



**FIRST CHOICE**  
SAFETY SOLUTIONS



**Rapid HazMat**

**Guidebook**

**March 2024**

- **RAPID HAZMAT**

- R = RESCUE
- A = Assess
- P = Personal Protective Equipment
- I = Implement an Incident Action Plan
- D = Decontamination and Demobilization

- **Rescue (Step 1)**

- Isolate & Deny entry
  - Life Safety
    - Responders
    - Civilians
    - Civilians not exposed
    - Civilians exposed
      - Hydrocarbons (organics)
        - Headaches
        - Nausea
      - Acids & Bases (Inorganics/some Organics) & Incapacitating Agents
        - Respiratory
        - Eyes
        - Skin Irritation
      - WMD Chemical Agents
        - Nerve (PSLUDGEM)
          - P = Pinpoint Pupils (Miosis)
          - S = Salivation
          - L = Lacrimation
          - U = Urination
          - D = Defecation
          - G = Gastrointestinal Cramps
          - E = Emesis (vomiting)
          - M = Muscle Contraction
        - Blister - Blisters on skin
        - Choking - Respiratory Pulmonary Edema
        - Blood – Hypoxia
  - Implement an ICS
    - Consider an IMT to assist with logistics and documentation of ICS
  - Establish Control Zones
    - Cold
      - Command Post Location
        - 200' from decontamination line
          - Usually, length of standard Pre-Connect

- Warm
  - Decontamination Line Location
    - Single Station Emergency decon at edge of hot zone
- Hot
  - Exclusion distance from material
    - Solid - 75' from spill
    - Liquid - 150' from spill
    - Gas, Unknown, or Toxic Flammable Solids - 330' from spill
    - Explosive (1.1, 1.2, 1.3, or 1.5) - 1/3 miles
    - Initial and Downward Distances indicated by Green Pages in DOT Guidebook
- If a primary search or an obvious urgent life hazard with rescue is required,
  - Ready urgent rescuer/patient decontamination area
  - Ready Patient removal device
  - Don Full Turnout Gear w/ SCBA
    - Bring the following metering/detection devices
      - 4 gas meters
        - CGI
        - O<sup>2</sup>
        - H<sub>2</sub>S
        - CO
      - Tape pH paper to face piece
      - Tape Fluorine (F) paper to face piece
      - Tape Potassium Iodide (KI) paper to face piece
        - Have a bottle of eye drops to wet paper
      - Thermal Imaging Camera or IR Thermometer Temp Gun
      - Radiological Dosimeter
- While making approach
  - Avoid pooled liquids
  - Listen for high pressure gases
  - Observe vapor clouds
- **DISCONTINUE EFFORTS**
  - If CGI Alarms at 10% of the LEL indoors
  - If O<sup>2</sup> Alarms Greater than 23.5%
  - IF pH paper changes color
    - Red = Acid
    - Blue = Base
  - If Fluorine (F) paper changes color
    - Pink to Yellow
  - If Wet Potassium Iodide Paper changes color
    - White to Black/Blue

- If a closed container or a container with a failed component or activated pressure relief valve is increasing in temperature
  - May be undergoing polymerization or internal chemical reaction which can become violent
- If Radiological Dosimeter Alarms
  - Indication of abnormally high radiation field
  - Depends upon what your alarm values are set to
  - Normal Background in CT is 5-20  $\mu$ R
  - Discontinue efforts at 25 Rem or 0.25 Sievert
    - Rescue you can exceed 25 Rem Voluntary
    - Conversions:
      - Units of Rem
        - 1 mR (millirem) = 0.001 Rem
        - 1  $\mu$ R (microrem) = 0.000001 Rem
      - Units of Sievert
        - 1 Rem = 0.01 Sievert
        - 1 mR = 0.00001 Sievert
        - 1  $\mu$ R = 0.00000001 Sievert
- If mission is discontinued while operating indoors and there is no risk of explosion (TIC or LEL)
  - Search adjoining rooms
  - Outside team Deploy a PPV fan, take windows, and vent the room from interior to the outside
  - Reapply back-up papers from Ziplock bag & Re-attempt rescue
  - If the conditions do not improve, this is a Level A removal event
    - Consult law enforcement to ensure scene integrity prior to the body removal

- **Access (Step 2)**

Chemical Name	
Synonyms	
U.N./N.A. ID Number	
DOT Hazard Class #	
CAS #	
EPA Registration Number (Pesticides)	
Container Type	
Markings/Placards	
MSDS Obtained	<input type="checkbox"/> Yes <input type="checkbox"/> No
Facility or Manufacturer contact name and number	

Victims:	<input type="checkbox"/> None	<input type="checkbox"/> Ambulatory	<input type="checkbox"/> non-ambulatory
Release	<input type="checkbox"/> Active	<input type="checkbox"/> Inactive	
<b>Container Stressor</b>			
<input type="checkbox"/> Thermal	<input type="checkbox"/> Internal Pressure	<input type="checkbox"/> Physically Damaged	<input type="checkbox"/> Physically Breached
<b>Release</b>			
<input type="checkbox"/> Humans	<input type="checkbox"/> Threatens	<input type="checkbox"/> Impacts	
	<input type="checkbox"/> Evacuate	<input type="checkbox"/> Protect in Place	<input type="checkbox"/> Decontamination
<input type="checkbox"/> Environment	<input type="checkbox"/> Threatens	<input type="checkbox"/> Impacts	
	<input type="checkbox"/> Air	<input type="checkbox"/> Soil	<input type="checkbox"/> Surface Water
	<input type="checkbox"/> Catch Basin	<input type="checkbox"/> Ground Water	<input type="checkbox"/> Drinking Water
<b>Essential Pertinent Research</b>			
<input type="checkbox"/> Solid		<input type="checkbox"/> Liquid	
<input type="checkbox"/> Gas			
PEL	Flash Point	Extinguishing Agents	
IDLH	Incompatibilities		
Vapor Pressure	By Product of Reaction		
Vapor Pressure (VP) @68°F/20°C 1 ATM = 760 mmHg = 14.7 PSI = 101.3 KPa			
<b>VP:</b> <25 mmHg = Very Low, 25-50 mmHg = Low, 50-100 mmHg = Moderate, 100-760 mmHg = High, >760 mmHg = Gas			
<b>Routes of Entry</b>			
<input type="checkbox"/> Absorption	<input type="checkbox"/> Inhalation	<input type="checkbox"/> Injection	<input type="checkbox"/> Ingestion <input type="checkbox"/> Radiation
Signs of Exposure			

<b>Other Physical Properties</b>			
	Odor		Odor Threshold
Chemical Properties			
pH		Melting/Freezing Point	
Ionization Potential ((PID)		Maximum Safe Storage Temp. (MSST)	
Carbon/Hydrogen Bond? (FID)		Self-Accelerating Decomposition Temp. (SADT)	
Lower Explosive Limit		<ul style="list-style-type: none"> <li>SADT of &lt;122°F/50°C require controlled temperature transport</li> </ul>	
Upper Explosive Limit		<ul style="list-style-type: none"> <li>Emergency Temperature is 18°F/10°C below the SADT</li> </ul>	
Vapor Density		Evaporation Rate	
Boiling Point		Specific Gravity	
Relative Density		Solubility(ies)	
Dust Deflagration Index Kst		Kst is expressed in bar.m/s	
Dust explosion class	K <sub>st</sub> (bar.meter/sec)	Characteristic	Typical material
St 0	0	No explosion	Silica
St 1	>0 and = 200	Weak explosion	Powdered milk, charcoal, sulfur, sugar and zinc
St 2	>200 and = 300	Strong explosion	Cellulose, wood flour, and poly methyl acrylate
St 3	>300	Very strong explosion	Anthraquinone, aluminum, and magnesium

- **PPE (Step 3)**

- General Safety

- Applies to Level D through Level A PPE Selection

- Always use head protection
  - When there is a risk of falling objects
- Always use appropriate gloves when risk of
  - Lacerations
  - Abrasions
  - Blistering
  - Chemical exposure
- Always use eye protection when risk of
  - Injury to eyes
- Always use steel toe boots when risk of
  - Crushing injuries to feet
- Always use traffic vest when
  - Operating on roadways with unstopped traffic

**TECHNICIAN LEVEL NON RESCUE ENTRY OR WHEN STEP 1 RESCUE EFFORTS ARE DISCONTINUED**

- **Level C (Non-Encapsulated Splash Protection with Cartridge Respirator)**

- For use with a known contaminate

- A cartridge is available and compatible with released materials

- The concentration is known and above PEL, below IDLH and
- Ambient O<sup>2</sup> is between 19.5 – 23.5% and
- No chance above criteria can rapidly change or become hazardous and
- There is the one of the following
  - Chemical warning property
  - Odor or acute system
  - End of service life indicator on cartridge
- Develop a cartridge replacement program

- Not for use

- During **ANY** emergency response efforts
- DOT ERG 117, 118, 119, 122, 123, 124, 125
- If any portion of the event is unknown
  - Material
  - Airborne concentration
  - Oxygen content
- Above IDLH concentration
- Any material where CGI meter indicates

- >1% of the flammable range
    - O<sup>2</sup> concentration
      - <19.5% or >23.5%
    - Change in ambient pH (wet or dry)
    - Change in ambient oxidation (wet KI)
  - Consult PPE Permeation Data to
    - Determine compatibility and stay times with chemical
  - Use Chem Tape to seal seams
- **Bunker Gear (Non-Encapsulated Flash/Splash Protection w/ SCBA)**
- For use with the following when coupled with metering package in Step 1
    - Rescue Operations
    - Initial Reconnaissance with low probability of Splash Contact
    - Initial Air Monitoring of Unknown Atmospheres
    - Flammable Liquid
    - Flammable Gas emergencies
  - Not for use with
    - Skin absorptive or skin damaging gases
      - DOT ERG 117, 118, 119, 122, 123, 124, 125
    - Any material where CGI meter indicates
      - >10% of the flammable range Indoors
    - O<sup>2</sup> greater than 23.5%
    - Change in ambient pH (wet or dry)
    - Change in ambient oxidation (wet KI)
    - High risk of engulfment of skin absorptive or skin damaging materials
    - High risk of engulfment on an unknown material
    - When victims show signs and symptoms of exposure to WMD chemical agents
    - A suspected WMD biological incident where the dissemination method is unknown or if dissemination was via an aerosol-generating device that still occurring or it has stopped but there is no information on the duration of dissemination, or what the exposure concentration might be.

○ **Level B – Low B (Non-Encapsulated Splash Protection w/ SCBA outside the suit)**

- For use with the following when coupled with metering package in Step 1)
  - A material that poses a low risk of contact
  - Often used during air monitoring or investigative measures
  - Manipulating a small quantity of a material
  - Handling small containers
- Not for use with
  - Skin absorptive or skin damaging gases
    - DOT ERG 117, 118, 119, 122, 123, 124, 125
  - Any material where CGI meter indicates
    - >10% of the flammable range Indoors
  - O<sup>2</sup> greater than 23.5%
  - Change in ambient pH (wet or dry)
  - Change in ambient oxidation (wet KI)
  - High risk of engulfment of skin absorptive or skin damaging materials
  - High risk of engulfment on an unknown material
  - When victims show signs and symptoms of exposure to WMD chemical agents
  - A suspected WMD biological incident where the dissemination method is unknown or if dissemination was via an aerosol-generating device that still occurring or it has stopped but there is no information on the duration of dissemination, or what the exposure concentration might be.

○ **Level B – High B (Fully Encapsulating Splash Protection w/ SCBA inside suit)**

- For use with the following when coupled with metering package in Step 1
  - Material that poses high risk of contact
  - Ensuring the SCBA not be exposed to material
  - Manipulating large containers or sealing/opening dome covers on tank vehicles
- Not for use with
  - Skin absorptive or skin damaging gases
    - DOT ERG 117, 118, 119, 122, 123, 124, 125
  - Any material where CGI meter indicates
    - >10% of the flammable range Indoors
  - O<sup>2</sup> greater than 23.5%
  - Change in ambient pH (wet or dry)
  - Change in ambient oxidation (wet KI)
  - High risk of engulfment of skin absorptive or skin damaging materials
  - High risk of engulfment on an unknown material

- When victims show signs and symptoms of exposure to WMD chemical agents
  - A suspected WMD biological incident where the dissemination method is unknown or if dissemination was via an aerosol-generating device that still occurring or it has stopped but there is no information on the duration of dissemination, or what the exposure concentration might be.
- **Level A (Vapor and Splash Protection w/ SCBA inside suit)**
    - For use with
      - Non-Flammable Corrosive Gases and Oxidizing Gases
        - DOT ERG 122, 123, 124, 125
      - High risk of engulfment of skin absorptive or skin damaging materials
      - High risk of engulfment on an unknown material
      - Change in ambient pH (wet or dry)
      - Change in ambient oxidation (wet KI)
      - When victims show signs and symptoms of exposure to WMD chemical agents
      - A suspected WMD biological incident where the dissemination method is unknown or if dissemination was via an aerosol-generating device that still occurring or it has stopped but there is no information on the duration of dissemination, or what the exposure concentration might be.
    - Not for use with
      - Flammable Corrosive Gases
        - DOT ERG 117, 118, 119
      - A known material where CGI metering
        - >1% of the LEL
  - **Flash Level A (Vapor and Splash Protection w/ SCBA inside suit)**
    - For use with
      - All skin damaging, skin absorptive Flammable Corrosive or Oxidizing Gases
        - DOT Guide DOT ERG 117, 118, 119, 123, 124, 125)
      - A known material where an CGI meter indicates >1% of the LEL
      - a high risk of engulfment of known skin absorptive or skin damaging materials,
      - a high risk of engulfment on an unknown material,
      - an ambient pH (Wet or Dry) change,
      - When there is a change in ambient oxidation (Wet KI),
      - a material when victims show signs of exposure to WMD agents.
      - A suspected WMD biological incident were
        - Dissemination
        - Unknown

- Via an aerosol-generating device
  - Still occurring or
  - Stopped but no information on duration
- Exposure concentration might be
  - Not for use with
    - A known material where an CGI meter indicates >10% of the LEL while indoors
    - Oxygen Concentration is >23.5%
- Glove Selection
  - All entries require inner Nitrile surgical gloves.
  - In determining Outer Glove Selection
    - consult the permeation charts published by the glove manufacturer.
  - Consider Glove Liners for pressurized liquefied gases.
  - Cryogenics require specific gloves.
  - Consider outer abrasion and cut resistant gloves when there is a possibility of damage
  - Use Silver Shield for tertiary protection (middle layer) for Level A and Flash A.
- Boot Selection
  - Always ensure safety toe/shank boots are used.
  - Disposable outer boots are adequate for use with Level C or Low-Level B incidents,
    - approved footwear is required under the suit
    - Reusable boots may be worn.
  - Reusable Outer Boots are required for use with High Level B and Level A.
- Communication
  - Based upon the needs of the incident
    - utilize the appropriate style
      - Hand Signals
      - Voice Amplifier
      - Portable with speaker microphone
      - Portable with Scott Envoy or other radio-based units

- **Incident Action Plan (Step 4)**
  - Develop an Incident Action Plan (IAP) to determine the tasks that must be accomplished
    - Couple the IAP with
      - Chemical and Physical Properties in Risk assessment (Step 2)
      - PPE Selection (Step 3)
        - This essential to determine
          - Working in Hot Zone can be accomplished safely for activities in decon (Step 5)
    - Risk vs. Benefit
      - An entry into an environment of a known material w/o victims on a release that has
        - Already expanded its volume
        - Not a threat to health or the environment worth
          - Personnel risk and financial cost
            - When all that is needed is a clean-up contractor

**Incident Action Plan**

- **Remember that Awareness precedes Operational skills and operational skills precede Technician skills.**
- **Responder Safety**
- **Inform Media as required**
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- Pre-Entry Briefing w/
  - Entry Team(s)
    - ID equipment and task assignments prior to entry
    - Check Suits/Air Supply
    - Bring self-rescue webbing, door chocks, forcible exit tools
  - Back-Up Team(s)
    - ID equipment and task assignments prior to entry
    - Rescue Equipment is available and ready: RIT Pack, SKED, 2:1 Rope Retrieval System, Lowering/Hauling Systems, Trauma Sheers, Chem Tape, door chocks...
    - Check Suits/Air Supply
  - Decon
    - ID equipment and task assignments prior to entry
      - Ambulatory and Non-Ambulatory corridors
    - Check Suits/Air Supply
  - Safety
  - EMS
    - Understand Signs of Exposure and treatment options
  - Fire/Vapor Suppression
- Resource in staging for long term operation
  - Technicians/Operations Manpower
  - Cascade System
  - Water supply
  - Waste removal
  - Bathroom facilities
  - Rehab/Canteen
- Life Safety
  - Responders
    - Bring Webbing for removal of partner
    - Back-up Team shall have needed rescue equipment
  - Civilians Not Involved
  - Civilians Not Exposed
  - Civilians Exposed
- Incident stabilization
  - Offensive Technician level actions as needed
  - Develop metering/sampling plan
    - Ensure IC Post/Cold Zone is Safe!

- Metering plan may be adjusted depending upon prior FD sampling, known materials, or obvious indications of material and availability of GC/MS.
- Get an inventory of chemicals in building
- Get a map of the building
- ID type of HVAC systems in building
- ID locations of chemicals and where associated signs of exposures occurred on map
- Location of sampling points based upon victim locations
- **No Deflection on a 4 Gas indicates normal parameters for those 4 gases, it does not mean there is/are no other contaminant(s) present!**
- Metering/Detection Options:
  - pH Paper: Determine pH of material
    - Dip in liquids
      - Red acid (<2 hazardous)
      - blue basic (>12.5 hazardous)
    - Dry paper in ambient air detects acid and basic gases/vapors
    - Wet paper in ambient air detects halogen water reactive gases and water-soluble basic gases,
      - but the water may give a false more neutral indication depending upon the ambient concentration of the material
  - Florine Paper
    - Detects fluoride ions and hydrogen fluoride (HF) with a pH of 2 or less
      - Dip in Liquids,
      - Use dry to detect vapors
    - Changes from pink to yellow
  - KI (Potassium Iodide or Starch paper)
    - Detects oxidizers
      - Dip in Liquids
      - Wet with water: Detects Oxidizing Gases (F, Cl, Br, I)
    - Changes from white to black/blue
    - May bleach out for bleaching oxidizers
      - Look for a thin black line at the wet/dry interface
  - Water Paper
    - Dip in liquids to detect water
    - Changes from White to Pink/Purple
  - M8 Paper
    - Classifies WMD chemical agents

- Blister H Agents, Nerve G Agents, Nerve VX
- Liquid dip only, will not detect vapor
- M9 Paper
  - Detects presence of WMD chemicals
    - Does not classify
    - Liquid dip only, will not detect vapor
- Combustible Gas Indicator (CGI) Measures flammable gases and vapors
  - Unit of Measure: % of the LEL of the Calibration Gas
- Oxygen Sensor
  - Measure % of Oxygen in the atmosphere
- Chemical Specific Electro-chemical sensors
  - Unit of Measure: PPM of the calibration gas
    - CO, H<sub>2</sub>S, HCN, NH<sub>3</sub>, Cl<sub>2</sub> SO<sub>2</sub> are the most common
- Photo-Ionization Detector (PID)
  - Indicates the presence of materials with an Ionization Potential (IP) equal to or less than the Unit's lamp of 10.6 eV
    - Calibrated to Isobutylene, use correction factor to determine concentration of measured gas
    - Unit of Measure: PPM
- Flame Ionization Detector (FID)
  - Indicates the presence of materials that contain Hydrogen-Carbon bonding and can burn
    - Calibrated to Methane,
      - use correction factor to determine concentration of measured gas
    - Unit of Measure: PPM
- Personal Radiological Dosimeter (PRD)
  - Measures Gamma Radiation
    - Rate: Reads in micro-, milli-, or REM per hour
      - Indicates the amount of energy being actively recieved
    - Dose
      - Indicated amount of radiation absorbed cumulatively for that event
- Ludlum With Scintillator Tube
  - Measures Gamma Radiation
  - Reads in micro-, milli-, or REM per hour

- Point tip of probe to determine location of the source material
- Radiation Ludlum with Pancake Probe
  - Detects Alpha, Beta and Gamma
  - Most often reads in Counts Per Minute (CPM)
- Dräger Tubes and Chips
  - Qualitative tubes indicate presence of chemical family
    - Quantitative tubes and chips indicate concentration of chemical
  - Check Pump Strokes required for tubes
- FTIR
  - Cannot detect simple ionic metal-nonmetal binary salts,
  - Can detect Metal ionically bonded to covalently bonded polyatomic non-metals salts
  - Can detect protein
    - Very good with polar materials, but water interferes with identifying other compounds
    - Poor with mixtures
- Raman
  - Cannot detect simple ionic metal-nonmetal binary salts,
  - Can detect Metal ionically bonded to covalently bonded polyatomic non-metals salts,
  - Cannot detect protein or other materials with high fluorescence,
    - Very good with polar materials, water does not interfere with identifying other compounds,
    - Good with mixtures
- Ion Mobility Spectrometer
  - Classifies WMD Chemicals and Irritating Agents
    - Numerous false positives when dealing with industrial chemicals
- GC/MS
  - Identifies and quantifies organic compounds
  - Cannot detect inorganic materials
- XRF
  - Detects RCRA 8 Toxic Metals
- Near-Infrared Spectroscopy
  - Handheld Field Asbestos Analysis

- **Known Initial Entry**
  - **Operations Level**
    - **FD Standard Meter Suite**
      - **4 Gas meter**
        - CGI, O<sub>2</sub>, H<sub>2</sub>S, CO or another chemical sensor
        - pH (dip liquids, dry for ambient vapor)
        - F (dip liquids, dry for ambient vapor)
        - KI (dip liquids, wet for ambient vapor)
        - Temperature Gun (TIC or IR Thermometer)
        - Personal Radiological Dosimeter
  - **Technician Level**
    - 4 Gas meter
    - CGI, O<sub>2</sub>, H<sub>2</sub>S, CO or another chemical sensor
    - pH (dip liquids, dry for ambient vapor)
    - F (dip liquids, dry for ambient vapor)
    - KI (dip liquids, wet for ambient vapor)
    - Temperature Gun (TIC or IR Thermometer)
    - Personal Radiological Dosimeter
    - Use the appropriate direct read meter or Dräger tube/chip.
    - If combustible/flammable: CGI or 4 Gas
      - If <1% LEL
    - HC bonding: FID
    - If IP of 10.6 eV or less: PID
    - Ludlum for Radiation if needed
      - Ensure there are no flammability issues
      - Pancake - Alpha, Beta and Gamma (CPM scale)
      - Scintillator - Gamma (mR/hour scale)
    - FTIR and Raman Spectroscopy
  - If the material is unknown, observe the signs and symptoms of exposure.
    - Standard Meter Suite
    - PID
    - FID
    - Dräger Poly Test (headache/nausea) and Acid Test (Respiratory and Eye Irritation)
    - Spill-Fytters

- If the signs and symptoms are WMD indicators (PSLUDGE or Blisters), add...
  - M8 paper
  - M9 Tape on shoulder, hip, and ankle
- Raman and/or FTIR may be utilized if needed
  - **Advanced Technician Level**
    - Secondary Metering
      - Standard Meter Suite
      - Tedlar Bag Air Samples or Portable GC/MS
      - Continue w/ Dräger Matrix if there is a positive for either tube above
      - Ludlum for Alpha and Beta if not done previously (ensure there are no flammability issues)
      - If the signs and symptoms are WMD indicators (PSLUDGE, Blisters, Choking), add...
        - Dräger CDS Kits I and IV
        - Ion Mobility Spectrometer (ensure there are no flammability issues)
    - Tertiary Metering (if still unknown after above...)
      - Standard Meter Suite
      - Obtain physical sample if possible
        - Refer to applicable sampling guides depending upon the physical characteristics of the material.
        - Fill out the Chain of Custody Form provided by the receiving lab.
    - May run in DEEP Mobile Lab
      - FTIR or Raman ID
      - PID and FID
      - GC/MS
      - XRF for toxic metals
      - Near-Infrared Spectroscopy for Asbestos
    - May run in CST Lab
      - FTIR or Raman ID
      - PID and FID
      - GC/MS
      - PCR Analysis for Biological
        - May go to CT DPH Lab for Biological (Microscopy and PCR) or
        - May go to Private Lab
        - May go to Law Enforcement for evidence

- If the material is ID'ed
  - Routine Incident, notifications:
    - Unified Command FD IC
      - Medical branch
      - Receiving hospitals
  - If there is a positive or suspected WMD (Chem, Bio, Explosive, Radiological) agent, work with care in the Hot Zone as the incident must be processed as a Crime Scene.
    - Unified Command/FD IC
      - Medical branch
      - Receiving hospitals
    - DEEP HazMat
      - Supervisor
      - Director-Bureau Chief-Commissioner-Governor
      - DEMHS/State EOC
      - CT National Guard CST
      - CT DPH
      - CT DEEP Rad-Con (If Radiological)
      - National Response Center
        - EPA
        - USCG
        - Other Federal Agencies
      - FBI New Haven
      - CSP ESU,
      - Local Bomb Squads
        - New Haven, Hartford, Stamford
- If a Drug Lab is suspected
  - Work with care in the Hot Zone
    - as the incident must be processed as a Crime Scene.
      - DEEP Supervisor
      - Notify DEA
      - CSP Statewide Narcotics Task Force
- Continue hot/cold zone delineation - Reestablish zones based on metering above
  - Routine Incident
    - Work with local assets and regional teams
    - Work with DEEP SASU/Mobile Lab
  - If WMD,
    - Work with DEEP SASU/Mobile Lab
    - Interface with FBI
      - Samples previously obtained

- Crime Scene Investigation (Hazardous Evidence Recovery Unit)
        - Work with regional teams
        - Work with CT National Guard CST
      - If Incident is of National significance, work with EPA ER and USCG and FBI
        - Develop remediation plan to begin after crime scene investigation
    - Vapor Control
      - Flammable Liquids
        - In Depth - Foam Compatibility
          - Hydrocarbon Non-Polar or Polar Solvent
            - Dot Guide #127, 128, 129, 130, 131 or 132
          - National Foam Universal Green 3%
        - Flammable Liquids Not in Depth - Foam Compatibility
          - Universal Green
          - Universal Knockdown
          - F-500
        - Do not mix foam concentrates (prior to application, OK to mix finished foam)
        - When transferring flammable liquids
          - ensure all components are bonded and grounded
    - Specific Gravity
      - <1 Float
      - >1 Sink
      - Water miscible/soluble Mix
    - Gases
      - Flammable Gases
        - LPGs: Methane, Ethane, Propane, Butane...
          - Use Master stream fog pattern to disperse vapors
          - Do not get on or in tank
          - When transferring flammable gases ensure all components are bonded and grounded
      - Water Soluble Gases
        - Must be a minimum of 10% Soluble – such as Anhydrous Ammonia
          - Use Master stream fog pattern to absorb and disperse vapors
          - Do not get on or in tank
      - Water Reactive Gases
        - Such as Chlorine, Fluorine, Bromine, and Iodine Gases

- Use Master stream fog pattern to react and disperse vapors
- Do not get on or in tank
- Control Run-off
  - Human Life has priority over animal and plant life
  - Try to keep out of water bodies
    - Water soluble/reactive gases will hydrolyze to hazardous wastes
      - Anhydrous Ammonia
        - Ammonium Hydroxide
      - Chlorine
        - Hydrochloric Acid
    - These wastes will mix and often discolor the water column
      - Will pose a toxicity issue with aquatic life
  - Transportation Incidents
    - MC306/DOT406
      - MAWP 3-15 PSI
      - Dome Cover Clamps or cribbing and ratchet straps
      - Use care with rolled over tankers when opening valves,
        - The vapor return system is incorporated into the top spill protection ensemble and
        - if damaged will release product when flooded with fuel.
      - Use air operated tools when drilling aluminum side walls for off-loading
      - Use a vac-truck pick-up tube made of metal, not PVC to limit static electricity issues
      - Side wall patch kits (ratchet straps with neoprene pads)
      - When transferring flammable liquids/gases ensure all components are bonded and grounded
    - MC307/DOT407 transporters.
      - MAWP of at least 25 PSI
      - Utilize the Betts Emergency Unloading Device
      - When transferring flammable gases ensure all components are bonded and grounded
    - MC331 High Pressure Transporter and Bobtail Delivery Trucks
      - MAWP 100-500 PSI

- Activate Emergency Shut Off Valves
  - Also shut off needle valve on belly piping of internal valve
  - If the leak can be isolated with valves, allow to passively bleed off or connect a flare to hasten the incident
  - When righting an overturned vehicle
    - You may consider off-loading (transfer or flare) to lighten the lift
    - Do not connect to the barrel (tank) lifting eyes
    - Wrap the barren and the frame with the lifting straps
  - When transferring flammable liquids/gases ensure all components are bonded and grounded
- MC338 Cryogenic Transporters
    - MAWP 25-500 PSI
    - Methane, nitrogen, hydrogen, oxygen, helium, and argon.
    - Liquid Oxygen will react violently with hydrocarbons (asphalt)
    - Hydrogen will have an invisible flame, Use TIC to determine if it is burning
    - Extremely cold < -130°F
    - Must have a pressure relief valve between all valves when transferring liquids
    - MC312 Transporters are a tank inside of a tank with an interstitial space that is under a vacuum.
      - There are vacuum indicator plates that will fall off when the outer tank is compromised. This will cause issues as the inner tank will warm faster than normal conditions; beware of PRV operation, especially if the truck is not upright as it may discharge liquid rather than vapor
  - MC 312/DOT412 Corrosive Liquid Transporter
    - MAWP of at least 15 PSI
    - Does not differentiate between acid and bases
    - Tank diameter is small due to heavy weight of product
    - External Ring stiffeners may be hidden behind a skin of stainless steel to improve aerodynamics while driving
  - TC423 Emulsion and water-gel Explosives
    - MAWP 5-15 PSI
    - Has two V-Hoppers
    - Do not confuse with a non-spec dry bulk carrier, which often has four V-Hoppers

- Refrigerated Boxes
  - May indicate that the container is carrying temperature sensitive materials.
  - Obtain shipping papers to determine cargo
  - SADT of <math>122^{\circ}\text{F}/50^{\circ}\text{C}</math> require controlled temperature transport
  - Emergency Temperature is  $18^{\circ}\text{F}/10^{\circ}\text{C}$  below the SADT
  
- Radiological Packaging
  - Will display placards that indicate
    - Contents (type of isotope)
    - Activity (Rate of disintegration or decay of a radioactive material; activity indicates how much radioactivity is present and not how much material is present)
      - Indicates how many becquerels or curies of the material are present. The more becquerels or curies means a greater amount of radioactivity.
    - Radioactive I & II also indicate a maximum Transportation index.
      - The transport index is determined by taking the maximum radiation level (as measured in mrem/hr) at one meter (3.3 feet) from an undamaged package.
      - When assessing a package's integrity at an accident scene, this information can be used as a baseline for determining if damage has occurred to the package
      - CAUTION: Be aware that other radioactive material packages in the immediate vicinity may interfere with measurements, resulting in radiation levels above the indicated transport index of any particular package.
  - Five different placards
    - Radioactive I
      - External Contact: Max: 0.5 mR/hr
      - No special handling is required.
    - Radioactive II
      - External Contact: Max: 50 mR/hr
      - Max TI: 1 mR/hr
    - Radioactive III
      - External Contact: Max: 200 mR/hr

- Maximum TI: 10 mR/hr
- Fissel
  - Applied to fissile material packages
  - Will appear next to the Radioactive I, II, or III label
  - CSI used by shipper to control total number of fissile packages on a conveyance
- Empty
  - Package emptied of contents as far as practical
  - May still have internal contamination
    - <0.5 mrem/hour on contact
  - Excepted from shipping paper and marking requirements (except UN ID number)
- Radiological Containers
  - Excepted Packaging
    - Packages carrying extremely low levels of radioactivity, which may be constructed of all types of materials. They will not be identified as such due to the low level of risk.
  - Industrial Packaging
    - Industrial packaging is used for shipping low specific activity materials and surface contaminated objects.
      - Low specific activity (LSA) materials are generally materials in which radioactivity is essentially uniformly distributed in a large amount of nonradioactive material such as uranium ore concentrate, low-level waste from hospitals, laboratories and power plants such as contaminated protective clothing and trash and building rubble from cleanup projects.
      - Surface Contaminated Objects (SCO) are nonradioactive items with surfaces slightly contaminated with radioactive materials, which include pieces of equipment used in nuclear power plants that are very slightly contaminated on the surface.
    - The packaging need only be "strong tight packages" that will not allow loss of contents under normal transport conditions. These "strong tight packages" will not display the usual required marking and

labeling. Instead, they will be marked "RADIOACTIVE-LSA" or "RADIOACTIVE-SCO."

- IP-1 meets the design of excepted packaging
- IP-2 meets the design of Type A for free drop and stacking
- IP-3 must pass IP-2 tests and the water spray and penetration tests for Type A shipments of solid contents
- Radiological Type A Packaging
  - The majority of radioactive material shipments are made with Type A packaging.
    - may be cardboard boxes, wooden crates, or drums.
    - Examples of materials shipped in Type A packaging include training sources, radiopharmaceuticals, and research and industrial sources.
  - The amount of radioactivity allowed in a Type A package is greater than that allowed in limited quantity packages but lower than that of Type B packages (described below). Thus, accidents that may cause damage to Type A packaging would not likely result in serious radiation hazards.
- Radiological Type B Packaging
  - Certain shipments of more highly radioactive materials require Type B packaging.
    - Packaging range from small hand-held radiography cameras to heavily shielded steel casks that weigh up to 125 tons.
    - Examples of such materials include radiography sources, larger research and industrial sources, and spent nuclear reactor fuel.
  - Most Type B shipments are made by commercial carriers, by tractor trailer or by rail. However, some such as radiography sources which are used to "X-ray" construction welds, may be transported from construction site to construction site in private vehicles.
- Radiological Type C Packaging
  - *Used for transporting materials by air that carry the UN/NA 3323 and 3330 with a shipping name of "Radioactive material, Type C package, fissile". Not for use domestically in the US, but can originate or terminate within the US as an international package.*

- *Fissile* - Material whose atoms are capable of being split. These materials are limited in quantity on any one shipment. Packages used to transport these fissile materials are required to prevent fission from occurring during normal transportation and accident situations.
- For a shipment of multiple packages containing fissile material, the sum of the CSIs must be less than or equal to 50 (for shipment on a nonexclusive use conveyance) and less than or equal to 100 (for shipment on an exclusive use conveyance).
- Criticality Safety Index (CSI) is a number which is used to provide control over the accumulation of packages, overpacks, or freight containers that contain FISSILE material.
- Container Safety
  - Pressure escaping from a container
    - If high pressure is escaping from a container, use a TIC to determine the relative temperature of the discharge
      - Escaping pressure will be cold under normal conditions
      - If escaping pressure is hot, it is indicating that the failure may be a result of an internal chemical reaction
      - Do not attempt to stop the release; stopping the release could result in an explosion
      - Immediately evacuate as the pressure build could increase faster than the escaping pressure can exit and cause the container to fail violently
  - LPG
    - A thermal imager can be used to determine the amount of product that is in a liquefied pressurized gas (LPG) container that is leaking.
    - For LPG containers with fire exposure
      - If the pressure relief valve activates and is unable to vent off the building pressure and/or the container fails due to metal fatigue
        - Expect a Boiling Liquid Expanding Vapor Explosion (BLEVE);
    - DOT Guidebook Page 367
      - Water Application Cooling Chart.
    - DOT Guidebook Page 374
      - BLEVE Stand-Off Safe Distances Chart.
  - Flammable/combustible liquid containers

- Polymerizing materials typically increase in volume and may rupture the container
- When the container with an internal chemical reaction is heated to a temperature at or above its auto-ignition temperature
  - it will ignite when it releases from its container without the presence of an ignition source.
    - Cool with fog pattern from handlines
- Fire impinging upon a static liquid container may weaken the container and cause a Heat Induced Tear (HIT).
  - Flammable and combustible materials will ignite
  - Non-combustible materials will evaporate and the vapors will impact the surrounding area.
  - Place monitor lines directed to the area of impingement to cool the metal as well as a minimum of 350 GPM at each point of flame impingement.
- Crystallized Containers May be shock sensitive explosives
- Drum Over-Packing
  - Flammable liquids
    - Steel or Poly (if DOT approved)
  - Corrosive Liquids
    - Poly
  - Hydrogen Peroxide
    - Poly or Steel Poly-lined drums must have breather bungs or PRVs installed
  - Attempt to place bungs on top
    - Use Care not to injure back/hands
  - Remember, the contents in abandoned drums may not be in the appropriate style drum
    - Use sample glass tube to determine product
      - Color
      - Viscosity
        - phase separation.
    - Always check the pH to ensure the material is compatible with the over-pack container.
- Acetylene Cylinders
  - Friction sensitive gas triple bonded hydro-carbon
  - Not an empty cylinder, filled with asbestos or other porous filler saturated with acetone.
  - Dented cylinders may detonate
  - Flowing gas at pressures higher than 15 PSI
    - may ignite and flash back to and/or into cylinder

- Never Place in a cylinder overpack or apply a hood/cap/bonnet that will allow gas to build in void space, the container may detonate
  - Extinguish the flame on a free burning cylinder, wide flammable range and it will flash into the cylinder and may detonate
    - Chlorine/Sulfur Dioxide Kits
      - A Kit – 100# Cylinder
      - B Kit – 1 Ton Cylinder
      - C Kit – Railcar
      - Cl<sub>2</sub> is an oxidizer that will react with hydrocarbons
    - Midland Rail Kits
      - High pressure rail car leaks
    - Piping leaks
      - ID isolation valves
      - Utilize Plug and Patch Kits
- Property Conservation
  - Operational level skills, must precede technician level skills
  - Dam, Dike, Divert, Containment or Adsorbent Boom Deployment
    - Attempt to keep contaminants out of environmentally sensitive areas.
    - Threat to drinking water, coordinate well sampling with
      - CT DEEP
      - Local Health Dept.

- **Decontamination/Debriefing (Step 5)**

- A decontamination procedure
  - shall be developed, communicated to employees, and implemented before any employees or equipment may enter areas on site where potential for exposure to hazardous substances exists.
    - Decontamination needs to be matched properly with these 5 considerations (PLATE):
      - Physical and Chemical Properties
      - Location of Contamination
      - Amount of Product
      - Time of Exposure
      - Environmental Considerations
- Standard operating procedures
  - shall be developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances.
- All employees leaving a contaminated area
  - shall be appropriately decontaminated
    - all contaminated clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated.
- Decontamination procedures
  - shall be monitored by the site safety and health supervisor to determine their effectiveness.
    - When such procedures are found to be ineffective
      - appropriate steps shall be taken to correct any deficiencies.
- Location
  - Decontamination shall be performed in geographical areas that will minimize the exposure of uncontaminated employees or equipment to contaminated employees or equipment.
- Protective clothing and equipment
  - shall be decontaminated, cleaned, laundered, maintained, or replaced as needed to maintain their effectiveness.
- Employees whose non-impermeable clothing becomes wetted with hazardous substances
  - shall immediately remove that clothing and proceed to shower.
    - The clothing shall be disposed of or decontaminated before it is removed from the work zone.
- Keep your decon efforts as simple as possible for the hazard that is present.
  - Urgent Patient/Rescuer decon

- Consider Dry decon only
- Quick single station decon on tarp for run-off collection or divert run-off to pavement or soil
- Mass decon
  - Do not wait for a decon trailer if decon is required
    - Have victims remove clothing ASAP
    - Issue Fiber Tect as close to possible to the Hot Zone
    - Utilize hand-lines for small crowds
    - Utilize Master streams for large populations
    - If the ambient temperature is low, plan to treat for hypothermia
  - Control decon water, if possible:
    - Direct to paved areas to allow pooling for recovery, or
    - Collect into portable tanks, or
    - Direct to open area to collect in soil for future remediation.
    - Avoid allowing into sanitary sewer, surface waters and storm water catch basins
- Technical decon for responders and non-emergent patients
  - The decon line should be commensurate for the hazard present
    - All personnel and equipment shall be appropriately decontaminated does not mean an elaborate line is required for all materials. The line must be risk based.
    - Look at the SDS on known materials or symptoms of exposure on unknown materials to determine risk
    - A non-ambulatory decon component should be incorporated to facilitate decon of a downed responder
  - Attempt to keep waste generation to a minimum
    - Consider Dry decon only
    - Utilize Pump Sprayers
    - Low volume garden hoses
    - Showers for Level A if you have the capacity to contain the waste water
      - Level B ensembles are incidental splash suits and are not meant for immersion in a shower.
  - Decontamination
    - Based on risk assessment,
      - when exiting the hot zone
      - if no contact is made with the material, when utilizing the proper technique
        - Doffing only is appropriate

- Chlorine or Anhydrous Ammonia or Other water reactive/soluble gases
  - Aeration
  - Rinse Station
  - pH Station
  - Doffing Station
- Chemicals/Petroleum
  - Consider Dry decon only
  - Rinse, Wash, Rinse of affected areas Single Station
  - Metering/Detection Station with applicable equipment
  - Doffing Station
- All personnel leaving decon are to wash hands/face, preferably shower
- After washing, rehab as needed
- Debriefing
  - Must be conveyed prior to leaving scene:
    - Outline actions taken/work performed
    - Advise of symptoms of exposure
- Demobilize as needed
- Written Report
- Set date for Formal Critique
  - All incidents where Personnel make an entry, a critique is recommended with-in 2 weeks.

