U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

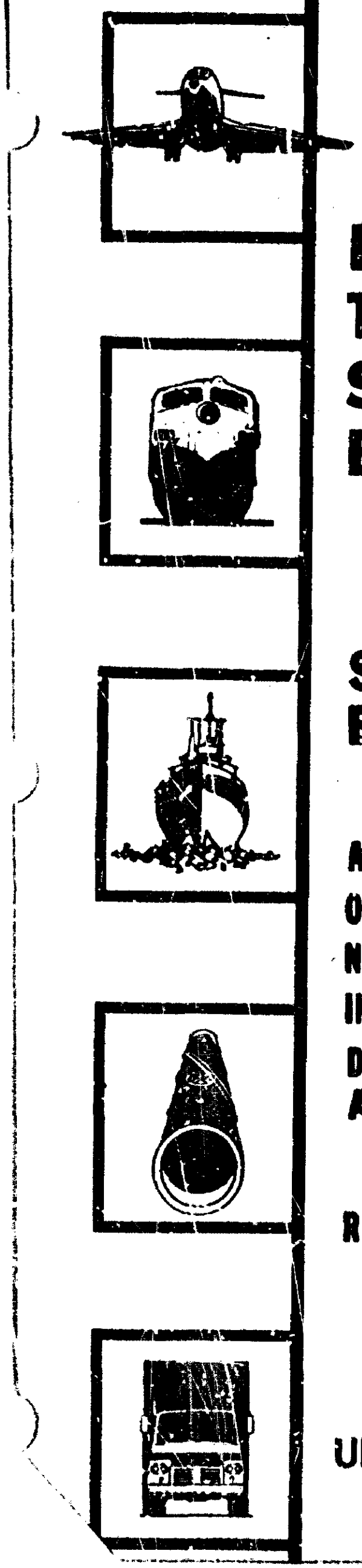
PB-284 665

# Analysis of Proceedings of the National Transportation Safety Board into Derailments and Hazardous Materials April 4-6, 1978

U.S. National Transportation Safety Board, Washington, D.C.

23 Jun 78

PB 284 665



# NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

# SAFETY EFFECTIVENESS EVALUATION

## ANALYSIS OF PROCEEDINGS OF THE NATIONAL TRANSPORTATION SAFETY BOARD INTO DERAILMENTS AND HAZARDOUS MATERIALS APRIL 4-6,1978

REPORT NUMBER: NTSB-SEE-78-2



UNITED STATES GOVERNMENT

TECHNICAL REPORT DOCUMENTATION PAGE

| 1. Report No. NTSB-SEE-78-2 | 2.Government Accession No. | 3. Recipient's Catalog No. PB284665 |
|---|---|---|
| 4. Title and Subtitle<br>Analysis of Proceedings of the National Transportation Safety Board into Derailments and Hazardous Materials, April 4-6, 1978 | | 5 Report Date<br>June 23, 1978 |
| | | 6.Performing Organization Code |
| 7. Author(s) | | 8.Performing Organization Report No. |
| 9. Performing Organization Name and Address<br>National Transportation Safety Board<br>Bureau of Plans and Programs<br>Washington, D.C. 20594 | | 10.Work Unit No.<br>2337A |
| | | 11.Contract or Grant No. |
| 12.Sponsoring Agency Name and Address<br>NATIONAL TRANSPORTATION SAFETY BOARD<br>Washington, D. C. 20594 | | 13.Type of Report and Period Covered<br>Railroad Public Hearing<br>April 4-6, 1978 |
| | | 14.Sponsoring Agency Code |

15.Supplementary Notes
This report contains Railroad Safety Recommendations R-78-19 through R-78-22 and R-78-28 through R-78-36 and Intermodal Safety Recommendations I-78-8 through I-78-13.

16.Abstract The public hearing held April 4-6, 1978 focused on derailments and the carriage of hazardous materials. Forty-nine witnesses testified during the hearing and provided expert testimony on derailments and the carriage of hazardous materials.

The Safety Board examined safeguard installations for DOT 112A and 114A tank cars, emergency notification and response procedures, the derailment problem, hazardous materials track routing, track standards, the Federal/State Participation Program, and other areas of Safety Board concern.

Immediate urgent recommendations were issued by the Safety Board to the Department of Transportation for acceleration of installation of shelf couplers and head shields for all DOT 112A and 114A tank cars. The Safety Board further determined that the severity of derailments with subsequent release of hazardous materials was increased by the lack of information and documented procedures for identifying and assessing the threats to public safety, the lack of accelerated action and leadership by Federal regulatory agencies in reversing derailment trends and minimizing the risk to the public of hazardous materials releases, the lack of timely notification of accidents, and the need to research and review current Federal regulations for improvement and application.

| 17.Key Words | 18.Distribution Statement |
|---|---|
| Railroad; hazardous materials; derailments; fire-fighting; emergency response; tank cars; critical car components; track; railroad safety; shelf couplers; head shields; thermal protection; emergency procedures; strike teams; train operation research; inspections; track safety standards; deferred maintenance. | This document is available to the public through the National Technical Information Service, Springfield; Virginia 22151 |

| 19.Security Classification (of this report) | 20.Security Classification (of this page) | 21. | 22.Price |
|---|---|---|---|
| UNCLASSIFIED | UNCLASSIFIED | | |

NTSB Form 1765.2 (Rev. 9/74)

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## DEFINITION OF TERMS

For the purposes of this report . . .

. . . risk is used to describe the estimated probabilities of harm likely to be associated with the conduct of an activity.

. . . safety analysis is used to describe the analytical work to identify safety concerns which need to be controlled.

. . . safety analysis technology is used to describe the methods available to perform safety analyses, including hazard analysis, fault tree analysis, failure mode and effects analysis, and events sequence analysis.

. . . system safety is used to describe a methology using a combination of safety analysis techniques to obtain optimum safety within the constraints of operational effectiveness, time and cost whereby hazards are identified and risks reduced to a minimum throughout all phases of the system under consideration.

. . . system safety plan is used to describe a formal document that fully describes the planned safety tasks required to meet the system's safety requirements.

. . . safety system is used to describe the safeguards and procedures adopted to control safety concerns associated with an activity.

## INTRODUCTION

On April 4, 1978, the National Transportation Safety Board convened a 3-day public hearing into the tragic releases of hazardous materials in train derailments. The Safety Board, sitting en banc, heard testimony from 49 witnesses representing the public, the United States Government, State and local governments, labor unions, the chemical and petroleum industries, tank car owners and lessors, firefighters, emergency services agencies, and safety associations.

A derailment and release of deadly anhydrous ammonia gas at Pensacola, Florida, on November 9, 1977, claimed the lives of 2 persons, injured 46, and resulted in property damage of $124,000 and claims in excess of $20 million. In this accident a head shield on the tank car would have prevented the disaster. The effect on the public of this accident is long term; as one witness stated:

". . . trains go by everyday. They never used to bother me. I am aware now that the train goes, how fast it goes, if it is knocking or clanging together--what are the noises, whether it will derail again in the middle of the night when my children are all there, (when) my children are asleep, and the windows are open."

In Waverly, Tennessee, on February 24, 1978, 16 persons were killed, and 45 were injured. Property in excess of $1.8 million was damaged and legal claims in excess of $50 million have been filed. In this accident a damaged tank car containing LPG exploded 2 days after a train derailment--much of the town of Waverly was destroyed. In Youngstown, Florida, on February 26, 1978, 8 were killed and 114 injured when chlorine gas escaped after a train derailment. Over $1.5 million in property was damaged and more than $600 million in claims have been filed.

These losses emphasized the Safety Board's concern over the delayed installation of safeguards on DOT 112A and 114A tank cars, and the adequacy of emergency response procedures and actions to decrease the dangers following derailments. Data provided to the Board indicate that derailment accidents increased from 4,960 accidents in 1967 to 7,981 accidents in 1977. Protection of the 20,000 DOT 112A and 114A tank cars and the need for a hazardous materials response system became imperative as four accidents in 1978 accounted for the deaths of 28 persons, injuries to 215 others, property damage in excess of $4.5 million, and claims in the hundreds of millions of dollars.

As a result of its analysis of the testimony and other available data, the Safety Board has formulated short-term, long-term, and longer-term corrections. Short-term corrections are those which can be achieved within 1 year; long-term corrections are those which can be achieved in 1 to 3 years; and longer-term corrections are those which can be achieved

in 3 to 10 years. The Safety Board has drawn conclusions and has made recommendations to the Secretary of Transportation, the Association of American Railroads, the Administrators of the Environmental Protection Agency and the Federal Railroad Administration, and the Task Force on Rail Transportation of Hazardous Materials.

ANALYSIS OF PROCEEDINGS
OF THE
NATIONAL TRANSPORTATION SAFETY BOARD
INTO
DERAILMENTS AND HAZARDOUS MATERIALS
APRIL 4-6, 1978

## DERAILMENTS AND CARRIAGE OF HAZARDOUS MATERIALS

### Tank Cars: Bigger But Not Safer

Several witnesses agreed that the 200-percent increase in capacity allowed by DOT 112A and 114A tank cars was not augmented by a like increase in safety. An analysis of the record of the hearing indicated that the risk to the public with the enlargement of tank cars from 11,000 gallons to 33,000 gallons was not suspected and methods for determining accident risks were not used before the size of the cars was increased. In the 1950's, specification changes were allowed by the Interstate Commerce Commission (ICC) in response to the economies of scale desired by shippers and endorsed by railroad ratemakers at the time. The changes allowed the size of the tank car for liquefied petroleum gas to be increased 200 percent and permitted external insulation to be eliminated.

Previously, the DOT 105A tank cars, which had been used to haul LPG were smaller capacity and were insulated on the outside to resist heat transfer. When these tank cars were involved in accidents, explosively violent ruptures and rocketing were infrequent; consequently, the size of the affected area was smaller and the dangers to the public were minimized.

The entire process used to approve the design of 112A and 114A tank cars lacked any documented safety methodology. One technique which should have been used in the initial design of "jumbo" tank cars was safety analysis. That is, the design of DOT 112A and 114A tank cars removed the safeguards previously found on DOT 105A tank cars--insulation, center sills, and smaller capacity--but the consequences of the removals were not analyzed before the cars were placed in service. The Safety Board understands industries' need to maximize capacity and minimize weight from the tank and carriage structure in order to be more economical; however, we cannot understand the lack of testing or analysis to see if such a tank car could withstand damage to the structure in an accident environment before it was introduced on the rail network. The unreasonable risk to the public, as verified over the last 10 years of serious accidents, was not addressed by the appropriate Federal regulatory agencies, by the Association of American Railroad (AAR), by the AAR Committee on Tank Cars, or by the tank car industry.

In 1971 1/, the Safety Board recommended that the Secretary of the U.S. Department of Transportation develop and adopt a risk-based framework for evaluating and planning dangerous goods transportation safety regulations or programs in the Department. This should have led to development of the analytical methods for risk identification and evaluation. The Department has made some progress, but DOT should complete its work on this recommendation expeditiously.

The Safety Board believes that DOT agencies should be encouraged to report their regulatory decisions in terms of "degree of safety provided" and compare their decisions to assure that changes will provide a level of safety either equivalent to or greater than those existing before the changes. It appears from the record of this hearing that both industry and Government would have benefited had a safety methodology based on safety analysis been used.

Demands, such as economic, environmental, and energy needs, have been placed on regulatory agencies. However, the demand to show in quantitative terms what specific safety improvements will be achieved by the Government's regulatory initiatives has not been placed on them. If, however, a safety methodology is established and the regulatory agencies properly analyze their regulatory changes, the results could be reported quantitatively to the public for their review, evaluation, and comment. Regulatory agencies should be able to quantitatively state and defend the degree of protection their regulations offer to the public.

Further, in its 1971 study, the Safety Board recommended that each private organization or agency involved in hazardous materials transportation develop and employ risk-based concepts and methods to the maximum extent possible. This recommendation needs to be addressed by private organizations whose decisions also impact safety. The AAR is known to be working to implement the approach. Had the AAR Committee on Tank Cars employed a safety methodology in the design, construction, and testing of DOT 112A and 114A tank cars, AAR would have recognized that the tank cars could not easily withstand impact forces to the tank head. Therefore, the AAR could have approved tank cars that would have maximized the benefits of testing in certain stress levels, and thereby minimized the potential for catastrophic accidents.

The certification procedures for approving tank car regulatory safeguards has followed a circuitous route and has included numerous parties outside the Federal Government. In 1969, industry recognized the need for safer tank cars, primarily as a result of the accident at Laurel, Mississippi, and formed the Tank Car Research Committee. As a result of this committee, the Railway Progress Institute (RPI) and AAR

1/ Special Study: Risk Concepts in Dangerous Goods Transportation Regulations; NTSB-STS-71-1, January 27, 1971.

opted to form the RPI-AAR Railroad Tank Car Safety Research and Test Project. The Tank Car Research Committee became known as the Tank Car Safety Council and oversaw funding and direction of safety projects. In 1971, the tank car research project recommended that head shields be installed on tank cars; in 1972 and 1973, it recommended shelf couplers. In 1974, after considerable research, the DOT published regulations (HM-109) requiring head shields on all tank cars by December 1977. However, some tank car owners, shippers, and lessors did not agree with the regulation, took the Federal Railroad Administration (FRA) to court, and were overruled. In the meantime, the tank car industry did not comply with the requirement. Unfortunately, the regulation had no enforcement provisions until the end of the installation period, and the impact of the regulation was lost.

The primary parties involved in the approval procedures consist of the AAR's Mechanical Division, the AAR's Tank Car Committee, the FRA, and the Materials Transportation Bureau (MTB). The AAR's Mechanical Division publishes "Specifications for Tank Cars." This manual includes DOT and AAR tank car specifications. Any builder of a tank car to carry hazardous materials must have his design, materials, and construction approved through the Mechanical Division for consideration by its Committee on Tank Cars and by other AAR committees. All applications are approved by the Mechanical Division when, in the opinion of the Committee on Tank Cars, the tanks comply with effective DOT regulations and specifications.

Proposed specifications must be submitted for all new tank cars. Justification for the new specifications must include the properties of the ladings and the method for loading and unloading. A subcommittee on specifications reports its findings to the Committee on Tank Cars, which reports its findings to the Mechanical Division. If approved through the Mechanical Division, the Committee on Tank Car's recommendations are reported to DOT. The Committee's recommendation is generally accepted by DOT. In the case of the DOT 112A tank car, the Committee's recommendations were adopted by the ICC, DOT's predecessor in this area.

In addition, the Committee on Tank Cars is the controlling agent for tank safety within AAR and reviews and approves designs for construction, alteration, conversion, and repairs of tank car tanks and their appurtenances. The primary function of the Committee is to maintain and revise specifications covering the various types of tank cars required by different commodities. Additionally, the AAR Committee on Tank Cars approves all private shops for repair of tank cars.

The Committee on Tank Cars consists of seven railroad representatives and six tank car industry representatives. The railroad representatives represent their industry on a geographic basis rather than as company representatives. The tank car industry representatives represent various trade and professional associations rather than individual companies.

Professional associations represented include the Compressed Gas Association, the Manufacturing Chemists Association, the National Liquefied Petroleum Gas Association, the American Petroleum Institute, the Chlorine Institute, and the Railway Progress Institute. The Safety Board believes that the composition of the Committee on Tank Cars represents an interlocking directorship between the tank car and railroad industries, and believes that this interlocking directorship needs careful review by AAR's leadership.

The Safety Board is aware of the recently founded Task Force on Rail Transportation of Hazardous Materials, consisting of members of the Manufacturing Chemists Association and the Association of American Railroads, which will accelerate current industry programs and take new steps to reduce the number and severity of transportation accidents involving hazardous materials. The Safety Board believes that this task force should review the safety methodology and analysis methods utilized by the AAR Committees when they approve tank car specifications and modifications.

Another organization actively involved in researching the tank car safety problem is the RPI. RPI represents tank car builders, shippers, and lessors, and together with the AAR researches safety mechanisms to minimize tank head punctures through the RPI-AAR Railroad Tank Car Safety Research and Test Project. Their research led to head shields and shelf couplers as the primary safeguards required to protect DOT 112A and 114A tank cars.

The FRA and the MTB have worked closely together to formulate tank car regulations. The FRA is primarily responsible for research, technical support, cost analysis, and enforcement of regulations, while the MTB formulates and issues all hazardous materials regulations under the DOT's auspices. These Federal agencies, acting on the Tank Car Research and Test Project's recommendation of 1971, concluded that head shields offered the best potential protection against punctures to DOT 112A and 114A tank cars.

In 1972, the RPI-AAR Tank Car Research Committee indicated that an improved coupler without a head shield was satisfactory. In fact, at the Safety Board's hearing, an AAR spokesman testified that the shelf coupler offered better protection than the head shield. 2/ The FRA and MTB, however, firmly maintained that shelf couplers by themselves offered protection primarily in switching operations and continued to press for head shields. As a compromise, in 1975, the DOT, AAR, and RPI jointly agreed that a combination of head shields and shelf couplers provided the best protection. In 1976, an NPRM was finally prepared and the MTB issued the final rule for HM-144 on September 9, 1977. The regulation not only requires head shields and shelf couplers, but also requires thermal protection. An NPRM 3/ to accelerate the schedule was published on May 11, 1978, as a result of Safety Board activity and Congressional concern. If the revised schedule is met, it will have taken 12 years to complete the safeguards.

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2/ Testimony of Dr. William Harris, Association of American Railroads, Director of Research; NTSB Public Hearing; April 5, 1978, pp. 2-378.

3/ Materials Transportation Bureau; 43 FR 20250; May 11, 1978.

Further, HM-144 allows the industry and the tank car shippers or owners latitude in the design used for implementation of HM-144. Any designs to be used on DOT 112A and 114A tank cars must be approved by the AAR's Committee on Tank Cars as a part of the AAR's self-regulatory policy. The Safety Board has heard testimony that the AAR requires that FRA-approved head shields be inspected every 6 months. AAR's concern over their questionable safety in railroad operations appears to have cast aspersions on the FRA-approved head shield. Thus HM-144 implementation may be delayed further because of approval and inspection requirements by the private sector's various technical committees. Although these approvals are not sanctioned by law or regulations, the AAR's interchange rules require that equipment meet AAR specifications in addition to all Federal regulations. These requirements may further delay the implementation of HM-144.

Additionally, procedures were designed by the railroad and tank car industries so they could develop an expensive safeguard instead of applying the relatively inexpensive FRA-documented safeguard. This ability of the industries to design and have approval over their own safeguards has also complicated the installation timetable. There seemed to be no sense of urgency by the parties involved to complete the necessary action. The Safety Board, aware of major noncompliance by industry with HM-109, is not completely satisfied that the industry will comply with HM-144. There are no penalties for not completing actions. The projected percentage completion rates in the regulation have no binding legal sanctions; therefore, compliance is not mandatory until the last day of December 1980.

As a matter of record, the AAR agreed with the worth of shelf couplers, but in no way prompted its membership to go ahead and install the couplers before the regulatory requirement was imposed. The AAR, as the major self-regulatory arm of the railroad tank car industry, has sufficient influence and power of persuasion over its membership to have insisted that shelf couplers be unilaterally adopted and installed before regulatory action. Testimony indicated that shelf couplers were ordered by the tank car industry and were waiting to be installed as soon as DOT acted.

Past history indicates that the industry determines DOT's action in tank car specifications and modifications. The Safety Board is convinced by the record that action on installation of shelf couplers could have been expedited.

Deferred Track Maintenance: Hazardous Materials Routes Have No Priority

Several witnesses addressed priority systems for track upgrading. Implicit was the need for track upgrading systems which specifically identify hazardous materials and give maintenance priority to corridors through urban, populated centers. Testimony indicated that traffic density was the railroad's prime criterion for expending maintenance dollars. Carriage of hazardous materials and repeated derailments were

not necessarily factors in determining maintenance budget expenditures. The Safety Board believes that priorities for upgrading track should systematically consider hazardous materials risks and accident and incident historical data.

The Safety Board is aware that the railroad industry does not ignore maintenance. Indeed, the AAR was very articulate in its statements on these matters. It indicated that $2.2 billion was expended for maintenance of track, roadbed, and facilities in 1975, with a 50-percent increase in 1977 to $3.3 billion. Further, testimony at the hearing revealed that in 1976 Class-I railroads (all major railroad systems representing 99 percent of the railroad traffic and 96 percent of the railroad mileage) installed 802,000 tons of new rail at a cost of $200 million and 25 million ties at a cost of $277 million. In 1977, 850,000 tons of new rail were inserted at a cost of $257 million and 26 to 27 million ties at a cost of $299 million. Even with this substantial investment in track maintenance, economies have been such that the railroad industry has minimized its investments in the rail track network.

The Safety Board reviewed the economic incentives to the industry to improve its track network. Basically, there are few. Most notably, the 4-R Act 4/ authorized $1.5 billion in Federal monies by Title V of Public Law 94-210 for track improvements; however, the implementation of this legislation by DOT is primarily to protect "the public investment." Therefore, the DOT provisions for obtaining Government assistance has resulted in DOT's insistence on restrictive covenants associated with this protection. The result appears to be reluctance of marginally-sound carriers, who could use the mechanism of Government guarantees on rail industry paper or Government preference shares, to commit to finalizing on these issues because of creditor positioning. While certain Title V funds will eventually find their way to track improvements, inflation and decline of railroad maintenance will make these funds inadequate to substantially improve the rights-of-way. This view is reinforced by the fact that only $62 million in preference shares and $12 million in guaranteed loans have been put to work. Additionally, the substantial amounts of monies being spent by Conrail and AMTRAK track improvement programs have put upward supply and demand pressures on rail and track material prices, and have thereby reduced the real values of the Federally authorized funds.

Additionally, FRA statistics indicate that the number of train derailments is increasing. From 1967 to 1974, the derailment trend, under the $750-minimum damage reporting threshold, increased by 40 percent; from 1975 to 1976, under the new $1,750 threshold, it increased by 25 percent. The AAR testified that these percentage increases are attributed to expanded railroad operations and inflationary changes in

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4/ Railroad Revitalization and Regulatory Reform Act of 1976; Public Law 94-210, February 5, 1976.

reporting which historically were not counted. The AAR also testified that the Office of Technology Assessment of the U.S. Congress has calculated the increase over the 9-year period as 15.9 percent and has taken into account inflationary factors and the increased severity of mishaps. Regardless of whether the rate is 40 percent, 25 percent, or 15.9 percent, the frequency of derailments has been increasing steadily for the last 10 years.

According to FRA's 1976 statistics, there were 10,248 train accidents. Track or structural defects were responsible for 4,260 of these accidents, or 42 percent, human factors causes were responsible for 2,360, or 23 percent, equipment defects were responsible for 2,174, or 21 percent, and miscellaneous factors were responsible for 1,454, or 14 percent.

Of the 10,248 train accidents, 7,934 were derailments. The AAR testified that the monetary damage (limited to railroad property damage and direct property claims) for Class I railroads for 1976, included only 381 accidents involving damage of more than $100,000. In 1977, 77 percent of all train accidents were derailments. Further, derailments caused by track have increased substantially from 38 percent in 1968 to 53 percent in 1977. Although the AAR was quick not to criticize the FRA's figures it did note that the reports by FRA should be presented so that they can be understood by the Congress, the press, and the public. The Safety Board believes that the FRA's Office of Safety Annual Report on accidents needs to analyze the nature and severity impact of the figures they report to the American public and provide summaries of their action programs to reverse causal trends. The public's awareness of rail conditions has increased appreciably because of serious hazardous materials railroad accidents. The public's concern over safe track through their communities demands increased Federal emphasis when hazardous materials are involved.

The underlying problem reinforced at the hearing appears to be lack of funds on some railroads. The average cost to maintain 1 mile of track is about $15,000 per year. The industry indicates that its deferred maintenance position is about $4.1 billion. This deferred maintenance position has been addressed by the ICC in its rate increases allowed under Ex Parte No. 305, Nationwide Increase of Ten Percent in Freight Rates and Charges, 1974. In this action, the ICC, cognizant of the railroad's economic inability to maintain track adequately, ordered that the 10-percent increase in freight rates and charges be disbursed 70 percent in deferred maintenance or capital expenditures categories. This was the first action by ICC to earmark monies for track improvement. However, even with this action, deferred maintenance stands at $4.1 billion. This deferred maintenance backlog indicates that heavier car loads moving at reduced rates may have seriously deteriorated track conditions and that the railroad carrier's ability to maintain and upgrade track has suffered because of general financial

conditions of the industry. Thus, a major paradox exists; railroads have deferred maintenance on tracks resulting in a degradation of the roadbeds and have increased the weight of their rolling stock and reduced the unit prices for these servi A combination of t:.se events, the Safety Board believes, has .. a major factor in the upward derailment trend.

Derailments Involving Dangerous Cargoes: Who Pays the Bill

The Safety Board heard testimony at the hearing from a number of public safety organizations and railroad spokesmen as to who bears the costs from derailments involving hazardous materials release. To focus on the severity of the tragedies involving hazardous materials releases, a review of relevant Safety Board major accident investigations follows. In all instances, the combination of head shields and shelf couplers, discussed at length during the hearing, would have minimized the risks to the public.

Laurel, Mississippi, February 3, 1969 -- After a broken wheel caused a car to derail, 15 DOT 112A tank cars containing liquefied petroleum gas exploded and fragmented. Many of the heads of the tank cars were dented or actually punctured, and the cars themselves were unable to survive in the derailment environment. Two persons were killed and 33 injured. The Southern Railway estimated total damage at about $3,000,000. After investigating and analyzing the accident, the Safety Board made recommendations which specifically addressed coupler design and called for a program to develop technical improvements for tank cars transporting liquefied petroleum gas and other hazardous materials.

Cresent City, Illinois, June 21, 1970 -- An overheated journal caused the cars to derail and nine cars of liquefied petroleum gas exploded. Sixty-six persons were injured and a number of buildings within Crescent City were destroyed. Estimated property damage was reported to be about $1,700,000. The Safety Board believed that a tank head puncture resistance system could have minimized this accident. As a result of its investigation, the Safety Board recommended that the Federal Railroad Administration encourage the expeditious completion of the RPI-AAR Railroad Tank Car Safety Research and Test Project and insure that the results of the research were applied to enhance the safety of transportation of hazardous materials.

East St. Louis, Illinois, January 22, 1972 -- A relatively fast moving tank car loaded with LPG collided with a standing hopper car. The impact was such that an overriding coupler on the empty freight car punctured the tank head. The pressurized propylene gas in the tank car leaked to the ground and vaporized. After a large vapor cloud was formed, it ignited and exploded. More than 230 people were injured and property damage was estimated at $7.5 million. Again, this tank head was too weak to withstand the blow inflicted by an overriding coupler.

E. Houston, Texas, September 21, 1974 -- In a hump yard, two loaded "jumbo" tank cars hit an empty tank car at 18 to 20 mph. The coupler of one of the tank cars punctured the tank head of the lead "jumbo" tank car. Butadiene spilled from the car and formed a vapor cloud; the vapor exploded violently. As a result, 1 person died and 235 were injured. Property damage amounted to $13 million. In this instance, the head shield probably would have prevented the puncture and the catastrophe.

Des Moines, Iowa, September 1, 1975 -- Cars derailed at or near a turnout and tank car heads were punctured by disengaged couplers. The 11 derailed cars which carried LPG caught fire, exploded, and injured 3 persons. Property damage was estimated at $834,000. The Safety Board again reiterated its recommendation to the FRA to determine the capabilities of top and bottom shelf couplers, head shields, or a combination of both, and issue regulations to require that DOT 112A and 114A tank cars be equipped with the best practical combination.

Glen Ellyn, Illinois, May 16, 1976 -- At Glen Ellyn, two trains derailed, a coupler overrode and punctured a tank head end releasing poisonous anhydrous ammonia gas. Fourteen persons were injured as a result of this derailment. Damage from the accident amounted to $1,914,000. A tank head puncture resistance system would have prevented this release.

From these accidents, two questions must be addressed. First, who bears the monetary costs for railroad accidents in which hazardous materials are released; and second, what parties bear the risks in terms of loss of life. Testimony indicated that the primary party responsible for the economic burden of a derailment and catastrophic release of hazardous materials is the railroad carrier. Once a hazardous material shipment is accepted by a railroad carrier, it is liable for the safety of the property while in its possession. Section 20(11) of the Interstate Commerce Act states in part:

> ". . . any common carrier, railroad or transportation company subject to the provisions of this part receiving property for transportation . . . shall issue a receipt or bill of lading therefore, and shall be liable to the lawful holder thereof for any loss, damage, or injury to such property caused by it . . . and no contract, receipt, rule, regulation or other limitation of any character whatsoever shall exempt such common carrier . . . from the liability hereby imposed."

Therefore, as a result of this liability of carriers, the railroad bears the cost of property damages, cleanup, evacuation costs, and claims for death and injuries as a result of a derailment accident involving DOT 112A and 114A tank cars. Evidence at the hearing indicated that tank car shippers or owners assume no liability for an accident.

The Safety Board addressed the topic, yet data provided by witnesses was incomplete as to the amount of money required for these investments and the likely return on that investment. After the hearing, the Safety Board pursued the topic because it was evident that financial responsibility for train accidents involving DOT 112A and 114A tank cars fell fully on the railroads and the public. In answer to our inquiries, the current and projected lease rates for DOT 112A and 114A tank cars fall in the following ranges:

| | | |
|---|---|---|
| 1. | Current Tank Cars No Retrofit (under 12 year lease) | $400/m. |
| 2. | Current Tank Cars No Retrofit (12 year or over lease) | $350/m. |
| 3. | Future Retrofit Tank Cars (12 year lease) | $500/m. |
| 4. | New Cars Built w/Steel Jacket | $600/m. |

The estimated life span of DOT 112A and 114A tank cars is 40 years. Therefore, a tank car built in 1958, with approximately 20 years of service, has accrued $84,000 from leases. If the retrofit is in place, the tank car is still good for 20 more years and will accrue another $120,000 for a total of $204,000 over the life span (1958-1998).

The down payment required to purchase a tank car is 10 percent; the rest is financed by a financial or other investment institution. Current tax advantages allow a 10 percent deduction annually on the investment at current market values. The return on investments will generally be 100 percent after 10 to 12 years. This includes all maintenance cost. Depreciation of the investment is allowed at the rate of 3 percent per year with a maximum depreciation of 90 percent. Depreciation stops at 90 percent as the scrap value of a DOT 112A and 114A tank car is 10 percent of the original cost.

According to our information, lease rates already are being increased to cover the entire cost of the HM-144 retrofit. It can be assumed that the costs for retrofit will be passed on to the end product consumer and the railroads. One tank car company is building a $9 million facility to retrofit cars and the Safety Board believes that this action indicates that steel jacketing of tank cars for its entire fleet, as well as a projected 30 percent of the remaining DOT 112A and 114A tank car fleet, means that new lease rates will make a profit for this company, as well as provide a $9 million facility with its own tax advantages.

In summary, the tank car owners bear no liability and yet have much to gain under current legal, regulatory, and economic conditions. The Safety Board believes Congressional action may be required in this area to shift the liability if the accident situation worsens.

Several witnesses made it evident who bears the burden of loss of life and injuries at these hazardous material accidents. Primarily, there are three groups -- railroad employees, emergency personnel, and the general public. Immediately after a derailment and release of hazardous materials, the railroad crews must take as many preventive and emergency measures as they dare. The general public may be enveloped in a fireball from LPG, such as that described in testimony by a Laurel, Mississippi, resident, or by toxic gas, such as in the Pensacola, Florida, case. Emergency personnel arrive on the scene and are immediately confronted with situations for which they are not prepared or in which they cannot identify the nature or extent of the dangers. One witness simply stated that most public safety firefighting groups could not handle the massive energy release situations they faced.

The MTB in its final rule (HM-144) for safeguarding for DOT 112A and 114A tank cars indicated that since 1969, more than 500 of these tank cars were involved in derailments, of which more than 170 cars lost some or all of their lading. These derailments resulted in 20 deaths, 855 injuries, and 45 major evacuations of 40,000 persons. Four of these losses, the MTB calculated, resulted in estimated losses of more than $100,000,000.

Firefighters and Emergency Response Personnel: They Need to Know

A number of witnesses representing the International Association of Fire Chiefs, the National Fire Protection Association, and the International Society of Fire Service Instructors testified at the hearing to problems encountered by emergency response personnel at train derailments in which DOT 112A/114A tank cars released hazardous materials.

Primary among their concerns were the inability of emergency response personnel to link up with a centrally located communications center where safety response personnel could receive timely, on-line technical advice and their inability to obtain immediate supporting hazardous materials experts in the event of a major railroad emergency. The need to know how to handle hazardous materials emergencies they believed, was extremely critical in the first few minutes after a train derailment.

These witnesses indicated that reliance on technical manuals, placards, computer printouts, and waybills did not fulfill their informational needs. They stated that all too often placards located on hazardous materials tank cars were destroyed, the knowledge of the traincrew was limited as to the exact placement of tank cars and the materials carried, and in immediate emergency conditions, there was not adequate time to search for waybills and cross-reference materials with an emergency manual to determine general emergency actions. Because of the massive energy threats of LPG or the dangers of toxic gases, emergency response personnel indicated they needed a hazardous materials emergency response system which would assist them in determining and expediting tactical procedures in a real-time environment.

Further, they indicated that most fire service organizations in smaller communities have neither the expertise nor informational materials at their disposal to handle major railroad disasters. These communities, they believed, needed a central location to call and request an emergency hazardous materials team of experts as well as on-line technical advice.

Postaccident feedback to emergency response personnel, they believed, was needed. Lessons learned from one hazardous materials catastrophe needed dissemination so that future accidents could be better addressed and losses to life and property minimized. A number of organizations are attempting to address emergency response personnel's need to know in railroad hazardous materials accidents.

The National Fire Protection Association (NFPA) -- This organization has a membership of approximately 32,000 drawn primarily from the fire service and industry. They are involved in conducting fire safety education and developing and disseminating consensus standards to minimize the possibility and effects of fire and explosion. Additionally, they publish a "Guide on Hazardous Materials" and recently completed a contract with DOT to develop a training program for hazardous materials transportation incidents.

The Manufacturing Chemist Association (MCA) -- This organization has a membership of 197 companies representing 90 percent of the production capacity of basic industrial chemicals within the U.S. Since 1971 MCA has been operating CHEMTREC (Chemical Transportation Emergency Center), a 24-hour direct-dial, toll-free communication system which provides advice to emergency response personnel in chemical transportation accidents and can contact the shippers of the chemicals for more detailed assistance and appropriate followup.

The Association of American Railroads, Bureau of Explosives (B of E) -- The B of E provides technical advice and services to the railroad industry for hazardous materials. Before 1967 they were the organization responsible for most Federal regulations affecting hazardous materials transportation by rail. Their publication, "Emergency Handling of Hazardous Materials in Surface Transportation," is being used by emergency response personnel as well as by railroad personnel.

The International Society of Fire Service Instructors (FSI) -- This organization represents 2,000 fire-training specialists. Their primary concern is to see that a comprehensive training program is adopted nationwide to insure adequate training of those who must fight hazardous materials fires and respond to other emergencies.

Materials Transportation Bureau (DOT-MTB) -- The MTB represents the lead Federal agency responsible for hazardous materials regulations.

Primarily, the regulations MTB has issued to assist emergency response personnel are placarding of hazardous materials tank cars and requirements that hazardous materials be included on the waybill and that the traincrew be advised of the location and type of hazardous materials in a train's consist. MTB has sponsored development of a training course for combating hazardous materials emergencies.

National Fire Prevention and Control Administration (NFPCA) -- The NFPCA has the responsibility for training fire service trainees in its fire academy. This program is not yet in full operation.

In addition to these major organizations, the International Association of Fire Chiefs and the International Association of Firefighters are actively involved in preparing their memberships to handle hazardous materials emergencies. Also, many States, such as Illinois, Arkansas, Tennessee, and Kentucky, are upgrading their abilities to handle hazardous materials emergencies as a result of recent tank car disasters.

## HOW TO MINIMIZE THE RISKS OF HAZARDOUS MATERIAL RELEASES IN TRAIN DERAILMENTS

### Short-Term Corrections

Install head shields and shelf couplers--The shelf couplers discussed at length in the public hearing are referred to as E-top and -bottom shelf couplers and F-bottom shelf couplers. (See figure 1.) Primarily, they will either prevent override or reduce to a minimum the impact of the coupler into the tank head end in an accident environment. According to AAR testimony, shelf couplers provide adequate protection in 60 percent of the accident situations. The FRA testimony indicated that for some overspeed switching impacts, shelf couplers would prevent some tank head punctures. For other impacts under differing conditions, primarily derailments, shelf couplers would not prevent tank head punctures. Therefore, the FRA did not believe that shelf couplers, alone, would provide an adequate degree of protection.

Primarily head shields protect the tank head from being punctured by overriding couplers in a derailment or other accident environment. (See figure 2.) FRA research concluded that the head shields would protect the tank car from punctures in the tank head in 85 percent of accident situations. The AAR believes that 50 percent reflected a more accurate figure for head shield protection. The AAR indicated that, in the absence of any accident data, it would stand by its percentage.

During the hearing, all parties agreed that head shields and shelf couplers used together would be the best technical safeguards in over 85 percent of accident situations involving tank head punctures by coupler override. At the hearing, the FRA indicated that tank heads might be protected in as many as 90 percent of the accidents if both head shields and shelf couplers were installed.

Figure 1. New E-type coupler with top and bottom shelf showing its retaining feature.


Figure 2. Completed applications of safety devices, new E-coupler with top and bottom shelf and head shield.

These short-term corrections--shelf couplers, head shields, or a combination of both--are technically feasible and easily installed. In fact, the final rule issued September 9, 1977, required that shelf couplers be installed by July 1, 1979, and that head shields be installed by January 1, 1982. During its hearing, the Safety Board found no evidence that an accelerated schedule cannot be met.

The hearing revealed that the argument over head shield appears to be a technical dispute over design and application. Although several witnesses maintained that the head shields would fall off the cars, the FRA maintained that it had researched and tested the FRA-designed head shields and was satisfied that the shields would not fall off. FRA testimony concluded that head shields have experienced the equivalent of 10 to 12 years rail travel at the Transportation Test Center without falling off.

As a result of the hearing the Safety Board now believes that the current time frame in revised regulation HM-144 is not the best. Even though the consensus of testimony indicates that shelf couplers with head shields provide the maximum level of safety, the revised regulation does not require head shields on the entire fleet until January 1, 1981. The Safety Board believes that this delay is unnecessary.

In fact, in order to understand the magnitude and complexity of installing shelf couplers and head shields, the Safety Board demonstrated the installation of each to the public and the press during its hearing. The time frames reported for successful completion of each task were:

- Shelf couplers (E-type bottom and top)--7 1/2 minutes, utilizing a 2-man crew.

- Head shield (railguard trademark design)--93 minutes, utilizing a 4-man crew.

Calculations indicated that using a 2-man crew on each end, it will take 11.32 man-years to install shelf couplers on all 20,000 DOT 112A and 114A tank cars by December 1978. The Safety Board realizes that logistics and scheduling are factors to be contended with; however, installation of shelf couplers can be accomplished at any of several hundred locations, including yard repair tracks with portable equipment. On May 9, 1978, as a result of the Safety Board's public hearing and Congressional concern, the DOT revised its schedule to December 1978 for installation of shelf couplers.

Head shields, however, pose a more difficult time frame; nevertheless, calculations indicate that an FRA-approved head shield can be installed in 93 minutes. Using a 4-man crew on each end of DOT 112A and 114A tank cars, installation of head-shields would require 274.6 man-years of effort to finish the work before the end of December 1978. There are about 86

AAR-approved private shops available for this work. One private repair shop indicated that by working 3 shifts, 7 days a week on a scheduled basis, 16 tank cars per day could be retrofitted on an accelerated basis. By the end of 1978, this shop could retrofit about 4,368 tank cars, or 18 percent of the entire DOT 112A and 114A tank fleet. Additionally, because the need is so urgent, the AAR Committee on Tank Cars could temporarily approve a number of tank car home points and interchange locations to expedite the installation process of couplers and head shields; there are several hundred of these points throughout the Nation. This action would allow shippers and owners flexibility in completing the required retrofit. One major shipper and owner of DOT 112A/114A tank cars, the E.I. du Pont de Nemours & Company, indicated its strong management commitment to the safety of its tank cars and plans to meet the Safety Board's recommended accelerated installation deadline of December 1978 for application of head shields. Du Pont Company will have shelf couplers installed by September 1978--a full 3 months before the required deadline of December 1978. Further, the demand for immediate head shield application should result in a supply of private shops to do the work. After the public hearing, the DOT accelerated the head shield program to partial completion by December 1979 and to full implementation by December 1980.

Long-Term Corrections

Install thermal protection.--The Safety Board has advocated thermal protection for tank cars since the Laurel, Mississippi, accident in 1969. In many accidents one tank car is punctured and its contents explode. However, its threat to the other tank cars in the train is minimized and the "BLEVE" 5/ effect on other damaged cars may be reduced by protecting the cars from intense heat. (See figure 3.) Based on the analysis of testimony from the hearing, we believe that thermal protection is needed; however, the time schedule could possibly be accelerated. We understand that some head shields are to be applied when thermal protection is applied. We further understand that this is necessary because certain head shield designs would have to be removed if steel jackets are to be applied. The Safety Board believes that head shields and shelf couplers are needed to minimize the danger of catastrophic hazardous materials releases. If the industries involved wish to design elaborate safeguards, the Safety Board commends their efforts. However, thermal protection should be accomplished after head shields are effectively in place.

After the Safety Board's public hearing, the DOT accelerated its schedule in Docket HM-144 for thermal protection from full implementation by December 31, 1981 to a newly scheduled date of December 31, 1980.

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5/ Acronym for "Boiling Liquid Expanding Vapor Explosion." The term is used because of the image it conveys to emergency response personnel.

Figure 3. The "BLEVE" Effect - Crescent City, Illinois - 6/21/70.

Develop an emergency notification system.--During the hearing, many public emergency response personnel testified that the Federal Government has not been effective in certain safety areas which threaten the lives of firefighters and members of the public. One of these safety areas is emergency notification procedures to effectively notify firefighters and the public of hazardous materials involvement in emergencies. Such procedures are invaluable to emergency response personnel and to the public in the first minutes after a hazardous materials release. Well documented emergency notification procedures would eliminate current confusion over who to contact for technical advice and aid to emergency response personnel so that they may effectively minimize the dangers of released hazardous materials in train derailments.

Implement hazardous materials emergency response centers and strike teams.--This system would include the central, regional, or State communication center for technical advice and information, and contact points for notification to other involved parties.

The Safety Board has previously recommended that the Secretary of Transportation, in compliance with Congressional legislation, establish and maintain a central reporting system and data center to provide emergency response personnel with technical and other information and advice for meeting emergencies connected with transportation of hazardous materials. MCA's CHEMTREC, the AAR's Bureau of Explosives, the NFPA, and other safety organizations would probably join with DOT/MTB to make available all resources at a central reporting location which could then make all necessary contacts required at the Federal, State, and safety association levels. For example, a single call to a hazardous material "Hot Line" would trigger: CHEMTREC to quickly contact a shipper to provide expert chemical advice; immediate notification to the State agency or agencies involved; notification of appropriate Federal agencies; immediate access information for the safety response personnel on the scene; and immediate notification to any emergency strike team that would be required.

The MTB should actively accelerate its role as the lead Federal agency for insuring that such centers are established to meet the safety needs of the American public. At the hearing, several witnesses recommended that the Federal Government provide minimum requirements for hazardous materials strike teams. One State, Illinois, has designated a single agency to handle all hazardous materials emergencies. This agency is the one-call agency within that State for all hazardous materials accidents and is responsible for coordinating disaster activities with other State agencies.

Other States, for example, Kentucky, use less formal arrangements and may have several agencies with hazardous materials responsibility, depending on the mode of transportation, the severity of the accident, or the impact to the public. However, the recent number of severe train

derailments and releases of hazardous materials, particularly in the Southern States, has led to increased activity and interest by States in insuring that they are adequately prepared for hazardous materials disasters. Arkansas, for example, as a result of railroad accidents within that State, has upgraded its hazardous materials activities to a council directly under the State's Governor.

A concern voiced at the hearing was that in some hazardous materials accidents the ferocity of the explosions, particularly of DOT 112A and 114A tank cars filled with LPG, overwhelms local government's ability and even the State government's ability to control it. The Safety Board has carefully considered this concern and believes that the MTB should review the concept of hazardous materials strike teams at the Federal, regional, or State levels which would be capable of augmenting local emergency response personnel with immediate and expert advice. A strike-team approach has already been formulated in the Interagency Radiological Assistance Plan. Under this program, radiological strike teams are in place both nationally and regionally to handle dangerous and contaminative radioactive spills. This approach can be reviewed as a model for implementation by the lead Federal agency--MTB-- for railroad hazardous material strike teams.

Employ railroad emergency system techniques.--To establish a nationwide emergency response capability the achievements of the railroad industry should be fully utilized. The railroads are integrally involved in the aftermath of a derailment with release of hazardous materials. Part 174.26 of MTB's regulations requires train and engine crews to be notified, in writing, of all EXPLOSIVE A or POISON GAS cars included in the train's consist. Secondly, the traincrew must have a document indicating the position in the train of each placarded car containing hazardous materials, and finally, a member of the traincrew, usually the conductor, must have in his possession a copy of the waybills of the hazardous materials being transported. Parts 172.202 and 172.203 of the regulations require the shipper to include the proper shipping name, the class, and other describers on the shipping papers. MTB and FRA regulations do not require that the railroads have an emergency response preparedness capability. According to the record from the hearing, most major railroads have developed, or are developing, their own emergency response systems to help local emergency response personnel and some States are implementing one-call systems for the railroads to notify.

Some of the techniques being utilized by the railroads include accelerated use of AAR's Bureau of Explosives Standard Transportation Commodity Codes which are computerized and printed out for each train's consist. These include emergency actions to be taken for each hazardous material in the train, coordination with local officials along railroad rights-of-way, use of specially denoted hazardous materials trains such as Southern Pacific's "K" trains, and Florida East Coast's designated hazardous material trains, and special railroad hazardous materials teams. The Safety Board commends these independent actions by the railroads.

However, a number of persons testified of informational difficulties such as (1) obtaining prompt notification from railroads of an accident; 6/ (2) the inadequacy of receiving only one copy of the shipping papers; 7/ and (3) the need for emergency manuals located in the train, such as the Bureau of Explosives' Hazardous Materials Handbook.

The Safety Board has been aware of this informational gap since the Dunreith, Indiana, accident in 1968. From this accident, the Safety Board recommended that the AAR and the American Short Line Railroad Association develop a system for informing the fire chief of every community about where to obtain immediate information describing the location and characteristics of all hazardous materials in any train involved in a train accident. 8/ This recommendation was repeated by the Safety Board in its reports on accidents at Glendora, Mississippi, September 11, 1969, (NTSB-RAR-70-2); Crescent City, Illinois, June 21, 1970, (NTSB-RAR-72-2); Houston, Texas, October 19, 1971, (NTSB-PAR-72-6); and Oneonta, New York, February 12, 1974, (NTSB-RAR-74-4). Additionally, the Safety Board recommended in the more recent report of the Glen Ellyn, Illinois, accident of May 16, 1976, (NTSB-RAR-77-2), that the DOT require by regulation that persons performing train dispatching functions maintain a record of trains and cars that are carrying hazardous materials and a record of current methods and procedures for containing these materials in the event of a mishap. The Safety Board further recommended that they communicate this information to public safety officials immediately after they learn of a train accident.

The Safety Board believes that as DOT develops a hazardous materials emergency response system, it should rely on the approaches used by progressive railroads and link the railroad emergency response computerized system to a coordinated Federal/State/industry hazardous materials response center. For example, the Bureau of Explosives uses the Standard Transportation Commodity Code. This STCC includes a numbering system that is easily referred to in the Bureau of Explosives' hazardous materials handbook and has been computerized and used by 35 major railroad companies. The 1,600 products in the Bureau's handbook goes beyond DOT's regulated substances. 9/ The Safety Board believes that this type of computerized system could facilitate better communications among all parties involved in hazardous materials accidents.

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6/ Testimony of Mr. Eugene Mooney, Kentucky Department of Natural Resources and Environmental Protection, April 6, 1978.

7/ Testimony of Mr. Erie Jones, Illinois Emergency Service and Disaster Agency, April 6, 1978.

8/ National Transportation Safety Board Railroad Accident Report, Laurel, Mississippi, adopted October 6, 1969.

9/ Testimony of R.M. Graziano, Association of American Railroads, April 5, 1978.

Protect the environment.--The Bureau of Explosives testified that the DOT needs to communicate more directly with the Environmental Protection Agency (EPA). According to testimony, EPA has recently issued regulations on 271 environmentally hazardous substances. Unfortunately, DOT has only 121 of these hazardous subscances covered by regulations. The railroads indicated that they need a mechanism to insure that hazardous properties of these substances are identified by the shippers. Likewise, neither DOT nor EPA requires shippers to clearly indicate on shipping papers that these substances are hazardous to the environment. 10/ The Safety Board believes that DOT is responsible for any hazardous materials notification regulations affecting shippers and the railroads. The Safety Board, therefore, believes that this area needs to be addressed by closer interagency communications and constructive action between EPA and DOT in their respective regulatory roles.

Disseminate emergency manuals and information.--In addition to the railroad information systems involved in an accident, there are four systems which may provide technical information to emergency response personnel in the first few critical minutes. First, the MTB distributes a handbook entitled, Selected Hazardous Materials, 1978, by chemical name which tells personnel how to handle the first 30 minutes of a hazardous materials emergency and includes 42 major chemical products. The MTB handbook references the second system, the Manufacturing Chemist Association's CHEMTREC one-call system. This system provides advice for those at the scene of emergencies by linking chemical industry personnel to on-scene safety personnel via telephone. Third, the AAR Bureau of Explosives issues a handbook entitled, Emergency Handling of Hazardous Materials, by chemical name, which includes recommended practices for handling hazardous materials emergencies. Fourth, the NFPA publishes a Fire Protection Guide on Hazardous Materials which lists liquid flashpoints for 6,800 substances by tradename in addition to chemical name and hazards for 1,300 substances. Additionally, this book includes a section on hazardous chemical reactions of 3,550 mixtures of two or more chemicals. Each of these technical information sources has its advantages and disadvantages.

The MTB handbook is primarily a guide for conducting evacuations for the 42 substances considered the most dangerous and most prevalent in hazardous materials transportation. It lists these hazardous substances by chemical name and summarizes actions to be taken based on size of spill and fire danger. The limited number of hazardous materials in the handbook limits its value to only those referenced. Although it does use the CHEMTREC one-call number for additional information, it does not indicate clearly what procedures emergency response personnel should follow if the hazardous material is not in the handbook.

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10/ Environmental Protection Agency, Title 40, Protection of Environment, Chapter 1, Part 116, Designation of Hazardous Substances: Federal Register, Vol. 43, No. 49, March 13, 1978.

The CHEMTREC one-call system provides immediate advice for those at the scenes of emergencies, and then promptly contacts the shippers of the chemicals involved for more detailed information and appropriate followup. CHEMTREC is a voluntary public service provided by the chemical industry. One weakness of CHEMTREC is its unfamiliarity to the public, to emergency response personnel, and even to some transportation officials, and its inability to link chemical personnel with shipper safety personnel. Additionally, CHEMTREC is hampered by the proliferation of chemicals in the not otherwise specified (NOS) category. These are new chemicals that meet the criteria of a flammable liquid, compressed gas, or other but have not been identified in the MTB regulations by name. The profusion of NOS chemicals is a major concern in identification of hazardous materials and sometimes handicaps emergency response personnel's abilities to act expeditiously in emergency situations until the hazard is determined. Since 30 to 40 new chemical products come on-line per day, some of which attain commercial volumes, one questions the ability of the regulatory process to address these substances so that emergency response personnel are notified of the dangers in a timely fashion.

The AAR's Bureau of Explosives' handbook includes chemical names for all regulated hazardous substances and indicates NOS substances. The handbook includes the CHEMTREC phone number and other available emergency response personnel. It is not a complete listing, however, and could be made more valuable by adding the Chlorine Emergency Plan (CHLOREP) of the Chlorine Institute, the National Agriculture Chemicals Association's Pesticide Safety Team Network, and the Canadian Chemical Producers Association's Transportation Emergency Assistance Progr a (TEAP). The National Fire Protection Handbook's greatest disadv. tage is its size. However, it does include a color-coded system for each hazardous material and indicates a numerical range of hazard for health, flammability, and reactivity or stability.

The Safety Board commends these organizations for the constructive information they are providing to public emergency response personnel. Each of these emergency information sources is trying to fulfill an informational void: MTB to emergency response personnel, highlighting 42 major chemical dangers; CHEMTREC linking emergency response personnel to industry specialists; AAR's Bureau of Explosives to railroad and emergency response personnel; and NFPA to emergency firefighting personnel. The Safety Board believes that the Secretary of DOT has the mandate in P.L. 93-633, Hazardous Materials Transportation Act, Section 109(d)(2), to review existing informational materials, insure their adequacy for hazardous materials emergencies, and encourage publication in a single document.

Assure postaccident documentation and feedback.--A continuing problem of regulatory agencies is their inability to make corrective changes. In nearly all cases, Federal regulations are formulated in reaction to problems, rather than to prevent problems. Generally,

mechanisms do not exist to regulate safety before a potential safety problem has been discovered. In most hazardous materials situations, the public and emergency response personnel are subjected to dangers which they do not know exist.

The Safety Board believes that an adequate postaccident documentation and feedback program should be established. Several witnesses testified to the need for an adequate training program for hazardous materials emergencies. In this regard, the Safety Board has previously recommended that the MTB develop an adequate hazardous materials system to generate information on actions taken by emergency response personnel, why the actions were taken, and the effects of such actions. Additionally, DOT was asked to develop procedures to report information to Federal and State agencies responsible for emergency training. The Safety Board believes these recommendations should be expeditiously implemented. 11/

Adequate training programs must have feedback mechanisms so that lessons learned in one hazardous materials catastrophe can be translated to other emergency response personnel before they encounter a similar accident. The Safety Board is aware that MTB has developed with the NFPA a comprehensive training program on hazardous materials transportation incidents that includes instructions for writing hazardous materials incident reports. 12/ The Safety Board believes that this training program should address the necessity for postaccident documentation and feedback.

Additionally, the MTB should begin to foster a positive environment and leadership role to direct communications to all parties involved in hazardous materials matters. For example, the International Association of Fire Service Instructors voiced the serious concern that adequate training of instructors is a first priority. 13/ Based on answers given during direct Safety Board questioning, the Safety Board concludes that the International Association of Fire Service Instructors, whose primary responsibility is dissemination of manuals, handbooks, training materials, and instructional training services to firefighting instructors, was not actively in communication with the Federal agency most involved in the transportation of hazardous materials and the safety of the public. It appeared from their testimony that they had never heard of the MTB. The Fire Service Instructors represent an organization where postaccident documentation and feedback could be translated to other safety personnel, such as the Nation's 2 million firefighters.

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11/ National Transportation Safety Board Recommendations I-76-9, and I-76-10, issued October 20, 1976.

12/ Testimony of Mr. Martin E. Grimes, National Fire Protection Association, presented at NTSB hearing, April 6, 1978.

13/ Testimony of Mr. Louis J. Ambilli, International Association of Fire Service Instructors, before the NTSB hearing, April 6, 1978.

Longer Term Corrections

Establish priorities for track upgrading hazardous materials routing system.--The Safety Board advocates a designated national rail hazardous materials routing system, similar to the concept for highway routing restriction around densely populated areas. A comparable system could be designated for rail movement of hazardous materials over designated track, with the least population exposure; the designated track would receive increased maintenance expenditures. The Safety Board believes that the railroads, in concert with the AAR, could devise a national hazardous materials routing system. Testimony at the hearing indicated that the number of derailments caused by inadequate track in hazardous materials routes could decrease as a result of adequate maintenance funding.

For example, the Consolidated Rail Corporation (Conrail) reduced all derailments 46 percent for the 9-month period, April through December 1977, as compared to the like period in 1976. Derailments caused by deficient track totaled 155 for the 1976 period and fell to 101 for the 1977 period, providing an overall reduction of 35 percent. The main reason for Conrail's success in this area has been Federal monetary support for Conrail's track rehabilitation program. Primary criteria for Conrail's rehabilitation program are established on safety (hazardous materials volume), tonnage, traffic density, rate of projected return on investment, and other factors.

The Safety Board is aware of Congressional concern for documenting the safety systems and programs implemented by railroads to attack specific accident causes. Recent Congressional legislation introduced March 13, 1978, (HR. 11491), entitled, the "Railroad Safety Incentive Act of 1978," is aimed in that direction. This bill would require each railroad to provide to DOT a system safety plan that would address accident causes and develop programs to reduce the accident causes. Likewise, the public, as a result of recent derailments with catastrophic hazardous materials releases, is demanding more effective Federal actions to address the safety concerns.

The Safety Board firmly believes that the policymakers within the Administration, the Congress, the Department of Transportation and industry must clearly address a basic and crucial issue--to what level must the national railroad network deteriorate before action will be taken to achieve a national rail network with track upgrading priorities including minimization of risk to the American public from hazardous materials.

Analyze train operations and critical components.--Several witnesses at the hearing referenced the need to answer questions about train operations and critical components in hazardous materials transport.

One major concern is the axle load contribution to rail deterioration. Many of the public witnesses who testified before the Safety Board expressed concern that the maintenance levels attained by some railroads in today's transportation environment were inadequate. There was a general consensus that axle loads of 100-ton cars coupled with trains containing 150 to 250 cars were doing considerable damage to the rail network. In view of the national deferred maintenance condition that the railroads report themselves, some merit must be given to this concern. The Safety Board believes that additional research should be expeditiously completed in this area. This research could address adequate maintenance levels for tonnage or axle loadings utilized by the carriers over differing track segments.

Second, the length of trains causes concern over the braking applications. This problem may be compounded by the composition of the brakeshoes--iron vs. composition--utilized in the train consist. According to testimony, the industry has requested the AAR to research this problem in conjunction with all wheel and brake shoe manufacturers. The Safety Board urges the FRA to review its research priorities to insure that the iron vs. composition shoe braking problem is adequately addressed by research and regulations.

The Union Pacific Railroad indicated in its testimony that because of its concern over the iron vs. composition brakeshoe controversy, it has implemented a complete program to eliminate broken wheel problems and has instituted braking procedures for its trains in order to minimize dangers.

The Safety Board believes that the actions by Union Pacific illustrate the industry's ability to individually analyze and correct critical components that may fail in train operations. However, the communication of efforts from one carrier to another needs to be reviewed critically by the FRA. The FRA needs to apprise the AAR of all possible critical components that may substantively affect the safety of train operations and pose a risk to the general public if allowed to stay in service. The Safety Board urges the AAR and the FRA to open expanded communication channels for translating potential safety problem areas to regulatory initiatives.

In conclusion, the Safety Board believes that the recommendations issued in the Soundview, Connecticut, railroad accident, issued December 22, 1971, need to be reiterated and expeditiously acted upon. As a result of that accident, the Safety Board recommended that the Federal Railroad Administration:

> "To the extent that data is available, promulgate regulations to insure the retirement of critical car components before normal service failure.

"Where data regarding useful safe life of critical car components is not available, initiate programs to determine the data required to promulgate regulations in those areas.

"Promulgate regulations to prevent misapplication of critical components."

The labor unions represented by the Railway Executives' Labor Association urged that the industry reduce its train length to a maximum of 75 cars. They referenced research completed at the Massachusetts Institute of Technology and an FRA report as sources. The Safety Board believes that the FRA could satisfactorily address this issue and produce derailment data to conclude the validity of and severity of the train length factor as it applies to train operations.

A third concern voiced at the hearing was the dispersion of hazardous materials cars in the train consist. Currently, there are regulations that generally require the tank cars to be placed no closer than six cars from the front and the rear of the train. This protects the train crews and engine crews; however, the Safety Board believes that research should be conducted to determine the safest positioning of loaded hazardous materials tank cars in a train which will minimize damages, and that the industry should be advised of that determination.

Additionally, one public witness indicated that the industry needed closer monitoring to insure compliance with the existing regulations regarding car positioning. A recent accident investigated by the Safety Board at Goldonna, Louisiana, supports this contention. 14/

Encourage State Participation in Inspection Programs.--There was considerable public testimony and followup correspondence from 11 States indicating major concern over the inadequate utilization of the State Participation Program required by Section 206 of the Federal Railroad Safety Act of 1970. Several witnesses testified that the FRA did not have adequate staff to monitor the rail systems within their respective States. For example, until this year Arkansas had Federal inspectors visit the State only once a year. The States, in general, and the National Association of Regulatory Utilities Commissioners (NARUC), in specific, do not understand the FRA's position in its design of the State Participation Program.

The current State Participation Program for rail is funded at a 50-percent State/50-percent Federal partnership. A comparable program in the DOT, the Pipeline State Participation Program, is also funded on

14/ Railroad/Highway Accident Report: Collision of a Louisiana & Arkansas Railway Freight Train and a L.V. Rhymes Tractor-semitrailer at Goldonna, Louisiana, December 28, 1977. (NTSB-RHR-78-1)

a 50/50 share agreement. The major difference in the two programs is that the pipeline program monitors the effectiveness of the State programs in enforcing Federal regulations, and personnel decisions are left to the States. According to testimony at the hearing, the rail program sets artificial personnel qualification levels before State certification (6 years of experience or 2 1/2 years of extensive training). Additionally, the States are limited to only two areas of activity--Federal track and equipment standards. These employee standards have limited the number of States involved in the total program. Pipeline has nearly 100 percent State participation (49 States); the railroad program has only 23 States participating, of which 4 are certified for track inspection with a full complement of State inspectors. Six States are fully certified in equipment with a full complement. A total of 57 State inspectors and trainees in both the Federal track and equipment inspections are currently on board.

The Safety Board is not in a position to question the FRA's rationale for managing this program. However, the impact of the States in affecting rail safety in the areas of derailments and the carriage of hazardous materials would greatly increase the regulatory coverage if they were allowed to participate with less Federal restriction. The Safety Board, in its analysis, does not interpret the Railroad Safety Act of 1970 from precluding State activity in other Federally regulated safety areas. Indeed, the Safety Board believes that the serious nature of the derailment and release of hazardous materials is of itself adequate rationale for the FRA to review its current State Participation Program in an effort to allow greater State participation in all areas of rail safety laws and regulations. Additionally, the use of 50/50 matching funds appears to be a better utilization of scarce Federal dollars to accomplish increased monitoring of the rail network.

The Safety Board believes, as a result of its hearing, that the States should be judged on their performance in accomplishing desired Federal safety goals and objectives. Restricting the States' entry into the Federal program because of qualifications standards or limited jurisdictional questions should be readdressed by the FRA. In the long term, increased State participation will augment the Federal monitoring effort, reverse the derailment trend, and minimize the effects of catastrophic hazardous materials releases.

Upgrade Federal track safety standards.--The testimony at the hearing documented that the Federal Track Safety Standards are minimum levels and that the industry as a whole utilizes higher standards; several witnesses testified that their company's own track standards far exceed Federal requirements. The standards issued were characterized as minimum levels and not generally acceptable railroad maintenance levels. However, testimony at the hearing also indicated that some carriers do use FRA standards as a criteria to accomplish their track maintenance and do not attempt to maintain track at higher levels.

In one case, as a result of a serious derailment (one of several in the same city), the carrier improved its track to FRA Class 5 standards, but because of the risk of further dangerous derailments, this carrier opted to run trains through the city at 10 mph and at speeds up to 40 mph outside the yard limits. The Safety Board believes that FRA track standards should be reviewed in light of varying operating conditions and that the use of performance standards based on accident histories, risks to the public, and other such criteria should be considered.

A witness from the American Railway Engineering Association indicated that his organization has been working with the FRA to develop a set of performance standards for track safety which would permit each railroad to meet established criteria (as yet not defined) to accomplish safe track based on the unique situations on differing railroad properties. To date this effort has not culminated in specific recommendations for improving the standards; however, it is an attempt to characterize track and set performance levels for differing track operations.

With regard to current FRA Track Standards, the Safety Board has addressed several recommendations for action. These recommendations should be expeditiously reviewed and acted upon by the FRA.

> On June 30, 1976, as a result of a derailment, the Safety Board stated that:
>
> > "FRA track standards are inadequate and the requirements for each track class should be tested to determine if all types of trains can meet the maximum allowable speed for each class." (R-77-8.)
>
> On July 5, 1974, as a result of a derailment, the Safety Board recommended that:
>
> > "FRA study the factors that affect rail failures and criteria that will promote effective rail inspection procedures and recommendations." (R-75-1.)
>
> On November 26, 1976, as a result of a derailment, the Safety Board recommended that:
>
> > "FRA revise its rail inspection regulations to ensure discovery of internal defects in all tracks, Classes 3 to 6, inclusive, before those defects develop into failures." (R-77-29.)

The Federal Track Standards were issued on October 20, 1971. There have been neither major revisions by the FRA in the last 5 years nor a determination as to whether or not the standards are fulfilling their intent to promote railroad safety. The Safety Board believes a review is necessary under the President's regulatory reform program based on the inability of current track safety standards to reverse the derailment trend.

## CONCLUSIONS

1. DOT 112A/114A tank cars which transport flammable gases and anhydrous ammonia were designed by the tank car and railroad industries in order to maximize economies on the railroad transportation system. No specific safety methodology to determine unreasonable risk to the public was employed.

2. No adequate safety methodology has been developed by Federal regulatory agencies in order to determine risks for the transportation of hazardous materials by rail as a basis for regulation.

3. When the DOT 112A/114A tank cars were accepted on special permit, the safety features of thermal insulation and a center sill were eliminated and the capacity of DOT 112A/114A tank cars was increased from 11,000 gallons to 33,000 gallons. There was no analysis or full-scale testing of the consequences of crashes before these designs and equipment were placed into service.

4. The accident history of the DOT 112A/114A tank cars has demonstrated safety shortcomings in their design, and increased losses to the public. The Safety Board has recommended safety changes to DOT 112A/114A tank cars since the accident in Laurel, Mississippi, in 1969. The Board concludes that the acceptance of the 112A/114A cars on special permits introduced an unreasonable risk to the public because safety assessments made at that time were inadequate.

5. DOT issued new regulations for DOT 112A/114A tank cars addressing a more complete line of safety corrections; shelf couplers, head shields, and thermal protection were to be installed at various dates, the last of which was December 31, 1981. The installation deadlines for these safety corrections were later than demanded by the accident and continuing risks.

6. The cost of correcting current 112A and 114A tank cars by headshields, shelf-type couplers, and added thermal insulation will fall most directly upon hazardous materials shippers and tank car investors. While these costs may later be spread to the general public, it is proper that these corrections be made as quickly as possible because the costs of retrofit are far exceeded by past savings to shippers and tank car investors through the efficiency of shipping in larger tank cars. The cost of retrofit is a cost which should have been borne in the original design of the 112A and 114A tank cars.

7. DOT's revised implementation schedule for DOT 112A/114A tank cars calls for installing shelf couplers by December 31, 1978, and head shields and thermal protection by various dates, the last of which is December 31, 1980. The installation dates are still later than technically feasible for head shields.

8. DOT has a limited ability to insure that tank car owners comply as scheduled and the revised safety regulations are neither strengthened by strong economic incentives for accelerated implementation nor economic disincentives for delay.

9. DOT 112A/114A tank cars still pose serious threats to local and State emergency response personnel when hazardous materials are released during a train derailment.

10. Current methods of alerting emergency response personnel to the presence of hazardous materials at the scene of railroad accidents often are unreliable, untimely, and rely upon unstructured individual actions to provide information in time to influence early response decisions.

11. Emergency response personnel need a reliable procedure to notify them of the presence of hazardous materials at the scene of a train accident so that emergency responses meet the critical needs of the first few minutes.

12. No adequate procedure exists for linking remote hazardous materials emergency diagnostic experts to on-scene emergency response personnel. Linking hazardous materials experts to assist emergency response personnel would be more responsive to immediate decisionmaking needs than existing procedures based on manuals, training, or computer readouts.

13. Effective channels need to be established for communication of postaccident safety lessons learned in hazardous materials railroad transportation accidents to all emergency response personnel.

14. A full hazardous materials emergency response system documenting emergency response alternatives, information needs of emergency personnel at risk, and coordination of all Federal efforts in railroad emergencies is not operational.

15. The MTB does not have needed regulations covering all environmental hazardous materials substances.

16. Train derailments and hazardous materials accident/incidents have increased over the past 10 years and firm actions to reverse these trends are required.

17. Track upgrading priorities do not include hazardous materials exposure to large urban populations as a major determinant for track maintenance.

18. FRA track safety standards are minimum standards and some solvent carriers maintain track to higher maintenance levels; however, most marginal carriers have reduced their maintenance levels to that of the FRA standards.

19. A considerable amount of research is required in track-train dynamics to determine the adequacy of the FRA track safety standards effectiveness and to reverse derailment trends.

20. DOT's accident/incident data collection programs for train derailments and hazardous materials provide a limited capability for accident prevention research and countermeasure development.

21. The Federal State Participation program is attempting to utilize States' resources, in track and railroad equipment safety; however, in most states insufficient money, training, and lack of Federal initiatives to strengthen the program jeopardize its success.

## RECOMMENDATIONS

As a result of its public hearing, the National Transportation Safety Board issued the following recommendations on April 24, 1978:

--to the Secretary of Transportation:

"Require that shelf couplers be installed on all DOT 112A/114A jumbo tank cars no later than December 25, 1978. (Class I, Urgent Action) (R-78-19)

"Require that approved head shields be installed on all DOT 112A/114A tank cars by December 25, 1978. (Class I, Urgent Action) (R-78-20)

"Require that thermal insulation be installed as soon as possible, but in no event later than the original deadline of January 1, 1982, contained in the Materials Transportation Bureau's Docket HM-144. (Class II, Priority Action) (R-78-21)

"Assist the responsible Federal regulatory agencies to develop economic regulations that provide a strong economic incentive to install tank car safeguards quickly and a strong economic disincentive for delay. (Class I, Urgent Action) (R-78-22)"

As a result of this analysis of the public hearing testimony and other data, the National Transportation Safety Board made these additional recommendations:

--to the Association of American Railroads:

"Restructure the membership and procedures of the AAR Committee on Tank Cars to eliminate conflicts of interest between shippers and the railroad industry in safety decisions. (Class I, Urgent Action) (R-78-28)

"Review and adopt all safety analysis methods that will strengthen the safety approval procedures within AAR Committees acting on hazardous materials tank car design and modification questions. (Class I, Urgent Action) (R-78-29)

"Implement emergency procedures for approval of facilities and locations for installation of shelf couplers and head shields on DOT 112A/114A tank cars. (Class I, Urgent Action) (R-78-30)

"Develop and document a system to notify FRA of critical car components that exhibit critical failures annually and recommend regulatory action as required." (Class II, Priority Action) (R-78-31)

--to the Task Force on Rail Transportation of Hazardous Materials:

"Develop, for use by the Association of American Railroads, tank car builders, and shippers. procedures and methods that will assure that the best available safety analysis technology is applied to determine and control risks involved in tank car transportation of hazardous materials." (Class II, Priority Action) (I-78-8)

--to the Secretary of Transportation:

"Develop and implement a safety plan for utilizing the best available safety analysis technology to determine regulatory actions needed to adequately control hazardous materials transportation risks. (Class II, Priority Action) (I-78-9)

"Supply the leadership required to establish an adequate nation-wide hazardous materials emergency response network able to meet all facets of hazardous materials emergency response needs, using existing State and private resources whenever possible. (Class II, Priority Action) (I-78-10)

"Encourage States to upgrade hazardous materials emergency handling capabilities, including State or regional one-call notification systems that will serve the needs of local public safety officials in significant hazardous materials transportation emergencies, and support development of guidelines by which States can evaluate their programs. (Class II, Priority Action) (I-78-11)

"Incorporate requirements imposed on shippers and carriers by Environmental Protection Agency Hazardous Materials regulations in 49 CFR 100-179, to assure that these regulations are complete and do not contain contradictions or gaps. (Class II, Priority Action) (I-78-12)

"Review and develop necessary regulations or funding mechanisms for a hazardous materials track improvement priority system to insure adequate protection of the public in urban corridors against accident risks. (Class III, Longer Term Action) (R-78-32)

"Provide sufficient funding for research that will assess the safety effects of heavier cars and trains on present track facilities, and safest positioning of hazardous materials tank cars and others in train consists, and issue regulations resulting from the findings of this research." (Class III, Longer Term Action) (R-78-33)

--to the Administrator of the Environmental Protection Agency:

"Assist the U.S. Department of Transportation in insuring that hazardous materials regulations issued by DOT are in agreement with EPA's hazardous materials regulations." (Class II, Priority Action) (I-78-13)

--to the Administrator of the Federal Railroad Administration:

"Publish an annual program management report that provides FRA's plans and programs to eliminate major accident causal factors. (Class II, Priority Action) (R-78-34)

"Identify critical car components failure rates and assure that they are properly addressed either by regulation or emergency order as required and expand communication channels with the Association of American Railroads to facilitate this program. (Class II, Priority Action) (R-78-35)

"Evaluate and revise the State Participation Program to allow greater State flexibility; base evaluation of the program on the States' ability to adequately monitor railroad and hazardous materials safety." (Class II, Priority Action) (R-78-36)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B KING
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ PHILIP A. HOGUE
Member

/s/ ELWOOD T. DRIVER
Member

June 23, 1978

APPENDIX A

WITNESSES BEFORE THE
NATIONAL TRANSPORTATION SAFETY BOARD'S
PUBLIC HEARING ON
DERAILMENTS AND HAZARDOUS MATERIALS
APRIL 4-6, 1978

1. Ms. Linda Stevens, CutBank, Montana
2. Ms. Cameron Smith, Pensacola, Florida
3. Mr. Berger E. Howard, Dalton, Alabama
4. Mr. George E. Tate, Waverly, Tennessee
5. Ms. Edna Dawkins, Laurel, Mississippi
6. Mr. Prime C. Osborn, President, The Family Lines
7. Mr. Richard N. Little, Vice President of Washington Affairs, The Union Pacific Railroad
8. Mr. Jack Kruizenga, President, Union Tank Car Company of the Trans Union Corporation
9. Mr. George B. Falconer, Chairman of the Committee on Industrial Traffic, American Petroleum Institute
10. Mr. Leon D. Santman, Acting Director of the Materials Transportation Bureau, U.S. Department of Transportation
11. Mr. Raymond K. James; Chief Counsel and Acting Associate Administrator for Safety, Federal Railroad Administration, U.S. Department of Transportation
12. Honorable Jimmy Powers, Mayor of Waverly, Tennessee
13. Honorable William Patrick, Mayor of Laurel, Mississippi
14. Honorable Shirley Murphy, Mayor of Belt, Montana
15. Mr. James Heisler, Director of Bay County Civil Defense, Youngstown, Florida
16. Mr. Billy B. Bussell, Jr., Division of Hazardous Materials, State Fire Marshall's Office of Kentucky

17. Mr. Joseph Mooney, Administrator of Escambia County, Florida

18. Mr. Robert J. Brooks, Director with the Office of Proceedings, Interstate Commerce Commission

19. Mr. Paul Reistrup, President, National Railroad Passenger Corporation (AMTRAK).

20. Mr. John Carlson, Consultant, Stoneridge, New York

21. Mr. William H. Dempsey, President, Association of American Railroads Accompanied by Mr. W.J. Harris, Mr. F.A. Danahy, and Mr. J.B. Martin

22. Mr. William S. Autrey, American Railway Engineering Association, the Association of American Railroads and the Atchinson, Topeka and Santa Fe Railroad

23. Mr. William Harris, Vice-President of Research and Testing, Association of American Railroads

24. Mr. R.K. Pullem, President of the Roadmasters and Maintenance of Way Association of America, the Chessie System

25. Mr. Jim R. Snyder, National Legislative Director, United Transportation Union and Chairman of the Safety Committee, Railway Labor Executives' Association. Accompanied by Mr. Marshall Sage, Research Director (UTU); Mr. Tom Bates, President of the Brotherhood of Railway Signalmen; Mr. Ed M. McCullough, National Legislative Representative and Vice President of the Brotherhood of Locomotive Engineers; Mr. J.R. McGlaughlin, National Legislative Representative and Vice President of the Brotherhood of Maintenance of Way Employees; Mr. W.E. Crawford, General Vice President of the Brotherhood of Railway Carmen in the United States and Canada; and Mr. Larry Mann, Counsel of the Railway Labor Executive Association.

26. Mr. Tom Bates, President, Brotherhood of Railway Signalmen

27. Mr. W.D. Crawford, General Vice President, Brotherhood of Railway Carmen in the United States and Canada

28. Mr. J.R. McGlaughlin, National Legislative Representative and Vice President, Brotherhood of Maintenance of Way Employees

29. Mr. Ed L. McCullough, National Legislative Representative and Vice President, Brotherhood of Locomotive Engineers

30. Mr. Lawrence Mann, Counsel, Railway Labor Executives' Association

31. Mr. Richard D. Spence, President, Consolidated Rail Corporation (Conrail)

32. Mr. Michael Johnson, National Association of Regulatory Utility Commissioners. Accompanied by Mr. John Ritchie, Missouri Public Service Commission; Mr. Paul Rogers, General Counsel of NARUC; Mr. Charles Schneider, Asst. General Counsel of NARUC; Mr. Ray Peteritis, Rail Division of the Pennsylvania Public Utilities Commission; and Mr. James Connors, Director of Intergovernmental Affairs, Pennsylvania Public Utilities Commission.

33. Mr. George Christiansen, Chairman of the Board, Racine Radio Products, representing the Railway Progress Institute.

34. Dr. C. High Thompson, Manager of the Office of Hazardous Materials Research, Battelle Memorial Institute.

35. Mr. Robert M. Graziano, Director of the Bureau of Explosives, Association of American Railroads. Accompanied by Mr. John R. Ramsey, General Manager, Southern Pacific Transportation Company.

36. Mr. Frank J. Heller, Chairman of the Tank Car Committee, Association of American Railroads, representing the Compressed Gas Association.

37. Mr. John R. Kukucka, Vice Chairman of Engineering and Regulatory Services, Suburban Propane Gas Corporation representing National LP Gas Association. Accompanied by Mr. Walter Johnson, Vice President of Technological Services, National LP Gas Association.

38. Mr. Donald Flinn, General Manager, International Association of Fire Chiefs. Accompanied by Chief Lloyd Fleming, Pensacola, Florida and Mr. Terry Hayes, Commissioner of Public Safety, Shreveport, Louisiana.

39. Mr. Albert C. Clark, Vice President and Technical Director, Manufacturing Chemists Association. Accompanied by Mr. C.R. Bigelow, Division Manager, Du Pont and Mr. Charles R. Hutchinrighter, Manager, Dow Chemical Company.

40. Mr. Martin Grimes, Assistent Vice President for Governmental Affairs, National Fire Protection Association (NFPA). Accompanied by Mr. James Lathrop, Investigator (NFPA); Mr. William Walls, Field Service Engineer (NFPA); and Mr. Joseph Redden, Director of Public Protection (NFPA).

41. Honorable Bill Clinton, Attorney General for the State of Arkansas.

42. Mr. Edward Waage, Hazardous Materials Planner, Illinois Emergency Services and Disaster Agency.

43. Mr. Eugene Mooney, Secretary of the Kentucky Department for National Resources and Environmental Protection.

44. Mr. Louis J. Amabili, President, International Society of Fire Service Instructors.

45. Mr. Rolf Mowatt-Larssen, Chief of Office Standards and Procedures, Federal Railroad Administration. Accompanied by Mr. Bill Black, Chief, Hazardous Materials Division; and Mr. Leon Santman, Acting Administrator, Materials Transportation Division.

46. Mr. Paul D. Deughdrill, Concerned Citzen, Lexington, Mississippi.

47. Mr. Richard Culp, Conductor and Inventor, Southern Pacific Railroad.

48. Ms. Isabel Burgess, Consultant representing Explosafe Company.

49. Mr. John Strock, Private Citizen, Glenside, Pennsylvania.

APPENDIX B

# NATIONAL TRANSPORTATION SAFETY BOARD
## WASHINGTON, D.C.

ISSUED: April 24, 1978

Forwarded to:

Honorable Brock Adams
Secretary
Department of Transportation
400 Seventh Street, S.W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

R-78-19 through 22

The National Transportation Safety Board concluded on April 6, 1978, a 3-day en banc hearing on railroad derailments and the carriage of hazardous materials. The hearing was prompted by the increasing number of derailments nationwide, especially those involving the release of hazardous materials from DOT 112A/114A "jumbo" tank cars. Forty-eight witnesses from the railroad industry, tank car builders and operators, shippers, other Federal agencies, and the public testified at the hearing.

Evidence developed at the hearing indicated a consensus on the two questions of whether the cars should be made safe, and what safeguards are needed.

There is no question that jumbo tank cars need to be made safer. The jumbo tank cars were designed and certified by an interlocking group of business interests who manufacture, buy, sell, and use tank cars. However, witnesses from the Federal Railroad Administration, shippers, and tank car companies testified that the design of the jumbo tank cars did not represent a safety increase commensurate with their 200-percent increase in product capacity over that of older tank cars.

There also appears to be no question concerning what safeguards are needed for these jumbo cars. All parties to the hearing generally agreed that the combination of headshields and shelf couplers is the most important single step that can be taken at this moment to reduce the danger from hazardous materials. In 1965 industry recognized the need for safer tank cars by forming a research committee. In 1971, the committee recommended headshields; in 1972, it recommended shelf couplers. In 1974, the DOT published regulations requiring headshields by December 1977. Practically none were installed under that regulation; however in 1975, after more research, the DOT, the Association of American Railroads, and the Railway Progress Institute jointly agreed that a combination of headshields and shelf couplers provided the best protection. Today we have a headshield and shelf coupler regulation, but are facing a 4-year delay of its complete implementation.

The only question still unanswered after the hearing is: When will these cars be made safer? Here there has not been a consensus. The Safety Board said before the hearing that headshields and shelf couplers should be installed according to a timetable that reflects a sense of urgency. The evidence developed during the hearing has confirmed the correctness of this statement.

The early installation of these safeguards is technically possible. The Safety Board demonstrated that a shelf coupler can be installed in 7 1/2 minutes while a headshield can be installed in 93 minutes. Testimony revealed that there are more than 100 private repair shops, in addition to the railroad shops, where the safeguards can be installed, and that labor was ready and able to do the work.

Testimony indicated that early installation of these safeguards is also financially feasible. One of the most important facts developed was that 98 percent of tank cars are owned not by the financially hard-pressed railroads, but by large corporations and wealthy individuals who have purchased the cars for investment and tax advantages. The $2,000 per car that is required to make the cars safe now is well within these investors' financial capabilities -- the 11 largest tank car operators had more than $50 billion in revenues last year. The total cost of headshields and shelf couplers for the 20,000 jumbo tank cars now in service, if amortized over 20 years, equates to $9 per car per month.

If head shields and shelf couplers are not installed, the risks of future catastrophes will continue to be borne by the people who live and work near the railroad. The Safety Board believes the time has come for the industry to assume the costs of the products they manufacture, sell and ship.

Evidence at the hearing indicated that because tank car owners do not now bear the costs of accidents, they have no incentive to make their cars safe. The Safety Board believes that the Department of Transportation, in cooperation with the responsible regulatory agencies, should work to devise strategies to make safety profitable.

Therefore, the National Transportation Safety Board recommends that the Department of Transportation:

> Require that shelf couplers be installed on all DOT 112A/114A jumbo tank cars no later than December 25, 1978. (Class I, Urgent Action) (R-78-19).

Require that approved headshields be installed on all DOT 112A/114A tank cars by December 25, 1978. (Class I, Urgent Action)(R-78-20).

Require that thermal insulation be installed as soon as possible, but in no event later than the original deadline of January 1, 1982, contained in the Materials Transportation Bureau's Docket HM-144. (Class II, Priority Action) (R-78-21).

Assist the responsible Federal regulatory agencies to develop economic regulations that provide a strong economic incentive to install tank car safeguards quickly and a strong economic disincentive for delay. (Class I, Urgent Action)(R-78-22).

KING, Chairman, McADAMS, HOGUE, and DRIVER, Members, concurred in the above recommendations.

By: James B. King
Chairman

tions 83.50 and 83.70, as shown in the attached Appendix.

4. The proposed amendments to the rules as set forth in the Appendix are issued pursuant to the authority contained in sections 4(i) and 303(r) of the Communications Act of 1934, as amended.

5. Pursuant to applicable procedures set forth in section 1.415 of the Commission's rules, interested persons may file comments on or before June 12, 1978, and reply comments on or before June 22, 1978. All relevant and timely comments and reply comments will be considered by the Commission before final action is taken in this proceeding. In reaching its decision in this proceeding, the Commission may also take into account other relevant information before it, in addition to the specific comments invited by this Notice.

6. In accordance with the provisions of Section 1.419 of the Commission's rules, an original and 5 copies of all statements, briefs or comments filed shall be furnished to the Commission. Responses will be available for public inspection during regular business hours in the Commission's Public Reference Room at its Headquarters in Washington, D.C.

FEDERAL COMMUNICATIONS COMMISSION,
WILLIAM J. TRICARICO,
*Secretary.*

Part 83 of Chapter I of Title 47 of the Code of Federal Regulations is amended as follows:

§ 83.50 [Deleted]

1. Section 83.50 is deleted and designated as [Reserved].

§ 83.70 [Deleted]

2. Section 83.70 is deleted and designated as [Reserved].

[FR Doc. 78-12855 Filed 5-10-78; 8:45 am]

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[4910-60]

## DEPARTMENT OF TRANSPORTATION

**Materials Transportation Bureau**

**Office of Hazardous Materials Operations**

[Docket No. HM-144; Notice No. 78-5]

**[49 CFR Parts 173 and 179]**

## SHIPPERS: SPECIFICATION FOR PRESSURE TANK CAR TANKS

**AGENCY:** Materials Transportation Bureau, Transportation.

**ACTION:** Notice of proposed rulemaking.

**SUMMARY:** As a result of a series of recent serious railroad accidents involving certain uninsulated pressure tank cars transporting hazardous materials, it is proposed to shorten the period of time for the retrofit program specified in this Docket under Amendments numbered 173-108 and 179-19 as follows:

1. Existing specification 112 and 114 tank cars used to transport flammable gases such as propane, vinyl chloride and butane, whose owners have elected to retrofit with jacketed insulation and integral tank head protection (known as the "J" retrofit), would have to be retrofitted over a 3-year period ending on December 31, 1980 (existing deadline: December 31, 1981).

2. Existing specification 112 and 114 tank cars used to transport flammable gases such as propane, vinyl chloride and butane, whose owners have elected to retrofit with a nonjacketed thermal protection system and tank head protection (known as the "T" retrofit) would have to be retrofitted with tank head protection over a 2-year period ending December 31, 1979 (existing deadline: December 31, 1981), and with the nonjacketed thermal protection system over a 3-year period ending on December 31, 1980 (existing deadline: December 31, 1981).

3. Existing specification 112 and 114 tank cars used to transport anhydrous ammonia would be required to be retrofitted with tank head protection over a 2-year period ending on December 31, 1979 (Existing deadline: December 31, 1981).

4. Existing specification 112 and 114 tank cars, regardless of the hazardous lading being transported, would have to be retrofitted with special couplers designed to resist coupler vertical disengagements over a time period ending on December 31, 1978 (existing deadline: June 30, 1979).

**ADDRESS:** All written comments received in this proceeding are available for examination during regular business hours in room 6500, Transpoint Building, 2100 Second Street SW., Washington, D.C.

**DATE:** Comments by June 26, 1978.

**ADDRESS COMMENTS TO:** Dockets Section, Office of Hazardous Materials Operations, Department of Transportation, Washington, D.C. 20590. It is requested that five copies be submitted.

**FOR FURTHER INFORMATION CONTACT:**

William F. Black, Office of Safety, Federal Railroad Administration, 202-426-2748.

**SUPPLEMENTARY INFORMATION:** This Notice is the result of the joint efforts of the Federal Railroad Administration (FRA) and the Materials Transportation Bureau (the Bureau). In accordance with internal DOT procedures, the FRA has developed the substantive proposals of this Notice for review and issuance by the Bureau. Accordingly, further information concerning substantive provisions of this Notice may be obtained from the above contact.

### BACKGROUND INFORMATION

#### EMERGING NEED FOR EXPEDITED RETROFIT

On September 15, 1977, the Bureau published in the FEDERAL REGISTER (42 FR 46306) a final rule concerning specifications for tank cars which included the following timetable:

1. Existing specification 112 and 114 tank cars used to transport flammable gases were to be retrofitted with thermal and tank head protection (such as a "head shield") over a 4-year period ending on December 31, 1981.

2. Existing specification 112 and 114 tank cars used to transport anhydrous ammonia were to be retrofitted with tank head protection (such as a head shield) over a 4-year period ending on December 31, 1981.

3. All specification 112 and 114 tank cars were to be equipped with special couplers designed to resist coupler vertical disengagements. These couplers were to be retrofitted on all cars by July 1, 1979.

The recent major accidents at Pensacola, Fla., on November 9, 1977, at Waverly, Tenn., on February 22, 1978, and at Lewisville, Ark., on March 29, 1978, in combination with an incident of apparent vandalism near Youngstown, Fla., on February 26, 1978, have again focused attention on measures to improve the safety of rail transportation of hazardous materials. In the decade prior to the issuance of these new tank car safety requirements, under Amendments 173-108 and 179-19, 20 persons were killed because of accidental lading release from specification 112 and 114 tank cars. However, in the 6 months following the issuance of the rule, 17 additional persons have been killed.

While it is not possible to prevent the release of dangerous products in all situations, the severity and variety of circumstances relating to the occurrence of recent accidents have pointed out the need to take all feasible steps to protect the public against potential major disasters involving the transportation of flammable gases, anhydrous ammonia, and other hazardous materials. In particular, attention has been directed toward the possibility of accelerating the retrofit timetable for 112 and 114 tank cars.

On March 15, 1978, the Transportation and Commerce Subcommittee of the House Committee on Interstate and Foreign Commerce conducted hearings on railroad safety matters which had come to national attention as a result of the incidents which had occurred at Pensacola, Waverly, and Youngstown. At this hearing, the National Transportation Safety Board (NTSB) stated that it believed that

with a strong sustained effort the special couplers and head shields could be installed on all 112 and 114 tank cars by late in December 1978.

On March 20, 1978, a second hearing was conducted jointly by the Subcommittee on Federal Spending Practices and Open Government and the Subcommittee on Civil Service and General Services of the Senate Committee on Governmental Affairs. At this hearing the NTSB reiterated its position regarding the acceleration of the retrofit schedule. After reviewing the testimony, the subcommittees requested that the FRA consider revising the retrofit schedule.

Further, on April 4-6, 1978, the National Transportation Safety Board conducted a special hearing in which a major focus was the timetable for the retrofit installation of the 112 and 114 tank car safeguards. At the conclusion of that hearing, its Chairman stated that the NTSB had determined that shelf couplers and tank head protective shields should and could be installed on all 112 and 114 tank cars by the end of 1978.

On April 7, 1978, the FRA conducted a special safety inquiry into the retrofit timetable for 112 and 114 uninsulated pressure tank cars. The purpose of this special inquiry was to obtain sufficient information to enable the FRA to determine whether the existing tank car retrofit schedule could be accelerated. The FRA received pertinent manufacturing, maintenance and cost data pertaining to this retrofit program from persons representing the National Transportation Safety Board, railroad carriers, tank car shippers, tank car owners, tank car builders, and coupler manufacturers.

Data submitted in the FRA special safety inquiry, together with other information available to the Department of Transportation, have made it possible to describe more accurately the problems associated with the retrofit process and to fashion a revised retrofit schedule which will improve the safety of specification 112 and 114 tank cars as quickly as possible without creating major economic disruptions. The balance of this Notice will describe the affected tank car pool and retrofit plans which have been made with respect to these cars, summarize the major obstacles to acceleration of the retrofit program, and outline the basic rationale underlying the proposed new schedule.

### NUMBER OF TANK CARS AND RETROFIT ELECTIONS

As a result of the special safety inquiry and other information received, the following summarizes the current 112 and 114 tank car pool.

The Universal Machine Language Equipment Register (UMLER), which is maintained by the Association of American Railroads, lists a total of 22,228 DOT and Canadian Transport Commission (CTC) specification 112 and 114 tank cars and 105 individual reporting marks covering these tank cars as of April 11, 1978. Included in this UMLER listing are United States, Canadian and Mexican owned tank cars and car owners (UMLER lists one Mexican owner with fifty tank cars).

Based upon UMLER information and information received from United States tank car owners, the number of DOT specification 112 and 114 tank cars currently does not exceed 20,400 and the number of United States owners is fewer than 100.

Data submitted to the FRA indicate that approximately 3,400 of these 112 and 114 tank cars will be dedicated to anhydrous ammonia service. These tank cars will require "head shields," but not thermal protection, and will be retrofitted to DOT specifications 112S and 114S. Approximately 700 of these tank cars have already been equipped with head shields.

Approximately 2,000 of these tank cars are used to transport vinyl chloride monomer, a flammable compressed gas, on essentially an exclusive basis. Because weight is a critical factor, it is expected that these tank cars will be retrofitted with systems having the least additional weight, e.g., a "spray-on" thermal protection with separate head shields. Consequently, these tank cars will be retrofit converted to DOT specifications 112T and 114T.

Owners of an additional 2,000 specification 112 and 114 tank cars used in flammable gas service such as for transporting propane appear to have elected to use the "spray-on" thermal protection and separate head shields, thereby retrofit converting to DOT specifications 112T and 114T.

Another group of approximately 500 of these 112 and 114 tank cars will be used exclusively in non-flammable gas and hazardous liquids services. These tank cars will require only a shelf coupler retrofit.

Owners of the remaining 112 and 114 tank cars (approximately 12,500) have elected or are expected to use a jacketed insulation with integral tank head protection and will be retrofit converting their cars to DOT specifications 112J and 114J.

### RELATIVE DIFFICULTY OF RETROFIT TASKS

As described above, specification 112 and 114 tank cars used in various services will be subject to the application of various retrofit "packages." All 112 and 114 cars are required to be equipped with shelf couplers, and that task is not integrally related to any other part of the process—either with regard to car availability or the mechanical steps involved. Therefore, both the existing retrofit program and the program proposed by this Notice treat the application of shelf couplers as a matter separate from the application of tank head protection and thermal protection.

The head protection and thermal protection tasks present a more complicated problem. The rationale of the existing schedule contemplated that these two elements of the retrofit would likely be accomplished in most cases as a single process so as to hold down costs and out-of-service time and minimize unfavorable impacts on the transportation of essential products.

In the case of the jacketed retrofit, which will evidently be used for the vast majority of cars requiring both protective devices, existing techniques of application will continue to mandate a unified retrofit process. However, the "spray-on" thermal protection method in combination with a "head shield," which is expected to be employed for roughly 4,000 cars, is capable of separation into two retrofit stages.

The NTSB and others have identified shelf couplers and head protection as those measures requiring most urgent attention. Shelf couplers, as discussed below, should not present a major problem based on recently developed information.

Representatives of the major tank car companies, in testimony before the FRA special safety inquiry, made statements supporting the conclusion that the complete retrofit program could probably be accomplished in a three-year period by utilizing extra shifts and withdrawing additional cars from service at any given time. However, these witnesses warned that a significant reduction of allowed time below three years could upset plans already established for the orderly accomplishment of the retrofit and could actually delay the final overall completion of the retrofit tasks.

The FRA and the Bureau have attempted to evaluate what reductions might be possible in the time allowed to complete the application of tank head protection. In doing so, it has been necessary to consider two factors as they apply to each of the retrofit packages ("S," "T," "J").

The first factor is car availability. That is, given a proposed regulatory deadline, how many cars would be removed from service at any given time? Can these cars be made available for retrofit in a orderly manner?

The second factor is capacity. That is, do the affected parties have reasonable access to the necessary plant, equipment, skilled labor and any other components necessary to do the job?

In addition to the two factors bearing on feasibility, the effect of various proposed deadlines on retrofit elections has been considered. Most particularly, the FRA and the Bureau

have given some weight to the superior protective qualities of the jacketed retrofit package. Any new regulatory deadlines which might require the immediate application of head protection would have the likely effect of discouraging the use of the jacketed retrofit, since the unitary process requires more shop time and can be accomplished at fewer facilities.

Thus, the proposed schedule outlined below emphasizes the completion of retrofit tasks which are more easily accomplished with less out-of-service time at a greater number of potential facilities. Although it is proposed to accelerate the timetable for the unitary jacketed retrofit, an effort has been made to leave undisturbed the elections which have already been made concerning the use of that approach.

### PROPOSED SCHEDULE

#### SHELF COUPLER APPLICATION

Based upon information gathered from coupler manufacturers, tank car owners and tank car shippers, it appears that shelf couplers can be applied to all 112 and 114 tank cars not later than December 31, 1978. An adequate supply of these couplers is or soon will be available, and application is not difficult. Such application can be performed at any location having a light duty crane. Railroad repair facilities ("rip tracks") on major tank car shipping routes are able to assist in applying these couplers. Accordingly, it is proposed to amend section 173.31(a)(5) to require retrofit installation of shelf couplers not later than December 31, 1978. Since the proposed accelerated coupler retrofit schedule would not result in additional "shopping," or significant "out-of-service" time, this change in schedule should not result in any appreciable change in retrofit cost.

#### NON-JACKETED THERMAL PROTECTION WITH SEPARATE TANK HEAD PROTECTION (SPECIFICATIONS 112T AND 114T)

As stated, it appears that approximately 4,000 specification 112 and 114 tank cars will be equipped with non-jacketed, "spray-on" thermal protection and separate tank head protection ("T" retrofit package). These cars when retrofitted will be specification 112T and 114T tank cars. Due to the urgency of placing tank head protection on these cars at the earliest possible time, it is proposed to amend section 179-105-3(d) to require that:

1. All tank head protection (head shields) be applied not later than December 31, 1979; and

2. Thermal, "spray-on" coating be applied not later than December 31, 1980.

Since this change in schedule could result in as many as 50 percent of these tank cars (e.g., the tank cars originally scheduled for retrofit in 1980 and 1981) having to be out-of-service twice (once for "head shield" application and once for thermal protection application) additional retrofit costs could occur. It was indicated at the FRA special safety inquiry that each such retrofit application could remove the car from service for up to 45 days. Since these non-retrofitted tank cars have an average monthly rental of $300, the overall maximum additional cost would be $900,000 (e.g., 2,000 tank cars×$300/mo.×1½ mo.). As noted below, 45 days is a relatively high estimate.

Although some participants in the FRA special safety inquiry suggested that "head shields" could be applied by not later than the end of 1978, the Bureau believes that such a drastic compression is not feasible.

Considerable concern exists among some parties as to the methods of retrofitting head shields to the tank cars. Several persons have questioned whether the "trapezoidal" head shield can be adequately attached to the tank car draft sill. Nine specification 112 tank cars were equipped with trapezoidal type head shields and fatigue tested at the Transportation Test Center at Pueblo, Colo. As of March 24, 1978, these head shields had been subjected to an average of 248 coupling impacts (ranging in speed from 4 to 10 miles per hour) and approximately 100,000 miles of over the road service. No fatigue problems were detected. Also, another type of head shield consisting of a half tank car head was installed on each end of one tank car. As of the same date, these two head shields were subjected to 248 coupling impacts and approximately 78,000 miles of over the road service. Again, no fatigue problems were detected. This testing indicates that no fatigue problems should occur when the head shield is attached to the tank car using proper welding techniques and a sound attachment design.

However, the welded attachment of all of these head shields to the tank cars was performed under controlled conditions. Most shield designers and manufacturers indicated that this welding operation was the critical factor and needed to be performed by highly skilled welders under controlled conditions in enclosed shops in order to avoid a risk of failure during train operations and consequent serious derailment. Since this retrofit application can result in a significant out-of-service period, the reduction in the supply of tank cars which would result from compressing this schedule to any greater degree could cause severe economic difficulty.

#### TANK-HEAD PROTECTION WITHOUT THERMAL PROTECTION (SPECIFICATIONS 112S AND 114S)

It appears that approximately 3,400 specification 112 and 114 tank cars will be dedicated to the transportation of anhydrous ammonia. These cars, which are required to be equipped with tank head protection ("head shields") ("S" retrofit package), will when retrofitted be specification 112S and 114S tank cars. Again, due to the urgency of placing tank head protection on these cars at the earliest possible time, it is proposed to amend section 179-105-3(d) to require that this tank head protection be applied not later than December 31, 1979.

It appears that such a change in schedule will not result in any appreciable increase in retrofit costs.

As was indicated in the discussion of the application of head shields to tank cars being retrofitted to the 112T and 114T specifications, suggestions have been made that head shield application be completed by the end of 1978. These tank cars are used exclusively to store and transport anhydrous ammonia. Due to the prolonged cold weather, most of these cars will not be available for retrofitting until early July and will be needed to store manufactured anhydrous ammonia beginning in early September. Any significant out-of-service disruption could result in a severe fertilizer shortage in the spring of 1979. For this reason, it appears that a second year (1979) will be required to perform this retrofit if significant disruption is to be avoided.

#### JACKETED INSULATION WITH INTEGRAL TANK HEAD PROTECTION (SPECIFICATIONS 112J AND 114J)

Of the roughly 20,400 specification 112 and 114 tank cars subject to the retrofit requirements of HM-144, approximately 12,500 are planned to be retrofitted with a jacketed insulation system incorporating integral tank head protection ("J" retrofit package). These cars when retrofitted will be specification 112J and 114J tank cars. Several major tank car builders have indicated that these cars could be completely retrofitted not later than December 31, 1980 and our analysis supports this conclusion. Accordingly, it is proposed to amend section 179.105-3(d) to require this retrofit operation to be performed so that:

1. Twenty-five percent of these tank cars owned by each tank cars owner be retrofitted not later than December 31, 1978;

2. An additional 40 percent of these tank cars owned by each tank car owner be retrofitted not later than December 31, 1979; and

3. An additional 35 percent of these tank cars owned by each tank car owner be retrofitted not later than December 31, 1980.

Likewise, based upon statements made at the FRA safety inquiry as well as other information received, it is believed that this proposed acceleration of the retrofit schedule should not result in any appreciable increase in retrofit costs.

Consideration has been given to requiring either total completion of this type of retrofit at an earlier date or increasing the percentage of tank cars required to be retrofitted during 1978 and 1979. Since this type of retrofit requires considerable ability in metals-forming and insulation application, only a few tank car repair shops have the existing capacity to perform this work. Construction of additional plant capacity would consume considerable time, while use of new car construction shops could cause severe tank car shortages and cause economic problems for many petroleum and chemical shippers and users. More importantly, any additional compression could cause critical out-of-service problems during the heating and fertilizing seasons, resulting in insufficient fuel during the winter and insufficient fertilizer in the spring. For this reason, as well as considering shop facility capacity, it appears that this retrofit schedule would cause the least overall economic disruption while achieving a more rapid implementation of the safety standards.

AVAILABILITY OF CARS DURING THE RETROFIT PERIOD

Without question the most serious constraint facing the FRA and the Bureau in the development of a compressed timetable has been the availability of pressure tank cars to perform essential transportation services. Witnesses at the FRA special safety inquiry indicated that the pressure tank car fleet is fully utilized during much of the year either to carry or to store fuels, fertilizer and industrial chemicals. This testimony is consistent with other information available to the Department of Transportation. Therefore, the FRA and the Bureau have attempted to fashion the proposed new retrofit schedule in a way which is intended to minimize disruptions in service. However, it is recognized that the compression of the program into a shorter time period may result in localized shortages of essential products. Comment is specifically solicited, therefore, on the following analysis of out-of-service time and the consequences of that analyses for users of the products transported and stored in 112 and 114 tank cars.

Application of a shelf coupler is a relatively simple operation requiring not more than a total elapsed time of one-hour per tank car using a two or three man crew and a light duty crane. The difficulty arises in having the appropriate pair of shelf couplers at the proper location so as to be ready for application to a specific tank car. However, this is a problem which is solvable through proper planning. In terms of total out-of-service time, coupler retrofit can cause a tank car to be "out-of-service" for a time period of up to one day. This one-day time period is caused by switching the tank car to and later from a "repair" or "work" track. Since many 112 and 114 tank cars will have to be moved to repair tracks for other purposes prior to the end of the year, this impact should not be significant. Through the exercise of proper initiative, couplers may also be applied at major shipping points without any out-of-service time attributable to the application of the couplers.

Application of "head shields," "spray-on" thermal protection and jacketed insulation systems require the tank car to be shipped to a repair facility. Shippers, car owners and tank car lessors agreed that a time period of from twelve to fifteen days is required to move a tank car from an unloading point to a repair shop and that a like period of time is required to move a tank car from a repair shop to a loading point. Estimates of the time required to perform the retrofit operations and related maintenance ranged from twelve to thirty days. This includes provision for preinstallation operations. An average period of fifteen days appears to be realistic. Thus, to total out-of-service time estimate range from 36 to 60 days. An average out-of-service time of 45 days is used in the following analyses. However, some time credit must be assigned to the fact that during this 45-day period the empty tank car has moved from the consignee's unloading facility to the shipper's loading facility. A ten-day time period would be the minimum average time required for this empty movement were not retrofit or maintenance shoping involved. Accordingly, the net retrofit out-of-service time chargeable to this program has been determined at 35 days (five weeks) for each shop cycle.

In order to determine the effect of out-of-service time, it is assumed that the major retrofit program will begin about July 1, 1978. Thus, there will be approximately five 5-week cycles in 1978, 10 such cycles in 1979 and 10 additional such cycles in 1980. Allowance for plant vacations and possible holiday interruption is taken into account by using a fifty, rather than a fifty-two week year.

The effect of this five-week retrofit cycle on approximately 2,000 vinyl chloride tank cars being converted to specifications 112T and 114T can be analyzed.

1. Under the existing retrofit schedule, fifty-percent (1,000) of these tank cars were to be retrofitted with "spray-on" thermal insulation and "head shields" not later than December 31, 1979.

2. Under the proposed accelerated retrofit schedule all 2,000 of these tank cars would have to be retrofitted with "head shields" by that date.

3. Therefore, at least 1,000 vinyl chloride monomer tank cars already have been scheduled for total retrofit not later than December 31, 1979; and thus, not more than 1,000 such tank cars will require two shoppings, one shopping between the present date and the end of 1979 for application of "head shields," and one shopping during 1980 for the application of "spray-on" thermal protection. By careful planning, some owners should be able to complete additional cars in a single shopping.

4. 2,000 tank cars will be out-of-service for a five-week retrofit cycle between the present date and December 31, 1979, with fifteen such cycles. This means that an average of 133 (2,000 tank cars divided by fifteen cycles) will be out-of-service at any one time due to retrofit applications being performed during the time period of July 1, 1978, through December 31, 1979.

5. A maximum of 1,000 tank cars will require retrofit installation of "spray-on" thermal protection during 1980. This means that an average of 100 (1,000 tank cars divided by ten cycles) will be out-of-service at any one time due to the retrofit applications being performed during 1980.

In the same manner, the effect of this five-week retrofit cycle on the approximately 2,000 specification 112 and 114 tank cars transporting liquefied flammable gases which are being converted to specifications 112T and 114T can be analyzed as follows:

An average of 133 tank cars will be out-of-service at any one time during the time period of July 1, 1978, through December 31, 1979; and an average of 100 tank cars will be out-of-service at any one time during 1980.

Likewise, the effect of this five-week retrofit cycle on the approximately 3,400 dedicated anhydrous ammonia tank cars being converted to specifications 112S and 114S can be analyzed.

1. Approximately 700 of these tank cars have been converted or built to specifications 112S and 114S.

2. Approximately 2,700 of these tank cars must have "head shields" retrofit installed by December 31, 1979.

3. With fifteen such cycles, this means that an average of 180 of these tank cars will be out-of-service during any one cycle for the time period of July 1, 1978, through December 31, 1979.

The proposed accelerated retrofit schedule would require that the approximately 12,500 specification 112 and 114 tank cars being converted to specifications 112J and 114J be retro-

fitted according to the following schedule: 25 percent in 1978; and additional 40 percent in 1979; and an additional 35 percent 1980.

Thus, during the time period of July 1, 1978, through December 31, 1978, there would be five, five-week retrofit cycles. Approximately 3,125 (25 percent of 12,500) tank cars would require retrofit shopping during this time period. Approximately 625 (3,125 tank cars divided by 5 cycles) such tank cars would be out-of-service at any one time during July 1, 1978, through December 31, 1978.

During 1979, approximately 5,000 (40 percent of 12,500) of these tank cars would require retrofit shopping. Approximately 500 (5,000 tank cars divided by 10 cycles) such tank cars would be out-of-service at any one time during the year.

During 1980, approximately 4,375 (35 percent of 12,500) of these tank cars would require retrofit shopping. Approximately 438 (4,375 tank cars divided by 10 cycles) such tank cars would be out-of-service at any one time during the year.

In summary, this analysis shows that under the requirements of the proposed retrofit schedule an average of 848 tank cars (4.2 percent) will be out-of-service at any one time between July 1, 1978, and December 31, 1980. Average units out-of-service for individual years are (a) 1,071 tank cars during 1978, (b) 946 tank cars during 1979, and (c) 638 tank cars during 1980. Greater impacts may be experienced within individual categories of service. These numbers represent an overall lower percentage than that estimated by the tank car companies. Since the analysis assumes an even flow of cars through the shops the number of cars actually withdrawn from service at any given time may be higher or lower.

Since most of the tank car builders indicated that retrofit operations will be performed at facilities other than their principal new car fabrication facilities, and since current production of tank cars of all types is considerably less than total capacity, additional new pressure tank car construction could ease shortages occurring during the retrofit period.

### CANADIAN 112 AND 114 TANK CARS

Approximately 2,000 specification 112 and 114 tank cars have been constructed to specifications promulgated by the Canadian Transport Commission (CTC) and are used principally in Canada. However, approximately 80 percent of these CTC specification 112 and 114 tank cars transport hazardous commodities on the United States railroad network at some time. Accordingly, it is proposed to amend § 179.105-1(e) to require shelf couplers on all such CTC tank cars transporting hazardous materials in the United States not later than December 31, 1978, and require total retrofit not later than December 31, 1980.

### COMPLIANCE

In order to assist in monitoring compliance with the HM-144 retrofit schedule, a separate Notice of Proposed Rulemaking is being developed. This Notice will propose requirements for car owner reporting of retrofit plans and accomplishments.

### ECONOMIC IMPACT

In analyzing the effect of accelerating the retrofit schedule as proposed in this Notice of Proposed Rulemaking, the FRA and the Bureau have attempted to identify additional costs resulting from compression of the schedule. A specific possible increased cost of $900,000 has been identified for non-jacketed thermal protection and separate tank head protection application. Other additional costs are not now identifiable in definitive terms. However, the Bureau recognizes that compliance with the compressed retrofit schedule proposed in this Notice will result in some additional costs such as overtime payments, second and third shift differential payments, and possible premium payments for components. Also there may be additional transportation costs associated with "double shopping" of a small number of DOT specification 112T and 114T tank cars, as well as some additional labor cost. It is the belief of the Bureau that such additional costs will be only a small percentage of the cost of the initial rule and that the benefits to public safety and industry of accelerating the retrofit of these safety features will far outweigh any additional cost. Commenters are requested to submit cost information pertinent to this proposal.

Primary drafters of this document are William P. Black and Rolf Mowatt-Larssen, Office of Safety, and Edward F. Conway, Jr., Office of the Chief Counsel, Federal Railroad Administration, and George W. Tenley, Jr., Office of the Chief Counsel, Research and Special Programs Administration.

In consideration of the foregoing, it is proposed to amend Parts 173 and 179 of Title 49, Code of Federal Regulations as follows:

1. In § 173.31 paragraph (a)(5) would be revised to read as follows:

**§ 173.31 Qualification, maintenance, and use of tank cars.**

(a) • • •

(5) After December 31, 1978, each specification 112 and 114 tankcar built before January 1, 1978, must be equipped with shelf couplers in accordance with § 179.105-6 of this subchapter.

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2. In § 173.314 paragraph (c) Table Note 23 and Note 24 would be revised to read as follows:

**§ 173.314 Requirements for compressed gases in tank cars.**

• • • • •

(c) • • •

NOTE 23.—After December 31, 1980, each specification 112 and 114 tankcar built before January 1, 1978, used for the transportation of flammable compressed gases must be equipped with thermal protection and tank head puncture resistance systems in accordance with § 179.105 of this subchapter.

NOTE 24.—After December 31, 1979, each specification 112 and 114 tankcar built before January 1, 1978, used for the transportation of anhydrous ammonia must be equipped with a tank head puncture resistance system in accordance with § 179.105 of this subchapter.

• • • • •

3. In § 179.105 paragraph (c) in § 179.105-1 would be revised; paragraphs (a) and (d) in § 179.105-3 would be revised to read as follows:

**§ 179.105 Special requirements of specifications tank cars.**

**§ 179.105-1 General.**

• • • • •

(c) Notwithstanding the provisions of § 173.8 of this subchapter, no 112 and 114 tankcar manufactured to specifications promulgated by the Canadian Transport Commission may be used:

(1) After December 31, 1978, to transport hazardous materials in the United States unless it is equipped with a coupler vertical restraint system under § 179.105-6; nor

(2) After December 31, 1980, to transport compressed gases in the United States unless it is equipped with thermal protection under § 179.105-4 and tank head puncture resistance under § 179.105-5.

• • • • •

**§ 179.105-3 Previously built cars.**

(a) After December 31, 1978, each specification 112 and 114 tank car built before January 1, 1978, shall be equipped with a coupler restraint system that meets the requirements of § 179.105-6.

• • • • •

(d) Each tank car owner shall equip its tank cars which are subject to paragraphs (b) and (c) of this section in accordance with the following schedule:

(1) Each tank car which is being retrofitted in accordance with paragraph (b) shall be retrofitted not later than December 31, 1979.

(2) Each tank car which is being retrofitted in accordance with paragraph (c) with a non-jacketed thermal protective system and a separate tank head puncture resistance system (112T/114T) shall be retrofitted:

(i) With the tank head puncture resistance system not later than December 31, 1979; and

(ii) With thermal protection not later than December 31, 1980.

(3) All tank cars being retrofitted in accordance with paragraph (c) with a thermal protective system enclosed in a metal jacket (112J/114J) shall be retrofitted such that—

(i) At least 25 percent of those cars owned on December 31, 1978, are so equipped by not later than that date;

(ii) At least 65 percent of those cars owned on December 31, 1979, are so equipped by not later than that date; and

(iii) All of those cars owned on December 31, 1980, are so equipped by not later than that date.

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53(e))

NOTE.—The Materials Transportation Bureau has determined that this document does not contain a major proposal requiring the preparation of an economic impact statement under Executive Order 11821, as amended by Executive Order 11949, and OMB Circular A-107 nor an environmental impact statement under the National Environmental Policy Act (49 U.S.C. 4321 et seq.). A draft evaluation of the estimated cost and anticipated benefits of this proposed amendment has been prepared in accordance with departmental policies and procedures for simplification, analysis and review of regulations (43 FR 9582) and has been placed in the public docket for this proceeding.

Issued in Washington, D.C., on May 4, 1978.

ALAN I. ROBERTS,
*Director, Office of Hazardous Materials Operations.*

[FR Doc. 78-12639 Filed 5-10-78; 8:45 am]

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[4310-22]

## DEPARTMENT OF COMMERCE

### National Oceanic and Atmospheric Administration

### [50 CFR Part 258]

### FISHERMEN'S PROTECTIVE ACT PROCEDURES

### Compensation for Damage Caused by Foreign Vessels in the Fishery Conservation Zone

AGENCY: National Oceanic and Atmospheric Administration, National Marine Fisheries Service.

ACTION: Proposed rulemaking.

SUMMARY: The National Marine Fisheries Service proposes regulations to govern section 10 ("section 10") of the Fishermen's Protective Act of 1967, as amended (the "Act"). Section 10, recently enacted, provides a program to compensate domestic fishermen who have suffered vessel or gear damage, loss or destruction as the result of foreign vessel operations in the U.S. Fishery Conservation Zone, and beyond, in appropriate instances.

DATE: Comments must be received no later than June 12, 1978.

ADDRESS: Financial Assistance Division, National Marine Fisheries Service, Washington, D.C. 20235.

FOR FURTHER INFORMATION CONTACT:

Michael L. Grable, Chief, Financial Assistance Division, National Marine Fisheries Service, Washington, D.C. 20235. Telephone 202-634-7436.

SUPPLEMENTARY INFORMATION: On November 16, 1977, the Act was amended by adding a new section 10 (Pub. L. 95-194). Section 10 authorizes the establishment of a loan program for domestic fishermen who have had their fishing vessels or gear damaged, lost, or destroyed as the result of foreign vessel operations off the coast of the United States. The program will apply to incidents occurring in the geographical area defined in these regulations on the "fishermen's protective zone," and consisting of the fishery conservation zone (FCZ) established by the Fishery Conservation and Management Act of 1976 and an area beyond the FCZ in appropriate instances.

This notice proposes procedures and standards for the loan program authorized by section 10. Rules governing the Act currently appear at 50 CFR 258.1 through 258.9. Under this proposal 50 CFR would be amended to include regulations governing section 10 by adding a new heading "Subpart A" for the Act's existing regulations (sections 258.1 through 258.9) and adding a new "Subpart B" to implement section 10.

Section 10 authorizes the Secretary of Commerce (the "Secretary") to make low-interest loans to eligible fishermen after making a determination that the eligibility and evidentiary criteria of section 10 relating to the lost, destroyed or damaged property have been met. After making the loan the Secretary is directed to investigate the circumstances of the incident resulting in the compensated loss, damage, or destruction and determine whether the loan will continue according to its original terms, be canceled or be repaid over a shortened time period.

This proposed rulemaking governs: (1) Eligibility for the program; (2) evidence to be submitted with loan applications; (3) procedures for making loans; (4) guidelines for the determination of the amount of the loans; (5) procedures and standards by which the Secretary will determine whether to modify or cancel loans; and (6) loan repayment and cancellation requirements.

One section governing the Government's disposition of rights assigned to it by loan recipients is being reserved for a proposal of rules to be made at a later time. The proposed rule follows:

Dated: May 5, 1978.

RICHARD A. FRANK,
*Administrator, National Oceanic and Atmospheric Administration.*

Amend part 528 as follows:

1. Add a new heading "Subpart A—Seizures of U.S. Commercial Fishing Vessels" for §§ 258.1 through 258.9.

2. Add a new subpart B as follows:

**Subpart B—Compensation for Damage Caused by Foreign Vessels in the Fishery Conservation Zone**

Sec.
258.20 Purpose.
258.21 Definitions.
258.22 Eligibility.
258.23 Applications.
258.24 Approval of loan applications.
258.25 Terms and conditions of loans.
258.26 Determination of amount of loss, damage, or destruction.
258.27 Determination of fault.
258.28 Loan repayment or cancellation.
258.29 Government collection. (Reserved)

AUTHORITY: Sec. 10, 91 Stat. 1413 (22 U.S.C. 1980).

## Subpart B—Compensation for Damage Caused by Foreign Vessels in the Fishery Conservation Zone

### § 258.20. Purpose.

This subpart provides rules and procedures for the granting, repayment, and cancellation of loans to owners and operators of United States Commercial fishing vessels for the loss, damage, or destruction of their fishing vessels or gear caused by a vessel of a foreign nation operating in the U.S. Fishermen's Protective Zone.

### § 258.21. Definitions.

Unless the context otherwise requires, in this subpart:

(a) "Alternative claim" means any claim not made under this subpart which seeks compensation for the same loss, damage, or destruction of a fishing vessel or fishing gear as is covered by a loan application under § 258.23.

(b) "At fault" means negligent or willful, through action or inaction causing the loss, damage, or destruction involved.

(c) "Fishermen's protective zone" means: (1) The area adjacent to the United States which, except where modified to accommodate international boundaries, encompasses all waters from the seaward boundary of each of the coastal states to a line on which each point is 200 nautical miles from the baseline from which the territorial sea of the United States is measured, (2) all areas in which U.S. continental

END

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