Coffee Break Training - Hazardous Materials

Petroleum Crude Oil Transportation and Response Considerations

No. HM-2014-2 October 27, 2014

Learning Objective: *The student will be able to explain the key petroleum crude oil transportation and planning considerations.*

Throughout the world, huge quantities of crude oil and natural gas are trapped in nonpermeable shale rock. Over the past few years, technological advances — especially in hydraulic fracturing ("fracking") and horizontal drilling — along with higher crude oil prices have made recovery of much of this oil and gas economically feasible. United States crude oil production has risen sharply in recent years, with much of the increased output moving by rail. In 2008, U.S. Class I railroads originated 9,500 carloads of crude oil. In 2013, they originated 407,761 carloads. To date, the most important U.S. shale deposits are located in North Dakota, Texas, Pennsylvania, Ohio, Wyoming and Colorado.

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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), 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 incidents will likely require mutual aid and a more robust on-scene Incident Management System than responders may normally use. Therefore, preincident planning, preparedness and coordination of response strategies should be considered and made part of response plans, drills and exercises that include neighboring departments, manufacturers/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. The hazards and risks of these situations need to be clearly understood before an effective response strategy can be determined.

The Pipeline and Hazardous Materials Safety Administration and the U.S. Fire Administration/National Fire Academy have been working closely to develop informational materials for first responders to better prepare them to respond to a crude oil rail transportation incident. These materials can be downloaded at http://www.phmsa.dot.gov/hazmat/osd/emergencyresponse.