



Billing Code 4910-60-p

DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Chapter I

[Notice No. 13-6]

Safety Advisory Guidance: Heating Rail Tank Cars to Prepare Hazardous Material for Unloading or Transloading

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA).

ACTION: Safety advisory guidance.

SUMMARY: This guidance provides safety precautions and recommended guidance for persons responsible for unloading or transloading¹ hazardous materials from rail tank cars, specifically those persons heating a rail tank car to prepare its hazardous material contents for unloading or transloading. Further, this guidance reminds such persons of current regulatory requirements addressing this type of operation. PHMSA is issuing this guidance in coordination with the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA), and in consultation with the Federal Railroad Administration (FRA).

FOR FURTHER INFORMATION CONTACT: Cheryl West Freeman, Division of Engineering and Research, Pipeline and Hazardous Materials Safety Administration, 202-366-4545. For further information regarding OSHA regulations, contact OSHA, Office

¹ As defined in § 171.8, *Transloading* means the transfer of a hazardous material by any person from one bulk packaging to another bulk packaging, from a bulk packaging to a non-bulk packaging, or from a non-bulk packaging to a bulk packaging for the purpose of continuing the movement of the hazardous material in commerce.

of Communications at 202-693-1999 and for further information regarding EPA's Risk Management Plan, go to: www.epa.gov/emergencies/rmp.

SUPPLEMENTARY INFORMATION:

- I. Background
- II. PHMSA's Coordinated Response With OSHA and EPA
- III. Federal Regulations
 - A. Applicable PHMSA Regulations
 - B. Applicable OSHA Regulations or Standards
 - C. Applicable EPA Regulations
- IV. Guidance for Heating of Rail Tank Cars for Unloading or Transloading
 - I. Background

PHMSA's mission is to protect people and the environment from the risks of hazardous materials transportation, including those loading and unloading operations covered under PHMSA regulations. Our efforts to enhance the safety of hazardous materials loading and unloading operations include development of standards for bulk loading and unloading of hazardous materials as part of our current strategic plan. Towards this end, on May 24, 1999, the Research and Special Programs Administration (PHMSA's predecessor agency) published a final rule [Docket No. RSPA-97-2718 (HM-225A), Hazardous Materials: Revision to Regulations Governing Transportation and Unloading of Liquefied Compressed Gases] that revised regulations applicable to the transportation and unloading of liquefied compressed gases. The revisions included new inspection, maintenance, and testing requirements for cargo tank discharge systems,

including delivery hose assemblies, and revised attendance requirements applicable to liquefied petroleum gas and anhydrous ammonia. Also, more recently, on March 11, 2011, PHMSA published a Notice of Proposed Rulemaking [Docket Number PHMSA–2007–28119 (HM–247), Hazardous Materials: Cargo Tank Motor Vehicle Loading and Unloading] that proposes to amend our regulations to require each person (i.e., carrier or facility) who engages in cargo tank loading or unloading operations to perform a risk assessment of the loading and unloading operation and develop and implement safe operating procedures based upon the results of the risk assessment. We received comments on the proposals in this NPRM and are currently evaluating the best course of action to address them.

As part of our continuing efforts to enhance the safety of hazardous materials loading and unloading operations, our combined effort with other Federal agencies to protect the public, and in response to the findings from an NTSB investigation, PHMSA is issuing this safety advisory guidance to all entities responsible for unloading or transloading of heated hazardous material from a rail tank car. In 1999 and again in 2002, accidents occurred as a result of the process of heating rail tank cars for unloading hazardous materials. On February 18, 1999, a rail tank car, which was on the unloading rack at the Essroc Cement Corporation (Essroc) Logansport cement plant near Clymers, Indiana, sustained a sudden and catastrophic rupture that propelled the tank of the rail tank car an estimated 750 feet and over multistory storage tanks. The 20,000-gallon rail tank car initially contained about 161,700 pounds (14,185 gallons) of a toxic and flammable hazardous waste that was used as a fuel for the plant's kilns. There were no

injuries or fatalities. Total damages, including property damage and costs from lost production, were estimated at nearly \$8.2 million. The National Transportation Safety Board (NTSB) determined that the probable cause of the accident was the failure of Essroc to develop and implement safe procedures for heating rail tank cars for unloading hazardous waste (i.e., toluene diisocyanate matter wastes). This lack of procedures resulted in the over-pressurization of the rail tank car due to chemical self-reaction and expansion of the toluene diisocyanate matter wastes.

On September 13, 2002, a 24,000-gallon-capacity rail tank car containing about 6,500 gallons of hazardous waste catastrophically ruptured at a transfer station at the BASF Corporation chemical facility in Freeport, Texas. The rail tank car had been steam-heated to permit the transfer of the waste to a cargo tank motor vehicle for subsequent disposal. The waste was a combination of cyclohexanone oxime, cyclohexanone, and water. As a result of the accident, 28 people received minor injuries. Residents living within one mile of the accident site had to shelter in place for five and one-half hours. The rail tank car, cargo tank, and transfer station were destroyed. The force of the explosion propelled a 300-pound rail tank car dome housing about 1/3 mile away from the rail tank car. Two storage tanks near the transfer station were damaged; that resulted in the released about 660 gallons of the hazardous material oleum.²

The NTSB investigated the Freeport, Texas accident and determined that the probable cause of the rupture of the rail tank car was over-pressurization resulting from a runaway exothermic decomposition reaction initiated by excessive heating of the

²The Federal Railroad Administration has identified three other incidents involving heating of rail tank cars that did not result in death or injury.

hazardous waste material. The NTSB determined that BASF's failure to monitor the temperature and pressure inside the rail tank car while the hazardous waste was heated in preparation for unloading contributed to the accident. As a result of its investigation of the Freeport, Texas accident, the NTSB recommended that PHMSA, in cooperation with the OSHA and the EPA, develop regulations that require safe operating procedures to be established before hazardous materials are heated in a rail tank car for unloading; at a minimum, the NTSB recommended that the procedures should include the monitoring of internal tank pressure and cargo temperature (NTSB Recommendation R-04-10; December 15, 2004).³

II. PHMSA's Coordinated Response with OSHA and EPA

PHMSA believes the current regulations provide important requirements for the safe unloading of heated hazardous material from a rail tank car. However, we believe it is always beneficial to remind regulated entities of their duties in affecting safe transportation and to offer guidance in furtherance of performing these duties, and therefore, PHMSA, in coordination with OSHA and EPA, and in consultation with FRA, is issuing this safety advisory guidance. This safety advisory guidance is supplemental to the regulations and is provided as information for all entities responsible for unloading or transloading heated hazardous materials from a rail tank car, including employees responsible for overseeing the operation, inspecting and maintaining equipment, establishing emergency shutdown procedures, and developing safe operating procedures.

Specifically, this safety advisory guidance provides additional guidance on the

³ See http://www.nts.gov/doclib/recletters/2004/R04_10.pdf

recommended safety precautions affected entities should use when heating a rail tank car to prepare its hazardous material contents for unloading or transloading. Employing the recommended guidance summarized in this guidance will enhance safety and diminish the occurrence of incidents resulting from the over-pressurization and runaway exothermic decomposition reactions initiated by heating of hazardous material. We note, however, that there is no binding regulatory impact of the guidance offered in this guidance.

III. Federal Regulations

A. Applicable PHMSA Regulations

PHMSA's Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) specify requirements for the safe transportation of hazardous materials in commerce by rail car, aircraft, vessel, and motor vehicle. Requirements in the HMR apply to each person who offers a hazardous material for transportation in commerce, causes a hazardous material to be transported in commerce, or transports a hazardous material in commerce (see 49 CFR § 171.1(b) and (c)). Transportation includes the movement of property and loading, unloading, or storage incidental to that movement (see 49 CFR § 171.8).

In 49 CFR 172.700, PHMSA sets forth training requirements to ensure a hazmat employee has familiarity with the general provisions of the HMR, is able to recognize and identify hazardous materials, has knowledge of specific requirements of the HMR applicable to functions performed by the employee, and has knowledge of emergency response information, self-protection measures and accident prevention methods and

procedures. Any hazmat employee (as defined in 49 CFR 171.8), including the designated employee, must be trained at least once every three years in accordance with the existing “function specific” training requirements in 49 CFR 172.704.

Unloading incidental to movement includes rail tank car transloading operations, such as the one that resulted in the Freeport, Texas accident described above (see 49 CFR 171.8). Rail tank car unloading operations conducted by consignee personnel after the rail tank car has been delivered to the consignee facility generally are not regulated under the HMR (see 49 CFR 171.1(d)(2)).

The HMR requirements applicable to rail tank car transloading operations are in 49 CFR 174.67. The operator of a facility at which transloading operations are performed must maintain written safety procedures governing transloading operations and must make the safety procedures immediately available to the employee responsible for rail tank car unloading. In addition, persons conducting transloading operations must take measures to prevent movement of the rail tank car and secure access to the track where the transloading operation takes place. During the transloading operation, the rail tank car must be attended or monitored at all times.

B. Applicable OSHA Regulations or Standards

OSHA’s Process Safety Management (PSM) standard (see 29 CFR 1910.119) contains requirements for processes that use, store, manufacture, handle, or transport highly hazardous chemicals on-site.⁴ Bulk⁵ loading and unloading operations involving

⁴ 29 CFR 1910.119(b), defines a *highly hazardous chemical* as a substance possessing toxic, reactive, flammable, or explosive properties and specified by paragraph (a)(1) of § 1910.119.

⁵ The use of this term with respect to the PSM standard is not the same as defined in the PHMSA HMR.

PSM-covered chemicals or other processes with PSM-covered chemicals are subject to the requirements of the PSM standard.⁶ The PSM standard requires employers to compile process safety information (PSI) to enable employers and employees to identify and understand the hazards of the process. The PSI must include: (1) physical and reactivity data of the highly hazardous chemicals in the process; (2) safe upper and lower limits of the process such as temperatures, pressures, flows and compositions; and (3) an evaluation of the consequences of deviation. Using the PSI, employers must perform a process hazard analysis to systematically identify, evaluate, and control the hazards of the process. After an employer completes a process hazard analysis, the employer must develop and implement written operating procedures providing clear, written instructions for safe operations of a process, such as loading and unloading operations to or from bulk containers (see 29 CFR 1910.119(f)). After the procedures are developed, each employee, including a contract employee, who is involved in loading and unloading operations must be trained in the required processes and the procedures, in accordance with 29 CFR 1910.119(g).

The OSHA standards also include requirements for the handling and storage of specific hazardous materials, including hazardous waste. Specifically, 29 CFR 1910.106(f) contains provisions for loading and unloading facilities. Additionally, the OSHA standard at 29 CFR 1910.120, pertaining to hazardous waste operations and emergency response, establishes requirements for emergency response operations. When

⁶ Both of these processes may be covered by OSHA's PSM depending on the flash point of the waste material and the other chemicals present in the process. For operations with hazardous materials, OSHA recommends implementation of management systems such as those required by the PSM standard, regardless of coverage.

there is a release of a hazardous materials, or a substantial threat of a release, then emergency response operations must comply with 29 CFR 1910.120(q).

In situations where an operation or a material is not covered by the PSM standard or the other OSHA standards, employers are obligated under Section 5(a)(1) – “the General Duty Clause” – of the OSH Act of 1970 to protect employees from serious “recognized” hazards.

Under OSHA’s Hazardous Waste Operations and Emergency Response (HAZWOPER) standards in 29 CFR 1910.120, an employer must train workers exposed to hazardous substances, health hazards, or safety hazards before performing hazardous waste operations and emergency response. Specifically, 29 CFR 1910.120(e)(3) and (e)(4) detail the level of training required of workers, who perform cleanup operations or on-site management and supervisors of workers, and 29 CFR 1910.120(q)(6) details the level of training required of workers who perform emergency response.

Section 29 CFR 1910.120(e)(3)(i) specifies the training requirements for general site workers engaged in activities which expose or potentially expose those workers to hazardous substances and health hazards. These workers are required to receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.

Section 29 CFR 1910.120(e)(3)(ii) specifies the training requirements for workers on site only occasionally for a specific limited task, who are unlikely to be exposed to hazardous substances and health hazards over defined permissible limits. These workers are required to receive a minimum of 24 hours of instruction off the site, and a minimum

of one day actual field experience under the direct supervision of a trained, experienced supervisor.

Section 29 CFR 1910.120(e)(3)(iii) specifies training requirements for workers who are regularly onsite in areas that have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing. These workers are required to receive a minimum of 24 hours of instruction off the site, and a minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor. In accordance with 29 CFR 1910.120(e)(3), on-site management and supervisors directly responsible for, or who supervise employees engaged in the activities described above must receive 40 hours initial training, and three days of supervised field experience and at least eight additional hours of specialized training at the time of job assignment.

For all the levels of workers and their on-site management and supervisors, the OSHA training requirements described in 29 CFR 1910.120(e) and (q) would need to include training in all aspects of the heating process if that employee is responsible for performing any such functions, including refresher training every three years.

C. Applicable EPA Regulations

EPA regulations establish a general duty for facility owners or operators of facilities that produce, handle, process, distribute, or store certain chemicals to identify hazards associated with the accidental releases of extremely hazardous substances, design

and maintain a safe facility as needed to prevent such releases, and minimize the consequences of releases. In addition, stationary sources with more than a threshold quantity of a regulated substance in a process are subject to EPA's accident prevention regulations, including the requirement to develop a Risk Management Plan (RMP) and submit the RMP to EPA (see 40 CFR Part 68). EPA's RMP requirements contain accident prevention measures that are virtually identical to those within the OSHA PSM standard.

In addition to the accident prevention requirements common to PSM, under 40 CFR Part 68, regulated facilities must perform a hazard assessment consisting of worst case and alternative release scenarios and a five-year accident history, implement an emergency response program, implement a management system, and develop and submit an RMP to EPA. Further, 40 CFR Part 112 establishes performance-based training requirements that would apply to any facility and covered operation, including facility transfers that handle certain chemicals in the specific quantities listed in 40 CFR 68.130.

IV. Guidance for Heating of Rail Tank Cars for Unloading or Transloading

Several Federal agencies share responsibility for the safety regulations of rail tank car unloading or transloading operations involving hazardous material—DOT (PHMSA and FRA), OSHA, and EPA. PHMSA, in coordination with OSHA and EPA, and in consultation with FRA, is issuing this safety advisory guidance to offer guidance on heating of a rail tank car to prepare solidified or viscous hazardous material products contained in the rail tank car for unloading or transloading. Based on existing regulatory

requirements, we have assembled and coordinated the following guidance to raise awareness of those requirements and the risks associated with heating rail tank cars. This guidance does not include all of the aspects applicable to the safe heating of rail tanks cars; rather, it focuses on the issues raised in the NTSB recommendations as a result of its investigations into the two incidents cited above.

Procedures. The shipper or facility operator, if not the same, should develop written safe operating procedures to be used when hazardous materials are heated in a rail tank car for unloading or transloading. The procedures should, at a minimum, establish hazard controls necessary to protect workers, the public, and the environment from adverse consequences, and include:

- Detailed information regarding the chemical characteristics of the material such as, melting temperature, flash point, the degree to which the hazardous material expands as a result of heating, and additional risk if the hazardous material reacts with air or water.;
- The pressure created by heating the rail tank car at which the material may safely be unloaded or transloaded from the rail tank car;
- Active monitoring and recordkeeping requirements of the internal tank pressure and material temperature during the heating process. The heating process should be monitored with time intervals (such as hourly) that are dependent upon the nature and history of materials being heated;
- Potential consequences of deviations from standard operating procedures and how to identify, control and respond to those consequences; and

- Training of all entities involved in the unloading or transloading process.

These procedures should be maintained in a location where they are immediately available to employees responsible for the heating, unloading or transloading operation. These procedures should clearly define employees' roles and responsibilities for the heating of a rail tank car, as well as the roles and responsibilities of contractor personnel that are employed at a facility to conduct the operations for heating of a rail tank car.

Monitoring. The facility operator should be knowledgeable of the chemical properties of all of the materials involved in the heating process, including the reactivity of those materials, and ensure that the heating process (i.e., pressure, temperature, and heating rate) applied to the rail tank car, and the pressure and temperature inside the rail tank car should be monitored to ensure that it does not result in over-pressurization of the rail tank car.

Monitoring should be conducted at the necessary frequency as heating continues until the material reaches its recommended parameters (e.g., viscosity and temperature) for safe unloading or transloading. Certain chemicals, such as a material that can undergo rapid exothermic decomposition, may require more frequent or even continuous monitoring during heating. Monitoring of the tank pressure and the temperature of the hazardous material includes measures to ensure that the heating rate does not result in over pressurization of the rail tank car.

As an additional aspect of monitoring, the facility operator may, when practical and safe, and the physical state of the material allows, sample the material that is in the rail tank car to verify the material and its chemical and physical properties. The rail tank

car contents should be monitored at multiple times as heating continues until the material is determined to be at its recommended parameters (e.g., viscosity and temperature) for safe unloading or transloading.

Designated employee. The facility operator should designate an employee responsible for monitoring the heating process. Prior to the onset of operation, the designated employee should be made thoroughly knowledgeable of the nature and properties of the material contained in the rail tank car and procedures to be followed in the event of an emergency. In the event of an emergency, the designated employee should have the ability and authority to take responsive action.

Training. Hazardous materials employees involved in heating rail tank cars for unloading or transloading operations should be trained in all aspects of the heating process that each employee is responsible for performing. Further, the level of training for each employee should correlate with that employee's level of exposure to hazardous materials at the facility where rail tank cars are heated for unloading or transloading. Please refer to the Section III for a discussion of specific training obligations under applicable Federal regulations.

Issued in Washington, D.C. on July 8, 2013, under authority delegated in 49 CFR Part 106.

Magdy El-Sibaie
Associate Administrator for Hazardous Materials Safety

[FR Doc. 2013-16672 Filed 07/11/2013 at 8:45 am; Publication Date: 07/12/2013]