U.S. DEPARTMENT OF ENERGY | Transportation Emergency Preparedness Program

Transportation Emergency Preparedness Program (TEPP) Update

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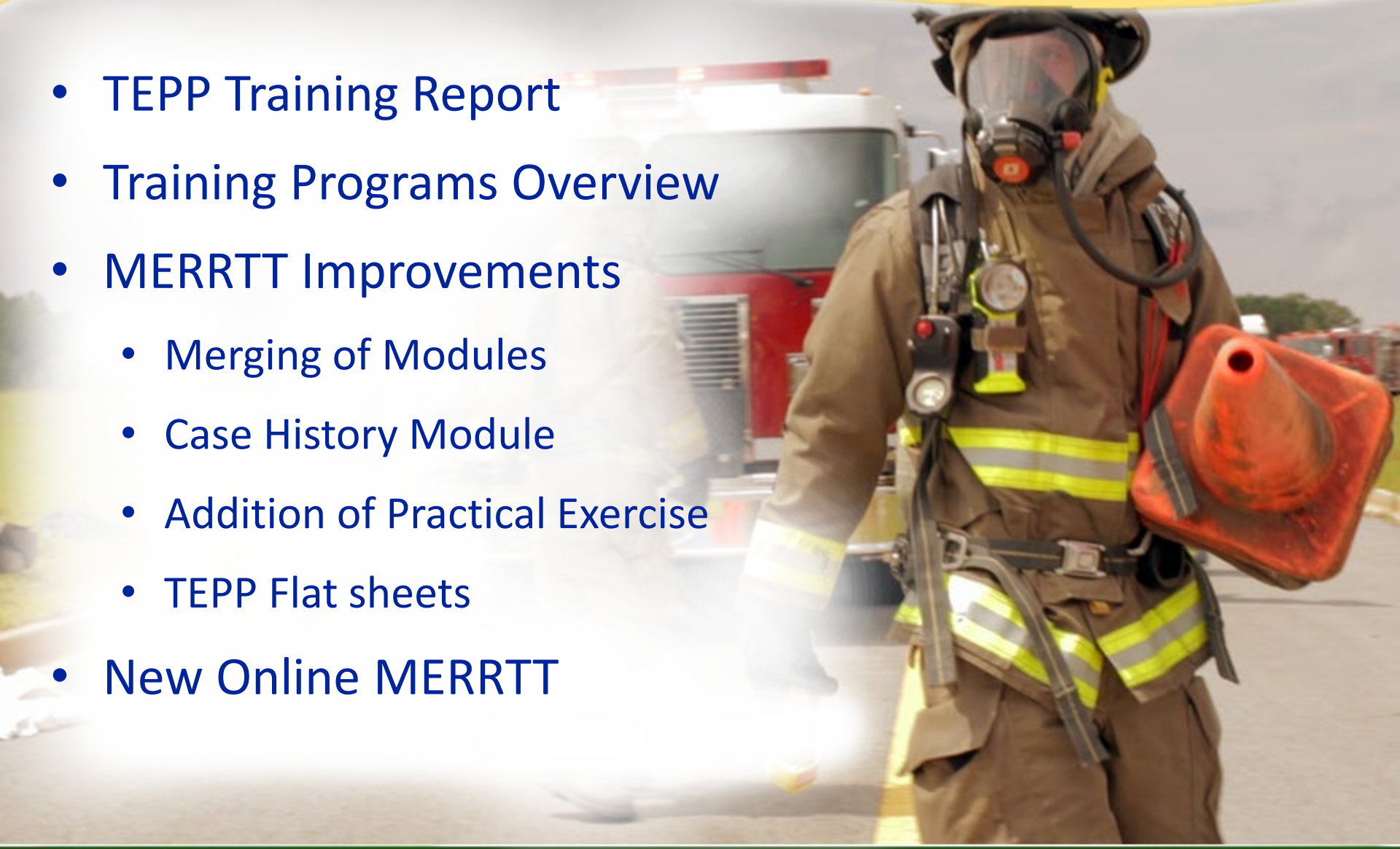
Technical Resources Group, Inc.

13 December 2022

TEPP – Discussion Topics



- TEPP Training Report
- Training Programs Overview
- MERRTT Improvements
  - Merging of Modules
  - Case History Module
  - Addition of Practical Exercise
  - TEPP Flat sheets
- New Online MERRTT

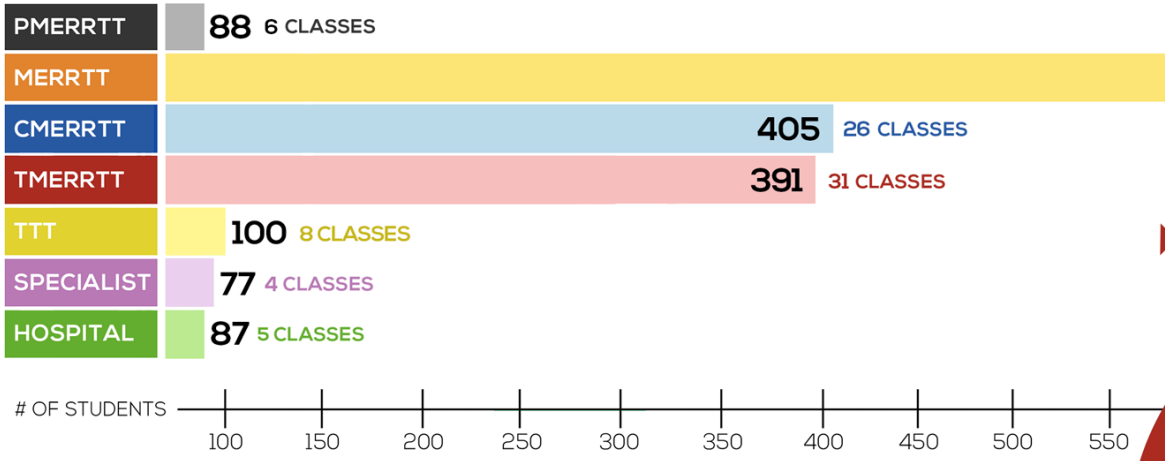
TEPP Training

BY THE NUMBERS FISCAL YEAR 2022

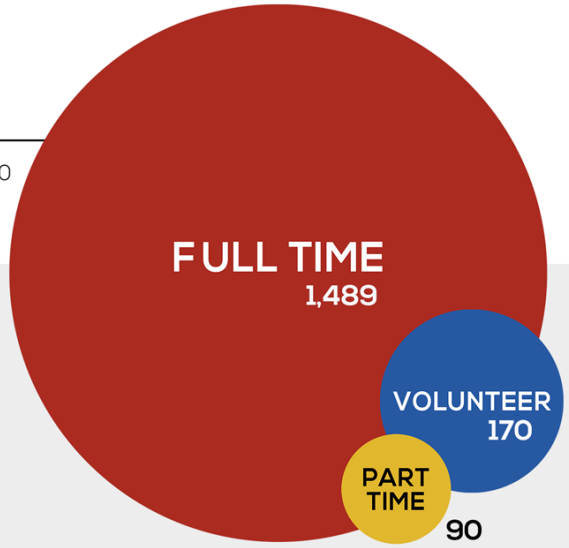
TOTAL NUMBER OF STUDENTS: 1,891

OF THESE 1,891 STUDENTS, 438 WERE AWARDED MEDICAL C.E.H.

BREAKDOWN BY TYPE OF CLASS

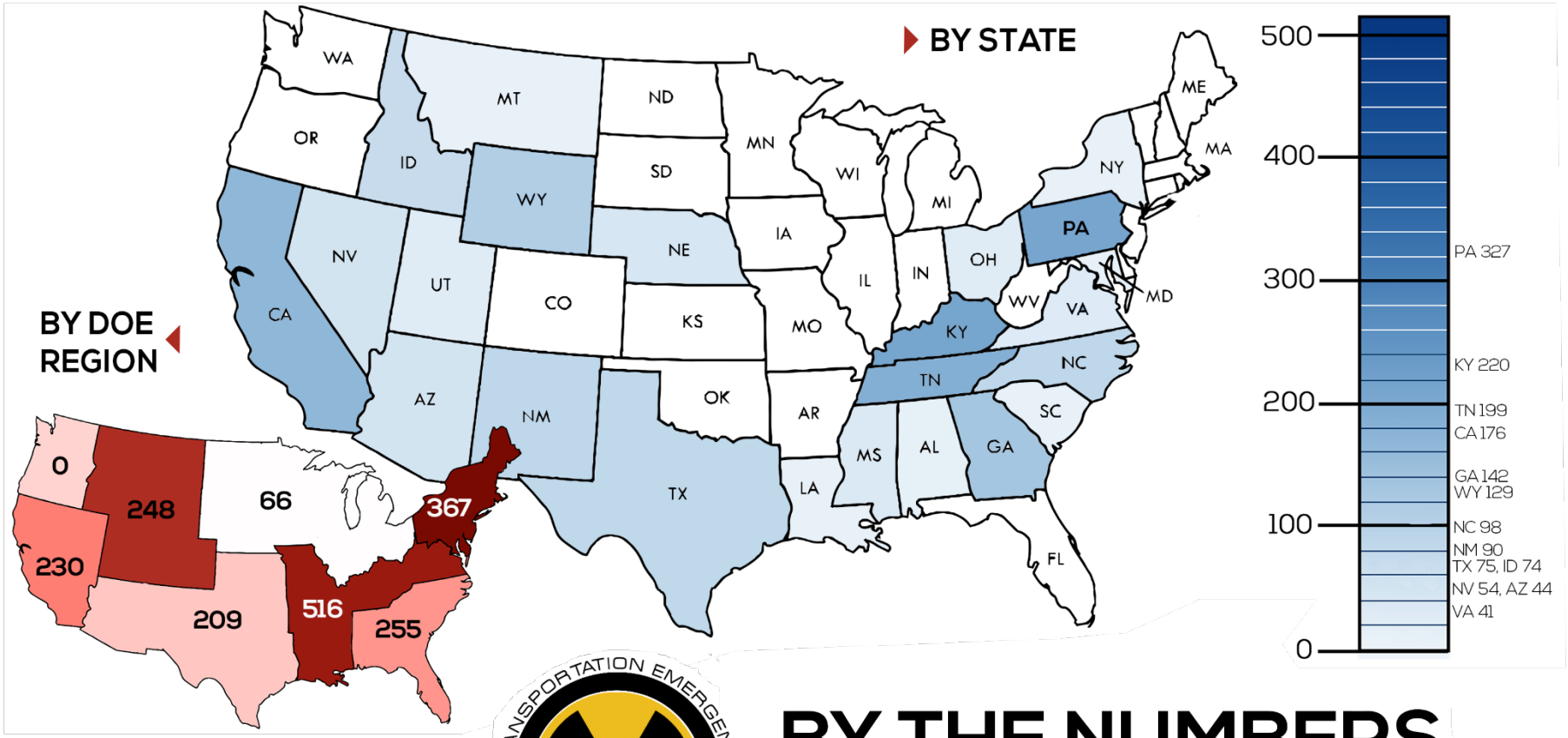


BY EMPLOYMENT STATUS



THE TEPP MISSION is to ensure that federal, state, tribal, and local responders have access to the plans, training, and technical assistance necessary to safely, efficiently, and effectively respond to transportation accidents involving DOE owned radioactive material. To accomplish this mission, a variety of tools have been developed to aid the response jurisdictions in their readiness activities.

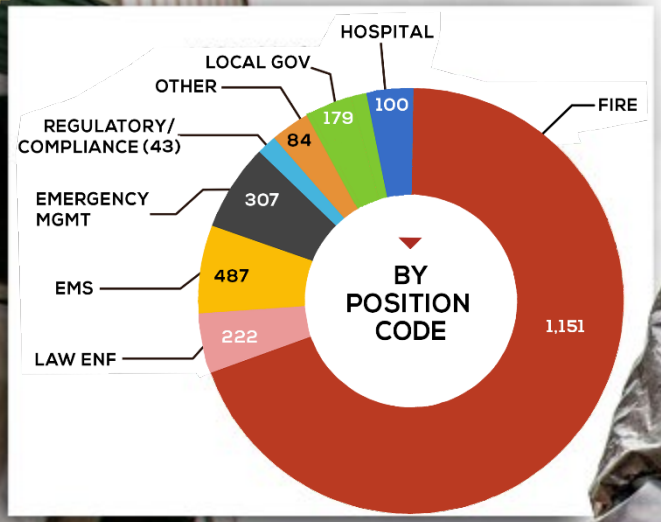
TEPP Training



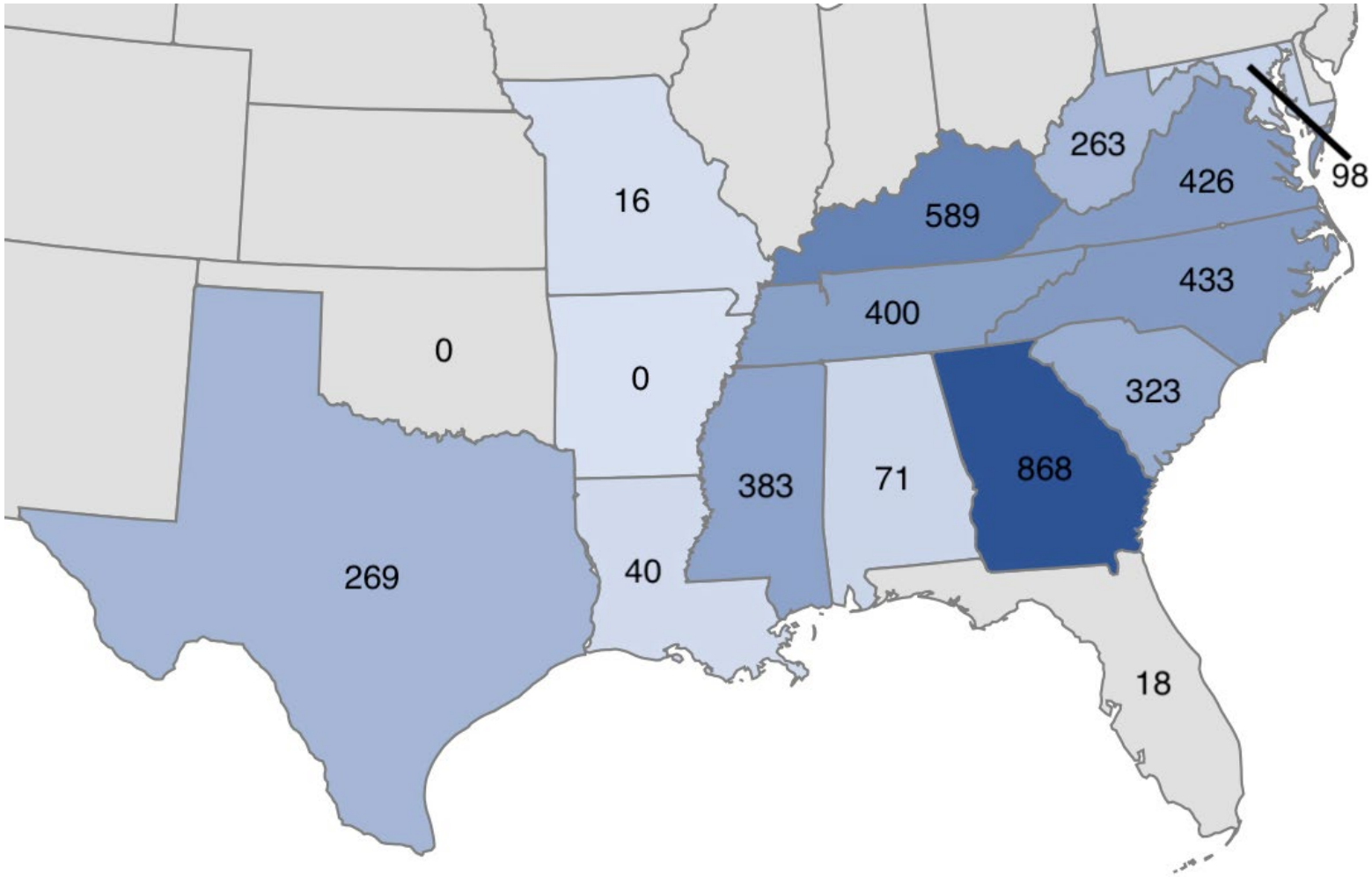
TRANSPORTATION EMERGENCY PREPAREDNESS PROGRAM — TEPP

BY THE NUMBERS FISCAL YEAR 2022

TEPP Training



5 Year Historical Training Numbers for SSEB States



TEPP Products

Planning Tools

- TEPP's **Model Needs Assessment** is designed to assist in identifying needed improvement area in planning and training

2.3 HAZARDOUS MATERIALS TEAM PROCEDURES AND CAPABILITIES

1. Does the county/region have a Hazardous Materials Team?
   ☐ Yes ☐ No

2. Has the Hazardous Materials Team completed a self-evaluation, such as that outlined in EPA Regulation 540 G-90 003, to ensure that the team meets local and state requirements?
   ☐ Yes ☐ No

3. Are the Hazardous Materials Team's services available 24-hours a day, 7 days a week?
   ☐ Yes ☐ No

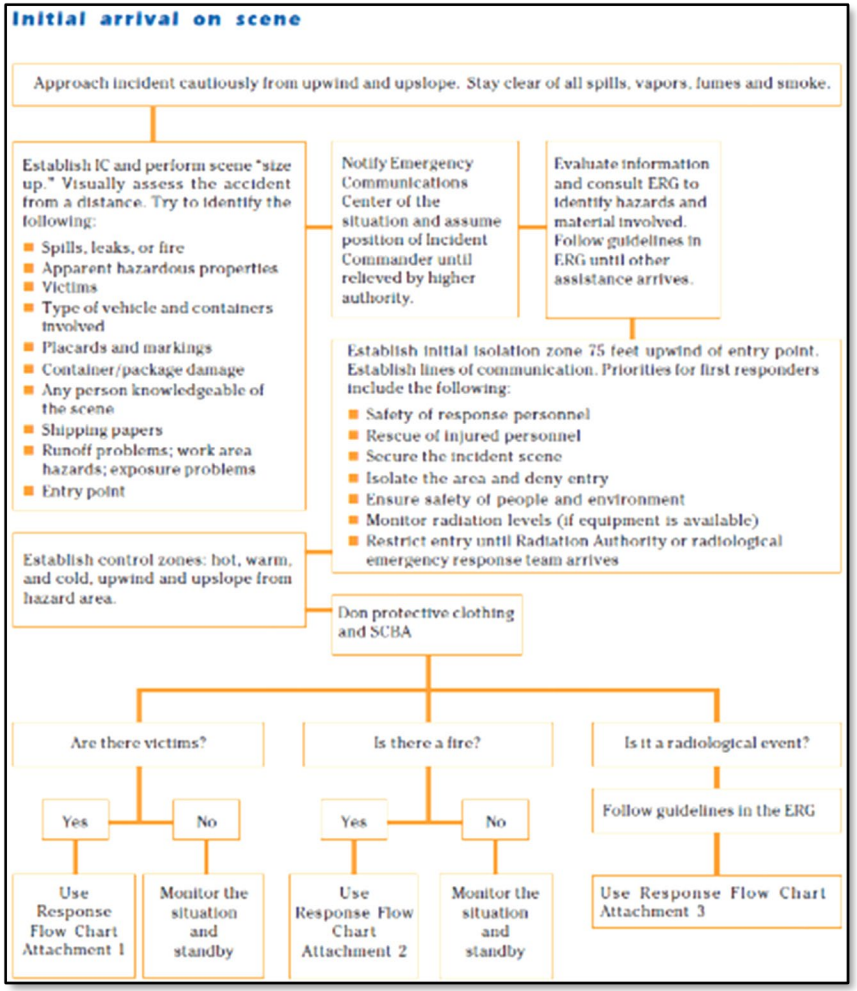
4. Are mutual aid agreements developed to support hazardous materials incidents?
   ☐ Yes ☐ No

5. Has the Hazardous Materials Team's mutual aid agreement been exercised/practiced in the past year?
   ☐ Yes ☐ No

TEPP Products

Planning Tools

- Model Procedures
  - First Responder Procedure
  - Hazardous Materials Team Procedure
  - EMS Responder Procedure for Handling a Radiologically Contaminated Patient
  - Medical Examiner/Coroner Guide for Handling a Radiologically Contaminated Body/Human Remains
  - Radioactive Material or Hazardous Materials Decontamination Procedure
  - Recovery Planning
  - Disposable PPE Don/Doff Procedure
  - Decon Line Doffing of Armed LEO



TEPP Products

Planning Tools

- Exercise Scenarios
  - Spent Nuclear Fuel
  - Low Specific Activity Material
  - Soil Density Gauge
  - Radiopharmaceuticals
  - Radiography Device

Other TEPP Resources

- TEPP maintains the DOE radiological training database
- The TEPP database tracks students who have completed TEPP training and we have records back as far as 2002
- TEPP maintains the license with the Commission on Accreditation for Prehospital Continuing Education (CAPCE)
  - This allows students who participate in MERRTT classes to receive medical continuing education hours
- TEPP maintains the state 24-hour emergency point of contacts listing that is posted on the DOE EM website
  - This is validated and updated every 6 months

TEPP Training

Training Programs

- All TEPP training programs are modular in design and each training program's content is based on National Fire Protection Association Standards
  - 472 Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents
  - 473 Standard for Competence of EMS Personnel Responding to Hazardous Materials/Weapons of Mass Destruction Incidents
  - 1072 addressed the specific job performance requirements (JPRs)

TEPP Training

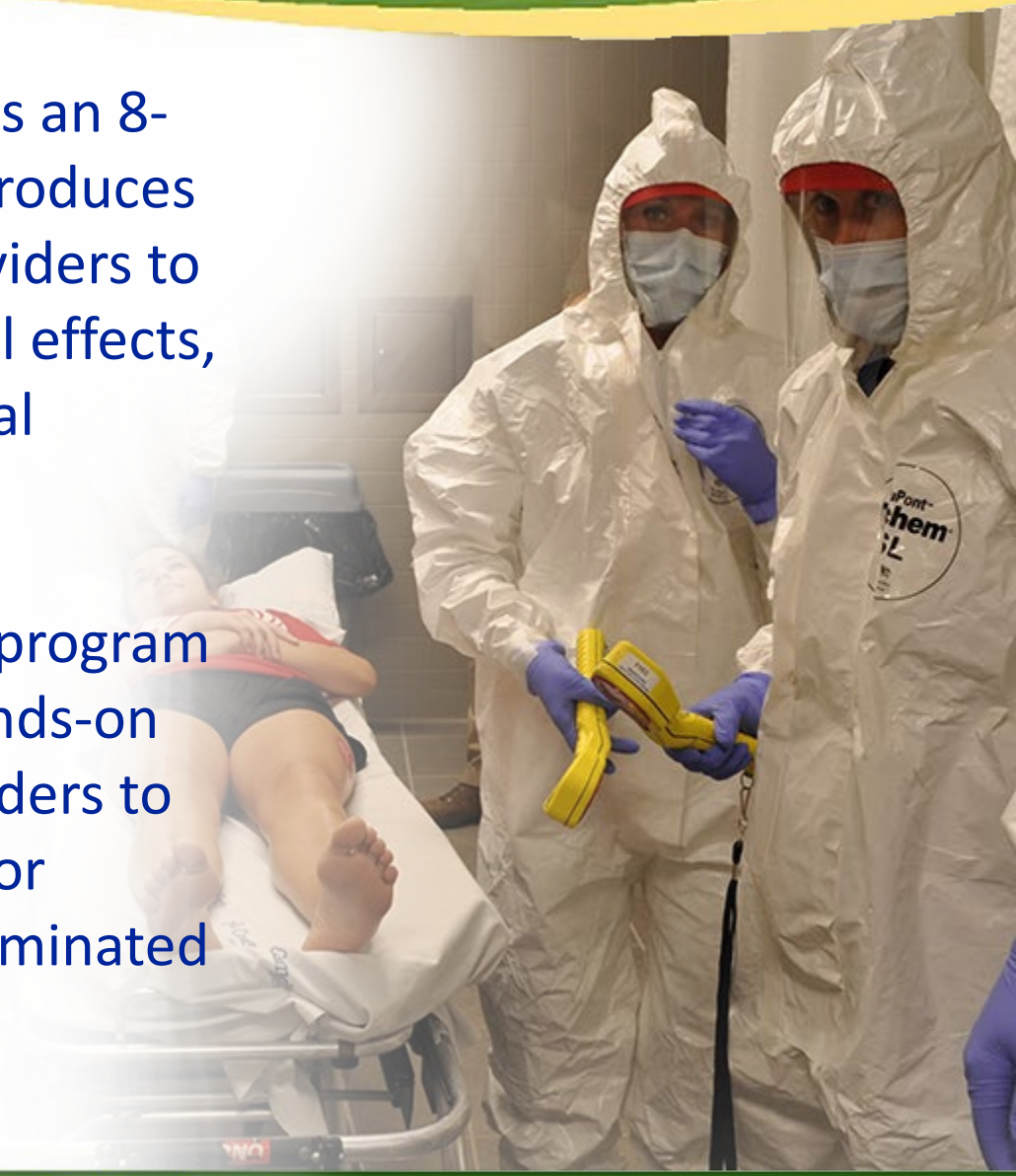
- **CMERRTT** - designed as an 8-hour training program that addresses core responder competencies and consist of 7 modules, textbook activities, and hands-on activities. Most frequently used as an orientation or refresher training program
- **MERRTT** - designed as a 16-hour training program that addresses awareness and operation level competencies and some technician level competencies. Program consists of 15 modules, textbook activities and hands-on activities and an exam to prove competencies

TEPP Training

- **TMERRTT** – designed as an 8-hour training program that addresses technician level competencies. This training program consist of pre-test, four modules, and involves the use of high activity radiological sources during hands-on activities
- **Radiation Specialist** – designed as a 40-hour training program that address specialist competencies. The training program consist of 19 modules, hands-on activities, and involves the use of high activity radiological sources during hands-on activities

TEPP Training

- **Hospital Training** – designed as an 8-hour training program that introduces hospital and medical care providers to ionizing radiation, its biological effects, facility preparation, radiological instrumentation, patient decontamination, and patient care/treatment. This training program consist of 7 modules and a hands-on exercise that allows care providers to practice techniques in caring for patients who have been contaminated with radioactive material



TEPP Training

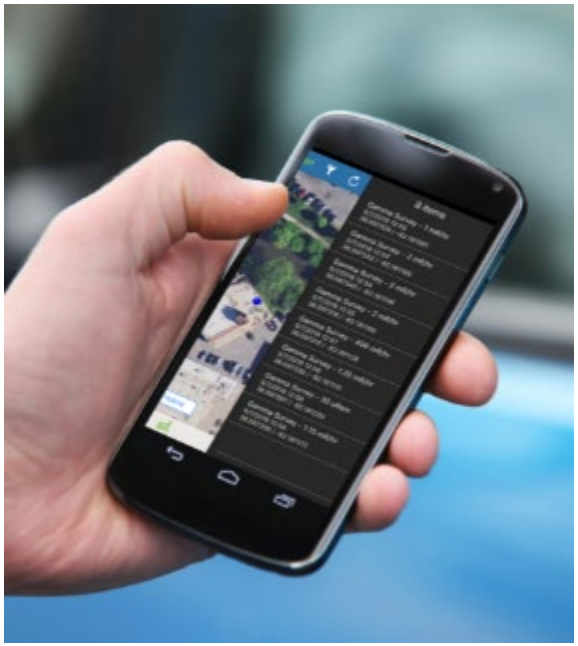
- TEPP created a medical examiner course based on the TEPP Model Procedure
  - This course was delivered as a pilot to the South Carolina Coroner's Association
- TEPP offers additional short courses that are taught at conferences

TEPP Training

- TEPP has produced 3 training videos covering the following topics:
  - Emergency Response
  - Pre-Hospital Response
  - Decontamination

TEPP Partnerships

- TEPP has been using RadResponder in our advanced classes
- RadResponder is a collaboration between FEMA, DOE, NNSA, and the EPA
- Provided free of charge to all federal, state, local, tribal, and territorial response organizations



CBRN Responder

RadResponder Network

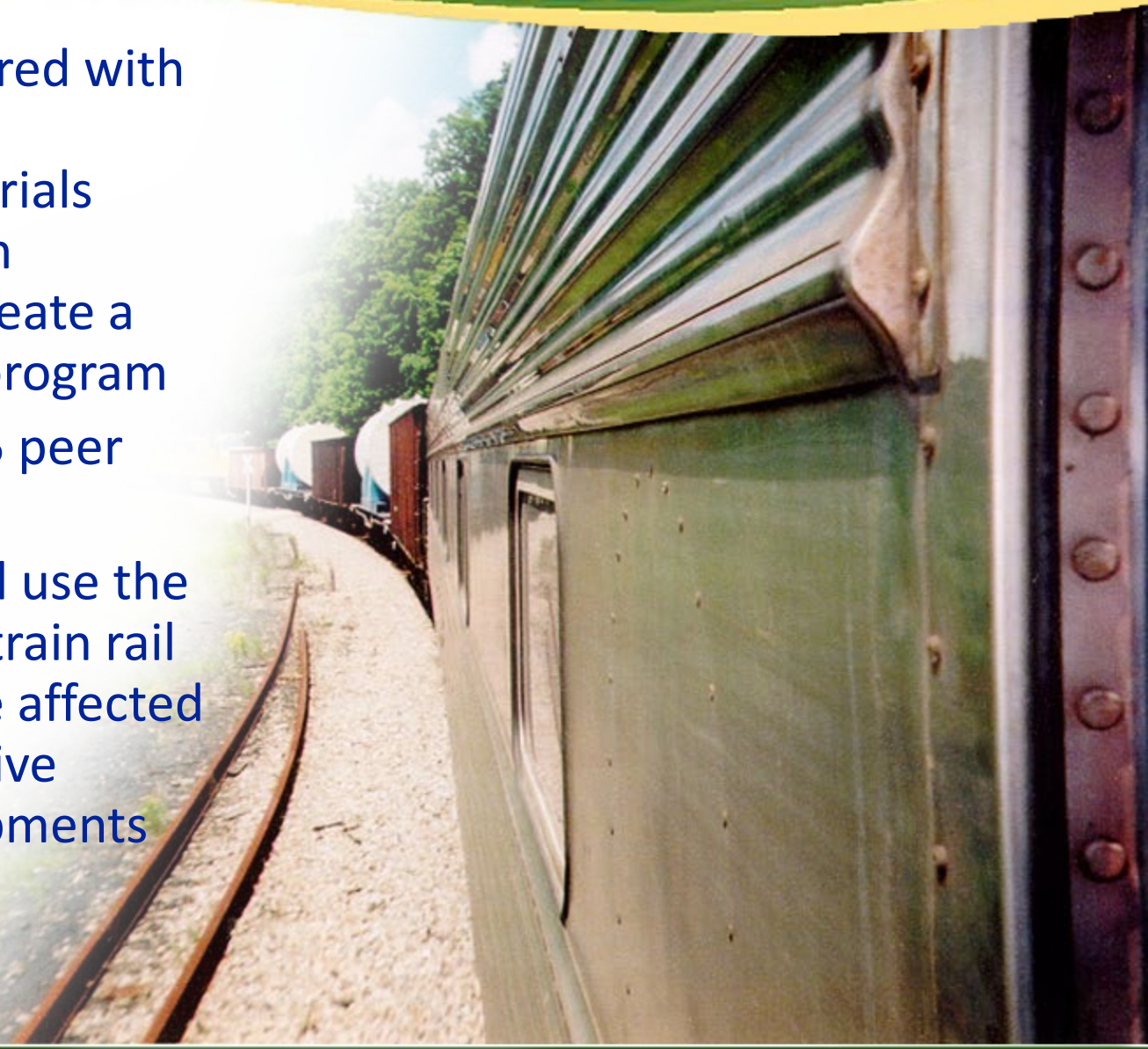
TEPP Partnerships

- TEPP partnered with the Office of Secure Transportation (OST) many years ago in adding a module to the MERRTT on their classified shipments
- This partnership has evolved to where OST agents now come to select MERRTT classes and assist with the training

OST Exercise in North Carolina

TEPP Partnerships

- TEPP has partnered with the Rail Workers Hazardous Materials Training Program (RWHMTP) to create a "Rail MERRTT" program
- RWHMTP has 15 peer trainers
- Peer trainers will use the Rail MERRTT to train rail workers who are affected by DOE radioactive material rail shipments



TEPP Partnerships

- TEPP works closely with trainers from the Waste Isolation Pilot Plant
- TEPP provides radiation sources for many of the WIPPTREX exercises conducted throughout the U.S.
- TEPP and WIPP co-teach many of the MERRTT sessions that occur on shipping routes that are shared between EM and WIPP shipments

MERRTT Improvement Items

- Original MERRTT was developed in 1998. It had 18 modules and three hands-on activities
- In 2000, WIPP began using MERRTT; providing a single DOE radiological responder training program that allowed for sharing training resources and reducing cost on shared transportation routes
- The MERRTT training program has been evaluated and as necessary revised on a biannual basis to ensure it remains current and relevant
- Over the years numerous improvements have been implemented because of feedback from the students, instructors, stakeholders, and the Training Task Group
- The 2012 implementation of the Case Histories module into the training program is an example of that feedback
- For each revision, the graphics and pictures throughout the training program have been updated

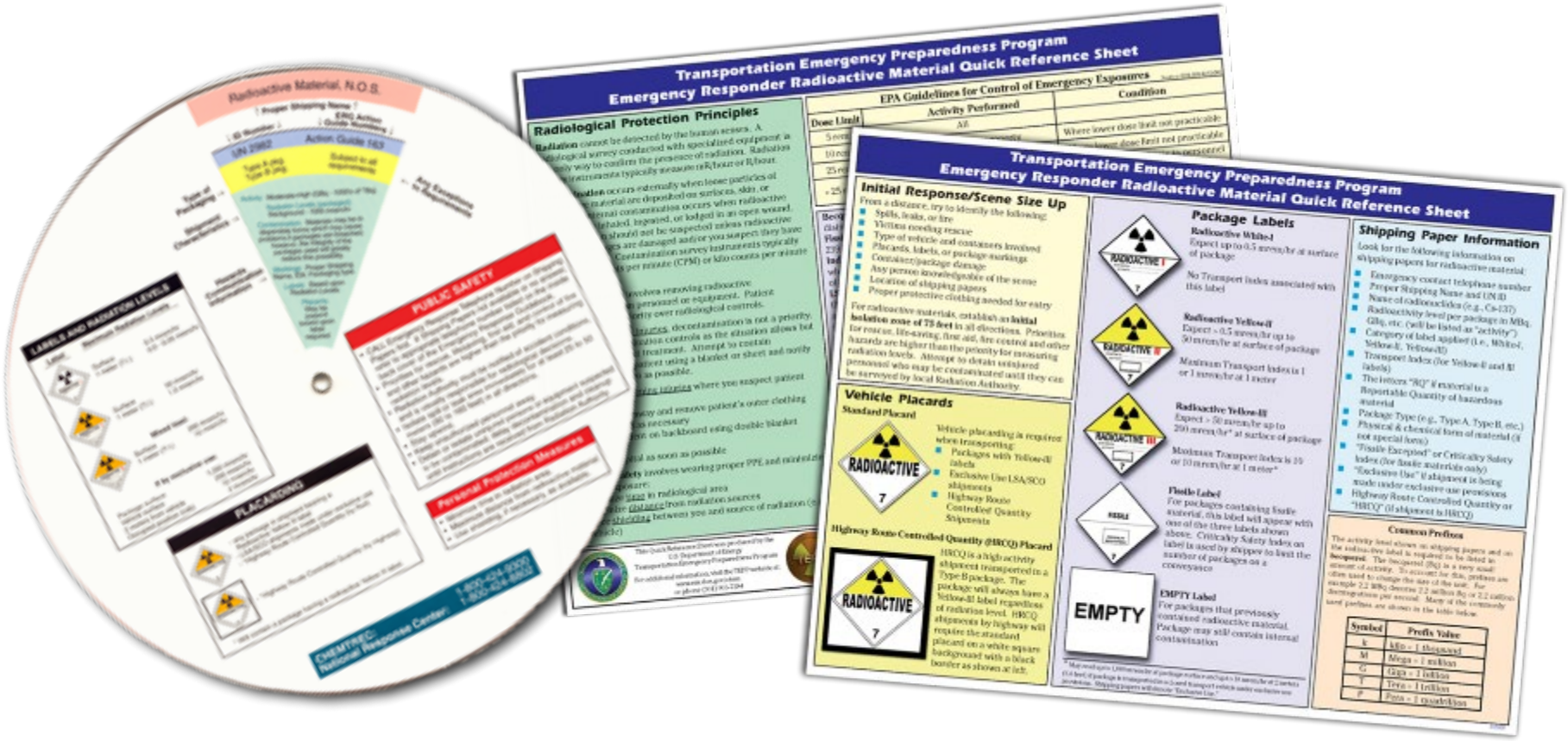
MERRTT Improvement Items

- In 2020 TEPP worked with the Training Task Group in merging Modules 5 and 7
  - Initial Response Actions (5) and Incident Control (7)
- Combining these modules freed up time for additional hands-on activities
  - Allowed for the addition of a bunker gear donning/doffing (dress up/dress down) practical exercise
- Numerous other modules were updated based on participant feedback
- Worked with the railroad officials to update the Rail Module
- Updated the Case Histories Module to include more recent incidents

MERRTT Improvement Items

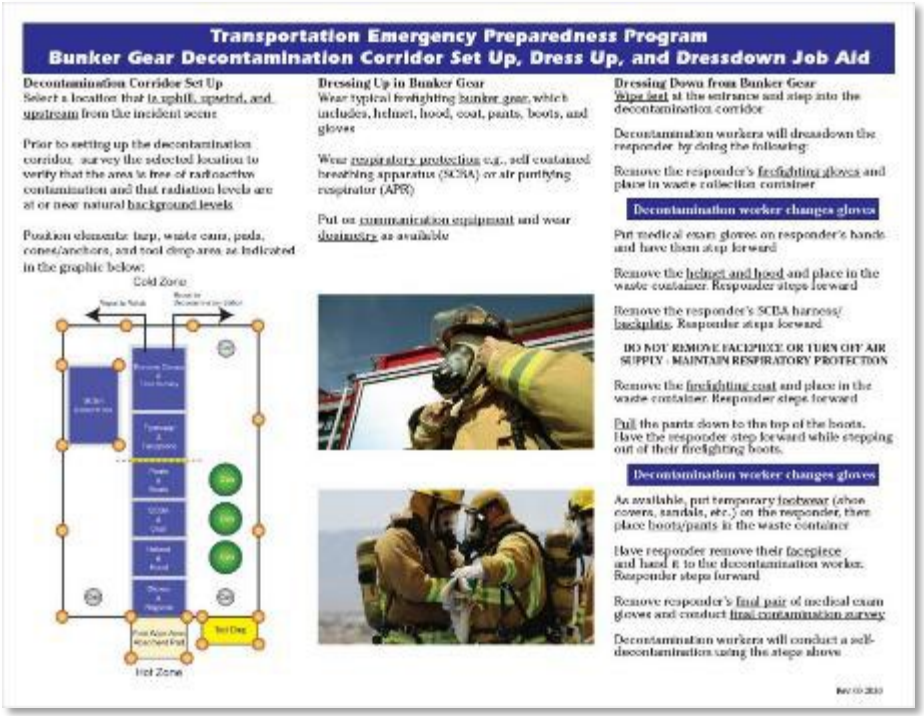
MERRTT Improvement Items

- Job Aids as a useful tool to responders



MERRTT Improvement Items

- New Job Aid "Flatsheet" for Decontamination Corridor Dressdown



Transportation Emergency Preparedness Program
Bunker Gear Decontamination Corridor Set Up, Dress Up, and Dressdown Job Aid

Decontamination Corridor Set Up
Select a location that is uphill, upwind, and upstream from the incident scene

Prior to setting up the decontamination corridor, survey the selected location to verify that the area is free of radioactive contamination and that radiation levels are at or near natural background levels

Position elements: tarp, waste cans, pads, cones/anchors, and tool drop area as indicated in the graphic below:

Cold Zone

Hot Zone

Dressing Up in Bunker Gear
Wear typical firefighting bunker gear, which includes, helmet, hood, coat, pants, boots, and gloves

Wear respiratory protection e.g., self contained breathing apparatus (SCBA) or air purifying respirator (APR)

Put on communication equipment and wear dosimetry as available

Dressing Down from Bunker Gear
Wipe feet at the entrance and step into the decontamination corridor

Decontamination workers will dressdown the responder by doing the following:

Remove the responder's firefighting gloves and place in waste collection container

Decontamination worker changes gloves

Put medical exam gloves on responder's hands and have them step forward

Remove the helmet and hood and place in the waste container. Responder steps forward

Remove the responder's SCBA harness/backplate. Responder steps forward

DO NOT REMOVE FACEPIECE OR TURN OFF AIR SUPPLY - MAINTAIN RESPIRATORY PROTECTION

Remove the firefighting coat and place in the waste container. Responder steps forward

Pull the pants down to the top of the boots. Have the responder step forward while stepping out of their firefighting boots.

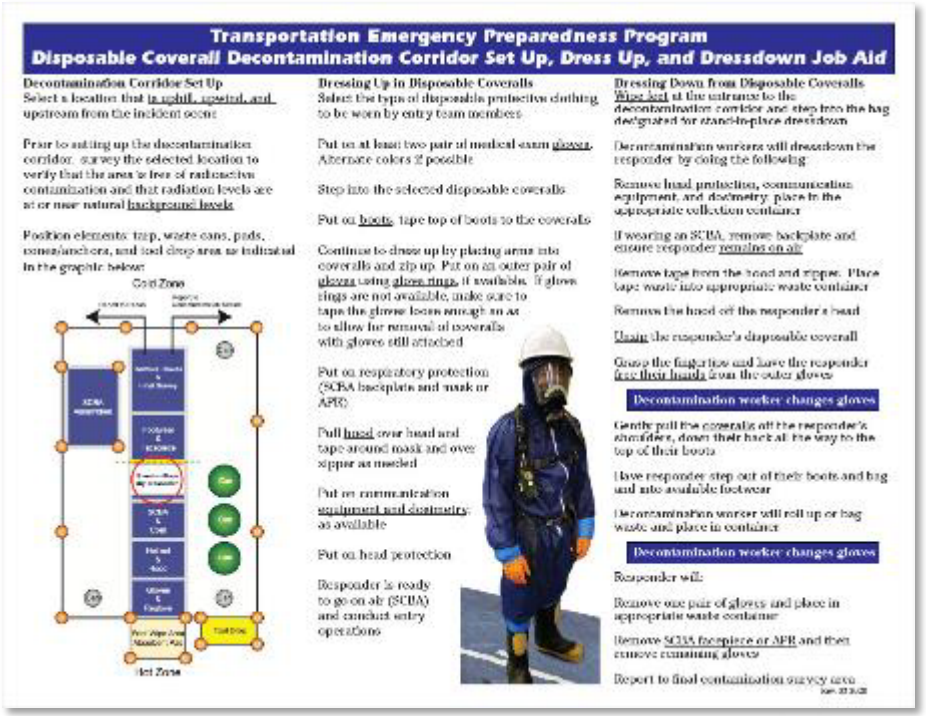
Decontamination worker changes gloves

As available, put temporary footwear (shoe covers, sandals, etc.) on the responder, then place boots/pants in the waste container

Have responder remove their facepiece and hand it to the decontamination worker. Responder steps forward

Remove responder's final pair of medical exam gloves and conduct final contamination survey

Decontamination workers will conduct a self-decontamination using the steps above



Transportation Emergency Preparedness Program
Disposable Coverall Decontamination Corridor Set Up, Dress Up, and Dressdown Job Aid

Decontamination Corridor Set Up
Select a location that is uphill, upwind, and upstream from the incident scene

Prior to setting up the decontamination corridor, survey the selected location to verify that the area is free of radioactive contamination and that radiation levels are at or near natural background levels

Position elements: tarp, waste cans, pads, cones/anchors, and tool drop area as indicated in the graphic below:

Cold Zone

Hot Zone

Dressing Up in Disposable Coveralls
Select the type of disposable protective clothing to be worn by entry team members

Put on at least two pair of medical exam gloves. Alternate colors if possible

Step into the selected disposable coveralls

Put on boots, tape top of boots to the coveralls

Continue to dress up by placing arms into coveralls and zip up. Put on an outer pair of gloves using glove rings, if available. If glove rings are not available, make sure to tape the gloves loose enough so as to allow for removal of coveralls with gloves still attached

Put on respiratory protection (SCBA backplate and mask or APR)

Pull hood over head and tape around mask and over zipper as needed

Put on communication equipment and dosimetry as available

Put on head protection

Responder is ready to go on air (SCBA) and conduct entry operations

Dressing Down from Disposable Coveralls
Wipe feet at the entrance to the decontamination corridor and step into the bag designated for stand-in-place dressdown

Decontamination workers will dressdown the responder by doing the following:

Remove head protection, communication equipment, and dosimetry; place in the appropriate collection container

If wearing an SCBA, remove backplate and ensure responder remains on air

Remove tape from the hood and zipper. Place tape waste into appropriate waste container

Remove the hood off the responder's head

Unzip the responder's disposable coverall

Grasp the fingertips and have the responder free their hands from the outer gloves

Decontamination worker changes gloves

Gently pull the coveralls off the responder's shoulders, down their back all the way to the top of their boots

Have responder step out of their boots and bag and into available footwear

Decontamination worker will roll up or bag waste and place in container

Decontamination worker changes gloves

Responder will:

Remove one pair of gloves and place in appropriate waste container

Remove SCBA facepiece or APR and then remove remaining gloves

Report to final contamination survey area

MERRTT Improvement Items

- New Job Aid "Flatsheet" for Armed Law Enforcement

Transportation Emergency Preparedness Program
Law Enforcement Decontamination Job Aid

Decontamination Set Up
If the officer entered the Incident scene (hot zone) to perform lifesaving actions or accidentally entered the hot zone and there is a potential that the officer is contaminated from the release of radioactive material, appropriate decontamination is necessary.

Responders will establish a decontamination corridor/process that uses a tarp, barricades, cones, or other identifying features to ensure that the decontamination area is obvious to responders.

Cold Zone

Hot Zone

Decontamination Considerations
Officer's who entered the hot zone and are potentially contaminated should implement self protection measures until they can be processed through the decontamination area:

- Do not eat, drink, smoke, or chew
- As possible, limit activities/movement to control the spread of contamination

If radiological survey equipment is on scene, a qualified person should conduct a full-body radiological survey of the officer to monitor for radioactive material contamination.

If no radiological material contamination is detected, the officer can return to normal duties once the officer, the vehicle, and other equipment has been cleared by the Radiation Authority.

If radiological survey equipment is not available or contamination is detected, proceed with the remaining steps of this procedure.

Options for securing officer's sensitive items

Option 1: If officer's response vehicle is located inside the hot zone, the officer may elect to secure their law enforcement sensitive items (specifically, firearms, Taser, ammunition, radios, body camera, department issued phone, and hard badges) in their vehicle. The officer should lock the response vehicle and prepare to exit the scene through the decontamination area.

Option 2: Have the officer continue to decontamination area wearing their sensitive items.

Law Enforcement Sensitive Items Custody
Maintaining a chain of custody of the weapons is required. Ensure that a law enforcement official who did not enter the hot zone and can act as the evidence custodian and is available to take possession of law enforcement sensitive items.

Options for proper handling of law enforcement sensitive items at the decontamination area

Option 1: If the items were locked in the vehicle, the vehicle keys will be placed in a large clear plastic bag and sealed. The bag will then be placed in a second large clear plastic bag and sealed to ensure good contamination control practices (double bagged).

Option 2: According to agency protocol, the officer will clear their sidearm, and render it safe before placing it and other law enforcement sensitive items will be double bagged.

Option 3: The weapons belt, backup weapon/holster, and law enforcement sensitive items will be double bagged.

Transportation Emergency Preparedness Program
Law Enforcement Decontamination Job Aid

Decontamination Stand-in-Place Dressdown
With the assistance of responders on the scene, the officer will step into the decontamination area where an oversized trash bag has been placed on the ground in a manner where the sides of the bag are rolled down.

All personal effects removed will be under the control of the evidence custodian.

Decontamination dressdown procedure

The evidence custodian will observe the decontamination workers removing/bagging the officer's personal effects using the following steps:

- The officer will step into the oversize trash bag
- Place wallet, jewelry, cell phone, etc. in a separate sealed bag
- Any gloves including medical exam gloves
- Glasses, head gear, and jacket
- Ballistic vest (if worn outside shirt)
- Shirt
- Ballistic vest (if worn inside shirt)
- Untie or unzip shoes/boots to make it easier for removal (leave on at this time)
- Slide pants to ankles
- With pants at ankles, have the officer step out of their pants/shoes/boots while stepping out of the trash bag
- All personal effects will then be double bagged and controlled by the evidence custodian

Modesty Clothing and Survey Station
After decontamination, modesty clothing (disposable coveralls) will be provided.

Officer will proceed to the radiological survey station

At the survey station, the officer will remove their modesty clothing and the Radiation Authority will conduct a radiological survey to determine if they are contaminated.

If the officer is contaminated, the Radiation Authority will note contamination locations, levels and designate the necessary steps to ensure the officer is properly decontaminated and the spread of contamination is minimized.

Upon completion of the whole-body survey, the officer should be provided with clean modesty clothing.

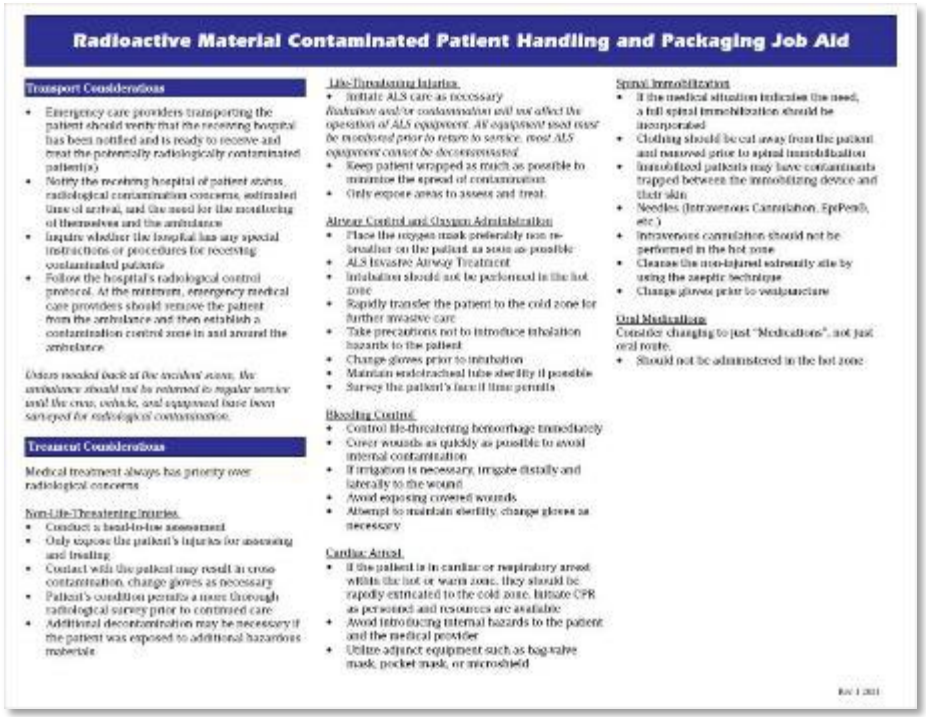
FRONT BACK

Return to Duty
The Radiation Authority and Incident Commander will decide if the officer can be released to continue normal work

- The evidence custodian will maintain custody of the bagged items at a designated location near the decontamination area. The receiving officer will brief the Incident Commander on the number, type, and location of items (vehicle keys, weapons, and law enforcement vehicles) needing survey or possible decontamination.
- The Incident Commander will work with the evidence custodian and the Radiation Authority to determine the best location for the final contamination survey and decontamination of personal and law enforcement sensitive items

MERRTT Improvement Items

- DRAFT Job Aid "Flatsheet" for Patient Handling



Radioactive Material Contaminated Patient Handling and Packaging Job Aid

Transport Considerations

- Emergency care providers transporting the patient should verify that the receiving hospital has been notified and is ready to receive and treat the potentially radiologically contaminated patient(s)
- Notify the receiving hospital of patient status, radiological contamination concerns, estimated time of arrival, and the need for the monitoring of themselves and the ambulance
- Inquire whether the hospital has any special instructions or procedures for receiving contaminated patients
- Follow the hospital's radiological control protocol. At the minimum, emergency medical care providers should remove the patient from the ambulance and then establish a contamination control zone in and around the ambulance

Unless needed back at the incident scene, the ambulance should not be returned to regular service until the crew, vehicle, and equipment have been surveyed for radiological contamination.

Treatment Considerations

Medical treatment always has priority over radiological concerns.

Non-Life-Threatening Injuries

- Conduct a head-to-toe assessment
- Only expose the patient's injuries for assessing and treating
- Contact with the patient may result in cross-contamination; change gloves as necessary
- Patient's condition permits a more thorough radiological survey prior to continued care
- Additional decontamination may be necessary if the patient was exposed to additional hazardous materials

Life-Threatening Injuries

- Initiate ALS care as necessary

Radiation and/or contamination will not affect the operation of ALS equipment. All equipment used must be monitored prior to return to service, most ALS equipment cannot be decontaminated.

- Keep patient wrapped as much as possible to minimize the spread of contamination
- Only expose areas to assess and treat

Airway Control and Oxygen Administration

- Place the oxygen mask preferably non re-breather on the patient as soon as possible
- ALS Invasive Airway Treatment
- Intubation should not be performed in the hot zone
- Rapidly transfer the patient to the cold zone for further invasive care
- Take precautions not to introduce inhalation hazards to the patient
- Change gloves prior to intubation
- Maintain endotracheal tube sterility if possible
- Survey the patient's face if time permits

Bleeding Control

- Control life-threatening hemorrhage immediately
- Cover wounds as quickly as possible to avoid internal contamination
- If irrigation is necessary, irrigate distally and laterally to the wound
- Avoid exposing covered wounds
- Attempt to maintain sterility; change gloves as necessary

Cardiac Arrest

- If the patient is in cardiac or respiratory arrest within the hot or warm zone, they should be rapidly extricated to the cold zone. Initiate CPR as personnel and resources are available
- Avoid introducing internal hazards to the patient and the medical provider
- Utilize adjunct equipment such as bag-valve mask, pocket mask, or microshield

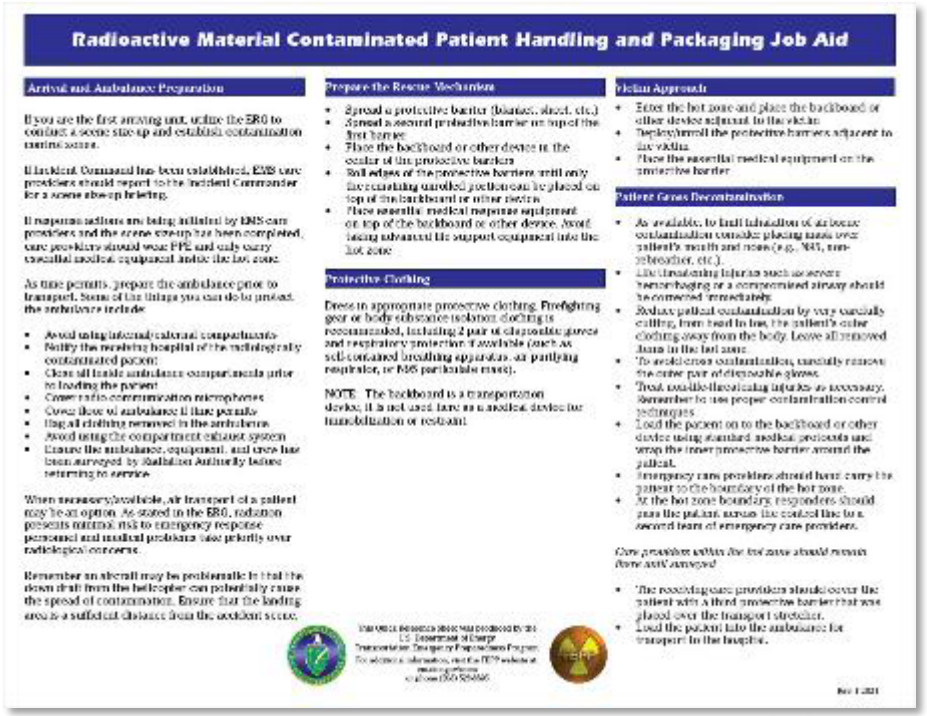
Spinal Immobilization

- If the medical situation indicates the need, a full spinal immobilization should be incorporated
- Clothing should be cut away from the patient and removed prior to spinal immobilization
- Immobilized patients may have contaminants trapped between the immobilizing device and their skin
- Needles (Intravenous Cannulation, EpiPens®, etc.)
- Intravenous cannulation should not be performed in the hot zone
- Cleanse the non-injured extremity site by using the aseptic technique
- Change gloves prior to venipuncture

Oral Medications

Consider changing to just "Medications", not just oral route.

- Should not be administered in the hot zone



Radioactive Material Contaminated Patient Handling and Packaging Job Aid

Arrival and Ambulance Preparation

If you are the first arriving unit, utilize the ERG to conduct a scene size-up and establish contamination control zones.

If Incident Command has been established, EMS care providers should report to the Incident Commander for a scene size-up briefing.

If response actions are being initiated by EMS care providers and the scene size-up has been completed, care providers should wear PPE and only carry essential medical equipment into the hot zone.

As time permits, prepare the ambulance prior to transport. Some of the things you can do to protect the ambulance include:

- Avoid using internal/external compartments
- Notify the receiving hospital of the radiologically contaminated patient
- Close all inside ambulance compartments prior to loading the patient
- Cover radio communication microphones
- Cover floor of ambulance if time permits
- Bag all clothing removed in the ambulance
- Avoid using the compartment exhaust system
- Ensure the ambulance, equipment, and crew has been surveyed by Radiation Authority before returning to service

When necessary/available, air transport of a patient may be an option. As stated in the ERG, radiation presents minimal risk to emergency response personnel and medical problems take priority over radiological concerns.

Remember an aircraft may be problematic in that the down draft from the helicopter can potentially cause the spread of contamination. Ensure that the landing area is a sufficient distance from the accident scene.

Prepare the Rescue Mechanism

- Spread a protective barrier (blankets, sheet, etc.)
- Spread a second protective barrier on top of the first barrier
- Place the backboard or other device in the center of the protective barriers
- Roll edges of the protective barriers until only the remaining unrolled portion can be placed on top of the backboard or other device
- Place essential medical response equipment on top of the backboard or other device. Avoid taking advanced life support equipment into the hot zone

Protective Clothing

Dress in appropriate protective clothing. Firefighting gear or bodily substance isolation clothing is recommended, including 2 pair of disposable gloves and respiratory protective if available (such as self-contained breathing apparatus, air purifying respirator, or N95 particulate mask).

NOTE: The backboard is a transportation device; it is not used here as a medical device for immobilization or restraint.

Victim Approach

- Enter the hot zone and place the backboard or other device adjacent to the victim
- Deploy/unroll the protective barriers adjacent to the victim
- Place the essential medical equipment on the protective barrier

Patient Gross Decontamination

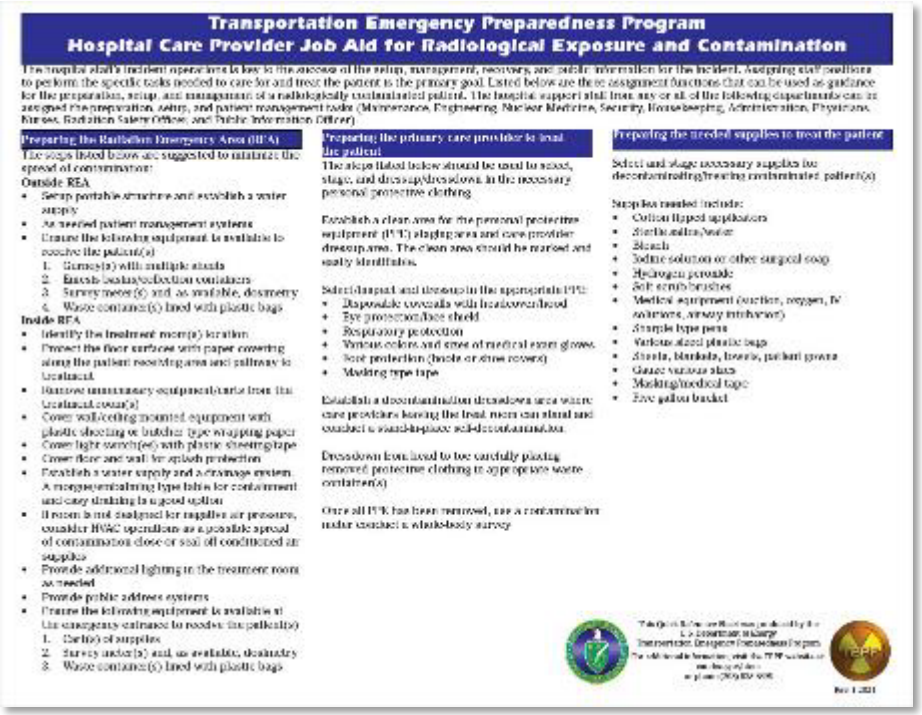
- As available, to limit inhalation of airborne contamination consider placing mask over patient's mouth and nose (e.g., N95, non-rebreather, etc.)
- Life-threatening injuries such as severe hemorrhaging or a compromised airway should be corrected immediately
- Reduce patient contamination by very carefully cutting, from head to toe, the patient's outer clothing away from the body. Leave all removed items in the hot zone
- To avoid cross contamination, carefully remove the outer pair of disposable gloves
- Treat possible/identified injuries as necessary. Remember to use proper contamination control techniques
- Load the patient on to the backboard or other device using standard medical protocols and wrap the inner protective barrier around the patient
- Emergency care providers should have carry the patient to the boundary of the hot zone
- At the hot zone boundary responders should pass the patient across the control line to a second team of emergency care providers.

Care providers within the hot zone should remain there until surveyed.

- The receiving care providers should cover the patient with a third protective barrier that was placed over the transport stretcher.
- Load the patient into the ambulance for transport to the hospital.

MERRTT Improvement Items

- DRAFT Job Aid "Flatsheet" for Hospital Care Providers



Transportation Emergency Preparedness Program
Hospital Care Provider Job Aid for Radiological Exposure and Contamination

The hospital staff's incident operations is key to the success of the setup, management, recovery, and public information for the incident. Assigning staff positions to perform the specific tasks needed to care for and treat the patient is the primary goal. Listed below are the re-assignment functions that can be used as guidance for the preparation, setup, and management of a radiologically contaminated patient. The hospital support staff from any or all of the following departments can be assigned the preparation, setup, and patient management tasks (Maintenance, Engineering, Nuclear Medicine, Security, Housekeeping, Administration, Physicians, Nurses, Radiation Safety Officer, and Public Information Officer)

Preparing the Radiation Emergency Area (REA)

The steps listed below are suggested to minimize the spread of contamination:

Outside REA

- Setup portable structure and establish a water supply
- As needed patient management systems
- Ensure the following equipment is available to receive the patient(s)
  1. Gurney(s) with multiple stands
  2. Barrels-bucket/collection containers
  3. Survey meter(s) and as available, dosimetry
  4. Waste container(s) lined with plastic bags

Inside REA

- Identify the treatment room(s) location
- Protect the floor surfaces with paper covering along the patient receiving area and pathway to treatment
- Remove unnecessary equipment/carts from the treatment room(s)
- Cover wall/ceiling mounted equipment with plastic sheeting or butcher type wrapping paper
- Cover light switch(es) with plastic sheeting/tape
- Cover floor and wall for splash protection
- Establish a water supply and a drainage system. A mosquito/draining type basin for containment and easy drinking is a good option
- If room is not designed for negative air pressure, consider HVAC operations as a possible spread of contamination close or seal off conditioned air supplies
- Provide additional lighting in the treatment room as needed
- Provide public address systems
- Ensure the following equipment is available at the emergency entrance to receive the patient(s)
  1. Cart(s) of supplies
  2. Survey meter(s) and as available, dosimetry
  3. Waste container(s) lined with plastic bags

Preparing the primary care provider to treat the patient

The steps listed below should be used to select, stage, and dress up/dress down in the necessary personal protective clothing

Establish a clean area for the personal protective equipment (PPE) staging area and care provider dress up area. The clean area should be marked and easily identifiable.

Select/don/put and treasure in the appropriate PPE:

- Disposable coveralls with hood/overhead
- Eye protection/face shield
- Respiratory protection
- Various colors and sizes of medical exam gloves
- Boot protection (boots or shoe covers)
- Masking type tape

Establish a decontamination dressdown area where care providers leaving the treatment room can shield and conduct a wash-in/post self-decontamination.

Dressdown items listed to be carefully placing removed protective clothing in appropriate waste container(s)

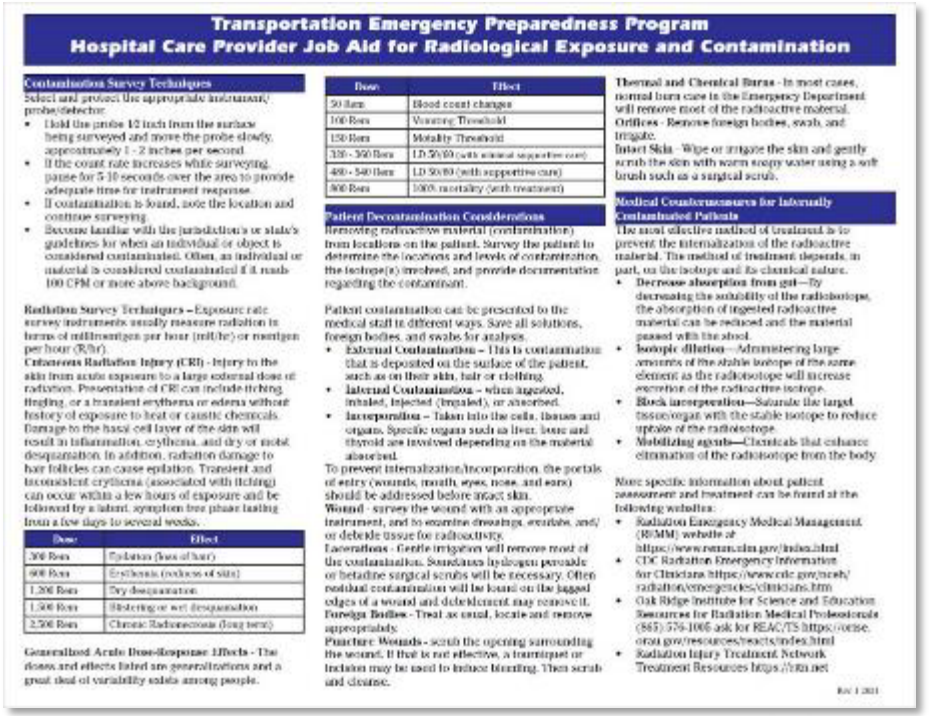
Once all PPE has been removed, use a contamination meter conduct a whole-body survey

Preparing the needed supplies to treat the patient

Select and stage necessary supplies for decontaminating/treating contaminated patient(s)

Supplies needed include:

- Cotton tipped applicators
- Sterile saline/water
- Bleach
- Iodine solution or other surgical soap
- Hydrogen peroxide
- Soft scrub brushes
- Medical equipment (suction, oxygen, IV warmers, airway interfaces)
- Sample type pens
- Various sized plastic bags
- Towels, blankets, towels, patient gowns
- Gauze various sizes
- Masking/medical tape
- Five gallon bucket



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Contamination Survey Techniques

Select and protect the appropriate instrument/probe/detector.

- Hold the probe 1/2 inch from the surface being surveyed and move the probe slowly, approximately 1 - 2 inches per second.
- If the count rate increases while surveying, pause for 5-10 seconds over the area to provide adequate time for instrument response.
- If contamination is found, note the location and continue surveying.
- Become familiar with the jurisdiction's or state's guidelines for when an individual or object is considered contaminated. Often, an individual or material is considered contaminated if it reads 100 CPM or more above background.

Radiation Survey Techniques – Exposure rate survey instruments usually measure radiation in terms of milliroentgen per hour (mR/hr) or roentgen per hour (R/hr).

Cutaneous Radiation Injury (CRI) - Injury to the skin from acute exposure to a large external dose of radiation. Presentation of CRI can include itching, tingling, or a transient erythema or edema without history of exposure to heat or caustic chemicals. Damage to the basal cell layer of the skin will result in inflammation, erythema, and dry or moist desquamation. In addition, radiation damage to hair follicles can cause epilation. Transient and inconsistent erythema (associated with itching) can occur within a few hours of exposure and be followed by a latent, symptom free phase lasting from a few days to several weeks.

Dose	Effect
300 Rem	Epilation (loss of hair)
600 Rem	Erythema (redness of skin)
1,200 Rem	Dry desquamation
1,500 Rem	Blistering or wet desquamation
2,500 Rem	Chronic Radionecrosis (long term)

Generalized Acute Dose-Response Effects - The doses and effects listed are generalizations and a great deal of variability exists among people.

Dose	Effect
50 Rem	Blood count changes
100 Rem	Vomiting Threshold
150 Rem	Mortality Threshold
320 - 360 Rem	LD 50/60 (with minimal supportive care)
480 - 540 Rem	LD 50/60 (with supportive care)
800 Rem	100% mortality (with treatment)

Patient Decontamination Considerations

Removing radioactive material (contamination) from locations on the patient. Survey the patient to determine the locations and levels of contamination, the isotope(s) involved, and provide documentation regarding the contaminant.

Patient contamination can be prevented to the medical staff in different ways. Save all solutions, foreign bodies, and swabs for analysis.

- **External Contamination** – This is contamination that is deposited on the surface of the patient, such as on their skin, hair or clothing.
- **Internal Contamination** – when ingested, inhaled, injected (impaled), or absorbed.
- **Incorporation** – Taken into the cells, tissues and organs. Specific organs such as liver, bone and thyroid are involved depending on the material absorbed.

To prevent internalization/incorporation, the portals of entry (wounds, mouth, eyes, nose, and ears) should be addressed before intact skin.

Wound - survey the wound with an appropriate instrument, and to examine dressings, swabs, and/or debride tissue for radioactivity.

Lacerations - Gentle irrigation will remove most of the contamination. Sometimes hydrogen peroxide or betadine surgical scrubs will be necessary. Often residual contamination will be found on the jagged edges of a wound and debridement may remove it.

Foreign Bodies - Treat as usual, locate and remove appropriately.

Puncture Wounds - scrub the opening surrounding the wound. If that is not effective, a tourniquet or incision may be used to induce bleeding. Then scrub and cleanse.

Thermal and Chemical Burns - In most cases, normal burn care in the Emergency Department will remove most of the radioactive material.

Orifices - Remove foreign bodies, swab, and irrigate.

Intact Skin - Wipe or irrigate the skin and gently scrub the skin with warm soapy water using a soft brush such as a surgical scrub.

Medical Countermeasures for Internally Contaminated Patients

The most effective method of treatment is to prevent the internalization of the radioactive material. The method of treatment depends, in part, on the isotope and its chemical nature.

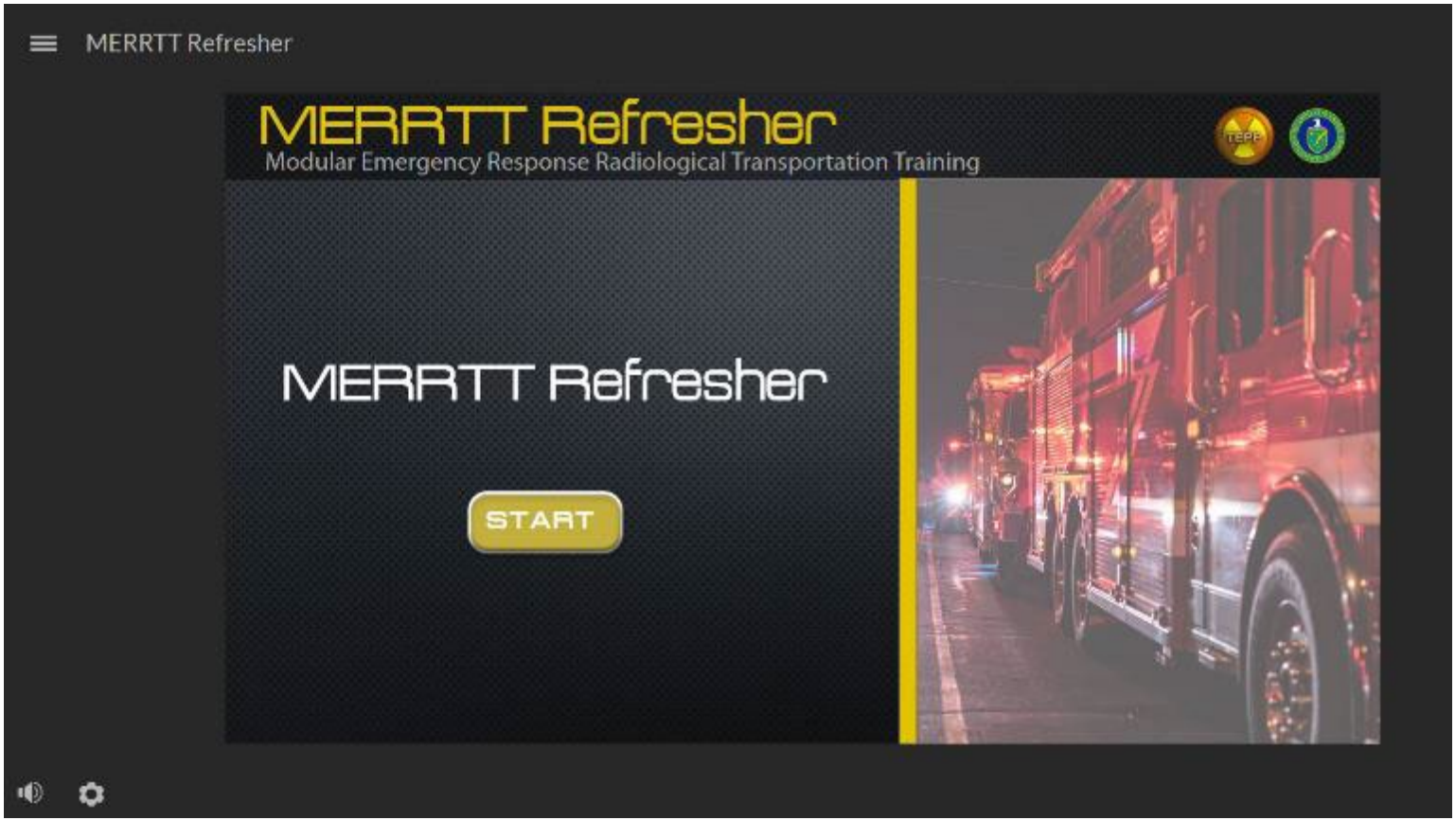
- **Decrease absorption from gut**—By decreasing the solubility of the radioisotope, the absorption of ingested radioactive material can be reduced and the material passed with the stool.
- **Isotopic dilution**—Administering large amounts of the stable isotope of the same element as the radioisotope will increase excretion of the radioactive isotope.
- **Block incorporation**—Saturate the target tissue/organ with the stable isotope to reduce uptake of the radioisotope.
- **Mobilizing agents**—Chemicals that enhance elimination of the radioisotope from the body

More specific information about patient assessment and treatment can be found at the following websites:

- Radiation Emergency Medical Management (REMM) website at https://www.remm.nlm.gov/index.html
- CDC Radiation Emergency Information for Clinicians https://www.cdc.gov/nceh/radiation/emergencies/clinicians.htm
- Oak Ridge Institute for Science and Education Resources for Radiation Medical Professionals (865) 576-1005 ask for REAC/TS https://orise.orau.gov/resources/reacts/index.html
- Radiation Injury Treatment Network Treatment Resources https://rtn.net

MERRTT Improvement Items

- New Online MERRTT program



Transportation Emergency Preparedness

A Comprehensive Emergency Management System established by the U.S. Department of Energy

Home | MERRTT Training Program | Scheduled Events | TEPP Tools | Contacts

- MERRTT Modules
- How-to Videos
- TEPP Full Length Videos
- Training Aid - RAM Flatsheet
- Training Aid - Decon Corridor
- Course Descriptions/TEPP Training Matrix
- Online MERRTT Refresher

Our Mission

TEPP i emergency management system established by DOE Order (DOE O) 151.1, Comprehen

TEPP i emergency planning and preparedness activities under a single program with the goal tribal ed to respond promptly, efficiently, and effectively to possible accidents involving DOE s implemented using an approach to ensure that initial responders to a radiological transportation accident have the necessary knowledge a situation.

The TEPP mission is to ensure that federal, state, tribal, and local responders have access to the plans, training, and technical assistance ne transportation accidents involving DOE-owned radioactive materials. To accomplish this mission, a suite of tools have been developed to a

MERRTT Program

The Modular Emergency Response Radiological Transportation Training (MERRTT) program is designed to take the complex topic of a radio

Questions

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