U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

COMMODITY PREPAREDNESS AND INCIDENT MANAGEMENT REFERENCE SHEET

PETROLEUM CRUDE OIL

CAS NO. 8002-05-9
UN 1267
DOT Hazard Class: 3
FLAMMABLE LIQUID
ERG Guide No. 128

HAZARD RATING = HIGH

DOT Hazard Classification and NFPA 704 - Standard System for the Identification of the Hazards of Materials for Emergency Response

TRANSPORTATION AND PLANNING CONSIDERATIONS

- With the increased production of oil from shale reserves in states such as North Dakota and Texas, there has been a dramatic increase in the transportation of crude oil by rail. Rail shipments of crude oil from these regions are typically made using unit trains. Unit trains of crude oil are single commodity trains that generally consist of over 100 tank cars, each carrying approximately 30,000 gallons of crude oil.
- Unit trains typically move from one location (e.g., shipper's production facility or transloading facility) to a single destination (e.g., petroleum refinery). Given the usual length of these trains (over a mile long), derailments can cause road closures, create significant detours, and require response from more than one direction to access the scene of the incident.
- In the event of an incident that may involve the release of thousands of gallons of product and ignition of tank cars of crude oil in a unit train, most emergency response organizations will not have the available resources, capabilities or trained personnel to safely and effectively extinguish a fire or contain a spill of this magnitude (e.g., sufficient firefighting foam concentrate, appliances, equipment, water supplies).
- Responses to unit train derailments of crude oil will require specialized outside resources that may not arrive at the scene for hours; therefore it is critical that responders coordinate their activities with the involved railroad and initiate requests for specialized resources as soon as possible.
- These derailments will likely require mutual aid and a more robust on-scene *Incident Management System* than responders may normally use. Therefore, pre-incident planning, preparedness and coordination of response strategies should be considered and made part of response plans, drills and exercises that include the shippers and rail carriers of this commodity.

- Tank cars carrying crude oil may also be found in general freight (manifest) trains that are made up of shipments of many different commodities from many different shippers. In these situations, emergency responders need to consider the potential impact that tank cars containing other hazardous commodities may have on tank cars containing crude oil if a release occurs, and vice-versa.
- To determine what specific commodities or hazardous materials may be involved, responders should obtain a train consist from the train crew or by contacting the rail carrier's emergency contact number.

HAZARD SUMMARY

- Petroleum crude oil is a light to dark colored liquid hydrocarbon containing flammable gasses. It is not a uniform substance and its physical and chemical properties may vary from oilfield to oilfield or within wells located in the same oilfield. Light, sweet crude oils contain flammable gasses such as butane and propane (unless it is known that the gasses have been removed). These gasses can readily ignite if released, when they come in contact with an ignition source. These crude oils may also contain hydrogen sulfide, a toxic inhalation hazard material, in the vapor space of the tank car. Due to the characteristics of crude oil, in an accident scenario, the behavior of this product may range from that of gasoline for the lighter (sweet) crude oils to diesel fuel for the heavier (sour) crude oils.
- Releases may create vapor/air explosion hazards indoors, in confined spaces, outdoors, or in sewers. Remove sources of heat, sparks, flame, friction and electricity, including internal combustion engines and power tools. Use caution when approaching the scene and positioning apparatus. Implement air monitoring as soon as possible to detect the presence of combustible gasses.
- Volatile vapors released from the spill area may create flammable atmospheres. Some crude oil vapors may be heavier than air and accumulate in low areas, and travel some distance to a source of ignition and flash back.
- When working in flammable atmospheres (where any concentration of lower explosive limit (LEL) exists), extreme caution must be taken to avoid creating ignition sources. This includes but is not limited to the use of non-sparking tools and intrinsically safe/explosion-proof equipment.
- The more volatile materials in crude oil may be present in air in high concentrations creating an inhalation hazard. There is also the possibility that the crude oil may contain varying concentrations of benzene or hydrogen sulfide. Products of combustion may also include toxic constituents. Responders should wear self-contained breathing apparatus (SCBA) to avoid potential exposure.
- Use water fog spray to cool containers, control vapors, and to protect personnel and exposures. Direct the cooling water to the top of the tank. There is some potential that containers of liquid that are not properly cooled may rupture violently if exposed to fire or excessive heat. Stay away from ends of tank(s) involved in fire, but realize that shrapnel may travel in any direction.

- **DO NOT APPLY WATER DIRECTLY INSIDE A TANK CAR. Apply water from the sides of the tank car and from a safe distance to keep fire exposed containers cool. Use unmanned fire monitors for cooling tank cars when available. Withdraw immediately in case of rising sound from venting pressure relief devices or discoloration of tank.** If available, dry chemical extinguishing agents, such as potassium bicarbonate (i.e., Purple K) may also be used in conjunction with Class B foams.

- Improper application of fire streams may create a dangerous phenomenon known as a *slopover*, thereby increasing risks to emergency responders. **A *slopover* results when a water stream is applied to the hot surface of burning oil. The water is converted into steam causing agitation of the liquid and burning oil to slop over the sides of the tank car. This can occur within 10 minutes of the product becoming involved in fire.** Note: *Slopover* will not occur in a pool of crude oil on the ground.

- Hazardous combustion/decomposition products may be released by this material when exposed to heat or fire. These can include carbon monoxide, sulfur oxides, nitrogen oxides and aldehydes. Response personnel should exercise extreme caution on-scene and wear appropriate personal protective clothing and equipment, including respiratory protection.

- Apply Class B firefighting foam as you would on fires involving other hydrocarbons. Class B foam blankets prevent vapor production and ignition of flammable and combustible liquids. Foam is most effective on static fires that are contained in some manner. Firefighting foam is not effective on hydrocarbon fuels in motion (i.e., three dimensional fires) that include product leaking or spraying from manways, valves, fractures in the tank shell (e.g., rips, tears, etc.) or spills on sloping terrain.

- As a general rule, **DO NOT** flush crude oil spills with water. Most crude oils are not water soluble and will have a tendency to float on water. Some crude oils will sink and some fractions of crude oil are water soluble. For those crude oils that float on water, burning crude oil may be carried away from the immediate area and may reignite on the surface of the water.

- Prevent runoff from entering storm/sewer systems and sensitive areas, as this may create a serious hazard and potential environmental problems. Notify proper authorities, downstream sewer and water treatment operations, and other downstream users of potentially contaminated water. Runoff may be flammable and/or toxic and should be contained, treated and disposed of in accordance with applicable federal, state and local environmental regulations.

RAILROAD SAFETY PROCEDURES

Emergency response personnel should always be aware of the potential for serious injury when working in and around railcars, tracks and related equipment. The following safe operating practices should be followed when involved in emergency response operations at the scene of a crude oil train derailment:

- **Expect a train or rail equipment to move on any track from either direction at any time.**

- Watch for movement in both directions before crossing tracks. If the tracks are clear, walk single file at a right angle to the rails.
- Trains can approach with little or no warning. You may not be able to hear them due to atmospheric conditions, terrain, noisy work equipment, or passing trains on other tracks. Stand a minimum of 25 feet away from the tracks if possible, and face the train when rail equipment is passing through.
- Always contact the railroad to advise them of your presence – they may not know that you are on-scene or that they have a problem. Work with the railroad to be sure the track is "blue flagged" – the railroad's version to provide protection by their lock-out, tag-out process.
- Never stand, walk or sit on railway tracks, between the rails or on the ends of ties. Never step on the rail - step over it. The rail can be a slip, trip, or fall hazard. Never put your feet on moveable parts of a rail car such as couplers, sliding sills or uncoupling levers.
- Do not occupy the area between adjacent tracks in multiple track territory when a train is passing. If crossing between two stationary railcars, ensure there is at least 50 feet between them.
- Be especially careful working in rail yards and terminal areas. Tank cars are pushed and moved, and can change tracks often. Cars that appear to be stationary or in storage can begin to move without warning. Be sure that any rail equipment is secured against movement (wheels chocked, hand brakes secured, etc.) before attempting to work on or near it. Keep at least 25 feet away from the end of a car or locomotive to protect yourself from sudden movement.
- Never move equipment across the tracks unless at an established road crossing or under the supervision of a railroad representative.
- If it is necessary to climb rail equipment, use three points of contact at all times. The ladders on rail equipment may curve around the car making it difficult to find the rung with your foot. The first step on to rail equipment is typically some distance off of the ground. When descending the ladder, step - do not jump from the last step. Normally, there is ballast around the tracks which can be uneven and shift, causing a fall hazard. Locomotive steps are considered ladders. Always face the locomotive going up and coming down.
- Never cross over or under rail equipment -- use the ladders, handholds and crossover platforms or walk around the attached equipment. Remember to block the feet and tie off ladders at the top. When laddering tank cars or box cars, always consider using two points of access - the second being a point of escape should the other become inaccessible for any reason. Plan to use your own ladders.
- Avoid the use of cell phones when within 25 feet of live tracks.
- Be aware of the location of structures or obstructions where clearances are close.
- Stay away from track switches since they can be remotely operated.

EMERGENCY PROCEDURES

Emergency response organizations should use the following framework and incident management best practices to prepare for, and safely and effectively respond to a crude oil rail transportation incident.

1. PRE-INCIDENT PLANNING AND PREPAREDNESS

- Emergency responders should determine the rail carriers of hazardous materials moving through their communities and ascertain if crude oil is one of the products being transported. This can be accomplished by contacting the individual rail carrier and requesting a list of the hazardous commodities transported through the community via the Association of American Railroads (AAR) Circular No. OT-55 protocol. This information can assist in preparing emergency response plans and procedures.

Note: A copy of the latest version of AAR Circular OT-55 and other related hazardous materials reference materials can be downloaded at http://www.boe.aar.com/boe-download.htm.

- Emergency responders should contact and engage the State Emergency Response Commission (SERC) and Local Emergency Planning Committee (LEPC) within their jurisdiction. The SERCs and LEPCs can be a valuable resource in obtaining information concerning the hazardous commodities being transported through the community, such as crude oil, as well as providing assistance with emergency planning, preparedness and response activities. LEPCs and emergency responders can seek planning information and commodity-specific training at www.TRANSCAER.com and selecting a state or region to determine the designated contacts.

- Emergency responders should also contact the railroads to identify appropriate points-of-contact and the railroad's hazardous materials response personnel that they are likely to interface with during an emergency. This can help to establish lines of communication and access to information and resources prior to an incident. The railroads can also provide extensive rail specific emergency response training at no cost to emergency responders. Information may be obtained via the railroad's web site or by contacting their media/public relations department.

- Emergency responders should identify the appropriate 24-hour emergency contact numbers for the major (Class I) railroads and ensure they are listed in their emergency operations and response plans. The emergency contact numbers for the Class I railroads are listed below.

Company	Emergency Telephone Number
BNSF Railway	(800) 832-5452
Canadian National (CN) Railway	(800) 465-9239
Canadian Pacific (CP) Railway	(800) 716-9132
CSX Transportation	(800) 232-0144
Kansas City Southern Rail Network	(877) 527-9464
Norfolk Southern Railroad	(800) 453-2530
Union Pacific Railroad	(888) 877-7267

Note: Emergency responders should also contact any Short Line or Regional Railroads that service their areas to obtain emergency contact information. These organizations should also be part of any pre-incident planning, preparedness and training/exercise activities.

- Emergency responders should establish contact with their state and local environmental protection agency representative(s) to identify potential air monitoring and spill control resource capabilities. These resources should be included in the organization's emergency response plan.

- Emergency responders should contact federal agencies such as the U.S. Coast Guard to determine the level of assistance that may be provided in the event of a spill in navigable waterways located in their jurisdiction. This resource, as well as other federal resources, can be contacted through the National Response Center (NRC) at 1-800-424-8802.

- Organizations should include a railroad annex in their emergency response plan that specifically addresses crude oil rail transportation emergency response operations. This annex should include:

    - hazard analysis that identifies the potential risks to people and property
    - emergency contact lists
    - resource listings
    - equipment inventories
    - foam and water supply requirements for operations at remote sites
    - incident management system roles and responsibilities
    - mutual aid response assets
    - law enforcement scene security and control operations
    - support and recovery assets

Note: Emergency response plans and procedures should be developed in close coordination with the railroad since they will play a critical role in response and recovery operations. Tests and drills should be conducted to exercise the plan at regular intervals to identify any issues that might require corrective action prior to an actual incident.

2. INCIDENT MANAGEMENT PRINCIPLES

- Initial site management and control will be a critical benchmark in managing the problem.

- Isolate and secure the area. Establish a secure perimeter and entry control points to prevent unauthorized personnel from entering the scene. This can be accomplished with tape, barricades, traffic cones, or assigned fire service or law enforcement personnel.

- The location of the restricted area should be communicated to all impacted personnel operating on the scene. Begin a site assessment from a safe distance, upwind and uphill. An Incident Command Post (ICP) should be established outside the impacted area as soon as possible.

- Follow initial guidance provided by the *Emergency Response Guidebook* (ERG) if practical. Establish a Staging Area in the cold zone for responding equipment and personnel.

- The *National Incident Management System* (NIMS) should be the framework used to manage all incident operations. Information on NIMS can be obtained at http://www.fema.gov/national-incident-management-system. Unified Command should be established that integrates those agencies and organizations with legal or jurisdictional responsibility. Liaisons should be provided at the ICP by assisting or cooperating agencies to ensure effective communication and coordination of resources.

- Due to the size, duration and complexity of these incidents, Incident Commanders should consider the possibility of additional support from regional or state *All-Hazard Incident Management Teams* (AHIMTs).

Note: AHIMTs are a multi-agency/multi-jurisdictional team for extended incidents formed and managed at the local, state or tribal level. It is a designated team of trained personnel from different departments, organizations, agencies and jurisdictions. AHIMTs are deployed as a team representing multiple disciplines who manage major and/or complex incidents requiring a significant number of local, state or tribal resources. They do not assume command of the incident; they help local officials manage incidents that extend into multiple operational periods and require a written Incident Action Plan (IAP). These incidents can include weather-related disasters such as a tornado, earthquake, or flood or major hazardous materials incidents such as train derailments.

- Emergency responders should anticipate a large number of liaison agencies operating at the scene (e.g., U.S. Coast Guard, Environmental Protection Agency, National Transportation Safety Board, Chemical Safety Board, private contractors). In addition, non-emergency regional and municipal agencies may have a role to play and need to be integrated into the command structure.

- The railroad will integrate its response assets into the public safety NIMS structure. While the exact structure will vary based on the scope and nature of the incident scenario, it will often be integrated as the Railroad Branch within the Operations Section.

- Large-scale incidents may require activation of the jurisdiction's Emergency Operations Center (EOC). The EOC should be fully staffed and the roles and responsibilities of all participating agencies must be clearly defined in the organization's emergency response plan.

3. PROBLEM IDENTIFICATION

- Identify, confirm, and verify the presence of the hazardous material(s) and the extent of the problem. This can be done through shipping papers (i.e., train consist), placards, labels, container shapes, markings/colors and senses (e.g., observable plume).

- Identify the rail carrier and locate the train crew. The conductor will have the complete train consist immediately available on the scene. Maintain contact with the conductor and crew until they are relieved by a railroad official(s).

- Notify the rail carrier's emergency operations center to have rail traffic stopped to avoid entering the location of the incident to avoid further risk to personnel operating at the scene. Request that a copy of the train consist or wheel report be sent to the ICP.

- Responding railroad officials may also have copies of the train consist. In the absence of shipping papers, emergency responders should use binoculars from a safe distance upwind, and try to locate any 4-digit identification numbers on the placards (or orange panels) displayed on the rail cars. If shipping papers, placards, markings, or labels are destroyed, the reporting marks and number on the railcar can be used to identify the commodities present.

- When contacting the railroad, provide the following information:

    - Your name, location, organization name and telephone number
    - Location of incident (provide the railroad with the DOT Crossing Number or the railroad milepost so the specific location can be identified)
    - Type and number of containers involved
    - Presence of markings, labels, reporting marks or placards on tank car
    - Presence of smoke, fire or spill
    - Extent of damage
    - Topography
    - Weather conditions
    - If pictures can be taken from a safe position, do so and send to a railroad representative as quickly as possible

- Be aware of utilities that commonly run next to or in the railroad right-of-way. As part of your scene size up, look for downed signal and communication lines, power lines, buried utilities and above ground switch heating systems.

4. HAZARD ASSESSMENT AND RISK EVALUATION

- The hazard assessment and risk evaluation process is a critical step to identify the level of danger posed by an incident involving the product(s), containers and their behavior, which is generally related to their physical and chemical properties.

- Risks refer to the probability of suffering harm or loss and are different at each incident and need to be evaluated by the Incident Commander.

- Emergency responders can use a number of reference materials such as the ERG, Safety Data Sheets (SDSs), technical specialists available by contacting the shipper or railroad, or contacting the Chemical Transportation Emergency Center (CHEMTREC) at 1-800-424-9300, or the 24-hour emergency contact telephone number required to be included on the shipping papers by the federal hazardous materials regulations.

- Evaluate the risks of personnel intervening directly in the incident. Consider the limitations of the people involved and the ability to have adequate resources available on site (e.g., sufficient firefighting foam concentrate, water supplies, appliances, equipment, trained personnel and technical expertise) and the ability to sustain operations for extended periods of time (hours or days).

- The level of risk will be influenced by the following factors:

    - Hazardous nature of the material(s) involved
    - Quantity of the material(s) involved
    - Type(s) of stress applied to the container and breach / release scenarios
    - Proximity of exposures and nature of terrain
    - Level of available resources (*e.g., adequate foam supply, location of foam supply, response time and appliances/equipment*)

- Emergency response personnel need to consider the following factors that may influence the behavior of a hazardous material:

    - Inherent properties and quantity of the material
    - Design characteristics of the container
    - Environmental factors (*e.g., weather, topography, surrounding physical structures*)

- The following factors should be considered to help estimate the potential impact of the problem:

    - Has the container been breached? If so, is product flowing?
    - Where will the container and its contents go if released?
    - Why are the container and its contents likely to go there?
    - How will the container and its contents get there?
    - When will the container and its contents get there?
    - What harm will the container and its contents cause when they get there?
    - How much material has been released? What is the proximity of the release to people, property and the environment?
    - Is the material on fire? Are other tank cars at risk of becoming involved?
    - Do you have the capability of successfully controlling fire spread, which in some cases may require a minimum of approximately 500 gallons per minute per exposed tank car?

- Are adequate foam supplies and equipment available for post-fire operations that may last for several hours or days?

- For non-fire spill scenarios:

  - Have the concentrations of any flammable or toxic vapors present been determined using air monitoring instruments? What are the flammability and toxicity readings?
  - Has the need for continuous air monitoring been properly evaluated and discussed with technical specialists?
  - Can sources of ignition be removed and/or eliminated?
  - Are adequate foam supplies and equipment available for vapor suppression?

Note: Agencies should refer to the most recent edition of NFPA 11 - *Standard for Low-Medium-and High-Expansion Foam* for information concerning the specific requirements for foam application.

- Based on the results of the hazard assessment and risk evaluation process, are there adequate resources available to respond to the scene within a reasonable timeframe so that intervention efforts will be successful?

Note: An initial benchmark to assess your agency's capability to successfully manage an incident involving a unit train carrying crude oil is your operational capability to respond to and successfully manage a gasoline tank truck incident (which typically involves approximately 9,000 gallons of gasoline). With regard to quantity of product, one tank car of crude oil is equivalent to approximately three gasoline tank trucks. The potential magnitude of this type of incident must be considered when preparing emergency plans and operational procedures.

- Emergency responders should use the information and options selected as the foundation to develop an IAP for the incident. An IAP should be developed for any incident that has the potential to last at least 24 hours, and a new/updated IAP developed for each successive operational period.

- **If your agency is not fully prepared and capable in terms of resources, equipment and properly trained personnel to intervene, defensive or non-intervention strategies will likely be the preferred strategic option.**

5. SELECT PROPER PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

- Assure that emergency responders are using the proper personal protective equipment (PPE) and clothing equal to the hazards present. Structural firefighting protective clothing (SFPC) and positive-pressure SCBA should be the initial level of PPE selected.

- Rescue should be performed from an uphill and upwind location, if possible.

- Any changes in the level of PPE should be based on the results of air monitoring operations. Continuous monitoring with a combustible gas indicator and instruments capable of detecting toxic components of crude oil vapors (e.g., hydrogen sulfide, etc.) are important in ensuring site safety. These instruments can include detector tubes or photoionization detectors (PIDs).

CAUTION: SFPC will provide thermal protection for fires involving crude oil; however SFPC is porous and will absorb liquids. For scenarios that do not and will not include the possibility of fire, such as spill control and clean-up activities, including decontamination, chemical liquid splash protective clothing protection and a compatible NIOSH-approved respirator may be required depending on the properties of the product.

- Information and guidance on the selection of personal protective equipment for oil spill response is available in American Petroleum Institute (API) *Recommended Practice* (RP) 78 – *Personal Protective Equipment Selection for Oil Spill Responders.* Copies of the RP can be obtained by contacting API at (202) 682-8000 or on-line at www.api.org (Product No. G09801).

6. LOGISTICS AND RESOURCE MANAGEMENT

- Order specialized equipment and technical resources early in the incident. If you are unsure of your initial resource requirements, always call for the highest level of assistance available. **Do not wait to call for additional resources or activate mutual aid agreements.**

- Establishing a Logistics Section early in the incident will be critical in providing the necessary support, resources and services to meet operational objectives. **The size, scope and resources needed to successfully manage a crude oil rail transportation incident will overwhelm the capability of most emergency response agencies.**

- Emergency planning and response agencies must identify their logistical needs, identify agencies or organizations that can meet those requirements, and effectively manage the resources available from those identified sources within the NIMS framework.

- The railroads will be the primary providers of logistical support and resources. Rail carriers can provide emergency response resources, air monitoring and environmental management capabilities, technical specialists and contractors to safely manage the consequences of a crude oil train derailment. For example, rail carriers may use the services of private contractors to provide air monitoring and toxicology assessments.

- The time required for assets to arrive on scene and initiate operations must be taken into account since long delays can diminish operational effectiveness. Logistics for access, positioning and movement should be considered, including the need for escorts to facilitate prompt access to the scene.

- Technical specialists and contractor support can also be made available from the shipper and can be obtained by contacting the 24-hour emergency telephone number provided on shipping papers or by contacting CHEMTREC at 1-800-424-9300.

- Emergency responders may also obtain assistance from the NRC by calling 1-800-424-8802. For example, the NRC can provide 24-hour access to federal government agency resources and technical assistance. The NRC also serves as the EPA's *Hazardous Materials Hotline* and the USCG *Oil Spill Hotline*.

7. SELECT AND IMPLEMENT RESPONSE OBJECTIVES

- The initial stage of an incident involving crude oil should include an analysis of appropriate site specific response procedures and potential effects that an incident would have on nearby life, property, critical systems and the environment.

- The ERG should be used by all emergency responders to obtain initial response guidance for crude oil incidents.

- **Traditional firefighting strategies and tactics may not be effective in these situations.** These incidents also need to be approached and managed as a hazardous materials problem to ensure that proper and appropriate technical assistance and the support of outside resources are notified and requested as soon as possible.

- Use the railroad's emergency telephone number to establish communication with the railroad and stay in constant communication with the railroad. If the train crew is disabled or unavailable, the train consist is available from the Railroad Emergency Telephone Number point-of-contact and can be sent to the scene via e-mail or fax.

- Confirm your location with the Railroad Emergency Telephone Number point-of-contact by observing mile posts or the individual grade crossing identification numbers at or near the scene.

- Coordinate operations with the railroad, chemical shippers and manufacturers, CHEMTREC and/or the shipper's 24-hour emergency contact to ensure that you have access to all the information available concerning the commodity and tank car(s) involved in the accident.

- Utilize the railroads' hazardous materials personnel when they arrive on scene. They can assist with size-up and damage assessment. These personnel have been specifically trained to respond to railroad emergencies and derailments.

- **Based on the collection, evaluation and verification of response information, emergency responders need to determine whether the incident should be handled offensively, defensively or by non-intervention. Remember that offensive tactics significantly increase the risks to emergency responders.**

- The following factors should be considered as part of developing the initial response strategy:

QUESTION	RESPONSE CONSIDERATIONS
Are there any life safety exposures in danger that responders must address right now? Can responders safely evacuate or protect in place?	Number of people to be protected, ability of public to move, available time, resources needed, adequate facilities to shelter evacuees.
Can responders safely approach the incident?	Location of the incident, access and terrain, number of tank car(s), extent of damage, size of spill, leak or fire involved.
Do responders fully understand the nature and scope of the problem?	Hazard assessment and risk evaluation must be completed and the results shared with technical specialists from the railroad and/or shipper.
If a fire is involved, do responders have immediate access to sufficient foam and water supplies that are required for effective fire control/suppression operations?	Most fire departments will not have adequate foam, water or spill control resources for an initial attack on a crude oil derailment scenario with large fires. Defensive operations will likely be required until sufficient foam concentrate, water, spill control and related support resources are on-scene.
If a spill is involved, do responders have the necessary spill control equipment readily available on-site?	Do responders have spill control and vapor suppression equipment/chemical available on- site?
Can fire suppression agents be effectively applied to the tank car(s) involved? Can cooling water be effectively applied to any exposures impacted by direct flame impingement?	Fire suppression agents and cooling water must be able to reach their intended targets to be effective. If access, supply or equipment is limited, the ability of suppression agents and cooling water to reach the affected area(s) will be diminished.
If not on fire, can potential ignition sources be removed and/or eliminated?	Vehicle traffic may need to be curtailed. Automatic switching systems (i.e. industrial air conditioning units, traffic signals) need to be switched off, etc.
Will extinguishment improve or worsen the incident and what is the environmental impact of doing so?	In some situations, the best and safest response option may be defensive or non-intervention tactics which allow the fires to burn out. Attempting to extinguish the fire(s) may cause additional risk to personnel and damage to the environment. The decision to protect exposures and let the product burn must be considered.