HAZMAT HQ

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What's Inside:

CHATROOM

CHEMICALS ON CHEMICALS

HAZARDS OF CARBON DIOXIDE DEWAR CONTAINERS IN FAST FOOD OCCUPANCIES

KNOW YOUR LIMITATIONS

WHAT IS AN LEPC? AND HOW CAN IT HELP YOU?

Conference Updates

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CHATROOM

What are some techniques or tools for dealing with Lithium-Ion Batteries?

Once the fire is extinguished, there are several options depending on their use. First, you must be in full PPE and on air.

Besides bunker gear & SCBA, what else is recommended?

Insulated gloves certified for electrical use which are tested along with training on their use and insulated hand tools i.e. screwdrivers for use in making access to the cells have been suggested. Never cut into the cell areas.

What about overpacking?

There are several methods being conducted. First, always seek advice from SME as not all LIB incidents are the same. As an emerging hazard, handling / containment of LIB's are evolving. One product many teams have used is Cellblock. Remember this will be a multi-agency operation to ensure all requirements are being met.

Chemicals on Chemicals

Vicki Quint, Co-Chair
Foam Exposure Committee

Foam ready for shipment to Canada during the Massachusetts take-back program.

You will be dealing with per- and polyfluorinated chemicals. They are better known as PFAS. PFAS are in all aqueous film-forming foams (AFFF) products. The public has become well informed of AFFF toxicity issues due to “impressive media attention.”

Firefighting foams can continue to be used on fires. But all AFFF are presently being phased out including by the Department of Defense and the FAA. Airports are in the process of transitioning as they continue using AFFF. There is one fluorine-free foam (F3) product on the Qualified Products List (QPL) at this time.

According to the Spring 2021 issue of Groundwater Monitoring & Remediation: "Although Australia and European countries have used F3 alternatives for nearly a decade in certain sectors, adoption in the United States has been slowed by industry's reliance on NFPA Standard 11 and UL 162, which address AFFF use for Class B fires…"

Some major incident calls are revealing fire chiefs' reluctance to use airports or other fire departments for mutual aid since their apparatus may still contain AFFF which contain PFAS chemicals. PFAS are persistent, bioaccumulating and biomagnifying chemicals.

In June 2021, a chemical facility in Rockton, Illinois caught fire. Grease, lubricating oil and fluids all were involved at the Chemtool plant. The local fire chief, Chief Kirk Wilson had quickly declined nearby airport assistance because he knew their firefighting foams contained PFAS chemicals which would contaminate his community.

A private firefighting crew hired by the company came in. Unknown to Illinois EPA and the fire chief, the crew began using 3,200 gallons of PFAS-containing firefighting foam. The foam, Signature Series 1X3% C6AR-AFFF, was confirmed as a fluorinated surfactant and may have contained Perfluorooctanoic acid (PFOA) as an unintended by-product. The foam is known to break down into Perfluorohexanoic acid (PFHxA) and potentially others.

The fire chief had not been informed that the foam contained PFAS and he ordered those operations be stopped. The company began steps recommended by USEPA and Illinois EPA to contain run-off as much as possible. The foam had been used for about three hours and run-off did occur to the Rock River which feeds into the Mississippi River.

The private company then switched to another foam without PFAS when it became available. The Rockton fire chief made the correct decision for his community in declining AFFF use.

Dr. Linda Birnbaum, former National Institute for Environmental Health (NIEHS) director and toxicologist stated it was amazing that the company would use PFAS-containing foam when alternatives were available.

Restrictions have been missing from PFAS for decades. But regulations are now catching up.

The firefighting foams containing C6, a 7 or less chain PFAS, contain 2 to 3 times more PFAS than the older AFFF products. The replacement foam products have been found to be as toxic as the original products.

The water contamination problems that occur with PFAS use are extremely difficult, if not impossible, to completely remediate. The shorter-chain PFAS are more difficult to filter from water and more mobile. Costs can be astronomical.

Fire chiefs have not previously had full information on firefighting foams that they require as incident commanders. They are the front-line risk managers.

States are dealing with PFAS chemicals more quickly than the federal government. Some fire departments have recently found themselves facing state fines for using AFFF.

Some state-level environmental offices are listing foams on firefighting foam contract lists that are fluorine-free but may still contain carcinogens. There are fire tested F3 products available that do not contain carcinogens.

What occurred in Rockton, Illinois was a fire chief who was well aware of the toxicity issues with AFFF foams. He made the right decision to decline AFFF because he knew the wrong decision would contaminate his own community.

Health care costs will be a component of PFAS regulations. According to a study by NYU Langone Health researchers in 2022: "Daily exposure to a class of chemicals used in the production of many household items may lead to cancer, thyroid disease, and childhood obesity, a new study shows. The resulting economic burden is estimated to cost Americans a minimum of $5.5 billion and as much as $63 billion annually."

AFFF has been used extensively during the past 60 years. The PFAS in AFFF can contaminate ground water which impacts drinking water. Unlike other chemicals, PFAS cannot be diluted with water. They are extremely persistent. The chemicals will form long-ranging plumes in water or underground. They are exceptionally difficult to break down because of the carbon-fluorine (C-F) bond.

Northwestern Now reports: “Fire can’t incinerate them, and water can’t dilute them.”

Vanguard reported that:

“Unfortunately, EPA has stated that PFAS is dangerous. They do not dilute, degrade, or disappear, and they pose significant human health risk as they travel through our groundwater and soil. According to the EPA, PFAS has been linked to adverse human health effects including cancer, liver damage, thyroid disease and imbalance, immune disorders, cardiovascular concerns, and more. Because

PFAS is negatively persistent, it can move through drinking water, oil, and even concrete, and has contaminated drinking water in cities across the United States."

HazMat will find AFFF in airports, trailer programs, county caches and fire departments. Fire training facilities have been discovered to be PFAS-contaminated throughout the US. Chemical manufacturers, petrochemical and oil refineries can be other sources of AFFF.

States have begun setting up storage or "take back" programs. AFFF product to be removed is being labeled with a Hazard Class 9 Department of Transportation (DOT) identification placard.

Another issue is older AFFF product in inventories. In 2019, the Foam Exposure Committee foam sample testing project came across a product manufactured in 1978 that was still in an active fire department inventory.

All fire equipment including apparatus used with AFFF is a concern.

No AFFF or AR-AFFF product should be poured out onto the ground, sewer drains or water resources. Once PFAS are in water or soil, they become “a persistent problem for generations.” PFAS should not be put into landfills which include burn pits and Superfund sites.

According to Jensen Hughes, Inc., fluorine-free foams are “consistent over a range of concentration levels, showed no difference at all from AFFF, and were still adequate across the board.” Fire departments are transitioning to F3 foam products. There are no regulations requiring a fire department to use AFFF.

PFAS chemicals represent a health risk to firefighters and the public they serve. State departments of natural resources, departments of environmental protection or state pollution agencies can direct you.

"Consider the firefighter and public safety first."

References:

NYU Langone, Daily Exposure to 'Forever Chemicals' Costs United States Billions in Health Costs, July 22, 2022, https://nyulangone.org/news/daily-exposure-forever-chemicals-costs-united-states-billions-health-costs

ITRC, Firefighting Foams, The PFAS Team, Training Module, https://pfas-1.itrcweb.org/3-firefighting-foams/

Northwestern Now, ‘Forever chemicals’ destroyed by simple new method, August 18, 2022, Amanda Morris, https://news.northwestern.edu/stories/2022/08/forever-chemicals-destroyed-by-simple-new-method/

Hazards of Carbon Dioxide Dewar Containers in Fast Food-Type Occupancies

By: Capt. Mike Bloski, Hazmat Captain, Southern Manatee Fire Rescue

Carbon Dioxide, commonly referred to as CO2, is a well-known gas, yet not everyone fully comprehends its potentially lethal nature. Being a fraction of the atmosphere, CO2 is typically associated with human exhalation and its application in specialized fire suppression systems. On a commercial scale, CO2 is either produced and transported as a liquefied compressed gas or employed in its solid form, commonly known as dry ice. The greatest hazards are a leak in the supply system of a CO2 system used in beverage delivery. The system uses the CO2 liquid converting it to vapor state to expel the contents from storage syrup bags or kegs.

Traditionally, these systems did not pose a significant threat to firefighters, primarily because of the relatively modest-sized volume of the CO_2 cylinders used in such establishments. However, firefighters are facing an escalating risk associated with CO_2 due to undetected leaks originating from exterior larger-sized CO_2 cylinders or the supply systems used to deliver CO_2 to the inside dispensing system. While these leaks remain infrequent, their occurrence appears to be on the rise in commercial settings. The increase in brewery locations in popular culture increases the potential for more emergencies placing firefighters at greater risk. In addition, to relative non-toxic conditions apparent to responders', greater safety must be exercised suspecting a CO_2 leak problem on any delivery system present. Lastly, CO_2 is commonly dispatched as a Carbon Monoxide issue as occupants do not understand local installed systems mistakes are made

Situational Awareness:

Education at the hazmat operations level should include responding to patients or unknown odors in fast food or local drinking establishments should be aware that they may be responding to a CO_2 leak. CO_2 is 1 ½ heavier than air and, in the event of a leak in enclosed spaces, such as walk-in coolers, manager's offices, restrooms, employee rest areas, and basements, can accumulate quickly. Since CO2 is undetectable by human senses, the only safe way to monitor it is by using fixed or portable alarm systems. Alarms designed for the restaurant industry are available, which monitor the level of CO2 in the air. As CO2 gas is heavier than air, it is recommended that fixed gas detectors be installed at breathing zone level, which is four to six feet above the floor. Employees must be trained in how to respond when a CO2 monitor activates.

Operational Considerations:

Response crews suspecting a CO2 leak must use an SCBA (Self-Contained Breathing Apparatus) while operating in a potentially

IDLH atmosphere and should consider calling for a Hazmat teams for response. The use of 4-gas meters to detect oxygen displacement should also be considered, as each 0.10% drop is equivalent to 5,000 ppm atmospheric replacement (IDLH for CO_2 is 40,000 ppm). An air reading of 20.0% indicates an IDLH atmosphere. Hazardous materials-trained and -equipped companies typically perform atmospheric monitoring for oxygen, methane, carbon monoxide, and potentially explosive gases by metering for the lower explosive limit (LEL), but they do not monitor for carbon dioxide. When response crews detect low oxygen levels in establishments using CO_2, they must consider the possibility of elevated CO_2 levels.


Commercial business CO_2 fill valve found on the exterior.

Response Options:

First responders dispatched to a carbon dioxide (CO_2) leak in a commercial building should prioritize safety and follow specific response procedures. Here are response options for first responders:

H- Hazard Identification:

- Identify the CO_2 supply system either exterior, interior, or both, what type and contents of tanks understanding the plumbing of the system. A thermal imaging camera is beneficial for locating leak sources on cold surfaces and plumbing.

- Begin air monitoring utilizing 4-gas meter inside the occupant checking all spaces with primary search.
- Caution all responders not to make contact with vapor clouds, exterior tank shells, or associated plumbing with the system.

A- Assistance:

- Immediately call for local hazmat response, if necessary.
- Check the tank for emergency assistance contact numbers.
- Work with the occupancy manager on the service company for the source tank. Have them respond to the scene to give technical advice and control of the system.

Z-Zoning:

- Evacuate the structure relocating occupants to safe distance of 330 feet following ERG Guide #120.

M-Manage the Incident:

- Establish Incident Command as needed.
- Establish a command post at least 330 feet from occupancy doors and windows.

A-Action Plan:

- If equipped with proper PPE, identify the source and extent of leak.
- Identify emergency shutoff's (E-Stops) and valves. Do not turn off valves or processes without technical assistance and advice.

- If possible, go into second round of air monitoring with Carbon Dioxide detectors from Hazmat Team response. Note: the occupancy alarm may only indicate leak and not give responders exact leak condition in parts per million.
- Monitor the system with thermal imager camera noting tank conditions.
- Consider your ventilation plan. Average size of fast-food restaurant is 21,000 cubic feet or greater. This might require 5 minutes of controlled ventilation before getting to 5,000 TWA for CO2.
- A consideration is to locate the cylinders outside the structure if can be done safely.

T-Termination:

- Verify by air monitoring prior to leaving for occupants to re-enter the structure.
- Secure the system until it can be service by a professional repair company.
- Reenforce customer service to call back if conditions change after the response.

Captain Mike Bloski (BLAH-SKI) has been in the fire service for 26 years starting his career as a volunteer firefighter in Escambia County Florida in 1992. In 1997, he moved to the Bradenton area and was hired by the Southern Manatee Fire Rescue district. He has served 17 years on the Manatee County hazmat team and as part of the Operations Division.

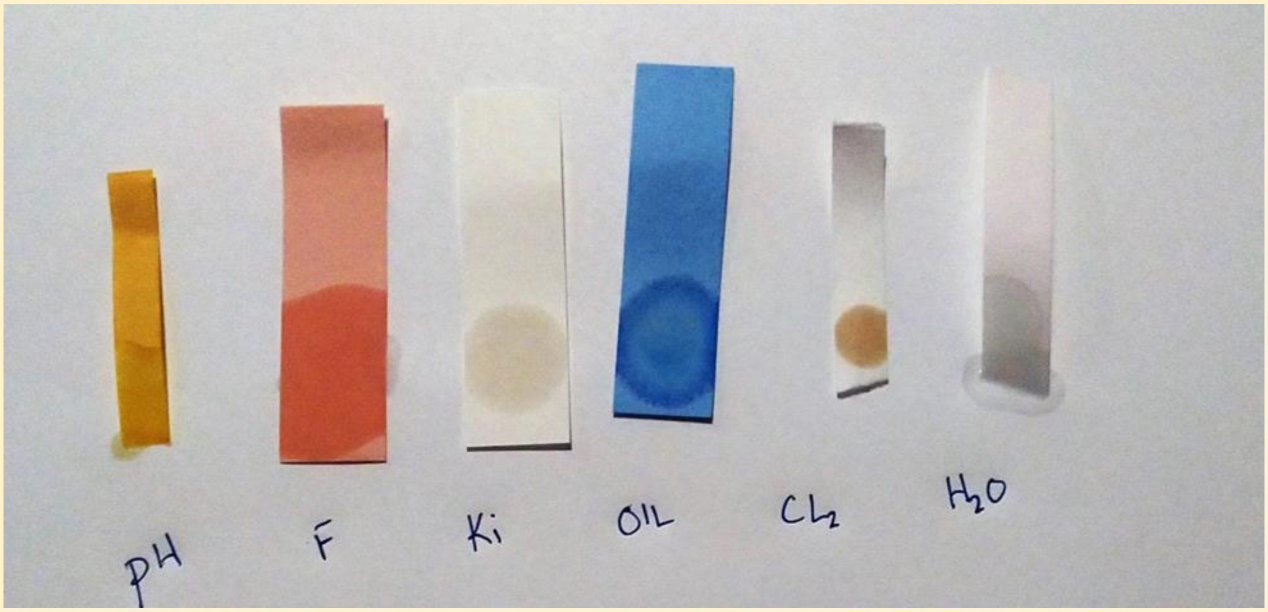
KNOW YOUR LIMITATIONS

By Kevin Ryan

Detection equipment training comes in many forms. The training can be formal in a conference session, or it may just be a technician taking a meter out of the box to refresh on it. My approach to training on detection equipment begins by asking one question. The question is this: Is your equipment smart or dumb? I get several puzzled looks once I pose this question. The answer lies in the eye of the beholder. The user may look at technology as an answer to help solve the mystery of a hazmat response. Another user may not trust newer technologies. The most brilliant answer I have ever gotten has been the equipment is only as smart as the user. The real answer lies in how well the user understands the limitations of the technology involved.

Let's start with a simple piece of pH paper carried by every hazmat team. The piece of pH paper is really easy to interpret. Orange to red color change indicates acidic whereas green to blue shows a basic product. Some pH papers even read in different ranges and colors. Does the technician know what it means when there is a reading in the 4 to 8 range but presents in a straight line on the leading edge? What does it mean when the jagged edges are present in that same range of 4 to 8? Here I thought pH was the simplest of measurements

and now it's more complicated. The answer is that the straight line on the leading edge indicates the presence of a neutral substance possibly a hydrocarbon. The jagged edges indicate a likely corrosive. What happens if I check a liquid with pH paper that turns blue-green then a minute or so later whites out portions of the paper? The paper is "bleaching" out at that point indicating a strong oxidizer is present. The question that always comes up with pH paper is should I use it wet or dry? Multi range pH paper should be more than sensitive enough to use dry, however some teams will use it wet, to see if a water reactive is present. Now you must be thinking to yourself that all of those possibilities are not shown on the packaging when you open the paper up. How many techs out there got this much information from their initial tech training? How many thought you could gain that much information from such a simple technology. How much more information can I gain when I use pH, water, F, KI, M9 together. Each one has their own set of limitations.



A multi gas meter is another example. Typical multi gas meters carry Cat B LEL sensors, toxicity sensors and possibly even a PID. Each sensor has a cross sensitivity, a correction factor or a characteristic that must be recognized when factoring into your reading. A Cat B LEL sensor can pick up all flammable gases besides the one you calibrate to necessitating correction factors. Toxicity sensors can have cross sensitivities as similar toxics can trigger readings. PID's are nonspecific so you don't have an idea of what specific chemical is present. The point I want to make here is that all detection equipment, no matter how advanced can be fooled, may not be sensitive enough, need correction factors and have a blind spot.

Advanced technologies such as IR, Raman, HP Mass Spec, IMS etc. are valuable in what they provide, however they bring on newer challenges such as interpretation. IR is fantastic however it does not see ionic bonds such as sodium chloride (ionic bonds are too strong to absorb IR energy). Optical technologies in general don't see components of a mixture below 10 percent. We have found that IR typically only sees the cutting agents on street drugs and not the actual narcotic because of the 10 percent threshold. How do you keep up with all of this? The simple answer is never stop training. You can never train enough, especially with some of the newer technologies we are seeing in the hazmat world.

Training is the cure for all of our ills in the hazmat detection world. The training we receive should include all aspects of the equipment. What is it intended for? How does it work? What are the limitations of the device? Are there any uses out there for the device other than what it is intended for? Once you truly understand the limitations of the device, then you can be creative and use these to your advantage.

A good example of this is by using toxicity sensors cross sensitivities to your advantage. Hydrogen is a major cross sensitivity to a CO sensor. Although in most sensors the response of Hydrogen is approximately 20 percent of the CO reading, this is still a way to take a limitation and turn it in your favor. Most responders have gone to a CO response only to find out it was a battery powered forklift overcharging and giving off hydrogen. Your CO sensor was going crazy, and you could not

Sensor	Response Time	Sensor Drift	Cross Sensitivity in %						
			CO	H_2S	SO_2	NO	NO_2	Cl_2	H_2
CO	30 sec.	2% per month	100%	<1%	<1%	<1%	<1%	10%	40%
H_2S	45 sec.	2% per month	1%	100%	20%	2%	-20%	N/A	<1%
HCN	200 sec.	2% per month	5%	600%	375%	-80%	-400%	N/A	N/A
O_2	30 sec.	N/A	•Levels above or below 20.9% will affect the accuracy of all other sensors.						
LEL	30 sec.	10% per month	•As sensor ages, ability to detect methane is reduced. •Damaged by silicon, heavy metals, H_2S and other sulfur compounds. Heavier vapors (gasoline, diesel, solvents, etc.) move slowly through the sensor resulting in reduced sensitivity and inaccurately low readings. *These products are VOC's and are better monitored using the PID.*						
VOC (PID)	15 sec.	Up to 10% per day	•Chemical being detected must have an IP of 10.6ev or less. •Humidity and condensation from temperature change can cause sensor fault.						

figure out why there was not a fuel fired source present.

As with all things fire service oriented, storytelling is one of the most effective ways to pass on the lessons of our trade. We cannot learn everything in a book and need the real-world experience. Informal training through story telling can be very effective to prepare newer hazmat techs to become the senior tech that understands limitations we face on our responses. Never be afraid to ask yourself if there is more, I need to understand. Anyone that has ever been to a fitness club has heard the expression “train insane or remain the same”. Realistic training combined with real world experience is the key to understanding our equipment as well as our limitations.

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.

What Is an LEPC and How Can It Help Me?

By: Michelle Cechowski, MS, CEM, FPEM

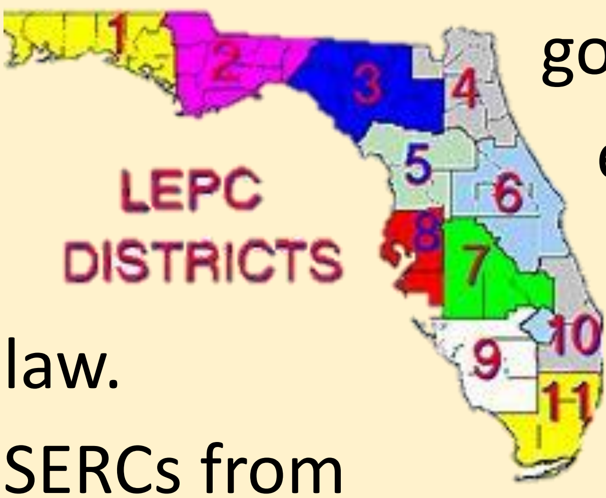
A Local Emergency Planning Committee, or LEPC, is a group of professionals, made up of first responders and subject matter experts, within a designated emergency planning district, who facilitate the preparation of and implementation of emergency response to chemical releases, whether accidental or intentional.

For context, we must go back to the 1980's. Throughout the 1970's and 80's, all over the world, incidents of chemical releases were increasing and little to no regulations existed to

protect people working in and around these facilities nor the environment.
Triggered by a faulty valve in Bhopal, India, a chemical was released at a facility which killed thousands of people in December 1984, followed by another incident in Institute, West Virgina in August 1985 that sent 125 people to the hospital, the United States Congress took proactive action for future incidents.

A new law called the Emergency Planning and Community-Right-To-Know Act, EPCRA, was enacted in October 1986. The law had dual purposes: first, to require facilities to report the presence of and release of hazardous chemicals to federal, state, and local authorities; second, the community right-to-know which requires facilities to report their inventories and uses of hazardous chemicals.

The first part of EPCRA (emergency planning) places the requirement of emergency planning on states and local agencies. To do this, EPCRA requires each state to establish a State Emergency Response Commission (SERC). Under the direction of the SERC, the state then must establish local emergency planning districts and a local emergency planning committee (LEPC) for each district.The governor of each state can establish a SERC in an executive order or by state law. Some states created their SERCs from existing organizations



while other states created new organizations made up of different representatives from varying existing agencies, departments, groups, and associations. Once established, SERCs oversee the activities of the LEPCs by establishing procedures for the second part of the EPCRA.

Part two of EPCRA is the community-right-to-know section of the law. The EPCRA law states LEPCs must create procedures for receiving and processing requests from the public, develop and regularly update an emergency response plan (chemical release response plan or an all-hazards plan addressing chemical releases) to include the whole community, manage the chemical information submitted by facilities, and provide information to the public. Each SERC can augment these duties with additional ones related to the oversight of the transportation, storage, and use of hazardous materials to the LEPCs as well.

Every state is different in the way they established their LEPCs. For example, some states created an LEPC in each county or parish; others aligned LEPCs with regional-based government entities. No matter, all have the same responsibilities and requirements under EPCRA.

Each SERC, through the governor of each state, designates an agency to receive grant funds from the U.S. Department of Transportation's Pipeline and Hazardous

Materials Safety Administration (US DOT PHMSA) called the Hazardous Materials Emergency Preparedness (HMEP) grant. This grant was created in the 1990's to "develop, improve, and carry out emergency plans" within the guidelines created by EPCRA. Once executed, the state agency then distributes the funds to the LEPCs. These grant funds can be used for trainings, exercises, and other programs to address the needs of the LEPC such as enhancing emergency response capabilities,

conducting hazard analyses, and forming commodity flow studies.

LEPCs are non-profit community organizations and can receive many types of grants including state and federal grant funding. LEPCs provide the platform for multi-jurisdictional and multi-discipline collaborations, emergency response and recovery planning for all hazards, and overall strengthen the community’s resilience when faced with a disaster. I encourage you to contact your LEPC, attend a meeting, make connections, and get involved.

Resources: U.S. EPA Office of Emergency Management National LEPC-TEPC Handbook
https://www.epa.gov/system/files/documents/2022-01/national-lepc-tepc-handbook-full-document.pdf.

U.S. DOT Pipeline and Hazardous Materials Safety Administration Hazardous Materials Emergency Preparedness (HMEP) Grant https://www.phmsa.dot.gov/about-phmsa/working-phmsa/grants/hazmat/hazardous-materials-emergency-preparedness-hmep-grant.

About the Author: Michelle Cechowski is the Director of Emergency Preparedness at the East Central Florida Regional Planning Council[1] and the LEPC Coordinator for the East Central Florida LEPC since June 2015. Michelle is an adjunct professor at the University of Central Florida where she teaches in the undergraduate Emergency Management and Homeland Security program. Michelle is also the Executive Director of the Florida Hazardous Materials Symposium. Michelle is a Certified Emergency Manager (CEM) and has a master's degree from Nova Southeastern University.

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[1] In Florida, the SERC aligned their LEPCs with the already established Regional Planning Councils, which are regional agencies created through Florida Statute (FSS 186.504).

CONFERENCE DATES

Florida HazMat Symposium
Jan 16th – 19th 2024

Massachusetts HazMat
MAHMT
Mar 26th – 28th 2024

Michigan HazMat Responders Conference
Apr 15th – 17 2024