

IMPROVING SECUREMENT

IN

HAZARDOUS MATERIALS
TANK CAR SHIPMENTS

RECOMMENDED INDUSTRY
PRACTICES

AAR/CMA North American Non-Accident Release Reduction Committee

OCTOBER, 1999

FORWARD

Over the next few years, the decisions we make with respect to protecting our environment, and the consequences of those decisions we fail to make, will profoundly affect our future and the future of our children.

This document, "Improving Securement in Hazardous Materials Tank Car Shipments, Recommended Industry Practices" documents the number and causes of non-accident releases in North America and proposes eight recommended industry practices which the chemical industry may implement to improve safety and reduce the overall number of non-accident releases.

The chemical and railroad industry's concerns with non-accident releases are of an on-going nature. Although the percentage of non-accident releases continue to decline, non-accident releases continue to threaten employee safety and the environment. The social cost of non-accident releases has never been quantified, but is estimated to exceed millions of dollars every year. The cost of implementing the proposed recommendations in this document pale in comparison.

The Association of American Railroads (AAR) and Chemical Manufacturers Association's (CMA) North American Non-accident Release Reduction Committee, has developed these recommended industry practices to reduce, and eventually eliminate, non-accident releases. The joint working group conducted several business meetings, site visits, and hosted representatives from various points of view, in developing this manual.

The recommended industry practices proposed in this document address improvements to existing tank car securement practices. The primary focus of the recommendations center around preventative maintenance, loading and unloading operating practices, management systems, and employee training.

The committee would like to extend its appreciation to all those involved in the development and future implementation of the recommended industry practices.

Chairman,
AAR/CMA North American Non-accident Release Reduction Committee

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DISCLAIMER

This manual describes the recommended practices developed by the North American Non-accident Release Reduction Committee.

The intended audience for this document includes the technical-oriented individuals who seeks more information about the implementation of the recommended practices.

It is not within the scope of this manual to analyze specific legal, policy, or technical issues that may arise when implementing the recommendations. Each company should consult with its own legal counsel about these specific issues.

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RECOMMENDATIONS FOR RAIL TRANSPORTATION OF HAZARDOUS MATERIALS

1. Establish, document, communicate and implement a company-wide securement policy with defined practices.
2. Establish, document, communicate and implement an inspection/change-out procedure for rupture discs.
3. Phase out the use of Slip-Tube (open system) Gauging Devices.
4. Establish, document, communicate and implement a company-wide preventive maintenance guidelines for tank cars.
5. Establish, document, communicate and implement a procedure for loading, unloading, and securement.
6. Establish, document, communicate and implement a procedure for the verification of the proper securement of a loaded tank car.
7. Establish, document, communicate and implement a procedure for tank car customers to report hard to operate valves and other fitting problems.
8. Establish, document, communicate and implement a procedure for providing periodic training on proper tank car loading, unloading, and securement.

1. COMPANY-WIDE SECUREMENT PROGRAM

RECOMMENDATION

Establish, document, communicate and implement a company-wide securement policy with defined practices.

BACKGROUND

Management should focus on non-accident releases and the importance of their reduction. Non-accident releases (NARS) are releases of product from tank cars not caused by, nor contributed to by, an accident. The importance of this has been jointly addressed by the Inter-Industry Rail Safety Task Group (IIRSTG). The IIRSTG is a panel of CEO's from the railroad industry, Chemical Manufacturers Association, and tank car builders that was formed to address the safety issues in the transportation of hazardous materials.

This suggested practice is based on the belief that any effort to reduce non-accidental releases should be company-wide in scope to demonstrate commitment and ensure consistency across the company.

SUGGESTED IMPLEMENTATION

The following steps are recommended to assist the implementation of the recommendation:

1. Management should assign, for example, a quality cross functional team, including representatives from the manufacturing, distribution and safety divisions to compile securement practices. Management should support and communicate these throughout the company with the securement policy.
2. A company-wide securement policy should emphasize the following elements:
 - Cross-functional team in charge with insuring that training has the necessary priority, scope and contend to eliminate NARs.
 - A statement of the company's commitment to proper securement and the elimination of non-accident releases:

- Documented securement operating practices.
 - Functional responsibility for the proper securement of rail cars.
 - A procedure for documenting, reporting, and investigating non-accident releases.
 - Specific non-accident release-reduction goals with performance measures and regular progress reviews.
 - A process for communicating with carriers, suppliers, customers, or others to solicit their support in NAR elimination.
 - A process for auditing securement policy and practices; and
 - A centralized oversight follow-up function for the policy.
3. Consider outside resources to develop policy and practices:
- Hire outside resources to develop your securement policy.
 - Request Association of American Railroads' Bureau of Explosives to assist in the development of your securement policy.

2. INSPECTION/CHANGEOUT PROCEDURE PROGRAM

RECOMMENDATION

Establish, document, communicate and implement an inspection/change-out procedure for rupture discs.

BACKGROUND

Data from the Association of American Railroads and Bureau of Explosives annual report has shown that rupture disc failures are one of the most prevalent type of non-accident releases. Efforts to reduce these failures by issuing recommended rail coupling speeds, prohibiting lead discs, and retrofitting cars with safety valves have reduced releases for this source.

The shipper industry has reported successes with special designs such as increased disc rating (i.e. 165psi), and baffling under the rupture disc holders. The Association of American Railroads Tank Car Committees' Safety Vent Task Force survey may lead to additional recommendations in this area. The Safety Vent Task Force has a list of surge baffle designs which have been successfully used and can be recommended for retrofit.

SUGGESTED IMPLEMENTATION

Each company should review its current inspection procedures for rupture discs to insure they include the following:

- Inspect the rupture disc prior to each loading and after unloading of the tank car. The housing has to be opened and the disc removed and examined on both sides to verify it has not been damaged either mechanically or chemically,
- Replace any rupture disc that has any indication of damage.
- Establish a program to change-out rupture discs on a prescribed frequency.
- Install a baffle designed to protect the rupture disc against liquid surges.
- To facilitate repair, place spare disk on top of the car.
- Convert to safety relief valves that are commodity compatible.

3. PHASE OUT SLIP-TUBE GAUGING DEVICES

RECOMMENDATION

Phase out the use of Slip-Tube (open system) Gauging Devices.

BACKGROUND

Slip-Tube (Open System) Gauging Device is a device that measures the level of pressurized liquid in a tank car. The device consists of a graduated hollow gauge rod fitted into a gas-tight housing. The lower end of the rod is open and the upper end is fitted with a valve. When the lower end contacts liquid in a tank car, a small amount of the liquid is expelled from the valve at the upper end by pressure inside the tank car.

Using this device to measure the contents of the tank car requires operations personnel to loosen the packing nut to release tension on the rod so it can move. This constant action causes rapid wear of the rod packing and relies on operations personnel experience and extra attention to ensure that a no-leak condition occurs as a result of the gauging operations.

Slip-Tube Gauging Devices can be a source of in-transit leaks. Leakage may occur from severe temperature changes that affect the packing material surrounding the slip tube gauging rod. A loose packing nut is the most common source of leaking on gauging devices.

Additionally, the slip tube gauging device is designed to release product during its operation, it may expose the operator and the environment to undue exposures to the material.

SUGGESTED IMPLEMENTATION

It is a good practice to use closed system gauges on compressed gas tank cars. When acquiring new tank cars, closed gauging systems should be installed.

Consideration should be given to replacing Slip-Tube (Open System) with a closed gauging device as applicable.

4. PREVENTATIVE MAINTENANCE FOR TANK CARS

RECOMMENDATION

Establish, document, communicate and implement company-wide preventive maintenance guidelines for tank cars.

BACKGROUND

Preventive maintenance on tank cars is important because valves, fittings, closures and gaskets fail due to wear and tear, product reaction, the aging process and improper handling. The concept of preventive maintenance is to rebuild or replace components before they fail or become inoperable. Preventive maintenance should be performed on a scheduled frequency determined by the requirements of the products being shipped.

Data from the 1993 Association of American Railroads Bureau of Explosives' *Annual Report of Hazardous Materials Transported by Rail* indicates that 898 (92%) of the 975 nonaccident releases from tank cars were due to loose or defective fittings. Many of these 975 non-accident releases may have been avoided with a preventive maintenance program in place.

Companies who have implemented preventive maintenance programs for tank car valves, fittings, packing and closures have reported a significant reduction in non-accident releases from fittings. Their preventive maintenance programs have also enabled them to take advantage of new and improved designs.

SUGGESTED IMPLEMENTATION

Work closely with valve, gasket and tank car manufacturers/leasing companies to develop written preventive maintenance guidelines which meet manufacturers' original specifications and are material and fleet specific.

Establish a preventive maintenance frequency based on the requirements of the material being shipped. A suggestion is to coordinate preventive maintenance with safety valve and tank retest dates, where appropriate.

Communicate written preventive maintenance guidelines to repair shops or plants responsible for performing the work.

5. LOADING, UNLOADING AND SECUREMENT PROCEDURE

RECOMMENDATION

Establish, document, communicate and implement a procedure for loading, unloading, and securement.

BACKGROUND

Written procedures should be in a user-friendly format allowing the personnel involved in the securement of tank cars to have a clear understanding of what they should do, how they should do it, and what are their responsibilities. The procedures should be available to all personnel who have a need to know.

SUGGESTED IMPLEMENTATION

Procedures should include the following elements in sufficient detail to provide instructions to personnel responsible for the proper securement.

- Review of existing documents to define current loading, unloading and securement procedures;
- Pre-load testing and inspections;
- A verification system to prevent overfilling;
- Post-load leak detection and fittings securement procedures;
- List of proper gasket materials and sizes for each group of tanks that are assigned to the location;
- Specific procedures and torque values for manways bolt closures and other fittings with multibolt closures;

- List of size and type of all tools needed for opening and closing all fittings and closures. Lubricants, if recommended, should be available. These items should be readily accessible to the loading, unloading and securement personnel.
- Documented procedures available at the work station for the personnel to use.
- Employees must be trained on the use of the procedures.

6. VERIFICATION OF PROPER SECUREMENT PROCEDURE

RECOMMENDATION

Establish, document, communicate and implement a procedure for the verification of the proper securement of a loaded tank car.

BACKGROUND

All closures must be secured in such a manner that no product will escape from the car in conditions normal to rail transportation. These conditions include but are not limited to increased vapor pressure on hot days as well as vibrations during switching and train handling.

Non-accident releases (NAR's) constitute a significant portion of the number of product releases from tank cars. The source of many releases are valves, fittings, or gaskets. Verification of securement after loading significantly reduces the number of NAR's.

Post-load leak testing is desirable for all commodities. However, not all forms of post leak testing are appropriate for all products. Care must be exercised in selecting the correct method of testing for each product.

SUGGESTED IMPLEMENTATION

Some companies are experiencing excellent results through the use of dedicated crews whose chief responsibility is the proper securement of tank cars. This, and other measures, offer an additional check on safety and instill a sense of personal responsibility in the individual performing these tasks.

Leak detection through the use of a post-load pressure test is the recommended method for testing cars for all commodities.

- After loading, the leak test may be accomplished by applying at least 10 lbs. per square inch of positive pressure of "inert gas or other medium compatible with the shipper's safety and quality requirements." Applied pressure may not exceed the rated pressure of safety relief valves. All flanges, valve packing glands, and opening closures should be checked through the use of one or more of the following methods:

- A suitable leak detection solution.
 - Ultrasonic instrument
- After inspecting for leaks, pressure can be released or can be reduced to commodity requirements.
- When a pressure test is impractical, unsafe, or unnecessary because the product can build up pressure while loaded, the car should be held and reinspected after twenty four (24) hours and valves and fittings retightened as needed to insure proper securement.
 - Visual inspection by qualified personnel.
 - If a leak is found, the car must be repaired and retested. If the leak cannot be repaired, the car *cannot be shipped*.

7. PROCEDURE FOR TANK CAR CUSTOMERS

RECOMMENDATION

Establish, document, communicate and implement a procedure for tank car customers to report poor securement, hard to operate valves and other fitting problems.

BACKGROUND

Shippers and customers of products shipped in tank cars should, from the outset of the customer/supplier relationship, identify the proper parties for sharing information about product delivery problems. These will generally be their respective shipping/receiving departments and customer service, but will vary depending upon a particular company's organization and staffing.

Poor securement, hard to operate valves and other fittings problems may not be detectable during routine inbound railcar inspection procedures. Such procedures cover obvious physical damage to cars. Poor securement, hard to operate valves and other fittings problems may only be detectable at the time of unloading. The shipper of a car with defective valves and other fittings problems should be notified of the defect prior to using that car for another shipment in the event its own inspection procedures may not uncover the defect.

SUGGESTED IMPLEMENTATION

Customers which receive chemical products in tank cars should develop procedures for reporting back to the shipper information about poor securement, hard to operate valves and other fittings which they discover during the unloading process. Shippers should cooperate in the process by developing a procedure that provides their customers with an simple method of communicating information about poor securement, hard to operate valves and fittings problems. The reporting of any defects should be at the time of unloading to insure that the defective tank car can be inspected and repaired before it is loaded for the next shipment. Some suggestions are listed below:

- Provide customer with single toll free telephone number or FAX number for reporting tank car defects.
- Provide customer with notification information to report tank car defects on the order acknowledgment.
- If your company has handling brochures, include information for reporting tank car defects.

- Stencil information for reporting tank car defects on the tank car.
- Develop a printed tag for customers to use on defective valves and/or other fittings. Work with the marketing organization to distribute to tank car customers.
- Provide training for customer's personnel.

8. PROCEDURE FOR PROVIDING TANK CAR TRAINING

RECOMMENDATION

Establish, document, communicate and implement a procedure for providing periodic training on proper tank car loading, unloading and securement.

BACKGROUND

Annual refresher training courses have proven beneficial in reducing non-accident releases. (Training will focus employees on the importance of safe hazardous material shipments, help employees retain more information, make them aware of changes, and allow them an avenue for feedback.)

In addition, experience with annual training suggests continuous training will help retain awareness and interest, enhance the learning process, and provide feedback to improve the training program.

SUGGESTED IMPLEMENTATION

Programs tailored toward specific products, locations, and the tank car type (s) involved have proven to be a best practice toward increasing awareness.

Some key elements for consideration are:

- Procedures established to notify company personnel about regulatory changes.
- Procedures in place to incorporate changes into new and existing training programs.
- Some of the training, where possible, should be hands-on and interactive.
- Company programs encourage feedback from participants.

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