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A Report on Tank Cars: Federal Oversight of Design, Construction and Repair

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UNITED STATES
DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration

Research and Special Programs Administration

A Report on

TANK CARS:

Federal Oversight of Design, Construction, and Repair

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EXECUTIVE SUMMARY

Under the Federal Railroad Safety Act of 1970, the Secretary of Transportation is directed to prescribe regulations "for all areas of railroad safety." The Hazardous Materials Transportation Act grants the Secretary authority to issue regulations which "govern any safety aspect of the transportation of hazardous materials."

As a consequence, DOT is responsible for regulating the design, construction, and repair of railroad tank cars. The Secretary has delegated implementation and enforcement of these acts and their regulations to the Research and Special Programs Administration (RSPA) and the Federal Railroad Administration (FRA).

Certain functions related to hazardous materials tank cars are, by regulatory delegation, vested in the Association of American Railroads Tank Car Committee (TCC). A task force consisting of FRA and RSPA staff has evaluated the implementation of that delegated authority. This report contains the assessment team's findings and its recommendations for corrective action to the RSPA and FRA Administrators.

The role of the Association of American Railroads Tank Car Committee as a resource for the development and implementation of safety regulations predates the creation of the Department of Transportation by more than 40 years. This inescapable fact of history gives context to both the benefits of and the problems with the current process of assuring that tank cars are being built and maintained in compliance with DOT regulations.

The first recommended practices for tank car construction appeared in 1903, promulgated by an industry group known as the "Master Car Builders Association." Those recommendations became industry standards in 1910 when they were accepted by the tank car manufacturers.

The Federal government intervened for the first time in 1927, when the Interstate Commerce Commission adopted a new set of standards drafted by ICC staff with considerable assistance from the American Railway Association's Committee on Tank Cars, a forerunner of the current TCC. The Commission's reliance on the Committee for development of the standards, and the Committee's role in executing them, were expressly sanctioned by the 1908 Explosives and Other Dangerous Articles Act. The relationship established by the Commission pursuant to that Act prevailed for 40 years and was assumed by the Department of Transportation when it succeeded to the Commission's role as safety regulator in 1967.

The relationship between the Department and the TCC can best be described as a relationship between a policymaker and a counselor. The Committee brings the Department technical expertise. It reviews the effectiveness of current standards and forwards recommendations for change. Proposed amendments to the tank car specifications originating outside the Committee must be referred to the Committee for review and comment prior to departmental action. In all instances, however, final policy judgments lie with the Department.

On the compliance side, the Committee's role is more significant; it has for 51 years played a quasi-governmental role as the implementation wing of, first, the ICC, and now, the Department of Transportation. The Department (like the ICC before it) continued to delegate authority to the Committee to review applications for construction or modification, and approve or deny them based on their consistency with DOT regulations. The Committee was also delegated authority, in more than one hundred individual subsections of the regulations, to approve fittings, attachments, materials, and procedures. The Committee has broad authority to implement DOT regulations on repair and retrofit; in addition, it certifies those facilities which are qualified to perform construction/repair services.

Late in 1983, the Federal Railroad Administration began to reassess the Department's relationship with the TCC. Somewhat thereafter, FRA and the Research and Special Programs Administration agreed to form a joint task force to assess the functioning of the Committee and the policy premises behind its long standing relationship with government regulatory agencies. That assessment was prompted by three considerations:

- A concern by the Administrators of the two agencies that, while the structure of the relationship between the Department and the Committee had not changed, a significant gulf had, in practice, developed between them, resulting in the TCC functioning independently of

-- rather than as an extension of -- the Department.

- The friction that arose when FRA attempted to reassert its role as an active participant in Committee deliberations.

- A general concern about the adequacy of TCC record keeping.

Shortly after the decision to reassess the relationship was made, the Department's concerns were intensified by the discovery of an error made by the Committee in approving the construction of a tank car with fittings welded directly to the shell in violation of DOT regulations. That error resulted in FRA's ordering the recall and retrofit of more than 10,000 tank cars.

The assessment team was comprised of representatives from the FRA and RSPA. The National Transportation Safety Board was invited to participate in the assessment but declined to do so for the most part. NTSB participation was limited to the attendance of one staff member at part of an Association of American Railroads introductory session and at the subsequent interview of a former TCC official.

This document summarizes the assessment team's findings and their recommendations to the FRA and RSPA Administrators.

SUMMARY OF FINDINGS

The Concept of Delegation:

The policies that led the ICC to adopt the original TCC delegation remain valid. In its role as policy advisor, the Committee gives the Department access to a level of experience and expertise that does not exist within the Department, and could not easily be duplicated in a governmental agency. In its implementation role, the Committee gives the Department -- at no cost to government -- a cadre of experienced personnel to sustain the burden of reviewing drawings, certifying facilities, and maintaining records. As a consequence, in addition to providing Federal agencies with expertise, the delegation conserves public resources for application to other safety sensitive areas.

We find the concept of utilizing the Committee as an extension of the regulatory agency to be sound; what is not sound is the manner in which the delegation is now being implemented.

This report recommends ways to improve implementation of that delegated authority. If improvements are not made, or if they prove insufficient, this report leaves open the door to other approaches to ensuring that tank cars are built, repaired, and maintained in accordance with the Department of Transportation's regulations.

The Committee's Performance:

From a bottom-line results perspective, the performance of the Committee over time is difficult to criticize. The Committee has served as policy counselor to the Department through a period in which there has been intense activity on many fronts and a marked improvement in railroad hazardous materials transportation safety. There has not been a fatality in a chemical release in nearly a decade -- a sharp contrast to the one year high of 22 established in 1979. Studies done for the AAR and the Railway Progress Institute conclude that since 1980 the regulatory changes adopted by the Department -- with TCC guidance -- have resulted in a 68 percent reduction in fire related tank failures and an 81 percent reduction in impact failures. Over the same period, the Committee has, in its administrative capacity, reviewed and processed more than 3,500 applications for alteration or new construction.

The assessment found little to criticize in the Committee's performance of its policy counselor role. But on the implementation side, notwithstanding the quantifiable progress resulting from its efforts, the Committee has made mistakes. The assessment identified approximately a half dozen cases in which the Committee violated either its own procedural standards or DOT substantive regulations in granting approval for construction or modification. At least one of those errors was significant, resulting in the recall and retrofit of more than 10,000 tank cars.

The assessment team analyzed the errors it found and we reached the conclusion that they stemmed more from human judgments than from any factor inherent in the structure of the Committee. However, the chance of error is materially enhanced by the Committee's poor record keeping and less than rigorous adherence to its own procedural requirements. We likewise found that the unacceptable distance that has developed between TCC proceedings and DOT oversight has increased the probability that an error, once made, will escape detection.

DOT Oversight:

From the issuance of the ICC's initial specifications in 1927 until the creation of the Department of Transportation in

1967, the relationship between the Federal government and the TCC remained basically unchanged. The ICC construed the language of the Explosives Act literally and turned tank car activity over to the Bureau of Explosives and the TCC. However, the ICC was represented at both Committee and subcommittee meetings; its delegate was not a voting member of the Committee, but did participate in the review of matters within the scope of the delegation. This observer status was consistent with the nature and objectives of the delegation; it respected the distinction between rulemaker and advisor while ensuring that the ICC remained informed of and involved in the Committee's deliberations.

With the transfer of safety jurisdiction from the ICC to the DOT, an DOT representative replaced the ICC delegate as a member of the TCC and participated in much the same way as his ICC predecessor. For reasons that are not entirely clear, the relationship between DOT and the TCC began to deteriorate in the late 1970's, and that deterioration escalated in the period 1980 to 1983. The Committee barred DOT representatives from all TCC deliberations other than "open sessions." It did not provide DOT with regular notice of matters discussed during closed deliberations, even when those matters fell within the scope of the delegation. DOT was denied the right to review TCC files and was permitted to receive file documents only upon special request for specific documents. While these changes occurred gradually over a period of years, the Department did not challenge them.

When, in late 1983, FRA sought to reassert its oversight role and resume direct review of tank car issues, the Committee resisted. It continued to bar FRA representatives from other than open sessions and refused to routinely provide DOT with copies of documents unless specifically requested to do so. It was this conduct that precipitated the decision by the FRA and RSPA Administrators to order this audit.

The growing separation between the Department and the Committee was more an evolution than a single, cathartic event; it occurred because the Department became increasingly passive in asserting its oversight role and because the members of the Committee lost sight of the nature of the delegation and sought to consolidate their power and independence. Whatever the reasons for this gradual drifting apart, the resulting situation is totally inconsistent with the proper functioning of a delegation of public responsibility. Moreover, the absence of a DOT representative at critical TCC meetings diminishes the probability that any error made by the Committee will be discovered before it is embodied in a structure or a change in policy.

Record Keeping:

Like any other body utilizing precedent as a basis for current decisions, the TCC is highly dependent on the quality of its own records. And the quality of TCC record keeping is severely lacking.

The Committee maintains no files of the precedents against which approval may be requested. It maintains no lists of approvals from prior applications; the data shown on an application claiming precedent approval is the only clue that a drawing is current. Moreover, the only way to determine what type of materials, valves, and appurtenances have been approved is to leaf through the thousands of applications on file until the appropriate document is found. These are only the most prominent examples of the record keeping problem; others could be cited.

The record keeping practices utilized by the TCC are inconsistent with ready access to the data needed by Committee members to perform their responsibilities. This data base represents a potential source of error rather than a protection against it.

Facility Certification:

One of the Committee's most important functions is the certification of facilities qualified to perform tank car construction, repair or modification. This is also the area in which the assessment team had the least confidence in the quality of the Committee's performance.

In the course of the assessment, the team conducted 13 inspections of AAR-certified fabrication and repair facilities. While we discovered no problem serious enough to draw a facility's right to retain its certification into question, we discovered a series of procedural irregularities and some lesser substantive irregularities that suggest an overall laxness in the degree of TCC oversight. For example:

- We discovered many instances in which Exhibit R-1 reports (the basic documentation required for any welded repair or modification) were not prepared and filed by the facility actually performing the work.

- We noted one facility, in the process of financial reorganization, that had failed to file the required forms for the period 1982-1984.

- We noted instances of failure to prepare Subcontractor Evaluation Sheets (Exhibit B-1 forms) for each outside contractor.

- We discovered procedural errors ranging from x-ray work performed in violation of Tank Car Manual requirements, and the use of welders with expired certification, to the use of "eyeball" rather than more technically correct inspections of tank car interiors.

While none of the conditions discovered led the assessment team to doubt the integrity of the cars or tanks at the shops when the inspections were conducted, they were evidence of a lax system of oversight in an area where loose procedures and passive oversight are not acceptable.

Absence of Follow-up Check on In-process or Completed Cars:

The TCC uses two mechanisms to ensure tank car compliance with Federal standards:

- Mandatory review and pre-approval of construction applications, including drawings, and

- Certification of the facilities in which the work will be performed.

At no point after approval of the application does the Committee inspect the product itself. It is up to the builder to inspect the finished cars and certify that they comply with DOT regulations, AAR requirements, and TCC-approved drawings. At least in theory, the TCC facility certification process ensures that these inspections and certifications are performed in a fully professional manner.

It is legitimate to question whether the absence of any independent vehicle inspection either during or after construction represents a weakness in the system. A facility which makes an assembly error because it misunderstands a drawing may well fail to recognize that error in a subsequent inspection. Moreover, there are problems of appearance, at least, in placing sole reliance on the ability of tank car construction facilities to inspect and police their own work. In analogous areas, such as compressed gas cylinders and intermodal portable tanks, the use of independent inspectors on at least a spot-check basis is a common practice.

After considerable discussion, the assessment team decided

not to include a specific recommendation to alter this aspect of the current system in its final recommendations. The primary reason for this decision was the fact that AAR had already acted to initiate changes aimed at resolving FRA/RSPA concerns about the practices discovered during the assessment. Those changes include having AAR personnel inspect tank car manufacturing and repair facilities; naming additional railroad employees to the Tank Car Committee; and commencing the microfilming of, and computer access into, tank car construction applications and repair records. We intend to evaluate implementation of those reforms on an ongoing basis, and for the moment reserve judgment on whether they are, in fact, sufficient to resolve our concerns. For the present, however, the reforms have mitigated those concerns to such an extent that we have elected not to incorporate specific recommendations for independent physical inspections in this report. However, this is an issue that the Department and the TCC should review as the process of tightening facility oversight progresses.

Procedures:

The assessment disclosed a number of instances in which the Committee departed from its own rules and procedures and others where the rules themselves are subject to question. The discrepancies found were not major, but they do suggest the need to both review the practicality of the Committee's procedural rules and to pursue more methodical adherence to them.

In particular, the assessment team questions the provision permitting 50 percent plus one member of the Committee to constitute a quorum for approval of an application. In our view, the decision to accept membership on the Committee carries with it a responsibility to review those matters that come before the TCC for deliberation. We do not question the fact that an occasional need will arise for a member to be excused from a particular proceeding, but lack of participation should be the exception, not the rule, and procedures which routinely allow approval with only one more than half the members participating encourage inconsistent levels of involvement by Committee members.

THE RECOMMENDATIONS IN BRIEF:

1. THE DEPARTMENT SHOULD CONTINUE,ON A PROVISIONAL BASIS, BOTH THE POLICY FORMULATION AND REGULATORY IMPLEMENTATION DELEGATIONS TO THE ASSOCIATION OF AMERICAN RAILROADS TANK CAR COMMITTEE.

2. WHEN THE TCC IS ACTING WITHIN THE SCOPE OF THESE DELEGATIONS, THE DEPARTMENT OF TRANSPORTATION MUST HAVE ACCESS TO EVERY MEETING OR OTHER PROCEEDING CONDUCTED AND EVERY FILE DOCUMENT MAINTAINED.

3. THE TANK CAR COMMITTEE MUST OVERHAUL ITS RECORD KEEPING SYSTEM TO ENSURE THAT COMMITTEE FILES CONTAIN THE INFORMATION NECESSARY FOR THE PROPER FUNCTIONING OF AN AGENCY WHICH DEPENDS UPON PRECEDENT.

4. THE MINIMUM NUMBER OF VOTES REQUIRED FOR APPROVAL OF AN APPLICATION MUST BE RAISED TO A LEVEL WHICH ASSURES BROAD PARTICIPATION BY SHIPPER AND CARRIER MEMBERS.

5. THE TCC SHOP CERTIFICATION PROGRAM NEEDS REASSESSMENT AND SUBSTANTIAL OVERHAUL.

6. THE TCC SHOULD DEVELOP A PROGRAM OF PERIODIC DATA REVIEW DESIGNED TO SPOT EVOLVING PROBLEM TRENDS BEFORE THEY REACH CRISIS STAGE.

7. THE PREVIOUS RECOMMENDATIONS SHOULD BE IMPLEMENTED NOW, WHETHER THROUGH REGULATORY ACTION, A WRITTEN AGREEMENT BETWEEN DOT AND THE COMMITTEE, OR A COMBINATION OF THE TWO.

UNITED STATES
DEPARTMENT OF TRANSPORTATION

Federal Railroad Administration
Research and Special Programs Administration

A Report on
TANK CARS:
Federal Oversight of Design, Construction, and Repair

INTRODUCTION:

Two key pieces of legislation make the Department of Transportation responsible for regulating the design, construction, and repair of railroad tank cars: The Federal Railroad Safety Act of 1970 and the Hazardous Materials Transportation Act.[1] Under FRSA, the Secretary of Transportation is directed to prescribe regulations "for all areas of railroad safety." The HMTA grants the Secretary authority to issue regulations which "govern any safety aspect of the transportation of hazardous materials." The Secretary has delegated implementation and enforcement of these acts and their regulations to the Research and Special Programs Administration and the Federal Railroad Administration.

There are about 200,000 tank cars in the North American rail car fleet, including about 22,000 which may move across the borders from Canada and Mexico under the industry's interchange rules. Comprising just over 13 percent of the fleet, tank cars move over 80 percent of rail-hauled hazardous materials.

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[1] 45 U.S.C. § 421, et seq. and 49 U.S.C. App. § 1801 et seq. A fuller development of the history of tank car construction and regulation appears in "Part One: A Brief History of Tank Cars."

Virtually all tank cars are owned by industrial shippers and car leasing companies. Because of the products they are likely to carry, tank cars get, and deserve, extra scrutiny in the name of safety. It should be recognized, however, that tank cars carrying hazardous materials are rarely the cause of railroad accidents and that since the first tank cars were built in the Pennsylvania oil fields in the years just before the Civil War, they have compiled a good safety record.

The industry had set its own standards for the design, construction, alteration, or repair of tank cars by the time the Interstate Commerce Commission began to regulate hazardous materials transportation early in this century. The ICC adopted industry standards and delegated to the Tank Car Committee of the American Railway Association[2] authority to approve applications for construction, alteration, or repair of tank cars. Setting the basic design standards, or specifications, is properly the role of the government, but the ICC became extremely reliant on the industry's recommendations for changes in the specifications.

While the DOT is now more active in matters relating to the basic design of tank cars, governmental/industry operating patterns have remained much the same since the creation of the Department of Transportation in 1966. Details will appear later, but, essentially, while the specifications are issued by the

[2] The predecessor of the Association of American Railroads, the present industry association.

Department, proposed changes are first submitted to the Tank Car Committee, and then, with Committee recommendations, from that body to the DOT. Applications for approval of designs, construction, alterations, or repairs must be submitted to the Tank Car Committee. The Committee shall approve the application when, in its opinion, the proposed tank cars meet the regulations. Before a car enters regulated materials service, its builder must issue a Certificate of Construction certifying that the car complies with all of the requirements of the specifications for that type of car.

This system has served the nation and the rail industry well for decades. However, over recent years concerns have been raised about the soundness of the system as a matter of public safety. DOT is aware that there are those who believe that delegations of Federal governmental authority to private industry are improper and that the "tank car problem," however it is defined at a given moment, centers around such an improper delegation. DOT believes that there are historical roots, legal precedents, and technical benefits that support the current practice.

This is not to deny that there have been problems, nor to say that problems do not continue to appear.[3] This report describes in some detail the concerns discovered during the first

[3] A brief description of some recent actual problems with tank cars is attached as Appendix D.

overall assessment ever conducted of the Tank Car Committee's methods and procedures.

The team found occasional errors in judgment including a few instances in which designs did not meet specifications. Criticisms about inadequate record keeping are also warranted, and there have been times when the Department was not advised of potential problems at the earliest practicable date.

The current Hazardous Materials Regulations of the Department of Transportation[4] continue the long established use of the expertise of private industry to aid in accomplishing public safety as the historical section which immediately follows will explain. After this, the report will discuss the audit team's review of the Tank Car Committee's organization and its operations and then present the assessment team's findings and their recommendations to the FRA and RSPA Administrators.

[4] 49 C.F.R. Parts 171-179.

PART ONE:
A BRIEF HISTORY OF TANK CARS

The history of tank cars is a fascinating example of the increasing sophistication of American engineering and materials science. It is also interesting as an exercise in specifications development in a market-place environment with little or no effective governmental intervention until relatively recently. The decades of Federal laissez-faire have important implications for any study of the interaction of industry and the government as they work to promulgate the standards for, and ensure the certification of, the kind of vehicle that carries 80 percent of rail-borne hazardous materials.

In August, 1859, the first successful oil well was brought in at Titusville, Pennsylvania and, when the petroleum trickle soon became a stream, it was obvious that there had to be a better way to transport crude oil than in 42-gallon, iron hooped barrels on flat cars.[5] Larger "kegs," of about 1,700 gallons, mounted on flat cars, were tried as were horizontally mounted, glued wooden barrels approximately 3,500 gallons in size. One of the problems with this method of moving petroleum was the rain;

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[5] Frank J. Heller, "Evolution of Tank Car Design Through Engineering," privately published monograph of talk before 1970 ASME Petroleum Conference, Denver, CO, p. 1. Much of this historical review is drawn from Frank Heller's work whether or not each statement is specifically footnoted. Mr. Heller was a long-time member of the Tank Car Committee and served a term as its chairman.

it dissolved the glue that kept oil inside the kegs! Finally, by the end of oil's first decade, in 1869, the Empire Transportation Company had developed a car with a riveted iron tank mounted to a double-beamed wood frame that at least looked very much like present tank cars.

The post Civil War era saw iron tanks replaced by steel as the Bessemer process yielded improvements. This early rapid evolution in tank designs and materials lead to a development that, in the minds of many, had a profound effect on the future of tank cars. The railroads sought ways to avoid investing in new tank car equipment and they

> argued that it was impractical and economically unsound for each railroad to maintain a fleet of tank cars . . . when a large portion of that fleet might lie idle during slack periods. In 1888 the Interstate Commerce Commission agreed with the railroads and thus, the securing of tank car equipment became a shipper's worry. The result was that private tank car companies were born whereby shippers or builders invested their capital in the acquisition and maintenance of tank cars for their own use or lease.[6]

The ICC's historic, 19th century decision created a class of cars with a unique pattern of ownership. Today, 99 percent of the tank cars in the American fleet are owned by car leasing companies and shippers. The next largest portion is covered hoppers, with 44 percent shipper or car company ownership. In third place are flat cars, with 33 percent "private" ownership.[7]

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[6] Heller, p. 4.

[7] Association of American Railroads, Railroad Facts, 1987 Edition, Washington, D.C., September, 1987, p. 47.

The Interstate Commerce Act played an important role in shaping the way in which railroads dealt with revenue equipment. Under that act, "common carriers" bear a duty to furnish transportation services "upon reasonable request therefor ...."[8] The Act further imposed a requirement for the interchange of both traffic and equipment.[9]

While the Commission established charges for using equipment not owned by the hauling railroad[10], the implications were far greater than just monetary compensation. Rail equipment, in order to move freely from one carrier to any other in the country, had to meet a set of common standards for such basic attributes as wheel gauge and coupler height. It soon became obvious that interchanging equipment meant repairing the damage from ordinary wear and tear. This, in turn, expanded the need to build cars to a common standard.

The problem with tank cars[11] was that, because the railroads did not own them, carrier mechanical officers were not as familiar with them as they were with box cars or gondolas. That

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[8] Interstate Commerce Act, § 1(4). The provisions of this and other sections noted here were re-enacted as Subtitle IV, Title 49, U.S.C. upon repeal of the IC Act. See, in this case, 49 U.S.C. § 11101(a).

[9] IC Act, §§ 3(4) and 1(10).

[10] IC Act, § 1(14).

[11] As early as 1900 there were already 10,000 tank cars in service.

ICC decision in 1888 absolving railroads from the responsibility to furnish tank cars made it virtually certain that non-railroaders would be an essential part of the decisions made about the cars used for chemicals and petroleum products. This dichotomy has shaped both tank car development and the Federal government's relationship to it.

From the first cars at Titusville until just after the turn of the century, tank cars were designed and built by agreement between the builder and the shipper. Railroad "acceptance" dealt with those features necessary for transportation: dimensional compatibility and normal materials of construction. The need to solve these and other problems led to the formation of organizations like the Master Car Builders Association. In 1903, the Master Car Builders Association Tank Car Committee (railroad mechanical officers and a representative of Union Tank Line) developed a set of recommended practices for the construction and repair of tank cars. The recommended practices were advanced to industry standards in 1910 when they were accepted by the car builders.

Tank cars made significant progress following the adoption of the first industry standards. Pressure cars were introduced, welded construction was approved, and the shippers, builders and railroads began applying the principles of metallurgy to tank steels. In 1918 a new specification insulated car, known as a Class IV, was developed to haul volatile flammable products. A

new Class V car was created especially for products dangerous to life in the event of leakage or rupture (chlorine and sulphur dioxide, for example). These 1918 specifications mark the first time that MCBA pre-construction approval of designs was required.[12]

On the legislative front, in 1908 Congress passed the Explosives and Combustibles Act, a law that governed hazardous materials transportation for six decades.[13] This legislation authorized the ICC to issue regulations covering the packaging, marking, loading and handling of explosives and other dangerous commodities in transit; it also prescribed criminal penalties for shippers or carriers who violated the ICC regulations.

The regulations adopted three years later by the ICC to implement the Explosives Act were based on rail safety standards developed by the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles (The Bureau of Explosives or BOE).[14] Bolstered by the specific reference to the BOE in the law, the ICC delegated extensive rulemaking and enforcement

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[12] To complete the early roster of tank cars: Class I cars were those built before 1903, Class II's were built from then until 1917 when a new general purpose specification, the Class III, was required for cars built after May 1, 1917.

[13] 18 U.S.C. §§ 831-837. Later called the Explosives and Other Dangerous Articles Act, or EODA. (Federal Law of May 30, 1908, modified by the Act of March 4, 1909, §§ 232-236.)

[14] 18 U.S.C. § 834(e) authorized, by name, the "utilization" of the Bureau of Explosives.

responsibilities to it. Over the next several decades, until the formation of the Department of Transportation, the relationship between the ICC and the BOE continued to grow, as rules that were originally designed for the railroads were applied to other modes of transportation.[15]

By 1927, the Commission and the American Railway Association Committee on Tank Cars had collaborated on a set of seven tank car specifications and, effective July 1, 1927, they were adopted as ICC regulations. The authorized car types were as follows:

ICC 103 - a low (or no) pressure general purpose car with a 2 percent expansion dome and safety valves capable of holding internal pressure below 45 psi.

ICC 103A - essentially a type 103 with a safety vent instead of a safety valve and no bottom outlet.

ICC 103B - a rubber lined type 103A with a 1 percent expansion dome.

[15] For a time between 1985 and 1989, the Bureau of Explosives ceased to exist as an organization. Formed in 1905 and operational soon thereafter, BOE developed standards for safe hazardous materials transportation and, through a network of inspectors across the United States and Canada, enforced those standards. Its laboratory tested new dangerous commodities to determine their classification for transportation. The relationship between BOE and the ICC was so close that the Bureau effectively wrote most of the hazardous materials regulations inherited by the Department of Transportation. BOE joined the Association of American Railroads when that organization was formed in 1935. In 1985, after more than 75 years of service, the AAR drastically changed the structure and methods of the Bureau and altered its name to "Hazardous Materials Systems." This report uses the name because regulatory references to it were never amended. In 1989, AAR moved to resurrect the BOE by amending the earlier reorganization. DOT notes structural changes in the "new" Bureau, including the closing of the Edison, NJ laboratory, and does not here express any opinions about the effect of either the 1985 event or its 1989 counterpart.

ICC 104	-	a type 103 car with 2 inches of insulation.
ICC 104A	-	a type 104 car with 4 inches of cork board as insulation, 75 pound safety valves, and a requirement for a tank shell of open hearth boiler plate steel.
ICC 105	-	a welded car for toxic products built to what had been Class V specifications.
ICC 108	-	a metal jacketed, wooden tank car for acetic acid, wine, or similar products.

Basically, the new ICC classes were designated by adding 100 to the former ARA class (I, II, III, IV, and V), so that a Class III car became an ICC 103 car, and so on.[16]

In terms which foretell the current procedures, the ICC regulations required a builder to secure approval of all designs from the ARA Committee on Tank Cars before beginning construction. To illustrate, a proponent seeking a change in the tank car specifications was required to submit the proposal to the American Railway Association (through the Secretary, Mechanical Division) for review by its Committee on Tank Cars. The Committee then transmitted its approval or rejection, with reasons, to the Commission. Review of the proposal and the Committee action on it would pass to the Bureau of Explosives for comments and suggestions prior to final action by the Commission.

Further, an applicant for approval of plans for construction needed to submit complete detailed prints/plans to the mechanical division secretary for a thorough investigation and review. If

[16] All types, except the wooden 108, survive and are in service today.

the application was in full compliance with specifications of the Commission and no increase in hazard was involved, approval would be granted. If the application was in full compliance with specifications of the Commission but a possible increase in hazard was involved, service trials would be necessary before permitting extended use. When, in the opinion of the Committee, the application did not comply with specifications of the Commission, but service trials were considered desirable, the Commission would have to approve the conditions of the service trials. In practice, the ICC relied heavily on the expertise of the Bureau of Explosives and the Committee's expert opinions were given substantial weight by the Commission in determining appropriate final action.

In 1934 the American Railway Association, the Bureau of Explosives, and the associations for Railway Executives, Railway Accounting Officers, Railway Treasury, and Railway Economics were combined into the existing Association of American Railroads. The final rule written by the AAR/ICC partnership, and issued by the Commission, was published October 19, 1964 and established 49 C.F.R. Section 79.3 (currently Section 179.3), codifying an approval process very much as had been in use since 1930.

In 1967 authority to regulate the transportation of hazardous materials was transferred from the ICC to a new Federal agency, the Department of Transportation. Within DOT, separate modal administrations were retained to preserve organizational

continuity; the Federal Railroad Administration was charged with responsibility for rail transportation safety matters. A separate entity, the Hazardous Materials Regulations Board, was created by the Secretary to coordinate hazardous materials activities within the Department.

In 1975, the enactment of the Hazardous Materials Transportation Act (HMTA) improved Departmental regulatory and enforcement activities by giving the Secretary of Transportation authority to establish regulations to "govern any safety aspect of the transportation of hazardous materials which the Secretary deems necessary or appropriate ...."[17] Shortly after passage, the Secretary created the Materials Transportation Bureau and named it the lead DOT agency for hazardous materials regulations, but enforcement authority was divided between the MTB and the modal administrations. In 1986, the MTB was abolished and its hazardous materials functions vested in the Office of Hazardous Materials Transportation and the RSPA Administrator.

The pattern of government staff involvement with the Tank Car Committee has evolved over time. From July 1, 1927, when the ICC specifications first superseded those of the industry, until April 1, 1967, when the DOT came into existence, the ICC took the language of the EODA quite literally and turned tank car activity over to the BOE and the Committee on Tank Cars. The ICC had a

[17] 49 U.S.C. § 1804(a).

representative at meetings of the Committee whose primary function was to review proposals for acceptability.

The change from ICC to DOT added a research capability to the Federal government's hazardous materials transportation activities and allowed FRA to become involved in the design of tank cars. Indeed, the FRA was considered a "member" of the Tank Car Committee and attended TCC functions from 1968 to 1975. From the passage of the HMTA in 1975 until 1980, a RSPA staff member attended TCC functions, sometimes with an FRA representative. Participation by FRA and RSPA, however, was restricted by the industry to "open" sessions only. Federal staff members acted as observers and did not participate in or vote on any issues pertaining to proposed changes or to tank car applications for new construction, alterations, or repairs.

Between 1980 and 1983, cooperation between DOT and TCC dwindled and the Federal representatives were not invited to, or advised of, Committee or subcommittee sessions. Beginning in 1983, FRA again asserted its role and resumed reviewing tank car issues although, until very recently, the agency did not participate in other than "open" meetings of the Tank Car Committee.[18]

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[18] In fairness, it must be noted that, beginning with the July 18-20, 1988 meeting, representatives of FRA and RSPA have attended meetings of the Tank Car Committee and of its subcommittees. Although AAR demonstrated some initial reluctance to permitting their planned appearance, once the meeting began Federal representatives had complete access to all deliberations except those, such as responses to DOT

PART TWO:
THE TANK CAR COMMITTEE:
Organization and Methods

Before it could assess the activities of the Tank Car Committee, the audit team had to compile an up-to-date picture of the Committee itself: where it fit within the industry, how it was organized, and how it intended to implement its mission.

ORGANIZATION:

The Association of American Railroads is divided into departments; the departments are further broken out into divisions. The largest department, Operations and Maintenance, includes the Mechanical Division. The Mechanical Division is responsible for industry freight car standards and for administration of the Interchange Rules, a body of private law that governs the acceptance and use by railroads of equipment which they do not own.[19] The Tank Car Committee is one of the standing technical committees of the Mechanical Division. Others

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rulemaking proceedings, that did not involve delegated authorities. DOT sees the cooperation at and since this meeting as an encouraging development. Appendix F includes other examples of DOT/AAR activities since the completion of the field assessment portion of this effort.

[19] Association of American Railroads, Interchange Rules, Washington, D.C., published annually in a "Field Manual" and an "Office Manual." The Interchange Rules allow the industry to carry out the Interstate Commerce Act mandate to exchange equipment by providing a contractual basis for equipment standardization. See Rule 124 in the Office Manual.

include the committees for Wheels, Axles, Bearings and Lubrication; for Car Construction; for Brakes and Brake Equipment; and so on. In common with all of the division's technical committees, TCC is subject to the rules and guidelines of the Mechanical Division's General Committee whose Articles of Organization[20] state that the General Committee:

- Designates the chairman and vice-chairman of the TCC for a two year term of office.
- Approves TCC membership based on recommendations from "member roads" and others having responsibility for the design, construction, and maintenance of car equipment.
- Approves, for the Mechanical Division, the reports and recommendations of TCC Dockets in accordance with AAR Standard S-050. This Standard provides:

  > Final action by each technical committee shall be submitted for approval to either the membership of the Mechanical Division at its annual meeting or to the General Committee, Mechanical Division in between annual meetings. By majority vote, the members of the Mechanical Division or the General Committee may direct that the final action be submitted for letter ballot vote to the AAR member railroads.

The office of the Executive Director (now Assistant Vice President - Mechanical Division) acts as Secretariat for the TCC.

The TCC functions through its Subcommittees I and II. These subcommittees, now chaired by AAR member-railroad employees,

[20] Association of American Railroads, Mechanical Division, Circular No. D.V. 2077, updated annually at Division annual meeting.

consist of working groups (currently 5) open to others involved in the industry who wish to participate in tank car issues.[21] Recommendations of the working groups need approval of their parent subcommittee and, then, of the full TCC before they progress to the Mechanical Division General Committee for approval or letter ballot.

MEMBERSHIP:

The Tank Car Committee currently has sixteen voting members chosen by the General Committee to represent AAR member railroads and those shipper organizations whose members use tank cars extensively. Shipper organization members include the Chemical Manufacturers Association, The Chlorine Institute, the Compressed Gas Association, The American Petroleum Institute, the Fertilizer Institute, and the National LP Gas Association.

The Chairman of the Tank Car Committee is chosen from among the members; in the past, three shipper representatives have held this position. The present rule, amended only recently, requires the chairman to be a railroad employee.

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[21] At the time of the assessment, the chair of a subcommittee could be any member of TCC. The working groups are divided on technical lines, to handle material contained in the various appendices to the Manual. They cover: Appendix A/D, General Design and Appendix E/M, Appendix B/R/W, General Operations and Appendix C/S/L, and Accident Review A/X. Association of American Railroads, Tank Car Committee, Organization Chart, supplied to audit team members during the assessment.

The Bureau of Explosives has a non-voting representative on the Committee. The Railway Progress Institute, representing tank car builders, also has a seat on TCC, but cannot vote on (and does not receive) applications for new construction, alterations, or repairs. The RPI representative can vote on subcommittee issues.

There is no prescribed limit on the number of Committee members and three rail carrier members were recently added. Members serve at the pleasure of the General Committee; tenure is typically determined by the person's position within his/her employing company. As long as a member's primary duties are compatible with the work of the Committee membership is maintained; when corporate duties change, the member usually resigns. The resigning member's company or association may nominate a replacement but the General Committee is not bound to accept the nomination.

Other than employment, membership is generally determined by education and experience, and a review of the current members' backgrounds is impressive. Four Registered Professional Engineers and an American Welding Society Certified Welding Inspector are on the Committee. Six members have Bachelor of Science - Mechanical Engineering degrees; other engineering degrees represented include one each in Civil Engineering, Chemical Engineering, Metallurgical Engineering, Electrical Engineering, General Engineering, and Engineering and Technology.

There are two advanced degrees: a Master of Science in Metallurgical Engineering and one in Mechanical Engineering. Of the three members whose formal education did not go beyond high school, two are in the midst of college degree programs and all have extensive, decades-long careers characterized by increasing responsibility and the obvious attainment of expertise within their fields. Several members have over 20 years of superb service in fields directly relevant to tank cars and transportation. Memberships in professional societies abound, including the American Railway Engineering Association, the American Chemical Society, the American Society for Testing and Materials, the American Institute of Mining, Metallurgy and Petroleum Engineers, the American Society of Mechanical Engineers, and the American Welding Society. One TCC member served on the US Coast Guard SOLAS (Safety of Life at Sea) working group on the Carriage of Dangerous Goods.

APPROVALS BY THE TANK CAR COMMITTEE:

In all Parts of the Department of Transportation's hazardous materials regulations except one, the term "approved" means "approval issued ... by the Department ...."[22] The sole exception is in Part 179, the "Specifications For Tank Cars," where "approved" means "approval by the AAR Committee on Tank

[22] 49 C.F.R. § 171.8.

Cars."[23] The Tank Car Committee has been delegated two distinct types of "approval" authority under the DOT Hazardous Materials Regulations: one is largely ministerial and the other relies heavily on the expertise of the Committee members.

Looking at only the essentials, when an application for approval of designs, materials and construction, conversion or alteration of tank car tanks is submitted to the Committee, it grants approval when, in its opinion, "such tanks ... are in compliance with effective regulations and specifications of the Department ...." [24] This "generic" approval authority, to ensure that tank car tanks comply with the DOT regulations, is primarily a ministerial delegation. An exploration of "generic" approvals and of how the TCC is organized to handle them appears later in this Part of this report.[25]

The Committee's other authority -- and virtually every application involves the exercise of both -- seeks to tap the collective expertise of its members and calls for a great degree of discretion. At more than 100 places in Part 179, the TCC must approve designs, fittings, methods, and materials.[26] To illustrate, in section 179.103-2(a), manway covers "shall be of

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[23] 49 C.F.R. § 179.3(a).

[24] 49 C.F.R. § 179.3.

[25] See "The Tank Car Approval Process," infra.

[26] Appendix C contains a full listing of the sections in Part 179 where the term "approved" is used.

approved design." According to section 179.201-9, "a gaging device of an approved design must be applied to permit determining the liquid level of the lading." Section 179.10 states, "The manner in which tanks are attached to the car structure shall be approved"; and section 179.100-4(a) says, "If insulation is applied, the tank shell and manway nozzle must be insulated with an approved material."[27] For these and for the nearly 100 other "specific" approvals in Part 179, there are no precisely worded standards, no engineering specifications, and no exact measures of acceptable performance. The reliance on lessons learned, and on developing technologies, has deep roots in history, as the preceding Part of the team's report relates. Subsequent Parts of this report discuss both the team's discomfort with the manner in which the TCC is implementing "specific" approval authorities and their recommendations for improvement in this vital aspect of tank car safety.

THE TANK CAR MANUAL:

A review of the Association of American Railroads Tank Car Committee, what it does, and how it functions would be impossible without at least a brief understanding of its major written work:

[27] Underscore added.

the Specifications for Tank Cars.[28] The TCC is responsible for developing and maintaining the specifications which cover:

> tanks for 'dangerous' commodities (or hazardous materials) subject to U.S. and Canadian government regulation with supplementary AAR requirements, and tanks for commodities not classified as hazardous materials and consequently subject only to AAR regulation. The car structure is covered by a portion of . . . Specification M-1001, as well as a portion of this specification. .... This publication supplements the U.S. Department of Transportation (DOT) Hazardous Materials Regulations for railroad transportation, Title 49 CFR, Parts 170-179.[29]

The Tank Car Manual contains six chapters and eleven appendices, summarized briefly below.

Chapter 1, Introduction, Approvals and Reports: This chapter lists abbreviations and definitions and establishes the procedures for securing approval for the new construction of tank cars.

Chapter 2, AAR Special Requirements for DOT Tank Cars: This chapter contains specific commodity requirements, over and above those in the regulations, for hydrogen sulfide, chloroprene, anhydrous hydrogen fluoride, chlorine in multi-unit tanks, flammable liquids, ethylene oxide, vinyl chloride, and

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[28] Association of American Railroads, Operations and Maintenance Department, Mechanical Division, Manual of Standards and Recommended Practices; Section C - Part III, "Specifications for Tank Cars, Specification M-1002," Effective September 1, 1985, revised annually, Washington, D.C. Often called the Tank Car Manual, or the Manual, this is actually only part of a comprehensive and inclusive work on standards published by AAR's Mechanical Division. The entire Manual of Standards has 11 sections, many of them with multiple parts.

[29] AAR, Specifications for Tank Cars, Introduction.

flammable gases. In addition, several commodities are specifically prohibited from aluminum tank cars. This chapter also establishes standards for items such as acid car fittings, lead frangible discs, vacuum relief valves, and interior protective coatings and linings.

Section 2.3, "Special Requirements," sets forth the revisions to the regulations recommended by TCC but not yet promulgated by DOT. The interchange rules state:

> Tank cars (empty or loaded) will not be accepted in interchange unless they comply with the AAR Specification for Tank Cars and DOT Regulations.[30]

The railroad industry has thus built a requirement to haul any owner's compatible cars into a standard which gives nearly the effective force of law to a body of non-governmental regulations. To explain: in addition to satisfying the requirements of 49 C.F.R. Part 179, a railroad tank car must also satisfy the interchange rules if it is to be guaranteed "free access" to any point served by the general system of railroad transportation. The Tank Car Committee may not, under section 179.3(b), refuse to approve construction of a car meeting all Federal requirements.[31] However, a tank car which does not also meet all the applicable

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[30] Association of American Railroads, Interchange Rules, published in a "Field Manual" and an "Office Manual," revised annually, Washington, D.C., referenced edition effective January 1, 1987, Rule 88.A.14.

[31] There is anecdotal evidence that this has happened; the assessment team could not document any specific examples.

requirements of the AAR specifications will only move if a separate agreement can be reached with each carrier involved in the haul. It must be clearly understood that DOT does not imply a violation of law or policy based on AAR's adoption of section 2.3 of the Tank Car Manual or Interchange Rule 88.A.14; both are a developed response of many years' standing to a requirement of the Interstate Commerce Act. It does, however, buttress the urgency of DOT oversight of TCC functions: both the facts and the appearance of TCC regulatory implementation activities must be of the highest caliber.

Chapter 3, Specifications for AAR Tank Car Tanks: With a few exceptions, tank cars built to AAR specifications cannot be used for hazardous materials; the AAR construction standards are very similar to the DOT specifications but usually do not include radioscopic examination of the welded seams or full post-weld heat treatment. Included in this chapter are specifications for AAR-203W, -211W, -204W, -206W, -207W, and -208W tanks; the specification numbers follow the DOT scheme.

Chapter 4, Acceptability of Tank Containers and Tank Trailers: This chapter contains industry standards for intermodal portable tanks, and for highway tank trailers to be

moved in trailer-on-flatcar (TOFC) service.[32]

Chapter 5, General Design and Test Requirements: AAR's general requirements cover items such as tank car heater systems, placard holders, lifting provisions, tank anchors, head shields, and auxiliary compressed gas cylinders.

Chapter 6, Car Structure Design and Test Requirements: This chapter cross-references the tank car standards with the general freight car standards; it also describes the methods for testing design loads.

Appendix A, Tank Car Valves and Fittings: This appendix contains requirements for the design, testing, construction materials, and marking of tank car valves and fittings. Because valves and fittings must be approved by the Tank Car Committee, this appendix also provides a reference to the applicable approval procedures.

Appendix B, Certification of Facilities: AAR requirements relating to the certification of facilities for fabrication, assembly, alteration, conversion, repair, and associated testing of completed tank car tanks are in this appendix. Certified facilities are listed according to the category of work and the materials of construction for which they are approved.

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[32] While 49 C.F.R. § 174.61(c) allows cargo tanks containing hazardous materials in TOFC service "under conditions approved by the Federal Railroad Administrator," AAR's TOFC/COFC Interchange Rules (Rule 9) prohibit such movements.

Appendix C, Marking of Tank Cars: This appendix describes the AAR requirements for stenciling and stamping tank cars. "Stamping" requirements include a list of the regulatory elements which must be physically metal stamped into a tank, including tank specification, material, tank builder's initials, date of original test, and the water capacity in gallons or liters for non-pressurized cars and in pounds or kilograms for pressure cars.

Appendix D, Retest and Reinspection Requirements: The majority of this appendix is a reprint of 49 CFR Section 173.31; additional material includes a form ("Certificate of Test Form") for recording retests.

Appendix E, Design Details: The information in this appendix includes standard dimensions and tolerances, the design of manway covers, vertical curve clearance requirements, joint efficiencies, bottom discontinuity protection, and the limiting dimensions for placard holders.

Appendix H, Basic Philosophy and Principles For the Metrication of the AAR Specifications for Tank Cars: In this appendix are the guidelines for converting the specifications from conventional units to SI units. (SI is the official abbreviation for the International System of Units, a modernized version of the centimeter-gram-second system.)

Appendix L, Interior Cleaning, Lining and Coating: Appendix L describes industry requirements for the application,

stripping, and cleaning of interior linings for tanks and coatings for valves and fittings.

Appendix M, Specifications for Materials: Contained in the text of this appendix is a listing of materials approved for various tank car applications. The appendix also establishes the procedure for obtaining approval of a specification material proposed for tank car construction.

Appendix R, Repair, Alteration and Conversion to Tank Car Tanks: In these specifications, "repair" means the reconstruction of a tank to its original design; "alteration" is a change in the tank or its fittings that does not change the specification but does change the certificate of construction, and "conversion" means changes in the tank or fittings that change the specification. Appendix R defines these terms and sets the standards for their application. The specification also explains the requirements for welding and for repairs of various types.

Appendix S, Loading Appurtenances for Tank Cars: The appendix describes requirements for ladders, platforms, railings and handholds for use by personnel loading and unloading tank cars; it supplements material contained in the safety appliance standards, 49 CFR Part 231.

Appendix W, Welding of Tank Car Tanks: Tank car fusion welding requirements are the subject of this appendix. Appendix W sets the standard for judging facilities seeking

status as certified welding shops. The standard is comprehensive and includes guidelines on radioscopy, penetrameter use, and fabrication techniques. Welding shops are required to maintain records of the qualifications of their welders, and each welder is assigned a number; the tests given by one shop do not qualify a welder to work for another without a retest.

THE TANK CAR APPROVAL PROCESS - INTRODUCTION:

The DOT Specifications for Tank Cars contain three primary references to the Tank Car Committee: approvals for construction; procedures for repairs or alterations; and changes in tank car specifications. The first two of these are substantial delegations of authority and the third is a designation of special status in potential administrative rulemaking proceedings.

An understanding of these features of the regulations and how they work in practice is vital if the system is to be effectively monitored.

Tank cars carrying hazardous materials must be built to meet a DOT design specification.[33] The specifications are developed in administrative rulemaking proceedings and published in Part 179 of the regulations.

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[33] As one minor exception, a few hazardous materials are authorized for transportation in tank cars certified to an AAR specification.

Where an applicable specification exists, Section 179.3 sets out the procedure for obtaining approval to build tank cars under it. Where no specification exists, Section 179.4 contains the procedure for establishing one. Where a tank car is in need of repair, alteration, or conversion, Section 179.6 points to Appendix R of the AAR Tank Car Manual for the required procedure.[34]

Changes in Tank Car Specifications:

The "no specification" situation is not, strictly speaking, a delegation of authority, but it serves well to illustrate the character and historical closeness of the relationship between AAR and the government. Section 179.4 states:

> Changes in specifications for tank cars
>
> (a) Proposed changes in or additions to specifications for tanks shall be submitted to the Secretary, Mechanical Division, AAR, for consideration by its Committee on Tank Cars. An application for construction of tanks to any new specification may be submitted with proposed specification. Construction should not be started until the specification has been approved or an exemption has been issued. When proposing a new specification, the applicant shall furnish information to justify a new specification. This data should include the properties of the lading and the method of loading and unloading.
>
> (b) The Subcommittee on Specifications of the Committee on Tank Cars shall review the proposed specification at its earliest convenience and report its recommendations to the Committee on Tank Cars for prompt consideration. The Committee on Tank Cars shall report its recommendations through said Secretary to the Department; such reports may be submitted to the Bureau of Explosives for its recommendation before action by the Department. Expert

[34] Part 179 also contains important references to eight of the eleven appendices to the AAR Tank Car Manual.

opinion thus obtained will be given due consideration by the Department in determining appropriate action.[35]

Section 179.4 is an anomaly in administrative rulemaking: "Typical" procedures call for the Administrator of RSPA to initiate rulemaking "on his own motion," although consideration may be given to recommendations from "any technical advisory body established by statute for that purpose."[36] Here, a special status is granted the Tank Car Committee, something like a "filter" for RSPA in considering proposed changes to the tank car specifications. It is clear, from the "...due consideration..." language in subparagraph (b), that the intention is deliberate.

It is also clear that the Department does not construe the procedure established in section 179.4 as a limitation on its rulemaking authority. While it is conceivable that the proponent of a new tank car specification could seek formal review of TCC action (or inaction) under the Administrative Procedure Act,[37] DOT sees the Committee as a source of advice in this area and not as a constraint on its jurisdiction. The Department need not wait for the completion of section 179.4 review by the Tank Car Committee before reaching a decision.[38]

As a practical matter, new tank car specifications are now

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[35] 49 C.F.R. § 179.4.

[36] 49 C.F.R. §§ 106.11 and 106.13.

[37] 5 U.S.C. § 551 et seq.

[38] See 49 C.F.R. §§ 106.31 and 106.33.

extremely rare and the anomalies of tank car specification setting need not detract from the major purpose of this report.

Approval for Construction:

Construction of a tank car is typically preceded by the filing of an Application for Approval on AAR Form 4-2.[39] The regulations state:

> Procedure for securing approval
>
> (a) Application for approval of designs, materials and construction, conversion or alteration of tank car tanks under these specification, complete with detailed prints, shall be submitted in prescribed form to the Secretary, Mechanical Division, AAR, for consideration by its Committee on Tank Cars and other appropriate committees. Approvals or rejections of applications, based on appropriate committee action, shall be issued by said Secretary.
>
> (b) When, in the opinion of the Committee, such tanks or equipment therefor are in compliance with effective regulations and specifications of the Department, the application will be approved.
>
> (c) When, in the opinion of the Committee, such tanks or equipment therefor are not in compliance with effective regulations and specifications of the Department, the Committee may recommend service trials to determine the merits of a change in specifications. Such service trials may be authorized by the Department under the terms of exemptions.[40]

To implement its responsibilities for approving applications for new construction, AAR Tank Car Committee staff members outlined these steps for the audit team:

1. The builder submits an application on AAR Form 4-2 to the Secretary, Mechanical Division, and to the Bureau of Explosives and to each member of the Tank Car

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[39] An example is attached as part of Appendix B.

[40] 49 C.F.R. § 179.3.

Committee (except the Railway Progress Institute member).

2. The application is recorded by AAR/TCC and is placed in a folder awaiting TCC comments.

3. TCC, BOE, and Mechanical Division review the application for compliance with DOT requirements and AAR procedures. A period of 45 days is allowed for comments and any comments made must be sent to the applicant as well as the other members of the Committee.[41]

4. TCC members vote by letter ballot (or make no response).

5. Any negative vote indefinitely delays the application. The proponent is notified and has 30 days to respond. Copies of the negative vote and reasons for denial are distributed to all TCC members, the BOE, and the Mechanical Division (again, the RPI representative does not receive a copy). Responses from the car builder are distributed in the same manner.

6. Applications are approved only when a majority of the ballots are received (one more than half the number of members on the Committee) and there are no negative votes. There is some question about the actual effect of negative votes: AAR staff told members of the assessment team that negative votes hold up approval until the reasons for the vote are resolved; the Manual and a submission by AAR to the National Transportation Safety Board[42] say that the Chairman, the BOE, and the Mechanical Division can state a negative vote based on a violation of the regulations or a hazardous condition and this causes a reappraisal by Committee members previously voting to approve the application; and section 1.4.2.2 of the Manual states, "Approval of an application requiring Tank Car Committee ballot must be by majority vote ...." The assessment team believes that the "unwritten procedure" actually followed is that a majority vote prevails, but that unresolved negative votes -- especially those based on violation of the regulations or hazardous condition -- will delay

[41] AAR, Specifications for Tank Cars, § 1.4.2.2.1.

[42] The text of AAR's submission to the NTSB is attached as Appendix A.

even majority approval until they are resolved.[43]

7. Actions of the Tank Car Committee are subject to review by the General Committee of the Mechanical Division. It is presumed that a party unsatisfied with the actions of the Tank Car Committee could appeal them to the Division's General Committee and, from there, to the General Committee of the Operating-Transportation Department of the AAR. Appeals to the Division level are rare and appeals above that level even rarer, but they have happened in technical areas other than tank cars.

8. After the tank cars are built, the "Certificate of Construction" is signed and becomes part of the cars' permanent record.

The Certificate of Construction (actually Form AAR 4-2 with the bottom portion completed and signed by the builder) is furnished to the car owner and to AAR, "certifying that the tank, equipment, and car completed comply with all the requirements of the specification."[44] Where an owner who is not the builder furnishes the valves and/or safety devices, the owner must also furnish a form to the same parties certifying that the appurtenances comply.[45]

Except that the Certificate must be completed and furnished to the appropriate parties before the car is placed in service, there is no required sequence for these events; cars can be, and

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[43] Whether or not a "resolution" of negative comments requires a revised application is unclear; it is one of the areas that will be examined more closely in subsequent audits of the TCC's operations.

[44] 49 C.F.R. § 179.5(a).

[45] 49 C.F.R. § 179.5(c).

are, built on "speculation" and applications for approval submitted after the car has been ordered by its new owner, to be equipped with those "customized" features necessary for the intended lading. Where this is done, it is at the peril of the builder. There is always the possibility that the Committee will not approve the car, for example, because a required grade of steel has changed since the shell was fabricated.

Precedent Approval:

For construction of cars built to designs already approved, AAR has a procedure which eliminates the time and effort consumed by full Committee review. It is known as "precedent approval" and it is handled through the Secretary of the Mechanical Division. Essentially, this process requires the applicant to submit the usual forms and drawings, but to reference earlier approvals and to request approval by precedent.[46] Staff at the AAR verifies the references cited and the Mechanical Division Secretary signs the application on behalf of the Committee.

Some design differences, alterations from the approved precedent, are allowable; they include tank volume changes due to longitudinal dimension changes, changes in heater coil systems, a

[46] AAR, Specifications for Tank Cars, § 1.4.1.2. Drawings used as precedents must have been submitted within the past five years, § 1.4.3.1.1.6.a.

reduction in tank capacity, and changes in insulation material.[47] However,

> The office of the Secretary or member of the Tank Car Committee may elect to request Tank Car Committee ballot on an application requesting precedent approval. Such a request must be made within 30 days of receipt of application.[48]

Approval for Alteration, Conversion, or Repair:

Procedures for these processes are explicitly delegated to the AAR by 49 CFR section 179.6, which states:

> For procedure to be followed in making repairs or alterations, See Appendix R of the AAR Specifications for Tank Cars.[49]

When alterations, conversions, or repairs are made to tanks using procedures and materials previously approved, the company doing the work must file a report, known as an Exhibit R-1 Report, with the car owner, and the AAR. The Exhibit R-1 Report[50] is a simplified record of what was wrong with the car and what was done to correct it. At the option of the Secretary of the Mechanical Division, Exhibit R-1 Reports may be submitted to the Tank Car Committee for review.[51] The Exhibit R-1 Report becomes a permanent part of the historical record of each DOT

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[47] AAR, Specifications for Tank Cars, § 1.4.1.2.

[48] AAR, Specifications for Tank Cars, § 1.4.2.1.

[49] The same text appears at 49 C.F.R. § 173.31(f)(1).

[50] A copy is attached as part of Appendix B.

[51] AAR, Specifications for Tank Cars, § R4.02.

specification tank car.

Alterations, conversions, or repairs requiring new procedures or materials must be submitted following the procedures for new construction, with Committee handling as previously described.[52]

ADDITIONAL ASPECTS OF THE APPROVAL PROCESS: SERVICE TRIALS

Even though a car or its appurtenances is in compliance with AAR specifications and DOT regulations, the Committee may order "service trials" when, "in the opinion of the AAR Tank Car Committee some component should be subject to a period of surveillance and evaluation ...."[53]

Service history for a component covered by an AAR service trial authorization is maintained by the owner and periodic reports are submitted to the AAR as prescribed by the TCC.

Service trial data must be submitted to AAR on Form AAR 4-4, "AAR Tank Car Service Trial Report"[54] at six month intervals on April 1 and October 1 of each year. Failure to submit the report may result in cancellation of the service trial authorization.

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[52] AAR, Specifications for Tank Cars, § R4.01.

[53] AAR, Specifications for Tank Cars, § 1.4.3.3.2.

[54] A copy of the report is attached as part of Appendix B.

ADDITIONAL ASPECTS: CERTIFICATION OF FACILITIES

Although only indirectly part of the DOT regulations, the AAR requirements for certifying facilities to build or repair tank cars are obviously key elements in TCC's role in implementing the hazardous materials regulations.[55]

AAR certified facilities must be capable of performing, or arranging to have performed, all relevant tank car repairs and assembly so that the completed car will be in compliance with DOT regulations and the AAR Interchange Rules. All work performed by an outside subcontractor remains the responsibility of the AAR certified facility and must be verified for compliance with all applicable specifications and regulations.

Welders at the certified facility must be "performance qualified" and there must be, on staff or directly available, a welding inspector qualified under the American Welding Society or the Canadian Standards Association, as appropriate, and a radiographer qualified by the American Society for Nondestructive Testing. In addition, there is also a list of the minimum

[55] 49 C.F.R. §§ 179.100-9 and 179.200-10 require welding to be done in accordance with Appendix W of the Manual. That appendix, in turn, mandates that certified welding can only be done in a certified shop. The Appendix B requirements and procedures for certified shops are thus part of the DOT regulations, even though the regulations never directly mention Appendix B. Appendix R, dealing with repairs, also references Appendix B. For easy reference, AAR certified facilities are listed in Table B-1 of the Manual, grouped according to by specification categories, material groups, and facility class.

equipment which certified facilities must possess.[56]

To become certified, a facility submits an application to the Director-Technical Committees, Mechanical Division, AAR with a copy to each member of the TCC (except the RPI representative). If the AAR Research Laboratory is to be used for checking the welder's test results, a copy of the application and specimens in compliance with Appendix W of the Tank Car Manual must be forwarded to the Laboratory in Chicago, Illinois.

The application must include an inventory of equipment, a list of the current qualification test for each welder employed at each facility, a description of the quality control program and the system for calibration of testing and measuring equipment, and a statement that the facility possesses the latest published volumes of both DOT and AAR regulations/specifications.

The Director-Technical Committees reviews the completed application. If all requirements appear to have been met, the AAR Manual requires the Director to appoint a task group to evaluate the facility involved. Upon the recommendation of this task group, the TCC will authorize certification.[57]

The initial certification of a facility is conditional. After receipt of conditional approval, the facility is required to advise the Director-Technical Committees regarding the first

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[56] AAR. Specifications for Tank Cars, § B4.02.

[57] A copy of a suggested shop evaluation form is attached as part of Appendix B.

tank car in process. At the discretion of the TCC, and upon the recommendation of the evaluating task group, this first car is subject to inspection. Based upon that inspection, final action will be taken by the Committee to remove conditional status. Conditional certification will lapse if there is no shop activity on a tank car within two years. If a lapse occurs, certification proceedings must be started again.

A facility rejected for certification or recertification is not eligible to reapply for six months after the date of notice of rejection. Reapplication procedure is a repeat of the requirements for original application.

Facilities are required to be recertified at intervals of five years and the facility is responsible for initiating the recertification procedure six months prior to expiration. A change in ownership of a certified facility requires reconsideration of certification; the new owners must make application for recertification within 90 days of acquisition.

The AAR assesses an initial minimum charge of $500 for certification or recertification, to apply toward the expenses incurred by the task group. A supplemental invoice can be issued for any expense incurred in excess of the initial charge.

ADDITIONAL ASPECTS: CANADIAN AND MEXICAN INVOLVEMENT

The Canadian Transport Commission, now a part of the National Transport Agency, has the responsibility for tank car safety in that country.[58] For the most part, CTC has agreed with the regulations promulgated by DOT.

The Canadian delegations of authority to AAR are virtually identical to those of DOT. Part 79 of Canada's Dangerous Commodities Regulations (the Specifications for Tank Cars) is very close to DOT's Part 179 and, until recently, the two texts were identical. The differences remain slight: Where DOT regulatory specifications now require head shields on newly built cars, Canada requires a shield over the full surface of the head while DOT permits either a trapezoidal shield or one that covers only half the head. Canada also requires orange bands one foot in width on its Class 2 compressed gas tank cars. There is no similar United States requirement. Canadian regulations allowed more time for compliance with thermal shielding requirements than did DOT. Finally, Canadian regulations prohibit the use of ASTM A515 steel for newly built tank cars. U.S. interests are reviewing current steel requirements, but have not excluded this steel yet.

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[58] Canadian Transport Commission, "Regulations for the Transportation of Dangerous Commodities by Rail," Revised July, 1986.

Even without special agreements or protocols between the governments of the United States and Canada, communications are maintained between senior staff members of FRA/RSPA and their Canadian counterparts. Exchanges on matters pertaining to tank cars and hazardous materials/dangerous goods transportation are free and open and cooperation at the staff level is good.

As this report is written, Mexico has begun to promulgate hazardous materials commodity identification requirements. There is significant chemical and petroleum traffic north and south across the border with Mexico which must, and does, meet United States/Canadian standards; Mexican transportation interests are active in North American hazardous materials information exchanges. There are several AAR certified tank car repair facilities in Mexico that are monitored by the Tank Car Committee.

PART THREE:
THE TANK CAR COMMITTEE:
Process and Operations

THE ASSESSMENT PROCESS

Late in 1983, the Federal Railroad Administration began to reassess the Department's relationship with the TCC. Somewhat thereafter, FRA and the Research and Special Programs Administration agreed to form a joint task force to assess the functioning of the Committee and the policy premises behind its long standing relationship with government regulatory agencies. That assessment was prompted by three considerations:

- A concern by the Administrators of the two agencies that, while the structure of the relationship between the Department and the Committee had not changed, a significant gulf had, in practice, developed between them, resulting in the TCC functioning independently of -- rather than as an extension of -- the Department.

- The friction that arose when FRA attempted to reassert its role as an active participant in Committee deliberations.

- A general concern about the adequacy of TCC record keeping.

Shortly after the decision to reassess the relationship was made, the Department's concerns were intensified by the discovery, early in 1985, of an error made by the Committee in approving the construction of a tank car with fittings welded directly to the shell in violation of DOT regulations. That

error resulted in DOT's ordering the recall and retrofit of more than 10,000 tank cars.

The assessment team, named in 1986, was comprised of representatives from the FRA and RSPA. The National Transportation Safety Board was invited to participate in the assessment but declined to do so for the most part. NTSB participation was limited to the attendance of one staff member at part of an Association of American Railroads introductory session and at the subsequent interview of a former TCC official.

By letter dated October 9, 1986, DOT announced to AAR that the agency would conduct an audit focusing "on how FRA and RSPA can be certain that newer tank cars are actually being built and maintained in compliance with DOT regulations."[59]

While the primary thrust focused on a "quality-control" assessment of new car construction, the review team also investigated AAR's internal processing of applications for construction, alteration, and repair.

The audit began in January, 1987, and the field work ended in mid-August. The team consisted of FRA senior staff and field inspectors and staff from RSPA. During its investigation, the team:

- Reviewed Tank Car Committee records at AAR's Washington, DC headquarters;

[59] Letter from FRA and RSPA Administrators John H. Riley and M. Cynthia Douglas to AAR President William H. Dempsey, October 9, 1986.

- Reviewed tank car applications for construction;
- Personally interviewed about half of the Committee members;
- Reviewed records of facility certifications; and
- Conducted on-site inspections of certified shops, virtually all of them unannounced.

THE RESULTS OF THE AUDIT:

Processing Applications for Construction:

The audit team selected and reviewed a random sample of tank car applications for the period 1980 through 1986 to learn how TCC members and the involved AAR staff actually managed the procedure. Applications were examined for completeness, timeliness, and compliance with both DOT requirements and AAR procedures.

The Tank Car Committee approved the following number of applications for each year between 1980 and 1986:

1980 -- 893	1981 -- 740	1982 -- 437
1983 -- 279	1984 -- 381	1985 -- 454
1986 -- 392		

Out of the eleven "official" (or voting) members on the Committee during the audit period, an average of just six or seven actually responded to any particular application. Certain members, mostly the representatives of the shipper organizations, were conspicuously more active in responding to applications and in submitting their views by letter ballot. The remaining

members rarely voted for the record.

As part of this review, FRA learned that there have been instances in which the 45-day deadline for responses by Committee members expired without sufficient votes to approve an application. AAR staff then telephoned members who had not responded, seeking a verbal approval for that particular application. The voice vote thus obtained might or might not be confirmed in writing. One of the reviewed applications had received both affirmative and negative votes, including some written objections. The applicant made a partial response but the audit team could not determine, because the application was amended and the records incomplete, if all Committee members were aware of how the builder had responded.

The assessment team found occasional examples of the improper use of AAR's delegated authority, including:

- Approval of an application for construction of a car which would not be in compliance with existing DOT regulations but as to which there was a pending ungranted petition for exemption from certain Federal requirements. The team could not verify that AAR had followed up to learn if the exemption had been issued before it granted approval.

- Granting approval to a car builder to mark two cars as Class DOT 105A, when both cars met the requirements for Class DOT 105J; this is contrary to 49 CFR Section 179.106-4(b).

- Approval of an application for which the records showed the favorable votes of only four letter ballots.

Deadlines established by the Tank Car Manual are generally met, although the AAR staff seems willing to allow a denied

application to remain pending for longer than the 30, plus 10, days specified in section 1.4.2.3. of the Manual.

The entire documentation showing an application's history is maintained by the AAR staff for a five year period.[60] Completed certificates of construction are maintained indefinitely. Applications are currently on file from 1980 to the present while AAR considers the issue of storing applications for longer than the present policy limit.

Meetings and Minutes:

Tank Car Committee business is conducted at meetings held each quarter of the year. The Committee meets at least twice a year, in the spring and fall, at which time all members are present. The subcommittees also meet twice a year (summer and winter) to consider technical matters in some detail.[61] Because non-committee members are a significant part of the membership of the subcommittees, these meetings are usually considerably larger than "official" Committee meetings. The only voting performed during full Committee meetings is that which relates to specially docketed issues such as changes to the Tank Car Manual, responses to DOT rulemaking proceedings, and petitions to DOT for

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[60] AAR Mechanical Division Circular Letter c-6993, dated July 10, 1984. A copy of AAR's recommended document retention times is attached as Appendix E.

[61] At the July, 1988, meeting attended by DOT representatives, the subcommittees met for a day and a half and the Committee met that afternoon and the following morning. The TCC chairman said that this is now the normal practice.

amendments to the regulations. Tank car applications may come before the subcommittees or the full Committee, but almost always only as part of the internal appellate procedure described in the Manual.

When audit team members were allowed to see minutes of meetings, both Committee and subcommittee, they found the records brief to the point of sketchiness. On several matters relevant to delegated authorities, minutes were determined by AAR to be "unavailable."

Approval Based on Precedent:

The AAR Manual permits, as described earlier, applications for tank car construction to be approved on the basis of precedent: if a design feature has once run the gauntlet of the Committee, the next time through, the proponent need only reference the earlier review. While this is not contrary to the DOT requirements in section 179.3, the audit team found that precedent drawings are no longer being checked by either the TCC as a whole or by the AAR staff to determine if there have been additions to, or deletions from, the originally approved drawings. It is possible for the Secretary, Mechanical Division, to approve an application under a precedent approval request without consulting either the TCC or those on the AAR staff with

special expertise.[62]

Tracking Tank Car Committee "Approvals":

DOT's Specifications for Tank Cars (Part 179) use the word "approved" -- meaning "approval by the AAR Committee on Tank Cars" -- over 100 times. As examples:

- § 179.12-1 (a) Interior heater systems shall be of approved design . . ..
- § 179.100-14 (a) If indicated in 179.101, tank may be equipped with a bottom washout of approved construction.
- § 179.200-4 (a) If insulation is applied, the tank shell and expansion dome when used must be insulated with an approved material.[63]

Despite the importance of this function, it has been many years since AAR maintained a separate list of the approvals it has rendered; or a catalogue of approved valves, fittings, materials, methods, and designs; or a master list of precedents against which approval can be requested. The only way to determine whether approval has been granted is to go through the applications until an example can be found.

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[62] As described earlier, any member of the Committee may request letter ballot approval on an application submitted for precedent approval. AAR, Specifications for Tank Cars, § 1.4.2.1.

[63] "Approved" is defined at 49 C.F.R. § 179.2(a)(2). A list of the sections granting TCC approval functions is attached as Appendix C.

Repairs, Fabrication and Facility Certification:

The audit team reviewed the TCC's records concerning tank car repairs and found: Exhibit R-1 forms are not being effectively reviewed; unsigned forms; forms with out-of-date drawings listed as precedent; and forms which did not show the applicable car reporting marks.

As part of this audit, and to determine compliance with the requirements of Appendices B and W of the Tank Car Manual, FRA conducted 13 inspections of AAR certified fabrication and repair facilities.[64] The following deficiencies were noted:

- One facility, in the process of financial reorganization, failed to file the required forms for the period 1982-1984.
- Exhibit R-1 forms have been filed by companies other than those performing the work.
- Exhibit B-1 forms (the Subcontractor Evaluation Sheet) are not being prepared for each outside subcontractor at about half the facilities inspected.
- X-Ray work performed by subcontractors was not in compliance with AAR requirements because the penetrameters were not located on the side closest to the radioactive source as required by Section W11.02(d) of the Manual. This problem appeared in about half the shops visited.
- The drawings being used for conversions at one facility were over five years of age and thus beyond the allowable age limit.
- Internal inspection of tank cars more than ten years old was being performed at one facility by having a

[64] Twelve of the inspections were unannounced; for reasons of international courtesy, the Canadian facility inspected by the team received about a week's notice.

technician place his/her head into the manway opening and shining a light around the inside of the tank. Good practice involves a closer inspection than that.

- A facility was discovered using a welder whose certification had expired.

- One builder not only built cars before the application for construction was approved -- not technically illegal -- but stenciled them with DOT markings and had some of them moved to a plant for loading, both clearly in violation of the regulations. (In this case the builder was able to "catch" the cars and advise the shipper not to load them until a proper certificate of construction had been furnished.)

- At several facilities the forms are mailed in batches, allowing tank cars to be repaired and returned to service before the Exhibit R-1 is submitted.

Adherence to the requirements of the AAR Facility Certification Program was not uniform and seemed to vary in relation to the size of the facility and the amount of work it performed. The larger fabrication/repair facilities had all of the required information on hand and appeared to be following most of the procedures contained in the AAR Tank Car Manual. The smaller facilities, by and large, were not following these procedures. The specific problem areas found most often were current welder qualifications, proper X-Ray procedures, and current and properly formatted Exhibit R-1 and B-1 forms.

While conducting a review at the AAR's headquarters it was determined that, since 1983, the AAR has retained as a consultant a retired tank car Committee member and railroad mechanical officer. This person, rather than the task group required by Appendix B, Section B5.03(a), performs inspections of fabrication

and repair facilities to determine their compliance with the Manual and with the regulations. In the past, this was performed by active TCC members. While inspection by a single person can yield fully acceptable results, DOT notes with concern that one benefit of a task group is that it brings a broad range of expertise to bear on a subject.

Reports prepared by AAR's consultant for certification and/or recertification of facilities were very brief and, in some cases, incomplete. Further, the audit team found no record of TCC follow-up to determine if exceptions to both DOT and AAR requirements were corrected.

Upon receipt of the consultant's report, the Secretary distributes it to Committee members who then vote. A review of ballots cast under Appendix B procedures revealed that one facility had some negative ballots in the folder and yet had been approved with no explanation either in the file or from the AAR. Another facility was recertified with no ballots in the folder; again, no explanation could be given.

Since 1976, two facilities have been denied approval. They both failed on their first attempt and neither reapplied. Despite railroad and shipper reports to AAR of below par work, the audit team came away from the Association's headquarters with the definite impression that even grave exceptions to the certification requirements would not cause AAR to withdraw an Appendix B certification.

PART FOUR:
FINDINGS

Tank cars have been subject to the pressures of safety and economy for more that 120 years, and to regulation by the Federal government for about half that period. The improvement in their record of safely moving dangerous chemicals speaks well for those who have participated as designers, users, loaders, builders, carriers, inspectors, and regulators.

A generally good record, even an improving one, is not sufficient where the safety of human life is in the balance. As just one example, a widely used book of railroad operating rules opens with the statement: "Safety is of the first importance in the discharge of duty. Obedience to the rules is essential to safety and is required."[65]

The FRA/RSPA assessment team identified problems with the AAR Tank Car Committee, both in what it has done and in the way it has done it. Rather than list each separate deficiency found during the first general audit the Department of Transportation has conducted of the AAR Tank Car Committee, we have prepared "Findings" along more general lines in the expectation that, when DOT and the TCC discuss these broad areas and move to implement the resultant recommendations, real improvement will result.

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[65] Association of American Railroads, Operations and Maintenance Department, Operating-Transportation Division, The Standard Code of Operating Rules, Washington, D.C., 1965, p.4.

The Concept of Delegation:

The reasons that led the ICC to adopt the original TCC delegation remain valid. In its role as policy advisor, the Committee gives the Department access to a level of experience and expertise that does not exist within the Department, and could not easily be duplicated in a governmental agency. In its implementation role, the Committee gives the Department -- at no cost to government -- a cadre of experienced personnel to sustain the burden of reviewing drawings, certifying facilities and maintaining records. As a consequence, in addition to providing Federal agencies with expertise, the delegation conserves public resources for application to other safety sensitive areas.

We find the concept of utilizing the Committee as an extension of the regulatory agency to be sound; what is not sound is the manner in which the delegation is now being conducted. This report recommends ways to improve implementation of that delegated authority. If improvements are not made, or if they prove insufficient, this report leaves open the door to other approaches to ensuring that tank cars are built, repaired, and maintained in accordance with the mandates of the Department of Transportation's regulations.

The Committee's Performance:

From a bottom-line results perspective, the performance of the Committee over time is difficult to criticize. The Committee has served as policy counselor to the Department through a period

in which there has been intense activity on many fronts and a marked improvement in railroad hazardous materials transportation safety.[66] There has not been a fatality in a chemical release in nearly a decade -- a sharp contrast to the one year high of 22 established in 1979. Studies done for the AAR and the Railway Progress Institute conclude that the regulatory changes adopted by the Department, combined with decreasing railroad accident frequency, have led to a marked improvement in safety. For instance, for retrofitted pressure gas tank cars:

> the effectiveness of the safety features are:
> 94% toward preventing head punctures.
> 93% toward preventing (or considerably delaying) ruptures due to fire.
> 67% toward preventing shell punctures.
>
> The effectiveness of all the safety features combined toward preventing all punctures and ruptures is 88%.[67]

Over the same period, the Committee has, in its administrative capacity, reviewed and processed more than 3,500 applications for

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[66] Many factors have contributed to improvements in tank car safety since the early 1970's: regulatory and enforcement actions taken by DOT agencies, NTSB investigations and recommendations, Congressional concerns, and a growing public demand for better performance.

[67] E.A. Phillips and H. Role, "Effectiveness of Shelf Couplers, Head Shields, and Thermal Shields on DOT 112(114) and 105 Tank Cars," Report No. RA-02-5-51 (AAR R-610), RPI-AAR Railroad Tank Car Safety Research and Test Project, June 13, 1985, p. 15. See also, E.A. Phillips and H. Role, "Analysis of Tank Cars Damaged in Accidents 1965 through 1986, Documentation Report," Report No. RA-02-6-55 (AAR R-709), RPI-AAR Railroad Tank Car Safety Research and Test Project, January 30, 1989, pp. 16-17, in which an even higher figure for head puncture resistance is noted.

alteration or new construction.

The assessment found little to criticize in the Committee's performance of its policy counselor role. But on the implementation side, notwithstanding the quantifiable progress resulting from its efforts, the Committee has made mistakes. The assessment identified approximately a half dozen cases in which the Committee violated either its own procedural standards or DOT substantive regulations in granting approval for construction or modification. At least one of those errors was significant, resulting in the recall and retrofit of more than 10,000 tank cars.

The assessment team analyzed the errors it found and we reached the conclusion that they stemmed more from human judgments than from any factor inherent in the structure of the Committee. However, the chance of error is materially enhanced by the Committee's poor record keeping and less than rigorous adherence to its own procedural requirements. We likewise found that the unacceptable distance that has developed between TCC proceedings and DOT oversight has increased the probability that an error, once made, will escape detection.

DOT Oversight:

From the issuance of the ICC's initial specifications in 1927 until the creation of the Department of Transportation in 1967, the relationship between the Federal government and the TCC remained basically unchanged. The ICC construed the language of

the Explosives Act[68] quite literally and turned tank car activity over to the Bureau of Explosives[69] and the TCC. However, the ICC was represented at both Committee and subcommittee meetings; its delegate was not a voting member of the Committee, but did participate in the review of matters within the scope of the delegation. This observer status was consistent with the nature and objectives of the delegation; it respected the distinction between rulemaker and advisor while ensuring that the ICC remained informed of and involved in the Committee's deliberations.

With the transfer of safety jurisdiction from the ICC to the DOT, a DOT representative replaced the ICC delegate as a member of the TCC and participated in much the same way as his ICC predecessor. For reasons that are not entirely clear,[70] the relationship between DOT and the TCC began to deteriorate in the late 1970's, and that deterioration escalated in the period 1980 to 1983. The Committee barred DOT representatives from all TCC

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[68] The Explosives and Other Dangerous Articles Act, 18 U.S.C. §§ 831-837. Sections 832-836 were repealed by Pub.L. 96-129, Title II, § 216(b), Nov. 30, 1979, 93 Stat. 1015. Section 837 was repealed by Pub.L. 91-452, Title XI, § 1106(b)(1), Oct. 15, 1979, 84 Stat. 960.

[69] See "Part One: A Brief History of Tank Cars," infra., for more information about the Bureau of Explosives.

[70] Part of the difficulty in recreating history here is that crucial pieces of it are lost due to the death or retirement of key persons and their propensity, when active in this area, to maintain no written records of their activities and decisions.

deliberations other than "open sessions." It did not provide DOT with regular notice of matters discussed during closed deliberations, even when those matters fell within the scope of the delegation. DOT was denied the right to review TCC files and was permitted to receive file documents only upon special request for specific documents. While these changes occurred gradually over a period of years, the Department does not appear to have actively challenged them.

When, in late 1983, FRA sought to reassert its oversight role and resume direct review of tank car issues, the Committee resisted. It continued to bar FRA representatives from other than open sessions and refused to routinely provide DOT with copies of documents unless specifically requested to do so. It was this conduct that precipitated the decision by the FRA and RSPA Administrators to order this audit.

The growing separation between the Department and the Committee was more an evolution than a single, cathartic event; it occurred because the Department became increasingly passive in asserting its oversight role and because the members of the Committee lost sight of the nature of the delegation and sought to consolidate their power and independence. Whatever the reasons for the gradual drifting apart, the resulting situation is totally inconsistent with the proper functioning of a delegation of public responsibility. Moreover, the absence of a DOT representative at critical TCC meetings diminishes the

probability that any error made by the Committee will be discovered before it is embodied in a structure or a change in policy.

Record Keeping:

Like any other body utilizing precedent as a basis for current decisions, the TCC is highly dependent on the quality of its own records. And the quality of TCC record keeping is severely lacking.

The Committee maintains no files of the precedents against which approval may be requested. It maintains no lists of approvals from prior applications; the data shown on an application claiming precedent approval is the only clue that a drawing is current. Moreover, the only way to determine what type of materials, valves and appurtenances have been approved is to leaf through the thousands of applications on file until the appropriate document is found. These are only the most prominent examples of the record keeping problem; others could be cited.

The record keeping concepts utilized by the TCC are inconsistent with ready access to the data needed by Committee members to perform their responsibilities. This data base represents a potential source of error rather that a protection against it.

Facility Certification:

One of the Committee's most important functions is the certification of facilities qualified to perform tank car

construction, repair or modification. This is also the area in which the assessment team had the least confidence in the quality of the Committee's performance.

In the course of the assessment, the team conducted 13 inspections of AAR certified fabrication and repair facilities. While we discovered no problem serious enough to draw the facility's right to retain its certification into question, we discovered a series of procedural irregularities and some lesser substantive irregularities that suggest an overall laxness in the degree of TCC oversight. For example:

- We discovered many instances in which Exhibit R-1 reports (the basic documentation required for any welded repair or modification) were not prepared and filed by the facility actually performing the work.
- We noted one facility, in the process of financial reorganization, that had failed to file the required forms for the period 1982-1984.
- We noted instances of failure to prepare Subcontractor Evaluation Sheets (Exhibit B-1 forms) for each outside contractor.
- We discovered procedural errors ranging from x-ray work performed in violation of Tank Car Manual requirements, the use of welders with expired certification, to the use of "eyeball" rather than more technically correct inspections of tank car interiors.

While none of the conditions discovered led the assessment team to doubt the integrity of the cars or tanks at the shops when the inspections were conducted, they were evidence of a lax system of oversight in an area where loose procedures and passive oversight

are not acceptable.

Absence of Follow-up Check on In-process or Completed Cars:

The TCC uses two mechanisms to ensure tank car compliance with Federal standards:

- Mandatory review and pre-approval of construction applications, including drawings, and
- Certification of the facilities in which the work will be performed.

At no point after approval of the application does the Committee inspect the product itself. It is up to the builder to inspect the finished cars and certify that they comply with DOT regulations, AAR requirements and TCC approved drawings.[71] At lease in theory, the TCC facility certification process ensures that these inspections and certifications are performed in a fully professional manner.

It is legitimate to question whether the absence of any independent vehicle inspection either during or after construction represents a weakness in the system. A facility which makes an assembly error because it misunderstands a drawing may well fail to recognize that error in a subsequent inspection. Moreover, there are problems of appearance, at least, in placing sole reliance on the ability of tank car construction facilities

[71] The builder must sign the Certificate of Construction (Form AAR 4-2) noting compliance. In addition, marking the tank with the DOT specification number constitutes certification of compliance with Federal requirements. (See 49 C.F.R. § 179.1(e).)

to inspect and police their own work. In analogous areas, such as compressed gas cylinders and intermodal portable tanks, the use of independent inspectors on at least a spot-check basis is a common practice.

After considerable discussion, the assessment team decided not to include a specific recommendation to alter this aspect of the current system in its final recommendations. The primary reason for this decision was the fact that AAR had already acted to initiate changes aimed at resolving FRA/RSPA concerns about the practices discovered during the assessment. Those changes include having AAR personnel inspect tank car manufacturing and repair facilities; naming additional railroad employees to the Tank Car Committee; and commencing the microfilming of, and computer access into, tank car construction applications and repair records. We intend to evaluate implementation of those reforms on an ongoing basis, and for the moment reserve judgement on whether they are, in fact, sufficient to resolve our concerns. For the present, however, the reforms have sufficiently mitigated those concerns that we have elected not to incorporate specific recommendations for independent physical inspections in this report. However, this is an issue that the Department and the TCC should review as the process of tightening facility oversight progresses.

Procedures:

The assessment disclosed a number of instances in which the Committee departed from its own rules and procedures, and others where the rules themselves are subject to question. The discrepancies found were not major, but they do suggest the need to both review the practicality of the Committee's procedural rules and to pursue more methodical adherence to them.

In particular, the assessment team questions the provision permitting 50 percent plus one member of the Committee to constitute a quorum for approval of an application. In our view, the decision to accept membership on the Committee carries with it a responsibility to review those matters that come before the TCC for deliberation. We do not question the fact that an occasional need will arise for a member to be excused from a particular proceeding, but lack of participation should be the exception, not the rule, and procedures which routinely allow approval with only one more than half the members participating encourage inconsistent levels of involvement by committee members.

PART FIVE:
RECOMMENDATIONS

1. THE DEPARTMENT SHOULD CONTINUE, ON A PROVISIONAL BASIS, BOTH THE POLICY FORMULATION AND REGULATORY IMPLEMENTATION DELEGATIONS TO THE ASSOCIATION OF AMERICAN RAILROADS TANK CAR COMMITTEE.

Use of the TCC substantially increases the in-house expertise of the regulatory agencies and has the practical effect of establishing an administrative mechanism for implementing tank car regulations at no cost to the Government. These advantages alone weigh heavily in favor of the preservation of the delegations.

While the Committee has not been flawless in its judgments, the relatively few errors that have occurred stem not from the structure of the organization, but from the judgment of the individuals involved. We believe that implementation of the recommendations in this report will minimize to the extent possible the potential for recurrence of those errors.

If, however, the Tank Car Committee is not cooperative in implementing the recommended, or equivalent, improvements, or if the improvements are implemented but prove insufficient to rectify current or subsequently identified problems, the entire range of alternatives should be considered. This would include alternatives such as withdrawing the delegations to the TCC and performing all of its approval and certification functions within DOT and/or adopting a system in which a private, third party

would inspect tank cars during construction and repair.

2.WHEN THE TCC IS ACTING WITHIN THE SCOPE OF THESE DELEGATIONS, THE DEPARTMENT OF TRANSPORTATION MUST HAVE ACCESS TO EVERY MEETING OR OTHER PROCEEDING CONDUCTED AND EVERY FILE DOCUMENT MAINTAINED.

Whenever a governmental agency delegates authority to any private entity, it is incumbent on that agency to maintain a constant, close oversight of the delegatee's performance. A delegation of authority is not a delegation of the agency's responsibility to ensure that the functions delegated are administered in a manner consistent with the public interest. That responsibility remains with the agency and can only be fulfilled when the agency has complete access to meetings held and records compiled in performance of the delegation.

We recognize that occasions may arise when it is in the interest of all concerned to permit TCC members to deliberate in private on an issue. But the final decision on when that is and is not appropriate lies with the Department. The current situation, in which TCC personnel determine when the Department may or may not participate, is the antithesis of a proper relationship. When operating within the scope of its delegation, the TCC functions somewhat as a division of the Department. It is accountable to senior department officials who, in turn, have a responsibility to maintain oversight on the Committee as they would on any other arm of the Department.

We believe that the access issue is crucial. As advantageous as the delegations may be, their continuation without departmental access to meetings and files cannot be justified.

3. THE TANK CAR COMMITTEE MUST OVERHAUL ITS RECORD KEEPING SYSTEM TO ENSURE THAT COMMITTEE FILES CONTAIN THE INFORMATION NECESSARY FOR THE PROPER FUNCTIONING OF AN AGENCY WHICH DEPENDS UPON PRECEDENT.

In more than 100 references in the regulations, the TCC has been delegated authority to "approve" methods, designs, materials, valves and similar matters. Unfortunately, the Committee maintains no files on the actions taken pursuant to these sections. It must begin doing so without delay. TCC approval relies, at least in part, on precedent and tank car builders, owners and lessors have a right to consult the Committee's data base to determine the parameters of prior approvals and denials. Committee members need such information for the proper exercise of their authority and FRA/RSPA must be able to monitor the actions TCC takes in implementing the delegated authorities.

While most of the technical work of the Committee is done during meetings of the working groups and subcommittees, the minutes kept of those deliberations, presumably the basis for policy decisions by the Committee as a whole, are so brief as to be no more than memory aids for those who attended. The Tank Car Committee must maintain accounts of its deliberations and

decisions in sufficient detail to provide a basis for review and a foundation for future policymaking.

Applicants for approval to build tank cars frequently seek committee permission based on precedent, i.e., on previous approvals granted by TCC. To facilitate this process -- and to reduce the possibility of error by ensuring that precedents are available for review by Committee members -- records of precedent drawings must be maintained and cross-referenced to the applications which refer to them; these records should be kept for the life of the involved car(s). Certificates of Construction and any related Exhibit R-1 forms should also be maintained for the life of the involved car. This requirement should apply to both TCC and the car owner, with the owner transferring the documentation to any subsequent purchaser.

Finally, the TCC must improve two aspects of its record keeping regarding specific applications:

- It is imperative that the votes on a particular application be recorded, that changed votes also be recorded and that no application be approved until the required number of votes have been entered into the record.

- It is equally necessary that comments on each application, including negative or dissenting comments, be recorded and that the resolution of the negative comments be recorded.

4. THE MINIMUM NUMBER OF VOTES REQUIRED FOR APPROVAL OF AN APPLICATION MUST BE RAISED TO A LEVEL WHICH ASSURES BROAD PARTICIPATION BY SHIPPER AND CARRIER MEMBERS.

We are concerned by the fact that the Committee's quorum

level, fifty percent plus one member, is so low that applications can be approved without the participation of nearly half of the membership of the Committee. In practice, this has produced an imbalance in participation with shipper representatives many times more likely to vote than carrier representatives. And lack of carrier participation undermines one of the basic policy arguments in favor of the delegations: the ability to access expertise reflecting the totality of the industry's knowledge and experience. The privilege of serving on the TCC carries with it a responsibility to participate in Committee deliberations. The number of votes required to clear an application should be raised to a level which guarantees substantial participation by both shipper and carrier representatives.

5. THE TCC SHOP CERTIFICATION PROGRAM NEEDS REASSESSMENT AND SUBSTANTIAL OVERHAUL.

We question whether the shop certification program is sufficiently stringent to ensure that facilities, once approved, remain in compliance throughout the five-year certification period. Surprise inspections are rare and there appears to be no pattern of follow-up inspections on facilities found in non-compliance. We have specific concerns about the depth of the investigation for initial certification performed by a consultant retained by the TCC. In particular, we find little evidence of follow-up to determine whether deficiencies noted in those investigations were corrected, and we have discovered instances

in which welders engaged in certified work lacked proper certification.

FRA will continue to perform random, unannounced inspections of certified facilities, but AAR should not see this as a long term substitute for proper TCC oversight. The Committee should reassess the adequacy of its monitoring program and present the department with a proposal, to be incorporated into the regulations or agreements recommended below, for more stringent quality assurance procedures.

6. THE TCC SHOULD DEVELOP A PROGRAM OF PERIODIC DATA REVIEW DESIGNED TO SPOT EVOLVING PROBLEM TRENDS BEFORE THEY REACH CRISIS STAGE.

The TCC collects a significant amount of data in performing its delegated functions. Certificates of Construction and Exhibit R-1 forms complement collection by the AAR of car repair billing records, DOT Form 5800.1 information on unintentional hazardous materials releases and material collected as part of the Tank Car Safety Test and Research Project. Ongoing analyses of these data could spot trends (for example: a high frequency of leaks from a particular valve, a sudden rash of manway nozzle cover plate leaks, or a high incidence of repairs to cracked draft stub sills) and could alert both the industry and the DOT before a problem reached the crisis stage. AAR either has the capacity for electronic data analysis on this scale or could develop it quickly; it should institute a program to periodically review the data for early warnings on performance trends.

7. THE PREVIOUS RECOMMENDATIONS SHOULD BE IMPLEMENTED NOW, WHETHER THROUGH REGULATORY ACTION, A WRITTEN AGREEMENT BETWEEN DOT AND THE COMMITTEE, OR A COMBINATION OF THE TWO.

While we are confident that the AAR will be quite responsive to the preceding recommendations, we also believe that concrete measures need to be taken to implement them. One option is to amend the regulations concerning the delegations to the TCC to condition exercise of those delegations on adherence to specific requirements outlined in the previous recommendations. Another alternative is a written agreement between DOT and AAR stating the understandings about and the requirements of each of the parties regarding the delegations and how they will be carried out.

Even here, however, some regulatory action might be necessary (for example, to require car owners to maintain lifetime records on each tank car). Other examples of improvements that may have to be made through regulatory amendment are an express grant of authority to withdraw or suspend shop certification and the provision of a process by which an aggrieved party could appeal Committee decisions to the Department of Transportation.

Whatever the combination of implementing measures, we believe that concrete action is necessary now, lest this opportunity to rectify mistakes of the past slip by, and the best intentions of current TCC members and task force staff fail to be realized.

PART SIX: CONCLUSION

The delegations of authority to the Tank Car Committee have a sound basis in policy and in practicality. But, like any other structure, the Committee is only as effective as its day-to-day administration. The Department of Transportation must remain the final judge on policy matters with the Committee acting in an advisory -- albeit a very important advisory -- capacity. On the administrative side, it is appropriate for the Committee, as delegatee, to wield considerable day-to-day authority, but under the active oversight of the Department.

Over time and for a variety of reasons, the implementation of the delegations has drifted away from these principles. While this has not yet compromised safety, it has the potential to do so. The time has come to reconstruct the administration of the Federal delegations in a manner consistent with their objective.

ACKNOWLEDGEMENTS

The Department appreciates the cooperation and assistance of the Association of American Railroads Tank Car Committee, particularly former chairman George P. Binns and the staff, especially Mason Flagg, Paul Kinnecom and Roy Holden. (Roy Holden died December 11, 1989. Those on the assessment team who had been his close colleagues feel a special debt of gratitude towards him. Roy was a friend, a teacher, and a mentor; he will be greatly missed.)

Thanks are also due to the Railway Progress Institute and to Earl Phillips for providing vital information about the car building industry and about tank car users. A special debt of gratitude is owed Frank Heller for allowing full and free use of his material on the history of tank cars. Many persons in the industry were interviewed for this report and, without exception, they all gave the kind of cooperation and candor which have made this first in-depth look possible. In addition, the assessment team thanks those who made the facility inspections productive by opening their doors and their records for inspection.

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APPENDIX A:
AAR'S VIEW OF THE APPROVAL PROCESS

As part of its response to investigation activity following the Miamisburg, Ohio accident on July 8, 1986, the Association of American Railroads presented a "Discussion Paper" in which it described the approval process. Because it is important to understand how AAR sees the delegations made to it, the text of that description follows:

> Approval Process Under Section 1.3.6 (M-1002), the TCC is authorized to approve the following:
>
> - design and materials for fabrication, alteration, conversion or welded repairs;
>
> - design and materials for all valves and fittings on tank cars;
>
> - design, materials, and flow capacity ratings of safety devices used on tank cars;
>
> - revisions or substitutions of any valve or fittings, except substitution of equivalent kind approved on the Certificate of Construction, or the addition of supplemental valves or fittings to the tank or to those fittings covered by the certificate, which constitutes an alteration as defined in Appendix R.
>
> Under Section 1.4 (M-1002), the application for approval (4-2) of designs and materials must be submitted to the Secretary, Mechanical Division, the Bureau of Explosives, and the TCC, and when required by AAR Specification M-1001, to other appropriate committees for approval of brake systems and car structure. The Railway Progress Institute representative of the committee does not receive applications and drawings.
>
> The Office of the Secretary may process and approve applications on the behalf of the TCC provided such applications are with precedent in that they are similar to previously approved applications; otherwise approval requires TCC ballot by majority vote and no dissenting

comments from the chairman, the B of E or the Mechanical Division. Comments must state if they are based on violations of the specifications or represent a hazardous condition.

In securing approval for construction of tank cars, AAR has four requirements of the applicant. In that the car company must be an AAR certified shop, use only the AAR approved drawing in building the car, follow the AAR fabrication practices and inspections, and submit a car certification to the AAR; specifically:

> Step #1. The car company must prove its fitness as an AAR certified shop. These certification procedures and detailed requirements for AAR approval of facilities for fabrication, assembly, alteration, conversion, repair and associated testing of tank car tanks are contained in Appendix B of the AAR Specification M-1002, Specification for Tank Cars.
>
> Step #2. The car company must secure approval from the AAR that the car design is in compliance with DOT specs. RSPA delegates to the Secretary, AAR authority to issue, based on appropriate committee action, approvals for the design, materials, construction, conversion, and alteration of tank cars when such is in compliance with DOT specifications. These procedures employed for carrying out the delegated authority are covered in the Tank Car Manual (M-1002) and the Mechanical Division's Articles of Organization (Rev 1986).
>
> Step #3. The car company must build the car according to the approved drawings and perform required AAR inspections. The procedures are listed in the Tank Car Manual.
>
> Step #4. The car company must finally certify that the car complies with DOT requirements. The designated car company officer must certify that the car conforms to all applicable DOT and AAR requirements, including Specification, Regulations, Rules of Interchange and the DOT Railroad Safety Appliance Standards. In addition the car company must place the DOT specification mark on the tank car. The builder must submit a properly executed certificate of construction certifying that all functions performed by the builder complies (sic) with the requirements of 49 CFR 179. (Underscoring in the original.)

APPENDIX B:
TANK CAR COMMITTEE FORMS

FORM DESIGNATION	TITLE
AAR 4-2	APPLICATION FOR APPROVAL & CERTIFICATE OF CONSTRUCTION
AAR 4-2.1	SUPPLEMENTARY DATA FOR APPROVAL
AAR 4-3	APPLICATION FOR APPROVAL OF SAFETY RELIEF DEVICES
AAR 4-4	AAR TANK CAR SERVICE TRIAL REPORT
AAR 4-5	APPLICATION FOR APPROVAL OF VALVES & FITTINGS
AAR 4-6	FINAL PRODUCT TEST & INSPECTION REPORT
EXHIBIT B-1	SUBCONTRACTOR EVALUATION SHEET
EXHIBIT B-2	AAR TANK CAR COMMITTEE SHOP EVALUATION
EXHIBIT D-1	CERTIFICATE OF TEST FORM
EXHIBIT R-1	REPORT OF WELDED REPAIRS, ALTERATIONS OR CONVERSIONS
FIGURE W11	RECOMMENDED FORM FOR FABRICATOR'S PROCEDURE SPECIFICATION
FIGURE W12	RECOMMENDED FORM FOR FABRICATOR'S RECORDS: RECORD OF WELDING PROCEDURE QUALIFICATION TEST
FIGURE W13	RECOMMENDED FORM FOR FABRICATOR'S RECORDS: RECORD OF WELDER PERFORMANCE QUALIFICATION TEST ON BUTT WELDS
FIGURE W14	RECOMMENDED FORM FOR FABRICATOR'S RECORDS: RECORD OF WELDER PERFORMANCE QUALIFICATION TEST ON FILLET WELDS

AAR 4-2

APPLICATION FOR APPROVAL AND CERTIFICATE OF CONSTRUCTION

APPLICATION FOR APPROVAL AND CERTIFICATE OF CONSTRUCTION

APPROVAL REQUESTED OF: ☐ Precedent ☐ AAR Tank Car Committee Ballot AAR APPLICATION NO._____
Applicant's No._____
Applicant _____ Date_____

APPLICATION FOR APPROVAL OF: ☐ Construction ☐ Conversion ☐ Alterations ☐ Welded Repairs ☐ _____ (Other)
Reporting Marks and Car Numbers_____ Number of Cars_____

1. Tank Specification _____
2. Stenciled Specification _____
3. Commodity _____
4. Initial Commodity _____ lb/gal. (_____ kg/L)

TANK SHELL:

5. Full Water Cap'y _____ gal. (_____ L)
6. Dome Cap'y or Outage, _____ gal. (_____ L)
7. Material _____ Lining _____
   Head thickness _____ in. (_____ mm)
   Shell thickness _____ in. (_____ mm)
8. Inside Diameter, _____ in. (_____ mm)
9. Head Radii { Main _____ in. (_____ mm); Knuckle _____ in. (_____ mm)
10. Test Pressure, _____ psi (_____ kPa)
11. Insulation, _____ in. (_____ mm) Kind _____
    Thermal Conductivity _____ Btu-in./hr.-ft.²-F (_____ kJ • mm/h • m² • °C)

SAFETY RELIEF DEVICES:

12. Type _____ Number _____
    Start to Discharge _____ psi (_____ kPa)
13. Flow Cap'y, (Air) Actual _____ cfm (_____ m³/s)
14. Flow Cap'y, (Air) Reqd. _____ cfm (_____ m³/s)
15. Tank Surface Area _____ ft² (_____ m²)

CAR STRUCTURE:

16. Underframe Type _____
17. Estimated Light Wt. _____ lb (_____ kg)
18. Center of Gravity Loaded _____ in (_____ mm)
19. Rail Load Limit _____ lb (_____ kg)
20. Truck Capacity, Tons _____
21. AAR Clearance Diagram Pl. _____

NOTES:

The Following Drawings Apply	Drawing Number	Precedent: Drawing Number	Precedent: Application Number
22. General Arrangement			
23. Arrangement, Tank			
24. Reinforced Openings, Including Calculations			
25. Anchorage, Including Calculations			
26. Fittings Arrangement			
27. Manway Assembly/Cover			
28. Protective Housing			
29. Venting, Loading and Discharge Valves			
30. Safety Relief Devices			
31. Heater Systems			
32. Gaging Devices			
33. Bottom Outlet Valve			
34. Repairs			
35.			
36.			

REVISIONS:

APPLICATION BY _____
I certify that the foregoing conforms to all applicable DOT and AAR requirements, including Specifications, Regulations, Rules of Interchange and the DOT Railroad Safety Appliance Standards.
SIGNATURE _____
TITLE _____

APPROVAL AAR Tank Car Committee Date Approved _____ _____
(Signature) on behalf of Tank Car Committee

CERTIFICATION: The cars enumerated below conform to the above approved description and to all applicable DOT and AAR requirements, including Specifications, Regulations, Rules of Interchange and the DOT Railroad Safety Appliance Standards. Copy of this Certificate of Construction will be furnished to the owner and others required by 49 CFR Part 179.5 before these cars are placed in service.

Initials and Car Numbers:

Date _____
By _____
Title _____

Form AAR 4-2 Revised 9-1-85

Page 1 of _____

AAR 4-2.1 SUPPLEMENTARY DATA FOR APPROVAL

AAR APPLICATION NO._____
Applicant's No._____
Date_____

APPLICATION BY _____
I certify that the foregoing conforms to all applicable DOT and AAR requirements, including Specifications, Regulations, Rules of Interchange and the DOT Railroad Safety Appliance Standards.
SIGNATURE _____
TITLE _____

APPROVAL AAR Tank Car Committee Date Approved_____ _____
(Signature) on behalf of Tank Car Committee

Form AAR 4-2.1 10-11-79 Page __ of __

AAR 4-3

APPLICATION FOR APPROVAL OF SAFETY RELIEF DEVICES

APPLICATION FOR APPROVAL OF SAFETY RELIEF DEVICE

AAR APPLICATION NO. SRD-_____

Applicant's No. _____

Date _____

Device Identification No. _____

APPROVAL REQUESTED OF AAR TANK CAR COMMITTEE

Applicant _____

1. Manufacturer _____
   Address _____
2. Test Facility _____ 3. Location _____
4. Test Date _____ 5. Observer _____

6. Device Number	7. Start-To-Discharge,		8. Flow Rating,		9. Vapor-Tight,		10. Flow Capacity,		11.
	psi	kPa	psi	kPa	psi	kPa	SCFM	std. m^3/s	

12. Official Flow Capacity (Air) _____ scfm (_____ std. m^3/s At Start-To-Discharge _____ psi (_____ kPa)
    (Enclose Curve if Extrapolation Method is Used) Test Medium _____
13. Commodities _____

The Following Drawings Apply	Drawing Number, Latest Revision	Precedent	
		Drawing Number	Application Number
14. Valve Assembly			
15. Valve Mounting Nozzle			
16.			
17.			
18. Extrapolation Curve			

REVISIONS:

CERTIFICATION: The above data is correct. The capacity test complies with AAR Specifications for Tank Cars, Appendix A and the devices tested conform with the drawings listed above.

By: _____ Title _____

APPROVAL AAR Tank Car Committee

Date Approved _____

_____
(Signature) on behalf of Tank Car Committee

NOTE: When the design of a safety relief device is such that the spring follower is guided by the mounting nozzle, the mounting nozzle shall be considered as a required part of the application and a drawing of the nozzle is sufficient detail to show critical dimensions shall be included. When the safety relief device design does not require the mounting nozzle to act as a guide for the epring follower the word "None" can be used in the space for this item.

Form AAR 4-3 Revised 1-1-82

AAR 4-4

AAR TANK CAR SERVICE TRIAL REPORT

AAR TANK CAR SERVICE TRIAL REPORT*

AAR Application No._____
AAR Docket No._____
Reporting Company_____ AAR Service Trial No._____
Address_____ Date_____
Covering Period_____

1. Applicant's No._____ 2. Device Ident. No._____ 3. Date Initial Installation_____

4. Description of Device_____

5. Number Cars Authorized to Applicant_____ Number of Cars This Report_____

6. Reporting Marks	7. Commodity	This Report			10. To Date		
		8. Loaded Trips	9. Distance		Loaded Trips	Distance	
			Miles	Km		Miles	Km
				AVERAGES			

11. Loading Temperature_____F (_____°C) 12. Unloading Temperature_____F (_____°C)
13. Loading Pressure_____psi (_____kPa) 14. Unloading Pressure_____psi (_____kPa)
15. Maintenance Required (specify by reporting marks and car no.)_____

16. General Performance Remarks_____

17. Continue Test_____
18. Discontinue Test_____

Final acceptance subject to Tank Car Committee approval on Form AAR 4-6.

*NOTE: This report to be furnished at six month intervals, April 1st and October 1st, and submitted to the Secretary with 25 copies for further distribution), and Bureau of Explosives. Failure to submit report may result in cancellation of service trial permit.

Submitted By_____ Title_____

Form AAR 4-4 Revised 1-1-84

AAR 4-5 APPLICATION FOR APPROVAL OF VALVES & FITTINGS

APPLICATION FOR APPROVAL OF VALVES AND FITTINGS

Applicant _____ AAR Application No. _____
Description of Device _____ AAR Docket No. _____
_____ AAR Service Trial No. _____
Applicant No. _____ Device Ident. No. _____ Date _____

1. Manufacturer _____
   Address _____ City _____ State _____ Zip _____
2. Test Facility _____ Address _____
3. Test Date _____ 4. Observer _____
TEST PROCEDURE:
5. Weight or mass of Device _____ lb. (_____ kg.)
6. Description of Prototype Testing: _____
7. Description of Production Testing: _____

8. Cycles	Min. Temp.	@ Pressure	Cycles	Max. Temp.	@ Pressure	Test Medium	Remarks
	___ F / ___ °C	___ psi / ___ kPa		___ F / ___ °C	___ psi / ___ kPa		
Cycles	Min. Temp.	@ Pressure	Cycles	Max. Temp.	@ Pressure	Test Medium	Remarks
	___ F / ___ °C	___ psi / ___ kPa		___ F / ___ °C	___ psi / ___ kPa		

9. Cycles	Min. Pressure	@ Temp.	Cycles	Max. Pressure	@ Temp.	Test Medium	Remarks
	___ psi / ___ kPa	___ F / ___ °C		___ psi / ___ kPa	___ F / ___ °C		
Cycles	Min. Pressure	@ Temp.	Cycles	Max. Pressure	@ Temp.	Test Medium	Remarks
	___ psi / ___ kPa	___ F / ___ °C		___ psi / ___ kPa	___ F / ___ °C		

10. Initial Commodity or Commodity Type _____ 11. Flow Rate (If Applicable) _____ gpm (_____ L/min)

Applicable Drawings	Material	Drawing Number Latest Revision	Precedent: Drawing Number	Precedent: Application Number
12. Device Application.....				
13. Device Assembly.....				
14. Device Details.....				

15. Quality Control Statement: _____

REVISIONS:

CERTIFICATION: The above data is correct and conforms with AAR Specifications for Tank Cars, Appendix A. The devices tested conform with drawings listed above.

By _____ Title _____

APPROVAL AAR Tank Car Committee:

Date Approved _____ _____
(Signature) on behalf of Tank Car Committee

Form AAR 4-5 Revised 1-1-82

AAR 4-6 FINAL PRODUCT TEST & INSPECTION REPORT

FINAL PRODUCT TEST AND INSPECTION REPORT

1. Applicant _____ AAR Application No. _____
Address _____ AAR Docket No. _____
2. Manufacturer _____ AAR Service Trial No. _____
Address _____ Date _____

3. Description of Device _____
4. Device Designation or Model No. _____
5. Total Number of Devices in Service _____ 6. Number of Devices for Teardown _____
7. Service Data (from latest Form AAR 4-4 dated _____)
Total Load/Unload Cycles _____ Total Loaded Mileage _____
Total Service Time _____

8. Teardown Data	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
From Car Number					
Last Lading					
Model No.					
Serial No.					
Test Pressure psi (kPa)					
Test Temp F (°C)					
Test Medium					
Cycles					
STD psi (kPa)					
Vapor Tight, psi (kPa)					
Test remarks					
Physical condition.....					
Compare Critical Final Dimensions to Original					
9. Drawing Nos.					
(Ref. Form AAR 4-3 or AAR 4-5					
Revisions made					
Revision date					

10. Conclusions _____

11. Recommendations to Tank Car Committee _____

12. CERTIFICATION

The above data is correct and complies with the AAR specifications for Tank Cars, Appendix A. Devices tested conform to the drawings listed above.

MANUFACTURER or APPLICANT

_____
(Signature)

Title _____
Company _____

INDEPENDENT OBSERVER

_____
(Signature)

Title _____
Company _____

13. APPROVAL AAR Tank Car Committee

Date Approved _____ _____
(Signature) on behalf of Tank Car Committee

NOTE: The AAR Tank Car Committee reserves the right to designate an independent observer to be present during test and teardown activity.

Form AAR 4-6 Revised 1-1-84

EXHIBIT B-1 SUBCONTRACTOR EVALUATION SHEET

EXHIBIT B-1

SUBCONTRACTOR EVALUATION SHEET
(TO BE RETAINED BY CERTIFIED FACILITY)

SUBCONTRACTOR NAME _____
PLANT LOCATION _____
PRODUCT OR SERVICE _____
PERSON CONTACTED NAME POSITION

_____ _____
_____ _____
_____ _____
_____ _____

1.0 SPECIFICATIONS AND PROCEDURES:

1.1 Does subcontractor have applicable AAR Specifications and/or procedures to provide necessary product and/or service? _____

1.2 List specifications and/or procedures applicable to product or service.

_____
_____
_____
_____

2.0 MANUFACTURING EQUIPMENT

2.1 Prepare listing of applicable equipment.

EQUIPMENT	MFG. NAME	TYPE	MODEL OR SERIAL NO.	CAPACITY

3.0 POSTWELD HEAT TREATMENT

3.1 Identify furnace, manufacturer, size, controller-recorded equipment:

_____
_____
_____

Equipment and method for local treatment:

_____
_____
_____

SUBCONTRACTOR EVALUATION SHEET (Second Page)

3.2 Does subcontractor have written procedure for postweld heat treatment and for calibration and maintenance of temperature recorders?_____

3.3 Are thermocouples attached to work piece or do they record furnace temperature?

3.4 If thermocouples are not used, how is the heating cycle monitored?_____

3.5 Are calibration records, furnace load records or other records of control on file and available as required?_____

4.0 DESTRUCTIVE AND/OR NON-DESTRUCTIVE TESTING

4.1 Is testing done in plant?_____

If not, who tests?_____ How are they qualified?_____

4.2 Check method(s) that testing vendor uses

Magnetic particle (dry) _____	Dye penetrant _____
Magnetic particle (wet) _____	Ultrasonic _____
Fluorescent penetrant _____	Radiography _____
Tension & bend _____	Hardness _____

4.3 Does subcontractor have written procedures for method(s) of testing employed? _____ Are copies of these specifications in our files? _____

4.4 List certifications held by subcontractor personnel.

4.5 List methods for calibration of equipment.

4.6 Are subcontractor reports (radiographic, ultrasonic) verified by other than subcontractor personnel?_____ If so, by whom?

SUBCONTRACTOR EVALUATION SHEET (Third Page)

4.7 List equipment and/or supplies used in testing.

EQUIPMENT	MFG. NAME	TYPE	MODEL OR SERIAL NO.	CAPACITY

EXHIBIT B-2 AAR TANK CAR COMMITTEE SHOP EVALUATION

EXHIBIT B-2

AAR TANK CAR COMMITTEE SHOP EVALUATION

TO: Director of Technical Committees

FACILITY _____

Location: Address _____

City _____ State _____ Phone _____

Requested Class: A B D Categories: I II III

Material Groups: 1 2 3 4 6 7 including/excluding TC-128

A. PUBLICATIONS

1. Are copies current: AAR Specs. for Tank Cars ___ Field Manual ___ Office Manual ___
2. Other Mechanical Division publications on hand _____
3. B of E Tariff 6000 _____ FRA Safety Appliance Manual _____

B. WELDERS

1. Check welder performance qualifications and welding procedure for results and tank car materials per Appendix M _____
2. Are the welders whose qualifications were submitted on rolls of this shop? _____
3. Have welders requalified in last two years (Class B shops only)? _____

C. SUPERVISION

1. Confirm names, titles, duties of shop and quality control personnel. List those interviewed _____
2. Is quality control independent of production supervision? _____
3. Confirm employment of welding inspector and radiographer per B4.01 _____

D. RADIOGRAPHY AND POSTWELD HEAT TREATMENT

1. Confirm location of, or check on-site:

   Radiography equipment _____

   PWHT facilities _____
2. Check a few radiographs and PWHT charts for quality and compliance _____
3. Where are films kept? _____ For how long? _____

AAR TANK CAR COMMITTEE SHOP EVALUATION (Second Page)

E. OTHER SHOP FACILITIES

1. Check: Welding rod ovens ___, Hydrotest equipment ___, Safety valve test device ___
2. Shop equipment per list submitted with request _____

_____

F. QUALITY CHECK

1. Examine work in progress:

   Welding _____ Welding procedure _____

   Stenciling _____ Sandblast-Paint _____ Lining _____
2. Workmanship and shop practices _____
3. Comments _____

_____

G. MISCELLANEOUS

1. Size of work force _____ Tracks under roof _____
2. Shop dedicated to _____
3. General comments _____

_____

_____

H. RECOMMENDATION

I/We inspected this facility on _____ (date) and found/did not find the equipment, personnel and records to be as listed in the request for certification dated _____. I/We recommend/do not recommend certification of this facility as Class _____, Categories _____, Materials Groups _____, including/not including TC-128.

Inspector(s) _____

_____

EXHIBIT D-1 CERTIFICATE OF TEST FORM

EXHIBIT D-1
CERTIFICATE OF TEST FORM

(a) The testing and re-testing of tank car tanks, safety valves and heater systems, either singly or any combination thereof, must be reported by the party making the tests. Reports must be submitted to and/or retained by the tank car owner. Submittal of the report may be on Exhibit D-1 form Certificate of Test or other equivalent form that will certify that all tests and pertinent information are reported in accordance with DOT 173.31(c)(8). Use either conventional or SI units.

(b) The following instructions must be followed by the party or facility reporting tests to make sure that all required information will be furnished with the numbered items entered regardless of the form used.

1. The reporting marks and car numbers must be those which will be or are those recorded in the "Official Railway Equipment Register" covering the cars being tested. (Space is provided for four cars per form.)

2. This item must show the tank specification to which the tank is presently certified. (This item must be known to make sure that the tank is tested to the required pressure in lieu of any lower pressure indicated by the stenciled specification.)

3. When the car is being operated under another specification, the stenciled specification must be entered here.

4. This item must show the capacity in U. S. gallons (liters), or water-pound (water-kilogram) capacity. For non-pressure cars, record shell full volume. For pressure cars, record shell full volume plus volume of manway nozzle.

5. This item must show the test pressure to which the tank was tested.

6. This item must show the test pressure to which the interior heater system was tested. [Minimum to be not less than 200 psi (1379 kPa)].

7. This item is divided into two identical sections, each having four parts, to record the following data for one or more safety relief valves as required by car design. Safety relief valves are numbered from the B-end or the BL-side.

(a) This item must show the safety valve manufacturer and the model number.

(b) This item must show the serial number of the specific valve being tested.

(c) This item must show the start-to-discharge pressure of the valve being tested and must be within the tolerance for the given valve setting in the applicable retest table. Note: For a safety relief valve used in combination with a breaking pin or frangible disc, the requirements of DOT 179.100-15 or 179.200-18 apply and the safety valve tests at the reduced test pressure must be shown.

(d) This item must show the vapor-tight condition of the valve being tested, and must not be less than the minimum for the given valve setting in the applicable retest table. Note: For a safety relief valve used in combination with a breaking pin or frangible disc, the requirements of DOT 179.100-15 or 179.200-18 apply and at least the minimum reduced vapor-tight pressure must be shown.

8. This item is divided into two parts for the information required when the safety relief valve is equipped with a combination device (breaking pin or frangible disc).

(a) This item to show the pressure to which the complete breaking pin device was tested with lower diaphram in place.

(b) This item must show the pressure rating of the frangible disc.

NOTE: See Appendix C for stenciling requirements for tank cars equipped with combination safety relief devices.

9. This item is divided into two parts to describe the safety vents on the car.

(a) Indicate the number of safety vents on car.

(b) Indicate the pressure rating of the frangible disc applied to the tank car tank after tank test or replaced while making test to the heater system.

10. This item must record the test date as stenciled on car. (month and year, e.g. 03/77)

NOTE: A safety valve applied from stock that was tested within six (6) months of installation may be considered as having been tested on the date of installation and may be so stenciled.

11. This item is divided into three parts to indicate the date stenciled on the car that the tank, safety relief valve and/or interior heater coil will be due for next test.

12. This item is to record the name of the test facility that made the tests.

13. This item is to record the location of the test facility that made the tests.

(c) The individual responsible for "certification" attests to the accuracy of the tests indicated above by signing and dating the form.

CERTIFICATE OF TEST FORM (Reverse Side)

CERTIFICATE OF TEST TANK, SAFETY VALVE & HEATER SYSTEM					
1. Reporting Marks and Car Number					
2. Tank Specification					
3. Stenciled Specification					
4. Tank Capacity in Gallons (Liters) or Pounds (Kilograms) of Water					
5. Tank Test Pressure, psi (kPa)*					
6. Interior Heater System Test Pressure, psi (kPa)*					
SAFETY VALVE NO. 1	7a. Manufacturer and Model/Type Number				
	7b. Serial Number				
	7c. Start-to-Discharge Pressure, psi (kPa)**				
	7d. Vapor-Tight Pressure, psi (kPa)**				
SAFETY VALVE NO. 2	7a. Manufacturer and Model/Type Number				
	7b. Serial Number				
	7c. Start-to-Discharge Pressure, psi (kPa)**				
	7d. Vapor-Tight Pressure, psi (kPa)**				
COMBINATION DEVICE	8a. Breaking Pin Lower Diaphragm Tight At psi (kPa)				
	8b. Frangible Disc Pressure, psi (kPa)				
VENT	9a. Number of Vents				
	9b. Frangible Disc Pressure, psi (kPa)				
10. Test Date (Date Stenciled on Car)					
TEST DUE STENCIL	11a. Tank (Date Stenciled On Car)				
	11b. Safety Valve (Date Stenciled On Car)				
	11c. Interior Heater System (Date Stenciled On Car)				
12. Company Performing Test					
13. Company Location					

*Tested with hydrostatic pressure shown for required time period without leak or evidence of distress.

**Valve has been set to start-to-discharge and is vapor-tight at pressure shown. For combination devices the start-to-discharge and vapor-tight pressures of the valve portion is shown.

I HEREBY CERTIFY THAT TESTS PERFORMED TO TANK CAR TANKS, SAFETY VALVES AND/OR HEATER SYSTEMS WERE DONE IN ACCORDANCE WITH REQUIREMENTS OF THE DEPARTMENT OF TRANSPORTATION REGULATIONS AND THE AAR SPECIFICATIONS FOR TANK CARS AND ARE REPORTED CORRECTLY.

DATE _____ (SIGNED) _____ OWNER
TESTER

EXHIBIT R-1 REPORT OF WELDED REPAIRS, ALTERATION OR CONVERSION

EXHIBIT R-1

Report of WELDED REPAIRS, ALTERATION or CONVERSION

1. To: Secretary, Mech. Div.—AAR
   Bureau of Explosives—AAR
   Car Owner
2. Reporting marks and number or numbers _____
3. Reported by _____ 4. Date _____
5. Performed at _____
6. Report of ☐ Conversion ☐ Alterations ☐ Welded repairs ☐ Other
7. Tank built date _____ 8. Built by _____
9. Original AAR Appl. No. _____ 10. Commodity _____ (after this work)
11. Constructed tank spec. _____ 12. Tank spec. _____ (after this work)
13. Stenciled spec. _____
14. Repairs: (Furnish details on back page)
    A. Nature of location of defect
    B. Cause
    C. Repair procedure
15. Alteration or conversion:
    A. Type
    B. Procedure
    C. Materials
16. Pertinent precedent approved drawings

	DRAWING TITLE	DRAWING NUMBER	PRECEDENT APPROVED APPLICATION NO.
A.			
B.			
C.			
D.			
E.			
F.			

17. Revisions and Notes:
18. The cars enumerated above conform to all precedent approvals mentioned and to all applicable DOT and AAR requirements, including specifications, regulations, rules of interchange and the DOT safety appliance standards.

By: _____ Title: _____

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Printed in U.S.A.

REPORT OF WELDED REPAIRS, ALTERATION OR CONVERSION (Reverse Side)

EXHIBIT R-1

SHOW DAMAGES: LOCATION & SIZE: GOUGE, PUNCTURE, RUPTURE, DENT, CRACK

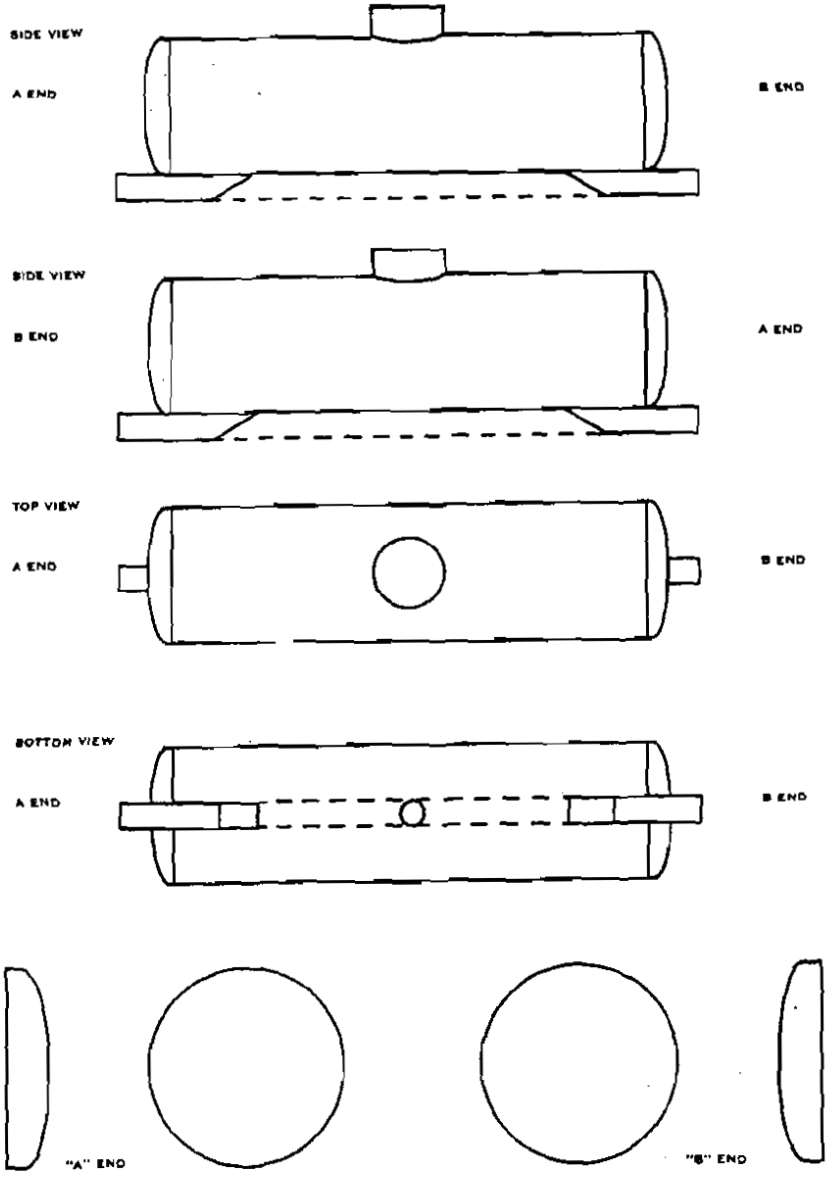

FIGURE W11 RECOMMENDED FORM FOR FABRICATOR'S PROCEDURE SPECIFICATIONS

FIGURE W12 RECOMMENDED FORM FOR FABRICATOR'S RECORDS: RECORD OF WELDING PROCEDURE QUALIFICATION TEST

RECORD OF WELDING PROCEDURE QUALIFICATION TESTS

PROCEDURE SPECIFICATION NO. .....DATE.....
WELDING PROCESS .....MANUAL OR MACHINE.....
MATERIAL SPECIFICATION .....TO.....of P-NO.....TO P-NO.....
THICKNESS.....IN (MM) THICKNESS RANGE THIS TEST QUALIFIES .....IN (MM)
FILLER METAL GROUP NO. F- .....
WELD METAL ANALYSIS GROUP NO. A- .....
DESCRIBE FILLER METAL IF NOT INCLUDED
IN TABLES W13.02(b)(1) or W13.02(b)(3).....
.....

FLUX OR ATMOSPHERE

FLUX TRADE NAME OR COMPOSITION .....
.....
SHIELDING GAS COMPOSITION .....
TRADE NAME .....FLOW RATE .....CFH (M^3/S)

WELDING PROCEDURE

SINGLE OR MULTIPLE PASS .....
SINGLE OR MULTIPLE ARC .....
CURRENT .....POLARITY .....
AMPS.....VOLTS.....IN/MIN (MM/MIN).....
TYPE OF BACKING .....
PREHEAT TEMPERATURE RANGE .....F(°C)
INTERPASS TEMPERATURE RANGE .....F(°C)
POSTWELD HEAT TREATMENT TEMP. .....F(°C) TIME.....
POSITION OF GROOVE (FLAT, HORIZONTAL, VERTICAL, OVERHEAD) .....
FOR VERTICAL WELD, STATE WHETHER WELD PROGRESSION UPWARD OR DOWNWARD .....
JOINT DIMENSIONS IN ACCORD WITH (OR SHOW BY SKETCH).....
FILLER METAL WIRE DIAMETER .....TRADE NAME .....
FOREHAND OR BACKHAND .....

REDUCED-SECTION TENSION SPECIMEN TESTS

TYPE AND FIGURE NO.	DIMENSIONS		AREA	ULTIMATE TENSILE STRENGTH		CHARACTER OF FAILURE AND LOCATION
	WIDTH in. (mm)	THICKNESS in. (mm)	sq. in. (mm^2)	TOTAL LOAD lb (kg)	UNIT STRESS psi (MPa)	

GUIDED-BEND SPECIMEN TESTS

TYPE AND FIGURE NO.	RESULT	TYPE AND FIGURE NO.	RESULT

ALL-WELD-METAL TENSION SPECIMEN TEST

TYPE AND FIGURE NO.	DIA. in. (mm)	AREA sq. in. (mm^2)	ULTIMATE TENSILE STRENGTH		YIELD STRENGTH (0.2% offset) psi (MPa)	ELONG. (%)	REDUCTION OF AREA (%)
			TOTAL LOAD lb (kg)	UNIT STRESS psi (MPa)			

Attach separate sheets when needed for: RESULTS OF FILLET-WELD SPECIMEN TESTS, Fig. W7B; RESULTS OF IMPACT SPECIMEN TESTS, Figs. W9 and W10; or RESULTS OF CORROSION SPECIMEN TESTS, Figs. W19A and W19B.

WELDER'S NAME.....CLOCK NO.....STAMP NO.....
Who by virture of these tests meets welder performance requirements.
TESTS CONDUCTED BY ..... LABORATORY TEST NO. .....
(Company or agency)
PER.....
(Individual)

WE CERTIFY THAT THE STATEMENTS IN THIS RECORD ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED, AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF AAR APPENDIX W.

FABRICATOR.....
DATE..... ATTESTED BY.....

(Details herein are illustrative only and may be modified to conform to type and number of tests required by tank specifications and Appendix W.)

NOTE: ANY ESSENTIAL VARIABLES IN ADDITION TO THOSE SHOWN ABOVE SHALL BE RECORDED IN THE PROCEDURE SPECIFICATION, FIG. W11.

FIGURE W12
RECOMMENDED FORM FOR FABRICATORS' RECORDS

FIGURE W13 RECOMMENDED FORM FOR FABRICATOR'S RECORDS: RECORD OF WELDER PERFORMANCE QUALIFICATION TEST ON BUTT WELDS

RECORD OF WELDER PERFORMANCE QUALIFICATION TESTS ON BUTT WELDS

WELDER'S NAME .....CLOCK NO. .....STAMP NO. .....
WELDING PROCESS.....
IN ACCORDANCE WITH PROCEDURE SPECIFICATION NO. .....
MATERIAL SPECIFICATION.....TO.....of P-NO .....TO P-NO.....
THICKNESS.....IN (MM) THICKNESS RANGE THIS TEST QUALIFIES.....IN (MM)
FILLER METAL GROUP NO. F-.....SPECIFICATION.....
DESCRIBE FILLER METAL IF NOT INCLUDED IN TABLES W13.02(b)(1) or W13.02(b)(3)
.....
POSITION OF GROOVE (FLAT, HORIZONTAL, VERTICAL, OVERHEAD).....
FOR VERTICAL WELD, STATE WHETHER WELD PROGRESSION UPWARD OR DOWNWARD .....
TYPE OF BACKING .....
FILLER METAL WIRE DIAMETER.....IN (MM) TRADE NAME .....
FLUX TRADE NAME OR COMPOSITION .....
SHIELDING GAS COMPOSITION.....TRADE NAME.....FLOW RATE .....CFH (M^3/S)

GUIDED-BEND SPECIMEN TESTS			
TYPE AND FIGURE NO.	RESULT	TYPE AND FIGURE NO.	RESULT

TESTS CONDUCTED BY .....LABORATORY TEST NO.....
(Company or agency)
PER.....
(Individual)

WE CERTIFY THAT THE STATEMENTS IN THIS RECORD ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED, AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF AAR APPENDIX W.
FABRICATOR.....
DATE ..... ATTESTED BY .....

(Details herein are illustrative only and may be modified to conform to type and number of tests required by tank specifications and Appendix W.)
NOTE: ANY ESSENTIAL VARIABLES IN ADDITION TO THOSE ABOVE SHALL BE RECORDED AND ATTACHED.

FIGURE W13
RECOMMENDED FORM FOR FABRICATORS' RECORDS

FIGURE W14 RECOMMENDED FORM FOR FABRICATOR'S RECORDS: RECORD OF WELDER PERFORMANCE QUALIFICATION TEST ON FILLET WELDS

RECORD OF WELDER PERFORMANCE QUALIFICATION TESTS ON FILLET WELDS

WELDER'S NAME ....CLOCK NO. .....STAMP NO. .....
WELDING PROCESS.....
IN ACCORDANCE WITH PROCEDURE SPECIFICATION NO.....
MATERIAL SPECIFICATION .....TO .....of P-NO.....TO P-NO.....
THICKNESS.....IN (MM)
FILLER METAL GROUP NO. F-..... SPECIFICATION.....
DESCRIBE FILLER METAL IF NOT INCLUDED IN TABLES W13.02(b)(1) or W13.02(b)(3)
.....
POSITION OF FILLET WELD (FLAT, HORIZONTAL, VERTICAL, OVERHEAD).....
FOR VERTICAL WELD, STATE WHETHER WELD PROGRESSION UPWARD OR DOWNWARD .....
FILLER METAL WIRE DIAMETER.....IN (MM) TRADE NAME.....
FLUX TRADE NAME OR COMPOSITION.....
SHIELDING GAS COMPOSITION ..... TRADE NAME ..... FLOW RATE....CFH (M^3/S)

TEE-JOINT SPECIMEN TESTS

DESCRIBE ANY VISIBLE CRACKS IN SPECIMEN "AS-PREPARED".....
LATERAL LOAD TEST
(Describe the location, nature and size of any crack, tearing, or incomplete fusion of the specimen
.....
.....
.....
LENGTH AND PER CENT OF DEFECTS .....IN. (MM).....PERCENT
MACRO TEST: FUSION .....
FILLET SIZE .....BY.....IN. (MM) CONVEXITY OR CONCAVITY.....IN. (MM)

TESTS CONDUCTED BY ..... LABORATORY TEST NO. .....
(Company or agency)
PER.....
(Individual)

WE CERTIFY THAT THE STATEMENTS IN THIS RECORD ARE CORRECT AND THAT THE TEST WELDS WERE PREPARED, WELDED, AND TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF AAR APPENDIX W.
FABRICATOR.....
DATE ..... ATTESTED BY .....

(Details herein are illustrative only and may be modified to conform to type and number of tests required by tank specifications and Appendix W.)
NOTE: ANY ESSENTIAL VARIABLES IN ADDITION TO THOSE ABOVE SHALL BE RECORDED AND ATTACHED.

FIGURE W14
RECOMMENDED FORM FOR FABRICATORS' RECORDS

APPENDIX C:
SECTIONS IN PART 179 GRANTING APPROVAL AUTHORITY TO THE AAR TANK CAR COMMITTEE

49 C.F.R. §179.2(a)(2)
49 C.F.R. §179.3(b)
49 C.F.R. §179.4(a)
49 C.F.R. §179.10(a)
49 C.F.R. §179.11(a)
49 C.F.R. §179.12-1(a)
49 C.F.R. §179.12-2(c)
49 C.F.R. §179.12-3(a)
49 C.F.R. §179.14(a)
49 C.F.R. §179.14(a)(1)
49 C.F.R. §179.14(a)(2)
49 C.F.R. §179.16
49 C.F.R. §179.100-4(a)
49 C.F.R. §179.100-7(a)
49 C.F.R. §179.100-7(c)
49 C.F.R. §179.100-9(a)
49 C.F.R. §179.100-12(a)
49 C.F.R. §179.100-12(b)
49 C.F.R. §179.100-12(c)
49 C.F.R. §179.100-13(a)
49 C.F.R. §179.100-13(b)
49 C.F.R. §179.100-13(c)
49 C.F.R. §179.100-14(a)
49 C.F.R. §179.100-15(a)
49 C.F.R. §179.100-16(b)
49 C.F.R. §179.100-17(a)
49 C.F.R. §179.102-1(a)(2)
49 C.F.R. §179.102-1(a)(3)
49 C.F.R. §179.102-1(a)(4)
49 C.F.R. §179.102-2(a)(2)
49 C.F.R. §179.102-3(a)(1)
49 C.F.R. §179.102-3(a)(3)
49 C.F.R. §179.102-4(c)
49 C.F.R. §179.102-4(g)
49 C.F.R. §179.102-6(a)(2)
49 C.F.R. §179.102-7(a)(1)
49 C.F.R. §179.102-8(a)(1)
49 C.F.R. §179.102-9(a)(1)
49 C.F.R. §179.102-10(a)(1)
49 C.F.R. §179.102-11(b)
49 C.F.R. §179.102-12(a)(4)
49 C.F.R. §179.102-13(a)(1)
49 C.F.R. §179.102-16
49 C.F.R. §179.102-17(c)
49 C.F.R. §179.102-17(d)
49 C.F.R. §179.102-17(e)
49 C.F.R. §179.102-17(g)
49 C.F.R. §179.102-17(i)
49 C.F.R. §179.103-1(a)
49 C.F.R. §179.103-2(a)
49 C.F.R. §179.103-3(b)
49 C.F.R. §179.103-3(c)
49 C.F.R. §179.103-4(b)
49 C.F.R. §179.103-5(a)
49 C.F.R. §179.103-5(a)(1)
49 C.F.R. §179.103-5(a)(2)
49 C.F.R. §179.103-5(b)
49 C.F.R. §179.103-5(b)(1)
49 C.F.R. §179.105-6(d)
49 C.F.R. §179.200-4(a)
49 C.F.R. §179.200-7(b)
49 C.F.R. §179.200-7(h)
49 C.F.R. §179.200-10(a)
49 C.F.R. §179.200-13(a)
49 C.F.R. §179.200-13(d)
49 C.F.R. §179.200-13(h)
49 C.F.R. §179.200-14(c)
49 C.F.R. §179.200-14(d)
49 C.F.R. §179.200-14(e)(4)
49 C.F.R. §179.200-15(a)
49 C.F.R. §179.200-15(c)
49 C.F.R. §179.200-16(a)
49 C.F.R. §179.200-16(b)
49 C.F.R. §179.200-16(c)
49 C.F.R. §179.200-16(d)
49 C.F.R. §179.200-16(g)
49 C.F.R. §179.200-17(a)(1)
49 C.F.R. §179.200-17(a)(2)
49 C.F.R. §179.200-17(a)(6)
49 C.F.R. §179.200-17(b)
49 C.F.R. §179.200-18(a)
49 C.F.R. §179.200-18(b)
49 C.F.R. §179.200-19(a)
49 C.F.R. §179.201-3(a)(1)
49 C.F.R. §179.201-3(a)(3)
49 C.F.R. §179.201-3(b)
49 C.F.R. §179.201-7(b)
49 C.F.R. §179.201-7(c)
49 C.F.R. §179.201-8(a)
49 C.F.R. §179.201-9

49 C.F.R. §179.202-4
49 C.F.R. §179.202-5
49 C.F.R. §179.202-9(a)
49 C.F.R. §179.202-10
49 C.F.R. §179.202-12(a)
49 C.F.R. §179.202-12(b)
49 C.F.R. §179.202-13
49 C.F.R. §179.202-18(a)(2)
49 C.F.R. §179.202-18(a)(4)
49 C.F.R. §179.202-18(a)(7)
49 C.F.R. §179.202-19
49 C.F.R. §179.202-21(a)(1)
49 C.F.R. §179.202-22
49 C.F.R. §179.220-4
49 C.F.R. §179.220-7(b)
49 C.F.R. §179.220-7(f)
49 C.F.R. §179.220-7(g)
49 C.F.R. §179.220-8(a)
49 C.F.R. §179.220-10(a)
49 C.F.R. §179.220-13(a)
49 C.F.R. §179.220-13(b)
49 C.F.R. §179.220-15(b)
49 C.F.R. §179.220-17(a)
49 C.F.R. §179.220-17(c)
49 C.F.R. §179.220-17(d)
49 C.F.R. §179.220-17(f)
49 C.F.R. §179.220-18(a)
49 C.F.R. §179.220-18(a)(1)
49 C.F.R. §179.220-18(b)
49 C.F.R. §179.220-19(a)
49 C.F.R. §179.220-19(c)
49 C.F.R. §179.220-20
49 C.F.R. §179.220-22(b)
49 C.F.R. §179.300-3(a)
49 C.F.R. §179.300-7(a)
49 C.F.R. §179.300-9(a)
49 C.F.R. §179.300-12(b)
49 C.F.R. §179.300-13(a)
49 C.F.R. §179.300-15(a)
49 C.F.R. §179.300-16(a)
49 C.F.R. §179.300-20(a)
49 C.F.R. §179.400-3(a)(2)
49 C.F.R. §179.400-4(d)
49 C.F.R. §179.400-11(d)
49 C.F.R. §179.400-13(a)
49 C.F.R. §179.400-13(b)
49 C.F.R. §179.400-13(c)
49 C.F.R. §179.400-16(a)
49 C.F.R. §179.400-17(b)
49 C.F.R. §179.400-19(a)
49 C.F.R. §179.400-19(a)(2)
49 C.F.R. §179.400-19(b)(1)(i)
49 C.F.R. §179.400-19(b)(2)
49 C.F.R. §179.400-20(c)(3)(iii)
49 C.F.R. §179.500-6(a)
49 C.F.R. §179.500-8(a)(1)
49 C.F.R. §179.500-8(b)
49 C.F.R. §179.500-10(a)
49 C.F.R. §179.500-11(a)
49 C.F.R. §179.500-12(a)
49 C.F.R. §179.500-12(c)

APPENDIX D:
TANK CAR PROBLEMS

The brief descriptions of actual tank car problems in this appendix were developed from data collected by FRA's Office of Safety; they demonstrate the kind of day-to-day problems which the Tank Car Committee and the Department of Transportation must bring to a safe conclusion. Some parallels exist between these summaries and the findings or recommendations of the assessment team, but an illustration of reality, rather than finger-pointing, is the reason this information was included.

PROBLEM -- ANTI-SHIFT BRACKET: On December 31, 1984 car RAIX 7033 was found at North Little Rock, Arkansas leaking from the bottom of the tank shell. The car, loaded with ethylene oxide, an extremely volatile flammable liquid, is a DOT 111A100W4. Post accident investigation revealed that the car had been constructed with a jacket anti-shift bracket which did not comply with Federal tank car specifications. The regulations specify that, after 1971, any attachment requiring more than 6 inches of quarter inch fillet weld could no longer be welded directly to the tank shell but would require a reinforcing pad between the shell and the attachment.

The car was manufactured by General American Transportation Corporation (GATX) with a vertical steel plate 8 inches by 12 inches by one-half inch thick welded directly to the shell to prevent the outer jacket from moving either horizontally or

vertically. Despite the fact that the original drawing submitted to the AAR Tank Car Committee did not show the required attachment pad, the application was approved and over 10,000 cars were either constructed or modified with a similar anti-shift bracket. A recall and modification program was mandated by the Department, working with the Committee; this program included "second recalls" for some of the cars which were recalled early and repaired improperly.

PROBLEM -- IMPROPER HEAD SHIELD DESIGN: Certain tank car head shields applied by General American Transportation Corporation do not meet the requirements of the DOT regulations. The GATX shields are two feet, nine inches across the bottom instead of the required four feet, six inches and top corners are not rounded to the required minimum radius of nine inches.

A rulemaking docket, with AAR in support, is pending before the DOT.

PROBLEM -- SELF-ENERGIZING BOTTOM MANWAY: On September 8, 1987 car GATX 55996, loaded with inhibited butadiene, a flammable gas, was placed on the Chessie Corporation interchange track in New Orleans, Louisiana. At 1:47am on September 9, 1987, the car was found burning near the lower middle of the tank. The fire burned for over 24 hours.

FRA investigation determined that an improper gasket had been applied to the self-energizing bottom manway (an opening in the bottom of the car which uses internal pressure to achieve a

leak-free seal); that the gasket had been misapplied; and that the manway was not constructed as originally approved by TCC. This car (with 28 others) was built in 1966 by the North American Tank Car Corporation (NATX), now General Electric Railcar Services, to a DOT 114A340W specification and converted in 1978 to "J" specifications with the addition of thermal insulation, head shields and shelf couplers. In 1979 the car was sold to Phillips and, in 1987, to GATX. Neither Phillips nor GATX inspected the car to determine compliance with the original approved drawings.

While the problem has been fixed on these cars, the "systems safety" solution has not yet been achieved. DOT believes that improved inspection, quality control, and record keeping are at least part of the answer.

PROBLEM -- EXCESS FLOW CHECK VALVES: On July 30, 1983, in Baton Rouge, Louisiana, the hoses came loose from a car just after it was loaded with vinyl chloride monomer (VCM), a flammable gas. The escaping product caught fire and seriously injured two people. Two tank cars and a portion of the loading rack were destroyed and three other cars were moderately damaged. Property damage alone exceeded $1 million.

The FRA investigation showed that a hose had come off the liquid eduction line and that the increase in flow was not enough to cause the excess flow valves to function and stop the escape of VCM.

It was also discovered that the excess flow valve seat was not fully tightened. While the excess flow valve is not designed to function unless the primary valve above it is completely removed (i.e., sheared off), if the valve is loose there is a chance that it will not function as intended. A further investigation by AAR revealed that a high percentage of check valve seats were loose. Amendments have been made to the regulations to require excess flow valves to be checked when safety valves are retested.

PROBLEM -- BROKEN SAFETY VALVE SPRINGS: In October, 1986, a tank car of LPG, contaminated with hydrogen sulfide, was found leaking from the safety valve at Pueblo, Colorado. Post-incident investigation found a safety valve spring broken due to hydrogen embrittlement. There were no signs of corrosion, but the hydrogen in the hydrogen sulfide attacks the hardest steel within the spring of the safety valve. The result of the attack is a spring that looks like it was frozen in liquid oxygen and then dropped. In similar cases, springs have been found broken into as many as eleven pieces. The problem has also been found in anhydrous ammonia service.

Hydrogen embrittlement is currently under study by the Tank Car Committee.

PROBLEM -- GATX "ZIPPER" CARS: For about three years, beginning in 1979, GATX altered DOT 111A100W1 tank cars in a manner inconsistent with the AAR approval for the work. In

addition, poor quality control was used as GATX repositioned the train line for the air brake and added two or three reinforcing bars to the belly of the car.

AAR approved a reinforcing bar and pad attached with a skip, or stitch, weld not to exceed three inches in length for each continuous bead, with no more than twenty-four inches of quarter-inch weld bead per reinforcing pad. (The skip welding was necessary if GATX was to avoid a post-welding heat treatment requirement.)

Following two metal fatigue induced failures on cars with reinforcement bars, an investigation revealed welds exceeding three inches in length (some were more than seven inches long) and one-quarter inch across the throat. Arc gouging up to one-eighth inch deep was discovered where the train line had been moved.

All 169 cars in the group have been inspected and all arc gouging and potential fatigue points have been removed. The matter of stress relieving is still of concern to FRA and a research study is in progress.

PROBLEM -- WELD UNDERCUTS: On February 4, 1985, a tank car containing the residue of anhydrous hydrogen fluoride developed a leak while in the Conrail yard at Elkhart, Indiana. The investigation disclosed defects in both the head welds and the program for monitoring weld integrity. This is not an isolated case and FRA has initiated a research program on welding

techniques. In addition, FRA has reinforced its inspection procedures for detecting failures in quality control.

PROBLEM -- DIRECT ATTACHMENTS TO TANK SHELLS: On July 8, 1986, at Miamisburg, Ohio, a tank car loaded with yellow phosphorus was part of a large derailment. The car had nothing to do with the cause of the accident, but the ensuing fire involving its lading created the need to evacuate thousands of people for several days. One of several breaches in the tank occurred when a brake system support bracket attached directly to the tank tore loose during the derailment and created an opening for the escape of phosphorus. The car had been constructed to standards applicable at the time it was built in 1966; it was in that segment of the fleet "grandfathered" when the standards changed in 1971 to require the placement of a welding pad between the tank shell and attachments welded to it. Following the success of the phased program to protect bottom discontinuities, the Tank Car Committee has developed a plan for adding protection to bottom attachments. Cars will be scheduled for retrofit based on the hazards of the products they carry; effective September 15, 1988, pressure cars not retrofitted were restricted from interchange. Non-pressure cars came under a similar restriction on March 15, 1989.

APPENDIX E:
ASSOCIATION OF AMERICAN RAILROADS
RECOMMENDED MINIMUM DOCUMENT RETENTION TIMES

Recommended Minimum Document Retention Time By Proponent

Item	Document	AAR Ref.	Retention Time By Proponent
1.	Mill test certificates		5 years
1a.	Plate material identification reports (consistent with radiograph retention time)	5.1.4	5 years
2.	Radiographs and radiotapes	R20.05	5 years
3.	Post weld heat treatment record (consistent with radiograph retention time)	W17.00/R21.00	5 years
4.	Welder performance qualification test results	W10.03/12.08	Until requalified
5.	Welding procedure qualification reports	W10.03/13.06	Until revised
6.	Calibration for tank capacity	1.3.8/1.3.9	Life of car
7.	Impact, corrosion and hardness tests when required by specification (consistent with radiograph retention time)	W9.00	5 years
8.	Certificate of tank test	Appx. D	Until next tank test
9.	Certificate of safety valve test	Appx. D	Until next safety valve test
10.	Certificate of interior heater coil test. Note: Test of exterior coils not a specification requirement	Appx. D	Until next interior heater coil test
11.	Original and subsequent tank car certificates of construction Form AAR 4-2	1.3.5/1.4.3	Life of car
12.	Exhibit R-1's report of welded repairs, alterations and conversions	1.3.5/R4.04	Life of car
13.	Safety relief device and other device certificate for approval (Forms AAR 4-3 and 4-5). (Precedent approvals are acceptable for 5 years, then must be resubmitted)	1.4.1.9/1.4.1.10	5 years
14.	Final product test and inspection report (Form AAR 4-6). (Service trials for devices in hazardous or regulated commodities are for 2 years)	1.4.3.6	2 years
15.	Open		

Recommended
Minimum Document Retention Time
By Proponent

Item	Document	AAR Ref.	Retention Time By Proponent
16.	Tank car service trial report (Form AAR 4-4)	1.4.3.4	Duration of trial
17.	Certificate of construction for Class DOT 107A tanks	1.4.4.2	Life of tank
18.	Drawings used as precedent for repairs. (Drawings used for precedent approval must be resubmitted every 5 years.)	1.4.3.1.1	5 years
19.	Certification and recertification of facilities. (Facilities must be recertified every 5 years.)	B6.00	5 years

APPENDIX F:

AN UPDATE ON DOT AND TCC ACTIVITIES SINCE COMPLETION OF THE ASSESSMENT FIELD WORK

Since completion of the field work for the Tank Car Report, both DOT and AAR have made changes in the way they interact and in the way they conduct business related to tank cars. The assessment team believes that more changes are necessary, and it fully recognizes that even many of these revised patterns of activity are, as yet, only "in process." However, the team also believes that a review of the following examples will provide a more current, and thus more accurate, picture of the status of Federal oversight of tank car design, construction, and repair:

* FRA developed and provided classes to train its inspectors in the on-site inspection and monitoring of tank car construction and repair.

* Following training, FRA inspectors began monitoring AAR/TCC certified tank car construction, alteration and repair facilities.

* FRA and RSPA have attended and participated in all scheduled annual and semi-annual meetings of the AAR/TCC.

* The AAR/TCC amended its procedures and now requires that the chairman of the Committee be a railroad representative (the previous three chairmen were shipper representatives).

* The AAR/TCC now requires that there be more railroad members on the Committee and that all members fully participate in Committee activities.

* The AAR/TCC started computerizing its Exhibit R-1 reports and now requires retention of all drawings and applications for the life of the car (previously, they were retained for only five years).

* AAR/TCC has begun using Bureau of Explosives inspectors to monitor AAR-certified tank car construction and repair facilities.

* FRA has issued letters to the AAR/TCC and tank car

owners on issues of non-compliance discovered while attending and participating at AAR/TCC meetings.

* By using a routine, standing Miscellaneous Rule docket (the HM-166 series), FRA and RSPA have incorporated several recommendations proposed by the AAR/TCC into the regulations (prior to 1987, these non-major proposed amendments had either been lost at the bottom of regulatory priority lists or had been included after an unreasonable delay).

* The AAR/TCC is now reviewing all requests for exemptions pertaining to the use of DOT specification tank cars not meeting existing requirements prior to final action on the exemption by RSPA. This enhances the approval process by capturing TCC expertise before commencement of the DOT decision-making process.

* FRA, working with the AAR/TCC and the RPI, is conducting joint research and development activities addressing tank car safety issues.

* The AAR/TCC has been furnished a list of recommendations made by the National Transportation Safety Board in order to assist the Department in performing research and in implementing design changes responsive to NTSB recommendations.