

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: JAN 15 1986

Forwarded to:

Mr. Michael A. Feder
President
North American Car Corporation
33 West Monroe Street
Chicago, Illinois 60603

SAFETY RECOMMENDATION(S)

R-85-117

At 6:30 a.m., on February 4, 1985, an "empty" placarded railroad tankcar, NATX 9408, containing an estimated 800 gallons of anhydrous hydrogen fluoride, a corrosive liquid, was found leaking in the Consolidated Rail Corporation's Elkhart, Indiana Receiving Yard. During the following 4 hours as local emergency response agencies worked to contain the spill, a vapor cloud formed and traveled approximately 2 1/2 miles affecting nearby residential areas northwest of the yard. A total of 1,500 people within a 1.1-square-mile area adjacent to and northwest of the yard were evacuated for 9 hours as an emergency precaution. Local area hospitals treated 75 persons for minor skin and eye irritations. 1/

NATX 9408 is a specification 112S400W pressure tankcar of the "stub sill" design. 2/ It has a nominal capacity of 22,500 gallons and is equipped with 100-ton trucks; it has a gross rail load limit of 263,000 pounds. NATX 9408 is rated at 400 psi pressure. The rating is not required for hydrogen fluoride acid service; however, the shipper selected this car because it was equipped with thicker than necessary tankheads. The tank shell is 13/16 inch thick, and the tankheads are 3/4 inch thick. The thicker tankheads provide an added measure of puncture resistance in the event the car is involved in a derailment. Also, NATX 9408 is equipped with half-head shields to provide additional tankhead protection. Head shields are not required for tankcars in hydrogen fluoride service.

NATX 9408 was manufactured by the North American Car Corporation at its Texarkana, Arkansas, facility in October 1962 as NATX 171123 under Interstate Commerce Commission specification 112A400W. There were no specific weld undercut rejection criteria in effect when the tank was fabricated in 1962 by the A.M.F Beaird Company of Shreveport, Louisiana. Reportedly, the tankheads were manufactured by Luekens, although no documentation could be found to support this. NATX 9408 was one of a 78-car lot manufactured to the earliest stub-still design built by North American Car under Association of American Railroad (AAR) Certificate of Construction No. D-14766. NATX 9408 was originally designed for vinyl chloride service.

1/ For more detailed information, read Hazardous Materials Accident Report—"Anhydrous Hydrogen Fluoride Release from Tankcar NATX 9408, Train No. BNEL3Y at Conrail's Receiving Yard, Elkhart, Indiana, February 4, 1985" (NTSB/HZM-85/03).

2/ A short longitudinal structural member of a car underframe designed to accommodate the coupler and draft gear and to transmit coupler forces to the car body on cars designed with no through center sill.

This investigation disclosed deficiencies in the fabrication of NATX 9400-series tankcars and the absence of adequate monitoring procedures for detecting head weld defects. The Safety Board's metallurgical analysis of samples removed from the tankhead of NATX 9408 disclosed that the excessive weld bead undercutting shortened the service life of the car. Examination of the fracture to the tankhead of NATX 9408 revealed that the leak-producing crack appeared to have resulted from a single overload impinging on a preexisting crack in the tankhead material. The 5 1/2-inch-long crack was initiated at an undercut on the external head-to-sill weld.

An examination of another NATX 9400-series tankcar shortly after the Elkhart accident disclosed similar problems and prompted the Safety Board to issue Safety Recommendation R-85-12 on March 6, 1985, to the Federal Railroad Administration (FRA):

Require that all DOT Specification 112 tankcars built to the same drawing specification as NATX 9408 be removed from service promptly for inspection using appropriate non-destructive inspection techniques, and that any car found defective not be returned until the defect is corrected.

The FRA responded on June 3, 1985, that all tankcars of the same drawing number would voluntarily be taken out of service by the owners for inspection. Inspections performed by the involved companies found cracking or indications of possible cracks in several other cars. As a result of these findings, the companies have decided for now to discontinue temporarily the use of the entire series of cars, regardless of future inspection findings. The FRA added in its response that it is reviewing other series of tankcars with similar design characteristics to determine if any other tankcars are prone to developing similar problems. The Safety Board in its reply on August 19, 1985, stated that it is concerned that while the involved companies have decided to discontinue the use of these tankcars, there exists the possibility that these tankcars could be returned to service at some time in the future. The Board believes that the FRA should take further action to prohibit these tankcars from being returned to service until the defects have been corrected. Based on the FRA's initial efforts, Safety Recommendation R-85-12 is being held in an "Open--Acceptable Action" status pending an indication from the FRA that it will take further action.

The Safety Board's investigation of an ethylene oxide release on December 31, 1984, at the Missouri Pacific Railroad Company Yard in North Little Rock, Arkansas, ^{3/} also disclosed welding fabrication deficiencies; during a 13-year period, more than 9,000 tankcars were built with an anti-shift bracket attached directly to the tank shell in violation of 49 CFR 179.200-19(b). The Safety Board's investigation disclosed that the inspection and repair now being made of General American Transportation tankcars may not adequately identify and correct all existing cracks in these tankcars and, in fact, may result in damage to the tank. As a result, the Safety Board issued Safety Recommendation R-85-99 on September 9, 1985, to the FRA:

Institute an inspection program to verify that tankcars intended to be used in hazardous materials service are manufactured in compliance with Department of Transportation standards.

Because of the recency of this recommendation, the FRA has not yet responded.

^{3/} Railroad Accident Report--"Hazardous Material Release, Missouri Pacific Railroad Company's North Little Rock, Arkansas, Railroad Yard, December 31, 1984," (NTSB/SIR-85/03).

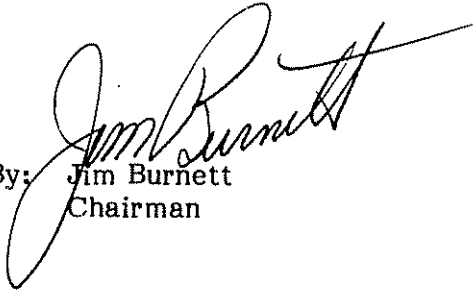
This investigation of the hazardous material release in Elkhart suggests that the head-to-stub sill weld attachment is a critical stress area that is subject to severe mechanical stress. Without frequent and intensive inspections and monitoring to detect incipient failures, the estimated useful life of the tank will be shortened resulting in an unwanted release of hazardous material. Subsequent design improvements to this tankcar have led to the attachment of a stiffener plate in the newer design series tankcars. On January 1, 1967, the AAR issued Standard M-1002, to include undercuts as specifically detrimental to weld quality, i.e., "sharply notched undercuts shall not be permitted in areas such as transverse joints in draft sills." Nevertheless, inservice testing and inspection requirements of existing tankcars do not provide assurance that this problem will be identified routinely and monitored properly. This incident and the resulting information suggest that the Department of Transportation needs to develop a long-range recertification program for stub-sill tankcars of this type of design and manufacture. An inspection program should be based on ultrasonic and x-ray procedures that were used to inspect the defective tanks as a result of Safety Recommendation R-85-12.

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the North American Car Company:

Inspect all stub-sill tankcars fabricated prior to 1967 to identify and correct weld undercuts in tankheads. (Class II, Priority Action)
(R-85-117)

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation R-85-117 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, Member, concurred in this recommendation.

By: 
Chairman