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MAJOR RAILROAD ACCIDENTS INVOLVING HAZARDOUS MATERIALS RELEASE

COMPOSITE SUMMARIES 1969-1978

U.S. DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
Transportation Systems Center
Cambridge MA 02142

JULY 1980
FINAL REPORT

DOCUMENT IS AVAILABLE TO THE PUBLIC
THROUGH THE NATIONAL TECHNICAL
INFORMATION SERVICE, SPRINGFIELD,
VIRGINIA 22161

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16. Abstract

This report presents composite summaries describing 75 major railroad accidents in which hazardous materials were released. The selected accidents occurred during the years 1969-1978. The data contained in the individual summaries were derived from various government and private agency reports and files. Categories used to classify the information in the summaries are: Events, Cause of Accident, Cause of Hazardous Material Release, Casualties, Damages, Notification and Response, Observations, and Recommendations.

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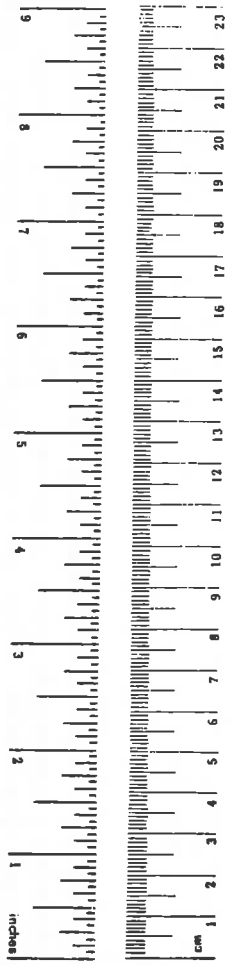
METRIC CONVERSION FACTORS

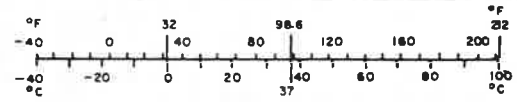
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
		AREA		
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
		MASS (weight)		
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
		VOLUME		
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
		LENGTH		
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
		AREA		
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
		MASS (weight)		
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
		VOLUME		
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



PREFACE

Stephanie H. Markos, Raytheon Service Company (RSC), prepared these accident summaries of railroad accidents involving hazardous material release under the direction of Theodore S. Glickman, Transportation Systems Center (TSC). Marilyn K. Goldberg (RSC) also assisted in writing several of the summaries.

The authors wish to acknowledge the contributions of the following individuals: Regina Clifton (RSC), Aviva Schulman of the American Association of Railroads (AAR), Frank Fanelli, Aaron Bigman, Horace Franklin, Henry Libby, all of the Federal Railroad Administration (FRA), and Clyde Klinestiver and William C. Morgan of the Materials Transportation Bureau (MTB), for making various government reports and files available; and Jon C. Jones of the National Fire Protection Association for access to NFPA incident files. In addition, Cynthia Gregoire and Fred Doten of SDC Integrated Services provided access to MTB and FRA computer files at TSC.

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INTRODUCTION

SCOPE:

This report presents composite summaries describing 75 major railroad accidents in which hazardous materials were released. The selected accidents occurred during the years 1969-1978. The descriptive information and other data were derived from various government and private agency reports and files. The summaries emphasize the use of accident information as it relates to the release of hazardous materials.

ACCIDENT SELECTION:

The majority of accidents considered for this report were derived from a computer search of Materials Transportation Bureau (MTB) Hazardous Materials Incident Reports for the period covering 1971-1978. This data base was used because the accident casualty and damage estimate data primarily reflect the impact of hazardous material release. Three criteria were used for selection: the occurrence of one or more fatalities, three or more injuries and/or more than $40,000 damage. Approximately 55 accidents contained in this data base meeting those criteria were not included in the descriptive summaries because of insufficient information. Additional accidents meeting comparable criteria, particularly for 1969 and 1970, were identified during the search of other information sources.

ORGANIZATION OF SUMMARIES:

With the exception of four accidents which were reviewed by the National Transportation Safety Board (NTSB), primary accident location names are those used by the Federal Railroad Administration (FRA). Different location names when used by MTB are also indicated for reference purposes.

Information contained in the individual summaries is classified under the following categories: Events, Cause of Accident, Cause of Hazardous Materials Release, Casualties, Damages, Notification and Response, Observations, and Recommendations.

An attempt was made to utilize all available sources in each accident summary description. For 71 of the 75 selected accidents, at least two sources were used in writing the composite summary. Although only one source was available, the other four were included because of the high degree of information available.

Unless specific sources are cited within the particular category, (e.g. Cause of Accident, Damages) the information represents a composite description derived from the sources initially listed for each accident.

Where various reports may have indicated different causes for the accident or differences in casualties and/or dollar estimates of damage, the variations are noted.

The summaries are presented in reverse chronological order beginning with 1978. Within each year the summaries are chronologically arranged by date.

SUMMARY OF INFORMATION SOURCES:

In an attempt to acquire as much data as possible about each accident, various potential sources of information were investigated. An account of the various government and private agency reports and files available is presented below.

Materials Transportation Bureau (MTB)

The computer records of MTB Hazardous Materials Incident Reports (HMIR) were reviewed. These reports are completed by the rail carriers and filed with the MTB. The contents indicate date, location, time (after 1973), carrier and shipper information, origin and destination, type of container, capacity, plus quantity and type of hazardous materials released. Casualty data indicated are those which result from the release of the hazardous material. Damage estimate data can include property damage, loss of lading, cost of decontamination, etc. After mid-1973, limited coded information is included for cause, result, recom-

mendation and violation. Additional information in the "Remarks" section of the original reports covering this eight year period furnished additional details.

Federal Railroad Administration (FRA)

The FRA Office of Safety conducts different level investigations for various types of accidents. "A" type reports are those full-scale investigations by the FRA of spectacular accidents. These accidents either resulted in death or injury to rail employees, passengers and/or community residents; or presented a potential hazard to a large number of people. "B" investigation reports are those conducted jointly with NTSB. "C" level investigations are those which the FRA determines to be of less than major proportion. Investigation files include: FRA inspector reports, FRA Factual Railroad Accident Reports, photographs, newspaper accounts, and published FRA investigation reports and summaries. Data contained in these files vary and generally include train information, track conditions, cause of accident and specific information about hazardous materials involved in the accident. These files are referred to in the summaries by investigation file numbers.

The FRA Office of Safety publishes a yearly (fiscal prior to 1977) Summary of Accidents Investigated. This report lists all investigations conducted by the FRA and includes location, railroad, casualty and damage estimates, and cause of accident. These data generally duplicate those contained in the FRA investigation reports. For this reason, the Summaries are not usually cited unless complete FRA investigation reports are unavailable.

Rail carriers are required to submit Rail Equipment Accident/ Incident Reports (RAIR) to the FRA concerning accidents which meet certain casualty and damage thresholds. Computer files of these reports were obtained for the period covering 1975-78. Data extracted include: date, location, time, weather, information about number of cars which carried hazardous materials, number of these damaged or derailed and number of these which released

hazardous materials, train consist, track classification*, speed, number of cars derailed, fatality and injury data, dollar estimates of damage to equipment and track (excluding lading), and cause of accident. Additional information in the "Narrative" sections of the original reports for this four year period offered further details.

Prior to 1975, rail carriers were required to submit accident information to the FRA in Monthly Reports of Accidents (Form T). These reports had a more limited format. Computer files of these records yield data indicating: month and year, state, railroad code, whether hazardous materials were carried on the train, cause of accident, dollar damage estimates and casualty information. The original copies of these reports no longer exist.

FRA Monthly Casualty Summaries for the last month of each year were used to obtain the most current available statistics for each accident.

National Transportation Safety Board (NTSB)

The various NTSB investigation reports contained the most complete material available about particular accidents with the exception of some FRA investigation reports. NTSB is required by law to investigate accidents in which a fatality or substantial property damage occurs or which involves passenger trains. The results of these investigations are published in Railroad Accident Reports (RAR). This type of in-depth report includes information about sequence of events, train and crew information, analysis of causes and contributing factors, conclusions, and recommendations.

More extensive data, concerning those NTSB investigations for accidents occurring since 1976, are available in the form of

*FRA classifies railroad track into six classes using roadbed and track geometry and structure standards. Operating speeds are lowest for Class 1 track.

Group Chairman Reports (GCR). This type of report, for accidents involving hazardous materials, is comprised of three sections: Factual, Human Factors and Analysis. NTSB hearing transcripts as well as police and fire department logs are also included within the GCR.

Information utilized in the composite summaries was limited to that contained in the published RARs.

The NTSB has published 19 RAR reports for accidents occurring during 1969-78 which involved hazardous material release. All of these reports were used as source materials.

National Fire Protection Association (NFPA)

Files maintained by the NFPA include fire department reports, NFPA investigation reports, newspaper accounts, photographs, and NTSB-RARs. About 40 of the 75 selected accidents appeared in these files.

Other Sources

Other sources which were investigated and which yielded a limited amount of data for certain accidents are as follows:

The Rail Progress Institute-American Association of Railroads (RPI-AAR) has published a "Summary of Ruptured Tank Cars Involved in Past Accidents." This contains information on tank car damage and release of hazardous materials. The RPI-AAR also published "Sequence of Events" reports for three acidents. Those reports (Callao, MO, Houston, TX, and Crescent City, IL) were utilized as information sources.

The Insurance Services Offices, an insurance-industry supported organization, reviewed two accidents involving high property damage to buildings. Those reports (Belt, MT and Roseville, CA) were also used as source material.

The Chemical Transportation Emergency Center (CHEMTREC) maintains a daily log of calls requesting information about

emergency handling procedures of hazardous materials. This agency's records do not include a breakdown by mode and specific information was not available.

State Fire Marshall Offices were considered as possible sources of information. Due to the large number of offices, these sources were not pursued.

INCIDENT: DILLSBORO, IN January 2, 1978

SOURCES: FRA RAIR #AWB002
FRA #C-50-78
MTB HMIR #8010428

EVENTS:

Baltimore and Ohio train #CI-96 consisted of four locomotives and 60 cars (16 empty) and included 15 cars of hazardous materials. At 4:40 a.m., while proceeding at an estimated speed of 35 m.p.h. east on a double main line (FRA Track Class 3), through an area of progressive curves, 23 cars derailed, 1.2 miles west of Dillsboro. Among the derailed cars were 9 cars containing hazardous materials. Three of these cars leaked and 36 people were evacuated. The temperature was 10°F and it was cloudy and dark.

CAUSE OF ACCIDENT:

FRA analysis (C-50-78) indicated that the 19th car in the train, ACFX 55087, was the initial car derailed. That same FRA report stated that the derailment was caused by high side turnover of a rail as a result of unknown excessive lateral forces. A fracture near a jointbar then caused a displacement of railends allowing the general derailment. The 19th-41st cars derailed.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

The FRA report (C-50-78) described the causes and quantities of hazardous materials released as follows:

The tank car heads of ACFX 84248 containing Methyl acrylate, and GATX 8554, loaded with Cresylic acid were punctured by drawbars. The car of Methyl acrylate sustained a total loss of its 150,000 pound contents while the car containing Cresylic acid released 8400 pounds of its contents. CCBX 2511, containing Monoethanolamine leaked 500 pounds from the dome area. Two other cars not classified as hazardous materials were total losses. UTLX 91592 containing Petroleum oil sustained a broken bottom outlet valve and DUPX 36393 containing Polyethylene was punctured by a draw bar.

MTB quantity loss information for the cars containing Methyl acrylate and Monoethanolamine agreed with that given in the FRA analysis. However, the 8300 pound loss quantity was ascribed to a car containing Alcohol instead of Cresylic acid.

CASUALTIES:

FRA C-50-78 reported 21 employees injured resulting from corrosive material contact during wreck clearance. FRA RAIR listed no injuries as a result of the derailment. MTB listed 84 injuries.

DAMAGES:

Dollar estimates are:

FRA C-50-78		FRA RAIR	
Equipment	$12,900	Equipment	$112,900
Track	8,050	Track, etc.	8,050
	$20,950	Total	$120,950

DAMAGES (con.):

MTB

ACFX 84248	
Contents	$20,000
Decontamination	15,000
	$35,000

NOTIFICATION AND RESPONSE:

Hulcher Emergency Service, the Bureau of Explosives, the State Board of Health and Chessie Environmental Office were on the clean-up scene. FRA RAIR listed 29 people evacuated.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: MANGAUP, PA (Pond Eddy) January 14, 1978

SOURCES: FRA RAIR #0140004
FRA #C-58-78
MTB HMIR #8020078A-B

EVENTS:

Conrail train, NY-74, while travelling east at 38 m.p.h. on main track (FRA Track Class 3), derailed five locomotive units and 26 cars. The original consist of five locomotive units and 57 cars (26 empty) included three cars carrying hazardous materials. All three cars were part of the derailment and all carried Acetaldehyde. The accident occurred at 11:25 a.m. (Temperature 28°F and snowing.)

CAUSE OF ACCIDENT:

According to the FRA investigation report (C-58-78) the derailment was caused by a broken rail which resulted from a pulled apart splicer-bar. Car BM 78460, the 6th car in the consist, was the first to derail (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Car GATX 40126 derailed onto the bank of the Delaware River. The bottom outlet was knocked off the car and the entire contents of Acetaldehyde lost. Approximately 17,000 gallons spilled into the river (FRA C-58-78). MTB indicated that this car lost 21,399 of its 22,766 gallon contents.

As a result of the derailment, car CELS 4232 had its valve jarred loose and 100 of its 20,915 gallon contents of Acetaldehyde leaked. The valve was tightened to stop the leak.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$282,800	Total	$56,000
Track, etc	32,900		
Total	$315,700		

NOTIFICATION AND RESPONSE:

There was no fire, explosion or injuries. However, approximately 50 people were evacuated from the area as a precautionary measure. The evacuation lasted for 7 hours (FRA C-58-78).

Approximately 30 people were evacuated from their homes (MTB).

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

January 30, 1978

INCIDENT: LEON, KY.

SOURCES: FRA RAIR #AWV 030
FRA #C-70-78
MTB HMIR #8020888A
NFPA State Fire Marshal's Report,
Carter Company Report, Letter to NTSB.

EVENTS:

Fifteen cars of Chesapeake and Ohio train #3891 derailed 2 miles west of Leon while travelling east on a single main line (FRA Track Class 2) at 30 m.p.h. The train consisted of six locomotive units and 54 cars (12 empty). Seven of the 17 cars carrying hazardous materials were involved in the derailment and five of these spilled their contents. Fire ensued. Acrylonitrile from one of the tank cars contaminated the Grayson water supply. The water was shut off and people were evacuated. The accident occurred at 5:30 a.m. on a clear night with the temperature at 10°F.

CAUSE OF ACCIDENT:

The derailment was caused by a three inch variation in the cross level of the track causing the wheel of the 17 car to lift and derail (FRA C-70-78). Interaction of lateral/vertical forces caused the 17th car (LN 188985) to derail (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

FRA C-70-78: Four cars (DOT 111A) containing Acrylonitrile were damaged and released their contents. DUPX 29198 overturned and came to rest across the tracks at a 45° angle. The tank shell was ruptured in two locations and 24,000 of the 29,000 gallon contents were exposed to the fire. NATX 71289 overturned and landed at a 30° angle. The bottom outlet of this car was broken off and 5000 of the 26,000 gallon contents were lost. UTLX 47461 overturned and came to rest at a 40° angle and all of its 25,000 gallon contents were lost. DUPX 29176 remained upright but sustained a rupture and released 24,000 gallons of the 29,000 contents.

One car, GATX 84114 containing LPG* overturned and came to rest at a 90° angle. The car was ruptured in two places. A small explosion occurred when a fire ignited. All of its 29,000 gallon contents were lost.

Another car of LPG (DUPX 28133) and another of Acrylonitrile were derailed but no leakage resulted from either.

CASUALTIES:

There were no casualties reported.

*LPG = Liquified Petroleum Gas.

DAMAGES:

Dollar estimates are:

FRA RAIR, C-7-78		MTB	
Equipment	$303,200	Total	$700,000
Track, etc.	4,500		
Total	$307,700		

NOTIFICATION AND RESPONSE:

Local residents informed state police about the derailment. A Command Post was set up. Since Acrylonitrile contaminated the water, the Grayson water supply was immediately cut off. Because of the lack of drinking water, water for sanitary purposes and, in some cases, water for heat, 50 to 300 people in two communities were temporarily relocated. The fire caused by the derailment was allowed to burn itself out.

OBSERVATIONS:

FRA C-70-78:

Train equipment inspection disclosed no defects which could have caused the derailment.

Track in the area was last inspected by a track foreman on January 24, 1978 and no exceptions were noted.

Confusion about the available information resulted from too many agencies being involved (NFPA).

RECOMMENDATIONS:

None.

INCIDENT: VIEW, TX February 4, 1978

SOURCES: FRA RAIR #22-028-101
MTB HMIR #8020474A-78A
NFPA - *Fire Engineering*, July 1978.

EVENTS:

Twenty-four cars of Atchinson, Topeka and Santa Fe train #594-C-1 derailed while travelling east at 53 m.p.h. on main track (FRA Track Class 4). The train consisted to two locomotive units and 72 cars (24 empty) and included nine cars carrying hazardous materials. Five cars of Methyl alcohol were derailed and damaged, causing spillage and fire. The accident occurred under the U.S. Highway 277 overpass at 3:00 p.m. It was a clear day with a temperature of 56°F.

CAUSE OF ACCIDENT:

FRA RAIR indicated that the cause of the derailment was a broken wheel rim on the 35th car (UTLX 48946). The 56th car (AT 66198) was the first car to derail.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

NFPA: Of the six cars of Methyl alcohol, five were damaged. Initially two of the cars leaked and were on fire. A third car split open and all of its contents spilled onto the fire. The leaks in two other cars, with a broken 2" valve and a 2" hole, respectively, were stopped by the fire fighters.

MTB: Five cars released Methyl alcohol. Two cars containing 23,149 and 29,383 gallons, respectively, were total losses. The third car released 10,699 of its 20,917 gallon contents. The fourth car lost 6875 of its 20,884 gallon capacity. The fifth car lost 5097 of its 20,864 gallon contents.

FRA RAIR: Three cars released hazardous materials.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Contributing to the intensity of the fire were two gondola cars of burning railroad ties.

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$275,000	Total	$142,091
Track, etc	$152,000		
Total	$427,000		

NOTIFICATION AND RESPONSE:

The Abilene Fire Department responded to a call reporting a train derailment and fire. The fire chief met with the train crew to determine the contents of the burning cars. Information concerning the contents of certain cars was confusing. It was initially reported that a tank car in the fire area was empty when it was in fact full of acetaldehyde. Three cars of propane were first reported to be in the fire area although they were in the main part of the train which has been pulled away from the fire. After fire fighters had extinguished a fire in a box car reported as containing corrosives, it was found that the car was empty. Sunday afternoon, the remaining contents of the tank cars were transferred by railroad personnel.

The Merkel and Tye Fire Departments and Dyess Air Force Base also provided assistance.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: BOONEVILLE, AR February 8, 1978

SOURCES: FRA RAIR #87
MTB HMIR #8020355

EVENTS:

At 5:15 p.m., while a Chicago, Rock Island and Pacific train crew were inspecting train #28AO, consisting of four locomotive units and 88 cars (39 empty), a brakeman noticed smoke coming from the door of car RI #20042. This car contained fiber drums of Potassium permanganate. Before the fire department arrived, the door of this car blew off. A fire resulted. No evacuation was ordered. The temperature was 31°F and it was dark and cloudy.

CAUSE OF ACCIDENT:

See below.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The shipper suggests that the drum of Potassium permanganate could have been punctured by a nail from the wood car deck or the material fell out and was ignited by friction or contact with oil (MTB). The quantity of hazardous material released was 59,000 pounds.

CASUALTIES:

FRA RAIR reported no injuries. MTB reported that 76 firemen were treated for smoke and fume inhalation.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$8600	Total	$30,000

NOTIFICATION AND RESPONSE:

Before the fire department arrived the door of the car containing Potassium blew off. The fire department could not suppress the fire. The car was moved to a spur track outside of town and allowed to burn out.

OBSERVATIONS:

MTB indicated shipper packaging violation.

RECOMMENDATIONS:

None.

INCIDENT: WAVERLY, TN February 22, 1978

SOURCES: FRA #C-84-78
FRA RAIR #02780733
MTB HMIR #8030716

EVENTS:

On February 22, Louisville and Nashville train #R584 consisting of three locomotive units and 93 cars (51 empty) was travelling north on a single main line (FRA Track Class 3). While proceeding at an estimated speed of 35 m.p.h., 26 cars (17th-39th) including two of propane gas, derailed. Four cars on an adjacent siding were also struck. An evacuation of a 2500 foot area had been ordered but it was not strictly enforced. At 2:55 p.m., on February 24, one of the derailed cars containing propane gas ruptured and exploded. About 500 people were evacuated. The temperature on the day of the derailment was 29°F. It was dark and snow was falling.

CAUSE OF ACCIDENT:

FRA RAIR attributed the derailment to a broken wheel on the "A" end of car LN 171228 hitting a facing point switch. The FRA investigation (C-84-78) indicated that the wheel broke as a result of being overheated by either a sticking air brake or an unreleased hand brake. Analysis of this wheel showed that a mismatched composition brake shoe had been installed. The other 3 brake shoes on the car were cast iron.

At Coleburg, TN, 5 cars including LN 171228 had been added to the train. No brake tests were performed by the train crew on the individual cars (FRA C-84-78).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Two days after the initial derailment, a tank car, UTLX 83013, which contained 30,161 gallons of propane gas ruptured. This car, and the other derailed tank cars carrying hazardous materials, had been checked by the train crew on the day of the accident and no leaks had been found. FRA analysis (C-70-78) indicated that stresses resulting from the derailment and movement of the car during cleanup operations could have caused the tank car to fail without warning.

CASUALTIES:

There were no casualties reported resulting from the derailment. Deaths and injuries caused by the explosion of the tank car are:

MTB		FRA RAIR	
Killed	15	Killed	16
Injured	50	Serious Injuries	25
		Minor Injuries	21

CASUALTIES (con.):

FRA Casualty Summary

Killed:		Injured (burns):	
RR -	4	RR -	14
Others -	12	Others -	29
Total	16	Total	43

DAMAGES:

Dollar estimates are:

FRA RAIR		FRA C-84-78	
Equipment	$343,486	Equipment	$203,000
Track, etc.	17,000	Track, etc.	22,500
	$360,486		$225,500

NOTIFICATION AND RESPONSE:

The local police and fire department arrived on the day of the derailment, examined the two derailed tank cars and could find no leaks. The conductor's waybills indicated that, in case of a leak, spill, or fire, a 2500 ft. evacuation was recommended. Although an evacuation was ordered, it was not strictly enforced. Clean-up of the derailment was started at 6:30 a.m. on February 23. The area was declared safe by a State Civil Defense hazardous material expert using vapor detectors and explosimeters. The two derailed tank cars of propane gas had been righted and pulled to one side about 2:15 p.m. At 2:55 p.m. on February 24, one of the tank cars of propane ruptured.

OBSERVATIONS:

FRA C-84-78 noted the following

Mismatched brake shoes on LN 171228 contributed to the overheating and destruction of the wheel.

When the five car cut of cars was added to the train in Colesburg, a brake test of each car was not performed by the crew.

RECOMMENDATIONS:

None.

INCIDENT: MILWAUKEE, WI February 24, 1978

SOURCES: FRA RAIR #418002
MTB HMIR #8030331A

EVENTS:

At 2:50 a.m., a Milwaukee Road tank car carrying Ethyl benzene, ruptured when the car received switching shock during a hump movement. The tank car was moving east at an extimated 4 m.p.h. on yard track (FRA Track Class 1) during this switching operation when it struck another car. It was a cloudy night with a temperature of 26°F.

CAUSE OF ACCIDENT:

FRA RAIR listed the primary cause of the collision as improper operation of a manual retarder.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

A seam of the tank car (GATX 62520), carrying the Ethyl benzene burst upon impact with another freight car. Its entire contents were released (MTB).

CASUALTIES:

There were no casualties reported by the FRA RAIR. Eight railroad employees and seven Milwaukee firefighters were treated for inhalation of fumes according to MTB.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$8000	Total	$18,621

NOTIFICATION AND RESPONSE:

The National Response Center and the Bureau of Explosives in Washington, D.C. were notified immediately of the accident. The FRA in Chicago, the Department of Natural Resources at Madison, the Milwaukee Fire Department and the Milwaukee City Bureau of Explosives were also notified. The Milwaukee City Bureau determined the area was clear of explosives. The tank car was sent to Davis Yard for further inspection and repairs.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: YOUNGSTOWN, FL (Couch) February 26, 1978

SOURCES: NTSB RAR 78-7
FRA #A-5-78
FRA RAIR #28278
FRA Casualty Summary
MTB HMIR #8050203A

EVENTS:

At 2:00 a.m., all five locomotives and 44 cars of Atlanta and St. Andrews Bay Railway train Extra #510 South derailed 1.7 miles north of Youngstown, FL, while travelling south at 30 m.p.h. on a single main line (FRA Track Class 4). The train consisted of five locomotive units and 140 (42 empty) cars. It was carrying 10 cars of hazardous materials, including two of Chlorine, four of Caustic Soda, one of LPG, one of Sodium hydroxide, and one of a flammable liquid, N.O.S.* Ten other cars on the train were loaded with gasoline. A tank car containing Chlorine was damaged in the derailment and Chlorine gas engulfed the area, including State Highway 231 running parallel to the railroad track, causing the evacuation of 1000 people. It was cloudy and dark with a temperature of 50°F. There were light, west winds.

CAUSE OF THE ACCIDENT:

According to NTSB, the probable cause of the derailment was vandalism to track, resulting in the intentional displacement of a rail end into the guideway reserved for the wheel flange. The rail end was restrained in this abnormal position until the train derailed.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Seven of the nine derailed cars carrying hazardous materials were damaged and released their contents.

GATX 50247 (DOT 105A), loaded with liquid Chlorine was punctured by the end sill of a piggyback car, originally located several cars behind it. The car was punctured at the bottom of the shell which allowed 17,303 gallons of the 90,000 pounds of Chlorine to escape (MTB). The gas cloud was 3 miles wide and 4 miles long.

The other cars carrying hazardous materials sustained damage of differing degrees. Specific quantities of materials released were not available from MTB.

Car GATX 83608 (DOT 112A), carrying LPG, suffered a small leak at the nozzle. Its contents were transferred to another car. Three cars containing Caustic soda spilled their contents. Car GATX 50861 (DOT 111A) sustained a ruptured safety vent while the bottom outlet nozzles of cars ACFX 77518 and TLDX 216090 (both DOT 111A) were torn off during the derailment.

Both ends of car GATX 49530 (DOT 111A) were punctured and the Sodium Hydroxide contents were lost.

A small amount of a flammable liquid, N.O.S., escaped from the manway cover of car GATX 72389 (DOT 111A).

*N.O.S. = Not Otherwise Specified.

Two other derailed cars, containing Caustic soda and Chlorine, were not damaged in the derailment and were attended to without incident.

CASUALTIES:

All of the deaths and injuries were caused by Chlorine gas inhalation. Seven motorists driving on Highway 231 died from Chlorine inhalation when they left their cars and attempted to escape from the gas. Another motorist managed to drive through the area but died a short distance down the road from the effects of the gas.

NTSB and FRA RAIR 28278 listed a total of eight deaths and 138 injuries. NTSB noted that 112 of the injured were treated and released, while 22 people were admitted to hospitals. FRA A-5-78 indicated eight deaths and five injuries. MTB casualty figures were 8 killed and 158 injured.

FRA Casualty Summary

Killed:	Injured:	
Non-Railroad - 8	RR -	4
	Others -	134
	Total	138

FRA A-5-78

Killed:	Injured:	
Non-Railroad - 8	RR -	5
	Others -	147
	Total	152

DAMAGES:

The NTSB & MTB estimates of damages were:

Equipment	$ 788,000
Lading	101,000
Outside wreck assistance	90,000
Public aid assistance	80,000
Track	30,000
Total estimated damages	$1,089,000

FRA reports estimated the cost of damages to equipment and track to be between $810,000 and $818,000.

NOTIFICATION AND RESPONSE:

The conductor could not communicate with the railroad office in Panama City because it was closed after midnight. The conductor and rear brakeman woke area residents and notified local police of the accident and danger due to the hazardous materials. The crew members stopped motorists on the highway and the rear brakeman made trips into the gas cloud to help motorists to safety. Motorist who entered the area were trapped in their automobiles since the heavy gas cloud caused the cars to stall. A passing deputy was stopped on the highway almost 30 minutes after the derailment. He used his radio to call for help. Civil defense forces, the Florida State Highway Patrol and the U.S. Air Force were activated.

Roadblocks were set up and a house to house evacuation ordered. This was later extended to 10 miles.

OBSERVATIONS:

NTSB noted that:

All railroad safety regulations were followed and all equipment was well maintained.

Thirty minutes elapsed before the proper authorities had been notified.

Top and bottom shelf couplers would have helped to keep the train more in line with the tracks during a derailment and reduce the likelihood of jacknifing.

The tank cars carrying the hazardous materials were in a position where they received high kinetic force from abrupt stopping and unequal braking.

If the wind direction had been different, the gas cloud could have engulfed Youngstown before it could have been evacuated.

RECOMMENDATIONS:

The NTSB recommended to the Secretary of Transportation that top and bottom shelf couplers be installed on all DOT 105 tank cars.

They also recommended expediting research efforts to determine the safest position for hazardous material tank cars in freight trains.

The NTSB recommended the Atlanta and Saint Andrews Bay Railway Company should maintain a 24 hour communication capability with its trains.

INCIDENT: JUSTIN, TX March 9, 1978

SOURCES: FRA RAIR #22-038-102
FRA #C-96-78
MTB HMIR #8030956-59
NFPA Newspaper Account

EVENTS:

Atchison, Topeka and Santa Fe train Extra #3657 was involved in a 15 car derailment while traveling east on a single main line (FRA Track Class 4) at 53 m.p.h. The train consisted of eight locomotive units and 66 cars (41 empty). All six of the cars carrying hazardous materials were involved in the derailment. Four of these spilled their contents. There was no fire. The accident occurred at 4:35 a.m. The temperature was 33°F. It was cloudy and the light wind blowing toward the community carried the fumes from the chemicals to a number of outlying dwellings causing the temporary evacuation of about 20 persons.

CAUSE OF ACCIDENT:

According to FRA C-96-78, a rail joint bar was broken causing the derailment of DRGW56259. The condition of the track in the general area was defective.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

Four of the six derailed cars carrying hazardous materials were damaged in the derailment and spilled their contents. Car RAIX 6367, (DOT 111AW), carrying Butyl acetate was punctured in the derailment and released all but 228 gallons of its 20,449 gallon contents. A car containing 23,361 gallons of Styrene monomer-inhibited was a total loss. Another car released 20,425 gallons of its 23,513 gallons of alcohol. The fourth car loaded with Ethylene glycol monoethylether lost 22,980 gallons of its 23,644 contents (MTB).

CASUALTIES:

There were no known casualties.

DAMAGES:

Dollar estimates are:

FRA RAIR

Equipment	$148,100
Track, etc	35,000
Total	$183,100

MTB:

Total	$152,277

FRA C-96-78:

Railroad equipment $191,000

NOTIFICATION AND RESPONSE:

A limited evacuation of some area residents was necessary for about 7 hours, because of chemical fumes.

OBSERVATIONS:

The FRA report (C-96-78) noted the following:

Oxidation of the metal indicated the break in the rail joint bar had existed for some time before the derailment.

Examination of the track for one mile east and west revealed seven other bars having center cracks or breaks.

Severe batter on the rail resulted from insufficient anchoring. fifty-seven percent of the restraining anchors were missing from the first six rails west of the point of the derialment.

New continuous welded rail and trim were lying adjacent to the track at the time of the accident in preparation for installation.

RECOMMENDATIONS:

None.

INCIDENT: LEWISVILLE, AR March 29, 1978

SOURCES: NTSB RAR 78-8
FRA RAIR #U4508
FRA Casualty Summary
MTB HMIR #8070066-8
NFPA Preliminary Investigation

EVENTS:

St. Louis Southwestern train SRASK consisting of four locomotive units and 116 cars (49 empty), was proceeding north at 30 m.p.h. on a single main line, (FRA Class Track unknown). There were 19 cars of hazardous materials on the train including: six of Butadiene, four of Vinyl chloride, two of Tetrahydrofuran, and seven of Propylene oxide. At 12:10 a.m., as the train entered the 8 degree curve Lewisville wye track, the engineer had failed to slow the train to the authorized speed limit of 10 m.p.h. He then applied the emergency brakes while the train was moving at 30 m.p.h. The four locomotives and 43 cars, including five of Vinyl chloride and two of Butadiene derailed. About 1700 residents were evacuated. The temperature was about 53°F. It was dark and there were scattered patches of ground fog.

CAUSE OF ACCIDENT

The cause of the accident was determined by NTSB to be the excessive speed of the train as it entered the wye. This caused lateral movement of the locomotive and resulted in the rail tipping and derailment.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

As a result of the derailment, one tank car containing Vinyl chloride (DOT Specification 112A) was hit broadside by the coupler of another tank car and ruptured, releasing its total contents of 26,114 gallons (MTB). The resulting vapor cloud ignited and a 1000 foot fireball formed. The locomotive and first 16 cars were engulfed in fire. (All three crew members in the two locomotives escaped.) A tank car of Tetrahydrofuran also leaked its total load of 43,742 gallons but did not ignite (MTB).

CASUALTIES:

NTSB: The engineer and the brakemen suffered second and third degree burns and other minor injuries. They were hospitalized. FRA Casualty summary indicated that the engineer and two brakemen suffered burns. FRA RAIR listed three injuries.

DAMAGES:

NTSB: Two locomotive units were destroyed and the other two were heavily damaged. Twenty-two of the derailed 43 cars were damaged and the rest heavily damaged. About 500 feet of track and a switch were destroyed, while another 1070 feet damaged.

DAMAGES (con.):

Dollar estimates are:

NTSB:		FRA RAIR	
Equipment	$1,648,000	Equipment	$1,648,000
Track	65,000	Track, etc.	100,000
Lading	240,000		$1,748,000
Property	236,000		
	$2,189,000	MTB	
		Total	$48,000

NOTIFICATION AND RESPONSE:

After the derailment, the conductor notified the Lewisville operator that the train was stopped and that he could not contact the engineer. The operator responded that he would come to the scene. The conductor then started to inspect the train and found eight cars near the rear of the train derailed. Both he and the rear brakemen then left the scene and got a ride to the Lewisville station. At first, the fire fighters who responded, thought that the fire had started in a nearby petroleum products building. Being unaware of the derailed train, they concentrated on fighting nearby building fires. About 20 minutes later, railroad officials informed the firefighters about the other tank cars of Vinyl chloride and Butadiene that had derailed. The firefighters then withdrew to avoid the potential danger of other ruptures. About 1700 people within a two mile perimeter of Lewisville were evacuated by state and local officials. Thirty patients at a nearby hospital were evacuated.

OBSERVATIONS:

NTSB made the following;

The train was exceeding the speed limit of 35 m.p.h. approaching the wye and entered the curve faster than the 10 m.p.h. limit. The engineer then applied the emergency brakes.

If the tank car had been equipped with head shields and/or top and bottom shelf couplers; it might not have been punctured.

Volunteer firefighters were unaware of the possible hazard presented by the hazardous materials on the train before they contacted railroad officials.

RECOMMENDATIONS:

The FRA should develop in cooperation with AAR, a failsafe device to stop trains in case of the incapacitation of the engineer due to sickness, death, etc. (NTSB).

INCIDENT: BROWNSON, NE April 2, 1978

SOURCES: FRA RAIR #0478NE203
FRA #C-106-78
MTB HMIR #8041375A
NFPA Preliminary Investigation

EVENTS:

Union Pacific Train #PF142 (Extra 2934 East), consisting of three locomotive units and 101 cars (14 empty), was traveling east on a double main line (FRA Class 3) at 61 m.p.h. At 4:45 a.m., the train brakes were applied in emergency. Thirty-one cars (cars 34-65), including a tank car containing Phosphorous, derailed. This car landed on its side and the leaking contents caught fire. Seven hours later, while firefighters and railroad personnel were in close proximity, the tank ruptured and pieces of the car were propelled up to 24,000 feet away. Between 400 and 1600 people were evacuated. It was dark and the weather was clear. The temperature was 40°F.

CAUSE OF ACCIDENT:

According to the FRA analysis (C-106-78), the derailment was caused by the horizontal draft key coming out of the coupler shank of empty flat car CGW 3102, the 37th car on the train. The coupler fell under the wheels of the car, derailing it.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The tank car, GATX 94057 (DOT 112A), containing Phosphorus, landed on its side. Fire seemed to come from the dome. A boxcar of paper bags and a carload of lumber near the tank car ignited and added to severe heat impingement. About 7 hours later. the tank car ruptured and exploded. The 17,300 gallons of Phosphorus were a total loss (MTB).

CASUALTIES:

FRA RAIR indicated no injuries as a result of derailment. FRA C-106-78 listed seven injuries as a result of the tank car explosion, five railroad personnel and two nonemployees. NFPA listed six railroad and construction workers as injured, two seriously. MTB listed four rail employees and one emergency personnel injured.

DAMAGES:

FRA C-106-78 described 13 cars as destroyed, 14 heavily damaged and three lightly damaged.

Dollar estimates are:

FRA C-106-78		FRA RAIR	
Equipment, lading and track	$1,323,512	Equipment	$622,553
		Track, etc.	35,979
			$658,532

DAMAGES (con.):

MTB:

Total $102,000

NOTIFICATION AND RESPONSE:

A railroad section foreman called the fire department after the accident. The fire chief had responded within 15 minutes.

According to NFPA report, the fire department had been advised CHEMTREC that there was no danger of the Phosphorus exploding.

OBSERVATIONS:

An FRA inspection (C-106-78) of the "A" end of car CGW 3102 indicated that the draft key had not been applied from the brake pipe center sill, as recommended by AAR rule 16.

RECOMMENDATIONS:

None.

INCIDENT: NACOGDOCHES, TX May 14, 1978

SOURCES: FRA RAIR #H4568
NFPA - *Fire Command*, November 1978

EVENTS:

A southern Pacific train consisting of seven locomotive units and 128 cars was proceeding north at about 2 m.p.h. on main line track (FRA Class 3). At 3:05 p.m., 16 cars (26th-41st) derailed while the train was crossing a wooden trestle bridge. The train carried 27 cars of hazardous materials. Among the derailed cars were one each of Acetic acid, Propylene oxide, Butadiene, and Ethyl acrylate. Other hazardous materials carried on the train were listed as dangerous chemicals, acids, poison gases, etc. Fire started immediately. The derailed car of Butadiene exploded at 4:45 p.m. Between 2500 and 3500 people were evacuated. The fire burned until Tuesday morning.

CAUSE OF ACCIDENT:

FRA RAIR indicated that a coupler shank was broken or defective on SP 656446. This caused the derailment.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

It was believed that the safety valve on the car of Propylene oxide sheared off allowing the contents to be spilled.

The tank car of Butadiene exploded about 20 minutes after the derailment. A large section of this tank car rocketed about 350 yards away.

CASUALTIES:

There were no casualties listed, but three firefighters, two police and a sheriff's deputy were admitted to the hospital for observation. Fifty other people were checked at the hospital and 26 of these were admitted.

DAMAGES:

Dollar estimates are:

FRA RAIR

Equipment	$267,780
Track	68,400
Total	$336,180

NOTIFICATION AND RESPONSE:

The fire department was notified of the accident by telephone but they did not know the type of fire involved at the scene. The fire chief was flown over the accident site while his assistant communicated the conductor's work report to him. In this way, the type of materials in the derailed cars which were exposed to fire were identified. Specific car contents were not known until the waybills were delivered by the railroad. A railroad hazardous materials expert arrived on the scene that same night. The remaining tank cars were cooled by firefighters. An initial area of 1500 feet was evacuated. The evacuation was later extended another 1/2 mile. Two nursing homes were also evacuated. Between 2500 and 3500 people were evacuated.

OBSERVATIONS:

The Nacogdoches fire department had previous training and experience in handling this type of accident. It had responded to the 1974 Climax, TX accident. In June 1977, the department chief had attended a Hazardous Materials meeting in Jacksonville, FL.

RECOMMENDATIONS:

None.

INCIDENT: ENOLA, PA February 12, 1977

SOURCE: FRA RAIR #0330002
MTB HMIR #7020679A

EVENTS:

This accident took place during a switching operation at Conrail's Enola Yard. On track #5, there were 114 standing cars. On Track #6, train #6708 consisting of one locomotive unit and 72 cars was moving east on yard track (FRA Track Class 1) at 3 m.p.h. Three of the cars on train #6708 carried hazardous materials. The plug door on the 50th car of the moving train fell off while being shoved and became wedged between tracks #5 and #6. The door raked several of the cars of the moving train from which it had fallen. As a result of friction, one of the two trailers containing fireworks loaded on a car, caught fire. The fire spread to three other cars of train #6708 on track 6 and to one car on track #5. Only one of the cars containing hazardous materials was involved in the fire. It was a clear night with a temperature of 29°F. The time was 5:45 a.m.

CAUSE OF ACCIDENT:

FRA RAIR stated that the plug door of car CNW 32942 fell off and was wedged between tracks #5 and #6. Friction caused by the raking of the door on the cars caused the trailer (SEAU 301481) containing fireworks on Car TTX 971700 (DOT 12B) to catch fire.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The entire contents of trailer SEAU 301481 burned, which included 23,780 pounds of fireworks (MTB). There was no actual spillage.

CASUALTIES:

According to MTB, one fireman was hurt while fighting the fire. There were no injuries reported by FRA RAIR.

DAMAGES:

Fire spread to four other cars containing furniture, seeds, paper and rubber (MTB).

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$10,610	Total	$95,000

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: DALLAS, TX (White Rock) February 20, 1977

SOURCES: FRA #C-47-77
FRA RAIR #22027103
FRA CASUALTY SUMMARY
MTB HMIR #7030275
NFPA *Fire Command*, September 1977

EVENTS:

At 7:35 p.m., Atchison, Topeka and Santa Fe train X2082 derailed 12 cars while travelling east at 29 m.p.h., on a single main line (FRA Track Class 2). The train consisted of four locomotive units and 39 cars (25 empty) including two cars of LPG and two of Vinyl Chloride. Fire and explosions resulted from damage to two LPG tank cars. The temperature was 65°F and there was a southerly breeze.

CAUSE OF ACCIDENT:

The FRA report (C-47-77) attributed the cause of the derailment to the combination of a brake application and placement of empty and loaded cars on the train. A service brake application was made by the engineer as the train was descending a 1.10° grade. The lead wheels of the 22nd car, CNW 37113, derailed. After a computer study, the carrier concluded that the train movement interaction at the time of the brake application resulted in high lateral/vertical forces which caused the derailment of the 22nd car.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The tank head section of the 28th car, UTLX 38355 containing LPG was punctured by the trailing coupler of the 27th car. The escaping vapor was channeled toward the locomotives by the descending grade and southerly breeze and ignited. The punctured tank car then exploded and set fire to a car containing plastic pellets. The heat from these two cars impinged on the 26th car, GATX 97359. This car also contained LPG. It ruptured and exploded after 40 minutes.

CASUALTIES:

MTB listed five employees injured as a result of breathing fumes. FRA Casualty Summary listed one employee injured. FRA C-47-77 stated that five employees were admitted to hospital for observation but no injuries. FRA RAIR listed one injury.

DAMAGES:

MTB indicated that many rail cars, their lading and nearby buildings were destroyed or damaged.

DAMAGES (con.):

Dollars estimates are:

FRA C-47-77		FRA RAIR	
Railroad Equipment	$469,375	Equipment	$459,075
3rd Party	3,500,000	Track, etc.	8,300
Total	$3,969,375	Total	$467,375
MTB		NFPA	
Property Damage	$3,500,000	RR	$ 605,000
Lading	135,000	Other property	$3,500,000
Total	$3,635,000	Total	$4,105,000

NOTIFICATION AND RESPONSE:

The conductor and brakeman in the caboose noticed the escaping gas and warned the head end crew of the danger. After the conductor notified the railroad operator of the accident, he and the brakeman took the waybills and started walking towards the freeway. At 7:35 the RR operator then called the Dallas fire department but reported that the fire was in Garland and that the train carried LPG and Vinyl flouride. In the resulting confusion about the exact location of the accident, the information originally relayed about the hazardous materials was lost. The on-site fire department command post did not know what kind of materials were on the train. The main firefighting efforts were concentrated on burning warehouses and grass fires and fire fighters were not close enough to be injured by the explosions. About 45 minutes later, the Dallas Fire Department headquarters notified the command post of the type and location of hazardous materials on the train. The order was then given to retreat to 2,000 feet.

OBSERVATIONS:

FRA C-47-77 indicated that:

FRA inspections of equipment and track disclosed no violations of FRA standards.

The 22nd car, CNW 37113, was an empty boxcar. Derailment was caused by the interaction of empty and loaded cars resulting from the braking procedure.

RECOMMENDATIONS:

None.

INCIDENT: GUILFORD, IN February 20, 1977

SOURCES: FRA #C-48-77
FRA RAIR #083001
MTB HMIR #7030002A

EVENTS:

At 6:20 a.m., one car of Conrail train SY-4 derailed while travelling east at 10 m.p.h. on a double main line (FRA Track Class 1). The train consisted of three locomotive untis a-d 63 cars. Eighteen of these cars were carrying hazardous materials. The derailed car damaged another car carrying Acrylonotrile, which released its contents. The accident occurred at dawn 1.7 miles West of Guilford. Cloudly skies were present and the temperature was 35°F.

CAUSE OF ACCIDENT:

The FRA analysis (C-48-77) indicated that the derailment was caused by defective track joint conditions. A frost heave on the track caused the derailment (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Tank car MONX 35012, carrying Acrylonitrile, was punctured by the draw bar of car SP 223786. All but 100 gallons of the 35,000 gallon contents were lost (FRA). MTB indicated that all of the 36,628 gallon contents of this car were lost.

CASUALTIES:

There were three injuries reported by MTB. One railroad employee and two private contractors were treated for inhalation of Acrylonitrile vapors. No casulaties were reported by the FRA.

DAMAGES:

Dollar estimates are:

FRA RAIR		FRA C-48-77	
Equipment	$4300	Equipment	$4300
Track, etc.	200		
Total	$4500	MTB	
		Total	$67,000

NOTIFICATION AND RESPONSE:

A dike was built to contain the lading but contamination of Tanners Creek occurred. Precautions for livestock on nearby farms were taken. Five test wells were drilled to check for subterranean water flow contamination.

OBSERVATIONS:

FRA track inspection (C-48-77) found three consecutive low joints within 62 feet resulting in a cross level difference of 3 1/2 inches. The carrier had made a track inspection five days before the accident and no exceptions were noted.

RECOMMENDATIONS:

None.

INCIDENT: LOVE, AZ (Wenden) March 16, 1977

SOURCES: FRA #C-58-77
FRA RAIR #30037101
MTB HMIR #7039050-A-B
NFPA Newspaper article

EVENTS:

Atchison, Topeka and Santa Fe train #708-P-1 consisted of three locomotive units and 63 cars (46 empty) and included eight cars of LPG. At 6:50 a.m., while proceeding at 49 m.p.h. on a single main line (FRA Track Class 4), the locomotive units and 18 cars of the train derailed at a siding switch. Among the derailed cars were the eight tank cars of LPG. Two cars of LPG exploded about 25 minutes after the derailment and three other cars burned. Twenty people were evacuated. The temperature was 45°F and it was a clear day.

CAUSE OF ACCIDENT:

Both FRA C-58-77 and FRA RAIR stated that the lead locomotive unit initially derailed as a result of the siding switch being improperly aligned due to vandalism.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

As a result of the derailment, a diesel fuel oil tank on the leading locomotive was dragged on the rail. The fuel oil escaped and ignited from the friction. The fire spread to the other parts of the derailment.

Five (30,000 gallons each) of the eight cars containing LPG were destroyed. About 20 minutes after the derailment, the contents of ACFX 17359 (DOT 112A) were ignited by the diesel fuel fire and the tank car exploded. The heat impingement from this car caused an adjoining car, ACFX 17355 (DOT 112A) to also explode. Cars RTMX 3515, RTMX 3487 (both DOT 105A) and ACFX 17358 (DOT 112A) were damaged during the derailment and their contents escaped and burned.

CASUALTIES:

FRA RAIR, FRA C-58-77 and MTB reported no personal injuries.

DAMAGES:

Dollar estimates are:

FRA C-58-77		FRA RAIR	
Equipment, track	$450,000	Equipment	$573,800
		Track, etc.	18,000
MTB			$591,800
Total	$756,000		

NOTIFICATION AND RESPONSE:

The Wenden Volunteer Fire Department did not arrive until after the explosions. Among various officials on the scene were the Highway Patrol, Sheriff, Phoenix Fire Department, railroad officials and an Air Force demolition team. A safety engineer for Cal-Gas, the owner of the eight tank cars, advised officials to let the burning cars burn out.

OBSERVATIONS:

The FRA investigation report (C-58-77) indicated that a padlock for the switch control had not been picked or forced but rather it apparently had been opened by a proper key.

None of the cars were equipped with head shields. Damage to the cars was apparently not caused by couplers.

RECOMMENDATIONS:

None.

INCIDENT: NEELYVILLE, MO June 16, 1977

SOURCE: FRA #A-9-77
FRA RAIR #4497S1396
FRA Casualty Summary

EVENTS:

A side collision occurred at 1:17 a.m. between two Missouri Pacific Railroad trains at the north switch connecting a siding to the single main track (FRA Track Class 4). Train Extra 3211 South, which consisted of two locomotive units and 110 cars (76 empty) was moving south at 15 m.p.h. on the main track and was entering the siding at the north switch. Train Extra 3126 North, consisting of three locomotives and 116 cars (13 empty), was proceeding north on the main track at 50 m.p.h. The locomotives of Extra 3126 North struck the 87th car of Extra 3211 South causing derailment of 18 cars and three locomotives. The known hazardous materials consisted of one tank car of Hydrochloric acid and another of Vinyl chloride. Both of these cars and two other cars loaded with hazardous materials were carried on Extra 3126 North. One hundred and sixty-two residents were evaculated. It was clear with a temperature of 70°F.

CAUSE OF ACCIDENT:

The cause of the initial accident and collision as determined by the FRA analysis (A-9-77), was the failure of the engineer of Extra #3126 North to observe a restricting signal while proceeding north on the main track.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

The tank car containing Hydrochloric acid was punctured and lost all contents. The tank car of Vinyl chloride was punctured by a coupler of another car. It exploded and burned. Neither of these two DOT 105A cars were equipped with head shields.

CASUALTIES:

FRA Casualty Summary listed an engineer and brakeman as suffering cuts and bruises. FRA A-9-77 indicated that the engineer and front brakeman of Extra 3126 North had minor injuries resulting from the overturning of the locomotive.

DAMAGES:

Dollar estimates are:

FRA A-9-77		FRA RAIR	
RR cars	$ 780,050	Equipment	$950,000
Locomotives:	246,150	Track, etc.	11,700
Track	57,000	Total	$961,000
Signals	60,000		
Total	$1,043,200		

NOTIFICATION AND RESPONSE:

FRA-A-9-77 stated that the local Civil Defense director ordered the evacuation of 162 residents for 5 hours. FRA RAIR lists 500 as evacuated. Other information is unavailable.

OBSERVATIONS:

FRA A-9-77:

The authorized speed limit in the area was 60 m.p.h. Both trains were restricted to 50 m.p.h. operation by train orders.

Conflicting statements were made by the train crew of Extra 3126 North concerning their actions before the collision.

The front brakeman on Extra 3126 North jumped from the locomotive cab without attempting to apply the emergency brakes.

RECOMMENDATIONS:

None.

INCIDENT: MC LEAN, TX July 24, 1977

SOURCES: FRA RAIR #WF798
MTB HMIR #7080227A-B

EVENTS:

At 3:15 p.m., 11 cars of Chicago, Rock Island and Pacific train #83A2 derailed while travelling east at 10 m.p.h. on main track (FRA Track Class 3). The train consisted of five locomotive units, 88 cars and a caboose. Four of the cars in the derailment were carrying hazardous materials. Two of these cars, both carrying LPG, were damaged in the accident. The 28th car (RI 8007) was the first car to derail. The temperature was 90°F and the weather was clear. The accident occurred 3 miles west of the town.

CAUSE OF ACCIDENT:

FRA RAIR - Track component was not working properly - either stiff improper lateral or improper swivelling.

MTB - Defective side bearing on a covered hopper of a rigid truck in a curve.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Car ENPX 1000 sustained a drawbar puncture. Car 84099 sustained an impact rupture from a car wheel. Within 2 hours of the derailment, 20,000 gallons of LPG had escaped from CATX 84099 and 10,000 gallons of LPG from EPNX 1000. Both of these cars were DOT 112A and each eventually lost all but 100 gallons of their 32,000 gallon contents (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$77,500	Total	$65,000
Track, etc.	11,500		
Total	$89,000		

NOTIFICATION AND RESPONSE:

Four people were evacuated (FRA). On the night of July 25, escaping vapor from ENPX 1000 was purposely ignited to speed up the escape of the LPG from the tank car and to eliminate any escape of the gas to unknown areas. An adjacent tank car of LPG was removed and the LPG from GATX 84099 was ignited on July 26. These fires were allowed to burn out.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: MONTEZUMA, IN (Bloomingdale) October 11, 1977

SOURCES: FRA #C-7-78
MTB HMIR #7100992 A-D

EVENTS:

At 4:15 a.m., the two locomotive units and 10 cars of Baltimore and Ohio train #91 derailed 5.5 miles west of Montezuma. The train consisted of two locomotove units and 27 cars, including two cars of LPG and three cars of Denatured alcohol, and it was travelling east at 30 m.p.h. on a single main line (FRA Track Class 3). One tank car of alcohol was punctured and lost all its contents. Although a tank car containing LPG was also damaged, the escaping vapor gas did not ignite. It was raining at the time of the accident.

CAUSE OF ACCIDENT:

The FRA investigation determined that the derailment was caused by a broken rail (bolt hole crack). It was also noted that many bar joint bolts in the area were either missing or loose. Poor track bed drainage was also present.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

FRA indicated that the tank heads of car ACFX 83095 containing Denatured alcohol and PSPX 33152 (DOT 114A) containing LPG were punctured by draw bars and leaked their contents. The LPG gas was not ignited but dissipated. FRA C-7-78 indicated that PSPX 33152 lost all of its 32,000 gallons contents. MTB reported damage and small amounts of leakage to the other cars containing Denatured alcohol and LPG.

CASUALTIES:

Train crew was treated for LPG gas inhalations (FRA C-7-78). MTB listed four injuries.

DAMAGES:

Dollar estimates are:

FRA C-7-78		MTB	
Total	$45,000	Total	$12,000

NOTIFICATION AND RESPONSE:

After the accident occurred, the engine crew radioed the conductor. The oil burning stove in the caboose was then turned off. Other information is unavailable.

OBSERVATIONS:

FRA analysis mentioned the following:

FRA Class 3 track on which freight only is operated is not inspected for internal defects.

Two daily trains are operated in each direction. The cars on trains travelling east contain a high percentage of hazardous materials, picked up at Tuscola, IL. If the road bed is maintained at the present level, more derailments are likely to occur unless speeds are reduced.

The derailment occurred at the low point in the valley. The LPG vapor rose 45 feet, only 15 feet below two homes located at a height of 60 feet. This was probably why the gas did not ignite.

RECOMMENDATIONS:

None.

INCIDENT: AMELIA, TX

October 12, 1977

SOURCES: FRA RAIR #K4567
MTB HMIR #7120475A

EVENTS:

At 5:45 a.m., Southern Pacific train #LN2820 struck a pickup truck at a highway grade crossing while travelling at 30 m.p.h. on Industry track (FRA track Class 4). When the train was placed into emergency, it caused the train to buckle in two places. Twelve cars derailed. One car contained a hazardous material listed as Toxaphene. Train #LN2820 consisted of four locomotive units and 194 cars. The car which carried the Toxaphene was the only car in the train carrying hazardous materials. At the time of the accident, the weather was clear and the temperature was 55°F.

CAUSE OF ACCIDENT:

The primary cause of the accident according to FRA RAIR was the collision of the train with a highway user (pickup truck) at a grade crossing. The secondary cause was the application of the emergency brake, causing the train to buckle.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The car carrying the Toxaphene had the bottom outlet sheared off on impact. All of its 8222 gallon contents spilled on the ground (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$54,350	Lading	$29,245
Track, etc.	10,600	Car	18,000
Total	$64,950	Total	$57,245

NOTIFICATION AND RESPONSE:

It was decided by the proper authorities to remove the tank car and all the contaminated soil from the site and dispose of it.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: PENSACOLA, FL (Yniestra) November 9, 1977

SOURCES: NTSB RAR 78-4
FRA #A-1-78
FRA RAIR #117705034
FRA Casualty Summary
MTB HMIR #7110988A

EVENTS:

Louisville and Nashville train #R407, consisting of three locomotive units and 127 cars (32 empty), was travelling south at 35 m.p.h. on a single main line (FRA Track Class 3). Included in the consist were 18 cars of hazardous materials. At 6:06 p.m., as the train entered 6° 04' curve, two locomotives and 35 cars derailed, including 16 DOT Specification 112A tank cars loaded with anhydrous Ammonia and one tank car containing a solvent. Two cars released anhydrous Ammonia and 100 people were evacuated. The temperature was 68°F. It was dark and a light rain was falling. The wind was initially from the southwest at 3 1/2 m.p.h. but later changed to southeasterly at 12 m.p.h. The accident occurred 8 miles south of Pensacola.

CAUSE OF ACCIDENT:

NTSB attributed the cause of the derailment to interaction between the tight gage of the curve and lateral motion of the six axle locomotive. Contributing to the increase of lateral force was the placement of two empty or lightly loaded freight cars followed by a string of heavily loaded cars on the train.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

The 18th and 19th cars on the train GATX 92740 and GATX 92665 (Both DOT 112A) landed on their sides and were punctured by wheel or truck assemblies and released anhydrous Ammonia vapor. The resulting vapor cloud formed and moved in a northeast direction for about 15 miles before dissipating. A third car, NATX 75100 (DOT 111A) containing Solvent, NOS, leaked 5094 gallons from its safety valve (FRA A-1-78). The other 14 cars, containing anhydrous Ammonia, were heavily damaged but did not leak. MTB indicated that one of the cars containing anhydrous Ammonia lost all of its 33,651 gallon contents. The reports were not clear concerning the other leaking car of Ammonia.

CASUALTIES:

FRA Casualty Summary listed one non-employee killed, four burned, two internally injured and one fracture. NTSB indicated that as a result of breathing ammonia gas, one man died the day of the accident and his wife died 2 months later. Forty-six other people suffered injuries from ammonia inhalation. Eight of these were hospitalized. MTB listed 15 injured and one killed. FRA RAIR listed one killed and eight injured. Seven local residents and a deputy sheriff were hospitalized as a result of breathing fumes. Eleven other residents and 26 other emergency personnel were treated for inhalation and released (FRA A-1-78).

DAMAGES:

NTSB: Twelve of the 35 derailed cars were destroyed and the other 23 cars were heavily damaged. About 1800 feet of track were damaged. Trees and local wildlife were affected by the ammonia gas.

Dollar estimates are:

NTSB		FRA RAIR	
Equipment	$434,500	Equipment	$434,334
Track	30,000	Track, etc.	30,000
Wreckage Removal	24,000	Total	$464,334
Lading	235,000		
Total	$724,000		
FRA A-1-78		**MTB**	
Equipment and track	$464,334	Total	$1,000,000
Derailment clearing	24,516		
Lading	235,000		
Total	$723,850		

NOTIFICATION AND RESPONSE:

The train crew inspected the train and notified the engineer of escaping ammonia gas. The engineer then informed the Goulding yardmaster of the situation.

A local resident notified the local police department of the derailment. Police and firefighters arrived at the accident scene at 6:13 p.m. They located the conductor and the waybills and determined the number and location of anhydrous Ammonia cars.

The Pensacola Pre-Fire Plan for Railroad Disasters was implemented. About 500 people in a 3,500 foot radius were evacuated and later another 500 were evacuated. Technical assistance was given by Air Products and Chemicals, Inc. Water was applied on the vapor cloud restricting its movement somewhat. The controller at the Pensacola airport observed the cloud, detoured air traffic and kept the local civil defense command post informed of the movement of the vapor cloud. A rescue helicopter evacuated people on the east side of Gull Point.

OBSERVATIONS:

NTSB noted the following:

The placement of lightly loaded and empty cars at the head of the heavy tonnage train did not comply with either L&N rules or AAR recommendations.

The tight gage of the track caused increased lateral force and rail tipping.

The placement of the lightly loaded and empty cars in front of the trailing heavy tonnage cars contributed to the lateral force and rail tip.

If the tank cars had been equipped with head shields, the punctures of the tank cars may have been prevented.

OBSERVATIONS (con.):

The existence of an emergency response plan enabled local officials to react promptly and efficiently.

Adequate information is lacking in current DOT hazardous materials guidelines to determine potential danger exposure zones.

If the wind direction had been easterly, the vapor cloud would have blown over a more heavily populated section of the city and resulted in more injuries.

RECOMMENDATIONS:

NTSB recommended that:

FRA should investigate whether present minimum gage requirements in curves are appropriate for operation of six axle locomotives.

FRA should investigate lateral motion allowable in relation to six axle locomotive operation.

FRA should promulgate regulations to limit length and tonnage of trains carrying hazardous materials according to train make-up principles developed under train dynamics programs.

FRA should promulgate regulations to provide hazardous materials emergency information on waybills.

INCIDENT: HAMBURG, LA November 12, 1977

SOURCES: FRA RAIR #315532
FRA Summary of Accidents Investigated, 1977
MTB HMIR #7120017

EVENTS:

Louisville and Arkansas train #42 (Extra 629 North) was moving north at 34 m.p.h. on a single main line (FRA Track Class 3). It consisted of two locomotive units and 63 cars (7 empty) and carried nine cars of hazardous materials. At 9 a.m., 15 cars, including two cars of motor fuel anti-knock compound, three cars of LPG and two cars of Ethylene dichloride derailed. The tank cars of Ethylene dichloride exploded and burned. One tank car of LPG (Butadiene) burned. About 250 people were evacuated. The temperature was 70°F and it was a clear day.

CAUSE OF ACCIDENT:

FRA RAIR indicated that a defective center plate on car KCS 5161 allowed excessive rocking of the car. Track was defective having irregular cross level. FRA Summary listed excessive track cross level.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

Two cars, GATX 12444 and 12441, which contained Ethylene dichloride exploded and burned. Their respective contents of 194,500 and 191,000 pounds were total losses. One car containing 31,504 gallons of LPG, GATX 92234 (DOT 112AW), burned.

CASUALTIES:

No casualties were reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB		FRA Summary	
Equipment	$243,000	Car contents	$49,739	Equipment	$197,000
Track etc.	15,000	Derailment	408,000		
Total	$258,000		$457,739		

NOTIFICATION AND RESPONSE:

Fire trucks from Simmesport and Alexandria responded. An Air Force foam truck responded.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: TACOMA, WA November 28, 1977

SOURCES: FRA RAIR #11770R207
MTB HMIR #7120314

EVENTS:

At 4:50 a.m., Union Pacific switch train consisting of a locomotive and 57 cars (11 empty) and including 19 cars of hazardous materials derailed seven cars in the Tacoma yard. Six of the cars released Caustic soda. The train was moving 10 m.p.h. on yard (FRA Track Class 2) track. The temperatures wer 45°F and it was dark and cloudy.

CAUSE OF ACCIDENT:

Cause of the derailment was a muddy soft spot in the track bed (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

While the UTLX 78703 containing Caustic soda was being rerailed, the bottom outlet valve lever caught, opened and caused spillage of 5300 gallons of the 16,393 gallon contents (MTB).

CASUALTIES:

Three railroad clean-up employees suffered burns, two of whom required medical treatment (MTB). FRA RAIR listed no injuries.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$18,000	Total	$1,100
Track, etc.	8,500		
Total	$26,500		

NOTIFICATION AND RESPONSE:

Willamete Western Corp. Environmental Services closed the valve, cleaned up the spill and did decontamination.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: COLLINSTON, LA December 9, 1977

SOURCES: FRA RAIR #9398
MTB HMIR #8030008A-8030013A

EVENTS:

Missouri Pacific train #NC-9 was involved in a 24 car derailment while travelling north at 40 m.p.h. on main track (FRA Track Class 4). Train #NC-9 consisted of two locomotives and 126 cars. Ten of the 21 cars carrying hazardous materials were derailed. The accident occurred at 11:30 p.m. on a cloudy night with a temperature of 28°F. (According to MTB, the accident occurred at 10:35 p.m.)

CAUSE OF ACCIDENT:

FRA RAIR stated that the accident was caused by a broken wheel plate on the west side of car GTTX 302309. This car and 23 others derailed.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

FRA RAIR listed one car of hazardous material releasing its contents. According to MTB, six cars released their hazardous materials. The six cars sustained external punctures or were destroyed by impact. Two cars containing 20,424 and 18,943 gallons of Hydrochloric acid, respectively, one car loaded with 20,943 gallons of Diethylene glycol, one car with 20,976 gallons of Dipropylene glycol, another car with 8,284 gallons of Methylene chloride and the last car containing 10,333 gallons of Propylene glycol, all sustained total loss of their contents. Spillage of all these materials was the result of the impact and puncture. There were no fires or explosions (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$335,800		
Track, etc.	22,000		
Total	$357,800	Total	$130,713

NOTIFICATION AND RESPONSE:

There were 25 people evacuated. Other information was unavailable.

OBSERVATIONS AND RECOMMENDATIONS:

None.

INCIDENT: GOLDONNA, LA December 28, 1977

SOURCES: NTSB RHR 78-1
FRA #C-45-78
FRA RAIR #315628
FRA Casualty Summary
MTB HMIR #8010436A-B, 8010437
NFPA Preliminary Investigation

EVENTS:

Louisville and Arkansas Railway train Extra 4102 North, consisting of two locomotive units and 79 cars (41 empty) was moving about 50 m.p.h. on a single main line (FRA Track Class 3) when it collided with a tractor semi-trailer carrying logs at the Vine Street crossing derailing the front locomotive and 22 cars. Obstructions around the crossing area resulted in the inability of both the truck driver and train engineer to see each other's vehicle. The truck driver did not see the train until his truck was 88 feet from the crossing, at which point he accelerated. The train engineer could not see the truck until the train was 250 feet from the crossing. Although the engineer applied the emergency brakes, this did not reduce the train speed before the collision. The lead locomotive struck the trailer near the middle of the load of logs and the trailer jackknifed. Nine of the 14 freight cars containing hazardous materials derailed. Three of these cars were DOT Specification 112A tank cars containing LPG. Two cars of Chlorine, four of Caustic soda, and one of Ethyl anti-knock compound were the other cars derailed. The collision occurred at 2:15 p.m. About 900 people in the area were evacuated. The temperature was about 40°F and it was dry and overcast. Ground visibility was not affected by atmospheric conditions. The road was dry.

CAUSE OF ACCIDENT:

The causes of the train-truck collision were determined by NTSB to be the excessive speed of the train, the failure by the truck driver to approach at a slow enough speed to stop at the crossing, and obstruction of the truck driver's vision by trees and buildings. Contributing to fatalities was the coupling of the LPG car in close proximity to the locomotive.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The fourth car on the train, loaded with LPG, left its trucks and its rear tank head was punctured by the coupler of the following car. It then rammed into the rear locomotive which punctured its front tank head. The gas was ignited and resulted in a fireball covering 1200 feet. The fuel tank on the front locomotive ruptured and leaking fuel ignited. MTB indicated that one car loaded with 32,859 gallons of LPG released 78,000 pounds of its contents.

CASUALTIES:

FRA Casualty Summary listed the engineer and one trainman as killed and another trainman burned. Another six people had various injuries. FRA #C-48-78 indicated that the engineer and flagman were killed and the front brakeman was injured. NTSB gave the following information. The flagman riding in the cab of the rear locomotive was killed by the fireball from the tank car. The engineer was killed and head brakeman was severely injured by fire resulting from the ruptured fuel tank of the front locomotive. The truck driver was slightly burned but escaped from the tractor before the collision. Eight bystanders were also injured. MTB listed two killed and eight injured. FRA RAIR listed one killed and one injured.

DAMAGES:

Both locomotive units and nine of the 22 derailed cars were destroyed. Eleven of the other cars were heavily damaged. One thousand feet of track were destroyed. Various residential and commercial buildings were destroyed or damaged by fire.

Dollar estimates are:

NTSB	
Trail Equipment	$879,000
Semi-trailer and lading	3,200
Train lading	45,000
Track and crossing	30,000
Private property	215,000
Salvage wrecking	58,000
Firefighting and rescue	25,000
Total	$1,256,000

MTB	
Total	$2,040,850

FRA RAIR	
Equipment	$395,850
Track, etc.	30,000
Total	$425,850

FRA C-45-78	
Cars	$265,850
Locomotives	1,100,000
Track	30,000
Total	$1,395,850

NOTIFICATION AND RESPONSE:

There was no organized fire department in Goldonna. Despite owning a firetruck, the community relied on the Natchitoches fire department, 25 miles distant. Although that fire department had attended a course in handling hazardous materials at a local university and responded quickly, this had no effect on damages or injuries. A passerby freed the head brakeman from the lead locomotive. Otherwise, he would have been trapped in the fire and died.

OBSERVATIONS:

NTSB noted that:

The truck driver did not hear the warning whistle of the train. This warning and the view of the approaching train were probably obstructed by a nearby building and trees.

The truck driver was driving too fast to stop short of the grade crossing.

The conductor was aware of the carrier regulation restricting the placement of loaded tank cars labeled other than "combustible" to six cars behind the locomotive. The location of three tank cars of LPG, three cars behind the locomotive, violated this Federal and carrier regulation.

The train was traveling at 50 m.p.h., 10 m.p.h. faster than the authorized speed. Otherwise, the truck would have cleared the crossing in time.

The state of Louisiana had surveyed the crossing 4 years earlier. Despite the initial recommendation that train-actuated warning devices be installed, this action had not been taken.

The equipping of the tank cars with head shields and shelf couplers would have prevented the initial puncture of the tank car of LPG.

RECOMMENDATIONS:

NTSB recommended the following:

Louisiana should improve sight quadrants at the Vine Street crossing and include sight quadrant evaluation in its grade crossing safety criteria.

L&A Railway train crews should be properly supervised regarding speed restrictions and other regulations.

FRA should assure that L&A comply with the regulation concerning placement restrictions of cars containing hazardous materials.

INCIDENT: MOLINO, FL (Barth) January 4, 1976

SOURCES: FRA #C-37-76
FRA RAIR #4420140221
FRA CASUALTY SUMMARY
MTB HMIR #6020206-7

EVENTS:

Louisville and Nashville train #R-403 consisted of five locomotive units and 134 cars (26 empty) and included eight cars of anhydrous Ammonia. The train was travelling north at an estimated speed of 28 m.p.h. on a single main line (FRA Track Class 3). At 10:20 p.m., the engineer noticed a jerk and the train emergency brakes applied. Thirteen cars, including the eight of anhydrous Ammonia derailed. Two of these cars released Ammonia gas. Between 275 and 335 people were evacuated. The temperature was 24°F and it was a clear night. The accident occurred 1.9 miles north of Molino.

CAUSE OF ACCIDENT:

According to FRA #C-37-76, both center joint bars on a track joint were broken. This caused the derailment.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Eight (DOT 112A) cars of anhydrous Ammonia were detailed. Two of these cars released their contents. GATX 93448 came to rest cross ways on the track and its tank head was punctured by other cars. ACFX 18710's tank head was punctured by a Type E coupler. These cars each released 30,000 gallons of their 33,600 gallon contents (MTB).

CASUALTIES:

FRA Casualty Summary indicated that one trainman was injured. FRA-RAIR listed one injury. MTB indicated that 26 were treated for breathing Ammonia fumes and released. The other FRA report indicated 26 were treated and six of those were hospitalized for breathing the fumes. This included one volunteer firefighter.

DAMAGES:

Dollar estimates are:

FRA C-37-76

Equipment	$88,570
Track	5,800
Communications	1,200
Total	$95,570

FRA RAIR

Equipment	$108,650
Track, etc.	4,654
Total	$113,304

MTB

Unknown

NOTIFICATION AND RESPONSE:

After the train crew discovered the derailed cars, railroad officials were notified. The State Patrol, Sheriff's department and local fire departments responded. About 335 people in a 2 mile radius were evacuated.

OBSERVATIONS:

On the day after the accident, an FRA walking inspection of the track disclosed 40 center cracked or broken joint bars in a ten mile section.

The railroad hi-rail equipment used to inspect track is inadequate.

RECOMMENDATIONS:

None.

INCIDENT: SPADRA, AR January 8, 1976

SOURCES: FRA RAIR #8994
MTB HMIR #6010358A

EVENTS:

Missouri Pacific train #WL6 derailed 18 cars from its consist of three locomotive units and 115 cars while travelling south at 38 m.p.h. on main track (FRA Track Class 4). The three cars carrying hazardous materials were derailed. They all carried Acetic Anhydride. The first car involved in the derailment was CELX 6440 (61st position in train). The accident occurred between 11:30 a.m. and 12:07 p.m. 2.5 miles north of Spadra. It was a clear day with a temperature of 19°F.

CAUSE OF ACCIDENT:

According to the FRA RAIR report, the narrative portion explains the cause of the accident. This narrative is not on the available computer report.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The tank cars CELX 6432, CELX 6442 and CELX 6440 were carrying Acetic anhydride. All three cars sustained tank shell punctures. MTB estimated at a total of 75,000 gallons was lost from the three cars.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$203,200	Total	$120,000
Track, etc.	6,660		
Total	$209,860		

NOTIFICATION AND RESPONSE:

Twelve people were evacuated.
The drainage ditches were plugged with dirt to prevent run off of the Acetic anhydride to low areas. Calcium carbonate and lime were used to neutralize the spilled material.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: WILCOX, AL May 11, 1976

SOURCES: FRA #C-84-76
FRA RAIR #4420541502
FRA Casualty Summary
MTB HMIR #6050807-8

EVENTS:

Louisville and Nashville train Extra 412 consisted of four locomotives and 48 cars (7 empty) and included four cars of hazardous materials. At 7:35 a.m., while moving at an estimated speed of 50 m.p.h. on a single main line (FRA Track Class 4), 19 of the cars (24th-42nd) derailed. Two of the cars which contained Aniline Oil and a flammable liquid (N.O.S.), released their contents. The temperature was 70°F and it was a cloudy day.

CAUSE OF ACCIDENT:

FRA RAIR listed the cause of the derailment as a broken center plate on the 23rd car (ACFX 90896), while FRA C-84-76 stated that this center plate was insecurely fastened to the car and off center.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

MTB: The dome valve on car ACFX 90896 (DOT 111AW) containing Aniline oil was damaged in the derailment and allowed the release of 3000 of its 10,967 gallon contents.

Information was not available concerning the flammable solid (N.O.S.), except that there was spillage of 10 gallons of the 20,878 gallon contents. This car was also a DOT 111AW.

CASUALTIES:

MTB, FRA RAIR and FRA Casualty Summary reports indicated nine injured from breathing fumes.

DAMAGES:

Dollar estimates are:

FRA C-84-86		FRA RAIR		MTB
Equipment	$101,277	Equipment	$140,100	Unknown
Track, etc.	16,940	Track, etc.	13,732	
Total	$118,217	Total	$153,832	

NOTIFICATION AND RESPONSE:

Temporary repairs were made to stop the leak in car ACFX 90896.

OBSERVATIONS:

According to the MTB, there was a shipper labeling violation on the car carrying the flammable liquid (N.O.S.).

RECOMMENDATIONS:

None.

INCIDENT: GLEN ELLYN, IL May 16, 1976

SOURCES: NTSB RAR 77-2
FRA #C-88-76
FRA RAIR #W11305
MTB HMIR #6060004A
FRA CASUALTY SUMMARY

EVENTS:

Chicago and North Western train #242 consisting of four locomotive units and 43 cars was travelling east at 60 m.p.h. on a triple main line (FRA Track Class 3) of a 1°54' to 2°15' compound curve, when 27 of its cars derailed. CNW train #380 consisting of two locomotive units and 62 cars (26 empty) was moving west at 28 m.p.h. on the adjacent track and struck the derailed cars of #242. One locomotive and four cars of #242 derailed. A tank car, containing anhydrous Ammonia, was punctured and released Ammonia gas. About 3000 people were evacuated. The time of the accident was 4:25 a.m. The temperature was 60° and it was cloudy and dark.

CAUSE OF ACCIDENT:

NTSB stated that the cause of the initial derailment of train #242 was the operation of that train at 60 m.p.h. over track which was not maintained to allow that level of speed. Cross ties were not maintained to standards for FRA Track Classification 5.

FRA C-88-76 indicated that lateral force generated by the locomotive of #380 could have been a contributing factor.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The fifth car on train #380, PSPX 32028 (DOT 112AW), a tank car containing 28,500 gallons of anhydrous Ammonia, was punctured by a coupler of an adjacent car and released 17,955 gallons of ammonia gas.

CASUALTIES:

FRA Casualty Summary indicated that one yard man was injured and 17 other people were injured. NTSB listed one train crew member as injured when jumping from the cab of #380. Fourteen other persons were injured from Ammonia gas inhalation. FRA C-88-76 indicated 12 people were treated for gas inhalation, one of these also suffered minor burns. Two crew members of #380 suffered bruises. FRA RAIR listed one injury. MTB listed two Wheaton firefighters and four residents treated for gas inhalation. Other injuries included those to a resident falling at the derailment site and a village policeman during crowd control.

DAMAGES:

Dollar estimates are:

NTSB		FRA RAIR	
Equipment	$804,600	#380 Equipment	$247,307
Lading	850,000	#242 Equipment	513,693
Track	92,000	Track	97,000
Track Removal	81,000	Total	$858,000
Surrounding Property	62,000		
Personal Claims	25,000		
Total	$1,914,000		

Other FRA and MTB damage figures are unavailable.

In addition, Lake Ellyn and a storm water reservoir were reported contaminated by oil and Ammonia. This contamination killed fish in the lake.

NOTIFICATION AND RESPONSE:

The derailment was witnessed by a Glen Ellyn police sergeant who notified the Dupage County Communication Center at 4:27 a.m. The fire department responded and the fire chief arrived at 4:31 a.m. He walked along the train in the dark trying to find the source of the escaping Ammonia gas. The railroad had notified the Dupage Communication Center at 4:30 a.m. However, the railroad did not offer any information about hazardous materials carried on the train. A resident who was a chemist offered technical assistance to the fire chief. At around 5 a.m., two CNW officials appeared on the scene and advised the use of water to disperse the gas. The fire chief tried to contact CHEMTREC shortly after he arrived, but his request was not transmitted by Dupage Communication Center until 6:26 a.m. CHEMTREC information was then relayed back at 6:45 a.m. The shipper, Phillips Petroleum Co., sent a representative to the site.

OBSERVATIONS:

According to NTSB, increasing the operating speed from 40 m.p.h. to 60 m.p.h. over defective roadbed produced more lateral forces that the track could support.

The engineer of #380 did not have enough time to slow or stop his train from striking the derailed cars of #242.

If the tank car had been equipped with head shields, it would not have been punctured in the accident.

There was a lack of information available to public safety officials about the hazardous materials involved.

FRA's investigation (C-88-76) did not disclose any defective track or equipment conditions or improper operating procedures.

RECOMMENDATIONS:

NTSB recommended the following:

Train dispatchers should keep a record of trains and cars carrying hazardous materials and current containment methods and communicate such information to appropriate officials in the event of an accident.

CNW should maintain its tracks to FRA standards.

CHEMTREC should develop a quicker communication system linkage with local officials.

INCIDENT: NIOBE, NY July 28, 1976

SOURCES: FRA RAIR #0510006
MTB HMIR #6090037

EVENTS:

At 4:30 p.m., eight cars including one car loaded with Toluene diisocyante liquid, of Conrail train #MB2 derailed, while the train was moving at an estimated speed of 35 m.p.h. on a single main line (FRA Track Class 3). The train consisted of two locomotive units and 91 cars including the car of Toluene diisocyanate. This latter car was damaged and released some of its contents. The temperature was 80°F. It was a clear day.

CAUSE OF ACCIDENT:

FRA RAIR listed the cause of the derailment as defective track conditions, consisting of broken splice (or joint) bars.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The outer shell of car GATX 71028 containing the Toluene diisocyanate was punctured by a broken rail and released 1010 gallongs of its 20,818 gallon contents (MTB).

CASUALTIES:

MTB listed four injuries due to fume inhalation by wreck clearing employees. FRA RAIR reported no injuries.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$56,500	Total	$1000
Track, etc.	7,797		
Total	$64,297		

NOTIFICATION AND RESPONSE:

Two days later the remaining contents of Car GATX 71028 were transfered to another car. Other information was unavailable.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: STEPHENVILLE, TX August 8, 1976

SOURCES: FRA RAIR #30-086-105
FRA CASUALTY SUMMARY
MTB HMIR #6080563

EVENTS:

A 19 car derailment was sustained by Atchison, Topeka and Santa Fe train #2576 while travelling west at 40 m.p.h. on a main line (FRA Track Class 4). The train consisted of six locomotive units and 60 cars (24 empty). The one car of the train carrying hazardous material (gasoline) was part of the derailment. The car ruptured and caught fire. The accident took place at 3:55 p.m. on a clear day with a temperature of 102°F.

CAUSE OF ACCIDENT:

FRA RAIR indicated that tank ATSF 14829 (50th position in train) had coupler cross key failure. Emergency application of air at 40 m.p.h. caused the derailment of 19 cars.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Tank car ACFX 88184 containing gasoline received an external puncture from other freight cars. It ruptured, spilled all but 1156 of its 29,293 gallon contents, caught fire and burned (MTB).

CASUALTIES:

There were no casualties reported by MTB. One trainman was injured according to the FRA Casualty Summary. FRA RAIR listed one injured.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$146,900	Total	$44,000
Track, etc.	10,800		
Total	$157,700		

NOTIFICATION AND RESPONSE:

No information was available.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: WEST END, WV August 10, 1976

SOURCES: FRA RAIR #AMD 848
MTB HMIR #6080777

EVENTS:

At 1:40 a.m., seven cars of Baltimore and Ohio train #88 derailed as it was moving at an estimated speed of 17 m.p.h. on main track (FRA Track Class 3). The train consisted of three locomotive units and 63 cars (13 empty) and included one car carrying Phosgene gas. This car was damaged in the derailment and released its contents. Five people were evacuated. It was 63°F, cloudy and dark.

CAUSE OF ACCIDENT:

The lead wheel, lead truck of car SRCX 858 derailed due to a low rail. The rail defect was caused by heavy rains during the previous weekend (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

A cylinder of Phosgene gas, carried on car SHPX 437 was punctured during the derailment. Quantity released unknown.

CASUALTIES:

FRA RAIR listed five injured while MTB indicated nine people received medical attention.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB
Equipment	$26,600	Unknown
Track, etc.	14,000	
Total	$40,600	

NOTIFICATION AND RESPONSE:

Personnel from Chemerton Chemical Corp., Chessie Environmental Div. and Hulcher Emergency Service were on the scene and sealed the leaking container. The area was evacuated.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: TERRE HAUTE, IN August 17, 1976

SOURCES: FRA RAIR #0830-003
MTB HMIR #6090036A

EVENTS:

Conrail train #AS0-8 derailed 11 cars while travelling east on main track (FRA Track Class 2) at 26 m.p.h. The train consisted of three locomotive units and 92 cars (31 empty). Of the 16 cars carrying hazardous materials, two were involved in the derailment and one spilled its contents. One car carrying Butyl isocyanate caught fire. There is conflicting data concerning which cars in the train were derailed. The accident occurred at about 9:55 p.m. on a clear night with a temperature of 72°F.

CAUSE OF ACCIDENT:

The center plate of the body of either car UTLX 85167 or car PLE 10181 was broken or defective (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Car GATX 27440 (DOT 111AW) carrying Butyl isocyanate came to rest on its side and caught fire. The bottom outlet was torn off, and about one half of the 20,797 gallon contents were lost (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$19,400	Lading	$260,000
Track, etc.	8,800		
Total	$28,200		

NOTIFICATION AND RESPONSE:

After the fire was extinguished, the tank car was removed from the scene and the remaining lading was transferred to tank trucks.

OBSERVATIONS:

None.

RECOMMENDATIONS:

MTB recommended effective protective skids be required on all tank cars now equipped with bottom outlets. This would prevent loss of lading after the accident.

INCIDENT: PECK, KS September 13, 1976

SOURCES: FRA RAIR #W676
MTB HMIR #6090996-7A,6091071A

EVENTS:

At 4:25 p.m., Chicago, Rock Island and Pacific train #20A12 consisting of six locomotives and 105 cars (64 empty), derailed 18 cars. The train was moving north at an estimated speed of 25 m.p.h. on main track (FRA Track Class 3). Of the four cars carrying hazardous materials, MTB indicated that three released their contents. The temperature was 80°F and it was a cloudy day.

CAUSE OF ACCIDENT:

The derailment was caused by wheel lift resulting from a defective truck component on car ACFX 12023. The side bearing wear plate was missing and the rollers were flattened (FRA RAIR).

CAUSE OF HAZARDOUS MATERIALS RELEASE:

This was not indicated. DOT 111A cars containing Petroleum Naphtha, Acetic acid, and combustible liquid, N.O.S., all released their contents. MTB indicated that the car containing 21,091 gallons of Petroleum Naptha released 8,000 gallons while another car loaded with 20,673 gallons of Acetic acid lost 6,000 gallons of its contents. The quantity released for the car containing a combustible liquid N.O.S. could not be determined. According to FRA RAIR a fourth car of hazardous material also released its contents.

CASUALTIES:

None were reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$230,996	Total	$58,000
Track, etc	16,542		
Total	$247,538		

NOTIFICATION AND RESPONSE:

Information was not available.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None

INCIDENT: ELK HILL, VA September 22, 1976

SOURCES: FRA RAIR #ARI101
MTB HMIR #6100213A

EVENTS:

Chesapeake and Ohio train #90 while travelling east on main track (FRA Track Class 4) at 33-35 m.p.h. derailed 13 cars. This train consisted of two locomotives and 202 cars (65 empty). The 129th through 141st cars were derailed. The 138th car carrying Toluene diisocyanate was the only car in the consist carrying a hazardous material. The derailment took place at 4:25 a.m. on a clear night with a temperature of 55°F.

CAUSE OF ACCIDENT:

According to FRA RAIR, the accident was caused by a failure in the coupler system. It was a coupler car mismatch, high/low on car SCL 22214.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

In derailing, car TLDX 223098 (DOT 111AW) containing the Toluene diisocyanate, had the bottom outlet chamber sheared off exposing the 4 inch ball valve. The ball valve was approximately 1/4 open permitting 18,240 gallons of the 23,678 gallon contents to leak out (MTB)

CASUALTIES:

There were no casualties listed by FRA RAIR. There were nine injuries due to fume inhalation according to MTB.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$152,900	Total	$91,200
Track, etc.	5,000		
Total	$157,900		

NOTIFICATION AND RESPONSE:

Off track equipment was brought in. TLDX 223098 was rolled to a 90 degree position and the ball valve closed. The largest portion of the contents had leaked out by this time.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: CUMBERLAND, MD October 20, 1976

SOURCES: FRA RAIR #AMD 866
MTB HMIR #6110122

EVENTS:

At 6.24 a.m., five cars of Baltimore and Ohio train #CU96 derailed while the train was proceeding east at an estimated speed of 5 m.p.h. on yard track. The train consisted of four locomotive units and 82 cars (30 empty) and included one car of Caustic soda. This car was damaged and released its contents. The temperature was 36°F and it was dark and raining.

CAUSE OF ACCIDENT:

A switch was improperly lined causing the derailment (FRA RAIR).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The covered hopper of car PPGX 12944 containing Caustic soda was punctured in the derailment and about half of the 90 ton contents were released (MTB).

CASUALTIES:

FRA RAIR listed no injuries. MTB indicated that seven of the derailment clean-up crew suffered injuries. One remained in the hospital for a week for extensive burns on his legs.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$19,300	Total	$15,000
Track, etc.	500		
Total	$19,800		

NOTIFICATION AND RESPONSE:

Information was not available.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: BELT, MONTANA November 26, 1976

SOURCES: NTSB RAR-77-7
Insurance Services Office Report No. 1-77
FRA #A-4-77
FRA RAIR #MT499
FRA Casualty Summary
MTB HMIR #6120458A-B

EVENTS:

At about 2:55 p.m., 24 cars of Burlington Northern Train Extra 5743 travelling at 37-38 m.p.h. on a single main line (FRA Class Track 3), derailed. A derailed tank car struck and punctured a 16,000 gallon ground fuel storage tank (one of four) standing adjacent to the track. Gasoline poured out and ignited immediately. Three of the derailed cars carried LPG. Five other cars contained No. 6 fuel oil. The oil was spilled, ignited by the ongoing fire and began to flow toward the town. About 1 1/2 hours later, a car of LPG exploded. The fire burned for more than 12 hours and about 200 people were evacuated.

It was a cold, cloudy day and the temperature 5°-13°F. The ground was covered with 4 inches of snow.

CAUSE OF THE ACCIDENT:

The probable cause of the accident was the breaking of a rail under the moving train. This rail failure was due to undetected transverse fissures (NTSB, FRA A-4-77, FRA RAIR). The 29th-52nd cars derailed.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The tankhead of GCTX 64226 (DOT 112A) containing LPG was punctured in the derailment. It ruptured and pieces rocketed 450 feet away. Tank car CGTX 64141 (DOT 112A) containing Butane landed upside down. About an hour and a half later as a result of heat impingement by the first car, this second car ruptured and exploded.

Several of the tank cars carrying No. 6 fuel oil were punctured in the derailment by impacts between the tanks and various car parts. The resulting oil spills contributed to the fire.

CASUALTIES:

NTSB listed two missing and 22 injured. ISO listed two killed and 24 injured. The other FRA (A-4-77, RAIR) reports indicated two killed and 12 injured. All of the casualties resulted from the fires set off by the accident. FRA Casualty Summary listed two killed, seven burned and one fracture among the other 10 injuries.

DAMAGES:

NTSB: Five houses, A Farmer's Union Cooperative facility and several other buildings were destroyed or damaged. There were 19 motor vehicles destroyed and Belt Creek was contaminated.

DAMAGES (con.):

Dollar estimates are:

NTSB		FRA A-4-77	
Equipment	$ 500,000	Equipment	$500,558
Track	40,000	Track	12,000
Property	4,000,000	Lading	77,500
Total	$4,540,000	Labor	40,000
MTB		Total	$630,058
Total	$100,300		

NOTIFICATION AND RESPONSE:

The Belt Fire Department responded immediately. There was no disaster planning between local fire departments but by 3:15 p.m. 12 fire departments within 30 miles were responding. Fire operations were controlled from a command post set up in the Belt National Bank. A sheriff's car radio equipped with all frequencies was used for communication since telephone and electricity were not available for some time. There was not adequate water available.

Railroad crewmen left the scene about 3:15 p.m. and left the waybills in the caboose. The conductor notified a dispatcher of the accident at 3:30 p.m. When the fire chief requested the waybills, he was told that the caboose and undamaged cars had been taken to Great Falls. BN officials arrived on the scene about midnight with the waybills and cargo information.

OBSERVATIONS:

NTSB indicated the following:

There had been a detector car inspection of the track on July 29 and August 4, 1976 showing no defects in the track.

BN's track inspection exceeded Federal regulations yet a detectable defect initiated the derailment. The rail was continuously subjected to more weight than it was designed to handle.

There was no information available to the fire department about the hazardous materials on the train or how to deal with them in an emergency. The lack of any catastrophe plans between local officials did not seem to affect the outcome of this accident.

RECOMMENDATIONS:

The NTSB made recommendations to the FRA and to BN.

They recommended the FRA revise regulations (49 CFR 213.23) concerning rail inspection "to insure the discovery of internal defects in all tracks, Classes 3 to 6, before those defects develop into failures."

They recommended BN "evaluate the capability of its internal rail defect testing program and make the necessary changes to insure the internal defects are detected before they develop to the failure stage." BN should also "relegate rail section of 100 pounds or less, made of noncontrol-cooled steel, to locations where service failures will not result in catastrophic derailments."

INCIDENT: ANSLEY, MS January 13, 1975

SOURCES: FRA RAIR #4420136666
MTB HMIR #5020425A

EVENTS:

Louisville and Nashville train #472 consisted of four locomotive units and 107 cars (61 empty). It included one car of Isobutyronitrile (liquid insecticide), and was proceeding north at an estimated speed of 45 m.p.h. on the main track (FRA Track Class 4). At 8:00 p.m., 16 cars of the train derailed, including the car containing Isobutyronitrile. This car leaked some of its contents. Thirty people were evacuated. The temperature was 51°F and it was a clear, dark night.

CAUSE OF ACCIDENT:

The derailment was caused by irregular cross level at track joints causing GATX 84487 to bounce off track (FRA).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The tank car, GATX 093487, which contained the Isobutyronitrile ruptured at its bottom outlet due to the derailment. Quantity of material released was not listed by MTB.

CASUALTIES:

FRA RAIR reported no injuries. MTB indicated that three employees were overcome by fumes.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$29,200	Total	$10,000
Track, etc.	6,290		
Total	$35,490		

NOTIFICATION AND RESPONSE:

Information not available.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: LAKE BRUCE, IN January 20, 1975

SOURCES: FRA RAIR #ACC-009
MTB HMIR #5030559A

EVENTS:

Chesapeake and Ohio train #91 derailed 20 cars while travelling west on main track (FRA Track Class 4) at 58 m.p.h. The train consisted of five locomotive units and 86 cars (38 empty). The two cars in the consist carrying hazardous materials were part of the derailment. Car CO 490536 (65th position in the train) was the first car involved in the derailment. Fire ensued following the derailment. The accident occurred at 10:30 a.m. on a clear day when the temperature was 10°F.

CAUSE OF ACCIDENT:

According to FRA RAIR the derailment was caused by a broken bolster on car CO 490509.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Trailer RCRX 209489 loaded on TTX 301369 containing lacquer thinner was damaged in the derailment, caught fire and the entire shipment was destroyed.

There is no information about the second car which, according to FRA RAIR, was involved in the derailment.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA RAIR		MTB	
Equipment	$133,008	Total	$133,000
Track, etc.	9,000		
Total	$142,008		

NOTIFICATION AND RESPONSE:

No information available.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: DES MOINES, IA September 1, 1975

SOURCES: NTSB RAR 76-8
FRA #C-15-76
FRA RAIR #DM340-775
MTB HMIR #7090004 A-J
NFPA "Hazardous Materials Transportation Accidents", p. 72

EVENTS:

Chicago, Rock Island, and Pacific train #81A31 consisted of two locomotives, and 62 cars (18 empty), including 11 cars of LPG. At 4:05 p.m., while the train was travelling south at an estimated speed of 20 m.p.h. on a main single line (FRA Track Class 3), 13 of the cars, including all eleven cars containing LPG, derailed. The derailment occurred 50 feet south of the eastbound Interstate 35-80 overpass. Explosions and fires resulted. Homes and businesses were evacuated and traffic was rerouted. The temperature was 94°F and it was a clear day.

CAUSE OF THE ACCIDENT:

The train derailed at the frog of a facing point switch on the main line. NTSB could not determine the cause of the initial derailment.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

MTB indicated that 10 cars, each containing 30,000 gallons of LPG were a total loss. Ten of the derailed cars of LPG were damaged and released their contents. Four explosions occurred. The first car to explode, GATX 83340 (DOT 112A) ruptured and exploded immediately after the derailment. Cars NATX 34071 and GATX 83347 (both DOT 114A) ruptured and exploded. The last car, UTLX 99429 (DOT 112A) ruptured due to heat impingement. Rocketing fragments from these cars landed from 200 to 1,200 feet away. DOT 112A cars UTLX 80635, NATX 34947, NATX 33824, and DOT 114A car NATX 34097 all overturned and later ruptured as a result of being struck by rocketing pieces of the other cars. The tank head of UTLX 81650 (DOT 112A) appeared to have been punctured by the coupler of car UTLX 99429 and rapidly lost its contents. The last car UTLX 80658 (DOT 112A) was punctured by a broken rail and released its contents.

To summarize: four cars exploded probably due to heat impingement and four cars stopped intact but suffered damage from the explosions. Three other cars were punctured either by couplers or a sharp object.

FRA analysis (C-15-76) suggested that the presence of heat shields on the tank cars would have prevented the damage to cars and the release and explosion of the contents.

CASUALTIES:

NTSB and MTB indicated three injuries. FRA RAIR listed two injuries. FRA C-15-76 reported no injuries as a result of the derailment but indicated severe burns from the exposions to a motorcyclist and an automobile passenger travelling over the highway overpass.

DAMAGES:

Dollar estimates are:

NTSB		FRA C-15-76	
Equipment	$294,461	Equipment	$294,461
Lading	126,800	Track	28,079
Property	385,000	Lading	126,800
Track	28,079	Property	385,000
Total	$834,340	Total	$834,340
FRA RAIR		**MTB**	
Equipment	$294,461	Total	$1,000,000
Track	1,100		
Total	$295,561		

NOTIFICATION AND RESPONSE:

The conductor radioed the Rock Island dispatcher at Des Moines of the derailment and fire. Local firefighters responded immediately. Fire fighters did not know of derailment and thought an adjacent business was on fire. They were setting up their equipment when the second blast occurred. Because of this explosion, the firefighters decided not to fight the fire. A firefighting unit from a surrounding community started to fight the fire but was ordered out. The Iowa State Fire Marshall observed the fire from a helicopter. He ordered the evacuation. A formal "no attack" decision was made. The fire was allowed to burn itself out. One tank burned for approximately 10 days.

Traffic was diverted from Interstate 35-80 for four days and persons in a one mile area were evacuated.

OBSERVATIONS:

NTSB noted that:

There were no apparent mechanical problems to cause a derailment. The reconstructed track indicated that a broken rail probably did not occur.

The lead coupler of the 29th tank car punctured the rear head of the 28th tank car. The coupler struck an area that would have been protected if the car had been equipped with tank head shields.

If top and bottom shelf couplers had been present they might have resisted the vertical forces which disengaged the couplers during derailment.

The firefighters did not analyze what action would have been safest and most effective to fight this fire which involved hazardous materials.

OBSERVATIONS (con.):

FRA C 15-76: The track complied with FRA standards and inspection of the equipment did not disclose any violations.

If not for the Labor Day weekend, many more people working in nearby businesses, could have been injured or killed.

RECOMMENDATIONS:

The NTSB recommended the FRA "determine the capabilities of top and bottom shelf couplers, head shields, and a combination of both, and issue regulations to require that DOT-112A and 114A tank cars be equipped with the best practical combination."

The NTSB also issued recommendations to the Department of Commerce to:

"Develop firefighting procedures which assure safety and minimize the duration of fire danger in accidents involving LPG and other compressed flammable gases in tank cars."

"Establish communication with all fire services and disseminate to them specific procedures for the safe handling of railroad transportation emergencies which involve hazardous materials.

INCIDENT: FERTILE, MN October 22, 1975

SOURCES: FRA #A-3-76
FRA RAIR #WS672
MTB HMIR #5110010A
NFPA - News account, State Fire Marshall, *Fire Command*, Sept. 1976.

EVENTS:

Burlington Northern train Extra 9754 East, consisting of four locomotive units and 89 cars (20 empty) derailed the 4th-12th cars while travelling through Fertile. There were 18 cars on the train carrying hazardous materials. Four of the derailed cars (6th-9th) were loaded with LPG. About one hour before the derailment (10:20 p.m.), Extra 9754 East was detained because the train had separated between the 20th and 21st cars. The cars were recoupled and the train proceeded to Fertile. As the train moved east through Fertile at 20 m.p.h. on a main line (FRA Track Class 2) the engineer noticed the locomotive brake cylinder pressure was rising. He assumed the train had parted again until he saw a cloud of flame which engulfed the train. The crewmen escaped from the train when the flames receded. The burning, leaking tank car of LPG then rocketed 550 feet north of the derailment spewing fire and burning debris. The accident occurred at 11:30 p.m. when the weather was cloudy and drizzling. The temperature was 40°F.

CAUSE OF ACCIDENT:

According to FRA A-3-76, Burlington Northern concluded the accident was caused by sudden heavy lateral forces from an unknown source fracturing a rail under the train.

That FRA report concluded the probable sources of the lateral force were brake application or slack action in the train causing a run-in. The existence of harmonic rock and roll was also possible or a combination of this and the above factors.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Of the four DOT 112A cars carrying LPG (UTLX 38418, GATX 83996, GATX 96906, UTLX 99191), two leaked. Car GATX 83996 sustained a punctured tank head at the B end of the car and released 24,478 gallons of LPG. The escaping gas ignited and the tank rocketed. Car UTLX 99191 developed a slight leak at the gland nut on gauging tube allowing 100 gallons of LPG to escape until nut was tightened and the leak stopped.

CASUALTIES:

FRA A-3-76 stated seven people sustained minor injures as a result of the explosion - the engineer and six Fertile residents.
The MTB reported four persons injured.
FRA RAIR reported one injury.

DAMAGES:

Ignition of the propane vapor cloud created a huge fireball which immediately caused fires that destroyed buildings and structures within a 250 feet radius. The intense heat of the LPG fireball and the shock waves generated by the rapid burning of the vapor cloud caused scorching damage to homes and buildings plus broken windows, charred curtains and melted plastics. The rocketing tank car spewed burning debris and damaged electric power lines, buildings and automobiles. The train and the track incurred heavy fire damage.

Dollar estimates are:

FRA A-3-76, RAIR		MTB	
Equipment	$135,300	Total	$370,889
Track, etc	12,540		
Total	$147,840		

NOTIFICATION AND RESPONSE:

Within minutes of the eruption of the fire, the alarm was sounded and radio calls for assistance were made by the sheriff and a highway patrolman. A communication center, headed by the mayor, was set up at the firehouse. The conductor of the train told the fireman that the derailed tank cars contained LPG (propane) and should be cooled with water. He also warned police that bystanders and nearby residents should be evacuated. This was immediately implemented. The street crossings in Fertile were blocked by the huge train, preventing fire fighters from reaching both sides of the derailment. Fire fighters from four or five communites came to help. Shortly after 1:30 a.m., October 23, locomotives from a train at Crookston arrived and moved the rear 76 cars of Extra 9754 East and thus cleared street crossings. A representative from AAR's Bureau of Explosives was called to stop the leak in overturned tank car UTLX 99191. Between October 24th and 26th the derailed propane tanks were retrucked. On these days, approximately 1/2 to 3/4 of Fertile residents were evacuated.

OBSERVATIONS:

FRA A-3-76 noted that:

Before the accident, Extra 9754 East was operating in compliance with all carrier rules and regulations.

The track in the accident area had been inspected the morning before the accident.

All derailment cars were equipped with type "E" couplers. They all uncoupled at both ends when they derailed.

The prompt response and action of Fertile and other emergency crews prevented impingement of flames on the tanks or nearby gasoline and fuel oil storage tanks.

RECOMMENDATIONS:

None.

INCIDENT: ELY, VT (Fairlee) November 9, 1975

SOURCES: FRA #C-30-76
FRA RAIR #750764
MTB HMIR #5120001A-C

EVENTS:

Canadian Pacific Train #8904 while travelling south at 38 m.p.h. on a Boston and Maine single main line (FRA Track Class 3) sustained a derailment of the rear two locomotive units and 19 head cars. The train originally consisted of three locomotives and 38 cars. The derailment occurred as the train was entering a 4° 15' curve to the left. The train originally consisted of three locomotives and 38 cars including three cars carrying hazardous materials. The 13th, 14th and 15th head cars were than cars carrying LPG. The derailment area was located in a fill section with the east bank dropping 40 feet to the Connecticut River and the west bank dropping 30 feet to a swamp area. Spillage, fire and three explosions followed the derailment. The fire involved the general wreckage. The accident occurred between 5:30-5:40 p.m. when it was dusk. The weather was clear with a temperature of 50°-52°F.

CAUSE OF ACCIDENT:

The Boston and Maine Corporation attributed the cause of the accident to a broken B/L truck side on car CP-260614 (the 1st head car).

The FRA report (C-30-76) determined the cause to be the failure of the B/L truck side of car CP-260614 allowing the truck side to drop and catch between the ties, completely disrupting the track structure.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

During the derailment, the 13th head car (CGTX 63788) was punctured on the top and bottom of the tank. The leaking LPG ignited and the general wreckage caught fire including CGTX 63821 and UTLX 29581, the other two tank cars of LPG. All three cars (DOT 112A) exploded. The first explosion was about 20 minutes after the derailment (5:50-5:55 p.m.) followed by the second at 6:00 p.m. and the third at 6:17 p.m.

CASUALTIES:

There were no casualties reported.

DAMAGES:

There was major damage to one locomotive and minor damage to another locomotive. Nineteen railroad cars were destroyed and there was considerable damage to the track structure.

DAMAGES (con.):

Dollar estimates are:

FRA C-30-76		FRA RAIR		MTB	
Cars	$270,000	Equipment	$310,000	Total	$312,000
Loco-motive	40,000	Track, etc.	17,897		
Track	15,000	Total	$327,897		
Total	$325,000				

NOTIFICATION AND RESPONSE:

The explosions and fires necessitated the evacuation of a 1/2 mile area which included 28 people. Railroad personnel and firemen remained at a safe distance until after the explosions.

OBSERVATIONS:

FRA C-30-76 indicated that:

The rail was last inspected on November 3, 1975.

The train was operating within the speed limits.

The explosions and fire so disturbed the area where the derailment took place it made reconstruction of the derailment events extremely difficult. Some cars went into the river.

The investigators could not locate the rear truck of car CP 260614 (the 1st head car).

RECOMMENDATIONS:

None.

INCIDENT: NIAGARA FALLS, NY December 14, 1975

SOURCE: NFPA - *Fire Journal*, September 1976

EVENTS:

At 7:35 p.m., one of three railroad tanks exploded on a rail siding adjacent to Hooker Plastics Co. These cars were used for storage of reprocessed gas (Chlorine). One piece of the tank car was thrown 450 feet away. A large vapor cloud formed. A very strong wind was present.

CAUSE OF ACCIDENT:

One of the three tank cars containing reprocessed gas exploded for an unknown reason.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The Chlorine vapor cloud was released when the tank car ruptured.

CASUALTIES:

Four chemical plant employees in the vicinity died and three others were hospitalized as a result of breathing the Chlorine gas. Eighty area residents, mostly located in a nearby shopping center, inhaled the gas and 20 were admitted to hospitals.

DAMAGES:

Unknown.

NOTIFICATION AND RESPONSE:

The accident occurred within an industrial complex. Various company safety engineers and the Fire Departments had previously met and established an emergency response plan. Fire fighters wore gas masks when responding. They rescued the employees and extinguished the fire on the roof of a nearby hydrogen storage facility. A search was made of an adjacent employee locker room but it had been empty at the time of the accident.

OBSERVATIONS:

Because the accident occurred in an industrial area, the number of potential casualties in the immediate area was low. However due to the strong wind, residents from 1 to 3 miles away were exposed to the gas. The number of casualties would have been greater if the wind had been blowing in the direction which was more densely populated.

RECOMMENDATIONS:

None.

INCIDENT: ONEONTA, NY (Emmons) February 12, 1974

SOURCES: NTSB RAR 74-4
FRA #A-17-74
FRA Form T #0136 5
FRA Casualty Summary
MTB HMIR #4030330A
NFPA Fire Record

EVENTS:

Delaware and Hudson Railway train #NWB-4 consisting of three locomotive units and 122 cars were proceeding northward on a double track line at 32 m.p.h. The train included eight DOT Specification 112A jumbo tank cars containing LPG. At 4:20 p.m., while the train was rounding a 3°30' curve, the train crew looked back and saw several rocking cars and a car leave the rail entirely. The engineer immediately applied brakes but could not tell if the train stopped due to his action or that of the train. A total of 27 cars derailed 4 miles north of Oneonta including seven containing LPG. Fire and explosions resulted.

CAUSE OF ACCIDENT:

NTSB concluded that the cause of the initial derailment was a fractured center sill on the 4th car of the train, CO 603325. This resulted in the pulling upward and separation of the couplers between cars 3 and 4. The ensuing emergency braking exerted unequal deceleration forces causing the derailment of the other cars on the train.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

NTSB stated that the 21st car of the train containing LPG stopped crosswise on the tracks and was crushed by the other cars. The contents of the car leaked and ignited immediately. The fire spread to the other derailed cars. About 5:10 p.m. one tank car ruptured and exploded. Three additional explosions followed 10 minutes apart. Some sections of the cars were propelled as far as 1200 feet away. Four tank cars ruptured and/or broke into sections. A small split in another tank car allowed LPG to escape. It was allowed to burn for 7 days.

According to FRA A-17-74, the first tank car of LPG to rupture was struck by the coupler of a boxcar of furniture. Five cars exploded and a sixth had a rip in the valve area and burned.

CASUALTIES:

NTSB listed 54 firemen and members of the press injured as a result of the first explosion. FRA A-17-74 indicated 47 firefighters, four reporters and one railroad employee as injured by the explosion. FRA Form T listed one trainman and one other employee as injured. FRA Casualty Summary listed one trainman injured and another employee burned.

DAMAGES:

A total of 1300 feet of track was destroyed. Damage dollar amounts were not available from NTSB or FRA A-17-74.

Dollar estimates are:

FRA Form T		MTB
Equipment	$275,000	Unknown
Track, etc.	40,000	
Total	$315,000	

NOTIFICATION AND RESPONSE:

The train engineer notified the Oneonta railroad office which in turn notified the Oneonta fire department. Firefighters arrived on the scene about 10 minutes after the derailment. They were under the impression that the fire was caused by gasoline instead of LPG. With the aid of two other city fire departments, an effort was made by firefighters to cool the tanks. After the first explosion, in which the injuries occurred, attempts to suppress the fire were abandoned and the tank cars were allowed to burn.

OBSERVATIONS:

NTSB noted that:

Insulation of the tank cars would have delayed and possibly prevented the explosions.

Local firefighters were not adequately trained or informed on how to deal with this type of accident.

Regulations have not been promulgated by FRA to reduce severity of such fires resulting from accidents.

Recommendations have not been made by RPI-AAR Railroad Tank Car Safety Project to help eliminate or reduce severity of such double accidents and resulting fires.

FRA A-17-74 indicated that:

The waybills were correct and the location of cars in the train was proper.

RECOMMENDATIONS:

NTSB recommended the following:

FRA should insure that an inspection program by the railroads is continued to discover possible defects on other freight cars having this particular center sill design.

FRA should reevaluate Federal Track Standards concerning track curve requirements.

FRA should use results from its own studies and RPI-AAR to expedite regulations to reduce the severity of accidents involving hazardous materials.

The recommendations made after two previous accidents were repeated: the local fire chief should have information about hazardous materials on trains moving through his community, and further research into braking system dynamics.

INCIDENT: COLMESNIEL, TX February 16, 1974

SOURCES: FRA #A-18-74
MTB HMIR #4030031A-B

EVENTS:

Southern Pacific train #Extra 9085 West sustained a derailment while travelling west on a single main line 2.35 miles east of Colmesniel. The train consisted of five locomotives and 112 cars. As the train was moving at an estimated 14 m.p.h., the train brakes applied in emergency. This was followed by an internal train collision in which the rear portion of the train ran into the front portion with violent impact. The first through 12th, the 21st through 29th and the 78th through 79th cars derailed (23 cars in all). Seven of these cars (6th-12th) carried LPG. Five of these cars ruptured and burned. There was an intense fire involving the train's lading. The accident occurred at 5:25 p.m. on a partly cloudy night when the temperature was 67°F.

CAUSE OF ACCIDENT:

FRA A-18-74 indicated that the accident was caused by a broken rail. A manufacturer's defect caused progressive horizontal cracks through the web of the rail so that it eventually split into three pieces.

Contributing factors included operating the train over a rough track at a speed in excess of that authorized by train order and operating a train of this length with an inoperative dynamic brake.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

FRA A-18-74 indicated that five of the 7 tank cars (DOT 112A) carrying LPG released their contents. Car UTLX 80810 and car UTLX 83755 exploded. Their respective contents of 33,748 and 30,951 gallons were a total loss. Car GATX 83647 containing 30,275 gallons ruptured. The leaking gas ignited at the rupture and burned for 7 days. Car GATX 84462 loaded with 32,884 gallons, sustained punctures at both ends. The leaking LPG burned like a torch and impinged intense heat on tank car GATX 84933 causing this car containing 32,841 gallons to explode. MTB indicated that two of the cars containing 31,648 and 28,819 gallons of LPG were a total loss. Specific information on the quantity released from the other cars was not available from MTB.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Eight train cars were destroyed, 14 cars had major damages and one car had minor damages. About 430 feet of track were destroyed. A home and camper trailer were destroyed. Trees and other vegetation also sustained damages.

DAMAGES (con.):

Dollar estimates are:

FRA A-18-74		MTB (information for two cars)	
Cars	$255,900	Lading	$15,078
Track	9,500	Cars	50,000
Total	$265,400	Total	$65,078

NOTIFICATION AND RESPONSE:

There was an evacuation reported by the FRA. No other information available from either the FRA or MTB.

OBSERVATIONS:

FRA A-18-74 made the following:

Train Order No. 1487 required the train to reduce its speed to 10 m.p.h. in the derailment area. Extra 9085 West was moving at 14 m.p.h.

Track conditions in the derailment area were unsafe for heavy tonnage even at 10 m.p.h.

The dynamic brake system on the train was not working.

RECOMMENDATIONS:

None.

INCIDENT: DAYTON, TX March 14, 1974

SOURCES: FRA #C-68-74
MTB HMIR #4040089

EVENTS:

Southern Pacific train 2nd 48 East consisted of four locomotives and 122 cars and was travelling east on single main line track. As the train entered a shoo fly track* at 30 m.p.h., the engineer applied the emergency brakes and 45 of the cars derailed. Four cars loaded with Vinyl acetate and one containing Alcohol were ruptured and destroyed by fire. The accident occurred 6.2 miles west of Dayton at 11:05 p.m. It was raining at that time.

CAUSE OF ACCIDENT:

The FRA investigation (C-68-74) indicated that the derailment was caused by the failure of the engineer to obey train orders. These orders included a speed limit of 10 m.p.h. and avoiding use of the brakes while moving on the shoofly. The first through 31st and 60th through the 73rd cars derailed.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

DUPX 29214, DUPX 29202, DUPX 29219, DUPX 29225 (all DOT 111A), containing Vinyl acetate were ruptured. The cars each had a capacity of about 29,500 gallons and their contents were destroyed by the fire. GATX 99040 carrying Alcohol (quantity not determined) was also a total loss (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

The FRA investigation (C-48-73) listed 20 cars destroyed and 17 cars damaged.

Dollar estimates are:

FRA C-68-74		MTB	
Equipment	$292,299	Cars	$104,000
Track	1,800	Lading	76,000
ACI Scanner	21,575	Total	$180,000
Total	$315,575		

*The "shoofly" is a temporary "run around" track. It permits the running of trains while the main track is undergoing heavy repair. The track was installed March 11, 1974 as the result of an AMTRAK train derailment.

NOTIFICATION AND RESPONSE:

Personnel from the Southern Pacific and Dayton Fire Departments and shipper's representatives were at the scene.

OBSERVATIONS:

The FRA investigation (C-68-74) noted that:

The engineer, fireman and front brakeman were in the lead locomotive unit. The conductor and rear brakeman were in the caboose.

The engineer had attended a rules class in 1973 and the fireman in 1974. The conductor attneded a rules class in 1971. No records indicated that either the brakeman or flagman (rear brakeman) had attended rules classes.

RECOMMENDATIONS:

None.

INCIDENT: CLIMAX, TX June 29, 1974

SOURCES: FRA #A-27-74
MTB HMIR #4070763-66
NFPA FILE - Government memo

EVENTS:

A derailment of four locomotive units and 37 cars occurred on Southern Pacific train Extra 8750 East as it was travelling east on a single main track at 38 m.p.h. Six of the derailed cars carried hazardous materials. There were 10 cars of hazardous materials in the consist. Extra 8750 East consisted of four locomotive units and 84 cars. As the train was moving through a 5° curve to the right, the lead pair of wheels of the lead locomotive dropped between the rails initiating the derailment. The locomotive units separated about 700 feet east of the initial point of derailment. Within one minute after the engine came to rest, a violent Vinyl chloride explosion occurred. The explosion ignited cars and lading involved in the derailment. The accident occurred at 7:35 p.m. The weather was clear and the temperature was 84°F.

CAUSE OF ACCIDENT:

FRA A-27-74 concluded that the derailment was caused by a rail spread or wide track gauge which resulted from train action on an existing track irregularity.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

FRA: The 28th car (DUPX 9967) containing 32,137 gallons of Vinyl chloride, was punctured in the derailment. When the escaping gas reached a source of ignition, it exploded. Heat impingement from that explosion on the 27th car (DUPX 9901), loaded with 31,178 gallons of Vinyl chloride, caused this car to explode. These two cars were DOT 112A. Intense heat from the explosions and fires caused failure of the two tank cars containing motor fuel anti-knock compound, PPGX 6649 and PPGX 6644, (both DOT 105A) the 16th and 17th head cars. The tanks split longitudinally allowing their respective contents of 6,174 and 6,162 gallons to spill. The area was contaiminated by the tetreaethyl lead residue left from the burned contents. Car DUPX 26005 (7th head car) and car DUPX 26109 (8th head car) (both DOT 111A) ruptured and each spilled their entire contents of 26,000 gallons of Hexamethylene diamine solution. Fire destroyed the lading of the remaining derailed cars.

MTB: The two cars each containing 150,000 pounds of Hexamethylene diamine were a total loss. One car with 77,200 pounds of motor fuel anti knock was also a total loss.

CASUALTIES:

There were no casualties reported by either the FRA report (A-27-74) or MTB.

The NFPA memo reported four firefighters and two state troopers were hospitalized for inhalation of toxic fumes.

DAMAGES:

Four locomotives were damaged, 34 cars were destroyed and two cars sustained major damages. The lading in these cars was also lost. Train equipment and track also incurred heavy damage.

Trees and vegetation were destroyed. There were broken windows and structural damages to homes in the derailment area.

Dollar estimates of damages:

FRA A-27-74		MTB	
Cars	$1,042,211	Equipment	$18,000
Track, etc.	7,500	Lading	30,000
Third party damage claims	70,000	Total	$48,000
Total	$1,119,711		

NOTIFICATION AND RESPONSE:

The FRA and NFPA reported 40 to 50 families were evacuated within a 2 mile radius of the accident.

OBSERVATIONS:

FRA A-27-74 noted the following:

Prior to the accident, the train was operating according to the rules and regulations of the carrier.

The destruction of the track structure prevented the determination of the condition of the track structure in the accident area prior to the derailment.

Crew members had reported a track irregularity at the derailment site 10 days before the accident but according to track inspection records, no effort had been made to correct the reported irregularity.

The front brakeman of the train observed an apparent wide gauge condition as the train approached the point of derailment but there was no time to do anything about it.

RECOMMENDATIONS:

None.

INCIDENT: DECATUR, IL July 19, 1974

SOURCES: NTSB RAR 75-4
FRA #A-2-75
FRA Form T #0175 4
FRA Casualty Summary
MTB HMIR #4080869
NFPA - *Fire Journal*, July, 1975.

EVENTS:

During switching operations in the Norfolk and Western Railway yard, 18 cars were being switched to different tracks without the use of mechanical speed retarders. A cut of five jumbo tank cars containing Isobutane was released by the switching crew onto track 11 where a collision resulted with an empty boxcar. One of the tank cars was punctured, and the ensuing vapor cloud exploded. The weather was clear and there was a northwest wind.

CAUSE OF ACCIDENT:

NTSB indicated that the collision of the five tank car unit containing Isobutane and the empty boxcar resulted from the overspeed condition developed by the tank cars. Although released at a speed between 3.5 and 4 m.p.h., they impacted the boxcar at an estimated speed of at least 15 m.p.h. The overspeed condition occurred when the switchman released the five car cut in a free rolling operation. The switchmen failed to understand the potential danger of such action.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

A five car cut of tank cars (DOT 112 or 114) of Isobutane was released, developed excessive speed and collided with a standing empty boxcar. The boxcar, NW 49203, overrode the coupler of the GATX 41623 tank car and punctured it. Isobutane vapor leaked from the tank car for about 10 minutes and then exploded at 4:03 a.m. NFPA indicated that the tank cars each contained 30,000 gallons Isobutane.

CASUALTIES:

NTSB indicated that seven railroad employees died from burns and 349 other people, including 33 railroad employees, were injured. Most of the killed or injured employees were in or next to the crew dormitory adjacent to the yard. MTB lists seven as killed, 349 injured. FRA A-2-75 reported (as of 7-22-74) that four employees were killed and 130 other people suffered burns and cuts. FRA-Form T and FRA Casualty Summary listed two railroad employees killed; injuries to one trespasser, one trainman, three other employees, three non-trespassers and 32 off duty employees.

DAMAGES:

NTSB listed 283 freight cars as destroyed and 312 other cars as as damaged. A railroad crew dormitory adjacent to the yard was demolished. Seven hundred residences were damaged, 67 of which were declared uninhabitable. Thirty-one commercial businesses reported damages. FRA A-5-75 indicated 500 of 700 freight cars in the yards were destroyed.

Dollar estimates are:

NTSB		FRA A-5-75	
Railroad		Total	$5 million
Lading	$3.2 million		
Cars	3.7 million	FRA Form T	
Other	1.0 million	Equipment	$3,700,000
Total	$7.9 million	Track, etc.	529,000
		Total	$4,229,000
Commercial	$4.9 million		
Residential	2.5 million	MTB	
City, emergency services	3.1 million	Total	$7,929,000
Total	$10.5 million	NFPA	
TOTAL	$18.4 million	Yards	$8.7 million
		Total area	$24 million

NOTIFICATION AND RESPONSE:

The railroad informed local emergency rescue and police services. Fire fighting efforts were hindered by the lack of water hydrants in the yard. Communication within the yard was limited due to damage to the electrical supply and the intercom system. There were seven other cars of hazardous materials, including one of explosives, which were moved by employee volunteers.

OBSERVATIONS:

NTSB made the following:

The lack of understanding of the potential risks by switchmen and routine acceptance of overspeed couplings contributed to the occurrence and severity of the accident.

There was no documented emergency plan.

The difficulty in obtaining water resulted in more extensive damage.

The use of head shields and top and bottom shelf couplers might have prevented the puncture of the tank car.

Available information in reports is insufficient to assess the possible hazard from various materials.

FRA A-5-75 stated that head shields would probably have prevented damage to the tank car.

RECOMMENDATIONS:

NTSB made the following:

FRA promulgate regulations to limit losses of rail hazardous materials accidents and issue regulations requiring the use of head shields and top and bottom shelf couplers.

The N&W Rwy. should insure that its employees recognize the risks present in switching cars of hazardous materials and establish an emergency response plan. The DOT should revise incident reporting form F-S800.1 to obtain more detailed information concerning casualties.

On October 25, 1974, FRA issued Emergency Order #5 requiring "shove to rest" switching of DOT Spec. 112A and 114A tank cars containing compressed flammable gas. On July 23, 1974, the FRA amended the Federal Code of Regulations requiring the equipping of tank cars with head shields by December 31, 1977.

INCIDENT: WENATCHEE, WA August 6, 1974

SOURCES: NTSB RAR 76-1
FRA Form T #0306 63
MTB HMIR #4080433A
NFPA - "Hazardous Materials Transportation Accidents," p. 78.

EVENTS:

At 12:32 p.m., during a routine switching operation at the Apple Yard of the Burlington Northern Railroad, a tank car (DUPX 16009) of Monomethylamine nitrate (PRM) solution exploded. This car was to be one of a 13 car cut. Car DUPX 16009 was the fifth car from the east end of eight cars. Five cars were added from the east. Shortly after the five cars were supposed to have locked, car DUPX 16009 began to smoke and fire and then detonated. The explosion produced a massive crater. Parts of the tank car were found up to one mile from the site. On the opposite side of the Columbia River, adjacent to Apple Yard and in Chelan County, grasslands were ignited by hot flying objects thrown out from the explosion. The temperature was 82°F and the day was clear.

CAUSE OF ACCIDENT:

The NTSB was unable to determine the probable cause of the accident. Many possiblities for the explosion were speculated, among them: a reaction of dried crystals, a reaction of spilled or leaking components, a reaction of solution of crystals sensitized by contaimination, ignition of escaped product by friction.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Unknown. Specific quantity also unknown.

CASUALTIES:

Two persons were killed and 113 injured (NTSB). Two persons were killed and more than 60 injured (MTB, NFPA). FRA Casualty Summary and FRA Form T listed one trainman and one trespasser were killed while five trainmen and nine other people were injured.

DAMAGES:

NTSB - Seventy-one cars and four containers were demolished. One hundred and one freight cars and 29 trailers were damaged.
NFPA - Thirty to forty railroad cars and 39 buildings were destroyed. Two thousand other structures were damaged.

DAMAGES (con.):

Dollar estimates are:

NTSB		FRA Form T	
Railroad cars	$1,444,000	Equipment	$1,423,750
Railroad (other)	1,152,000	Track, etc.	62,570
Property	5,100,000	Total	$1,486,320
Total	$7,696,000		

MTB

Unknown

NOTIFICATION AND RESPONSE:

Chelan County Fire District No. One was notified by radio by Douglas County Fire District No. Two. They responded immediately and called for assistance from surrounding communities. Equipment and help came from as far as 50 miles. Police and firefighters worked together to secure the area and transport the injured. The pumps which bring water from the Columbia River were not working because of damage done to power lines by the blast. Tank cars of water were brought in and aircraft dropped a fire supressant on the area. The yard was evacuated because of other hazardous materials in the area. Local, county and state police, the National Guard, ambulance personnel and 182 fire department personnel responded to the emergency using 43 pieces of fire fighting and life saving equipment.

OBSERVATIONS:

NTSB made the following:

PRM was known to be detonable when stimulated by heat, shock or friction.

Dupont had acquired a special permit (5737) for transporting the Monomethylamine nitrate (PRM). It was shipped in a water solution and classified as a "flammable solid" rather than as an explosive. Because of its classification, the PRM did not receive proper attention.

The PRM was contaminated with iron and was not of the same quality as that used by the DOT to determine its hazardous material classifications.

PRM crystals probably were present in the insulation and bottom outleg leg of DUPX 16009 before the accident.

CAR DUPX 16009 had been in an unreported train accident on an earlier trip. It was not reported to the shipper since regulations for this classification of lading did not warrant it.

RECOMMENDATIONS:

The NTSB made the following recommendations to the FRA:

All liquids capable of detonation should be identified for detonation risks.

Guidelines for safety analyses to determine detonation risks should be published.

RECOMMENDATIONS (con.):

Appropriate explosives classification definitions and test procedures should be established.

Regulations for quality specifications and quality control procedures in the manufacture, packaging and loading of detonable materials should be established.

The FRA suspended Special Permit 5737.

INCIDENT: MUSTANG, OK September 1, 1974

SOURCES: NTSB RAR 75-6
MTB HMIR #4090351A-B

EVENTS:

Two St. Louis-San Francisco Railway trains scheduled to meet on a single main track at 1:52 p.m., instead collided between 1:44 and 1:46 p.m., 1.7 miles from Mustang. Prior to the collision train #3210, which consisted of two locomotives and 18 cars (6 empty) and carrying one tank car of gasoline, was travelling eastbound. Train #3211 consisted of two locomotives and 39 cars (15 empty), was carrying 15 tank cars of JP-4 jet fuel and one tank car of Isobutane and was moving west. Both trains were travelling at about 40 m.p.h. Train #3210 was considered the "superior" train, meaning it had the right of way. When the engineer of #3210 saw the other train approach, he applied the emergency brakes. Then he, the conductor and brakemen evacuated the train. The engineer of train #3211 also applied the emergency brakes. The crew of #3211 then jumped from the locomotive cab. The collision immediately followed. Twenty-three cars on train #3211 derailed. Eight families were evacuated. The temperature was about 80°F. The sky was heavily overcast and a light rain had fallen about 1 p.m.

CAUSE OF ACCIDENT:

NTSB concluded that the cause of the collision and derailment was the passing ahead of schedule, by train #3211 at the scheduled meeting point with train #3210.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

A tank car of Isobutane was punctured in the derailment and burned. Three tank cars of JP-4 jet fuel also burned.

CASUALTIES:

NTSB indicated that one crew member on train #3211, a brakeman, was killed as a result of being crushed under the derailed cars. Other members of that crew suffered various injuries. The conductor received third degree burns. The engineer of train #3210 received burns. He was the only crew member of #3210 to be injured. MTB listed no injuries.

DAMAGES:

NTSB stated four locomotives were destroyed. Nineteen of the 23 derailed cars on #3211 burned.

DAMAGES (con.):

Dollar estimates are:

NTSB		MTB	
Lading	$100,000	Total	$40,000
Equipment	246,000		
Locomotives	868,924		
Track	8,000		
Cleanup	73,571		
Damage to Adjacent property	1,000		
Total	$1,297,495		

NOTIFICATION AND RESPONSE:

After the collision, the rear brakeman on train #3211 radioed the Oklahoma City operator. The operator notified the Oklahoma City police and gave them information about the hazardous materials involved. The Oklahoma City Fire Department was separately notified. Because of the hazardous materials, the fire was allowed to burn and the area was evacuated.

OBSERVATIONS:

NTSB made the following:

The overcast conditions enabled radio transmissions to be heard beyond the normal range. This caused the engineer of train #3211 to believe that train #3210 was farther from the meet point that it was.

The engineer of train #3211 failed to heed the warning of his head brakeman that the train was early at the meet point. The collision occurred 6 to 8 minutes before the scheduled meet point.

MTB indicated a possible violation existed.

RECOMMENDATIONS:

NTSB recommended that:

The ST. Louis-San Francisco Railway Company, should enforce operating rules and insure that employees understand them. Special attention should be given to rules G, 3, 3b, 14n, 34, 5-87, S-89, S-90, 92, 106 and 8D1.

FRA should issue regulations providing for the use of radio in operations. Railroads should institute formal cab management procedures to specify duties of crew if the engineer does not function to operate the train safely.

INCIDENT: HOUSTON, TX September 21, 1974

SOURCES: NTSB RAR 75-7
FRA #A-7-75
MTB HMIR #4110585-7, 92, 94-99, 001-2
NFPA Fire Report

EVENTS:

Switching operations at Southern Pacific's Englewood yard consisted of releasing cars from a hump (hill) and using a mechanical master retarder and track group retarders to control the speed of the cars as they were switched to a particular track. During switching operations of a 145 car cut, an overspeed collision occurred between a tank car containing Butadiene and an empty tank car. The tank car of Butadiene was punctured and the resulting vapor cloud exploded. Extensive damage was caused and 1700 people were evacuated.

CAUSE OF ACCIDENT:

NTSB determined that the probable cause of the excessive speed of the switched cars and resulting collision was the presence of resin on the wheels of the 15th and 16th cars. This expoxy resin caused the retarding system to fail. The epoxy on the wheels of those cars was transfered to the retarding system and caused it to fail. This resulted in the overspeed of the 17th and 18th cars. Although SP had warned the shipper, Shell Co. about the hazard of foreign substances on wheels, no followup action had been taken.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The first 14 of 145 cars had been switched without incident. The following two cars, #15 containing Bisphenol, and #16, containing epoxy resin, were routed toward track 50 and moved through the retarder system at excessive speed. The operator attempted to manually override the retarder system to slow these cars but the cars continued moving at the excessive speed. Two more cars, #17 and #18, both containing Butadiene and routed to track 1, had been released, could not be slowed by the retarder system or operator, but continued moving at 18 to 20 m.p.h. The operator was able to divert a fifth car, #19 containing Vinyl chloride, also originally routed for track 50, to an alternate track. After the tank cars containing Butadiene had entered track 1, one of these cars struck an empty tank car and was punctured by its coupler. The Butadiene escaped and formed a vapor cloud. Two or 3 minutes later at 12:03 p.m., the vapor cloud exploded. The MTB report indicated a total loss of 31,000 gallons from one car of Butadiene. Other information was not available.

CASUALTIES:

NTSB: An engineer, in a locomotive on track 17 which was about 600 feet from the impact, died from burns. Two hundred thirty-five people were injured and 15 hospitalized. MTB listed one killed and 15 injured.

DAMAGES:

NTSB: 231 railroad cars were destroyed and 282 others were heavily damages. Commercial property and residences in the area suffered heavy damage.

Dollar estimates are:

NTSB		MTB	
Railroad equipment	$4,897,875	Lading	$ 29,500
Lading	1,735,210	Other lading	1,661,921
Railroad fixed plant	1,231,000	Cars	25,000
3rd Party damage and personal injury	5,500,000	Total	$1,671,421
Total	$13,364,085		

NOTIFICATION AND RESPONSE:

The retarder operator warned employees of the vapor cloud using the loud speaker system and intercom. The Houston Fire Department responded and worked with railroad officials to identify and move cars. One fireman suffered minor injuries when he fell from a boxcar.

OBSERVATIONS:

NTSB noted the following:

The failure of the retarder system was due to the deposit of foreign substances (epoxy resin and Bisphenol) on the master retarders and group retarders of the cars. These cars had picked up the foreign substance from the track adjacent to the warehouse where epoxy resin was loaded. Shell Oil Company failed to heed warning of Southern Pacific that foreign substances on car wheels could negatively effect braking action. No effective follow-up action was taken by SP.

Although accidents of a similar type had occured previously, railroad inspectors did not concentrate on finding and controlling the presence of foreign substances on wheels.

The presence of top and bottom shelf couplers would probably not have prevented puncture of the tank car but head shields would probably have prevented it.

There were no emergency procedures of facilities to follow in the event of overspeed incidents.

The efficient handling of the fire emergency resulted from the previous planning of the railroad and fire department.

RECOMMENDATIONS:

NTSB recommended that:

The railroad should review the design of the hump switching operation at the yard to insure the proper speed control of cars.

The FRA should conduct research and then promulgate regulations concerning retarding systems and issue regulations requiring that railroads handle large shipments of hazardous materials in the same manner as explosives.

INCIDENT: HARRODS, OH January 4, 1973

SOURCES: FRA #A-7-73
FRA - Form T #0148 3
MTB HMIR #3010191
NFPA Fire Report
FRA Casualty Summary

EVENTS:

Erie Lackawanna train consisted of three locomotive units and 67 cars (12 empty) and was travelling east about 40 m.p.h. on a double main line. At 1:50 p.m., 21 cars of this train derailed including a car carrying Pentane. This car was punctured and ignited. The heat from this burning car impinged on two nearby tractor tanks containing anhydrous Ammonia and caused them to explode. About 350 people were evacuated. It was a clear day.

CAUSE OF ACCIDENT:

FRA A-7-73 indicated the derailment was caused by the dropping of a cotter key from a brake rod.

NFPA indicated that the derailment was caused by a broken or defective brake rod and that the derailment occurred as a result of a cotter key dropping from a brake rod or a loose wheel.

MTB indicated the connector pin on the connector rod for a hand brake on car SPFE 453152 dropped out. The brake rod struck a concrete slab at a crossing. This slab derailed UPFE 460185 and 20 other cars derailed.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

Car ACFX 12173 containing Pentane was ruptured and ignited as a result of the derailment. It lost its entire 134,937 pound contents (MTB). Adjacent to the track were six tractor tanks containing anhydrous Ammonia. The heat from the burning car of Pentane caused two of these tanks to explode.

CASUALTIES:

Pieces of the ruptured Ammonia tanks rocketed four blocks away. One girl was killed by metal fragments and her father suffered a broken leg. All casualty source figures agreed.

DAMAGES:

NFPA indicated that 18 cars burned.

Dollar estimates are:

FRA Form T		MTB	
Equipment	$251,775	Total	$448,000
Track, etc.	15,760		
Total	$267,535		

NOTIFICATION AND RESPONSE:

Eight fire departments responded. The Pentane was allowed to burn. Foam was used on the remaining fires. About 350 people were evacuated.

OBSERVATIONS:

FRA A-7-73 found that the accident could have been avoided had the specified hand brake bottom connecting rod safety supports been properly attached to the truck frame of car SPFE 453152.

RECOMMENDATIONS:

None.

INCIDENT: POWDER SPRINGS, GA January 21, 1973

SOURCES: FRA #C-41-73
MTB HMIR #3020076
NFPA Fire Report

EVENTS:

Seaboard Coast Line train #586 consisted of three locomotive units and 32 cars and was proceeding east at an estimated speed of 45 m.p.h. on a single main track. While moving on a 3° 25' curve, 3.1 miles west of the town, the train derailed 17 cars. The two known cars of hazardous materials containing LPG were among the derailed cars. Fire and an explosion followed. Several families were evacuated. The accident occurred at 11:25 p.m. It was raining.

CAUSE OF ACCIDENT:

FRA C-41-73 listed the cause of the derailment as a broken rail. The 7th-23rd cars derailed.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

FRA C-41-73 indicated that a fire started when GATX 83706 (DOT112A) was apparently punctured by a coupler in the derailment. GATX 89910 (DOT112A) also containing LPG landed upside down and exploded 20 minutes later. These cars lost their entire contents of 30,267 and 33,597 gallons of LPG.

CASUALTIES:

FRA C-41-73 listed two trainmen as injured when they jumped out of the caboose. The conductor suffered a broken kneecap and the flagman had a bruised leg. MTB mentioned the crew injuries but stated they were not due directly to hazardous materials.

DAMAGES:

A boxcar of paper and a tank car of vegetable oil burned. Six other cars were destroyed, eight others were heavily damaged and one slightly damaged.

Dollar estimates are:

FRA C-41-73		MTB	
Equipment	$138,366	Equipment	$41,232
Track	6,600	Contents	5,000
Total	$144,966	Total	$46,232

NOTIFICATION AND RESPONSE:

The county fire chief saw the sky light up from his house 6 miles away. He and another firefighter responded and looked for injured crew members. They had come within 225 feet of the derailment when they say the tank car with fire around it. They had

NOTIFICATION AND RESPONSE (con.):

retreated to 500 feet away when the car exploded. The accident occurred in an isolated area. The rain minimized ground fire. The county civil defense and police blocked off the area. FRA indicated no evacuation was ordered but MTB listed families close to the scene were evacuated.

OBSERVATIONS:

FRA C-41-73 stated that the track had been inspected by Sperry Rail Service on November 9, 1972 and the railroad test car on September 14, 1972. The track was also inspected by RR officials and the engineering department. No defects were noted on any of these dates.

That FRA report also noted that the cars of hazardous materials were properly placed on the train and that there were no equipment defects.

RECOMMENDATIONS:

None.

INCIDENT: DOWNINGTON, PA February 5, 1973

SOURCES: FRA #C-49-73
MTB HMIR #3020275A

EVENTS:

Penn Central Train #Extra P-3A derailed 21 cars (76th-96th) while travelling at 40 m.p.h. on westbound main track. The train consisted of three locomotives and 118 cars. Only one of the derailed cars was carrying hazardous material (acid). As the train approached Downington on tangent track, the brakes were applied in emergency as a result of the derailment. None of the crew members were aware that anything was wrong prior to this. The first car in the derailment became uncoupled and dragged 2400 feet. Twenty cars derailed on the Brandywine Bridge and just east thereof. They were in various positions across all four main tracks and several cars went off the bridge and into the creek. There was no fire, just spillage. The accident occurred at about 4:00 a.m., on a clear night.

CAUSE OF ACCIDENT:

According to FRA C-49-73, this accident was caused by an overheated journal on car EL 40430. The journal burned off, allowing the truck side to drop to the track structure causing the derailment. The journal bearing pads were not lubricated sufficiently resulting in the overheating.

A contributing factor was car EL 40430 being overloaded by 2,800 pounds.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Car GATX 8620 carrying mixed acid, 40% Nitric acid and 60% Sulfuric acid came to rest on its side with dome pointed downward. The safety assembly was torn off leaving a 2-inch opening from which 97,960 pounds of the lading escaped (MTB).

CASUALTIES:

The FRA report (C-49-73) listed no casualties resulting from the derailment. The MTB reported 29 injuries.

DAMAGES:

All 21 derailed cars were damaged, 16 with substantial damage and five with minor damage. The structure of track No. 4 was heavily damaged for a distance of about 2,500 feet.

Dollar estimates are:

FRA C-49-73		MTB	
Equipment	$65,900	Total	$6,425
Track, etc	1,850		
Total	$67,750		

NOTIFICATION AND RESPONSE:

The Chester County Fire Board learned of the derailment from the police via radio. It was 4:30 a.m. before authorities knew what chemical was involved in the spill. As the fumes became worse, CHEMTREC was notified. Downington Fire Department ordered an evacuation. They were given emergency instructions by CHEMTREC. The mixed acid was sprayed with plenty of water. Because of the fumes, a portion of Downington was evacuated including 600 people. At 6:05 a.m., the fumes seemed to move in a different direction. An additional 1,200 people were evacuated. At approximately 9:15 a.m., fumes had dissipated and the evacuation was lifted.

OBSERVATIONS:

The FRA analysis (C-49-73) noted the following:

The waybill for car GATX 8620 did not have "DANGEROUS" stamped on it and it did not have notation and endorsement as required.

At Norristown, PA Extra P-3A passed a Servor hot box detector which did not detect the overheated journal.

The car was inspected by crew members on the east and west sides with no defective condition of cars noted. Five minutes before the accident, an eastbound freight train passed and gave crewmen of Extra P-3A an okay signal.

RECOMMENDATIONS:

The MTB recommended the use of safety valves instead of a safety vent and that all devices should be enclosed in protective housing on top of the tank.

INCIDENT: PECOS, TX February 20, 1973

SOURCES: FRA #C-52-73
FRA Summary of Accidents Investigated, 1972-73.
FRA Form T #3072 5
MTB HMIR #3030229

EVENTS:

At 3:25 a.m., while Texas and Pacific train #61 was moving west at 61 m.p.h. on a single main line track, 14 cars derailed. The train consisted of four locomotive units and 100 cars including five cars carrying known hazardous materials. Among the derailed cars were one carrying Vinyl chloride and four loaded with Phenol. The car loaded with Vinyl chloride burned. Three cars containing Phenol were damaged and released their contents. Evacuation was ordered. It was dark and partly cloudy.

CAUSE OF ACCIDENT:

According to FRA C-52-73, the derailment was caused by a broken journal on car UTCX 44501. The journal dropped to the track and the opposite wheel on the car derailed.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

After the derailment, an intense fire burned at the dome of overturned car GATX 50555 containing Vinyl chloride. When water was used on the fire, it went out and the safety valve seated. No real loss resulted. Four of the cars carrying Phenol (GATX 24543, UTLX 74740, TSTX 40228 and NATX 23172) also overturned and each released its total contents of 200,000 pounds (MTB).

CASUALTIES:

FRA-Form T listed no casualties. FRA C-52-73 noted that an unknown number of persons were injured by the Phenol during fire-fighting and wreck clean-up operations. MTB indicated that two employees of a trucking company involved in the wreck clearing received chemical burns and one was admitted to hospital.

DAMAGES:

Dollar estimates are:

FRA C-52-73		FRA Form T		MTB	
Equipment	$154,000	Equipment	$139,800	Total	$321,200
Track	7,500	Track, etc.	10,500		
Total	$161,500	Total	$150,300		

NOTIFICATION AND RESPONSE:

The police department ordered a two block evacuation after the derailment. The Pecos Volunteer fire department responded and poured water on the burning car of Vinyl chloride. This cooled the contents enough so that the safety valve seated and the fire went out. Tank cars were hired to remove the remaining Phenol from the cars. Because of the danger of ground water contamination from the Phenol, a levee was formed and a barbed wire fence was erected. Contaminated soil was removed.

OBSERVATIONS:

The FRA analysis (C-52-73) concluded that the loss of Phenol and contamination was aggrevated by the carrier's rush to clear the wreckage. The resulting injuries to carrier and other clean-up crew could have been reduced by more caution.

RECOMMENDATIONS:

None.

INCIDENT: OGLESBY, GA March 5, 1973

SOURCES: FRA #C-60-73
MTB HMIR #3040016-17

EVENTS:

Seventeen cars of Seaboard Coast Line train 2nd 296 derailed as the train was proceeding east at 45 m.p.h. through a 5° curve on a single main line track. The train consisted of four locomotive units and 81 cars. A car loaded with Xylol was ruptured and lost its contents. Two of the five derailed cars containing Caustic soda also released their contents. The accident occurred at 2:27 p.m., on a concrete composite bridge about 1.2 miles east of the town. The weather was clear and the temperature had ranged from 56° to 71°F.

CAUSE OF ACCIDENT:

The FRA report (C-60-73) attributed the derailment to misaligned track in the curve.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

Car NATX 71038 containing 20,102 gallons of Xylol was ruptured and released all of its contents. GATX 97525 lost all of its 10,029 gallon contents. ACGX 14883 lost about 40% of its 10,120 gallon contents. Both of these two cars were carrying Caustic soda (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

The FRA report (C-60-73) listed 12 cars destroyed and five with substatial damage.

Dollar estimates are:

FRA C-60-73		MTB	
Equipment, track	$85,000	Equipment	$32,117
		Contents	12,400
			$44,517

NOTIFICATION AND RESPONSE:

Information was not available.

OBSERVATIONS:

The FRA investigation (C-60-73) indicated that:
The derailment occurred on a concrete composite ballast deck bridge.
The track was misaligned through the area of the 5° curve.
The track was inspected February 28, 1973 and spot tamped February 11, 1973.
Examination of equipment revealed no condition which could have contributed to the derailment.

RECOMMENDATIONS:

None.

INCIDENT: MC NARY, TX April 22, 1973

SOURCES: FRA #C-67-73
MTB HMIR #3050074A
NFPA

EVENTS:

Southern Pacific train #2/41 derailed 45 cars (37th-81st) while travelling east on single main line track at 45 m.p.h. The train consisted of four locomotive units and 104 cars. Six of the derailed cars were loaded with hazardous materials. As the locomotives rounded a 2° curve, 1.1 miles west of McNary, the crew members observed a low spot in the north rail and that the track mis-aligned northward. The engineer initiated a full service application of the train brakes and radioed a warning to other crew members. The train rocked severely as it passed over the insecure track. The train brakes applied in emergency and the derailment occurred. Methyl alcohol, Diesel fuel and Lube oil, leaking from damaged tanks, combined and ignited. The 45th to 80th cars were destroyed by fire. The accident took place at 6:40 p.m., and the weather was clear.

CAUSE OF ACCIDENT:

According to FRA C-67-73 the accident was caused by an unstable subgrade of track structure. The 37th-81st cars derailed.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

The 60th through 63rd cars (SHPX 86027, UTLX 40894, UTLX 48752, SHPX 86047) sustained tank punctures. The Methyl alcohol contents of these four cars leadked and burned. Average content of each car was 190,000 pounds.

The 77the car, RAIX 6223, carrying Carbolic acid, was punctured, spilled its contents and burned.

The 79th car, CELX 2307, contained Vinyl acetate. The car was damaged but there was no loss of lading.

CASUALTIES:

There were no casualties reported.

DAMAGES:

There were 38 train cars destroyed, four train cars sustained major damage and one sustained minor damage. About 2,860 feet of track was demolished.

Dollar estimates of damages:

FRA C-67-73		MTB (cars carrying Methyl alcohol)	
Equipment	$519,000	Cars	$55,000
Track	18,000	Lading	13,200
Total	$537,000	Total	$68,200

NOTIFICATION AND RESPONSE:

Fire fighting and rescue personnel were sent from the El Paso Fire Department. There was no water available for fire fighting. The fire was permitted to burn itself out to minimize ground contamination and remove the danger of flammable materials reigniting during clean-up operations. For a short time, Texas Highway Department stopped cars travelling on Interstate Highway 10, in case the fire should reach the highway.

A large foam dispensing fire truck from Biggs Air Force Base stood by until the fire burned out.

OBSERVATIONS:

FRA C-67-73 noted that:

Recent snows and rains caused the embankment in the accident area to become soft and unstable.

Twenty-seven hours prior to the derailment, a train crewman reported a rough track condition but due to a misunderstanding with the alternate track supervisor about the location of the track, it was not repaired.

RECOMMENDATIONS:

None.

INCIDENT: ROSEVILLE, CA April 28, 1973

SOURCES: FRA #A-18-73
MTB HMIR #3050342
NFPA-ISO Report

EVENTS:

At around 8 a.m., cars loaded with Mark 81 bombs exploded while standing on Southern Pacific receiving track number 7, in the Roseville yard. Heavy damage was caused by the explosions.

On the previous day, these 18 cars along with 3 other carloads of bombs had been moved on train #Extra 9117 West. That train had consisted of seven locomotive units and 110 cars and had moved from Ogden, Utah to Roseville, California. The 21 boxcars of bombs had been added to the train at Sparks, Nevada. Train #9117 arrived at Roseville yard at 6:05 a.m. the morning of the 28th and moved onto track #7. At 7 a.m., three of the 21 cars of bombs were moved to yard track #3. About 7:30 a.m., yard employees saw smoke. At about 8 a.m., a yard inspector heard an explosion which was followed by a bigger explosion. For about 1 1/2 hours after the first explosion, the other 17 cars of bombs exploded intermittently. Bombs contained in burning debris continued exploding until 4:05 p.m. the following day.

CAUSE OF ACCIDENT:

The FRA analysis (A-18-73) indicated two possible conflicting causes of the accident.

The carrier offered the view that the explosions were initiated by a defective bomb. The Navy presented the position that the accident was caused by an outside heat source.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

See cause of accident.

CASUALTIES:

According to FRA A-18-73, 15 railroad employees and 335 area resident were injured. Most of these were minor. MTB listed 52 as injured.

DAMAGES:

Three hundred and thirty-six 250 lb. bombs were destroyed.

About 5,500 buildings in the area were damaged. In addition, 169 freight cars were destroyed and 98 other cars and a locomotive were damaged.

Dollar estimates are:

FRA a-18-73		MTB	
Railroad Total	$3,490,000	Lading	$720,000
Other	23,000,000	Cars	156,195
Total	$26,490,000	Total	$876,195

NOTIFICATION AND RESPONSE:

A yard car inspector heard the first small explosion and saw smoke and flames at the west end of the yard. He advised a lead car inspector by radio to call the fire department. Members of a local town fire department heard the explosion and responded. Various agencies responding to the emergency included the highway patrol, Red Cross, Army, two fire departments, the National Guard and two sheriff departments. About 18,000 people were apparently evacuated because of misinformation about fumes released by the explosions. An emergency central command post was established to care for evacuees, firefighting, etc. NFPA indicates that co-ordination of the firefighting was sometimes lacking due to different jurisidctions and communication problems. SP employees moved the three other cars containing bombs. A computer check was conducted and showed that the only cars containing hazardous materials were in the boxcar of bombs.

The FRA, FBI, U.S. Treasury Dept., Navy and the railroad all conducted investigations and sabotage was ruled out.

OBSERVATIONS:

The FRA report (A-18-73) noted the following:

The train had been visually inspected many times and passed over numerous hot box detectors while traveling from Sparks to Roseville. No indication of fire or overheated components were noted.

All of the wheels on each of the cars carrying the bombs were equipped with spark shields.

A college student who was camping noticed sparks from one of bomb carrying cars and a glowing wheel. It is possible that heavy brake application caused sparks to be directed toward unprotected parts of the boxcar. The ignited wooden floor could then have smouldered for hours.

An unstable bomb could have caused the initial explosion.

RECOMMENDATIONS:

While the evidence was not strong enough to indicate that an unstable bomb caused the explosion, the FRA recommended that the NAVY re-examine its manufacturing and loading procedures.

INCIDENT: BENSON, AZ (TULLY) May 24, 1973

SOURCES: NTSB RAR 75-2
FRA #B-23-73
MTB HMIR #3060437A

EVENTS:

Southern Pacific train 2nd BSM consisting of five locomotive units and 106 cars (7 empty) was traveling at 45 m.p.h. on a single main line track. The train was carrying 12 cars of MK-82 bombs. At 6:43 p.m., an explosion occurred within boxcar MKT 6259 as the train passed the culvert near the west switch of the Dragoon, AZ siding. After the train had actually passed the west switch of the Dragoon siding, the train crew in the caboose noticed smoldering cross-ties and grass fires. This was brought to the attention of the engineer who began braking. Another explosion followed. The conductor, on seeing fire and black smoke above the train, applied the emergency brakes. The locomotive crew saw black smoke, a flash and a ball of fire as the emergency brakes were applied in the caboose. Explosions continued until 1:15 a.m. the following day. The temperature was 87° and there was a southwest 10 m.p.h. wind.

CAUSE OF ACCIDENT:

The cause of the initial explosion, as determined by NTSB was a 25 minute floor fire in the boxcar MK 6259. This fire resulted from sparks from the brakeshoe igniting the Sodium nitrate impregnated wooden floorboards.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

See above accident cause.

CASUALTIES:

NTSB and MTB noted that two of the crew members were injured as a result of jumping from the caboose. The FRA report (B-23-73) did not list any injuries.

DAMAGES:

Train equipment and parts were found up to 3/4 mile away. Bombs were discovered to have been thrown up to 1 mile away. The 12 cars of munitions were completely destroyed. About 500 of the 2600 bombs were undetonated. Twenty-one other cars were damaged. About 460 feet of roadbed were destroyed.

Dollar estimates are:

NTSB		MTB	
RR Equipment	$274,600	Lading Total	$375,840
Track	70,000		
Wreck Clearing	70,000		
Lading	47,000		
Total	$461,600		
Total Estimate	$884,000		

NOTIFICATION AND RESPONSE:

The locomotive crew notified a railroad control point. Benson Police, the county sheriff and the state highway patrol responded and secured area. The nearby Army base sent a demolition team. The Naval Investigative Service and the FBI also conducted investigations.

OBSERVATIONS:

NTSB noted that:

Control of car fires should be considered in regulations governing rail shipment of heat-sensitive hazardous materials.

Regulations do not at present prohibit use of wooden floored boxcars when MK-82 are shipped.

The wooden floor was contaminated with Sodium nitrate and regulations were unclear as to whom was responsible for removal of such potentially hazardous materials.

Because the fire occurred within the boxcar, it was not detected. There are no regulations requiring interior detection devices.

Physical evidence suggests that the lack of spark shields enabled sparks to ignite the flooring.

RECOMMENDATIONS:

NTSB made the following:

The Secretary of Transportation should reassess various current regulations for munitions shipments and develop a coordinated safety compliance program for those shipments.

FRA should develop and require use of fire detection systems by crews on trains carrying Class A bombs.

The FRA did issue an emergency order in August 14, 1973 requiring the use of certain types of brakeshoes, the use of steel sub-flooring or metal spark shields. If these conditions could not be met, then an increased inspection schedule was mandated. On November 27, 1974, FRA amended the Federal Code of Regulations to make the above provisions permanent. In addition, it governed the condition of the boxcar used and mandated the use of roller bearings after December 31, 1975.

INCIDENT: KINGMAN, AZ July 5, 1973

SOURCE: NFPA, "Hazardous Materials Transportation Accidents", pg. 92.

EVENTS:

At 1:30 p.m., two plant employees began transfer operations between a rail tank containing propane and bulk storage tanks. The tank car was located on a Santa Fe railroad siding near Highway 66. About 1:50 p.m., a white stream of propane appeared at the dome of the tank. It ignited and the force threw the employees away from the car. Twenty minutes later, while firefighters attempted to cool the car, it exploded.

CAUSE OF ACCIDENT:

The cause of the initial leak is unknown.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The rail tank car ruptured and exploded. One end of the car travelled 1200 feet. A 200 foot fireball was followed by a mushroom cloud several hundred feet high.

CASUALTIES:

One of the unloading employees died of thermal burns, while the other suffered severe thermal burns. Twelve firemen were killed by the explosion while a thirteenth was in critical condition. Ninety-four other spectators were injured.

DAMAGES:

Unknown.

NOTIFICATION AND RESPONSE:

Volunteer firefighters arrived on the scene about 2:00 p.m. and the decision was made to start cooling the tank with water. While the pump hose was being charged, the tank car ruptured and exploded. All 13 firefighter casualties were within 150 feet of the car. The police had warned spectators standing along the highway to move back. Many of the people ignored the order and were injured by the explosion 1000 feet away.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: FORT WAYNE, IN July 20, 1973

SOURCES: FRA #A-2-74
MTB HMIR #3080153A
NFPA - Fire Report, Newspaper account

EVENTS:

Penn Central train Extra 6077 East derailed 10 cars 3.55 miles west of Fort Wayne while travelling east at 42 m.p.h. on main line double track. The train consisted of three locomotive units and 11 cars. Eight cars carried hazardous materials but only the 100th-103rd loaded with Vinyl chloride were part of the derailment. The 97th and 98th cars separated with no warning, causing the train brakes to be applied in emergency. Fire and explosion of a tank car of Vinyl chloride followed. About 300 people were evacuated. The accident occurred on a clear day at 3:45 p.m.

CAUSE OF ACCIDENT:

The accident was caused by a broken coupler on the east end of the 98th car (MTTX 91856). The coupler dropped to the track structure and derailed the 98th-107th cars when the brake rigging and axle could not pass over the coupler (FRA A-2-74).

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The 102nd car (GATX 55323) was punctured about 4 feet above the center sill causing the release of Vinyl chloride which immediately ignited. As the heat of the fire intensified, the safety valve of the 103rd car (GATX 33465) released, and thereby permitted Vinyl chloride to escape. This provided more fuel for the fire. This type of reaction continued for several hours. Finally at 7:22 p.m., the 103rd car exploded. The quantity of material released could not be determined from the available reports.

CASUALTIES:

There were no casualties reported.

DAMAGES:

There were three train cars destroyed, six sustained substantial damage and one had minor damage. Signal equipment and track were damaged. A two story dwelling was destroyed by fire after being hit with burning debris from the exploding tank car.

Dollar estimates are:

FRA A-2-74		MTB	
Cars	$93,100	Total	$86,000
Signals	4,520		
Track	2,164		
Total	$99,784		

NOTIFICATION AND RESPONSE:

Wayne and Washington Township Volunteer firemen, local and state police, local Civil Defense Personnel from the Indiana State Fire Marshall's Department arrived at the scene shortly after the accident. They recognized the imminent danger of explosion and ordered an evacuation at 4:00 p.m. At 4:25 p.m., the evacuation was extended and at 4:50 p.m. it was extended further. About 3000 people were evacuated from their homes and businesses. At about 8:00 a.m. the next morning, the evacuation was rescinded for all but about 300 people.

OBSERVATIONS:

FRA A-2-74 indicated that:

At the time of the accident, Extra 6077 East was being operated in accordance with rules and regulations of the carrier.

The broken coupler which caused the derailment failed under normal stress load because of (1) its worn condition, (2) an old break and (3) fatigue cracking.

The prompt evacuation prevented the possibility of casualties.

RECOMMENDATIONS:

None.

INCIDENT: MARKED TREE, AR October 10, 1973

SOURCES: FRA #B-4-74
MTB HMIR #4070399

EVENTS:

St. Louis-San Francisco train #235 consisted of four locomotives and 80 cars, including four cars known to be carrying hazardous materials. Three of these cars carried LPG and the fourth carried Naphtha. At 9:15 a.m., 36 cars (20th-55th) of the train, including the latter four derailed while the train was moving north at 50 m.p.h. on single main line track. A tank car containing LPG landed on its side, was punctured and ignited. About 1000 residents were evacuated. It was a clear day.

CAUSE OF ACCIDENT:

The FRA investigation report (B-4-74) stated that an overheated journal on flat car SLSF 104043 failed and caused the derailment.

The train had passed a hot box detector 20 miles before entering Marked Tree. No indication of a problem was signaled by the detector.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Car ACSK 933009 was punctured as a result of the derailment and landed on its side. All of its 32,000 gallon contents of LPG burned. Cars LEYX 500 and GATX 55433 both containing LPG and APOX 8378 containing Naphtha were damaged but did not release their contents (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

Twenty of the derailed cars were destroyed and 16 heavily damaged.

Dollar estimates are:

FRA B-4-74		MTB	
Total	$247,300	Total	$349,300

NOTIFICATION AND RESPONSE:

Nearby fire department and state police responded. The business district and residential area within 1/2 mile radius were evacuated. The fire was allowed to burn itself out (7 a.m. the next day).

OBSERVATIONS:

FRA analysis (B-4-74) stated "that prompt action by railroad, state, and city employees probably averted more serious post-derailment incidents". The overheated journal on the flat car was not detected by the hot box detector.

RECOMMENDATIONS:

None.

INCIDENT: WADSTROM, CA (VENTURA JCT.) November 6, 1973

SOURCES: FRA #A-9-74
FRA Form T #0366 4
FRA Casualty Summary
MTB HMIR #3110281A
NFPA - Ventura County Fire Protection District Report
NFPA - "Hazardous Materials Transportation Accidents," p. 86

EVENTS:

At 3:10 p.m., Southern Pacific train #Extra 2548 consisting of one locomotive unit and two cars were involved in a collision with five tank cars loaded with LPG. The train was moving at 10 m.p.h. eastward toward Wadstrom on the single track of the Ventura branch line when the crew observed the five car cut heading toward them at about 50 m.p.h. The engineer applied the brakes and stopped the train before the collision. All four crew member then junped from the engine cab. A tank car of LPG was punctured and escaping LPG formed a tremendous vapor cloud. It did not ignite even though it was subjected to several ignition sources. The accident occurred at 3:15 a.m. on a clear day.

CAUSE OF ACCIDENT:

According to all sources, the accident was caused by trespassers releasing the hand brakes of standing tank cars. This resulted in the cars moving onto the branch track and striking the oncoming train. At 1:30 p.m., five juveniles were observed near the 13 cars. Two of the juveniles released the hand brake on the west car and the cars began to roll. The cars apparently were not coupled since the three west cars moved out of the siding first, followed by two more about 100 feet behind. The five cars coupled and continued rolling westward toward Wadstrom. The five cars were part of a 13 car (all loaded with LPG) cut which was being stored on the run-around track at Conet. The eight remaining cars also started to move but were brought to a stop with the handbrakes by a local school employee.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The lead car of the five car cut (GATX 91432) containing LPG was punctured in the west end by the drawbar of the locomotive of Extra 2548 east. The car spilled its contents (29,754 gallons) of LPG onto the track structure (MTB). There was no fire or explosion. This was the only car that spilled hazardous material.

CASUALTIES:

All four train crew members jumped from the train into the ravine before the collision. The two brakemen were able to escape from the ravine before the collision occurred. However, the engineer and conductor were trapped in it until rescued by

CASUALTIES (con.):

emergency personnel. The FRA Casualty Summary listed the conductor killed and the engineer's subsequent death as a result of burns. FRA Form T listed one trainman killed and two injured. The other FRA report (A-9-74) and NFPA noted that the conductor died 8 hours after the accident and the engineer died 2 days later. Both of the fatalities were attributed to extreme external burns and internal lung damage from exposure to the LPG.

DAMAGES:

Two cars sustained substantial damage and one car sustained minor damage.

Dollar estimates are:

FRA A-9-74		MTB	
Locomotive	$ 6,800	Lading	$ 7,000
Car damage	12,650	Car damage	9,500
Track	800	Total	$16,500
Total	$20,250		

FRA Form T	
Equipment	$19,450
Track, etc.	800
Total	$20,250

NOTIFICATION AND RESPONSE:

Eight fire engines and 38 firemen from Ventura County and Ventura City responded immediately. They sprayed the tank cars with water. They rescued the engineer and the conductor who were trapped in the ravine but they both died shortly after.

OBSERVATIONS:

FRA analysis (A-9-74) noted that:

The five boys who took part in the release of the cars were apprehended. Involuntary manslaughter charges were filed against the two boys who released the brakes.

The juveniles involved testified that only one hand brake had been released on the 13 cars but the evidence indicated that the brakes on more than one car had been released.

There is always a threat of tampering by juveniles to cars stored in close proximity to schools.

The accident could have been avoided if the carrier had conformed to their operating rules and installed a derail on track leased for car storage.

Hand brakes were the only methods used to secure stored cars.

All the tank cars involved had deflector shields on the front except the lead car which was punctured (NFPA p. 86).

RECOMMENDATIONS:

On November 7, 1973, the railroad installed a split point derail on the branch track.

INCIDENT: E. ST. LOUIS, IL January 22, 1972

SOURCES: NTSB RAR 73-1
FRA Form T #0410 4
FRA Casualty Summary
NFPA File: Newspaper Accounts
MTB HMIR #2070201A

EVENTS:

During switching operations at 6:30 a.m. of a 35 car cut in the Alton and Southern RR Gateway yard, an overspeed collision between a three car unit of LPG tank cars and an empty standing hopper car occurred. A punctured tank car released LPG vapor. The overspeed and collision of the cars, and vapor cloud formation was observed in the tower and yard employees were warned. The vapor cloud ignited, resulting in two explosions. More than 100 families evacuated homes due to structural damage.

CAUSE OF ACCIDENT:

NTSB stated that the collision occurred when a three car unit of LPG tank cars was humped from receiving track #2 and travelled at faster than programmed speed (15 m.p.h.) to track #15. The cause of the collision was the excessive speed of the three car unit of LPG tank cars. It was determined that excessive grease on the wheels of those cars prevented the retarder system from slowing the cars sufficiently.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The head tank car, containing LPG, of the three car unit struck an empty standing hopper car and was punctured by its coupler. The tank car spilled LPG and a vapor cloud formed. A fourth car of LPG was humped and coupled onto the other tank cars without damage. The four tank cars and hopper continued rolling down track #15 and hit other cars standing on that track. The puncture of the tank car was enlarged and LPG began escaping at a greater rate. The escaping vapor cloud ignited. Of the 30,000 capacity, 28,289 gallons were released (MTB).

CASUALTIES:

NTSB listed 230 people including 19 train crew as injured. Of these totals, 19 were hospitalized, including three train crew. Both FRA Form T and FRA Casualty Summary listed one trainman and three other RR employees as injured.

DAMAGES:

Dollars estimates are:

NTSB		FRA Form T	
Freight Cars	$654,000	Equipment	$675,000
Lading	442,000	Track, etc.	10,000
Buildings	50,000	Total	$685,000
Wrecking Cost	18,000		
Track	10,000	MTB	
Total	$1,174,000	Total	$685,000

NOTIFICATION AND RESPONSE:

The railroad notified E. St. Louis police, fire, and civil defense departments and requested them to secure yard. Employees of the Monsanto Chemical Co. assisted in identifying the threat posed by hazardous materials present. On January 12, the railroad had circulated to employees, "Emergency Handling of Hazardous Materials in Railroad Cars" which outlined the various responsibilities of the railroad employees. The employees appear to have complied with the applicable sections in dealing with the explosion.

OBSERVATIONS:

NTSB indicated the following:

Classification of LPG should not have been limited to "flammable compressed gas" but should include "explosive".

Discrepancies in reporting of injuries by the railroad to FRA and MTB were noted.

Reporting procedures should be reexamined to insure accuracy.

Co-ordination of emergency response was exceptional, although a careful safety assessment of potentially hazardous materials was not performed before emergency crews entered the area.

Grease on the wheels of the tank cars reduced the effectiveness of the retarding system and allowed cars to travel at excessive, unsafe speeds.

Although previous cars left the retarder at excessive speeds, cars continued to be humped in violation of A&S procedures. Minor accidents are routinely tolerated in switching operations and increase the probability of another such accident.

The need exists to reclassify hazardous materials to more accurately identify the different types of potential threat present.

RECOMMENDATIONS:

NTSB recommended that:

The railroad review the yard to eliminate overspeed crash conditions.

FRA require large shipments of hazardous materials to be handled as "explosives".

FRA should develop requirements for collecting, documenting, and analyzing of how hazardous materials produce injuries and damages in RR accidents and review and revise reporting requirements to promote better accuracy of casualty reporting.

INCIDENT: UNION, IL March 16, 1972

SOURCES: FRA #C-63-72
MTB HMIR #2030282

EVENTS:

Illinois Terminal train X2305 consisted of three locomotive units and 61 cars. At 10:00 a.m., 12 cars derailed while the train was moving north on single main line track. The only known car carrying hazardous material, Petroleum Naphtha, was among the cars derailed. It leaked its contents into a nearby stream. No fire resulted.

CAUSE OF ACCIDENT:

FRA C-63-72 indicated that the carrier determined the cause of the derailment as a broken rail.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

UTLX 25992 carrying Petroleum Naptha was punctured in the derailment and lost all of its 10,078 gallon contents. The Petroleum Naphtha leaked into a drainage ditch underneath a railroad bridge (MTB).

CASUALTIES:

There were no casualties reported.

DAMAGES:

The railroad bridge was destroyed. Five cars were destroyed, six heavily damaged and one slightly damaged.

Dollar estimates are:

FRA C-63-72		MTB	
Equipment	$71,800	Total	$130,000
Lading	16,877		
Track, bridge	2,000		
Total	$90,677		

NOTIFICATION AND RESPONSE:

See "Observations."

OBSERVATIONS:

The FRA analysis (C-63-72) noted that the carrier had been advised by the shipper that the Naphtha was not a dangerous commodity since it had a flashpoint of 250°. That report also noted the waybill indicated "flammable" and investigation showed the Naphtha had a flash-point of 56°F.

OBSERVATIONS (con.):

Although this mishandling and misinformation did not have any effect in this accident, FRA noted that "improper communications between the shipper and carrier could lead to grave circumstances in a future accident".

RECOMMENDATIONS:

None.

INCIDENT: DALLAS, TX June 1, 1972

SOURCES: FRA Summary of Accidents Investigated 1971-72
MTB HMIR #2070061
NFPA Fire Report

EVENTS:

At 11:55 p.m., during switching operations, five cars of Texas and Pacific train derailed in the yard. The speed of the train was 12-14 m.p.h. A tank car of Ethylene was damaged and its leaking vapor was ignited. About 325 people were evacuated. It was a clear day.

CAUSE OF ACCIDENT:

According to the FRA Summary, the derailment was "apparently due to a combination of worn flange, worn facing point switch rail and latitudinal forces exerted by the sloshing of contents of a long tank car."

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Two cars containing Ethylene overturned. The valve on one (DOT 113A) car was sheared off, allowing leakage of 35,000 gallons of vapor. It ignited and the car exploded and burned.

CASUALTIES:

The FRA Summary indicated 52 people were injured. MTB listed 25 injured. NFPA listed burns to two firemen.

DAMAGES:

Dollar estimates are:

FRA Summary

Equipment	$53,640	Total	$315,000

NFPA

Property damage	$74,000

NOTIFICATION AND RESPONSE:

About 325 people were evacuated from the area for 3 days.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: HUBEN, MO August 13, 1972

SOURCES: FRA #B-1-73
FRA Summary of Accidents Investigated, 1972-73
MTB HMIR #2080410A

EVENTS:

At 7:20 p.m., St. Louis-San Francisco train Extra 62 derailed 43 cars (23rd-65th) while travelling east at 49 m.p.h. The train consisted of 8 locomotive units and 98 cars. Three of the derailed cars carried hazardous materials. Separation occurred between all the derailed cars. The cars jackknifed, overturned and stopped in positions on or near the track. Fire ensued, (conflicting data within the FRA report and the MTB report as to whether there were 42 or 43 cars derailed and whether car SLSF 64018 was the 23rd or 24th car in the train).

CAUSE OF ACCIDENT:

The accident was caused by a failed journal (overheating) on the lead wheels on the lead truck of car SLSF 64018 (23rd or 24th car (FRA B-1-73).

CAUSE OF HAZARDOUS MATERIALS RELEASE:

The 28th car, UCLX 5009 was loaded with liquid Chlorine. This car overturned and sustained a slight leak at one of the dome valves. The leak was capped a few hours after the accident by the shipper.

The 50th and 51st cars, FMLX 19013 and FMLX 19007, loaded with White Phosphorous solution overturned and caught fire. Specific quantities of hazardous materials could not be determined from available reports.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Twenty-seven cars were totally destroyed by fire (FRA B-1-73).

The FRA Accident Summary estimated $326,550 damage to RR equipment.

The MTB estimated the damage to each of the two cars containing White Phosphorous solution to be $35,000 for a total of $170,000.

NOTIFICATION AND RESPONSE:

Three local Volunteer fire departments responded to the emergency. They were unable to control the fire associated with the White Phosphorous but were able to stop it from spreading.

NOTIFICATION AND RESPONSE: (con.)

The area was sparsely populated but three families were evacuated from their homes for a few hours until the car loaded with liquid Chlorine was removed from the area of the fire.

OBSERVATIONS:

FRA B-1-73 noted that:

Car FMLX 19013, carrying White Phosphorous solution had stenciling on it "not for flammable Liquids."

All cars were equipped with E couplers except the 36th head car which was equipped with F couplers.

RECOMMENDATIONS:

None.

INCIDENT: MELVERN, KS December 28, 1972

SOURCES: FRA Summary of Accidents Investigated, 1972-73
MTB HMIR #3010083-92

EVENTS:

At 3:25 a.m., 29 cars of an Atchison, Topeka and Santa Fe train moving on double track derailed. Ten cars carrying hazardous materials were among the derailed cars and were damaged. The contents of the cars were released and fire resulted.

CAUSE OF ACCIDENT:

The FRA Summary attributed the derailment to a low track joint.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

The 10 derailed cars of hazardous materials consisted of seven cars of Naphtha solvent, two cars of Carbolic acid (Phenol) and one of LPG. All these cars overturned and as a result of punctures and/or loosened fittings, their contents were released and ignited. The fires spread to the other derailed cars. The MTB report available listed the loss of 17,430 pounds of Phenol from NATX 22926.

CASUALTIES:

There were no casualties reported.

DAMAGES:

Dollar estimates are:

FRA Summary		MTB	
Equipment	$317,450	Total	$140,500

NOTIFICATION AND RESPONSE:

Information was not available.

OBSERVATIONS:

None.

RECOMMENDATIONS:

None.

INCIDENT: CALLAO, MO (New Cambria) January 8, 1971

SOURCES: FRA Summary of Accidents
Investigated 1970-71
MTB HMIR #1000021
NFPA Fire Report, News accounts
RPI-AAR RA 01-2-7

EVENTS:

A Burlington Northern train consisting of one locomotive unit and 21 cars was moving at 50 m.p.h. on single track. At 6:40 a.m., the rear 14 (FRA-17) cars of the train derailed after the head end of the train had passed over a railroad bridge. Five cars of anhydrous Ammonia and an empty LPG car were among the derailed cars. A tank car containing anhydrous Ammonia blew up and landed 600 feet from the track. It and another car of Ammonia leaked contents into the Chariton River. Twenty families were evacuated. It was a dry, clear day.

CAUSE OF ACCIDENT:

MTB indicated that the 3rd car on the train had a loose wheel. The derailment occurred when this car struck the bridge. The FRA Summary listed the cause as a broken truck sideframe.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The FRA Summary indicated that part of the empty LPG car sheared off and a small fire of its residue resulted. Two cars of anhydrous Ammonia ruptured. MTB stated that "something struck GATX 94451 causing it to explode." GATX 94444 was also damaged but its punctured end was out of the river. Both cars leaked Ammonia. The available MTB report indicated that one car, GATX 94451 lost 30,000 gallons of its contents.

CASUALTIES:

No casualties were reported.

DAMAGES:

The railroad bridge was completely destroyed. Ammonia leaked into the river and contaminated it. The railroad and State Wildlife division tested it and declared it safe for animals and towns down river. FRA estimated the damage to equipment at $286,000 while MTB estimated damage at $500,000.

NOTIFICATION AND RESPONSE:

Twenty families were evacuated.

OBSERVATIONS AND RECOMMENDATIONS:

None.

INCIDENT: HOUSTON, TX October 19, 1971

SOURCES: NTSB RAR 72-6
FRA Form T #0348 11
NFPA Fire Report
RPI-AAR RA 01-3-9

EVENTS:

At 1:45 p.m., 20 cars of Missouri Pacific train #94 derailed while moving through a track work area just after passing the south switch of the Mykawa siding. The train consisting of four locomotive units and 82 cars (19 empty) was travelling north at 40 m.p.h. on a single Atchison, Topeka and Santa Fe track. There were 29 cars of hazardous materials carried on the train. Of those the following cars were derailed: one of Caustic soda, six of Vinyl chloride, one of Butadiene, three of Fuel oil, one of Acetone, and one of Formaldehyde. Fire and explosions resulted. The temperature was 83°.

CAUSE OF ACCIDENT:

NTSB determined that the cause of the derailment was an unexplained emergency brake application which resulted in an overturned rail. Different possible causes considered were dragging equipment, a broken rail, a loose wheel, "rock and roll" phenomena or excessive speed. The condition of the track in the work area as a factor was also considered but the more probable cause was thought to be among those first mentioned above.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

As a result of the derailment, two cars of Vinyl chloride, ESMX 4804 and ESMX 4803, were punctured and their contents immediately ignited and burned. At 2:30 p.m., these two cars ruptured and one rocketed 600 feet. A fire started at the top of car TSVX 2010, which contained Acetone and which was damaged by a flying piece of the other tank car.

CASUALTIES:

NTSB indicated that one fireman was killed. Sixty people were injured, 20 seriously enough to be hosptialized. Thirty-nine fire fighters, eight newsmen and photographers and three spectators were injured. FRA listed no casualties.

DAMAGES:

NTSB described two freight cars as destroyed; 14 as damaged extensively and six as lightly damaged. About 600 feet of main track, 500 feet of the siding and 400 feet of team track were demolished and a side track turn out was destroyed. A residence, fire truck, automobile and RR motor truck were destroyed.

DAMAGES (con.)

Dollar estimates are:

FRA Form T

Equipment	$259,150
Track, etc.	15,300
Total	$274,450

NOTIFICATION AND RESPONSE:

Local residents reported the fire to the Houston fire department. Although RR personnel also notified the fire department, they did not identify the contents of the tank cars. The fire department did not learn what the exact kind of material burning was until hours after the derailment. The fire department, in attempting to contain the fire, recognized the possible danger of flying tank car fragments in the event of an explosion, but the thermal (burn) threat of a fire ball resulting from such an explosion was not considered. One fireman was killed and several other firefighters and photographers were injured as a result of the explosion.

OBSERVATIONS:

NTSB indicated the following:

The stability of the track had been affected by installation of new ties.

The speed of the train was within speed limits but contributed to the seriousness of the accident.

Although the cause of the emergency brake application was unknown, it occurred before the derailed cars passed over the track work area. The placement of empty and loaded cars within the train contributed to excessive impact and contributed to development of high lateral forces on the rail.

Inadequate information was available both from the railroad crew and placarding of the tank cars concerning the hazardous materials.

RECOMMENDATIONS:

NTSB recommended the following:

The Missouri Pacific and Sante Fe should initiate crew training programs on proper procedures to follow in accident situations.

Criteria be established for hazardous materials. The National Fire Protection Association develop recommended practices for the use by fire fighters in combating hazardous materials accidents.

Repeated recommendations offered after two earlier accidents, were the development of plans enabling local fire chiefs to know the location and characteristics of hazardous materials carried on trains; and further research and development into braking systems and dynamics.

INCIDENT: CRESCENT CITY, IL June 21, 1970

SOURCES: NTSB RAR 72-2
FRA Form T # 0375 4
FRA Casualty Summary
RPI-AAR RA-01-1-1

EVENTS:

Toledo, Peoria & Western Company train #20 was moving east at 45 m.p.h. on single track through the town. At 6:20 a.m., 15 cars of its 4 locomotive unit, 109 car consist, derailed at the west switch of a siding. Twelve cars of LPG were involved in the derailment. a series of fires and explosions resulted and townspeople were evacuated.

CAUSE OF ACCIDENT:

NTSB concluded that the cause of the initial derailment was the excessive overheating and breaking of a journal on the 20th car of the train, CBQ boxcar #182544. The truck side of the journal dropped to the track and derailed the leading wheels of the car.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

One tank car of LPG was immediately punctured by the coupler of another and the contents ignited forming a huge fire ball. Fire fighters arrived on the scene and appeared to have the fire under control until the safety value of another car vented, releasing LPG and more fire resulted. At 7:10 a.m., the initial burning car ruptured and sections of the tank were hurled 600 to 750 feet away. At 9:40, 10:20, and 10:55 a.m., other tank cars ruptured as a result of heat impingement and some tank sections were driven between 600 and 1200 feet away. The last two cars burned for two days. A total of 9 nine cars ruptured or burned.

CASUALTIES:

NTSB stated that 66 were injured and 11 were admitted to the hosptial. One train employee suffered minor injuries. FRA Form T listed one train crewman as injured and FRA Casualty Summary listed burns to one trainman.

DAMAGES:

NTSB stated that seven tank cars and six other cars were destroyed. Two tank cars were damaged.

Dollar estimates are:

NTSB		FRA Form T	
RR	$ 345,000	Equipment	$250,000
Property	1,700,000	Track, etc.	7,075
Total	$2,045,000	Total	$257,075

NOTIFICATION AND RESPONSE:

A motorist at a crossing initially noticed fire and smoke under one of the freight cars of the train but could not get train crew to notice him. The noise and fire of the derailment alerted the townspeople and the volunteer fire fighters of hazard and initiated evacuation of the town. After firefighters and a photographer were injured by the 9:40 ruptures, attempts to further fight the fires were abandoned. Because a wooden power pole was broken by the derailing cars and wires were exposed to fire, a power company employee deenergized the town's main power supply to protect fire fighters. As a result of this, a major supply of water from town pumps was eliminated. The last two cars of LPG were allowed to burn themselves out on the advice of a Bureau of Explosives agent.

OBSERVATIONS:

NTSB noted that:

The successive coupling of 12 tank cars together increased the severity of fire.

Information about the tank car contents was not readily available to fire fighters.

No central command of fire departments resulted in some confusion.

Lack of adequate training for fire fighters in dealing with this kind of accident existed.

No sufficient alternate water supply was available.

RECOMMENDATIONS:

NTSB made the following:

FRA and AAR should encourage testing of tank car insulating materials and require the use of such a material on all cars carrying flammable liquids.

FRA should publish current study of overheating journals and continue study for use in promulgating new regulations.

Training methods for local fire departments should be improved. Local fire chiefs should know locations and characteristics of hazardous materials carried on trains through their community.

INCIDENT: SOUND VIEW, CT October 8, 1970

SOURCE: NTSB RAR 72-1

EVENTS:

At 8:50 p.m., 8 cars of Penn Central freight train, Advanced CB-1, moving westbound, derailed on the main line track and blocked the opposing track. Included in the consist of two locomotive units and 51 cars was a tank listed as empty, yet still contained 1,150 gallons of LPG (capacity 33,000 gallons)

A collision occurred between this train and Penn Central passenger train #174, as the passenger train consisting of a locomotive, baggage car and six passenger cars approached eastward on the other main track at 60 m.p.h. The entire passenger train derailed and passed through a cloud of LPG gas which ignited after the tank car was punctured by the passenger train locomotive. It was a clear dark night with a temperature of 51°-71°F.

CAUSE OF ACCIDENT:

NTSB determined that the cause of the initial freight train derailment was a fractured truck side frame on an ATSF #19334 boxcar. The truck frame dropped down, struck the frog of a siding and spread the switch point and the rail, causing the derailment. The failure of this truck probably resulted from the incorrect use of a truck spring package intended for 40 ton loads. The boxcar was carrying 50 tons.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

The tank car, NATX 34473, was punctured by the collision with the passenger train locomotive. The resulting vapor cloud of LPG escaped and was ignited. The fire burned for 2 1/2 hours.

CASUALTIES:

The conductor and flagman of CB-1 and the engineer, fireman and car attendant of #174 were injured. Two passengers of #174 were also injured.

DAMAGES:

Four of the eight derailed cars of CB-1 were destroyed and the other four were damaged. The passenger train locomotive was also destroyed. 1500 feet of track was damaged as well as a hand operated switch, track guard rails and bridge timbers.

NOTIFICATION AND RESPONSE:

Witnesses contacted local police and other emergency units. Six fire departments including Sound View responded. An initial decision by the fire chief to let the fire burn itself out was reversed and the car was later purged with water.

OBSERVATIONS:

NTSB noted that:

The truck spring package on the ATSF boxcar was unable to stand the strain of the load.

Industry regulations to prevent the use of incorrect components are not adequate.

Re-classification of "empty" tank cars should be considered.

Joint usage of railroad right-of-way by passenger trains and trains carrying hazardous materials poses a hazard unless possible interference is prevented.

RECOMMENDATIONS:

NTSB listed the following:

FRA promulgate regulations insuring retirement of critical car components and preventing the misapplication of such components.

Develop criteria to determine the useful safe life of car components.

Studies should be initiated to identify hazards involved in the joint use of tracks by passenger trains and freight trains carrying hazardous materials.

A new definition of "empty" regarding tank cars should be developed.

INCIDENT: LAUREL, MS. January 25, 1969

SOURCES: NTSB RAR
FRA Form T #024526
FRA Casualty Summary
RPI-AAR RA 01-2-7

EVENTS:

Southern Railway train was moving northward through the town at 30 m.p.h. on single main line track. The train's emergency brakes applied after the 62nd car of the train had passed over the Gulf Mobile & Ohio crossing diamond. Fifteen cars of propane derailed. The train consisted of four locomotives and 140 cars (37 empty). Hazardous materials carried on the train included 28 cars of LPG, and one car each of Ammonium nitrate, anhydrous Ammonia, Hydrocyanic acid, Isopropanol and Benzol benzene. Explosions and fires resulted from the derailment. About 100 people were evacuated. The time of the accident was 4:15 a.m. and the temperature was 35°F. It was a clear morning with a brisk northwest wind.

CAUSE OF ACCIDENT:

The cause of the derailment was attributed by NTSB to a broken wheel on the west side of the lead truck of the 62nd car. This car travelled another 300 feet before it damaged a switch which caused 14 cars to derail. The broken wheel had substantial hollow tread wear. This caused sudden lateral loading on the wheel as it passed over the GM&O crossing and resulted in its failure. Rough machining of the wheel plate contributed to the lower impact resistance of the wheel at the 35° air temperature.

CAUSE OF HAZARDOUS MATERIALS RELEASE:

Fourteen of the 15 derailed cars of LPG released their contents. The head of ACSX 932003 and shell of POTX 109 were punctured in the derailment. A fire resulted. Twelve other cars of LPG were exposed to the heat from these cars. Violent ruptures of these cars started 6-20 minutes after the derailment and continued until 45 minutes later. Several large sections of tank cars rocketed up to 1600 feet away. Two of the tank cars, ACSX 732003 and ACSX 432178 were later vented by explosive charges.

CASUALTIES:

NTSB indicated that one person died 7 days after the accident while another died a month later, both as a result of injuries. Thirty nine other people were hospitalized and 17 still remained in the hospital one month later. FRA Form T and Casualty Summary reports both listed burn injuries to one trainman.

DAMAGES:

NTSB indicated that 54 residences were destroyed and over 1,350 residences damaged. Two businesses were destroyed and four others were heavily damaged. A number of automobiles were destroyed. The explosions caused many fires. Fire damage resulted from the explosions and rocketing of tank car pieces.

Dollar estimates are:

NTSB		FRA Form T
Equipment	$334,675	None
Lading	45,000	
Total	$379,675	
Overall Total	$3 million	

NOTIFICATION AND RESPONSE:

The tower operator saw sparks as the train passed over the crossing. He was not able to contact the train crew by radio. After the train brakes applied in emergency, the fireman looked back to check for the reason and the condition of the train. On seeing fire, he notified the Hattiesburg dispatcher by radio. The conductor in the caboose saw the fire ahead and tried to call the Hattiesburg dispatcher. He was unable to do so because of radio failure. The train crew then warned nearby residents of the danger. The conductor was also concerned about the car containing Hydrocyanic acid. This car was the 27th car in the train. It was among the head 61 undamaged cars that were moved away from the derailed cars. The rear 64 cars were also pulled back to a side track.

The Laurel Fire Department and four other neighboring departments concentrated on fighting the residential fires caused by the escaping Propane and rocketing tank car pieces.

The chief of police issued orders to evacuate as much of the area as possible. The National Guard was activated and two county Sheriff departments and the Highway Patrol also assisted in the evacuation. The Salvation Army, Red Cross and Civil Defense personnel were active in meeting the needs of the displaced people. A local radio station began emergency broadcasting and provided general information and aided in directing persons to shelters etc. Telephones and electricity in part of the town were affected by the accident. The state governor and the president of the Southern Railway also visited the site.

After the initial explosions, two tank cars containing Propane were still relatively intact and burning. A decision was made by railroad officials to vent these two cars with explosive charges the next morning. After this was done, the fire quickly burned out.

OBSERVATIONS:

The NTSB indicated that:

Although various safety controls existed, they did not function effectively in this accident. Many of these controls were in the form of "voluntary specifications, voluntary communication between agencies and implementation by economic self-interest of an informed purchaser." Safety controls involving wheel finish, wheel tread and cross-level of track were inadequate in engineering specificity and the latter two were unenforceable within the pattern of industry self-regulation.

Although a tread worn hollow condition had existed in the fractured wheel, the AAR had no standards which required its condemnation. Its standards were based on measurement of flange height.

The surface finish of the wheel plate was roughly machined. The rough finish contributed to the impact fracture at the 35° air temperature. There are no objective specific AAR standards to inspect and judge wheel finishes. Although the AAR knew that wheels were produced by Armco's Butler plant which did not comply with finish specifications, these wheels continued to be sold to member railroads.

A slight out-of-level condition existed at the GM&O crossing. Such a condition was not included in the self-regulatory recommendations of the American Railway Engineering Association.

Virtually all regulations concerning tank cars have originated in the AAR Committee on Tank Cars and been adopted, without change, as Federal regulations. These included the abandonment of heat insulation and continuous center sills. Federal responsibility should include determination of possible dangerous side effects of such proposals regardless of the supposed competency of the source.

The use of interlocking couplers on the tank cars would have decreased the probability of puncture damage.

The investigation was not able to determine the exact cause of all the tank car ruptures. Mechanical damage and heat impingement were major factors.

The safety valves on the tank cars did not have sufficient venting capacity for pressure relief under the conditions of the accident.

There was no previous effective communication between the local fire department and the railroad concerning hazardous materials emergencies.

The exact speed of the train was not known due to the absence of a speed recorder.

RECOMMENDATIONS:

NTSB included the following:

The FRA should impose the regulation requiring speed recorders.

The American Railway Engineering Association should revise track and track maintenance standards to provide objective measurement of track conditions and criteria for correction.

Local fire departments should have access to training enabling them to handle hazardous material emergencies more effectively. Local fire departments should also be provided with information that describes the location and characteristics of hazardous materials involved in accidents in their communities.

Railroad employees who inspect passing trains for defects should have a means of rapid communication with train crews.

The AAR should conduct studies of stress limits of hollow worn treads and surface finishes for wheels. It should also give notice to wheel purchasers when manufacturing inadequacies are found.

AAR should review the performance of the Bureau of Explosives in protecting the public from hazardous materials accident damage and develop a cooperative plan with carriers to accomplish the responsibility delegated by CFR 49 174.506. NTSB endorses an FRA amendment requiring that reports of accidents made to the Bureau of Explosives will also be filed with the FRA.

The FRA should sponsor research to improve the design of couplers.

Government and Industry should sponsor a cooperative effort to improve the rail transportation of hazardous materials.

This accident was the third Southern wreck since January 12 involving LP gas. Southern has now issued speed restrictions for trains carrying LP gas to 45 m.p.h. in open country and 15 m.p.h. through heavily populated areas.

INCIDENT: CRETE,NE February 18, 1969

SOURCES: NTSB RAR 71-2
FRA Form T #0306 18

EVENTS:

Chicago, Burlington and Quincy train #64, consisting of three locomotive units and 95 cars, were extering the town at 52 m.p.h. on the single main line track. Eleven boxcars were standing on a sliding south of the main track. Train #824 with one locomotive and 49 cars was standing on a track north of the main one and contained three tank cars of anhydrous Ammonia. The temperature was 4°F. A temperature inversion was present, as was ground fog. At about 6:30 a.m., as #64 passed the turnout leading to the Old Wymore main siding, the spread closure allowed the wheels of the 28th car to derail. The wheels struck and broke the guard rail, then derailed and the car and train continued. The 72nd car derailed at the frog towards the side where the broken guard rail was and a total of 19 cars of this train derailed. A collision occurred between cars on trains #64 and #824 and caused a tank car containing anhydrous Ammonia to release its contents. Between 1200 and 3000 people in the area were evacuated.

CAUSE OF ACCIDENT:

NTSB attributed the cause of the derailment to movement of rail at the turnout due to lateral forces of the locomotive caused by surface deficiencies of track. The track was not maintained for 50 m.p.h. operation according to standards and irregularities contributed to the increase of lateral forces.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

Some of the derailing cars on train #64 struck and caused the derailing and overturning of two cars of Anhydrous Ammonia and the shattering of a third car carrying anhydrous Ammonia on train #864. This third car of Ammonia, GATX 18120 (DOT 112A) shattered completely after being struck by the cars of the other train. According to NTSB, the shattering of this car resulted from the brittleness of the metal at a very cold temperature, 4°F.

CASUALTIES:

NTSB stated six townspeople died as a result of breathing anhydrous Ammonia gas. Fifty six others were injured by breathing the fumes, 28 seriously. Three transients who were riding in the train (boxcar?) were killed in the collision of the cars. FRA Form T listed three trespasser deaths, five others killed. It also listed two trainmen and 155 others as injured.

DAMAGES:

NTSB stated 22 RR cars were destroyed or extensively damaged and nine cars were damaged moderately.

Dollar estimates are:

FRA Form T

Equipment	$204,500.
Track, etc.	10,000.
Total	$214,500.

NOTIFICATION AND RESPONSE:

Many townspeople called an emergency telephone number to report the accident. Police and fire department officials were notified and sealed off area. Between 200-300 people were evacuated. The local hospital had an emergency plan and were successful in treating most of the victims. A National Guard Unit patrolled area.

OBSERVATIONS:

NTSB stated the following.

Track was not maintained to AAR standards of freight train operation at 50 m.p.h.

The original fracture of the tank car occurred at a defective weld but it could not be determined whether a complete weld would have prevented the fracture.

Although steel plates of tank cars met DOT required specifications, these standards did not include any related to brittleness at cold temperatures.

Citizens of Crete used an emergency procedures plan to cope with the situation.

RECOMMENDATIONS:

NTSB made the following:

FRA should establish objective and enforceable standards for inspection and maintenance of track.

FRA should conduct a study to examine the inter-action between various components of a train while moving over track under a full range of operating conditions to serve as a basis for objective track standards.

FRA should conduct studies of steel used in tank specifications in order to define the brittleness resistance at various temperatures and revise future specifications for new tank car construction.

A study should be conducted by FRA to study methods of rapidly dispersing toxic vapors.

INCIDENT: GLENDORA, MS September 11, 1969

SOURCE: NTSB RAR 70-2

EVENTS:

Illinois Central Railroad train #2nd 76 consisting of four locomotive units and 149 cars was travelling at 45 m.p.h. on a single track through the town. At 2:30 p.m., the train engineer applied emergency brakes to avoid a pedestrian walking on the track. This resulted in the derailment of 15 cars. The number of tank cars and types of hazardous materials involved in the derailment were as follows: eight of Vinyl chloride, two of Fuel additive, and one of Petroleum. A series of fires and explosions resulted. The weather at the time of the accident was clear with a southwest wind of 3 m.p.h.

CAUSE OF ACCIDENT:

When the engineer applied the emergency brakes, the 108th car, an empty MILW 2010 boxcar, buckled. The buckling resulted from uneven braking of the train and caused 15 other cars to derail. One set of trucks each on the 106th and 120th cars left the track. The 107th to 119th cars, inclusive, derailed completely and stopped in various positions.

CAUSE OF HAZARDOUS MATERIAL RELEASE:

One tank car, SHPX 85212 of Vinyl chloride was punctured by the coupler of another car. Vapor escaped from this car but did not immediately ignite. A series of flashes and explosions occurred at sundown, injuring a power company employee. About 6:45 a.m. the following day, CATX 86069 of Vinyl chloride exploded, as a result of heat impingement from the burning SHPX 85212. Parts of this second car landed from 350 to 850 feet away. SHPH 85144, also of Vinyl chloride, was punctured as a result of the second car's explosion and burned for 12 days. A total of three cars of Vinyl chloride burned or exploded.

CASUALTIES:

NTSB stated that two injuries occurred. The pedestrian suffered severe injuries from the impact of the locomotive but recovered. The power company employee suffered burns from initial flashes from the tank car, but he also recovered.

DAMAGES:

Property damage included four houses and seven farm buildings. the plantation office was seriously damaged and eight automobiles were destroyed.

DAMAGES (con.):

Dollar estimates are:

NTSB

RR Equipment	$125,525
Lading	36,753
Total	$162,278

NOTIFICATION AND RESPONSE:

The engineer notified RR authorities and requested an ambulance. The conductor discovered the derailment of 15 cars and learned from the waybills in the caboose that vapor escaping from a punctured tank car was Vinyl chloride. The conductor, after consulting with RR dispatcher, warned townspeople to evacuate. At 3 p.m. a power company employee arrived on the scene to check a power line pulled taut by a tank car. At that time, no RR personnel were available on the scene. At 8 p.m., another power company employee arrived to check the wire and was burned by the initial series of flashes and fire.

The RR requested assistance from various local authorities for security.

University and military personnel advised the State's Governor that a danger existed from Phosgene gas, a product of Vinyl chloride combustion. The Governor ordered the evacuation of the area by the National Guard. Between 17,000-21,000 people were evacuated.

OBSERVATIONS:

NTSB noted the following:

After the derailment, the site was not adequately protected by the railroad to prevent injury to employees or bystanders.

Reported danger from Phosgene gas obscured the potential dangers of Hydrogen chloride gas.

The absence of shelf couplers allowed jacknifing of the cars and the resulting puncture of the tank car containing Vinyl chloride.

RECOMMENDATIONS:

NTSB recommended that FRA initiate research and development for prototype models of freight train braking systems.

IC Railroad should initiate a training program for employees to handle hazardous materials accidents.

NOTES