two they are your medical team. Wouldn't you want them to understand the complete picture in the event you the responder has a problem?
4. Use the EMS tools effectively, just don't take numbers to write them down to wash your hands of that task. This is a thinking man's game, and if you are going to

evaluate your team, the medic in charge should be trained to the highest level as well. Invest in your people.

Remember complex problems are truly managed by understanding the basic concepts.

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.



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SCAN ME

Let's Be Real

By Kevin Ryan

The Florida Hazmat Symposium took place in Daytona Beach, FL in January of this year. The conference was first class with educational, social and competitive components during the four days it was held. I was fortunate to be a presenter for a two-hour class on Thursday of the conference. My presentation covers leadership, training but most importantly it's all about the members you work and train with. The class is constantly evolving after each iteration I present. The biggest reason for this is because I learn from the hazmatters in attendance. One of my goals for the training is to allow me to become the student and expand my own learning. The best way to accomplish this is to start open conversations. The value of

learning goes up when multiple ideas are shared amongst us.

In the two years of attending the Florida Hazmat Symposium, my learning and understanding of the greater world of hazmat has greatly increased. One of the most common themes in my presentation has to do with quality training. As I presented my program this year, it hit me all the sudden when I kept repeating the concept of quality training. Why is this not a discussion all its own? There is no replacement for quality training of any kind given the nature of the work we do. We have all heard the phrase “you can never train enough for a job that can kill you” or something similar that emphasizes training. Take a deeper look at the training you

do. Is it realistic? Does this meet the needs of our team?

Training for hazmat responders needs relevance. To define quality training, let's separate it into two categories. The categories would be ***foundational*** and ***continual*** training. Foundational type training is your basic hazmat tech program that certifies you to operate according to OSHA, NFPA. Basic hazmat training is the beginning of your journey in the world of hazmat response. Continual or re-certification training allow you to advance the skills you learned during foundational training. Members can even reach a specialist level depending on the needs of your team. In the Baltimore City FD (BCFD), hazmat continuing education training consists of weekly team training and opportunities to attend

conferences or advanced training such as SERTC or CDP-Anniston. The definition of quality training for me would be relevant, timely and focused.

Now in keeping with the title of this article, let's get real. The reality of training is that sometimes it is hard to make it realistic. How often do we get to do live chemical agent training? How much of your fire academy time



did you spend in live fire scenarios? Decision making for officers present all new challenges. How can you introduce the stress of the situation? What

tools can you use to try and mimic the stress? The first tool that comes to mind is

competition. Creating a scenario that puts technicians head-to-head can introduce stress. Most of our members do not like to lose so competition creates internalized stress. One of my favorite PPE training scenarios is to have members square off in a game of Jenga. Technicians dress out in Level A or B to let the games begin!!! The players forget that they are building on their skill of operating in suits because they are focused on winning the game. We even added a twist to this and created a MAYDAY scenario during the game play. A RIT team on standby then had to remove the downed technician, move to decontaminate, and practice suit cut outs.



Peer pressure can be an effective tool to practice decision making skills. In his book “The Art of Clear Thinking”, Air Force F-35 pilot Hasard Lee describes the stand-up procedure used at the Air Force Academy during pilot training. The student stands in the center of the room with classmates lining up around the lone student. The instructor then gives the student a scenario and decisions to make. Initial scenarios given are typically easier and less complex. As training progresses, students are then given more difficult and complex training. Stand ups go a long way in determining whether the student gets to fly a cargo plane or a fighter jet for their career. The pressure to perform in these scenarios is extreme. Imagine yourself in this type of training with other highly competitive

hazmatters. Peer pressure can truly make or break you. The participants learn to think critically and not just in a reactive fashion. The Air Force has an expression for when things start to spiral out of control. The expression “wind the clock” is taught to students. Aircraft that students would fly would always have an old analog clock that needed to be wound to tell the correct time. Anytime an emergency occurs, students were told to reach down and “wind the clock”. The simple act of doing this would prevent them from being reactive. The pilot would then be able to think in a more concise manner instead of a knee jerk reaction that probably makes the situation worse. The book relays another expression that is so true. “There is no situation that you encounter that you can’t make worse”. Basically, this means

your problem is not as bad as you think it is. Take a breath and work the problem at hand.

There is no substitute for realistic training to prepare us for game day. The tools I have described are just a few options you have to make your training more effective. Creativity is needed to find ways to introduce reality. Wind the clock and Let's Be Real!!!

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.

YOUR AD HERE!

CONTACT US FOR MORE

INFORMATION

Grounding and Bonding – The why, when, and how we do it.

By Glen Rudner

Why do we, as emergency responders, need to be concerned with grounding and bonding? Static electricity is everywhere, and it is present at the scene of a Hazardous Materials spills. The most common, and the major types of chemical spills we respond to as emergency responder incidents involve flammable and/or combustible liquids to mitigate these types of emergencies, effectively and safely, involving hazardous materials products, we need to understand and know how to properly perform grounding and bonding. Knowing the proper procedure for grounding and bonding is also of utmost importance for monitoring a cleanup

contractor or trucking company who may be performing emergency transfer operations, to ensure that operations are carried out in a safe and appropriate manner.

Grounding and bonding applications are necessary to effectively control the generation and conduction of static electricity. Static electricity occurs as an electric charge on the surface of an insulator (glass, rubber, plastic, etc.) or insulated conductive body (insulated metal). It is generated (meaning made free to act) through the expenditure of mechanical work: such as occurs when liquids are pumped through pipes or hoses, agitated, or fall freely through the air. The generation of static electricity cannot be prevented absolutely because it is present everywhere.

For static to be a source of ignition, four conditions must fulfill:

- 1) There must first be an effective means of static generation,
- 2) There must be a means of accumulating the separate charges and maintaining a suitable difference of electrical potential,
- 3) There must be a spark discharge of adequate energy, and
- 4) The spark must occur in an ignitable mixture.

Proper grounding and bonding applications must be accomplished before product removal and transfer operations begin. This is necessary

for any container, which contains flammable or combustible products including: flammable/combustible liquids, gases, solids, and dusts. This would also be necessary for products, which are not normally flammable but may give off flammable gases when contaminated or react, such as sulfuric acid. Sulfuric acid will give off hydrogen gas when heated or contaminated. Proper grounding and bonding, along with other proper control measures, will greatly minimize the hazards of a flash fire or explosion during any incident mitigation operations.

Definitions

Bonding: the process of connecting various pieces of conductive equipment together to

keep them at the same electrical potential. Two pieces of equipment at the same potential eliminates or minimizes the chance of static sparking.

Grounding: is a special form of bonding in which conductive equipment is connected to the ground through an earthing electrode. This is done to minimize potential differences between objects and the ground.

Resistance: the difficulty an electrical current encounter in passing through an electrical circuit or conductor. This resistance is measured with an ohm meter. In hydraulics, the resistance to water passing through a pipe or hoseline is called friction loss and is measured in pounds lost in pressure over the length of the pipe or hoseline. In electricity, resistance can be measured in terms of voltage

drop over a part of the circuit but usually is measured in terms of ohms.

Ground Resistance Tester: measures the earth's resistance to a ground rod.

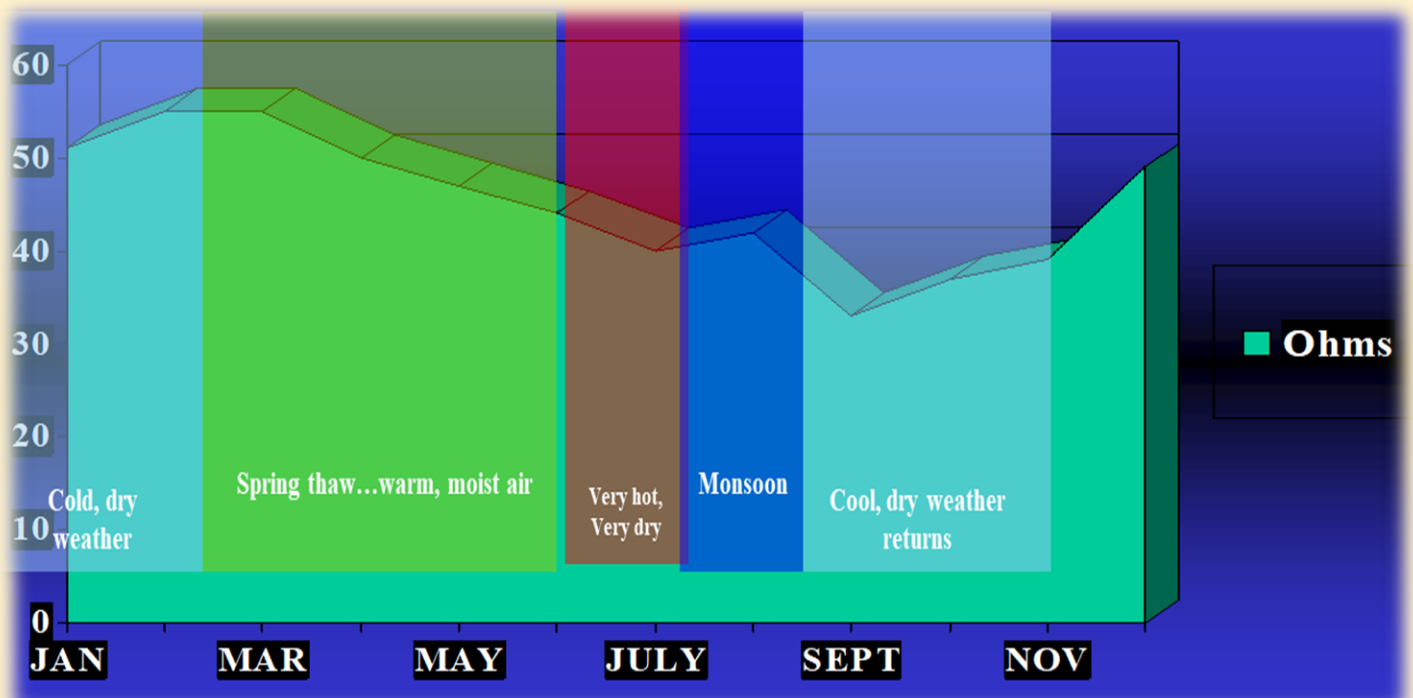
Soil	Resistivity (approx), Ω -cm		
	Min.	Average	Max.
Ashes, cinders, brine,waste	590	2,370	7,000
Clay, shale, gumbo, loam	340	4,060	16,300
Same, with varying proportions of sand and gravel	1,020	15,800	135,000
Gravel, sand, stones with little clay or loam	59,000	94,000	458,000

Ohm meter: used to measure resistance, ensures continuity.

Equipment: (minimum equipment needed)

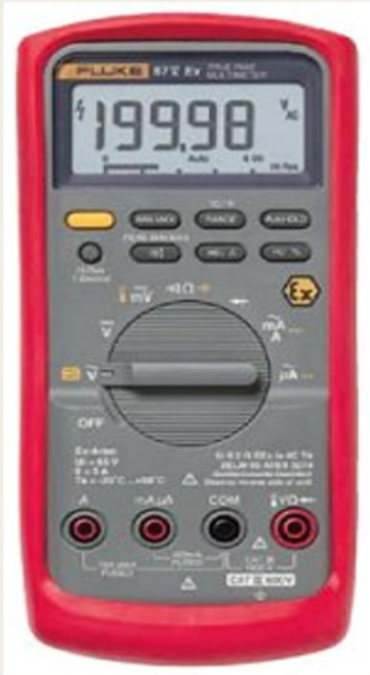
- 3 - 3/4" copper grounding rods, 4' to 6' in length

- 3 - 1/8 " stainless steel grounding cables with single point clamp at one end and alligator clamp at other end, 50' in length (clear insulated or uninsulated cable preferred)
- 2 - 1/8" stainless steel bonding cables with single point clamp at both ends, 50' in length (clear insulated or uninsulated cable preferred)



- 1 - ground resistance tester

Determine the Grounding Field



OHM Meter, Intrinsically Safe

- 1 - ohm meter, intrinsically safe

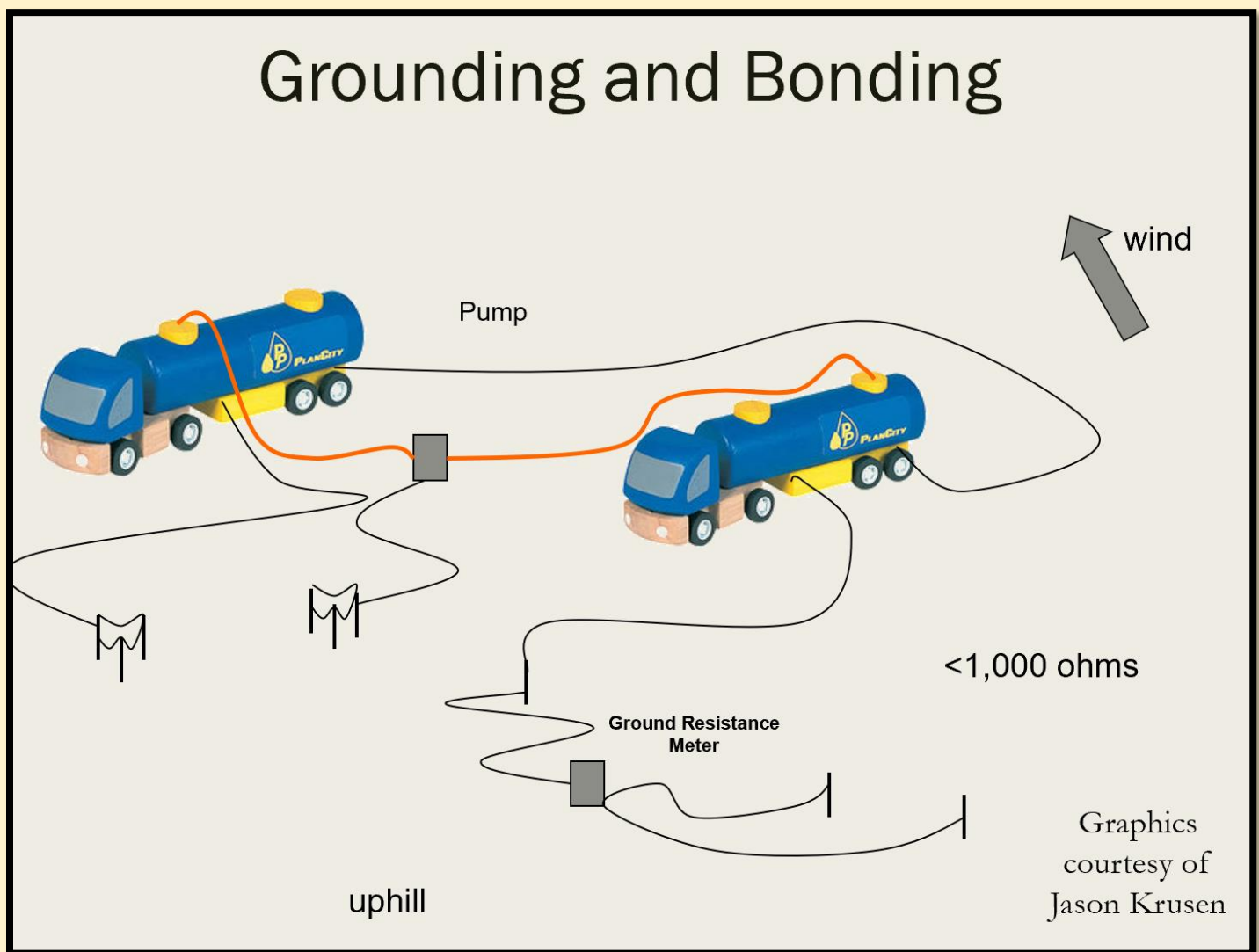
Routine care and inspections of this equipment must be performed regularly. This will include checking for wear and defects in the cable (broken strands, kinks, etc.), a solid

connection between the clamp and the cable, that the points of the clamp are in good condition, and that sufficient stiffness remains in the clamp spring.

Procedure

Prior to performing any grounding and bonding procedures, detection and monitoring must be done to determine if the atmosphere is above the action level for the LEL (>20 - 25 % of the LEL). If the atmosphere is above the action level, then personnel should not be allowed to enter the area until vapor suppression is carried out by the application of the proper type of foam. Detection and monitoring must be continued throughout the course of the incident. The resistance of the cables to be utilized should be tested prior to use. To test the resistance, connect the ohm

meter cables to each clamp of the grounding or bonding cable. The reading should be 0 ohms. After conducting this test then proceed with the following steps: (the same procedure applies for tank trucks, rail cars, or drums)



1. Ground Damaged or Leaking Tank (Nurse)

- a. Place grounding rod - place as far away as possible but within the reach of the cable.
- b. Test ground resistance - tester calibrated, test ground resistance. The reading should be 2-5 ohms or less.
- c. Single-point clamp laced - proper placement so container is grounded.
- d. Test resistance - ohm meter set correctly, test connection after making. The reading should be 1,000 ohms or less.

- e. Alligator clamp to grounding rod - placed low to be in foam blanket.



- f. Test resistance - test connection after making. The reading should be 1,000 ohms or less.

2. Ground Receiving Tank (Calf)

- a. Place grounding rod - place as far away as possible but within reach of the cable.
- b. Test ground resistance - tester calibrated, test ground resistance. The reading should be 1,000 ohms or less.

- c. Single-point clamp placed - proper placement so container is grounded.
- d. Test resistance - test connection after making. The reading should be 1,000 ohms or less.
- e. Alligator clamp to grounding rod - placed low to be in foam, if foam operations is necessary.
- f. Test resistance - test connection after making. The reading should be 1,000 ohms or less.

3. Bond between Damaged and Receiving Tanks

a. Single-point clamp placed to Damaged Tank - good contact between container and clamp.

i. Test resistance - test connection after making. The reading should be 1,000 ohms or less.

4. Single-point clamp placed to Receiving container - good contact between tank and clamp.

a. Test resistance - test connection after making. The reading should be 1,000 ohms or less.

- b. Delay before performing any work and bonding of other equipment used.

After grounding and bonding are in place there should be a **5-minute** delay before any work begins to allow for any static charge to be dissipated.

Any other equipment such as stingers or pumps to be used in transfer operations must also be properly grounded and/or bonded. Nothing should be introduced into a tank until it has been properly bonded, and the charge allowed to dissipate.

After the transfer has been completed, the grounding and bonding equipment should be the last equipment to be removed. All domes and hoses should be closed or removed before

disconnecting the grounding and bonding equipment.

Transferring

Each different type of container will present unique challenges if in need of transfer. This involves access to the material, controlled removal, and safe introduction into an acceptable container. Access to the material may involve opening valves, bungs, or creating a new access port. Transfer may involve basic mechanical methods such as pouring and the use of hand pumps. Advanced methods, such as power takeoff pumps, vacuum pumps, and air driven portable pumps, are generally employed on bulk containers.

Specific attention must be given to static electricity, compatibility, vapor suppression and contamination of the product.

Glen Rudner recently retired as a Manager, Environmental Operations, for the Norfolk Southern Railway with environmental compliance and operations responsibilities in the states of Tennessee, Alabama, Mississippi, and Louisiana. Prior to moving over to Environmental Operations, he was the Hazardous Materials Compliance Officer for NS' Alabama Division covering the states of Alabama, Mississippi, Louisiana, Western Georgia, and Southwestern Tennessee.

Prior to NS, Glen served as one of the General Managers at the Security and Emergency Response Training Center in Pueblo, Colorado. Has worked as a private consultant and retired as a Hazardous Materials Response Officer for the Virginia Department of Emergency Management.

Glen has nearly 45 years of experience in public safety. He spent 12 years as a career firefighter/hazardous materials specialist for the City of Alexandria Fire Department, as well as a former volunteer firefighter, emergency medical technician, and officer. As a subcontractor, he has served as a consultant and assisted in development of many training programs for local, state, and federal agencies.

Glen serves as secretary for the National Fire Protection Association Technical Committee on Hazardous Materials Response. He is a member of the International Association of Fire Chiefs (IAFC) Hazardous Materials Committee, member of the American Society of Testing and Materials (ASTM), and former Co-Chairman of the Ethanol Emergency Response Coalition. He has served as a member of the FEMA NAC RESPONSE Subcommittee.

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