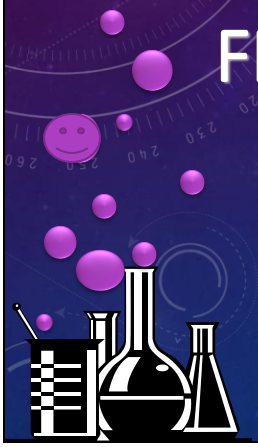
HAZARDOUS MATERIALS AWARENESS LEVEL

FRA 2025



FRA COURSE CONTENT

- FRA Responsibilities and Operations
- Hazmat Recognition Clues
- Hazardous Materials Identification
- Chemical Properties and Behavior
- Hazmat PPE
- Safety Identification and Notification
- The 2024 Emergency Response Guide

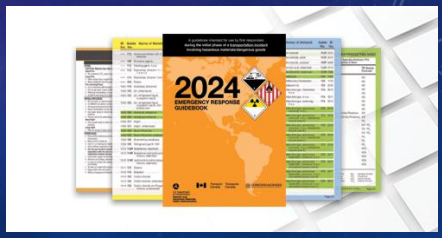
Why should we be aware of hazardous materials? Because if we are not aware of the dangers we will get injured, simple as that!

Highly recommended that everyone download the 2024 Emergency Response Guidebook app.

This section will cover the reasons we should all be aware of the dangers of hazardous materials we might encounter in our jobs.

MAIN COURSE OBJECTIVE

- **At the end of this class, the First Responder Awareness (FRA) level personnel will be able to:**
- **Safely identify, isolate and make necessary notifications for an incident involving hazardous materials, and…**
- **Utilize the 2024 ERG and app**

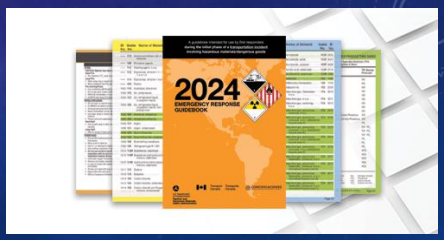


AND use your IRPG – the yellow pages, 36-38

Be sure to download the PDF version or the mobile app for either your iPhone or Android phone from the DOT here:
https://www.phmsa.dot.gov/hazmat/erg/erg2020-mobileapp

MAIN COURSE OBJECTIVE

- **Download the 2024 Emergency Response Guide as either a PDF file**
- **or as the mobile app for android or iOS here: https://www.phmsa.dot.gov/training/hazmat/erg/erg-mobile-app**



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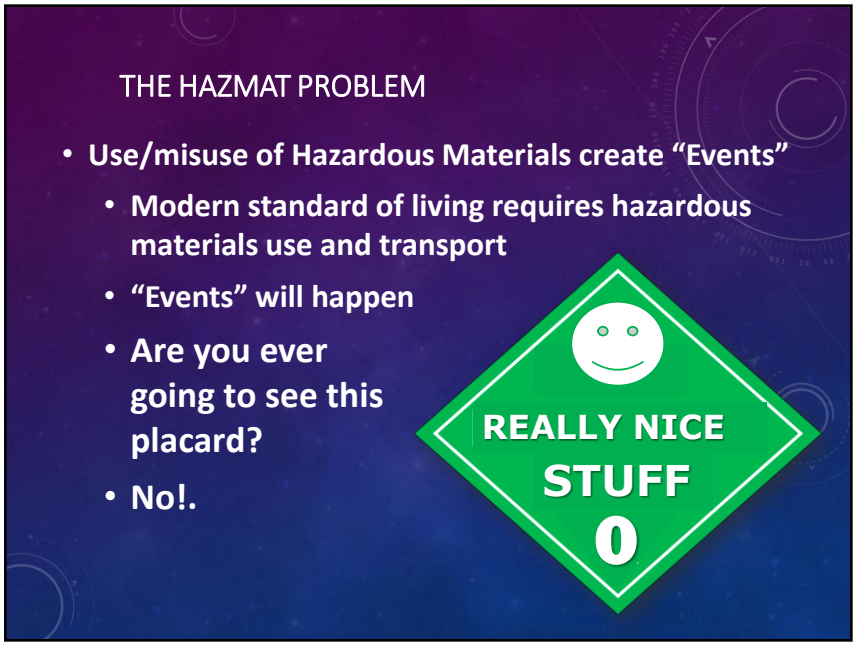
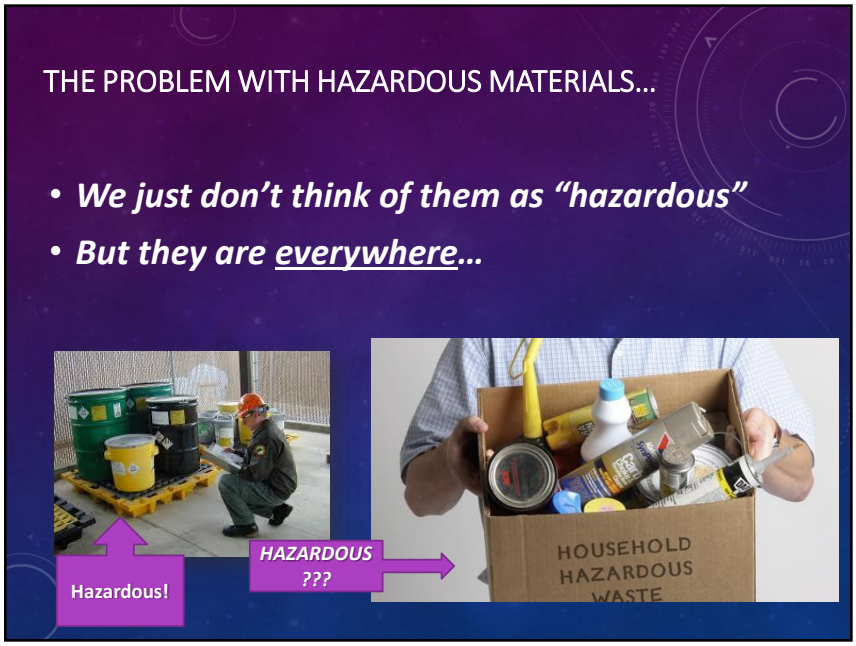


OK – you're NEVER going to see a hazardous materials placard like this: *if it's got*

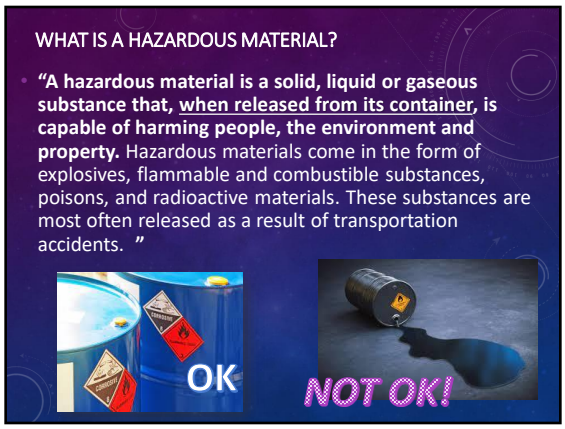


Not just the industrial amounts – think of all the household hazardous materials we can come across during a 911 call…

We MUST be aware of all the chemicals and products that can be found in house holds, garages, on the roadway, in cars and even as trash in the forest.

They might not be as big as an industrial incident – but they can be just as deadly to us!

The question is – WHERE MIGHT WE BE EXPOSED TO HAZARDOUS MATERIALS?



REMEMBER – the key part here is "when released from its container"!

It's OK as long as it is in the container that is designed for it, and it is not under stress (more of this later).

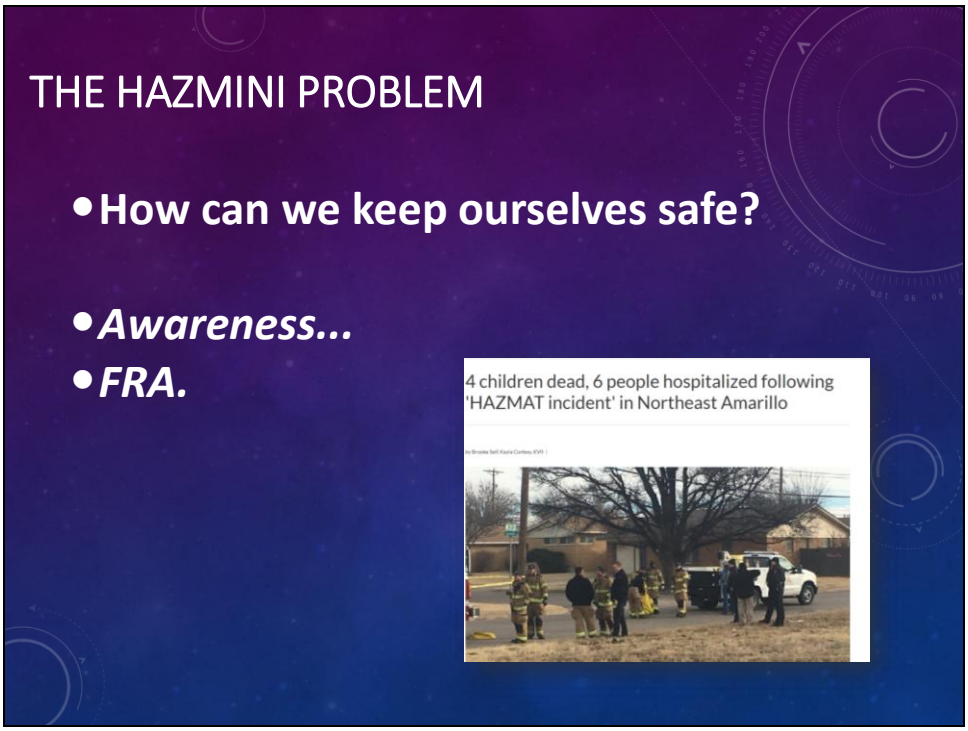
HAZMAT VS. "HAZMINI"

- **Hazardous materials are everywhere, and when they get out of their containers we have a problem**
- **The "huge" hazmat's happen only rarely**
- **The "hazminis" *happen all the time***
- **We have to be able to recognize the problem, *before we become another part of the problem*.**

THE HAZMINI PROBLEM

- We are surrounded by small amounts of dangerous chemicals
- They are literally everywhere:
  - Every home
  - Every garage
  - Every automobile
  - Every commercial structure
- **Every emergency has the potential to include small amounts of hazardous materials.**

Even though they are small amounts – they are still hazardous to us – especially if they are involved in a fire.



January 2, 2017:

The Amarillo Fire Department said there were 10 people inside the home when the incident occurred. When crews arrived at the scene just after 5 a.m. Monday, one minor died on scene. The other three died after being taken to the hospital. The oldest of those who have died due to this incident was 17 years old. One of the other people who were taken to the hospital is said to be unstable and in critical condition.

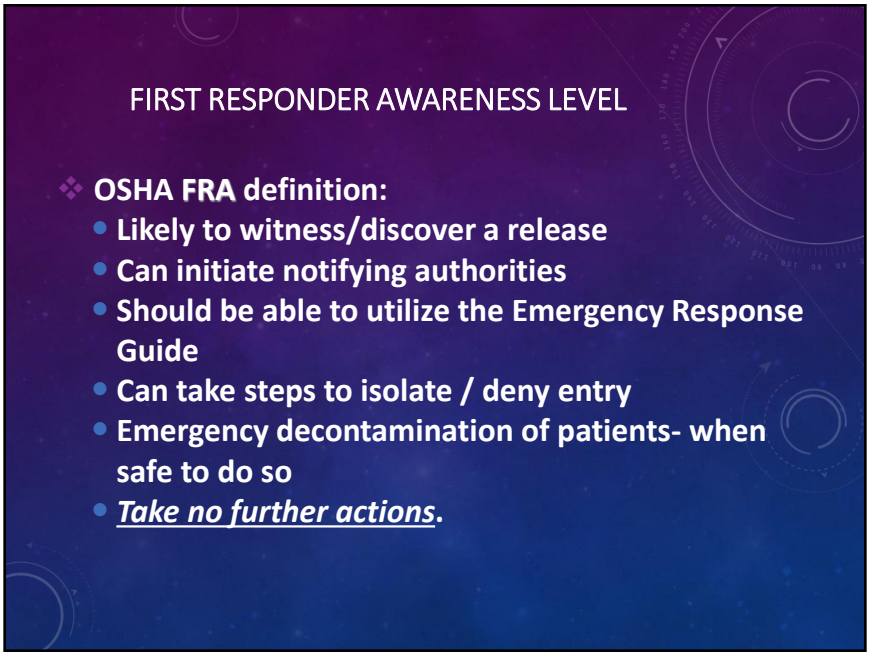
AFD said someone at the residence had placed a pesticide, which is now identified as Weevil-Cide, containing aluminum phosphide (UN #1397, Guide Number 139) underneath the house. At some point, a person living at the home tried to wash away the pesticide with water. This caused a chemical reaction that created phosphine gas, which is extremely dangerous. Phosphine gas causes pulmonary edema and extreme respiratory distress. (IDLH 50 ppm)

The only way to keep ourselves safe is to be aware of what is out there and how it can hurt us.

This is where FRA – First Responder Awareness training comes in.

This section covers the various levels of hazardous materials response.

The difference between these levels in education hours: FRA about 2-4 hours, FRO 16 hours, Technician is four weeks of class, Specialist is Technician level plus two more weeks.



FRA does not “respond” to a hazardous materials incident, but will more than likely find one. At this level you will be able to recognize a hazmat incident and take the necessary steps to protect people from the material.

At this level you do not take any steps to contain or stop the release of the material.

FIRST RESPONDER OPERATIONS

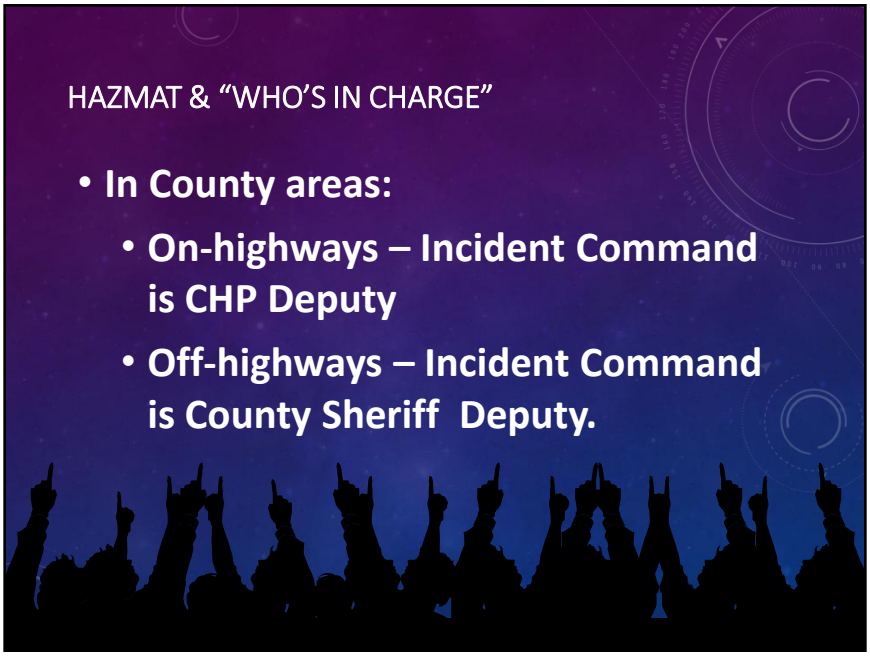
- **OSHA FRO Definition:**
  - **One who responds to HazMat release**
    - **As part of the initial response**
    - **In a defensive fashion**
      - **Doesn't try to actually stop the release**
  - **<u>Contains release from a safe distance</u>.**

FRO will defensively contain the release from a safe distance. The key here is "safe": This level does not have any specialized protective equipment or materials to stop the release, but has to work with what is present.

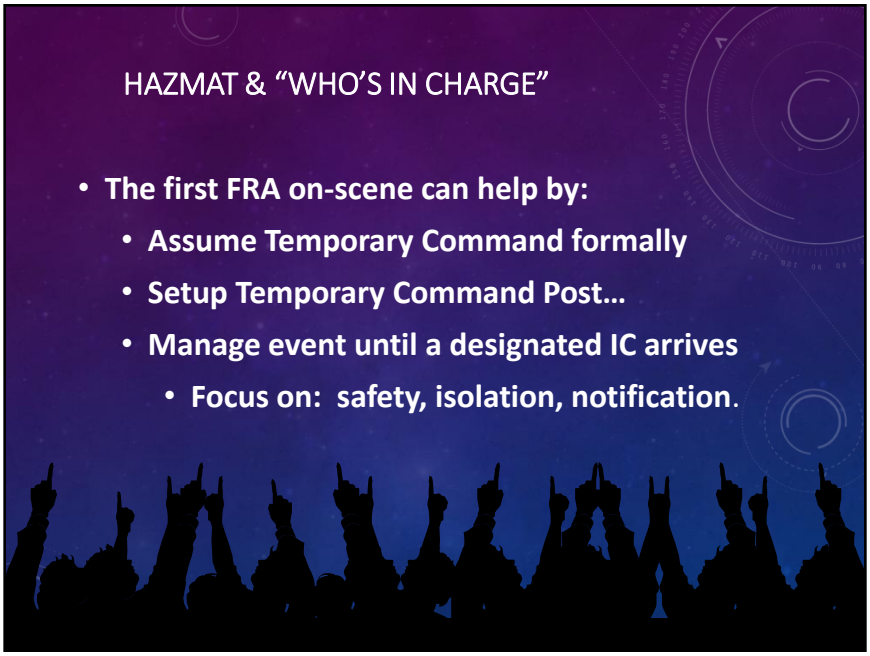
TECHNICIANS / SPECIALISTS

- **Tech/Spec OSHA Definition:**
  - **One who responds to HazMat release**
  - **Enters the Hot Zone**
  - **Actively stops the release.**

Technicians and Specialists (when fully equipped) enter the Hot Zone and stop the release; if this level has no specialized equipment (such as the level A hazmat suits shown in the picture) then they are responding at the FRO level only.

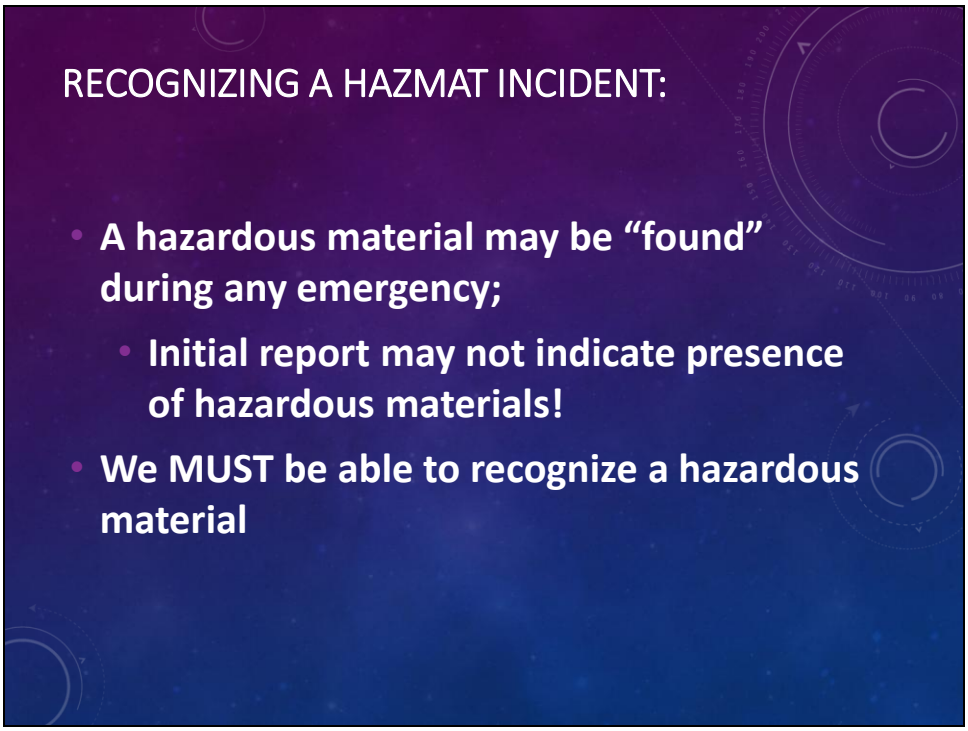


Of course, you may be on scene before one of these agencies, so what do you do?



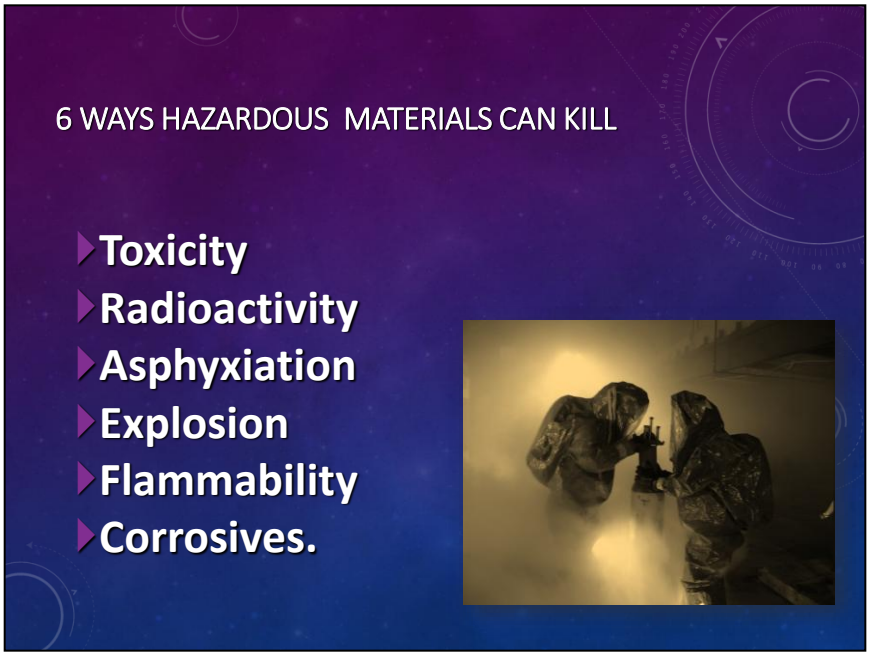
Focus on the safety of yourself, others in your crew, and the public (in that order), on isolating the incident (per the directions you will find in the Emergency Response Guide and your IRPG) and notification of the next levels of response (such as CHP and County Sheriff, and CAL FIRE).

First on-scene has the responsibility to recognize a hazardous materials incident. **This is the main purpose of this course – we can't deal with something we don't recognize!**



- Why do we need to recognize a hazardous material?

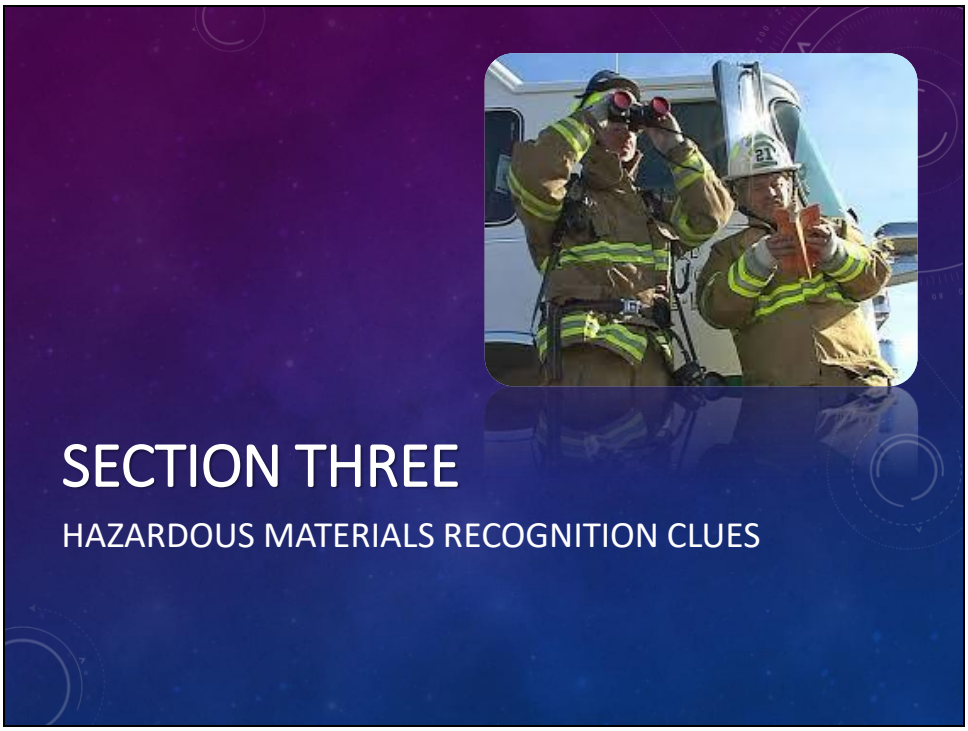
- **How many ways can hazardous materials kill you????**



You don't want to be at the receiving end of any of these. The only way we can keep ourselves safe is by recognizing a hazmat before we go stomping through it.

HWIKMF – means How Will It Kill Me First? We need to be aware of these dangers!

And to find that we need recognition clues!



This section covers the clues we should be searching for – these clues will give us the heads-up on a suspected hazardous materials release so we can deal with them in a safe manner

Looking at this picture – would you rush in? NO! Whatever made this per

Occupancy/Location (Plating shop or highway).
Container Shapes (55-Gallon drum or ribbed tanker).
Markings & Colors (Package/label markings or colors).
Placards & Labels (Orange placard = Explosive).
Shipping Papers and MSDS (Consist for railroad incident).

Senses (Sight, hearing and smell - last resort PLEASE!).
Other Clues (Responsible party, witness, business plan, etc).

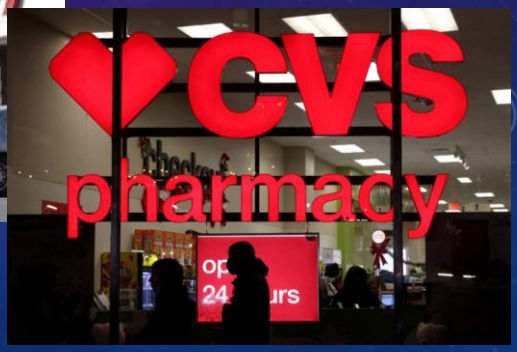
HAZMAT RECOGNITION CLUES

- **Occupancy?**
- **How about hazardous materials here?**

The auto parts store is pretty obvious – it is loaded with potentially hazardous materials.

HAZMAT RECOGNITION CLUES

- **And don't forget: Hazardous materials here?**



BUT how about a grocery store? What might it have that is potentially hazardous? (Think pesticides, cleaners etc)

And the drug store as well – what is in there that could cause harm?

RECOGNIZING A HAZMAT INCIDENT:

The types of reported injuries may be a clue:

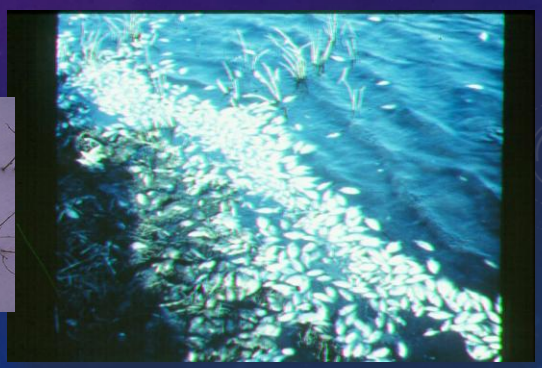
- **Presence of multiple patients with the same signs and symptoms,**
- **Two or more people "down" in an area.**

Several people have sudden onset of difficulty breathing? Do YOU want to be the next one?

THINK before you enter!

RECOGNIZING A HAZMAT INCIDENT:

- **Dead animals, birds, fish and insects around the area.**



What killed the animals – could it kill YOU too???

RECOGNIZING A HAZMAT INCIDENT:

- **Areas of dead vegetation at the scene.**

Again – what killed the plants?

RECOGNIZING A HAZMAT INCIDENT:

- **Low-lying fog- like clouds.**

At around 4:25 a.m. on April 25, 2019, a large release of anhydrous ammonia occurred on Green Bay Road at Clarendon St. in Beach Park, Illinois. The Lake County Sheriff's Office and 39 fire departments responded to the incident. Officials advised residents within a one-mile radius to shelter in place.

The ammonia gas affected residents and people traveling through the area. Emergency crews conducted door-to-door wellness checks, evaluating and treating residents as needed. Approximately 40 people were transported via ambulance to local hospitals. The Sheriff's Office lifted the shelter in place order at 10:00 a.m.

More on these later. Just remember – if it has a placard it is hazardous!

RECOGNIZING A HAZMAT INCIDENT:

- **Evidence of fumigation.**

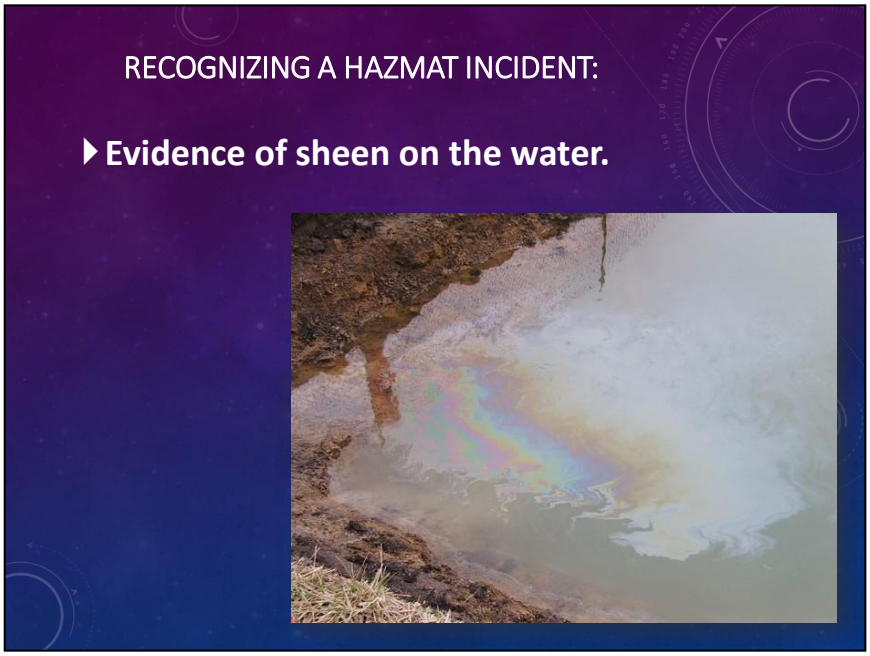
Why would this be dangerous? Whatever is killing the spiders can certainly kill you!

RECOGNIZING A HAZMAT INCIDENT:

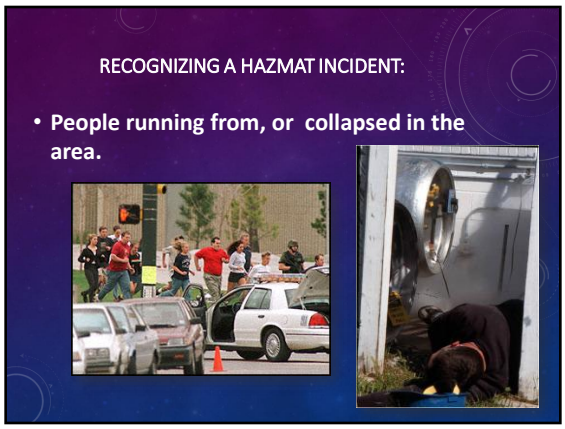
- **Evidence of leak, fire, smoke, visible vapors, unusual colors/odors.**

This is an actual picture of a release of red fuming nitric acid. Notice the water streams trying to contain some of the gasses by making them soluble with the water – it is easier to contain a pool of liquid than it is to contain a gas cloud.

Try not to be the one who reports an unusual odor – if you breathe it in you are contaminated.



What might this spill be? Some sort of hydrocarbon like oil.



You want to find out what is happening before you go running in to that scene!

RECOGNIZING A HAZMAT INCIDENT:

- **Responders may sense unexplained odors or irritation (let's try not to be close enough for this one)**
- ***Or something just doesn't look right…***
- **Remember:** ***Assume HazMat & look for clues or warning signs until you confirm the absence of hazardous materials.***

Trust your gut feelings on this – if something just doesn't seem right it usually isn't

This happens to be a spill of Sunny Delight concentrate into a waterway.

RECOGNIZING A HAZMAT INCIDENT:

- **Container shapes:**

What's Wrong With This Picture? Whatever was in these containers wanted out – in a big way. Remember the definition of a hazardous material? This stuff is no long in it's container!

CONTAINERS AND PACKAGES

- **Shape may be a clue to the contents:**
  - **Container shape**
  - **Package shape**
  - **Truck**
  - **Tank.**

Look at this picture – if this truck was leaking we could determine a safe stand off distance from the ERG just by the shape. More on this later.

PRESSURIZED GAS CYLINDERS

- **NEVER use cylinder color to determine contents!.**

These cylinders happen to contain CO2 – but do not assume that all black cylinders contain CO2.

CONTAINER SHAPES - CRYOGENIC

A refrigerated, liquefied gas that has a boiling point ***colder than -90°C (-130°F) at*** atmospheric pressure.

This photo is from the parking lot of JCF Hospital – liquified oxygen in cryogenic containers can be seen.

What is the danger to responders with cryogenics?

We have lots of these in our mountain counties – remember – a propane incident is still a hazmat

How about transportation incidents ---- let's take a look at a scenario…see if you can spot the clues…

TRANSPORTATION INCIDENTS

First On-scene, and you see this:

So – you are first on scene of a accident involving a big-rig tank truck. What are you going to do?

Number One – you keep yourself safe by recognizing the clues that shout "HAZMAT!" – the red placard and shape of the tank are big clues!

Number Two – you keep yourself safe by staying away from it. You may be in great danger by splashing through this incident.

Number Three - you must identify it. But how can you when you can't get close?

We can use the shape of the truck trailer for one, and the placard for another…. **Let's take the tank shape first.**

DOT SPEC VEHICLES (PAGE 12/13 ERG)

- **DOT/TC 406:**
- **Carries gasoline or other flammable and combustible materials**
- **Oval-shaped tank**
- **MAWP – max allowable working pressure 3-15 psi.**

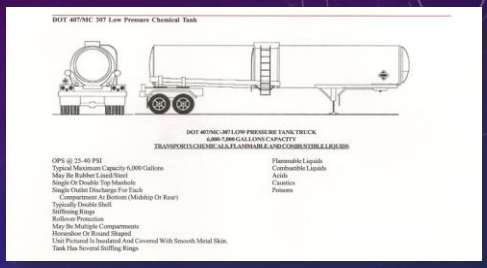
Look at pages 12-13 in your 2020 ERG – all the silhouettes are shown here, with the Guide Number that you can reference in a black circle.

Why? Because if you are approaching a scene and can only see the general shape of the truck trailer then you can still get a Guide Number and that gives you a safe isolation distance.

So for our incident you recognize that this is a DOT 406 with a Guide Number of 131

DOT SPEC VEHICLES

- **DOT/TC 407:**
- **Round or horseshoe shaped tank**
- **Carries 6000 to 7000 gal (MAWP >25 PSI)**
- **Flammable liquids, mild corrosives, and poisons.**



Take a look at the other types of tank trucks that are shown in the ERG:

This is a DOT 407 - Greater psi allowable here, with a smaller diameter for heavier liquids and strengthening rings for greater pressure. It might be insulated and covered with a skin that makes its silhouette a horseshoe shape.

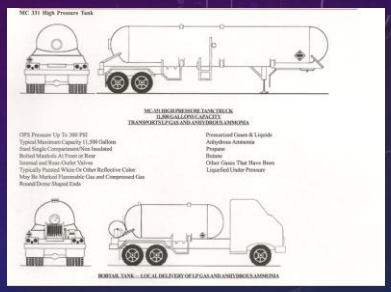
DOT SPEC VEHICLES

- **DOT/TC 412:**
- **For corrosive substances**
- **Round - Smaller diameter**
- **Reinforcing rings**
- **MAWP > 15 psi**
- **Holds 6000 gal.**

The DOT 412 is for even heavier liquids with rings for added strength and a smaller round cross-section. You might see this type of tanker carrying water (yes, just plain old drinking water) because water is heavy – 8.34 lbs. per gallon (6000 gallons would weight over 50 thousand pounds!)

DOT SPEC VEHICLES

- **MC/TC 331:**
- **Carries materials like ammonia, propane, and butane**
- **Rounded ends**
- **MAWP 100-500 psi**
- **Significant explosion hazard.**



We see lots of these on the road – “bobtail” trailers carrying propane. Significant explosion hazards with release and fire.

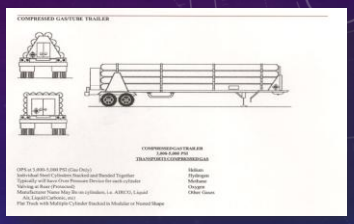
DOT SPEC VEHICLES

- **MC/TC 338:**
- **Cryogenic liquid tank**
- **Tank insulation**
- **Boxlike structure at end**
- **MAWP 25-500 psi**
- ***Contents can be at -400 ℉.***

Liquid Oxygen @ -297 degrees, liquid hydrogen at -423 degrees. Would this be a hazard to your?

DOT SPEC VEHICLES

- **Tube Trailer:**
- **Carry compressed gases**
- **Several individual cylinders banded together and affixed to a trailer**
- **Large-volume cylinders operate at 3000 psi to 5000 psi.**



Very high pressure in these tubes.

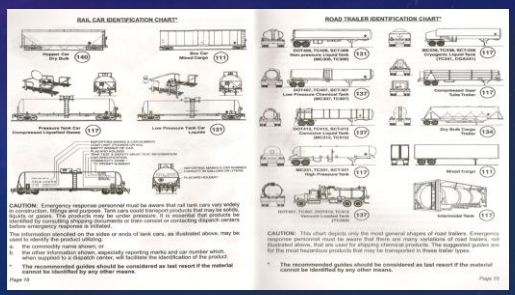
DOT SPEC VEHICLES

- **Dry Bulk Cargo:**
- **Powders, pellets, fertilizers, or grain**
- **Not pressurized**
- **May use pressure to off-load product**
- **Generally V-shaped with rounded sides.**

We see these carrying dry bulk cargo such as livestock feed, grains and fertilizer.

DOT SPEC VEHICLES

- **Where do you find this information?**
- **Remember the ERG app!**
- **Start page, go to Search by Image, tab at the top of the page Road Trailers.**



The ERG is where you go FIRST! THEN go to the Guide Number…

TRANSPORTATION INCIDENTS

Back to our incident:

- **Find the road trailer, DOT 406, find the black circle with a three=digit number, click on that and it will take you to the correct Guide Number page**
- **In this case, Guide Number 131.**

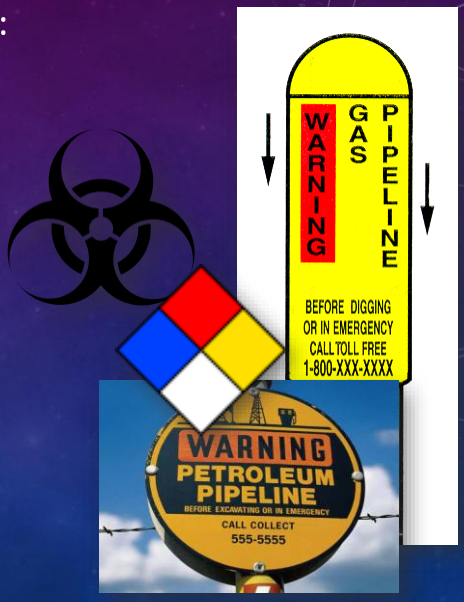
So - We can use the shape of the truck trailer – what is this tank and what Guide Number would you use? Oval shape - DOT 406, Guide Number 131

What does Guide Number 131 tell us?

It may be carrying Flammable Liquids – Toxic, just that alone makes you want to stay far, far away. More on using the rest of the information on these two Guide pages later in this course.

OTHER WARNING SIGNS: SPECIAL MARKINGS

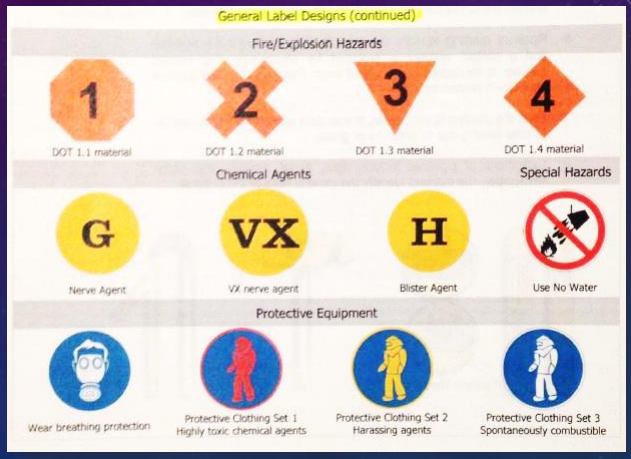
- Biohazard sign
- Military markings
- Pipeline markers
- Placards and labels
- NFPA 704
- ***We need to identify this stuff..***



Let's take a look at these in the next section…

This section covers how we can identify the materials before they cause injury

MILITARY MARKINGS



These are not going to be found without an escort of military personnel. And that's a good thing.

Look at your IRPG page 37: U.S. Army Operations Center for incidents involving explosives and ammunition: **(703) 697-0218**

The United States military tries to use markings such as the Department of Transportation (DOT) placards, labels, and NFPA 704 as much as possible both while materials are in transportation and once stored at a fixed facility.

However, there are times when a special marking system developed by the military must be used. The primary reason for this is that the military marking system is not language dependent

The military uses the marking systems within facilities when working around ammunition such as rockets, missiles, and other devices.

First Row (Fire and Explosion Hazards):

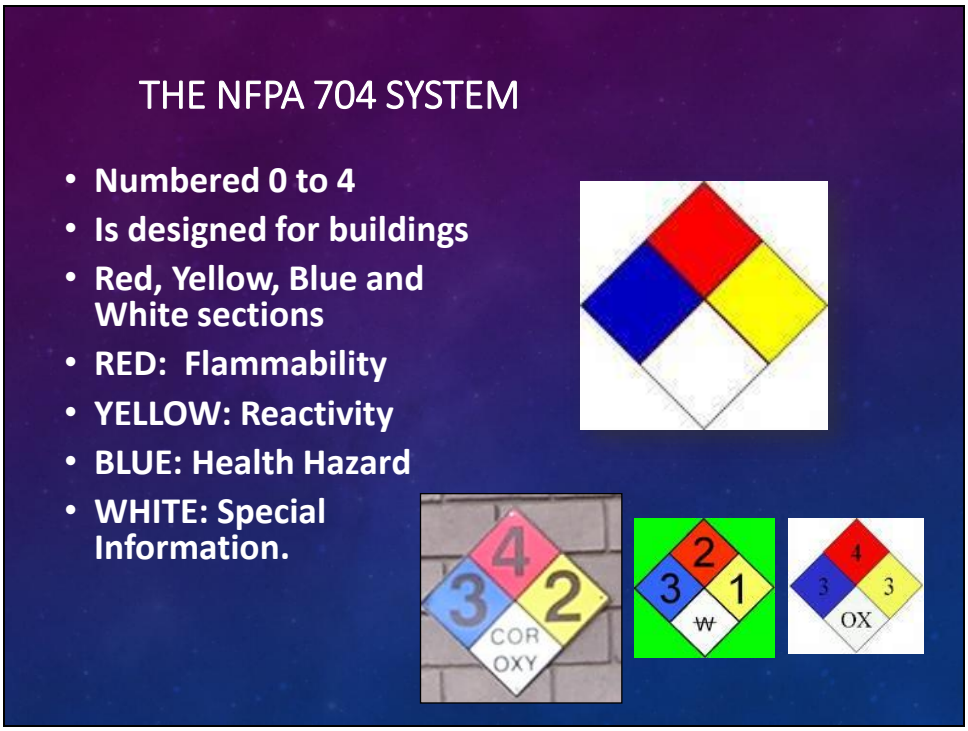
Octagon = DOT 1.1 Material

X = DOT 1.2 Material

Inverted Triangle = DOT 1.3 Material
Diamond = DOT 1.4 Material

Second Row (Chemical Agents)
G = Nerve Agent
VX = VX Nerve Agent
H = Blister Agent
Special Hazard: Use No Water (Water Reactive)

Third Row (Protective Equipment)
Wear Breathing Protection
Protective Clothing Set 1 (Red) for Highly Toxic Chemical Agents
Protective Clothing Set 2 (Yellow) for Harassing agents
Protective Clothing Set 3 (Silver/white) for Spontaneously Combustible



We will see these – the NFPA 704 system designed for fixed facilities. It doesn't give specific information on what is in there, just the main hazards

Red is for flammability

Yellow is for reactivity – if it will readily explode

Blue is for health hazards

White is for special information - Special information in the white quadrant includes corrosives, oxidizers and don't put water on it.

0 means no hazard, 4 means very hazardous.

DOT PLACARDS AND LABELS

- **9 Hazard classes/with associated placards;**
  - **Colors**
  - **Symbols**
  - **Class Numbers**
- **See list in your 2024 ERG app:**
- **Start page, Reference Materials, Hazard Classification, Hazard Classification System**
- **See placards by touching Search by Image.**

The DOT requires transportation of hazardous goods to be placarded – there are nine classes.

The nine hazard classes are shown by placards of different colors symbols and class numbers. On page 6 in your ERG you will find a list of all the hazard classes and subclasses, on pages 8-9 are all the placards with the associated Guide Numbers.

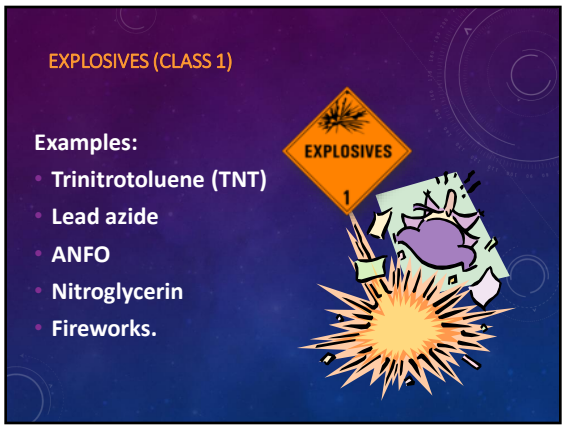
Why do we need this? Because if all you can see (from a safe distance) is a placard you can still get an idea of the isolation distances.

THE NINE HAZARD CLASSES

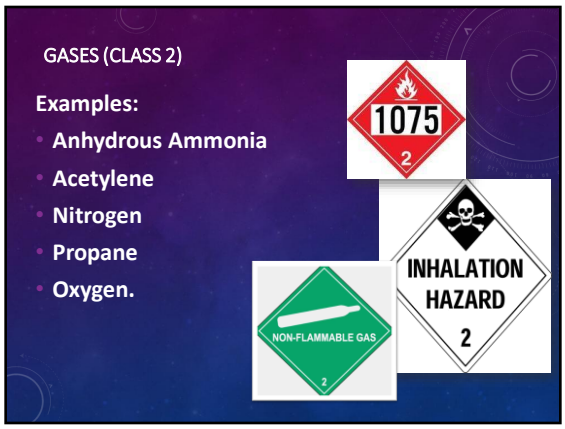
- **Class 1 – Explosives**
- **Class 2 – Gases**
- **Class 3 – Flammable Liquids**
- **Class 4 – Flammable Solids**
- **Class 5 – Oxidizers and Organic Peroxides**
- **Class 6 – Toxic/Poison**
- **Class 7 – Radioactive**
- **Class 8 – Corrosives**
- **Class 9 – Miscellaneous Hazardous Materials.**

Remember – classes and divisions listed on page 6 in your ERG. You don't have to memorize these because you will always have an ERG to reference – RIGHT?

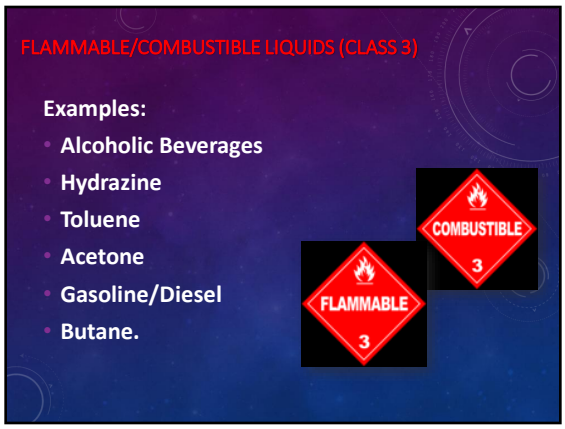
Let's take a look at each class -



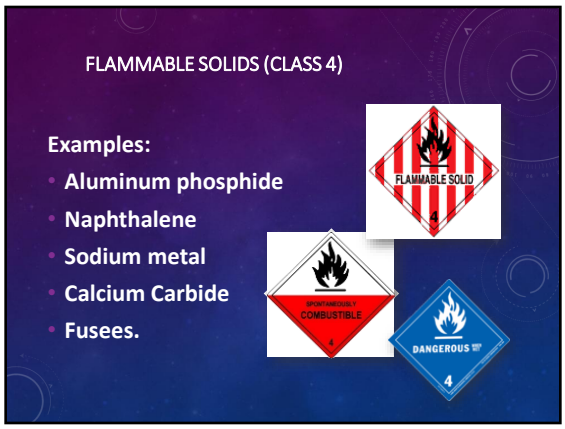
ANFO = Ammonium Nitrate Fuel Oil, consists of prilled ammonium nitrat
Trinitrotoluene is called TNT
Lead azide is NOT in the ERG – it is not considered safe enough to transp
And yes, fireworks will be placarded when transported



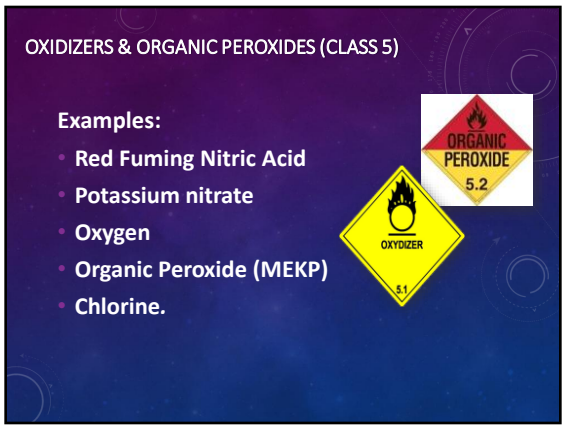
Gasses can be three different colors – Class 2 has divisions of flammable (red), nonflammable (green) and toxic (white). Does the green placard mean there is no danger? NO – still a gas under pressure.



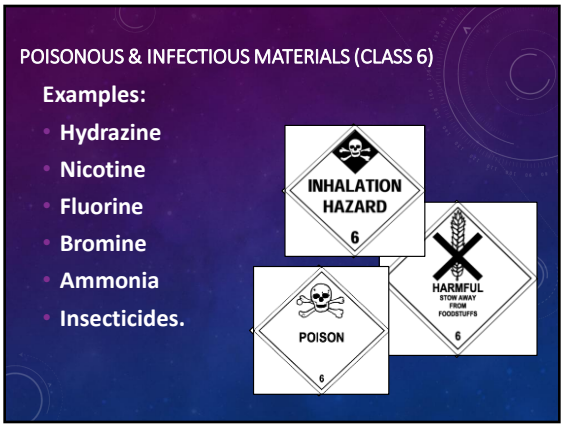
Yes, alcoholic beverages can be placarded! The main materials we will see will be gasoline and diesel.



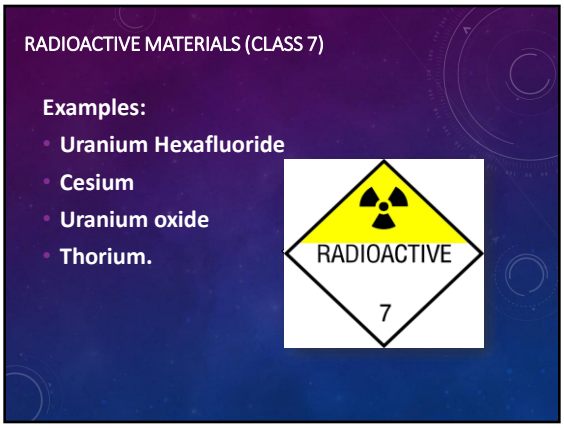
Your fusees will be in a box with the red and white striped placard label – they are a flammable solid.



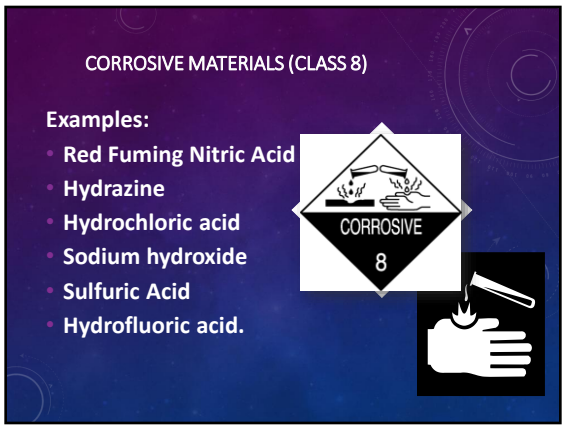
Remember the fire triangle – fuel, heat and oxygen. With any oxidizer, you do not need another source of oxygen – that's why they are considered highly dangerous for fire situations – they add oxygen to the fire.



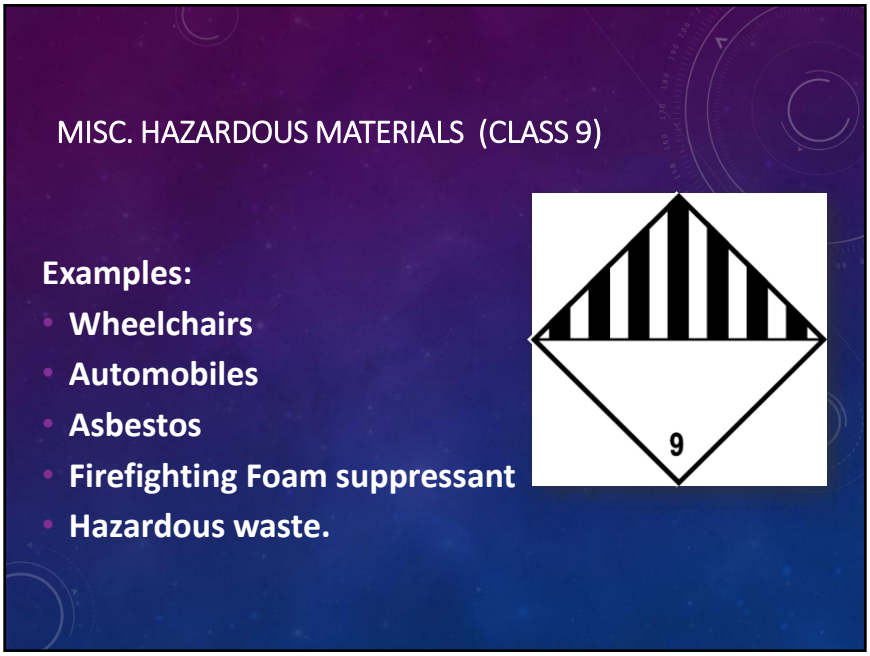
Yes, nicotine is considered poisonous…..



This one is pretty well –known. There are various classes of radioactivity, take a look at the various placards on page 9 in your ERG.



Corrosives include both bases and acids – at either end of the pH scale, defined as: A **corrosive substance** is one that will destroy and damage other substances with which it comes into contact" hence the pictogram showing a test tube spilling a liquid on a human hand and a bar of metal (and dissolving both of them) – NOT something you want to come in contact with!



The miscellaneous hazardous material is a material that presents a hazard during transportation but which does not meet the definition of any other hazard class.

This class includes:

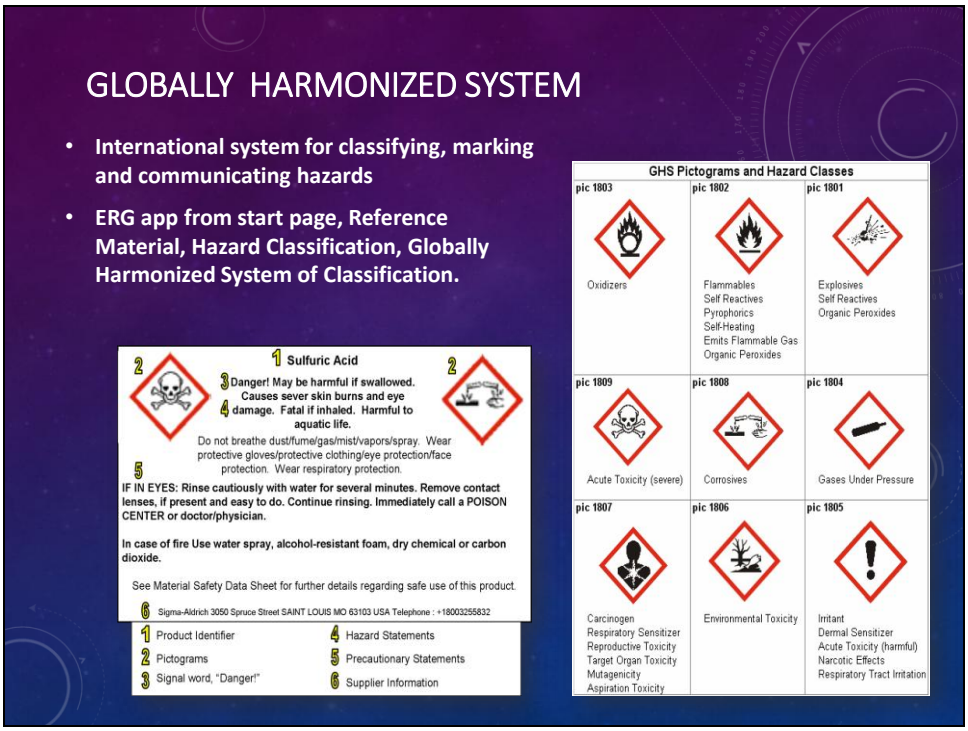
Any material which has an anesthetic, noxious or other similar property which could cause extreme annoyance or discomfort so as to prevent the correct performance of assigned duties; or

Any material that meets the definition in 49 CFR 171.8 for an elevated temperature material, a hazardous substance, a hazardous waste, or a marine pollutant. And yes, your firefighting foam suppressant would have this placard.

PLACARDS AND LABELS

- **Remember: Placards on pages 8-9 of ERG**
- **Know the placard limits:**
  - **Multiple and subsidiary hazards**
  - **"Dangerous" placard:**
    - **Used when two or more different categories are shipped together**
  - ***Used for mixed loads of over 1001 lbs.***

The Dangerous placard is for mixed loads – anything could be in there!



The **Globally Harmonized System of Classification and Labelling of Chemicals** (**GHS**) is an internationally agreed-upon standard managed by the United Nations that was set up to replace the assortment of hazardous material classification and labelling schemes previously used around the world. Core elements of the GHS include standardized hazard testing criteria, universal warning pictograms, and harmonized safety data sheets which provide users of dangerous goods with a host of information.

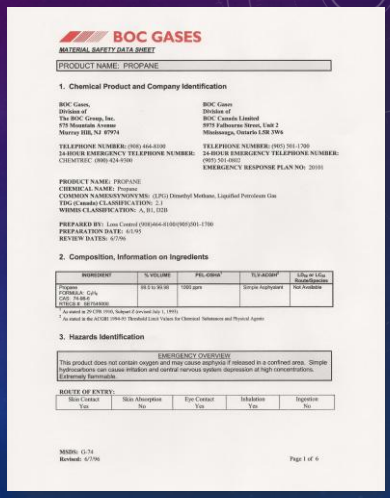
The system acts as a complement to the UN Numbered system of regulated hazmat transport. Implementation is managed through the UN Secretariat.

Although adoption has taken time, as of 2017, the system has been enacted to significant extent in most major countries of the world.

In a Truck: Bill of Lading (In cab near driver seat or with driver);
In an Airplane: Air Bill (With pilot, usually in cockpit);
In a Rail car: Waybill and Consist (With crew, usually conductor);
On a Marine Vessel: Dangerous Cargo Manifest (On bridge. For barges – in

MATERIAL SAFETY DATA SHEETS

- **Should be available for each product in the workplace**
  - **Required by OSHA Hazard Communication Regulations**
- **Provides valuable information:**
  - **Chemical/physical properties**
  - **Toxicity**
  - **Flammability**



BOC GASES

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PROPANE

1. Chemical Product and Company Identification

BOC Gases,
Division of
The BOC Group, Inc.
575 Mountain Avenue
Murray Hill, NJ 07974

BOC Gases
Division of
BOC Canada Limited
5975 Falbourne Street, Unit 2
Mississauga, Ontario L5R 3W6

TELEPHONE NUMBER: (908) 464-8100
24-HOUR EMERGENCY TELEPHONE NUMBER:
CHEMTREC (800)-424-9300

TELEPHONE NUMBER: (905) 501-1700
24-HOUR EMERGENCY TELEPHONE NUMBER:
(905) 501-0802
EMERGENCY RESPONSE PLAN NO: 20101

PRODUCT NAME: PROPANE
CHEMICAL NAME: Propane
COMMON NAMES/SYNONYMS: (LPG) Dimethyl Methane, Liquified Petroleum Gas
TDG (Canada) CLASSIFICATION: 2.1
WHMIS CLASSIFICATION: A, B1, D2B

PREPARED BY: Loss Control (908)464-8100/(905)501-1700
PREPARATION DATE: 6/1/95
REVIEW DATES: 6/7/96

2. Composition, Information on Ingredients

INGREDIENT	% VOLUME	PEL-OSHA[1]	TLV-ACGIH[2]	LD$_{50}$ or LC$_{50}$ Route/Species
Propane FORMULA: C_3H_8 CAS: 74-98-6 RTECS #: TB7400000	95.0 to 99.99	1000 ppm	Simple Asphyxiant	Not Available

[1] As stated in 29 CFR 1910, Subpart Z (revised July 1, 1993).
[2] As stated in the ACGIH 1994-95 Threshold Limit Values for Chemical Substances and Physical Agents

3. Hazards Identification

EMERGENCY OVERVIEW

This product does not contain oxygen and may cause asphyxia if released in a confined area. Simple hydrocarbons can cause irritation and central nervous system depression at high concentrations. Extremely flammable.

ROUTE OF ENTRY:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

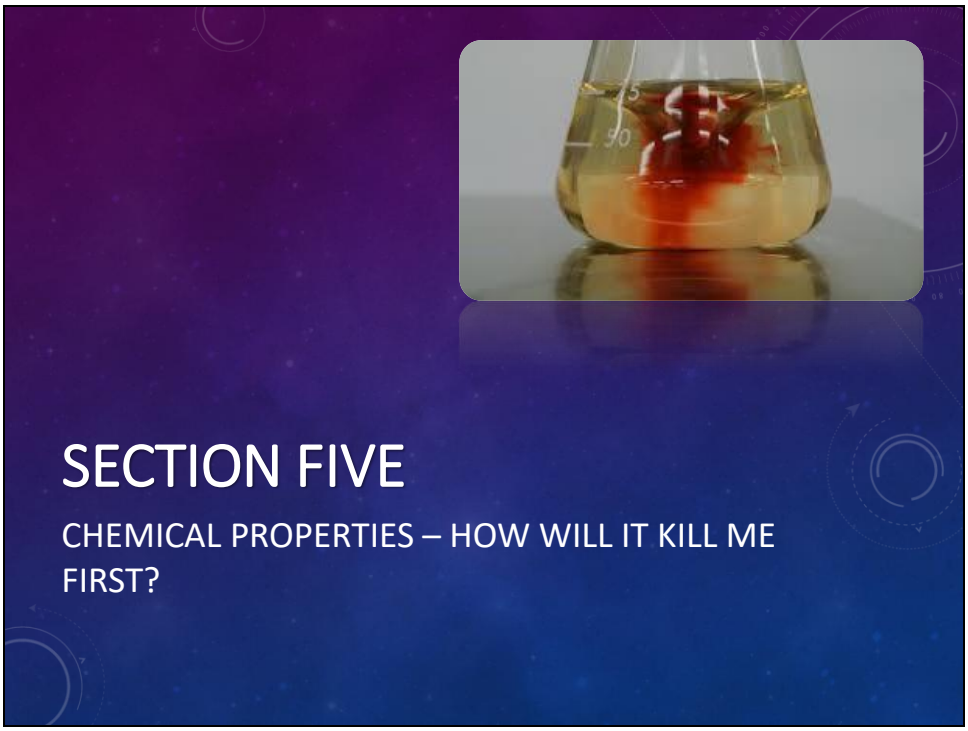
MSDS: G-74
Revised: 6/7/96

Page 1 of 6

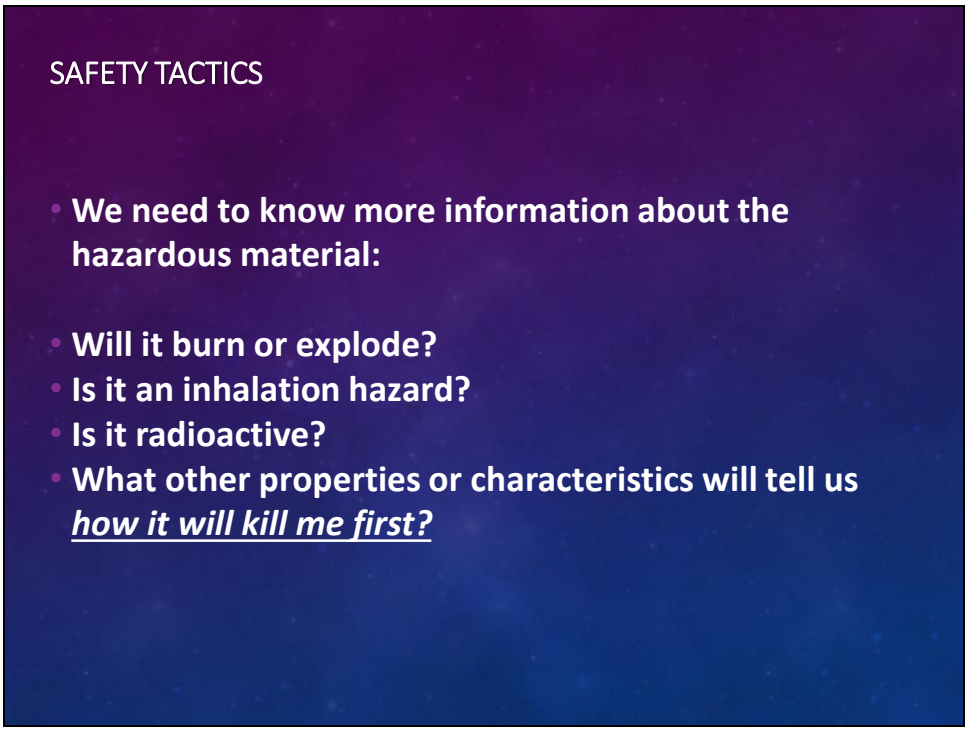
The MSDS will have the following information:
Chemical name.
Company identification.
Hazard identification.
Response information.

Chemical/physical properties, etc.

But – WHY do we need to know this information?



This section covers how we can identify the materials worst-case scenario – and keep ourselves safe



We can't just go rushing into a hazmat incident. We need as much information about the substance as we can get.

WE NEED MORE INFORMATION

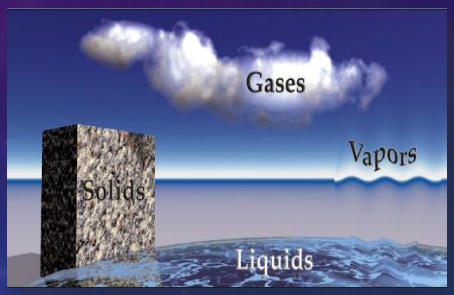
- **The physical properties will tell us where to position ourselves for safety and what to watch out for during this incident:**
  - **Boiling point**
  - **Flash point**
  - **Specific gravity / vapor density**
  - **Vapor Pressure**
  - **pH**
  - **Radioactivity levels and type.**

Why do we need to know these things? How it will hurt or kill me or other responders/public. Where can we get this information? Programs such as WISER are available for free(more on WISER later) The MSDS also lists all pertinent chemical properties.

What are the elements of the fire triangle?. Fuel, oxygen and heat – and remember that a solid or liquid fuel will NOT burn unless it is heated enough to give off vapors. The vapors burn, not a solid or liquid fuel.

#1: FUEL – WILL IT BURN?

- **Fuel is in three physical states:**
  - **Solid**
  - **Liquid**
  - **Vapor/Gas**
- ***Combustion only occurs when fuel is in a gas or vapor state.***



Number One – you need some sort of fuel.

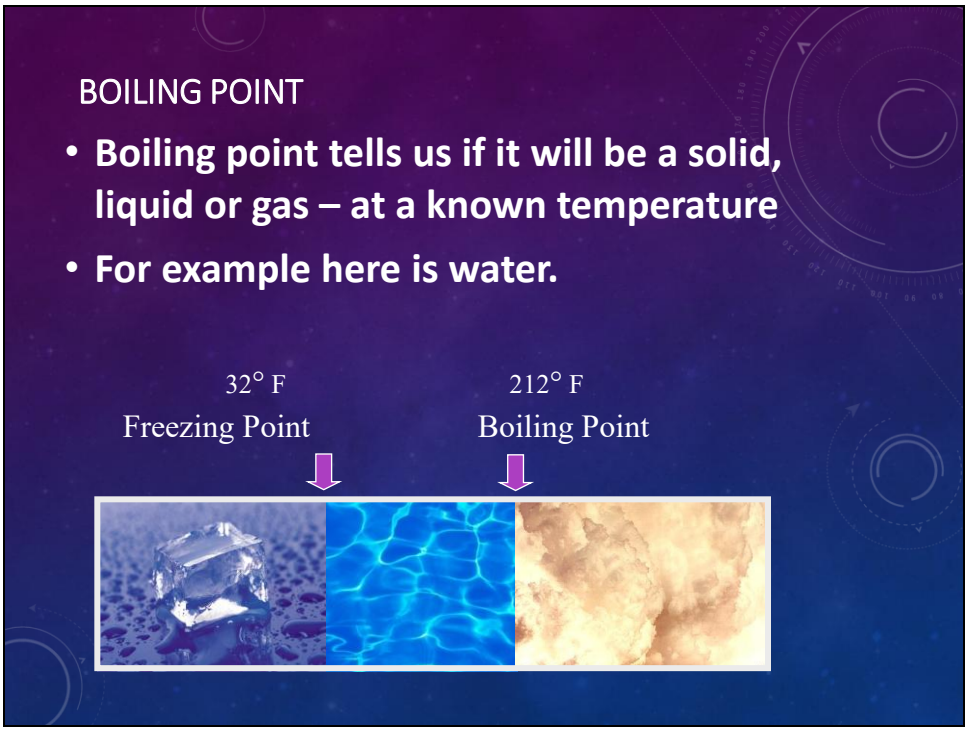
REMEMBER; combustion ONLY occurs when the fuel is in a gas or vapor state – NOT when it is a solid or a liquid (solids and liquids do NOT burn!). The fuel must be hot enough to produce gas/vapor or you will not have fire.

But certain materials will vaporize at lower temperatures so we need to know this. Certain properties will let us know when the fuel can burn.

HAZMAT FLAMMABILITY

- **What Properties Tell Us If It Will Explode Or Burn?**
- **Boiling Point (BP)**
- **Flash Point (FP)**
- **Flammable Range (FR).**

Let's take a look at each one of these…

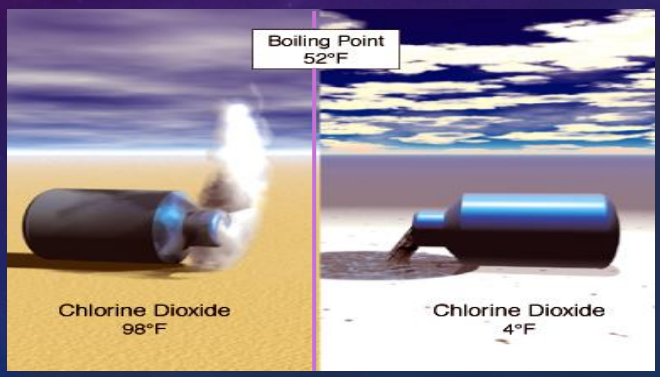


Boiling point tells us when it gives off vapors that might burn

What is this compound that is a solid below 32 degrees F and a gas/vapor above 212 degrees F? Water – dihydrogen oxide.

BOILING POINT

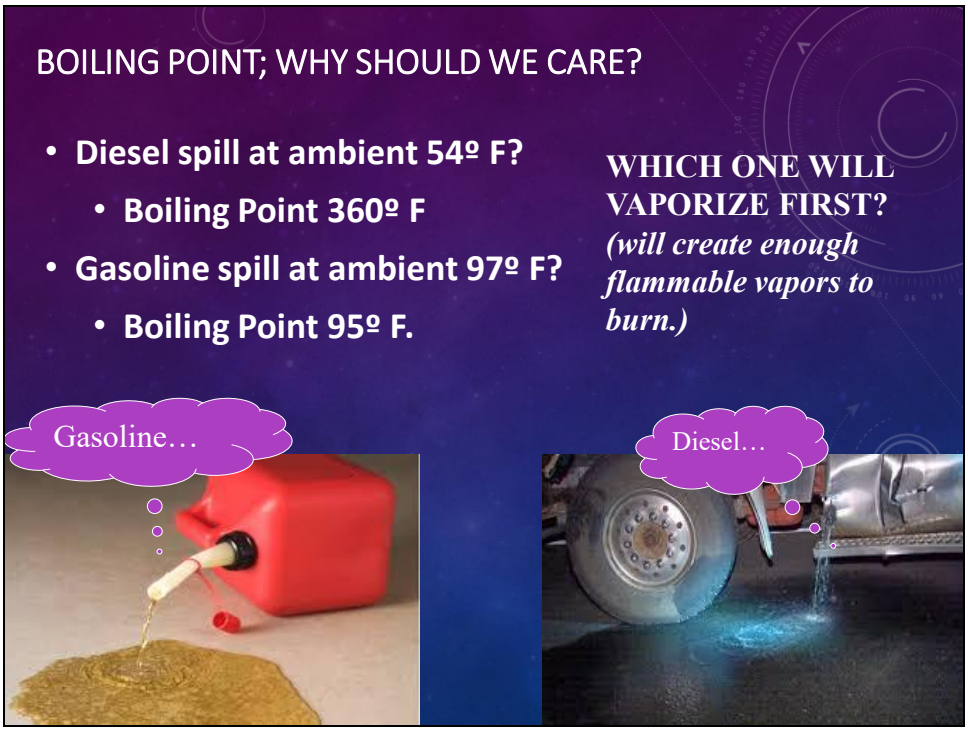
- **Boiling Point (BP):**
  - **<u>The temperature a material will begin to vaporize.</u>**



So, we need to know when a material will be in it's gaseous state and therefore able to be a fuel and burn: in other words when it is above its boiling point.

That depends on its temperature. Here we have two containers of chlorine dioxide – UN 9191, Guide Number 143, kinda nasty stuff

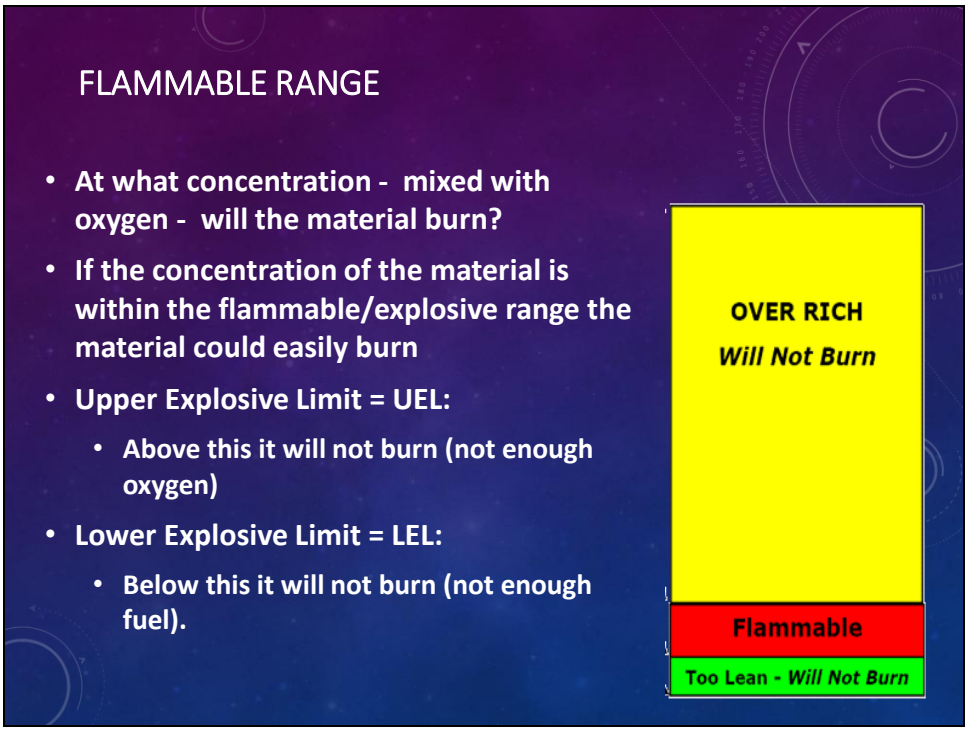
If its boiling point is above 52 degrees F – it will be a liquid at 4 degrees F and a vapor at 98 degrees F. **At what temperature will it be able to burn?????**



So – why should we care?

Here are two fuel spills – one of diesel in the winter, and one of gasoline in the summer.

Based on the boiling point and the ambient temperature – the gasoline will be much more of a potential problem than the diesel spill, because it will create enough vapors at 95 degrees F to burn – the diesel will not create vapors at 56 degrees F. (In fact you would have to heat up the diesel fuel to burn: Glow plugs, grid heaters and block heaters help achieve high temperatures for combustion of diesel fuel during engine startup in cold weather.)



Besides temperature we must take into account the concentration when mixed with air (oxygen). Too rich or too lean it will NOT burn. This is why the gasoline in your car's tank will not explode until breached – not enough oxygen in the intact tank to burn.

The flammable range is different for each material – let's take a look at some ranges:

FLAMMABLE RANGE

The Wider the Range the More Dangerous it is in Terms of Flammability:

Chemical	LEL	UEL
Gasoline	1.7%	7.6%
Acetone	2.6%	12.6%
Ethylene Oxide	3%	100%
Propane	2.1%	9.5%

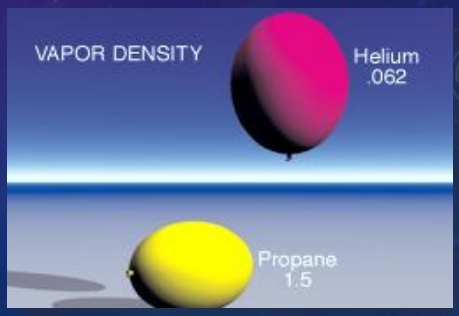
So – which one is more dangerous to us? Ethylene oxide carries its own oxygen, so it will burn at 100% concentration.

Gasoline has much less of a range; 1.7% up to a concentration of 7.6%.

But look at propane – which we have through this County – 2.1 to 9.5% - that's all , it won't burn below that or above that**.. However, the real problem with propane is its vapor density – we have to know where it will go…**

#2: GAS VAPOR DENSITY – WHERE WILL IT GO?

- **Vapor Density:**
  - **Weight of a gas compared to air (air = 1.0)**
  - **Gas with vapor density less than 1.0 will rise**
  - **Gas with vapor density greater than 1.0 will settle**
  - **Knowing vapor density helps predict *where* the danger will be.**



Look at the difference between helium (and where it will go) and propane and where IT will go – what is a problem with propane? It will go downhill, it will find an ignition source and flash back to the tank.

This is a problem with flammable gasses as well as those that are hazardous to health. Confined space programs deal with this as a major part of the program – because WE need a certain amount of oxygen to function too.

CONFINED SPACE AND VAPOR DENSITY

- **A confined space compounds the problem of vapor density by allowing the gas to accumulate; either pushing out the available oxygen or by becoming toxic**
- **And remember: most gases are colorless, odorless and tasteless**
- **We can get in trouble before we know it;**
  - ***Unless we have a high index of suspicion!***

Don't become a canary - The classic example is the "canary in the coal mine". The idea of placing a canary or other warm blooded animal in a mine to detect carbon monoxide was first proposed by John Scott Haldane, in 1913 or later. Well into the 20th century, coal miners brought canaries into coal mines as an early-warning signal for toxic gases, primarily carbon monoxide.

Do we still go into confined spaces without considering the atmosphere? Yes, we do…

SAFETY: IDLH ATMOSPHERE

- ***Remember: Inhalation is the #1 route of exposure!***
- ***"IDLH" = Immediately Dangerous to Life and Health:***
- **"…refers to an atmospheric concentration of any toxic, corrosive, or asphyxiate substance that poses an immediate threat to life or that would interfere with an individual's ability to escape from a dangerous atmosphere."**

IDLH means the amount of a gas/vapor in the atmosphere that will either kill you or prevent you from escaping the danger. It is measured in PPM (parts per million) and is usually very, very small amounts.

SAFETY: SOME IDLH EXPOSURE VALUES:

- **Acetone vapor = 2500 ppm**
- **Ammonia gas = 300 ppm**
- **Carbon Monoxide = 1200 ppm**
- **Hydrogen Sulfide = 100 ppm**
- **Hydrogen Cyanide = 50 ppm**
- **Chlorine gas = 10 ppm**
- **Toluene Diisocyanate = 2.5 ppm**
- **Phosgene = 2 ppm**
- **Sarin = 0.03 ppm**
- **Mustard gas = 0.0005 ppm.**

PPM is parts per million. There are 400 sextillion (10^{21}) molecules in one cubic inch of air. A million is 10^{6}. One part per million is approximately 1000 trillion (10^{15}) molecules in each cubic inch of air (1,000,000,000,000,000 molecules). We breathe in about 800 cc with each inspiration. So with each breath we could be inhaling nine times the amount that will kill us.

Toluene Diisocyanate comes from memory foam when burned (think about taking your SCBA off in a structure fire). Phosgene is a by-product of meth labs.

This section covers how we can protect ourselves using PPE (IF we have it…)

PPE – *THE RESPONDERS BEST FRIEND*

- **Four levels of chemical protective equipment used in hazardous materials response.**

There are four levels of PPE used to protect ourselves in a hazardous materials incident…

PPE – *THE RESPONDERS BEST FRIEND*

- **Level A – vapor/liquid tight (encapsulating)**
- **SCBA inside suit.**

Highest level of protection – only Tech/Spec can use this level as it takes a higher level of skill and training to use, the Self Contained Breathing Apparatus SCBA needs to be fitted and trained in

PPE – *THE RESPONDERS BEST FRIEND*

- **Level B – not vapor tight, splash protection only, with high respiratory protection**
- **SCBA over suit.**

This level is only when you KNOW what material you are dealing with because it is splash protection only (but high respiratory protection with the SCBA). It is generally used for technical decontamination.

PPE – *THE RESPONDERS BEST FRIEND*

- **Level C – level B with APR instead of SCBA, splash with minimal respiratory protection**
- **Air Purifying Respirator (APR) only – with chemical-specific canisters.**

Since this level uses the APR (Air Purifying Respirator) which takes chemical-specific cartridges – again, you need to know what material you are dealing with

PPE – *THE RESPONDERS BEST FRIEND*

- **So, what's the fourth level?**
- **Level D –normal work unifiorm – *it is not certified for chemical contact, and may act like a "sponge".***

So how safe is this level? Not at all. But it might be all we have.

PPE: *NUMBER ONE LIMITATION*

- **Lack of PPE for hazardous materials:**
  - **We just don't have any!...**

So – if we don't have any proper PPE – then how do we keep ourselves safe????

NUMBER ONE FRA LIMITATION

- **So – how do we protect ourselves?**
- **By recognizing a hazardous materials release and acting accordingly…**

How do we act accordingly – Safety Isolation Notification

This section covers how we can protect ourselves by using what we DO have…

IF YOU THINK YOU HAVE A HAZARDOUS MATERIALS SITUATION…THEN YOU DO HAVE A HAZARDOUS MATERIALS SITIATION!

- **So…What Do You Do?.**

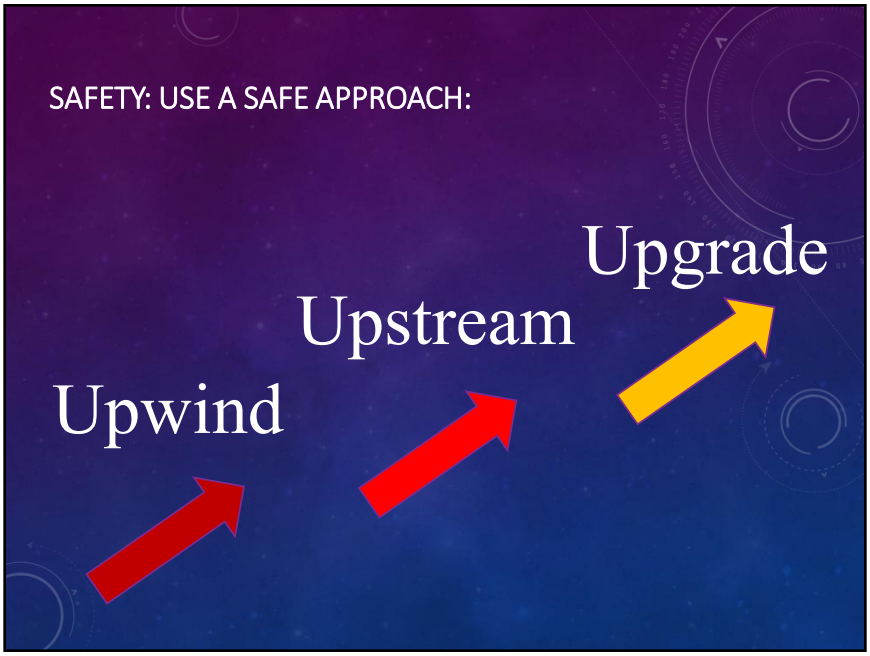
So – what can we do to protect ourselves and others?

YOU NEED TO - *SIN*

1. S = Safety
2. I = ID/Isolation
3. N = Notifications.

SAFETY – ISOLATION - NOTIFICATION

Safety: being able to RECOGNISE that this is a hazardous materials incident is paramount here. Use all the clues you can find to eliminate a hazmat before rushing in to one!



This is the safest place to stage: up in all situations, because…this stuff tends to go down hill and with the wind

SAFETY: HOW DO YOU PROTECT YOURSELF?

- **#1: recognize any possible hazardous material**
- **#2: keep your distance, resist rushing in, approach uphill, upwind, upstream**
- **#3: use ALL your PPE…**

Why a picture of a structure fire? What is in there, on fire? What is under the sink, in the closets, in the garage?

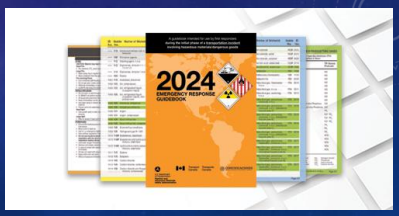
#2: I = *ISOLATION & IDENTIFICATION*

- **Keep bystanders and other responders away**
- **Notify 911:**
  - ***"This is a Hazardous Materials Incident"***
- **Stage upwind/uphill if necessary**
- **Identify the product, if you can**
- **Establish ICS**
- **Flag isolation zones**
- **How large a zone?....**

So for isolation we need to know how large of a zone to flag. Where do we get that information? THE EMERGENCY RESPONSE GUIDE!

ESTABLISH ISOLATION DISTANCE

- **FRAs — usually isolate and deny entry by establishing the isolation distance;**
  - **Use ERG recommendations.**



This is where we really get good at using the ERG -

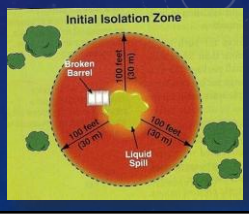
SECTION EIGHT

USING THE 2020 EMERGENCY RESPONSE GUIDE

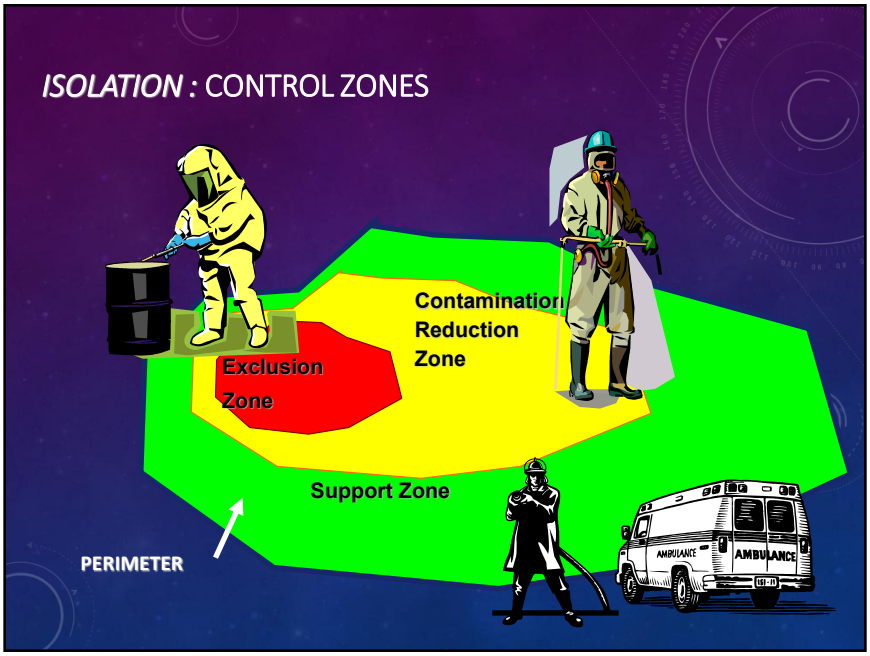
This section covers how we can protect ourselves by using what we DO have…

ISOLATION : CONTROL ZONES

- **Control Zones are established to:**
  - **Secure the scene;**
  - **Control the spread of contamination from a hazardous materials release;**
  - **Ensure the safety and requisite control of emergency services personnel and operations;**
  - **Prevent personnel, vehicles, and other resources from entering a potentially hazardous area.**



Exclusion/Hot Zone — Area of isolation (only responders with proper level of PPE, as d
Contamination Reduction/Warm Zone — Used to control areas such as Decontamination
Support/Cold Zone — Safe area for Command Post, Media, etc. (No protective clothing



Exclusion zone requires the highest level of PPE and knowledge – Tech/Spec only here to stop the release

CRZ – can be one step lower in PPE – used to reduce the contamination – usually 100 feet because the fire engines are in the support zone and can stretch a line to give the required water supply for decon

Support zone for everyone else – fire EMS, LE – no PPE is required here – this is where the First Responder Awareness level personnel should be.

EXCLUSION ZONE

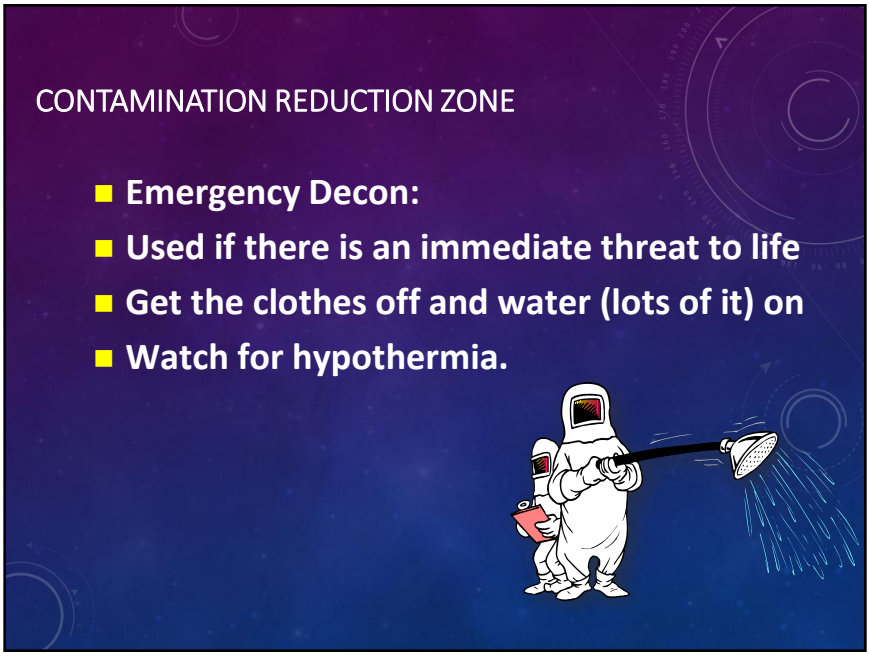
- **Exclusion/Hot Zone/Red Zone:**
- **Highest degree of hazard**
- **Highest degree of PPE required**
- **Highest degree of certification required.**

This is the isolation zone we set per the ERG – and we do NOT go in there at the FRA or FRO levels.

CONTAMINATION REDUCTION ZONE

- **Warm Zone / Contamination Reduction Zone/Yellow Zone:**
- **Lesser degree of hazard**
- **Probably a lesser degree of PPE required**
- **Where contamination is removed (decon).**

Decontamination is performed in this zone – usually 100 feet out from the exclusion zone (because a fire engine in the green zone can stretch a 100 foot line easily into this zone).



And I MEAN emergency here – otherwise there would be a great deal of time needed to set up zones, containment areas and a process of gradually removing contaminated PPE.

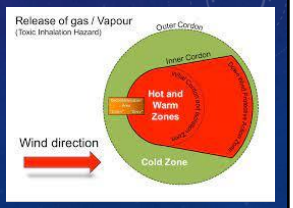
This is get the clothes OFF, get water ON and then get the victim to a hospital.

NOTE: contaminated patients will NOT go by air ambulance (even post-decon) ONLY ground transport and the hospital must be notified

Everyone else is here – no PPE is required in this zone.

PERIMETER CONTROL

- Set the exclusion zone first!
- Determine size/extent of exclusion:
  - Per ERG!
  - Downwind perimeter usually longer;
  - Can be 2-3 times larger than upwind
- Use law enforcement units to secure entry points
- Use vehicles, barricades, cones, tape, personnel, fences, terrain, buildings, etc. to set perimeter.



Set the exclusion zone first! Use law enforcement units to secure entry points. Set the dow
perimeter.

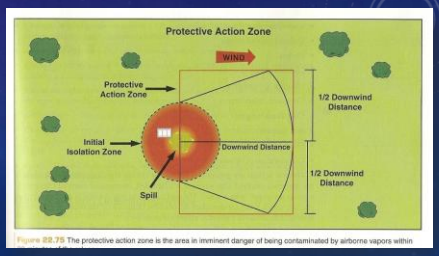
ISOLATION : LIMIT ENTRY TO HOT ZONE

- **Isolate and deny entry:**
  - **DOT Placards are only estimates of the dangers**
  - **We may not even have *that***
- **After recognizing a hazardous material – keep everyone else away.**

Feel like you want to make the red zone even larger? Do it!

ISOLATION : CONTROL ACCESS

- **Deny entry to all**
- **Stage responders not assigned**
- **Establish emergency exit procedures**
- **Establish control zones**
- **Watch for wind shifts**



Why watch for wind shifts? Because you will need to change the zones!

#2: I = *ISOLATION & IDENTIFICATION*

- **How much of an isolation zone???**
- **You first have to identify it -**
- ***USE YOUR INFORMATION SOURCES!***

Identify it – then use the ERG to determine the size of the isolation zone

IDENTIFICATION: INFORMATION SOURCES

- **Identify with:**
  - **NFPA 704 system**
  - **MSDS**
  - **DOT Placarded trucks/containers**
  - **Shipping Papers**
- **Use the Emergency Response Guide app.**

Get all the information you can – then use the ERG. Here is the meat of this course – how to use the ERG

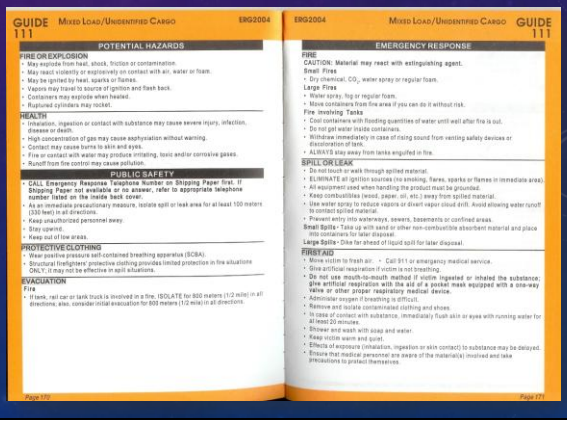
IDENTIFICATION: THE EMERGENCY RESPONSE GUIDE

- **What we use for the first 30 minutes of a hazardous materials incident**
- **Published by the DOT**
- **New edition every four years**
- **THE ERG is our most valuable reference book – it is in all emergency vehicles per OSHA.**

For the first 30 minutes of a hazmat incident -

THE ERG

- **Need a <u>Guide</u> Number in the *Orange Pages:***
- ***If you have NO OTHER INFORMATION USE GUIDE 111…***



GUIDE 111 MIXED LOAD/UNIDENTIFIED CARGO ERG2004

POTENTIAL HAZARDS

FIRE OR EXPLOSION
- May explode from heat, shock, friction or contamination.
- May react violently or explosively on contact with air, water or foam.
- May be ignited by heat, sparks or flames.
- Vapors may travel to source of ignition and flash back.
- Containers may explode when heated.
- Ruptured cylinders may rocket.

HEALTH
- Inhalation, ingestion or contact with substance may cause severe injury, infection, disease or death.
- High concentration of gas may cause asphyxiation without warning.
- Contact may cause burns to skin and eyes.
- Fire or contact with water may produce irritating, toxic and/or corrosive gases.
- Runoff from fire control may cause pollution.

PUBLIC SAFETY
- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.

PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it may not be effective in spill situations.

EVACUATION

Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

Page 170

ERG2004 MIXED LOAD/UNIDENTIFIED CARGO GUIDE 111

EMERGENCY RESPONSE

FIRE

CAUTION: Material may react with extinguishing agent.

Small Fires
- Dry chemical, CO_2, water spray or regular foam.

Large Fires
- Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.

Fire Involving Tanks
- Cool containers with flooding quantities of water until well after fire is out.
- Do not get water inside containers.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK
- Do not touch or walk through spilled material.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Keep combustibles (wood, paper, oil, etc.) away from spilled material.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- Prevent entry into waterways, sewers, basements or confined areas.

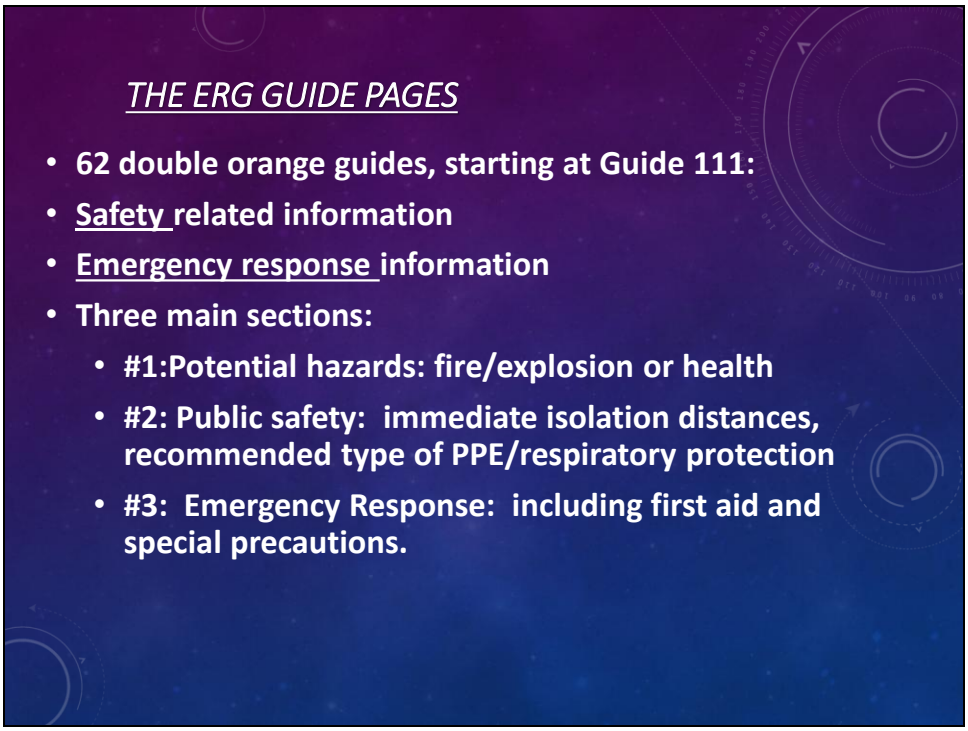
Small Spills - Take up with sand or other non-combustible absorbent material and place into containers for later disposal.

Large Spills - Dike far ahead of liquid spill for later disposal.

FIRST AID
- Move victim to fresh air. • Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- **Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Shower and wash with soap and water.
- Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

Page 171

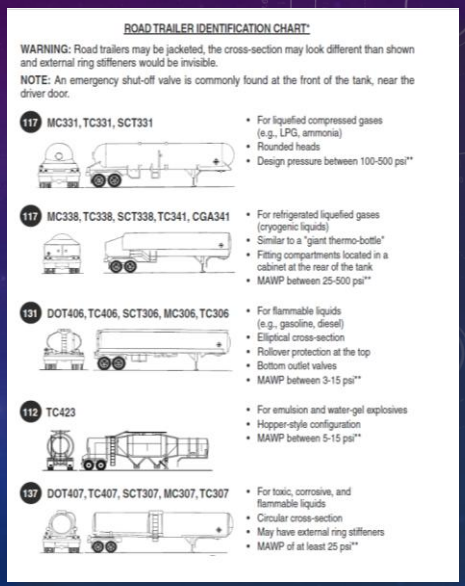
And remember: No other information – use guide number 111



When you turn to a Guide Number you will have two main sections to reference – at the top of the left page will be either the words "FIRE/EXPLOSION" or "HEALTH" – that is how this stuff will kill you first

GATHER INFORMATION BY CONTAINER SHAPE

- **By rail car ID**
- **By Trailer ID**
- **The circled number is the Guide to use.**



ROAD TRAILER IDENTIFICATION CHART*

WARNING: Road trailers may be jacketed, the cross-section may look different than shown and external ring stiffeners would be invisible.

NOTE: An emergency shut-off valve is commonly found at the front of the tank, near the driver door.

117 MC331, TC331, SCT331
- For liquefied compressed gases (e.g., LPG, ammonia)
- Rounded heads
- Design pressure between 100-500 psi**

117 MC338, TC338, SCT338, TC341, CGA341
- For refrigerated liquefied gases (cryogenic liquids)
- Similar to a "giant thermo-bottle"
- Fitting compartments located in a cabinet at the rear of the tank
- MAWP between 25-500 psi**

131 DOT406, TC406, SCT306, MC306, TC306
- For flammable liquids (e.g., gasoline, diesel)
- Elliptical cross-section
- Rollover protection at the top
- Bottom outlet valves
- MAWP between 3-15 psi**

112 TC423
- For emulsion and water-gel explosives
- Hopper-style configuration
- MAWP between 5-15 psi**

137 DOT407, TC407, SCT307, MC307, TC307
- For toxic, corrosive, and flammable liquids
- Circular cross-section
- May have external ring stiffeners
- MAWP of at least 25 psi**

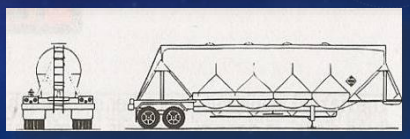
First – from the farthest away the container shape.

By container shape I mean the identification of the rail car or road trailer that is carrying the material. So, by staying farthest away from the incident we can make out the shape of the trailer – look for that shape on page 12 or 13 in the ERG, find the Guide Number and go to that guide page.

For example = see the next pages

GATHER INFORMATION BY CONTAINER SHAPE

- **What is the immediate isolation distance for this incident?:**
- **Guide #134**
- **75 feet**
- **How far do you isolate?**
- **75 feet**
- **If it's on fire?**
- **½ mile.**



You arrive on scene and see this: what is the immediate isolation distance?

First go to page 12-13 in the ERG – what is the name of this trailer? **Dry bulk container**.

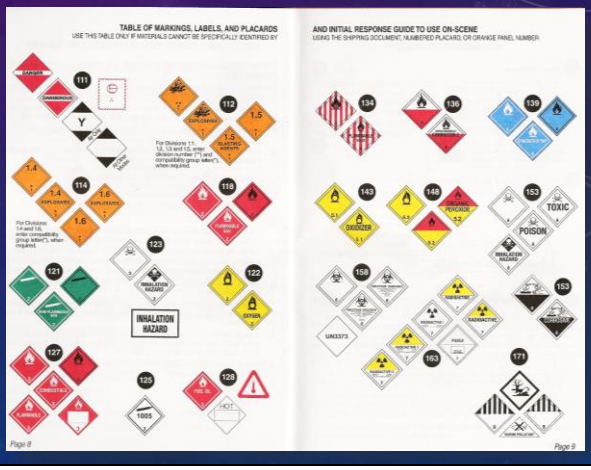
What is the Guide Number to use? **Guide 134, so turn to that guide page**

Under Public Safety – second bullet point – what is the immediate isolation distance to use here? **75 feet in all directions**. If it is a large spill – go for 330 feet (notice there is no distance for liquids because this is a DRY bulk container)

What if it is on fire? ½ mile with an additional evacuation for that ½ mile in all directions if needed.

GATHER INFORMATION BY DOT PLACARD

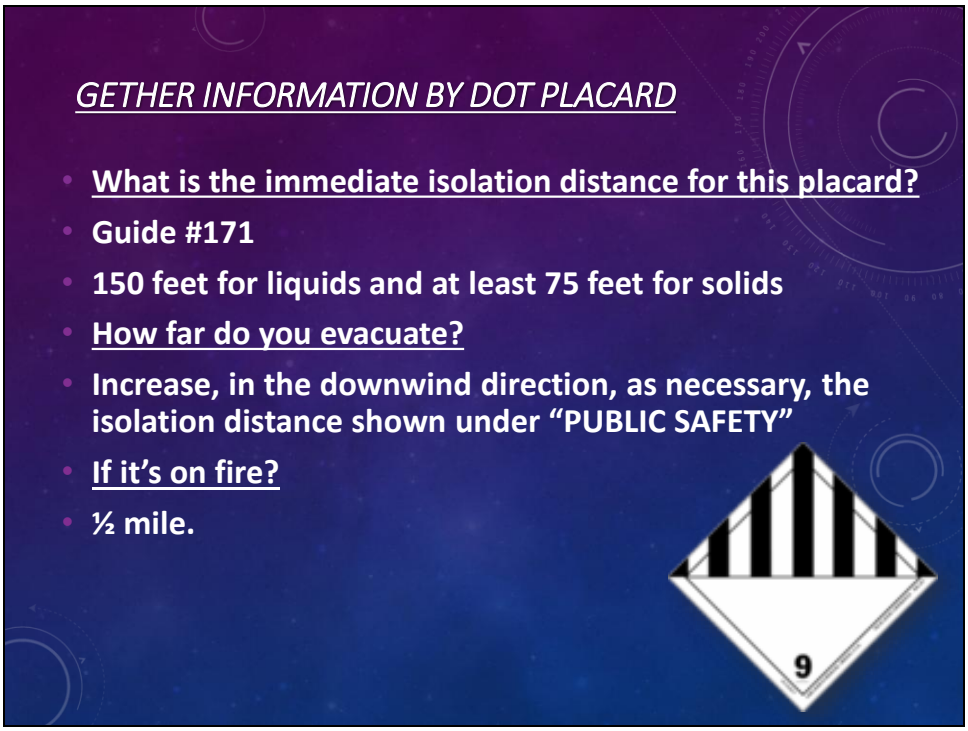
- **By Placard**
- **The circled number is the Guide to use.**



Second – if you can get closer to see the color of the placard.

Binoculars is best for this because there are several different placards of each color.

Pages 8-9 have the placards in groups with a Guide Number by each group.



What is the isolation distance for this placard? Class 9 placard

What is the Guide Number by this placard? Go to pages 8-9 and find the placard. **Guide Number 171**

Turn to the guide number 171 in the orange pages and go to the Public Safety section, second bullet point – isolate for isolate spill or leak area in all directions for at least 50 meters

(150 feet) for liquids and at least 25 meters (75 feet) for solids.

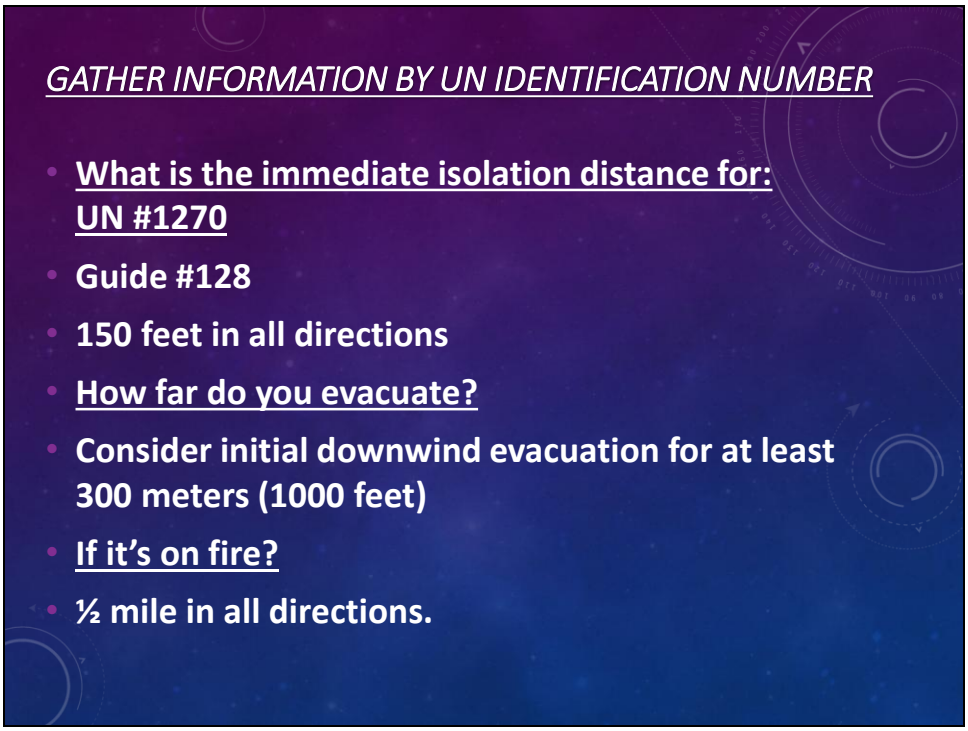
For evacuation distance - For nonhighlighted materials, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY".

If it is on fire – ½ mile in all directions.

GATHER INFORMATION BY UN IDENTIFICATION NUMBER

- ~~By 4 digit ID Number numerical list~~
- Or by name
- Touch Search by Name or UN
- Type in the UN number or the name
- Touch Guide Number next to it
- Go to the Guide page and read carefully.

Third: If you can safely get a bit closer, and you can see a UN number or you have a name –



Take the number 1270 to the yellow pages – there are two entries for this number – but they both have the same guide number: for a Guide Number of 128

Go to Guide #128

Find the initial isolation distance in the Public Safety section – 150 feet in all directions

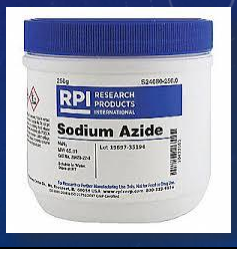
What is the evacuation distance? Consider initial downwind evacuation for at least 300 meters (1000 feet).

If it is on fire? (1/2 mile) in all directions

What is this material's primary hazard? Flammability - fire or explosion

GATHER INFORMATION BY NAME

- **What is the immediate isolation distance for: Sodium Azide**
- **Guide #153**
- **150 feet for liquids and at least 75 feet for solids**
- **How far do you evacuate?**
- **Increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY"**
- **If it's on fire?**
- **½ mile.**



So you have a name – Sodium Azide - go to the blue pages (alphabetical) for the guide number

We have a Guide number 153 –

Which suggests you isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

What about evacuations? See Table 1 - Initial Isolation and Protective Action Distances for highlighted materials. For nonhighlighted

materials, increase, in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY".

On fire – ½ mile.

What is its primary hazard?

HEALTH

• **TOXIC**; inhalation, ingestion or skin contact with material may cause severe injury or death.

• Contact with molten substance may cause severe burns to skin and eyes.

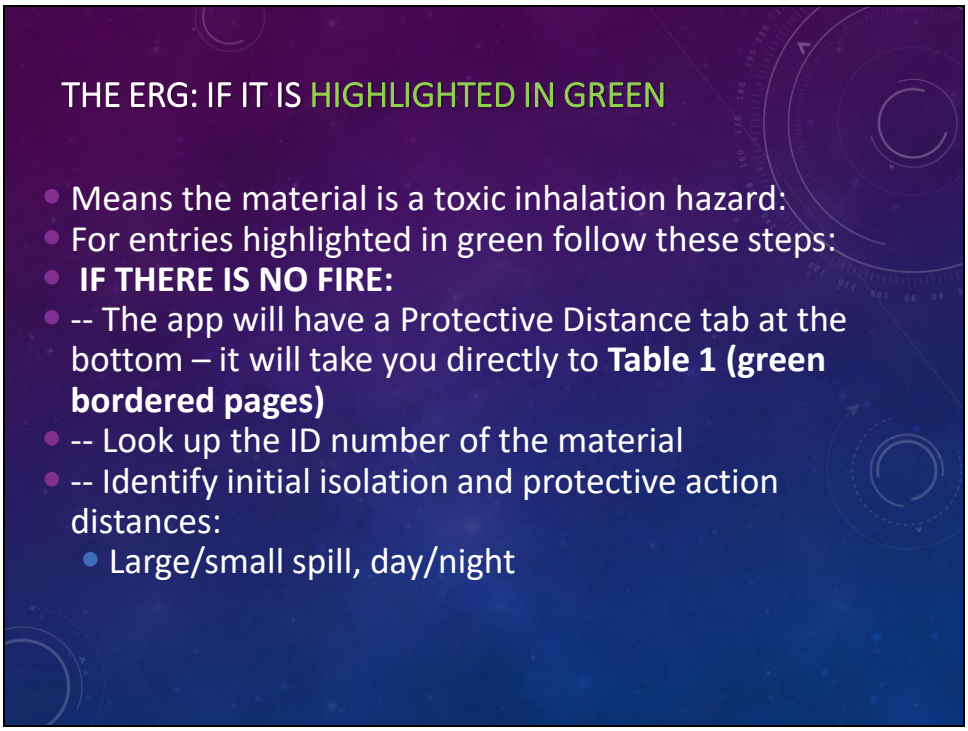
• Avoid any skin contact.

• Effects of contact or inhalation may be delayed.

• Fire may produce irritating, corrosive and/or toxic gases.

• Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution

And what is this green highlighted part?

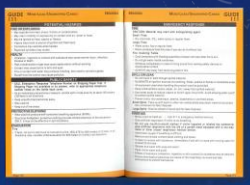


If any number or name is highlighted it means it is a potential toxic inhalation hazard. Go first to the green pages for the initial isolation distance. For the apps – for the iPhone there is an icon at the lower right corner called Protective Distance – tap on that to take you to the applicable green pages

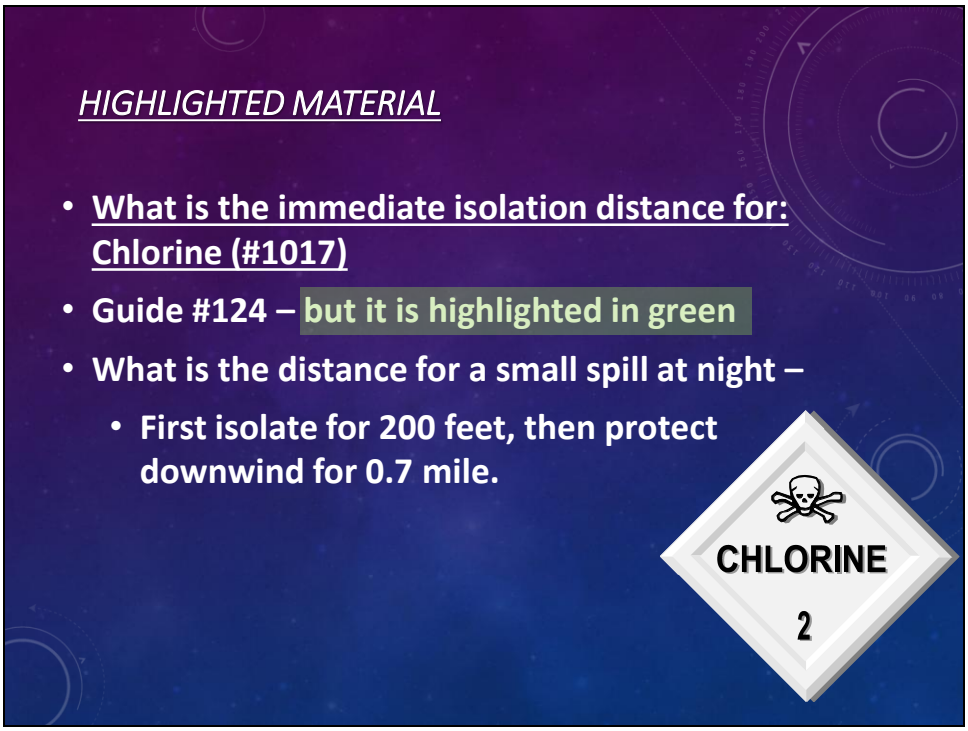
For the Android – simply swipe left to show the applicable green pages

THE ERG: HIGHLIGHTED IN GREEN

- **IF THERE IS A FIRE or A FIRE IS INVOLVED:**
- -- Also consult the assigned orange guide pages
- -- If applicable, apply the evacuation information shown under PUBLIC SAFETY.



Go first to the green pages for the initial isolation distance, then also consult the orange guide pages if it is on fire



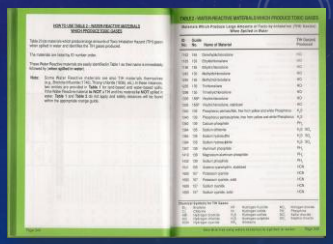
How about chlorine #1017 – first look it up in either the yellow pages (with the number) or the blue pages (name) - and we see that it is highlighted in green.

So we first take the number 1017 to the green pages –

For a small spill at night – first isolate for 60 m (200 ft) THEN protect downwind for 1.1 km (0.7 mi)

THE ERG: HIGHLIGHTED

- **In Table 1:**
- **If the words "When Spilled In Water" follow the name – the app will also have the information for what hazardous gas is produced**
- **Table 2 – water reactive materials which produce toxic gases**



If a material is highlighted in green and ALSO says "When Spilled in Water" then take that name to Table 2 for the substance it produces when wet

THE ERG: TABLE 3

- **Table 3 – isolation distances for large quantities (more than 208 liters or 55 US gallons) of 6 common toxic gases:**
  - **Ammonia, anhydrous (UN1005)**
  - **Chlorine (UN1017)**
  - **Ethylene oxide (UN1040)**
  - **Hydrogen chloride, anhydrous (UN1050) and Hydrogen chloride, refrigerated liquid (UN2186)**
  - **Hydrogen fluoride, anhydrous (UN1052)**
  - **Sulfur dioxide/Sulphur dioxide (UN1079)**

Six chemicals that are TIH and are transported in large quantities are in table 3

THE ERG: THE LETTER "P"

- **A Guide Number with a "P" means the material may undergo a violent polymerization reaction if subjected to heat or contamination:**
- **This term describes a chemical reaction which is generally associated with the production of plastic substances**
- ***(By "violent polymerization reaction" we mean it explodes*)**.

What does the "P" mean? It could explode

BLEVE

- **Boiling liquid, expanding vapor explosion**
- **Occurs when a tank storing liquid fuel under pressure is heated excessively.**

Speaking of explosions – the BLEVE is a very rare, but potential killer of firefighters who forget what it means

BLEVE

- **Sequence:**
  - **Tank is heated**
  - **Internal pressure rises beyond ability to vent**
  - **Tank fails catastrophically**
  - **Liquid fuel at or above boiling point is released**
  - **Liquid immediately turns into a rapidly expanding cloud of vapor**
  - **Vapor ignites into a huge fireball.**

You can find many videos demonstrating the BLEVE on You Tube.

BLEVE: FOR INSTANCE

- **BLEVE chart in the ERG –**
- **Start page, touch Reference Material, Safety Precautions, BLEVE**
- **Gives minimum time to failure, approximate time to empty, fireball radius, emergency response distance, evacuation distance (minimum and preferred) and cooling water flow rate**

What is a “safe distance”? Using the chart for a 42 foot long tank? 18,000 gal – **9 minutes to fail, fireball radius 374 feet, response distance 1499 feet (0.3 mile)**

Improvised Explosive Device (IED)

- Another chart in the ERG – Reference material, Safety Precautions, Improvised Explosive Device
- An improvised explosive device is a bomb that is manufactured from commercial, military or homemade explosives
- A Safe Standoff Distance Chart for various threats when improvised explosive device are involved is found in the app

Run away, screaming…

THE ERG

- **About/Contact, 24 Hour Emergency Response Telephone Numbers**
- **important phone numbers:**
- **CHEMTREC**
- **Military**
- **Poison Control.**

EMERGENCY RESPONSE TELEPHONE NUMBERS

CANADA

1. CANUTEC, provides a 24 hour national bilingual (French and English) emergency response advisory service:

613-996-6666 *

***666 (STAR 666) cellular** (in Canada only)

UNITED STATES

1. CHEMTREC®, a 24 hour emergency response communication service:
1-800-424-9300 *
(Toll-free in the U.S., Canada and the U.S. Virgin Islands)
703-527-3887 For calls originating elsewhere

2. CHEMTEL, INC., a 24 hour emergency response communication service:
1-888-255-3924 *
(Toll-free in the U.S., Canada, Puerto Rico and the U.S. Virgin Islands)
813-248-0585 For calls originating elsewhere

3. INFOTRAC, a 24 hour emergency response communication service:
1-800-535-5053 *
(Toll-free in the U.S., Canada and the U.S. Virgin Islands)
352-323-3500 For calls originating elsewhere

4. 3E COMPANY, a 24 hour emergency response communication service:
1-800-451-8346 *
(Toll-free in the U.S., Canada and the U.S. Virgin Islands)
760-602-8703 For calls originating elsewhere

The emergency response information services shown above have requested to be listed as providers of emergency response information and have agreed to provide emergency response information to all callers. They maintain periodically updated lists of state and Federal radiation authorities who provide information and technical assistance on handling incidents involving radioactive materials.

5. MILITARY SHIPMENTS, for assistance at incidents involving materials being shipped by, for, or to the Department of Defense (DOD), call one of the following numbers (24 hours):
703-697-0218 * - Explosives/ammunition incidents
(U.S. Army Operations Center)
1-800-851-8061 (Toll-free in the U.S.) - All other dangerous goods incidents
(Defense Logistics Agency)

6. NATIONWIDE POISON CONTROL CENTER (United States only)
1-800-222-1222 (Toll-free in the U.S.)

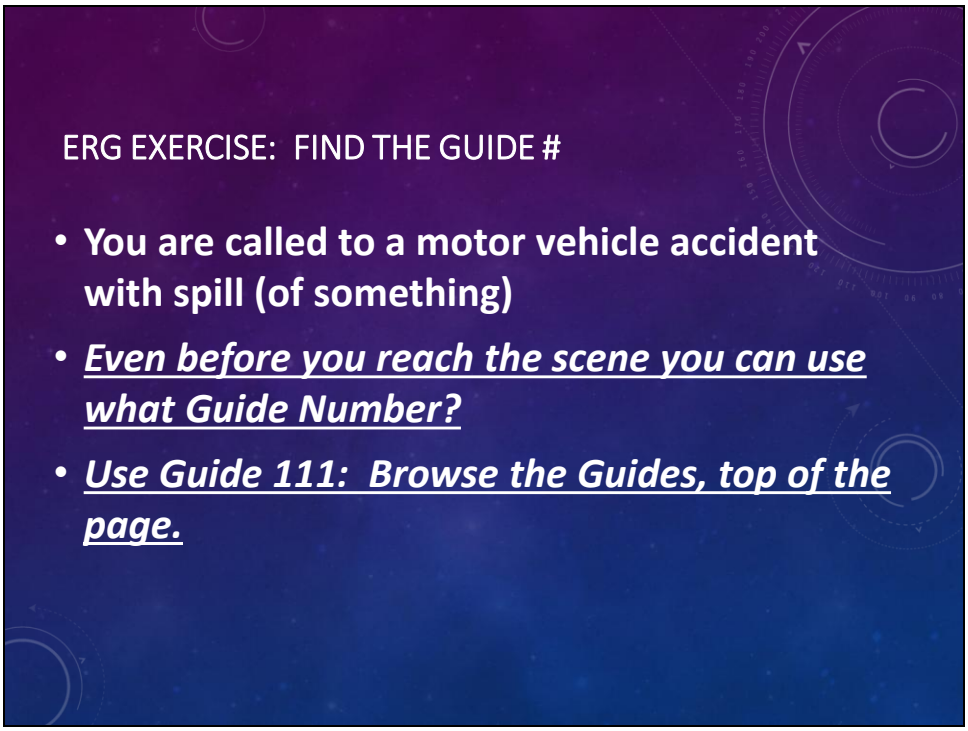
* Collect calls are accepted

CHEMTREC's® primary mission is to provide vital information quickly and accurately 24- hours a day for transportation incidents

The phone call is toll-free (800) 424-9300; there is no charge to the caller for this service

The website address is: www.chemtrec.com.

Now – let's put this information to use -



GUIDE 111 – keep everyone away by at least 330 feet

ERG EXERCISE: FIND THE GUIDE

- **First on scene – you see this tank truck:**
- **Based on the tank shape: First Guide Number to use?**

Oval cross section – see page 12 in your ERG – **Guide Number 131**

What is your initial isolation zone**? 50 meters / 150 feet in all direction with no fire**

Main hazard is? **Health by Guide 131**

ERG EXERCISE: FIND THE GUIDE

- **Using binoculars you see a number on the placard:**
- **Based on the yellow pages: what is the Guide Number to use?**

3475 is several things: but they ALL have **Guide Number 127**

ERG EXERCISE: PARKING LOT

- **You respond to a damaged tank in the "1850" restaurant parking lot**
- **How do you identify it?**
- **What Guide Number?**
- **Primary Hazard?**
  - **_____**
- **Isolation?**
  - **_____ feet**
- **Other immediate actions?**
  - **_____.**

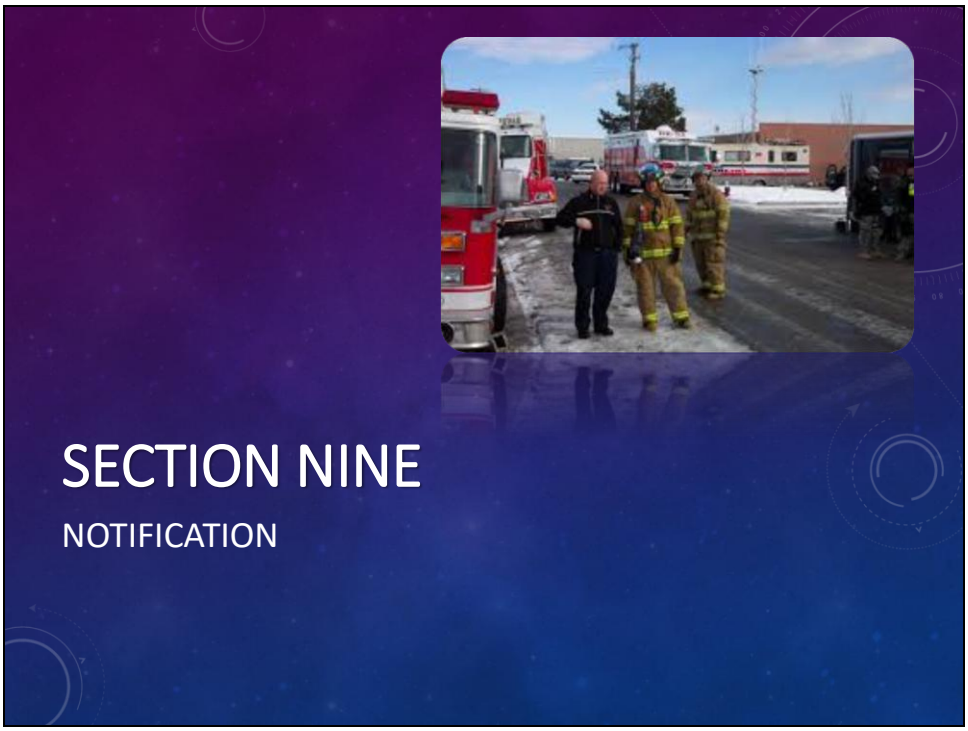
ID by shape – tanks of this sort usually hold propane

Guide Number 115

Primary Hazard Fire/Explosion

Isolation – 100 meters / 330 feet in all directions

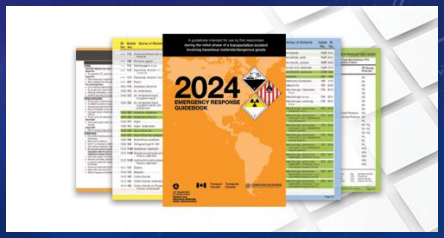
Other immediate actions – eliminate ignition sources, heavier than air so it may flow down hill to find an ignition source



This section covers who we notify

SIN REVIEW

- **Number One Priority for FRA is - SAFETY**
- **Number Two Priority for FRA is…**
- **IDENTIFY & ISOLATE!**
- ***Number Three is???***



What is next?

#3: N = NOTIFICATION

- **Notify 911**
- **They will Notify duty Chief / Dispatch of a Hazardous Materials Incident**
- **They will Request Law Enforcement for IC / crowd control / traffic control.**

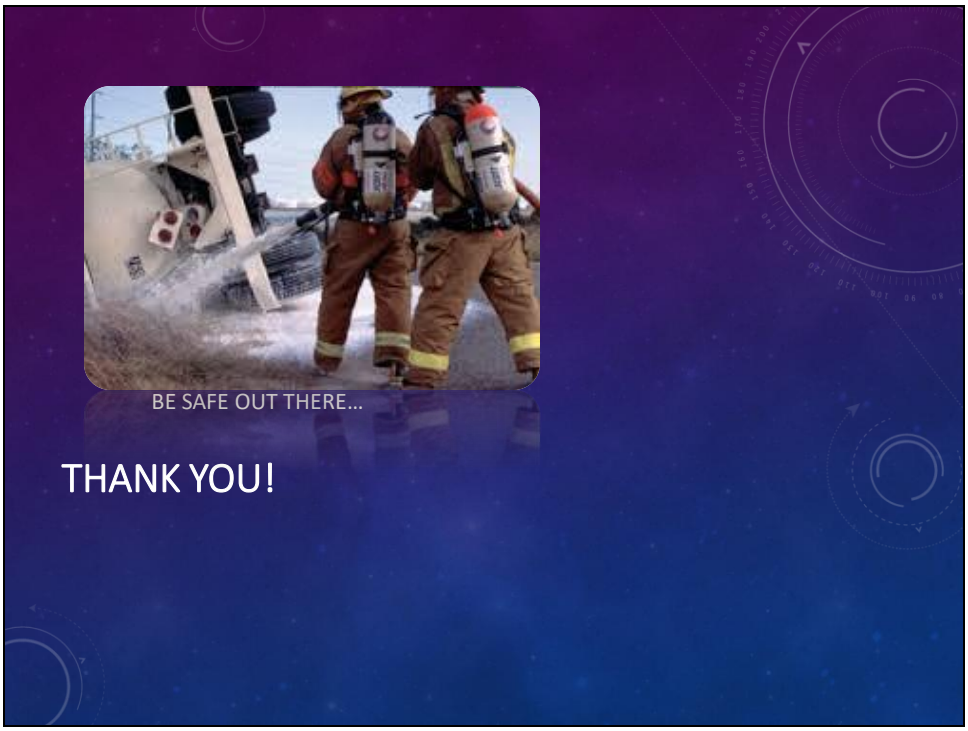
Notify everyone – get the word out there so they will all know. Don't let anyone go splashing through it.

SUMMARY

- ***Recognizing*** **a potential hazardous material is of primary importance**
- **Then SIN:**
  - **Always consider safety first**
  - **Next step is to isolate/identify**
  - **Then make notifications.**

Safety, isolation then notification. AND don't let anyone tell you "it's probably nothing…"

<u>Because what if it is something ???????</u>



Let's take the test – you can use your ERG/ERG app on the test. Be sure to save it as your name and email back for evaluation and for your Completion Certificate.

Email to: kreamowheat@sbcglobal.net